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# PUBLIC NOTICE
# Availability of Draft Environmental Impact Report

*Date:* March 13, 2013
*Case No.:* **2011.0123E**
*Project Title:* Peninsula Pipelines Seismic Upgrade Project
*Zoning:* Various
*Project Sponsor:* San Francisco Public Utilities Commission (SFPUC)
*Staff Contact:* YinLan Zhang – (415) 487-5201; yzhang@sfwater.org
*Lead Agency:* San Francisco Planning Department
*Staff Contact:* Steven Smith – (415) 558-6373; steve.smith@sfgov.org

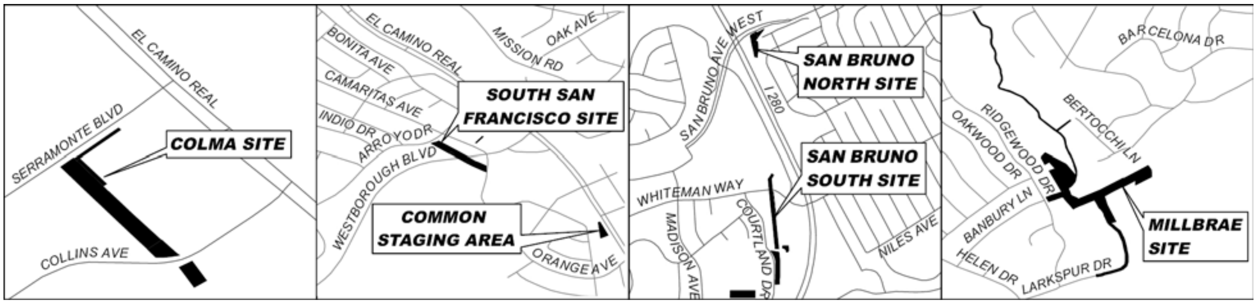
A draft environmental impact report (EIR) has been prepared by the San Francisco Planning Department in connection with this project. The report is available for public review and comment on the Planning Department's Negative Declarations and EIRs web page for SFPUC sponsored projects (http://tinyurl.com/puccases). CDs and paper copies are also available at the Planning Information Center (PIC) counter on the first floor of 1660 Mission Street, San Francisco. Referenced materials are available for review by appointment at the Planning Department's office on the fourth floor of 1650 Mission Street. (Call (415) 558-6378)

**Project Description:**
The proposed project would entail seismic upgrades to the SFPUC's potable water transmission pipelines that deliver water from the Harry Tracy Water Treatment Plant (HTWTP) to the SFPUC's regional water system, the San Andreas Pipeline No. 2 (SAPL2), San Andreas Pipeline No. 3 (SAPL3), and Sunset Supply Branch Pipeline (SSBPL). The proposed project would be located on the San Francisco Peninsula at five sites in San Mateo County, as described below. The goal of the proposed project is to improve the seismic reliability of transmission pipelines between HTWTP and the Capuchino, Baden, and San Pedro Valve Lots in the event of a major earthquake on the San Andreas Fault. The project proposes replacement and stabilization of segments of the existing pipelines, and would not increase the normal operating capacity of the regional water system.

The proposed project activities and locations are as follows:

- Colma Site – Replacement of an approximately 700-foot segment of SAPL2 located south of Serramonte Boulevard and north of Colma Avenue, east of El Camino Real;
- South San Francisco Site – Replacement of an approximately 720-foot segment of SAPL2 located south of Arroyo Drive and north of West Orange Avenue, extending under Westborough Boulevard (portion of the site is located in unincorporated San Mateo County);
- San Bruno North Site – Stabilization of SAPL2 where it extends through a tunnel located south of San Bruno Avenue West and north of the Interstate-280 off-ramp;
- San Bruno South Site – Replacement of an approximately 1,170-foot segment of SAPL2 and an approximately 1,050-foot segment of SAPL3 located between Shelter Creek Lane and Courtland Drive, extending under Whitman Way; and
- Millbrae Site – Replacement of an approximately 900-foot segment of SSBPL located east of Banbury Lane extending into the Green Hills Country Club.

A common staging area would be located at SFPUC's Baden Valve Lot in South San Francisco on El Camino Real.



Construction would primarily entail open trench construction methods although alternative construction methods including jack-and-bore construction would be also used. Open-trench construction for the pipe replacement would generally include: (1) removal of vegetation and grading; (2) trench excavation; (3) removal of existing pipe and installation of new pipe; (4) trench backfill and compacting; and (5) surface restoration.

The Draft EIR found that the project would lead to significant impacts related to land use, aesthetics, cultural resources, transportation, noise, air quality, recreation, utilities, biology, geology, hydrology and water quality, and hazards. These significant impacts would be reduced to less-than-significant levels with implementation of mitigation measures identified in the Draft EIR, except as follows. Implementation of the proposed project would lead to significant unavoidable impacts related to: daytime and nighttime construction noise associated with heavy equipment; generation of noise levels in excess of standards established in the local general plan or noise ordinance; and generation of excessive groundborne vibration from heavy equipment.

A **public hearing** on this draft EIR and other matters has been scheduled by the City Planning Commission for April 18, 2013, in Room 400, City Hall, 1 Dr. Carlton B. Goodlett Place, (Call (415) 558-6422 the week of the hearing for a recorded message giving a more specific time.) An additional public meeting will be held on April 16, 2013, at 6:30 PM (starting promptly) at the San Bruno Chinese Church, 250 Courtland Drive, San Bruno, CA 94066.

**Public comments** will be accepted from March 14, 2013 to 5:00 p.m. on April 29, 2013. Written comments should be addressed to Sarah Jones, Acting Environmental Review Officer, San Francisco Planning Department, 1650 Mission Street, Suite 400, San Francisco, CA 94103. Comments received at the public hearing and in writing will be responded to in a draft EIR comments and responses document.

If you have any questions about the **environmental review** of the proposed project, please call Steven Smith at (415) 558-6373.

## San Francisco Public Utilities Commission

# Peninsula Pipelines Seismic Upgrade Project

San Mateo County, California

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# Public Review Draft
# Environmental Impact Report

## Volume 1 of 2

March 2013

SEAL OF THE CITY AND COUNTY OF SAN FRANCISCO

*Prepared for:*

**San Francisco Planning Department, Environmental Planning Division**

**San Francisco Planning Department Case No. 2011.0123E**
**State Clearinghouse No. 2011112028**

DEIR Publication Date: March 13, 2013
DEIR Public Comment Period: March 14, 2013 to April 29, 2013
DEIR Public Hearing Dates: April 16, 2013, San Bruno, CA and
April 18, 2013, San Francisco, CA

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**DATE:** March 13, 2013

**TO:** Distribution List for the Peninsula Pipelines Seismic Upgrade Project Draft EIR

**FROM:** Sarah Jones, Acting Environmental Review Officer

**SUBJECT:** Request for the Final Environmental Impact Report for the Peninsula Pipelines Seismic Upgrade Project (Planning Department File No. 2011.0123E)

This is the Draft of the Environmental Impact Report (EIR) for the Peninsula Pipelines Seismic Upgrade Project. A public hearing will be held on the adequacy and accuracy of this document. After the public hearing, our office will prepare and publish a document titled "Responses to Comments," which will contain a summary of all relevant comments on this Draft EIR and our responses to those comments. It may also specify changes to this Draft EIR. Those who testify at the hearing on the Draft EIR will automatically receive a copy of the Responses to Comments document, along with notice of the date reserved for certification; others may receive a copy of the Responses to Comments and notice by request or by visiting our office. This Draft EIR together with the Responses to Comments document will be considered by the Planning Commission in an advertised public meeting and will be certified as a Final EIR if deemed adequate.

After certification, we will modify the Draft EIR as specified by the Responses to Comments document and print both documents in a single publication called the Final EIR. The Final EIR will add no new information to the combination of the two documents except to reproduce the certification resolution. It will simply provide the information in one document, rather than two. Therefore, if you receive a copy of the Responses to Comments document in addition to this copy of the Draft EIR, you will technically have a copy of the Final EIR.

We are aware that many people who receive the Draft EIR and Responses to Comments have no interest in receiving virtually the same information after the EIR has been certified. To avoid expending money and paper needlessly, we would like to send copies of the Final EIR in Adobe Acrobat format on a compact disk (CD) to private individuals only if they request them. Therefore, if you would like a copy of the Final EIR, please fill out and mail the postcard provided inside the back cover to the Environmental Planning division of the Planning Department within two weeks after certification of the EIR. Any private party not requesting a Final EIR by that time will not be mailed a copy. Public agencies on the distribution list will automatically receive a copy of the Final EIR.

Thank you for your interest in this project.

## San Francisco Public Utilities Commission

# Peninsula Pipelines Seismic Upgrade Project

San Mateo County, California

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# Public Review Draft Environmental Impact Report

## Volume 1 of 2

March 2013

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**San Francisco Planning Department, Environmental Planning Division**

**San Francisco Planning Department Case No. 2011.0123E**
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## APPENDICES

## ACRONYMS

| | |
|---|---|
| AASHTO | American Association of State Highway and Transportation Officials |
| AB | Assembly Bill |
| ABAG | Association of Bay Area Governments |
| ACM | asbestos-containing materials |
| AADT | annual average daily traffic |
| AEP | Archaeological Evaluation Plan |
| AEW | AEW Engineering, Inc. |
| AMP | Archaeological Monitoring Plan |
| *A.D.* | *Anno Domini* |
| ANSI | American National Standards Institute |
| APE | area of potential effect |
| ASP | Archaeological Survey Plan |
| AYSO | American Youth Soccer Organization |
| B.C. | Before Christ |
| B.P. | before present |
| BAAQMD | Bay Area Air Quality Management District |
| BART | Bay Area Rapid Transit |
| BAWSCA | Bay Area Water Supply and Conservation Agency |
| BCRLF | Brownfields Cleanup Revolving Loan Fund |
| bgs | below ground surface |
| BMPs | best management practices |
| BO | Biological Opinion |
| C/CAG | City and County Association of Governments of San Mateo County |
| CAL FIRE | California Department of Forestry and Fire Protection |
| Cal Water | California Water Service Company |
| Cal/OSHA | California Division of Occupational Safety and Health |
| Cal-EPA | California Environmental Protection Agency |
| Cal-IPC | California Invasive Plant Council |
| Calisphere | Calisphere: A World of Digital Resources |
| Caltrans | California Department of Transportation |
| C-APE | California Environmental Quality Act – Area of Potential Effects |
| CARB | California Air Resources Board |
| CBC | The 2008 California Building Code |
| CCR | California Code of Regulations |
| CCSF | City and County of San Francisco |
| CCTS | Central California Taxonomic System |
| CDC | California Department of Conservation |
| CDFG | California Department of Fish and Game (now CDFW) |
| CDFW | California Department of Fish and Wildlife |
| CEHTP | California Environmental Health Tracking Program |
| CEQA | California Environmental Quality Act |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |

| | |
|---|---|
| CERCLIS | Comprehensive Environmental Response, Compensation, and Liability Information System |
| CESA | California Endangered Species Act |
| CFC | California Fire Code |
| CFPD | Colma Fire Protection District |
| CFR | Code of Federal Regulations |
| CGS | California Geological Survey |
| CHMIRS | California Hazardous Material Incident Report System |
| CMP | Congestion Management Program |
| CNDDB | California Natural Diversity Database |
| CNEL | community noise equivalent level |
| CNPS | California Native Plant Society |
| CO | carbon monoxide |
| $CO_2$ | carbon dioxide |
| $CO_2e$ | carbon dioxide-equivalent |
| Corps | U.S. Army Corps of Engineers |
| CPUC | California Public Utilities Commission |
| CRA | Conestoga-Rovers & Associates |
| CRHR | California Register of Historical Resources |
| CSCSD | Crystal Springs County Sanitation District |
| CWA | Clean Water Act |
| CWHR | California Wildlife Habitat Relationships System |
| dBA | A-weighted decibel |
| DPM | diesel particulate matter |
| DPR | Department of Parks and Recreation |
| DTSC | Department of Toxic Substances Control |
| DWR | California Department of Water Resources |
| eb | eastbound |
| EDR | Environmental Data Resources, Inc. |
| EIR | Environmental Impact Report |
| Environmental Planning | San Francisco Planning Department's Environmental Planning Division |
| ERNS | Emergency Response Notification System |
| ERO | Environmental Review Officer |
| ESA | Environmental Site Assessment |
| °F | degree Fahrenheit |
| FAA | Federal Aviation Administration |
| FAR | Federal Aviation Regulations |
| FCC | Federal Communications Commission |
| Fed-OSHA | U.S. Occupational Safety and Health Administration |
| FEMA | Federal Emergency Management Agency |
| FESA | Federal Endangered Species Act |
| FHSZ | Fire Hazard Severity Zones |
| FIRM | Flood Insurance Rate Map |
| FRAP | Fire and Resource Assessment Program |
| FTA | Federal Transit Authority |
| FWLA | Fugro William Lettis & Associates, Inc. |

| | |
|---|---|
| GSR | Groundwater Storage and Recovery |
| GTC | Geotechnical Consultants, Inc. |
| HASP | Health and Safety Plan |
| HCASR | Historic Context and Archaeological Survey Report |
| HCP | Habitat Conservation Plan |
| HI | hazard index |
| HMBP | Hazardous Material Business Plan |
| HPC | The San Francisco Historic Preservation Commission |
| HPSR | Historic Properties Survey Report |
| HQ | hazard quotient |
| HTWTP | Harry Tracy Water Treatment Plant |
| I-280 | Interstate 280 |
| I-380 | Interstate 380 |
| IBC | International Building Code |
| ICF | ICF Jones & Stokes |
| in/sec | inches per second |
| ISCST3 | Industrial Source Complex Short Term Model 3 |
| ITP | Incidental Take Permit |
| JRP | JRP Historical Consulting, LLC |
| $L_{dn}$ | day-night average sound level |
| $L_{eq}$ | equivalent continuous noise level |
| $L_{max}$ | maximum A-weighted sound level |
| LOS | Level of Service |
| LUST | Leaking Underground Storage Tank Lists |
| MBTA | Migratory Bird Treaty Act |
| MEA | San Francisco Planning Department, Major Environmental Analysis Division (now Environmental Planning) |
| MEI | maximally exposed individual |
| MG | million gallons |
| mgd | million gallons per day |
| μg/L | micrograms per liter |
| $\mu g/m^3$ | micrograms per cubic meter |
| micro-Pa | microPascal |
| MLD | Most Likely Descendant |
| $MMTCO_2e$ | million metric tons of carbon dioxide-equivalent |
| MOA | memorandum of agreement |
| mph | miles per hour |
| MS4s | municipal separate storm sewer systems |
| msl | mean sea level |
| MRZ | Mineral Resource Zones |
| MT | metric tons |
| NAHC | Native American Heritage Commission |
| nb | northbound |
| NEPA | National Environmental Policy Act |
| NFIP | National Flood Insurance Program |
| NHPA | National Historic Preservation Act |
| NMFS | National Marine Fisheries Service |

| | |
|---|---|
| $NO_2$ | nitrogen dioxide |
| NOA | naturally occurring asbestos |
| NOI | Notice of Intent |
| NOP | Notice of Preparation |
| $NO_X$ | oxides of nitrogen |
| NPDES | National Pollutant Discharge Elimination System |
| NPL | National Priorities List |
| NRHP | National Register of Historic Places |
| NSR | New Source Review |
| NWIC | Northwest Information Center |
| OHP | Office of Historic Preservation |
| OPR | California Governor's Office of Planning and Research |
| PCB | polychlorinated biphenyls |
| PCCP | Prestressed Concrete Cylinder Pipe |
| PEIR | Program Environmental Impact Report |
| PG&E | Pacific Gas and Electric Company |
| Phase I ESA | Phase I Environmental Site Assessment |
| $PM_{10}$ | particulate matter less than or equal to 10 microns in diameter |
| $PM_{2.5}$ | particulate matter less than or equal to 2.5 microns in diameter |
| ppb | parts per billion |
| ppm | parts per million |
| PPSU | Peninsula Pipelines Seismic Upgrade |
| PPV | peak particle velocity |
| PRC | California Public Resources Code |
| PRDs | Permit Registration Documents |
| RCRA | Resource Conservation Recovery Act |
| REL | reference exposure level |
| RGSR | Regional Groundwater Storage and Recovery |
| ROG | reactive organic gas |
| ROW | right-of-way |
| RWQCB | Regional Water Quality Control Board |
| s/n | serial number |
| SamTrans | San Mateo Country Transit |
| SAPL | San Andreas Pipeline |
| SAPL2 | San Andreas Pipeline No. 2 |
| SAPL3 | San Andreas Pipeline No. 3 |
| SARA | Superfund Amendment Reauthorization Act |
| SB | Senate Bill |
| sb | southbound |
| SFBAAB | San Francisco Bay Area Air Basin |
| SFDPH | San Francisco Department of Public Health |
| SFO | San Francisco International Airport |
| SF Planning | City and County of San Francisco, San Francisco Planning Department |
| SFPUC | San Francisco Public Utilities Commission |
| SFWD | San Francisco Water Department |
| SIL | Significant Impact Level |

| | |
|---|---|
| SIP | State Implementation Plan |
| SLIC | Spills, Leaks, Investigations, and Cleanup |
| SMARA | Surface Mining and Reclamation Act of 1975 |
| SMCEH | San Mateo County Environmental Health |
| SMCWPPP | San Mateo Countywide Water Pollution Prevention Program |
| $SO_2$ | sulfur dioxide |
| SR | State Route |
| SSBPL | Sunset Supply Branch Pipeline |
| SVP | Society of Vertebrate Paleontology |
| SVWC | Spring Valley Water Company |
| SWRCB | State Water Resources Control Board |
| TAC | toxic air contaminant |
| TBA | Targeted Brownfields Assessment |
| TMDL | Total Maximum Daily Load |
| TOG | total organic gas |
| TPH-diesel | total petroleum hydrocarbons as diesel |
| TPH-gas | total petroleum hydrocarbons as gasoline |
| TSCA | Toxic Substances Control Act |
| U.S. 101 | U.S. Highway 101 |
| U.S. EPA | United States Environmental Protection Agency |
| URS | URS Corporation |
| USFWS | U. S Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| UTM | Universal Transverse Mercator Zone |
| VegCAMP | Vegetation Classification and Mapping Program |
| VHFHSZ | Very High Fire Severity Zones |
| WMUDS/SWAT | Waste Management Unit Database System |
| WSIP | Water System Improvement Program |

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# CHAPTER 1

# Executive Summary

## 1.1 Introduction and Purpose of Project

The San Francisco Public Utilities Commission (SFPUC) is proposing the Peninsula Pipelines Seismic Upgrade (PPSU) project (or proposed project). The proposed project involves seismic upgrades to SFPUC regional water facilities on the San Francisco Peninsula at five sites in the Town of Colma and the cities of South San Francisco, San Bruno, Millbrae, and in unincorporated San Mateo County. The SFPUC is proposing the PPSU project to improve the seismic reliability of transmission pipelines between the Harry Tracy Water Treatment Plant (HTWTP) and the Capuchino, Baden, and San Pedro Valve Lots, in the event of a major earthquake on the San Andreas Fault.

Under the San Francisco Administrative Code, Chapter 31, the San Francisco Planning Department's Environmental Planning Division (Environmental Planning) (formerly the Major Environmental Analysis Division) is responsible for conducting the environmental review of all City and County of San Francisco (CCSF) projects pursuant to the requirements of the California Environmental Quality Act (CEQA). Thus, Environmental Planning is the lead agency responsible for preparing this Environmental Impact Report (EIR) in compliance with CEQA, and the SFPUC is the project sponsor proposing to implement the PPSU project. This EIR is being prepared to disclose to the public and decision-makers the potential physical impacts of the PPSU project, so that an informed judgment can be made about the project's environmental consequences.

## 1.2 Overview of SFPUC Regional Water System

The CCSF, through the SFPUC, owns and operates a regional water system that extends from the Sierra Nevada to San Francisco, and serves retail and wholesale customers in San Francisco, San Mateo, Santa Clara, Alameda, and Tuolumne counties. The regional water system consists of water conveyance, treatment, and distribution facilities, and delivers water to retail and wholesale customers. The regional system includes more than 280 miles of pipelines, more than 60 miles of tunnels, 11 reservoirs, five pump stations, and two water treatment plants. The SFPUC currently delivers an annual average of about 265 million gallons per day of water to its customers. The water comes from a combination of local supplies from streamflow and runoff in the Alameda Creek watershed and the San Mateo Creek and Pilarcitos Creek watersheds (referred to together as the Peninsula watersheds), augmented with imported supplies from the Tuolumne River watershed. Local watersheds provide about 15 percent of total supplies, and the Tuolumne River provides the remaining 85 percent.

The SFPUC serves about one-third of its water supplies directly to retail customers, primarily in San Francisco, and about two-thirds of its water supplies to wholesale customers by contractual agreement. The wholesale customers are largely represented by the Bay Area Water Supply and Conservation Agency, which consists of 26 member agencies in Alameda, San Mateo, and Santa Clara counties. Some of these wholesale customers have other sources of water in addition to the SFPUC, while others rely completely on the SFPUC for supply.

In October 2008, the SFPUC adopted a systemwide program, the Water System Improvement Program (WSIP) (also known as the "Phased WSIP Variant") (SFPUC Resolution 08-200 [SFPUC, 2008]). The WSIP is a comprehensive program designed to improve the regional system with respect to water quality, seismic response, and water delivery, based on a planning horizon through the year 2030; and to improve the regional system with respect to water supply to meet water delivery needs in the SFPUC service area through the year 2018. The WSIP consists of a water supply strategy and modifications to system operations, as well as construction of a series of facility improvement projects in seven counties—Tuolumne, Stanislaus, San Joaquin, Alameda, Santa Clara, San Mateo, and San Francisco. The PPSU project was not initially identified as a WSIP facility improvement project, but is now proposed under the WSIP. The PPSU project was determined to have independent utility, as further described in Chapter 2, Introduction and Background.

# 1.3 Project Background and Objectives

## 1.3.1 Project Background

The PPSU project was not included in the WSIP Program EIR (PEIR) as a facility improvement project because the need for the project was not identified when the WSIP was originally conceived. The SFPUC identified the need for the project after certification of the WSIP PEIR, as a result of geotechnical investigations in connection with the HTWTP Long-Term Improvements Project, which is a WSIP facility improvement project that was approved and adopted by the SFPUC in 2010.

During these investigations, the SFPUC determined that fault strands within the plant's site could cause significant failure in existing facilities in the event of a major San Andreas earthquake (G&E/GTC Joint Venture, 2011). The fault strands were determined to be part of the Serra Fault system, a secondary fault located along the peninsula in San Mateo County. During additional investigations of the Serra Fault system, the SFPUC identified areas along the San Andreas Pipeline No. 2 (SAPL2), San Andreas Pipeline No. 3 (SAPL3), and Sunset Supply Branch Pipeline (SSBPL) that are susceptible to liquefaction, ground shaking, and landslides (G&E/GTC Joint Venture, 2011). As a result of these studies, the SFPUC identified six pipeline segments in need of seismic improvements at five locations, which are included in the proposed project and are the subject of this EIR.

### 1.3.2 Project Objectives

The goal of the proposed project is to improve the seismic reliability of transmission pipelines between HTWTP and the Capuchino, Baden, and San Pedro Valve Lots in the event of a major earthquake on the San Andreas Fault. Objectives would be achieved by completing proposed improvements designed to prevent the failure of SAPL2, SAPL3, and SSBPL, to maintain reliability during a major seismic event.

The objectives of the proposed project are as follows:

- Upgrade segments of the SAPL2, SAPL3, and SSBPL to meet current seismic standards in locations where they cross the Serra Fault, so that they can withstand the ground displacements potentially caused by a fault offset. This is intended to preserve water flow from the HTWTP to downstream facilities after a major San Andreas earthquake, and to achieve WSIP seismic reliability Level of Service goals.

- Minimize interruptions of water delivery during and following a seismic event by minimizing seismic vulnerabilities at the Serra Fault crossing locations, and by minimizing vulnerabilities at the liquefaction-susceptible zones.

- Reduce the physical, social, and economic impacts associated with the potential rupture of the existing SAPL2, SAPL3, and SSBPL during a major earthquake.

## 1.4 Project Description

### 1.4.1 Project Location and Components

The proposed project consists of seismic upgrades to three SFPUC water transmission pipelines—SAPL2, SAPL3, and SSBPL—at five locations on the San Francisco Peninsula. The upgrades would improve segments of pipelines to increase reliability during potential seismic events. The proposed project activities are listed below:

- Colma Site – Replacement of an approximately 700-foot segment of SAPL2;
- South San Francisco Site – Replacement of an approximately 720-foot segment of SAPL2;[1]
- San Bruno North Site – Stabilization of SAPL2 where it extends through a tunnel;
- San Bruno South Site – Replacement of an approximately 1,170-foot segment of SAPL2 and an approximately 1,050-foot segment of SAPL3; and
- Millbrae Site – Replacement of an approximately 900-foot segment of SSBPL.

A common staging area would be located at SFPUC's Baden Valve Lot in South San Francisco on El Camino Real.

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[1] A portion of the project site is also located in unincorporated San Mateo County.

## 1.4.2 Project Construction

Construction is estimated to begin in 2014 and end in 2015, with a total duration of approximately 12 months. The duration of construction activities at each site would range from 1 month to 9 months. Construction activities would occur concurrently at multiple sites, and primarily during weekdays, from 7 a.m. to 5 p.m. Weekend work may be required on a limited basis, although the nature of such work is not currently known. Weekend construction hours would be the same as those described for weekdays. Nighttime construction may be required at the San Bruno North site. Nighttime activities would also include limited 24-hour pumping for dewatering of the pipelines at a few locations, as described in Chapter 3, Project Description.

There would be three phases of construction activities. Initially, tree removal would be completed at the South San Francisco and Millbrae sites, where dense groves of trees are present in the SFPUC right-of-way. The first construction phase would entail shutdown and dewatering of the pipeline, and mobilization activities such as installation of fencing, grubbing, and preparation of laydown areas. The second phase would include excavation; pipeline removal and installation; hydrostatic testing; and backfill, landscaping, and site restoration. The third phase would include disinfection of the pipelines.

Primary access to the sites that comprise the project and the common staging area would be from Interstate 280; localized access would vary by site. Construction access routes would include both public roadways and unpaved routes. New and existing unpaved routes through public and private lands would be required for the Millbrae site.

On-haul of construction materials, including shoring materials, new pipes, and trench backfill materials; and off-haul of construction debris, including old pipe, shoring, tree debris and vegetation, and excavated spoils, would require a total of approximately 7,060 truck trips. The estimated average trips per day would range from approximately two trips at the San Bruno North site to approximately 21 truck trips at the San Bruno South site; the estimated maximum trips would range from approximately eight trips per day at the San Bruno North site to approximately 118 trips at the San Bruno South site.

## 1.4.3 Project Operations

Future operations and maintenance would be the same as existing operations and maintenance activities, and would continue to entail yearly visual inspections. Approximately every 10 to 15 years, inspections would entail physically entering the manholes for visual inspections inside the pipelines. On an annual basis, water may be discharged from the manholes, as required by other SFPUC projects or inspections.

## 1.5 Summary of Project Impacts and Mitigation Measures

Table 1-1 summarizes the potential environmental impacts for each site, by resource area, and identifies the mitigation measures that would reduce potentially significant impacts to a less-than-significant level, where feasible. The significance criteria used for each environmental topic/ resource area are presented in each section of Chapter 5, following the environmental setting and before the discussion of impacts. For the impact analyses, the following categories are used to determine impact significance:

- **No Impact (NI).** An impact is considered not applicable (no impact) if there is no potential for impacts, or the environmental resource does not occur within the project area or the area of potential effect. For example, there would be no impacts related to tree removal if there is no tree removal proposed at a project site.

- **Less-than-Significant impact, no mitigation required (LS).** This determination applies if there is a potential for a limited impact that would not qualify as a significant impact under the significance criteria.

- **Less-than-Significant impact with Mitigation (LSM).** This determination applies if the project would result in an adverse effect that meets the significance criteria, but feasible mitigation is available that would reduce the impact to a less-than-significant level.

- **Significant impact (S).** This determination applies if the project would result in a substantial, or potentially substantial, adverse change that meets the significance criteria before mitigation.

- **Significant and Unavoidable impact for which feasible mitigation is not available (SU).** This determination applies if the project would result in an adverse effect that meets the significance criteria, but for which there appears to be no feasible mitigation available to reduce the impact to a less-than-significant level. Therefore, the impact would be significant and unavoidable.

- **Significant and Unavoidable impact with implementation of feasible Mitigation (SUM).** This determination applies if it is certain that the project would result in an adverse effect that meets the significance criteria and mitigation is available to lessen the impact, but the residual effect after implementation of the measure would remain significant. Therefore, the impact is significant and unavoidable with mitigation.

## Table 1-1
## Summary of Impacts and Mitigation Measures

| Impact Summary | Impact Significance Without Mitigation Measure | | | | | | Mitigation Measures | Impact Significance With Mitigation Measure | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
| **Section 5.2: Land Use and Land Use Planning** | | | | | | | | | | | | | |
| **Impact LU-1:** Project construction could have a substantial temporary direct or indirect impact on the existing character of the vicinity, or could substantially impact or disrupt existing land uses or land use activities. | S | S | S | S | S | NI | **Mitigation Measure M-LU-1a: Notice of Construction Activities**<br>This mitigation measure applies to all the project sites. The following notification procedures shall be implemented prior to construction:<br>1. The SFPUC shall provide advance notification to businesses, property owners, facility managers, and residents of adjacent areas potentially affected by the PPSU project about the nature, extent, and duration of construction activities, at least 1 week prior to construction. The SFPUC shall also provide interim updates to these parties during periods of active construction to inform them of the status of the construction activities and schedule. Notices shall be sent to sensitive receptors and affected adjacent properties identified below:<br>• **Colma Site** – Kohl's Department Store; Home Sweet Home Assisted Living Facility; and Cypress Lawn Memorial Cemetery;<br>• **South San Francisco Site** –Residences adjacent to the construction zone along Arroyo Drive; Clubview Apartments; and California Golf Club of San Francisco; | LSM | LSM | LSM | LSM | LSM | NI |
| | | | | | | | | Overall Project Impact: LSM | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure | | | | | | Mitigation Measures | Impact Significance With Mitigation Measure | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
| | | | | | | | • **San Bruno North Site** – Residences adjacent to the construction zone along Cedarwood Court and Pepper Drive;<br>• **San Bruno South Site** – Park Plaza Apartments and Shelter Creek Condominiums; Residences adjacent to the construction zone along Courtland Drive; Peninsula High School and other uses at the former Crestmoor High School campus; Peninsula High School Athletic Fields; and San Bruno Chinese Church; and<br>• **Millbrae Site** – Green Hills Country Club; Meadows Elementary School; Residences along Ridgewood Drive; Residences adjacent to the construction zone along Ridgewood Drive, Hacienda Way, Helen Drive, Banbury Lane; Millwood Drive and Barcelona Drive; and Glen Oaks and Millbrae Montessori Schools;<br>2. The SFPUC shall coordinate with managers of facilities including, but not limited to, Kohl's Department Store, San Bruno Chinese Church, Peninsula High School, and the Green Hills Country Club to minimize disruptions to facility operations and activities, to the extent feasible.<br>3. Should weekend work be necessary, the SFPUC shall notify adjacent properties, including reasonable advance notification to the businesses, owners, and residents of adjacent areas potentially affected by the proposed project, and interim updates shall be provided. | | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure | | | | | | Mitigation Measures | Impact Significance With Mitigation Measure | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
| | | | | | | | **M-LU-1b: Minimum 2-Week Notice of Construction Activities to Homes with Significant Unavoidable Noise Impacts**<br>This mitigation measure applies to South San Francisco, San Bruno North, San Bruno South, and Millbrae sites only. The SFPUC or its contractor shall provide 14-day advance notice by mail or hand delivery to all residents, tenants, and/or property owners in those homes listed below as being potentially subject to significant and unavoidable noise impacts, even after administrative and source controls are implemented.<br>• **South San Francisco Site –** Arroyo Drive (address numbers 105, 107 and 108);<br>• **San Bruno North Site –** Cedarwood Court (address numbers 1790, 1791, 1800, 1801, 1820, 1821, 1840, and 1841); and Pepper Drive (address numbers 763, 769, 773, 779, 783, 789, 793, and 795);<br>• **San Bruno South Site –** Courtland Drive (address numbers 300, 306, 310, 316, 320, 326, 330, 336, 340, 350, 360, and 370); Shelter Creek Condominiums Buildings 4A, 4B, and 4D; and Park Plaza Apartments; and | | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure | | | | | | Mitigation Measures | Impact Significance With Mitigation Measure | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
| | | | | | | | • **Millbrae Site –** Hacienda Way (address numbers 859, 869, 873, 877, 881, 885, 889, 913, and 917); Ridgewood Drive (address numbers 1078, 1086, 1094, 1100, 1101, 1106, 1110, 1116, 1120, 1126, and 1130); and Banbury Lane (address number 971).<br>The notice will state the construction location, anticipated activities, and schedule, including whether nighttime construction is proposed. The notice will provide information about anticipated construction-related noise impacts and provide suggestions for avoiding or reducing exposure to such impacts (e.g., planning alternative schedules, closing windows facing the planned construction sites).<br>The SFPUC shall identify and provide a public liaison person before and during construction to respond to the concerns of neighboring property owners. Procedures for contacting the public liaison officer via a toll-free telephone number, email, or in person will be included in the notices. Prior to construction, the SFPUC communications manager, resident engineer, and construction manager shall develop and review procedures for receiving and responding to questions and complaints. | | | | | | |
| | | | | | | | **M-RE-1: Coordination with Green Hills Country Club Facility** (see Impact RE-1 in Section 5.11, Recreation, for description) | | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure | | | | | | Mitigation Measures | Impact Significance With Mitigation Measure | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
| **Impact LU-2:** Project operations would not result in substantial long-term or permanent impacts on the existing character of the vicinity or could substantially impact or disrupt existing land uses or land use activities. | NI | LS | NI | NI | LS | NI | None required. | NI | LS | NI | NI | LS | NI |
| | | | | | | | | Overall Project Impact: LS | | | | | |
| **Impact C-LU:** Project construction could result in a cumulatively considerable contribution to cumulative impacts on existing land uses. | S | S | S | S | S | S | **Mitigation Measure M-LU-1a: Notice of Construction Activities** (see above) | LSM | LSM | LSM | LSM | LSM | LSM |
| | | | | | | | **M-LU-1b: Minimum 2-Week Notice of Construction Activities to Homes with Significant Unavoidable Noise Impacts (**see above) | Overall Project Impact: LSM | | | | | |
| **Section 5.3: Aesthetics** | | | | | | | | | | | | | |
| **Impact AE-1:** Project construction would not result in substantial adverse effects on scenic vistas or temporarily degrade the visual character of the site and its surroundings | LS | LS | LS | LS | LS | LS | None required. | LS | LS | LS | LS | LS | LS |
| | | | | | | | | Overall Project Impact: LS | | | | | |
| **Impact AE-2:** Project construction could result in significant impacts related to a new source of substantial light or glare. | LS | LS | S | LS | LS | LS | **M-AE-2: Site-Specific Construction Lighting Plan**<br>This mitigation measure applies to the San Bruno North site only. | LS | LS | LSM | LS | LS | LS |
| | | | | | | | | Overall Project Impact: LSM | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure | | | | | | Mitigation Measures | Impact Significance With Mitigation Measure | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
| | | | | | | | The SFPUC shall require the contractor to develop and implement a site-specific nighttime lighting plan. A qualified lighting professional shall prepare the plan, which shall specify lighting sources for nighttime operations, and require that lighting be shielded and directed specifically onto work areas to minimize light spillover. The plan shall also provide for light source monitoring to ensure that feasible adjustments are made as necessary to provide maximum shielding during all phases of construction. The contractor shall submit the plan to the SFPUC for review and approval prior to commencing nighttime construction operations, at which time the plan shall be implemented continuously until the end of nighttime construction. | | | | | | |
| | | | | | | | **M-LU-1b: Minimum 2-Week Notice of Construction Activities to Homes with Significant Unavoidable Noise Impacts** (see Impact LU-1 in Section 5.2, Land Use and Land Use Planning, for description) | | | | | | |
| **Impact AE-3:** Project operations would not result in long-term adverse effects on scenic vistas or scenic resources, or degradation of the visual character of the site and its surroundings. | LS | LS | LS | LS | LS | LS | None required. | LS | LS | LS | LS | LS | LS |
| | | | | | | | | Overall Project Impact: LS | | | | | |
| **Impact C-AE:** Implementation of the proposed project would not result in a cumulatively considerable contribution to cumulative impacts on scenic vistas, scenic resources, visual character, or light and glare. | LS | LS | LS | LS | LS | LS | None required. | LS | LS | LS | LS | LS | LS |
| | | | | | | | | Overall Project Impact: LS | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| | Impact Significance Without Mitigation Measure | | | | | | | Impact Significance With Mitigation Measure | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Impact Summary** | **Colma Site** | **South San Francisco Site** | **San Bruno North Site** | **San Bruno South Site** | **Millbrae Site** | **Common Staging Area** | **Mitigation Measures** | **Colma Site** | **South San Francisco Site** | **San Bruno North Site** | **San Bruno South Site** | **Millbrae Site** | **Common Staging Area** |
| **Section 5.4: Population and Housing** | | | | | | | | | | | | | |
| No impacts related to Population and Housing. | NI | NI | NI | NI | NI | NI | None required. | NI | NI | NI | NI | NI | NI |
| | | | | | | | | Overall Project Impact: NI | | | | | |
| **Section 5.5: Cultural and Paleontological Resources** | | | | | | | | | | | | | |
| **Impact CP-1:** Project construction would not cause a substantial adverse change in the significance of a historical resource. | NI | NI | NI | NI | LS | NA | None required. | NI | NI | NI | NI | LS | NA |
| | | | | | | | | Overall Project Impact: LS | | | | | |
| **Impact CP-2:** Project construction could cause a substantial adverse change in the significance of a historical or unique archaeological resource. | S | S | NI | S | S | NA | **M-CP-2a: Distribute "ALERT" Sheet**<br>This mitigation measure applies to the Colma, South San Francisco, San Bruno South, and Millbrae sites only.<br>At these sites, there is a potential for the inadvertent discovery of archaeological resources because all require excavation into previously undisturbed soils. | LSM | LSM | NI | LSM | LSM | NA |
| | | | | | | | | Overall Project Impact: LSM | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure: Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | Mitigation Measures | Impact Significance With Mitigation Measure: Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | To avoid any potential adverse effects on accidentally discovered buried cultural resources, as defined in CEQA Guidelines Section 15064.5(a)(c), the SFPUC shall distribute the San Francisco Planning Department's archaeological resource "ALERT" sheet to the project prime contractor; to any subcontractors (including firms subcontracted to perform demolition, excavation, grading, foundation, and pile driving); and/or to any utilities firms involved in any and all soil-disturbing activities within the PPSU C-APE.<br>Prior to any soil-disturbing activities, each contractor shall be responsible for ensuring that the ALERT sheet is circulated to all field personnel, including machine operators, field crew, pile drivers, and supervisory personnel. The SFPUC shall provide the Environmental Review Officer (ERO) with the sign-in sheet from the responsible parties (i.e., prime contractor, subcontractor[s], and utilities firm) confirming that all field personnel have received copies of the ALERT sheet.<br>Should any indication of an archeological resource be encountered during any soil-disturbing activity, SFPUC and/or the contractor shall immediately suspend the soil-disturbing activities within 50 feet of the discovery, and shall notify the ERO immediately. | | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure | | | | | | Mitigation Measures | Impact Significance With Mitigation Measure | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
| | | | | | | | The SFPUC will retain a qualified archaeologist meeting the Secretary of the Interior's professional standards for archaeology and, as necessary, a Native American monitor to be present during specific ground disturbing activities at specific locations within the Colma, South San Francisco, and San Bruno South sites as stipulated within the Archaeological Monitoring Plan (AMP) to be prepared for the project (URS, 2012a). The monitoring shall be conducted in accordance with the approved AMP. Archaeological monitoring is not required at the Millbrae site, given the low archaeological sensitivity of the soils occurring within that portion of the C-APE. | | | | | | |
| | | | | | | | **M-CP-2c: Prepare and Comply with an Archaeological Evaluation Plan and Evaluation Report**<br>This mitigation measure applies to the Colma, South San Francisco, San Bruno South, and Millbrae sites only. In the event archaeological resources are inadvertently exposed during any project-related construction, all ground-disturbing work within 50 feet of the discovery shall immediately cease, and the SFPUC Project Manager and the ERO shall be notified immediately. | | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure |  |  |  |  |  | Mitigation Measures | Impact Significance With Mitigation Measure |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |  | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
|  |  |  |  |  |  |  | In consultation with the SFPUC, the ERO, and the San Francisco Planning Department's Environmental Planning Division archaeologist or Designee, the monitoring archaeologist shall prepare an Archaeological Evaluation Plan (AEP) consistent with the requirements of the San Francisco Planning Department, Environmental Planning Division (EP) WSIP Archaeological Guidance No. 5.<br>The AEP shall create a program to determine the potential of the expected resource to meet the California Register criteria—particularly Criterion 4, the resource's potential to address important research questions identified in the AEP—and the archaeologist shall submit this plan to the ERO for approval. The archaeologist shall then conduct an evaluation consistent with the ERO-approved AEP. The methods and findings of the evaluation shall be presented in an Archaeological Evaluation and Effects Report consistent with EP WSIP Archaeological Guidance No. 6, which shall be submitted to the ERO upon completion.<br>Based on the conclusions of the Archaeological Evaluation and Effects Report, the Environmental Planning Division Archeologist or Designee shall determine if the project will adversely affect a CEQA-significant archaeological resource. If the project will have an adverse effect on such a resource, an Archaeological Research Design and Treatment Plan shall |  |  |  |  |  |  |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure | | | | | | Mitigation Measures | Impact Significance With Mitigation Measure | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
| | | | | | | | be prepared by the archaeologist and submitted to the ERO. The Archaeological Research Design and Treatment Plan shall be prepared consistent with the EP (formerly MEA) WSIP Archaeological Guidance No. 7. Once approved by the ERO, a data-recovery investigation and/or other treatment shall be conducted by the archaeologist. | | | | | | |
| **Impact CP-3:** Project construction could result in a substantial adverse effect by directly or indirectly destroying a unique paleontological resource or site. | S | S | NI | S | S | NA | **M-CP-3: Prepare and Implement a Paleontological Resources Monitoring Program**<br>This mitigation measure applies to the Colma, South San Francisco, San Bruno South, and Millbrae sites only.<br>Prior to the initiation of any site preparation or start of construction, SFPUC shall retain a qualified professional paleontologist or a California Professional Geologist with appropriate paleontological expertise, as defined by the Society of Vertebrate Paleontology's Conformable Impact Mitigation Guidelines Committee (SVP, 1995), to carry out a paleontological resources training program for construction workers and to develop a paleontological monitoring program, except at the San Bruno North site. The SFPUC shall require the paleontologist to be on call throughout the duration of ground-disturbing activities. At a minimum, the monitoring program shall include: | LSM | LSM | NI | LSM | LSM | NA |
| | | | | | | | | Overall Project Impact: LSM | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure | | | | | | Mitigation Measures | Impact Significance With Mitigation Measure | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
| | | | | | | | **Preparation of a Paleontological Monitoring Plan.** Based on the results of the paleontological investigation completed for the PPSU project (URS, 2012b), the volume and depth of proposed soil excavations, and professional judgment, the paleontologist shall identify the specific locales and depths within the project components where geologic units of high paleontological sensitivity occur, and to determine the frequency in which monitoring will be undertaken to ensure the proper management of paleontological resources. The SFPUC shall review and approve the plan in consultation with the ERO.<br>**Paleontological Resources Training.** All construction forepersons and field supervisors shall be trained in the recognition of potential fossil materials prior to the initiation of any site preparation or start of construction. Training on paleontological resources shall also be provided to all other construction workers, but may include videotape of the initial training and/or the use of written materials rather than in-person training by the qualified paleontologist. In addition to fossil recognition, the training shall convey procedures to follow if construction crews encounter potential fossil materials in the course of earthwork, excavation, or grading, as described below. | | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure: Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | Mitigation Measures | Impact Significance With Mitigation Measure: Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | **Active Monitoring of Construction Sites for Paleontological Resources, if Recommended in the Paleontological Monitoring Plan.** Paleontological monitoring shall consist of inspecting disturbed, graded, and excavated surfaces, as well as soil stockpiles and disposal sites in accordance with the schedule and methods outlined in the Paleontological Monitoring Plan. The monitor (i.e., the professional paleontologist or a designee of the paleontologist) shall have authority to divert grading or excavation away from exposed surfaces temporarily in order to examine disturbed areas more closely and/or recover fossils. The monitor shall coordinate with the construction manager to ensure that monitoring is thorough but does not result in unnecessary delays. If the monitor encounters a paleontological resource, he or she shall assess the fossil, and record or salvage it, as described above.<br>**Assessment and Salvage of Potential Fossil Finds.** If the paleontological monitor or construction crews discover potential fossils, all earthwork or other types of ground disturbance within 50 feet of the find shall stop immediately until the qualified professional paleontologist can assess the nature and importance of the find. | | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure | | | | | | Mitigation Measures | Impact Significance With Mitigation Measure | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
| | | | | | | | Based on the scientific value or uniqueness of the find, the monitor may record the find and allow work to continue, or recommend salvage and recovery of the fossil. The monitor may also propose modifications to the stop-work radius based on the nature of the find, site geology, and the activities occurring on the site. Recommendations for any necessary treatment shall be consistent with the SVP 1995 and 1996 guidelines and currently accepted scientific practices.<br>If required, treatment for fossil remains may include preparation and recovery of fossil materials so that they can be housed in an appropriate museum or university collection, and may also include preparation and publication of a report describing the finds. The monitor's recommendations shall be subject to review and approval by the ERO or designee. The SFPUC shall be responsible for ensuring that treatment is implemented and reported to the San Francisco Planning Department. If no report is required, the SFPUC shall nonetheless ensure that information on the nature, location, and depth of all finds is readily available to the scientific community through university curation or other appropriate means. | | | | | | |
| **Impact CP-4:** Project construction could result in a substantial adverse effect related to the disturbance of human remains. | S | S | NI | S | S | NA | **M-CP-4: Treatment of Inadvertently Discovered Human Remains** | LSM | LSM | NI | LSM | LSM | NA |
| | | | | | | | | Overall Project Impact: LSM | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure | | | | | | Mitigation Measures | Impact Significance With Mitigation Measure | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
| | | | | | | | This mitigation measure applies to the Colma, South San Francisco, San Bruno South, and Millbrae sites only. The treatment of any human remains and associated funerary objects discovered during soil-disturbing activities shall comply with applicable state laws. Such treatment would include immediate notification of the San Mateo County coroner and, in the event of the coroner's determination that the human remains are Native American, notification of the NAHC, which would appoint a Most Likely Descendant (MLD) (PRC Section 5097.98).<br>The archaeological consultant, SFPUC, and MLD shall make all reasonable efforts to develop an agreement for the treatment, with appropriate dignity, of any human remains and associated objects (CEQA Guidelines Section 15064.5[d]). The agreement would take into consideration the appropriate excavation, removal, recordation, analysis, custodianship, curation, and final disposition of the human remains and associated or unassociated funerary objects.<br>The PRC allows 48 hours to reach agreement on these matters. | | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure | | | | | | Mitigation Measures | Impact Significance With Mitigation Measure | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
| | | | | | | | If the MLD and the other parties could not agree on the reburial method, the SFPUC shall follow Section 5097.98(b) of the PRC, which states that "the landowner or his or her authorized representative shall reinter the human remains and items associated with Native American burials with appropriate dignity on the property in a location not subject to further subsurface disturbance."<br>All archaeological work performed under this mitigation measure shall be subject to review by the ERO or designee. | | | | | | |
| **Impact C-CP:** Project construction could result in a cumulatively considerable contribution to cumulative impacts on cultural resources such as archaeological sites (historical and/or unique) including those with human remains, historic architectural, or paleontological resources. | S | S | NI | S | S | NA | **M-CP-2a: Distribute "ALERT" Sheet** (see above)<br>**M-CP-2b: Conduct Archaeological Monitoring in Accordance with Approved Archaeological Monitoring Plan** (see above)<br>**M-CP-2c: Prepare and Comply with an Archaeological Evaluation Plan and Evaluation Report** (see above)<br>**M-CP-3: Prepare and Implement a Paleontological Resources Monitoring Program** (see above)<br>**M-CP-4: Treatment of Inadvertently Discovered Human Remains** (see above) | LSM | LSM | NI | LSM | LSM | NA |
| | | | | | | | | Overall Project Impact: LSM | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure | | | | | | Mitigation Measures | Impact Significance With Mitigation Measure | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
| **Section 5.6: Transportation and Circulation** | | | | | | | | | | | | | |
| **Impact TR-1:** Project construction could substantially conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of travel. | LS | LS | S | LS | LS | LS | **M-TR-1: Maintain Traffic Flow on San Bruno Avenue West During the A.M. Peak Hour**<br>The SFPUC or its contractor(s) shall maintain eastbound traffic flow on San Bruno Avenue West during the a.m. peak period (generally, between 7 and 9 a.m.) if the temporary closure of the right-turn lane of the I-280 off-ramp and the eastbound San Bruno Avenue West lane adjacent to the project site occur simultaneously. Eastbound traffic flow would be maintained on San Bruno Avenue West during the 2-week period when a portion of the right-hand eastbound lane of San Bruno Avenue would be required for construction activities by plating over the access pit. The SFPUC or its contractor(s) shall coordinate with the City of San Bruno and Caltrans, and the plan for maintaining access shall conform to the State's Manual of Traffic Controls for Construction and Maintenance Work Areas (Caltrans, 2006). | LS | LS | LSM | LS | LS | LS |
| | | | | | | | | Overall Project Impact: LSM | | | | | |
| **Impact TR-2:** Project construction would not result in inadequate emergency access. | LS | LS | LS | LS | LS | LS | None required. | LS | LS | LS | LS | LS | LS |
| | | | | | | | | Overall Project Impact: LS | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure | | | | | | Mitigation Measures | Impact Significance With Mitigation Measure | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Colma Site** | **South San Francisco Site** | **San Bruno North Site** | **San Bruno South Site** | **Millbrae Site** | **Common Staging Area** | | **Colma Site** | **South San Francisco Site** | **San Bruno North Site** | **San Bruno South Site** | **Millbrae Site** | **Common Staging Area** |
| **Impact TR-3:** Project construction activities could decrease the safety of public roadways for vehicles, bicyclists, and pedestrians. | S | S | S | S | S | S | **M-TR-3: Traffic Control Plan**<br>This mitigation measure applies to all project sites, as well as the common staging area. The SFPUC or its contractor(s) shall prepare and implement a traffic control plan.<br>The plan shall conform to the State's Manual of Traffic Controls for Construction and Maintenance Work Areas (Caltrans, 2006), where applicable. Elements of the traffic control plan shall include, but not be limited to, the following:<br>***General Measures for All Project Sites***<br>• Advance warning signs shall be placed upstream of work areas advising motorists, bicyclists, and pedestrians of the construction zone ahead in order to minimize hazards associated with construction activities, including the vehicular entry and egress of project-related construction activities.<br>• A public information system shall be developed and implemented to advise motorists, bicyclists, and nearby property owners of the impending construction activities (e.g., direct distribution of flyers to affected properties, email notices, portable message signs, and informational signs). | LSM | LSM | LSM | LSM | LSM | LSM |
| | | | | | | | | Overall Project Impact: LSM | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure | | | | | | Mitigation Measures | Impact Significance With Mitigation Measure | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
| | | | | | | | • All equipment and materials shall be stored within the designated work areas so as to avoid obstructing traffic.<br>• At all project sites, roadside safety protocols shall be implemented such as advance "Road Work Ahead," "One Lane Road Ahead," "Flagger Ahead," "Prepare to Stop," and "Trucks Entering Road" signs. Warning signs and speed control shall be provided to achieve speed reductions for safe traffic flow through the work zone.<br>• At all sites, pedestrian and bicycle access and circulation shall be maintained during project construction where it is safe to do so. Where appropriate, detours shall be included for bicycles and pedestrians in areas affected by project construction.<br>• To the maximum extent feasible, truck trips (i.e., haul trucks and heavy construction equipment) shall be scheduled outside of the a.m. (7 to 9 a.m.) and p.m. (4 to 6 p.m.) peak commute periods. | | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure |  |  |  |  |  | Mitigation Measures | Impact Significance With Mitigation Measure |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |  | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
|  |  |  |  |  |  |  | • At all project sites, construction shall be coordinated with facility owners or administrators of sensitive land uses such as schools, police and fire stations, churches, hospitals, and residences. Facility owners or operators shall be notified in advance by the SFPUC regarding the timing, location, and duration of construction activities, and the locations of detours and lane closures.<br>• Roadway rights-of-ways shall be repaired or restored to their original conditions or better upon completion of construction.<br>*Specific Measures for Project Sites*<br>• At the **Colma** site, construction worker parking shall be accommodated within the project area boundary.<br>• At the **South San Francisco** site, flaggers shall be provided at new project driveway on West Orange Avenue to facilitate pedestrian travel adjacent to the project site. Construction worker parking shall be accommodated within the project staging area, or within the common staging area; carpooling between the South San Francisco site and the common staging area shall be established. |  |  |  |  |  |  |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure | | | | | | Mitigation Measures | Impact Significance With Mitigation Measure | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
| | | | | | | | • At the **San Bruno North** site, the construction contractor shall obtain an encroachment permit from Caltrans, and comply with Caltrans requirements for traffic control activities within the State right-of-way, as described in Section 3.10, Required Permits. Construction worker parking on local residential streets shall be limited to 10 vehicles. The remaining workers shall park at the common staging area, and carpooling between the San Bruno North site and the common staging area shall be established.<br>• At the **San Bruno South** site, travel lane closures on Whitman Way shall be limited during the a.m. (7 to 9 a.m.) and p.m. (4 to 6 p.m.) peak periods to the maximum extent feasible.<br>Outside of allowed working hours or when work is not in progress, Whitman Way shall be restored to normal operations by covering all trenches with steel plates. When sidewalk closures are required on Whitman Way, pedestrian detour routes shall be maintained. | | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure |  |  |  |  |  | Mitigation Measures | Impact Significance With Mitigation Measure |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |  | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
|  |  |  |  |  |  |  | At the intersection of Shelter Creek Lane and the driveway to the Shelter Creek Condominiums (Intersection #5), the construction contractor shall provide flaggers to facilitate truck access into and out of the project work area at the Shelter Creek Condominiums. Access to lower Garage 4, Lot B, and Lot C shall be maintained to the maximum extent feasible, and alternative fire access to building #3B shall be maintained.<br>The construction contractor shall be required to have ready at all times the means necessary to accommodate emergency vehicles, such as plating over excavations through the use of steel place to provide for a fire lane with a minimum width of 12 feet. The traffic control plan shall include flaggers with radio communication to allow ingress/egress to the parking areas. |  |  |  |  |  |  |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure |  |  |  |  |  | Mitigation Measures | Impact Significance With Mitigation Measure |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |  | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
|  |  |  |  |  |  |  | Flaggers shall be provided on Courtland Drive at the construction vehicle access to the staging area within the Peninsula High School site, to reduce the potential for conflicts between construction vehicles and vehicles destined to other parking or passenger loading/ unloading areas within the site. If construction activities occur on weekends, flaggers shall be provided.<br>Plans and Specifications at 65 percent design completion, along with the traffic control plan, shall be submitted to the San Bruno Fire Marshal when available for review and comment.<br>Construction worker parking shall be accommodated within the project area boundary.<br>• At the **Millbrae** site, the SFPUC or the construction contractor shall coordinate with the schedule of schools to minimize impacts on school operations to the maximum extent feasible. At the Millbrae site, to the maximum extent feasible, construction haul trips shall not be conducted prior to 9 a.m. or after 3 p.m. when |  |  |  |  |  |  |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure: Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | Mitigation Measures | Impact Significance With Mitigation Measure: Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | children are traveling to and from the Meadows Elementary School and the Glen Oaks/Millbrae Montessori School. Similarly, if determined appropriate by the school administrators, the SFPUC or the construction contractor shall provide traffic control officers at the intersections of Helen Drive/Larkspur Drive (Intersection #9) near the Meadows Elementary School, and Santa Margarita Avenue/Capuchino Drive (Intersection #11) near the Glen Oaks/Millbrae Montessori School.<br>If sidewalk closures are required on Ridgewood Drive, pedestrian detour routes shall be provided. Construction worker parking shall be accommodated on-street.<br>• At the **Common Staging Area**, construction worker parking for the PPSU project shall be accommodated within the site, as feasible. | | | | | | |
| **Impact TR-4:** Vehicle trips generated during project operation and maintenance activities would not substantially conflict with an applicable congestion management program. | LS | LS | LS | LS | LS | LS | None required. | LS | LS | LS | LS | LS | LS |
| | | | | | | | | Overall Project Impact: LS | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure: Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | Mitigation Measures | Impact Significance With Mitigation Measure: Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Impact C-TR:** Project construction could result in a cumulatively considerable contribution to cumulative traffic increases and safety hazards on local and regional roads. | S | S | S | S | S | S | **M-TR-1: Maintain Traffic Flow on San Bruno Avenue West During the A.M. Peak Hour,** (see above)<br>**M-TR-3: Traffic Control Plan** (see above) | LSM | LSM | LSM | LSM | LSM | LSM |
| | | | | | | | **M-C-TR: Assign a SFPUC Water System Improvement Program Projects Construction Coordinator**<br>This mitigation measure applies to all project sites, as well as the common staging area. Due to the potential for overlapping project activities and the operation of construction vehicles to affect travel along local roadways, the SFPUC shall assign a qualified construction coordinator responsible for coordinating the project-specific traffic control plan developed as part of **Mitigation Measure TR-3: Traffic Control Plan** with other SFPUC projects, including, but not limited to the Regional GSR project and the HTWTP Long-Term Improvements project.<br>Throughout the construction schedule for the SFPUC projects in the Water System Improvement Program Peninsula Region, the SFPUC construction coordinator shall work with local and regional agencies to minimize local and regional traffic impacts, and shall incorporate these measures into the SFPUC's project-specific traffic control plans.<br>Such measures could include, but would not be limited to, monitoring during construction to identify intersections or areas of problematic cumulative congestion or hazard; and re-routing or coordinating the timing of vehicular or truck trips to avoid or minimize such congestion or hazard. | Overall Project Impact: LSM | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure | | | | | | Mitigation Measures | Impact Significance With Mitigation Measure | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
| **Section 5.7: Noise** | | | | | | | | | | | | | |
| **Impact NO-1:** Daytime construction activities could result in substantial temporary increases in ambient daytime noise levels that could interfere with nearby land uses. | S | S | S | S | S | LS | **M-NO-1: Prepare and Implement Administrative and Source Controls**<br>This mitigation measure applies to all project sites, but does not apply to the common staging area.<br>The SFPUC shall include in construction contract specifications the requirement to prepare a noise control plan. The contractor shall submit a noise control plan, prepared by a qualified noise consultant, to the SFPUC for review and approval at least 21 days before the start of mobilization/ construction. The SFPUC shall require the noise consultant to be a board-certified Institute of Noise Control Engineering member or other qualified consultant or engineer, to be approved by the SFPUC project construction manager. The noise control plan shall contain performance standards based on the more-restrictive of the 70 dBA Leq speech interference threshold and the limits established in noise ordinances of San Mateo County, the Town of Colma, and the cities of San Bruno and Millbrae. The noise control plan shall identify the applicable threshold for each project site. The noise control plan shall, at a minimum, contain the following elements: | LSM | SUM | SUM | SUM | SUM | LS |
| | | | | | | | | Overall Project Impact: SUM | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure |  |  |  |  |  | Mitigation Measures | Impact Significance With Mitigation Measure |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |  | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
|  |  |  |  |  |  |  | • Location of equipment, parking, and other noise generating sources.<br>• Detailed list of potential noise control methods to meet the performance standards. Locations where it is not feasible to meet the performance standards shall be identified<br>• Proposed staging and schedule of noise control measures.<br>• Anticipated performance of noise control measures.<br>• Number and location of monitoring locations and relation to stationary noise controls and sensitive receptors.<br>• Schedule for ongoing monitoring and reporting of construction noise levels to meet performance standards. Monitoring shall occur at least weekly, or more often if needed, in response to complaints.<br>Specific noise control measures that shall be contained in the plan may include, but are not limited to, the following:<br>a) Best available noise control techniques (including mufflers, intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds) will be used for all equipment and trucks in order to minimize construction noise impacts. |  |  |  |  |  |  |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure | | | | | | Mitigation Measures | Impact Significance With Mitigation Measure | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
| | | | | | | | b) If impact equipment (e.g., concrete/rock breaker, rock drill) is used during project construction, hydraulically or electric-powered equipment will be used to avoid the noise associated with compressed-air exhaust from pneumatically powered tools. However, where use of pneumatically powered tools is unavoidable, an exhaust muffler on the compressed-air exhaust will be used (a muffler can lower noise levels from the exhaust by up to 10 dBA). External jackets on the tools themselves will be used, which could achieve a reduction of 5 dBA. Quieter procedures, such as drilling or vibratory methods rather than impact equipment, will be used.<br>c) Alternative shoring installation techniques, such as beam-and-plate or drilled soldier piles, shall be employed to meet noise thresholds.<br>d) The use of vibratory rollers and pile drivers shall be limited to the hours between 7 a.m. to 5 p.m.<br>e) Locate stationary noise sources away from sensitive receptors. If the sources must be located near receptors, adequate muffling (with enclosures where appropriate) will be used to ensure performance standards are met. Enclosure openings or vents will face away from sensitive receptors. If any stationary equipment (pumps, ventilation fans, generators) is operated beyond the ordinance time limits, this equipment will conform to the affected jurisdiction’s noise limits. | | | | | | |

## Table 1-1
## Summary of Impacts and Mitigation Measures (Continued)

| Impact Summary | Impact Significance Without Mitigation Measure | | | | | | Mitigation Measures | Impact Significance With Mitigation Measure | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area | | Colma Site | South San Francisco Site | San Bruno North Site | San Bruno South Site | Millbrae Site | Common Staging Area |
| | | | | | | | f) Erect temporary noise barriers to maintain construction noise levels at or below the performance standards. Barriers shall be constructed with a solid material with a density of at least 2 pounds per square foot with no gaps. The location and specification of the barriers shall be determined by the approved noise consultant as part of the noise control plan.<br>g) Designate a project liaison to be responsible for responding to noise complaints during construction. The name and phone number of the liaison will be conspicuously posted at construction areas and on all advanced notifications. The liaison will take steps to resolve complaints, including the arrangement of periodic noise monitoring, if necessary. Results of noise monitoring will be presented at regular project meetings with the project contractor, and the liaison will coordinate with the contractor to modify any construction activities that generated excessive noise levels. | | | | | | |

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# 3.0 SCOPING PROCESS FOR THE PPSU PROJECT

CEQA guidelines encourage the lead agency to identify an appropriate area of project effect, prepare and distribute a NOP to potentially interested parties, provide notice of a scoping meeting if one is to be held, and to consider any oral or written comments received during the comment period pertaining to the scope of the environmental analysis. Environmental Planning conducted public scoping for the PPSU project from November 9, 2011, through December 9, 2011. A public scoping meeting was held during this period on November 30, 2011 at the San Bruno Chinese Church located within the project vicinity. The sections below document the actions that were taken to meet CEQA requirements and engage the community in the scoping process for the PPSU project.

## 3.1 NOTICE OF PREPARATION

Environmental Planning submitted an NOP to the State Clearinghouse on November 8, 2011. The NOP report and notice of the scoping meeting also was mailed to all parties on the project mailing list (described in the next section). The NOP is required as part of the CEQA process, to notify potentially interested parties about the project and pending environmental analysis. The NOP provides a brief description of the proposed project, identifies some of the environmental issues to be analyzed in the review process, announces dates for the public comment period and scoping meetings, and identifies project contacts for additional information.

The complete text of the NOP is contained in Appendix A, including the cover letter, NOP form, detailed NOP report, and the State Clearinghouse distribution notice.

## 3.2 NOP MAILING LIST

A project-specific NOP mailing list was developed for the PPSU project from multiple sources. The San Francisco Planning Department maintains a list of agencies, organizations and individuals who have requested to receive notices of all projects that will be reviewed by the Planning Department. In addition, the SFPUC maintains a list of agencies and individuals who have expressed interest in receiving notifications with regard to the WSIP program activities. These lists were used as a basis for identifying interested parties for the PPSU project, including SFPUC wholesale customers and local elected officials, in addition to all property owners and residents in the project vicinity (i.e., within 300 feet of any of the project components).

The NOP and scoping meeting notice were mailed to a list of 3,682 parties. This included 3,519 owners and occupants, 49 wholesale water customers, 28 local agencies and bordering jurisdictions, 17 media and library representatives, and 69 other interested parties. A copy of the NOP mailing list is available for public review at the San Francisco Planning Department, 1650 Mission Street, Suite 400, San Francisco, California, 94103 by appointment (refer to Case No. 2011.0123E).

## 3.3 ADDITIONAL NOTIFICATION

In addition to mailing the NOP report to the project mailing list, advertisements were placed in the San Mateo Times and in the San Francisco Examiner on November 9, 2011. Copies of these notices are included in Appendix B.

NOP information was also posted on the San Francisco Planning Department website at http://www.sf-planning.org/ and on the SFPUC website at http://www.sfwater.org/. Copies of the NOP were available for review at the San Francisco Planning Department and local public libraries.

On November 9, 2011, representatives from the SFPUC met with two owners of houses on Ridgewood Drive and the general manager of Shelter Creek Condominiums to discuss the proposed project.

## 3.4 PUBLIC SCOPING MEETING

A public scoping meeting was held at 6:30 p.m. on November 30, 2011, at the San Bruno Chinese Church, 250 Courtland Avenue, San Bruno, California. Members of the public were encouraged to sign in, and a variety of printed materials were made available to them, including copies of the NOP report (Appendix A), as well as copies of the meeting Agenda, Speaker Cards, Comment Cards, and the Power Point presentation (included in Appendix C). The formal meeting was concluded at 7:20 p.m., although members of the public remained after that time, looking at display boards and speaking with agency representatives and consultants.

Presentations were made by Timothy Johnston, the San Francisco Planning Department's Environmental Coordinator, and by Alison Kastama and Susan Hou on behalf of the SFPUC. Information presented included introductions, an explanation of the environmental review process, the proposed environmental review schedule, and a description of the six project components at five different site locations in the Town of Colma and the cities of South San Francisco, San Bruno, and Millbrae.

Approximately a dozen members of the public attended the scoping meeting, in addition to two other SFPUC staff representatives and four non-agency project environmental consultants. Four members of the public spoke and made oral comments for the record. The sign-in sheets from the public scoping meeting are included in Appendix C, and a full transcript of the scoping meeting is included in Appendix D. Comments made by members of the public at the scoping meeting are included in the summary of scoping comments presented in Section 3.6, below.

## 3.5 COMMENTS RECEIVED

As noted above, four members of the public made oral comments during the scoping meeting. These comments are documented in the formal meeting transcript included in Appendix D. In addition, Environmental Planning received a total of five written communications during the scoping period, by mail, fax, and/or e-mail, included in Appendix E. Three of these were from persons representing local or regional agencies, and two were from homeowners living in the immediate project vicinity. The commenters were as follows:

### Local Jurisdictions

- Aaron Aknin, AICP, Community Development Director, Community Development Department, City of San Bruno (written comments dated December 9, 2011)
- Michael P. Laughlin, AICP, Acting City Planner, Town of Colma Planning Department (written comments dated December 9, 2011)

### Regional Agency

- Nicole M. Sandkulla, P.E., Water Resources Planning Manager, Bay Area Water Supply & Conservation Agency (written comments dated December 8, 2011)

### Homeowners/Residents/Individuals

- Henry L. Cash and Lais Henderson-Cash (December 5, 2011)
- Eva Tong (written comments dated December 8, 2011)
- Steve Balchior (oral comments November 30, 2011)
- Eva Tong (oral comments November 30, 2011)
- Silvia Pratt (oral comments November 30, 2011)
- Alan Wong (oral comments November 30, 2011)

The oral and written comments submitted are summarized in Section 3.6, below.

## 3.6 SUMMARY OF SCOPING COMMENTS

Oral and written comments received during the scoping period are summarized by topic area below, to facilitate review by specialists preparing the Draft EIR. Oral comments can be reviewed in the transcript included in Appendix D, and written comments can be seen in the correspondence included in Appendix E.

### General

- The EIR should describe the history of right-of-way and easement boundaries and ownership issues, especially in the area of the Fifth Avenue right-of-way in Colma (Laughlin)
- Provide a detailed site plan showing planned improvements in the vicinity of the Fifth Avenue right-of-way (Laughlin)

### Communications

- Describe neighborhood outreach plans that will be implemented during project construction (Aknin)
- Specify a contact person whom neighbors can call should concerns arise (Aknin, Cash, Tong)
- Keep affected neighbors informed of exact construction start and end dates (Cash)
- Notify neighbors in advance of any scheduled utility interruptions, or if any evening or weekend work is planned (Cash)

### Safety and Security

- Address the potential for project activities to disrupt gas pipelines in the neighborhoods and result in explosions (Tong)
- Identify site security measures to be taken in and near construction areas, including fencing and signage (Cash, Tong)

### Aesthetics

- Consider the location of staging areas and spoils storage areas to minimize the visual impacts to the Serramonte Boulevard commercial uses in Colma (Laughlin)
- Consider locating staging and material/equipment storage areas to minimize the visual impacts on adjacent residential areas (Cash)
- Describe post-construction landscaping and grounds maintenance plans; consider improving on existing conditions in Colma commercial corridor (Laughlin)
- Describe post-construction vegetation management plans in the Spur Area (Cash)
- Identify plans to restore directly affected residential parcels after project completion to be visually compatible with the surrounding neighborhood (Cash)
- Keep portable restrooms within the staging areas (Cash, Tong)
- Remove construction debris from work areas regularly (Cash, Tong)

### Noise and Vibration

- Identify noise impacts on adjacent neighboring uses (Aknin)
- Identify construction equipment noise and vibration impacts on nearby homes (Cash)
- Address project vibration impacts on nearby home foundations (Cash)

### Land Use Conflicts

- Address project construction interference with activities at the San Bruno Chinese Church (Wong)
- Address construction impacts on residents of Shelter Creek Condominiums (Pratt)
- Consider privacy concerns of residents in immediate project vicinity (Tong)
- Consider quality-of-life impacts on adjacent residents (Cash)

### Transportation, Traffic, and Parking

- Describe impacts of construction on local roads (Balchior)

- Consider project traffic impacts on sidewalks, curbs, and roads that homeowners are responsible for maintaining (Tong)
- Consider project impacts on local parking and traffic (Aknin)
- Describe project disruption to ingress/egress from Shelter Creek Condominiums and parking structure (Pratt)
- Consider impacts to home access and street parking in residential areas (Cash)
- Consider the traffic impacts of construction access routes, as well as routes for ongoing cleaning, maintenance, and repair activities (Laughlin)
- Consider the need for additional traffic mitigation measures to reduce conflicts during the busy holiday shopping period in the adjacent Colma commercial uses (Laughlin)
- Identify how project construction may interfere with Meadows Elementary School traffic—especially parents dropping off or picking up kids (Cash)

### Biological Resources

- Provide a detailed description of tree removal plans and post-construction vegetation management (Cash)
- Address pest control issues associated with vegetation removal and excavation, and identify an environmentally sensitive pest control program (Cash)
- Discuss the need to handle noxious weeds and poison oak carefully on the Spur property (Cash)
- Identify encroachment impacts on local wildlife habitat and suggest mitigation measures to minimize such impacts (Cash)
- Implement an active neighborhood pest control program after vegetation removal and ground disturbance (Cash, Tong)

### Hydrology and Water Quality

- Identify stormwater impacts associated with project construction (Aknin)

### Air Quality

- Identify dust impacts and proposed control measures related to the project (Aknin, Tong, Cash)

### Erosion Control

- Address the potential for removal of vegetation and grading/trenching activities to exacerbate landslide risks in hilly areas (Cash, Tong)
- Consider the need for additional erosion control measures during winter construction periods (Laughlin)
- Identify post-construction compacting and drainage plans for sloped areas (Cash)

### Utilities and Services

- Consider project impacts on other utilities that may be located in the vicinity of the right-of-way (Aknin)
- Describe construction impacts on all wholesale customer turnouts (Sandkulla)
- Identify any other utility repair or replacement work in the vicinity to be done concurrently with the PPSU work (Cash)

### Other

- Address project description discrepancies between the NOP, the PPSU Final Alternatives Analysis Report, and the Conceptual Engineering Report (Sandkulla)

- The Alternatives Analysis should quantify the degree to which seismic reliability goals can be met, as well as any potential changes in operating performance (Sandkulla)
- Consider compensation and/or relocation for homeowners whose daily lives will be disrupted by the project (Cash)
- Identify property value impacts associated with construction (Cash, Tong)
- Indemnify property owners for actions related to the project (Cash)

# APPENDIX A

# NOTICE OF PREPARATION DOCUMENTS

SAN FRANCISCO
**PLANNING DEPARTMENT**

1650 Mission St.
Suite 400
San Francisco,
CA 94103-2479

Reception:
**415.558.6378**

Fax:
**415.558.6409**

Planning
Information:
**415.558.6377**

November 9, 2011

**TO:** Responsible Agencies, Trustee Agencies, and Interested Parties

**RE:** **CASE NO. 2011.0123E – PENINSULA PIPELINES SEISMIC UPGRADE PROJECT**

**NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT AND NOTICE OF PUBLIC SCOPING MEETING**

A Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the above-referenced project, described below, has been issued by the Planning Department. The NOP and Notice of Public Scoping Meeting are either attached or are available upon request from Timothy Johnston, who may be reached at (415) 575-9035 or timothy.johnston@sfgov.org, or by mail at the above address. It is also available online at http://www.sf-planning.org/index.aspx?page=1829. This notice is being sent to you because you have been identified as potentially having an interest in the project or the project area.

## PROJECT DESCRIPTION:

The San Francisco Public Utilities Commission (SFPUC), operator of the Hetch Hetchy Regional Water System, is proposing the Peninsula Pipelines Seismic Upgrade (PPSU) project (project or proposed project), which includes six project components at five different locations on the San Francisco Peninsula in San Mateo County, in the cities of Colma, South San Francisco, San Bruno, and Millbrae. The proposed project consists of upgrades to three Regional Water System water transmission pipelines — San Andreas Pipeline No. 2 (SAPL2), San Andreas Pipeline No. 3 (SAPL3), and Sunset Supply Branch Pipeline (SSBPL) — to increase pipeline reliability during potential seismic events. The proposed project is one of several pipeline and facility improvement projects that the SFPUC proposes to implement under the SFPUC's Water System Improvement Program (WSIP) to meet Regional Water System objectives and service goals.

The proposed project upgrades would improve segments of pipelines to increase reliability during potential seismic events. The proposed activities at each project site include the following:

- Colma Site – Replacement of an approximately 700-foot segment of SAPL2;
- South San Francisco Site – Replacement of an approximately 650-foot segment of SAPL2;
- San Bruno North Site – Structural support of SAPL2 within an existing tunnel;
- San Bruno South Site – Replacement of an approximately 1,170-foot segment of SAPL2 and an approximately 1,050-foot segment of SAPL3; and
- Millbrae Site – Replacement of an approximately 890-foot segment of SSBPL.

Construction would primarily entail open trench construction methods although alternative construction methods are also under consideration. The pipe replacement would generally include the following activities: (1) mobilization of the site, including removal of vegetation and grading; (2) trench excavation and shoring, as necessary; (3) removal of existing pipe and installation of new pipe; (4) trench backfill and compacting; and (5) surface restoration.

Pursuant to the NOP, the San Francisco Planning Department has determined that an EIR must be prepared for the project prior to any final decision by the SFPUC regarding whether to approve and implement the project. The purpose of the EIR is to provide information about potentially significant adverse environmental effects of the project, to identify possible ways to minimize any potentially significant adverse effects, and to describe and analyze feasible alternatives to the project. Preparation of a NOP or EIR does not indicate a decision by the City of San Francisco to approve or to disapprove the project, and prior to making any such decision, the SFPUC must review and consider the information contained in the EIR.

The San Francisco Planning Department will hold a **PUBLIC SCOPING MEETING** at the location, date, and time listed below. The purpose of this meeting is to receive oral comments to assist the Planning Department in its review of the proposed scope and content of the EIR as summarized in this NOP. The public will be given the opportunity to provide comment for consideration. The Planning Department also will accept written comments at the meeting or by mail, email, or fax until the close of business (5:00 p.m.) on December 9, 2011. Written comments should be sent by mail to San Francisco Planning Department, Attn: Bill Wycko, Environmental Review Officer, PPSU EIR Scoping Comments, 1650 Mission Street, Suite 400, San Francisco, CA 94103-2479; by fax to (415) 558-6409; or by e-mail to timothy.johnston@sfgov.org.

## PUBLIC SCOPING MEETING LOCATION, DATE, AND TIME:

| San Bruno Chinese Church |
|---|
| Wednesday, November 30, 2011 |
| 6:30 PM (starting promptly) |
| 250 Courtland Drive<br>San Bruno, CA 94066 |

If you work for an agency that is a Responsible or a Trustee Agency, we need to know the views of your agency as to the scope and content of the environmental information that is relevant to your agency's statutory responsibilities in connection with the proposed project. Your agency may need to use the EIR when considering a permit or other approval for this proposed project. We will also need the name of the contact person for your agency. If you have questions concerning environmental review of the proposed project under CEQA, please contact Timothy Johnston at (415) 575-9035 or timothy.johnston@sfgov.org.

SAN FRANCISCO
**PLANNING DEPARTMENT**

1650 Mission St.
Suite 400
San Francisco,
CA 94103-2479

Reception:
**415.558.6378**

Fax:
**415.558.6409**

Planning
Information:
**415.558.6377**

# Notice of Preparation of an Environmental Impact Report

| | |
|---|---|
| *Date:* | November 9, 2011 |
| *Case No.:* | **2011.0123E** |
| *Project Title:* | **Peninsula Pipelines Seismic Upgrade Project** |
| *Locations:* | Within SFPUC right-of-way in the cities of Colma, South San Francisco, San Bruno, and Millbrae |
| *BPA Nos.:* | N/A |
| *Zoning:* | Various |
| *Block/Lot:* | N/A |
| *Lot Size:* | Various |
| *Project Sponsor* | San Francisco Public Utilities Commission (SFPUC) |
| *Staff Contact:* | Anna M. Roche – (415) 551-4560<br>aroche@sfwater.org |
| *Lead Agency:* | San Francisco Planning Department |
| *Staff Contact:* | Timothy Johnston – (415) 575-9035<br>timothy.johnston@sfgov.org |

## PROJECT DESCRIPTION

The San Francisco Public Utilities Commission (SFPUC), operator of the Hetch Hetchy Regional Water System, is proposing the Peninsula Pipelines Seismic Upgrade (PPSU) project, which would include six project components at five different locations on the San Francisco Peninsula in San Mateo County, in the cities of Colma, South San Francisco, San Bruno, and Millbrae. The proposed project consists of upgrades to three Regional Water System water transmission pipelines — San Andreas Pipeline No. 2 (SAPL2), San Andreas Pipeline No. 3 (SAPL3), and Sunset Supply Branch Pipeline (SSBPL) — to increase pipeline reliability during potential seismic events. The proposed PPSU project (project or proposed project) is one of several pipeline and facility improvement projects that the SFPUC proposes to implement under the SFPUC's Water System Improvement Program (WSIP) to meet system objectives and service goals.

The proposed project upgrades would improve segments of pipelines to increase reliability during potential seismic events. The proposed activities at each project site include the following:

- Colma Site – Replacement of an approximately 700-foot segment of SAPL2;
- South San Francisco Site – Replacement of an approximately 650-foot segment of SAPL2;
- San Bruno North Site – Structural support of SAPL2 within an existing tunnel;
- San Bruno South Site – Replacement of an approximately 1,170-foot segment of SAPL2 and an approximately 1,050-foot segment of SAPL3; and
- Millbrae Site – Replacement of an approximately 890-foot segment of SSBPL.

Construction would primarily entail open trench construction methods although alternative construction methods are also under consideration. The pipe replacement would generally include the following activities: (1) mobilization of the site, including removal of vegetation and grading; (2) trench excavation and shoring, as necessary; (3) removal of existing pipe and installation of new pipe; (4) trench backfill and compacting; and (5) surface restoration.

Please see the attached for more information about the proposed project, the potential scope of the EIR, and the expected environmental issues.

## FINDING

**This project may have a significant effect on the environment and an Environmental Impact Report is required.** This determination is based upon the criteria of the State CEQA Guidelines, Sections 15063 (Initial Study), 15064 (Determining Significant Effect), and 15065 (Mandatory Findings of Significance), and for the reasons documented in the Project Description, which is attached.

## PUBLIC SCOPING PROCESS

Pursuant to the State of California Public Resources Code Section 21083.9 and California Environmental Quality Act Guidelines Section 15206, a public scoping meeting will be held to receive oral comments concerning the scope of the EIR. The meeting will be held on **November 30, 2011, at 6:30 PM** (starting promptly) at the **San Bruno Chinese Church, 250 Courtland Drive, San Bruno, CA 94066**. Written comments will also be accepted at this meeting and until the close of business on December 9, 2011. Written comments should be sent to Bill Wycko, Environmental Review Officer, PPSU EIR Scoping Comments, San Francisco Planning Department, 1650 Mission Street, Suite 400, San Francisco, CA 94103, or by fax to 415-558-6409 (Attn: Timothy Johnston), or by e-mail to timothy.johnston@sfgov.org.

If you work for a Responsible or Trustee agency, we need to know the views of your agency regarding the scope and content of the environmental information that is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency may need to use the EIR when considering a permit or other approval for this project. Please include the name of a contact person in your agency.

November 3, 2011
Date

Bill Wycko
Environmental Review Officer

# Peninsula Pipelines Seismic Upgrade Project

CASE NO. 2011.0123E

## 1.0 OVERVIEW AND BACKGROUND

The San Francisco Public Utilities Commission (SFPUC), operator of the Hetch Hetchy Regional Water System, is proposing the Peninsula Pipelines Seismic Upgrade (PPSU) project (project or proposed project), which includes six project components at five different locations on the San Francisco Peninsula in San Mateo County, in the cities of Colma, South San Francisco, San Bruno, and Millbrae, and consists of upgrades to three Regional Water System transmission pipelines — San Andreas Pipeline No. 2 (SAPL2), San Andreas Pipeline No. 3 (SAPL3), and Sunset Supply Branch Pipeline (SSBPL) — to increase pipeline reliability during potential seismic events. To meet California Environmental Quality Act (CEQA) requirements, the San Francisco Planning Department's Environmental Planning Division (EP) will prepare and distribute an Environmental Impact Report (EIR) describing and analyzing the environmental effects of the proposed project. This Notice of Preparation (NOP) provides a description of the project background and existing facilities, a brief description of the proposed project elements, and the potential environmental effects that could result from implementation of the proposed project.

### 1.1 San Francisco Regional Water System and the PPSU Project

The City and County of San Francisco, through the SFPUC, owns and operates a water conveyance, treatment, and distribution system that extends from the Sierra Nevada mountain range to the San Francisco Bay Area, as shown on Figure 1. The Regional Water System serves 2.4 million people in San Francisco, San Mateo, Santa Clara, Alameda, and Tuolumne counties. The basic network of major facilities in the Regional Water System was built from the late 1880s through the 1930s. Expansion and improvements of the major facilities continued through the 1970s. The SFPUC has identified aging facilities within the system that are in need of major repair, rehabilitation, upgrade, and/or replacement.

In October, 2008, the SFPUC adopted a systemwide program, the Water System Improvement Program (WSIP) (see http://sfwater.org/index.aspx?page=114). The WSIP is a comprehensive program designed to improve the Regional Water System with respect to water quality, seismic response, and water delivery, based on a planning horizon through the year 2030; and to improve the water system with respect to water supply to meet water delivery needs in the SFPUC service area through the year 2018. To address the potential environmental impacts of the WSIP, the San Francisco Planning Department prepared a program EIR (PEIR), which was certified by the San Francisco Planning Commission in 2008 (PEIR State Clearinghouse No. 2005092026). The WSIP PEIR evaluated the environmental impacts of the water supply strategy and system operations at a project level of detail, and evaluated the environmental impacts of certain WSIP facility improvement projects at a program level of detail.

The PPSU project was not included in the WSIP PEIR as a facility improvement project because the need for the project was not identified when the WSIP was originally conceived. The SFPUC identified the need for the project after certification of the WSIP PEIR as a result of geotechnical investigations in connection with the Harry Tracy Water Treatment Plant (HTWTP) Long-Term Improvements Project, which is a WSIP facility improvement project that was approved and adopted by the SFPUC in 2010. During these investigations, the SFPUC determined that fault strands located within the plant's site could cause significant failure in existing facilities in the event of a major San Andreas earthquake. The fault strands were determined to be part of the Serra Fault system, a secondary fault located along the peninsula in San Mateo County. As a result, additional geotechnical studies were pursued to determine the ability of the Peninsula water transmission system to achieve the adopted WSIP Level of Service (LOS) goal related to seismic reliability. (The LOS goal requires that within 24 hours of a major earthquake on the San Andreas Fault, the HTWTP must be capable of delivering up to 140 million gallons per day of potable drinking water to customers within the Regional Water System and in the City and County of San Francisco.) During these additional investigations of the Serra Fault system, the SFPUC identified areas along the SAPL2, SAPL3, and SSBPL that are susceptible to liquefaction, ground shaking, and landslides (see Figure 2). As a result of these studies, the SFPUC identified the six pipeline segments in need of seismic improvements that are the subject of this NOP. The SFPUC does not propose any new pipelines, an increase the size or capacity of existing pipelines, or an increase in the normal operating capacity of the Regional Water System.

### 1.2 Environmental Review Process

EP has determined that a project-specific EIR is required to evaluate the environmental effects of the proposed project. While the PPSU project is one of the projects that would be funded through the WSIP bond measure, it was not evaluated in the Final WSIP PEIR and is undergoing environmental review independent of the PEIR.

The first step in the environmental review process is the formal public scoping process, for which this NOP has been prepared. Following the public scoping meeting, a Draft EIR will be prepared and circulated for a 45-day public review period. In accordance with CEQA Guidelines Section 15161, the EIR will address project-specific construction and operational impacts, identify possible ways to minimize any potentially significant adverse impacts, and describe and analyze feasible alternatives to the proposed project. Public comments on the Draft EIR will be accepted in writing during the review period or orally at one or more formal public hearings to be held by the San Francisco Planning Commission. EP will then prepare written responses to comments on environmental issues raised during the public review period, and a Response to Comments document will be prepared. This document will be considered by the Planning Commission, along with the Draft EIR and any revisions to the draft based on the responses to comments, for certification as a Final EIR.

### 1.3 Public Scoping Meeting

The San Francisco Planning Department will hold a public scoping meeting as follows:

**San Bruno – November 30, 2011, 6:30 p.m. (starting promptly)**

San Bruno Chinese Church
250 Courtland Drive
San Bruno, CA 94066

The purpose of this meeting is to assist the Planning Department in its review of the proposed scope and content of the EIR, as summarized in this NOP. The public will be given the opportunity to provide comments for consideration. The Planning Department will also accept written comments on the scope and content of the EIR at the meeting or by mail, e-mail, or fax until the close of business on December 9, 2011. Written comments should be sent by mail to the San Francisco Planning Department, Attn: Bill Wycko, Environmental Review Officer, PPSU Project EIR Scoping Comments, 1650 Mission Street, Suite 400, San Francisco, CA 94103, by fax to (415) 558-6409, or by e-mail to timothy.johnston@sfgov.org.

## 2.0 PROJECT DESCRIPTION

### 2.1 Project Goals

The primary PPSU project goals are to ensure water delivery from HTWTP through a combined system of Peninsula pipelines, to assist in meeting the WSIP seismic reliability LOS goals; and to upgrade segments of existing Peninsula pipelines to meet current seismic standards.

### 2.2 Project Location and Existing Facilities

The existing SAPL2, SAPL3, and SSBPL transmission pipelines deliver water from the HTWTP to the Regional Water System. SAPL2 is a 54-inch-diameter riveted lockbar steel pipe that was constructed in approximately 1928. SAPL3 is a 66-inch-diameter steel pipeline that was constructed in 1979. The portion of SSBPL that is within the project area is a 60-inch-diameter welded steel pipe constructed in 1955. The pipelines are located below ground in the project area and extend through land that is within the SFPUC right-of-way (ROW). The majority of the ROW is undeveloped vacant land in urban areas, adjacent to residential communities and commercial areas. Portions of the ROW extend through open space/recreational areas, golf courses, and cemeteries. Within two project sites, the pipelines extend under a roadway.

The proposed project would entail upgrades of six components at five different locations or sites along these Regional Water System pipelines in the cities of Colma, South San Francisco, San Bruno, and Millbrae, as shown on Figure 2. Each proposed site is identified by the city in which it is located. There are two sites in the City of San Bruno; the northern site is referred to as San Bruno North and the southern site is referred to as San Bruno South.

## 2.3 Proposed Facilities and Operation

The proposed project upgrades would improve segments of pipelines to increase reliability during potential seismic events. The location of the five sites and the proposed project activities at each site are shown on Figures 3 through 7 and listed below:

- Colma Site – Replacement of an approximately 700-foot segment of SAPL2;
- South San Francisco Site – Replacement of an approximately 650-foot segment of SAPL2;
- San Bruno North Site – Structural support of SAPL2 within an existing tunnel;
- San Bruno South Site – Replacement of an approximately 1,170-foot segment of SAPL2 and an approximately 1,050-foot segment of SAPL3; and
- Millbrae Site – Replacement of an approximately 890-foot segment of SSBPL.

<u>Construction Activities</u>

Construction would be performed primarily using open-trench construction methods. The pipe replacement would generally include the following activities: (1) mobilization of the site, including removal of vegetation and grading; (2) trench excavation and shoring, as necessary; (3) removal of existing pipe and installation of new pipe; (4) trench backfill and compacting; and (5) surface restoration.

Alternative construction methods, such as sliplining or jack-and-bore, may be used at the South San Francisco site. If sliplining is used, pits would be excavated and shored, and new pipe would be inserted inside of the existing section of pipe, and connected to the existing pipeline. If jack-and-bore is used, pits would be excavated and shored, steel casing would be pushed and drilled horizontally underground through the soil, and a new “carrier” pipe would be installed and connected to the existing pipe. With either of these construction methods, site mobilization, pit backfill and compaction, and surface restoration would also occur.

For the structural support of SAPL2 at the San Bruno North location, project construction activities would include excavation of up to two access pits above the existing tunnel in which the pipeline is located, removal of portions of the tunnel roof to gain access to the tunnel, and the injection of grouting to fill the structural void between the pipeline and the tunnel, and/or the installation of pipe stabilization structures within the tunnel.

## Additional Activities

### *Tree Removal*

Trees within the SFPUC ROW may be removed to allow construction access to the pipelines, and in compliance with the SFPUC's Vegetation Management Policy. Tree removal would occur at some portions of the South San Francisco and Millbrae project sites, because dense groves of trees are located above the pipelines at these sites. A minimal amount of tree removal or trimming could be required at the other sites.

### *Pipeline Shutdown and Startup*

Pipeline shutdown activities, primarily dewatering of pipeline sections, would be required prior to pipeline construction activities. Following shutdown of a pipeline segment, water would be drained from the pipeline and dechlorinated, prior to its discharge overland to a nearby storm drain, open channel, or creek. The shutdown process typically takes up to 1 week. Pipeline shutdowns would be scheduled so as to not disrupt water service to customers.

Pipeline startup activities, including hydrostatic testing and disinfection, would be completed prior to operation of the upgraded pipelines. Hydrostatic testing is used to verify the structural integrity of the pipeline, and entails filling sections of the pipeline with clean water, maintaining a test pressure in excess of normal operating pressures for a specified period of time (typically 8 hours), and then discharging the water. Disinfection of the pipeline typically requires 1 week, and includes filling, disinfecting, flushing, dechlorinating, and taking water samples from the pipelines. Discharge of disinfected water would occur in a manner similar to discharge of water during shutdown.

### *Dewatering*

During construction, dewatering may be required for groundwater, rainwater, or other water that enters the trenches and pits. Once this water is pumped out of the trench or pit, it would be stored, tested, and treated to meet required standards, then discharged to a nearby sanitary sewer, stormwater culvert, creek, or overland, similar to the initial pipeline shutdown performed by the SFPUC.

*Excavation*

The proposed project would result in the excavation of approximately 61,000 cubic yards of soil. Excavated soils, including topsoil, would be stockpiled during construction at each project site, and may be reused as backfill and/or off-hauled for recycling or disposal.

*Staging Areas*

Staging and spoils storage areas are proposed within the SFPUC ROW adjacent to the construction areas and at some offsite locations near the project sites, as shown on Figures 3 through 7. These proposed temporary staging and spoils areas would be used for materials and equipment staging and laydown, worker vehicle parking, temporary construction equipment trailers and office trailers, and stockpiling of spoils and construction debris. Temporary fencing would be installed around these staging areas to prevent public access to them.

*Operations and Maintenance*

Future operations and maintenance would be the same as existing operations and maintenance activities, and would entail yearly visual inspections. Approximately every 10 to 15 years, inspections would entail entering the manholes. On an annual basis, water may be discharged from the manholes, as required by other SFPUC projects or inspections.

Access

Access to the project sites would be via public roads. At the Millbrae project site, additional off-road access routes would be required. Alternative access routes may include: (1) the SFPUC ROW through the side yards of residences at 1100 and 1080 Ridgewood Drive; (2) Larkspur Drive to an access route through the Green Hills Country Club golf course; (3) Lomita Avenue to an existing access route through City of Millbrae open space north of the Millbrae site; and/or (4) an alternative route through the Millbrae open space via Bertocchi Lane. Minor improvements to these access routes at the Millbrae project site could be required.

## 2.4 Schedule

Construction of the proposed project is estimated to begin in 2014 and end in 2015, with a total duration of approximately 16 months. Pipeline construction is expected to progress at a rate of approximately 40 feet per day. Construction activities at each site would range from approximately 2 weeks to 5 months in duration.

Construction activities would occur primarily during weekdays, from 7 a.m. to 5 p.m. If necessary, weekend construction hours would be the same as those described for weekdays. No nighttime construction is proposed.

## 3.0 ENVIRONMENTAL ANALYSIS

### 3.1 Environmental Issues to Be Addressed in the EIR

The EIR will address all environmental issue areas required under CEQA. The EIR will address environmental impacts of the proposed project's construction and operation activities, and will propose mitigation measures for impacts considered to be potentially significant. The following sections describe the anticipated environmental issues that will be addressed by the EIR.

Land Use and Land Use Planning

Existing land uses along or adjacent to the existing ROW and adjacent to Project areas could be adversely affected by project construction.

Aesthetics

Project construction could affect aesthetics at the project sites and surrounding areas.

Population and Housing

Given that the project would be built within the existing SFPUC ROW and would not increase water supplies, construction of the proposed project would not likely affect population and housing issues in the project vicinity. Nevertheless, these issues will be examined further.

Cultural and Paleontological Resources

The project could potentially affect archaeological, historical, or paleontological resources through ground-disturbing activities during construction.

Traffic, Transportation, and Circulation

Construction could have temporary impacts on traffic volumes, traffic safety, and alternative modes of transportation in the vicinity of the project sites.

Noise

Potential noise and vibration impacts associated with project construction would be temporary and short term, but will be examined further.

### Air Quality

Effects on air quality from the project would largely be associated with construction activities and, as such, would be temporary and short term, but will be examined further.

### Greenhouse Gas Emissions

Effects related to greenhouse gas emissions from the proposed project would be both temporary and short term (associated with construction activities), but will be examined further.

### Wind and Shadow

No permanent aboveground facilities that would cast shadows or affect local wind patterns or concentrations are proposed to be constructed for the project. Nevertheless, the potential for these types of impacts will be examined further.

### Recreation

Project construction could temporarily disrupt recreational uses that may be adjacent to the proposed project sites, as a result of noise, dust, and temporary access restrictions. The EIR will evaluate potential impacts on these recreational resources.

### Utilities and Service Systems

Construction could result in temporary effects on utilities and service systems.

### Public Services

Construction of the proposed project would not likely affect public services in such a way that new or expanded public service facilities would need to be built, the construction of which could have a significant impact on the environment. Nevertheless, the potential for these types of impacts will be examined further.

### Biological Resources

Temporary impacts on biological resources could result from construction activities, including vegetation clearing, tree removals, excavation, noise, and vibration.

### Geology, Soils, and Seismicity

Construction of the project could result in site-specific impacts on or from local geology and soils conditions.

## Hydrology and Water Quality

Project construction could affect surface and groundwater water quality in the project area if the project results in discharges of contaminants to receiving waters (either surface or groundwater) or otherwise substantially affects water quality. Dewatering pipelines and trenches may be required during construction, and the water would be treated and discharged in accordance with existing permits.

## Hazards and Hazardous Materials

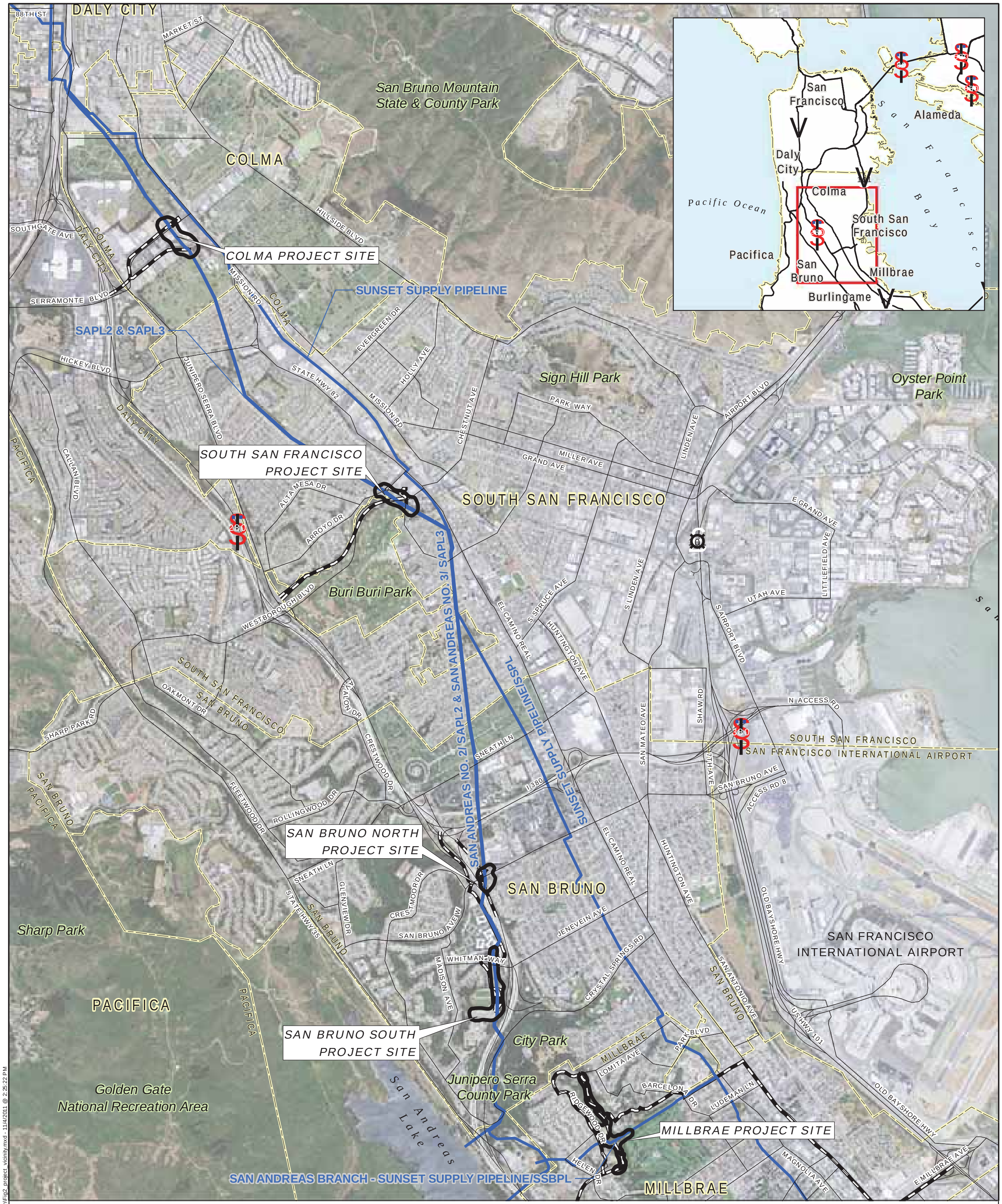
Construction of the proposed project could require the use of hazardous materials, including fossil fuels, solvents, and flammable compressed gases (e.g., for welding). Additionally, project construction (mainly excavation) could expose workers to existing hazardous materials sites.

## Mineral/Energy Resources

Construction of the project would not likely affect the availability of mineral resources, if present in the project area, given that the project would be built within the SFPUC's existing ROW, which is land that is no longer available for n1longer no > ã$ òQ•'7pĐÀ#

lessening any significant effects of the proposed project. CEQA also requires evaluation of the "No Project" alternative.

## 4.0 ATTACHED FIGURES



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Project Site

Access Route to I-280

SFPUC Water Transmission Line

City Limits

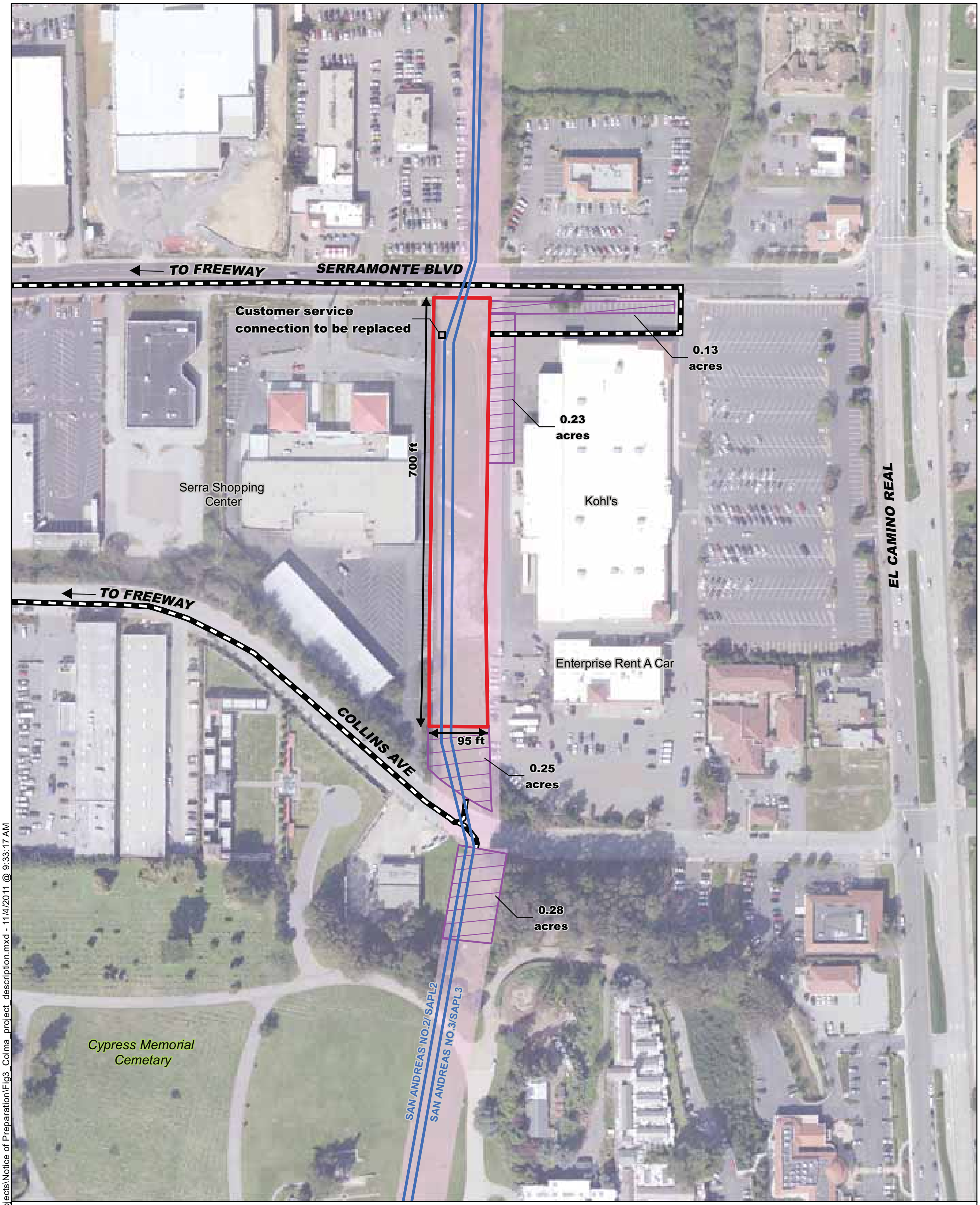
## PROJECT VICINITY

Peninsula Pipeline Seismic Upgrade
San Francisco Public Utilities Commission
San Mateo County, California

November 2011

**FIGURE 2**

Source: SFPUC 2009/2011



Project Components

🟥 Construction Zone

▨ Staging and Spoils Area

▬ Access Route

― SFPUC Water Transmission Line

▭ SFPUC Parcels - Right of Way

N

0 100 200 Feet

## COLMA SITE

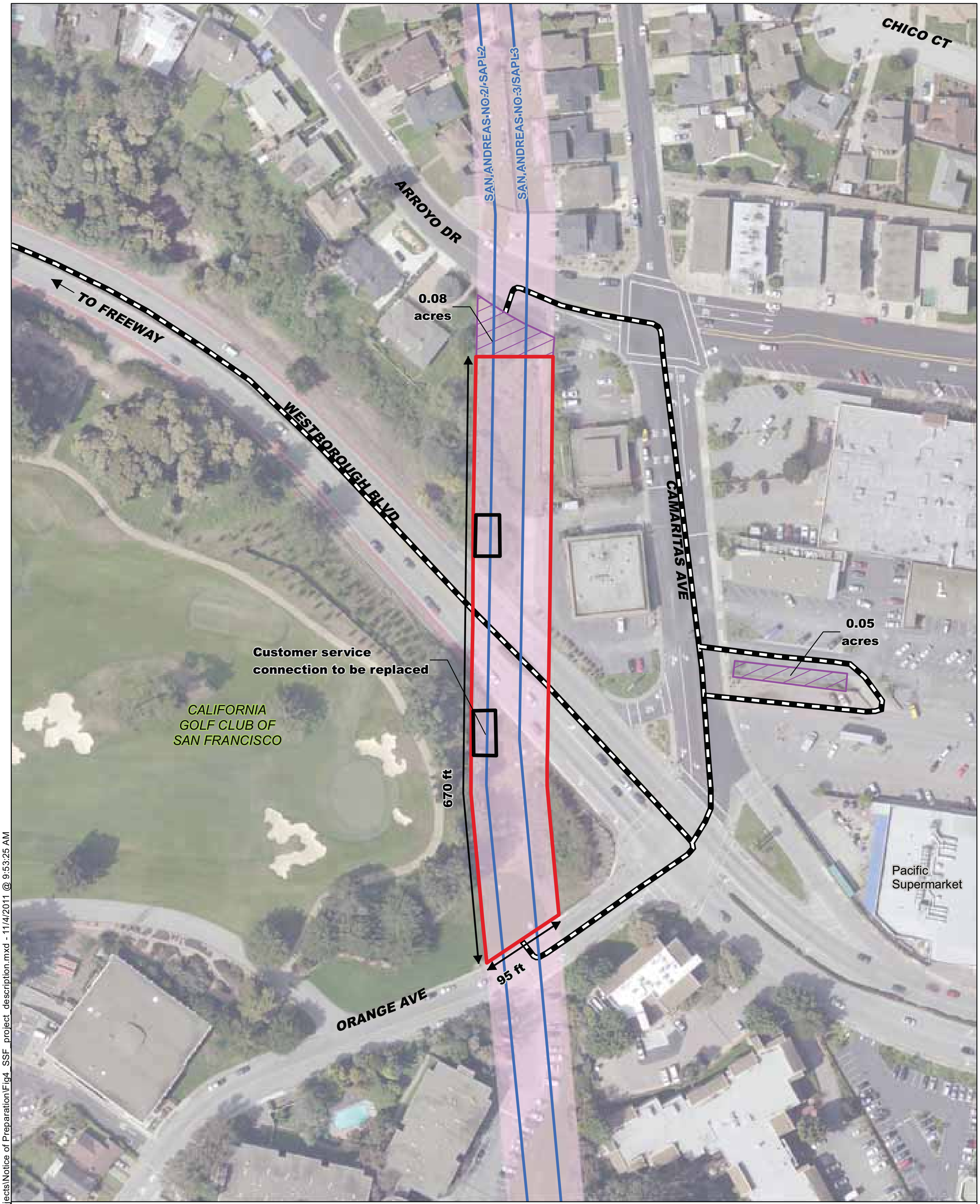
Peninsula Pipeline Seismic Upgrade
San Francisco Public Utilities Commission
San Mateo County, California

November 2011

**FIGURE 3**

U:\GIS\SFPUC_Peninsula_Pipeline\Projects\Notice of Preparation\Fig3_Colma_project_description.mxd - 11/4/2011 @ 9:33:17 AM

Source: SFPUC 2011



Project Components

🟥 Construction Zone

▭ Boring Pit (~ 50' x 20')

▨ Staging and Spoils Area

▬ Access Route

— SFPUC Water Transmission Line

▭ SFPUC Parcels - Right of Way

N

0 75 150 Feet

## SOUTH SAN FRANCISCO SITE

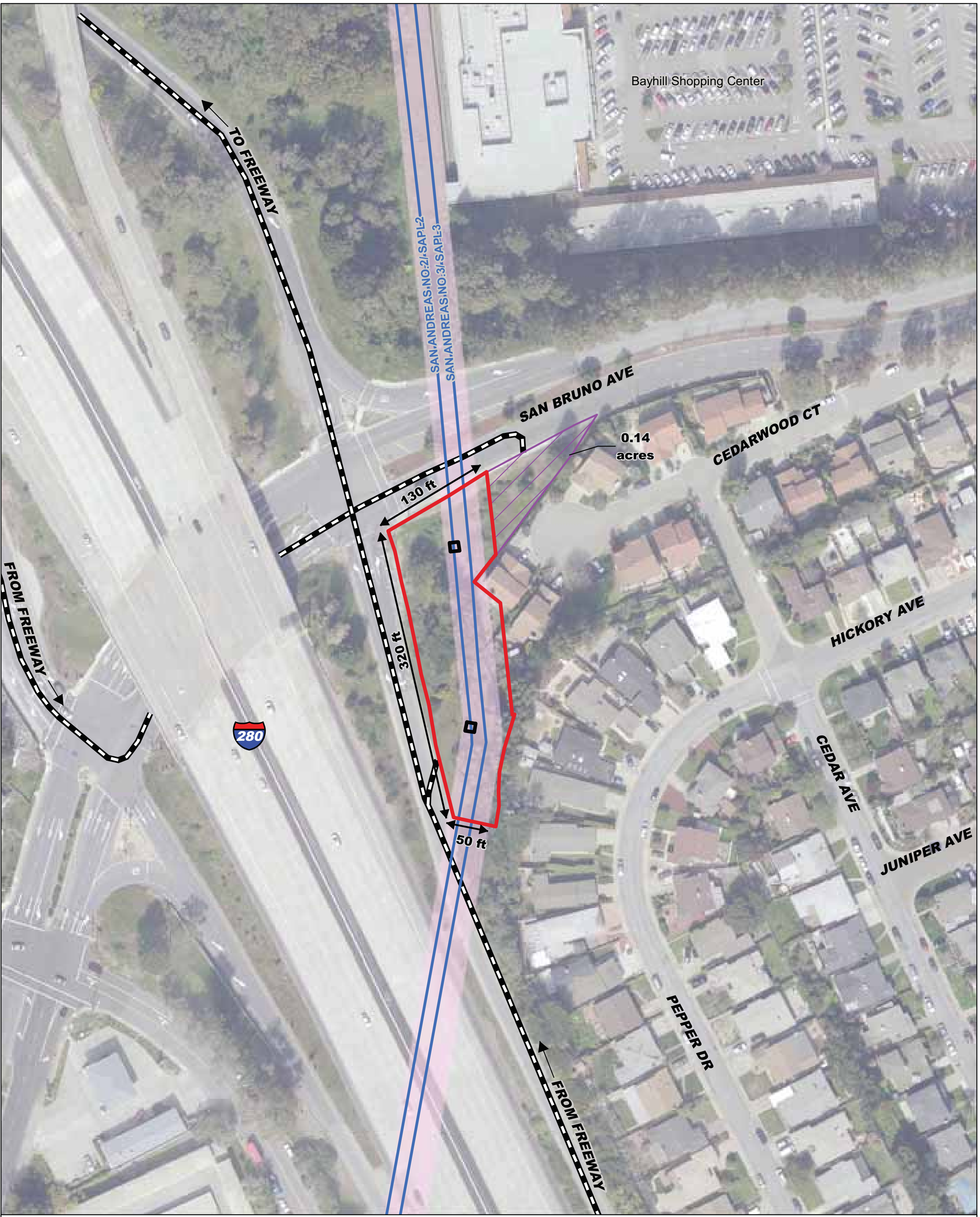
Peninsula Pipeline Seismic Upgrade
San Francisco Public Utilities Commission
San Mateo County, California

November 2011

**FIGURE 4**

Source: SFPUC 2011

U:\GIS\SFPUC_Peninsula_Pipeline\Projects\Notice of Preparation\Fig4_SSF_project_description.mxd - 11/4/2011 @ 9:53:25 AM



Project Components

🟥 Construction Zone

☐ Pit (10' x 10')

▨ Staging and Spoils Area

▬ Access Route

▬ SFPUC Water Transmission Line

▭ SFPUC Parcels - Right of Way

N

0 75 150
Feet

## SAN BRUNO NORTH SITE

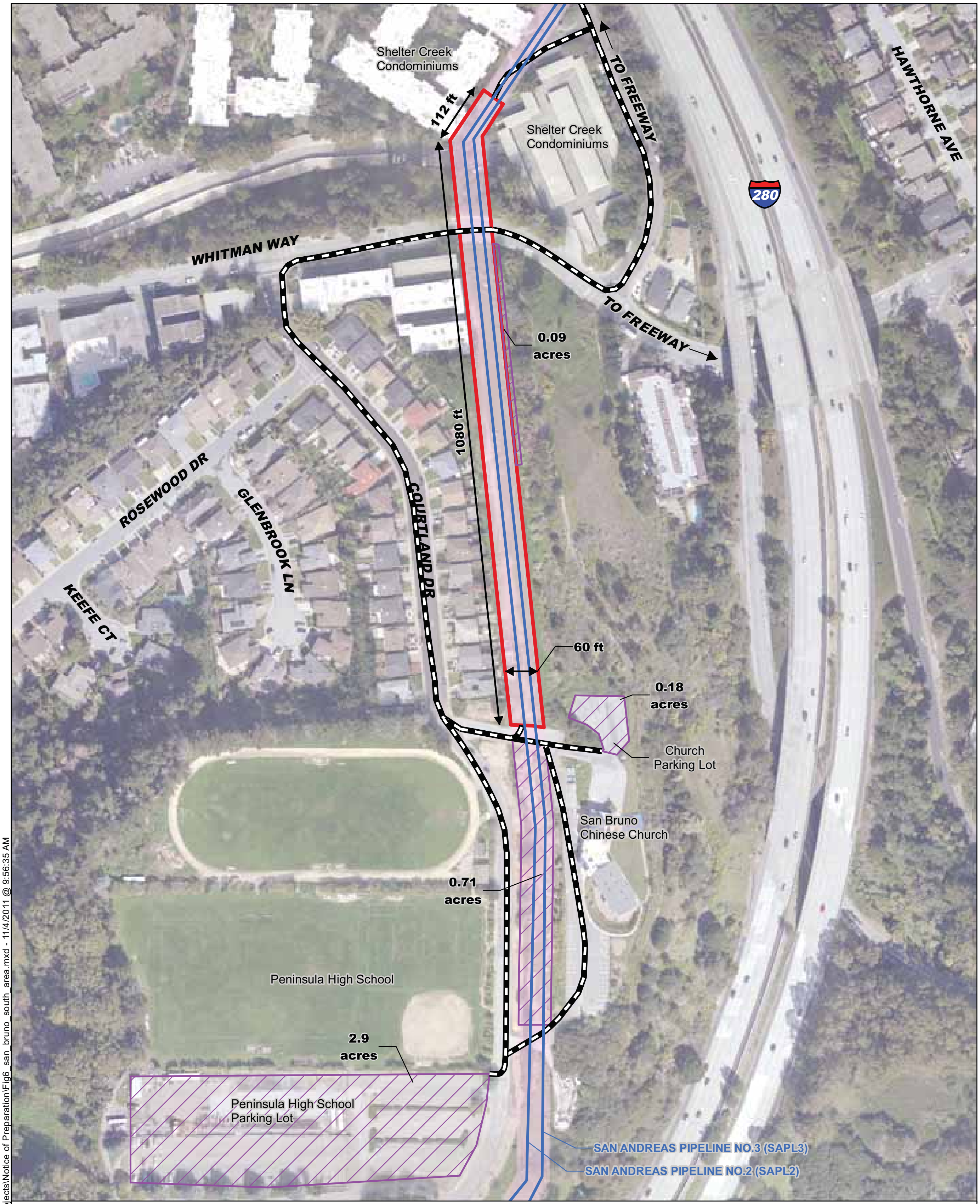
Peninsula Pipeline Seismic Upgrade
San Francisco Public Utilities Commission
San Mateo County, California

November 2011

FIGURE 5

U:\GIS\SFPUC_Peninsula_Pipeline\Projects\Notice of Preparation\Fig5_SanBrunoNorth_project_description.mxd 11/4/2011 9:55:17 AM

Source: SFPUC 2011



Project Components

🟥 Construction Zone

▨ Staging and Spoils Area

▬ Access Route

▬ SFPUC Water Transmission Line

▭ SFPUC Parcels - Right of Way

## SAN BRUNO SOUTH SITE

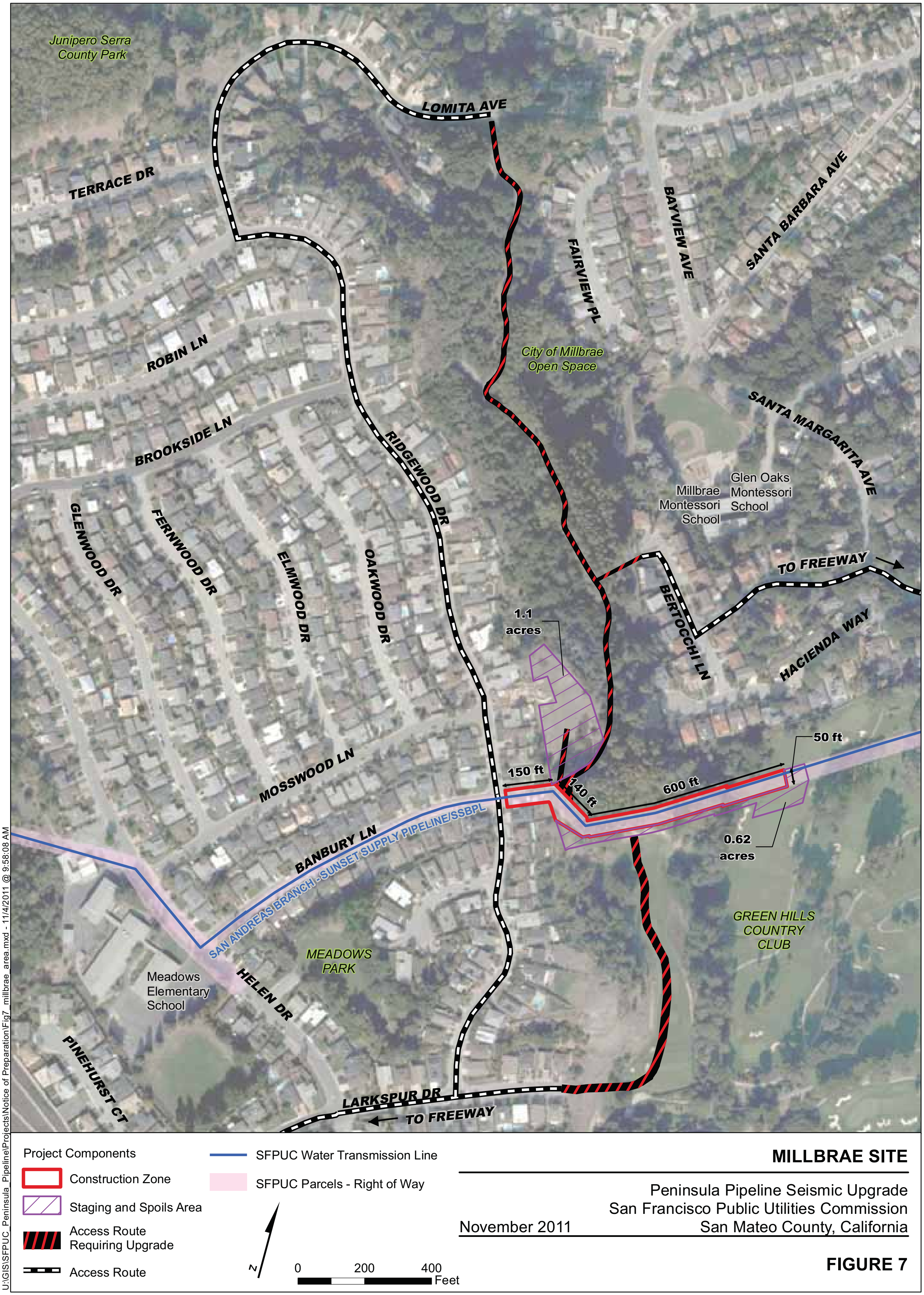
Peninsula Pipeline Seismic Upgrade
San Francisco Public Utilities Commission
San Mateo County, California

November 2011

FIGURE 6

U:\GIS\SFPUC_Peninsula_Pipeline\Projects\Notice of Preparation\Fig6_san_bruno_south_area.mxd - 11/4/2011 @ 9:56:35 AM

Source:SFPUC 2011



**MILLBRAE SITE**

Peninsula Pipeline Seismic Upgrade
San Francisco Public Utilities Commission
San Mateo County, California

November 2011

**FIGURE 7**

U:\GIS\SFPUC_Peninsula_Pipeline\Projects\Notice of Preparation\Fig7_millbrae_area.mxd - 11/4/2011 @ 9:58:08 AM

Source: Bing Aerial Maps/ SFPUC 2011

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# APPENDIX B

# NEWSPAPER ADVERTISEMENTS

FUTURE INNOVATORS

# Modern trailblazer moves country in right direction

## Student designed iPad textbook app, created virtual textbooks for all kinds of learners

**MARGARET LAVIN**

ELEMENTARY, MY DEARS

As an educator in the Bay Area for over a decade, I have had the privilege to work with and know many students. These bright young stars are the future mavericks of Silicon Valley, and I am optimistic, despite all the discouraging news regarding test scores and low academic achievement. I assert that students today are brighter, savvier and more self-sufficient than at any other time in our history. My case in point — Jeff Grimes.

Jeff graduated from Crystal Springs Upland School in Hillsborough last year and is now a freshman at the University of Pennsylvania, dual majoring in Computer Science and Marketing,

For his senior project at Upland, he released an interactive textbook on the American Revolution as an iPad application, http://itunes.apple.com/tw/app/id471681913?mt=8.

Visit the app store on your iPad and search for "Revolution Interactive Guide" if you want to download the app for free.

Jeff created his iPad interactive textbook in part to save money in classrooms and engage students.

"History has always been an academic subject that I have thoroughly enjoyed," Jeff said. "I got goosebumps when we studied the American Revolution because it's the first chapter of the story that unites us all as Americans. It's a story of trailblazers and pioneers who risked their lives for ideals that drove a nation forward for over two centuries."

He presented his iPad application to representatives of Kno Inc, www.kno.com, and Inkling, www.inkling.com, two Bay Area startups in the iPad textbook industry. He spoke of the iPad revolutionizing the classroom by eliminating the conventional textbook model. His argument for doing so is more than compelling. He told his audience that textbooks work only for visual learners, but the iPad is effective for visual, auditory and kinesthetic learners, allowing students to have more control of the information they are receiving.

He admitted there would be significant up-front costs to converting textbooks to an iPad version but noted that costs of iPad books would be considerably less expensive, due chiefly to the elimination of printing and shipping costs Also, their shelf life is much longer.

His zeal for technology is palpable, even if I don't understand much of what he studies. He has taken classes in C, C++ and Java and learned Objective-C and Cocoa during his senior year. He created the iPad app for his senior project.

"My passion lies with technology and programming. I have been programming since I was 12," he said. "With programming, there's a pride of creation that you can't find in many other places. Computer science is the most creative of all the maths and sciences because there is never one set way of solving a problem. That degree of creativity is what I love the most."

Teens like Jeff Grimes rarely make it in the news, but they are certainly the ones who will shape the future of our country. They are our modern trailblazers. They take risks, study hard and work diligently to drive our nation in the right direction.

---

*Contact Margaret Lavin at elementarydays@gmail.com.*

### SAN FRANCISCO PLANNING DEPARTMENT ENVIRONMENTAL REVIEW NOTICE

Notice is hereby given to the general public of the following actions under the Environmental Review Process. Review of the documents concerning these projects can be arranged by calling (415) 575-9025 and asking for the staff person indicated.

NOTICE OF PREPARATION OF AN EIR

The initial evaluation conducted by the Planning Department determined that the following project may have significant effects on the environment and that an Environmental Impact Report (EIR) must be prepared.

**Case No. 2011.0123E: Peninsula Pipelines Seismic Upgrade Project**

The San Francisco Public Utilities Commission (SFPUC), operator of the Hetch Hetchy Regional Water System, is proposing the Peninsula Pipelines Seismic Upgrade (PPSU) project, which includes six project components at five different locations on the San Francisco Peninsula in San Mateo County, in the cities of Colma, South San Francisco, San Bruno, and Millbrae. The proposed project consists of upgrades to three Regional Water System water transmission pipelines — San Andreas Pipeline No. 2 (SAPL2), San Andreas Pipeline No. 3 (SAPL3), and Sunset Supply Branch Pipeline (SSBPL) — to increase pipeline reliability during potential seismic events. The proposed PPSU project (project or proposed project) is one of several pipeline and facility improvement projects that the SFPUC proposes to implement under the SFPUC's Water System Improvement Program (WSIP) to meet system objectives and service goals.

Notice is hereby given to the general public as follows:

1) A Notice of Preparation of an EIR was published on November 9, 2011, by the San Francisco Planning Department in connection with this project. A copy of the NOP can be obtained for public review and comment at the Planning Department offices at 1660 Mission Street, 1st Floor Planning Information Center. The report can also be viewed on-line starting November 9, 2011, at http://www.sf-planning.org/index.aspx?page=1829. Referenced materials are available for review by appointment at the Planning Department's office at 1650 Mission Street, 4th Floor. Call Timothy Johnston at (415) 575-9035 to schedule an appointment.
2) The San Francisco Planning Department will hold a public scoping meeting on November 30, 2011, at 6:30 p.m. (starting promptly), at the San Bruno Chinese Church, 250 Courtland Drive San Bruno, CA, 94066, to receive comments on the scope and content of the EIR.
3) Public comments concerning the scope of the EIR will be accepted from November 9, 2011, to 5:00 p.m. on December 9, 2011. Written comments should be sent to the San Francisco Planning Department, Attn: Bill Wycko, Environmental Review Officer, PPSU EIR Scoping Comments, 1650 Mission Street, Suite 400, San Francisco, CA 94103-2414, by fax to (415) 558-6409, or by email to timothy.johnston@sfgov.org.

**SAN FRANCISCO EXAMINER**

71 STEVENSON 2ND FL, SAN FRANCISCO, CA 94105
Telephone (415) 359-2723 / Fax (415) 359-2659

This space for filing stamp only

VIRNALIZA BYRD
S.F. PLANNING DEPT
1650 MISSION ST #400
SAN FRANCISCO, CA - 94103

# PROOF OF PUBLICATION

(2015.5 C.C.P.)

State of California )
County of SAN FRANCISCO ) ss

Notice Type: GPN - GOVT PUBLIC NOTICE

Ad Description:

CASE NO'S: 2004.0976E, 2011.0123E & 2011.0558E

I am a citizen of the United States and a resident of the State of California; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer and publisher of the SAN FRANCISCO EXAMINER, a newspaper published in the English language in the city of SAN FRANCISCO, county of SAN FRANCISCO, and adjudged a newspaper of general circulation as defined by the laws of the State of California by the Superior Court of the County of SAN FRANCISCO, State of California, under date 10/18/1951, Case No. 410667. That the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

11/09/2011

Executed on: 11/10/2011
At Los Angeles, California

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Liliana Moreno

Signature

EXM#: 2204407

### PLANNING DEPARTMENT ENVIRONMENTAL REVIEW NOTICE

**Notice is hereby given to the general public of the following actions under the Environmental Review Process. Review of the documents concerning these projects can be arranged by calling (415) 575-9025.**

### PRELIMINARY MITIGATED NEGATIVE DECLARATION

The initial evaluation conducted by the Planning Department determined that the following projects could not have a significant effect on the environment, and that no environmental impact report is required. Accordingly, a Preliminary Mitigated Negative Declaration has been prepared.

Public recommendations for amendment of the text of the finding, or any appeal of this determination to the Planning Commission (with $500 filing fee) must be filed with the Department within 20 days following the date of this notice. In the absence of an appeal, the Negative Declaration shall be made final, subject to any necessary modifications, 20 days from the date of this notice.

**2004.0976E: 376 Castro Street -** The proposed project would involve demolition of an existing automotive gasoline and service station, and construction of a six-story, approximately 65-foot-tall, 43,070-square-foot, mixed-use building with 24 residential units, approximately 2,990 square feet of ground-floor commercial space and a 14-space underground parking garage with ingress and egress from Castro Street. The project site (Assessor's Block 2623, Lot 6) is located on the northwest corner of the intersection of Castro and Market Streets, on the block bounded by States Street to the north, Castro Street to the east, Market and 17th Streets to the south, and Douglas Street to the west, in the Corona Heights/Castro neighborhood in the Upper Market Street Neighborhood Commercial District and 65-B height and bulk district. [LEWIS]

### NOTICE OF PREPARATION OF AN EIR

The initial evaluation conducted by the Planning Department determined that the following project may have significant effects on the environment and that an Environmental Impact Report (EIR) must be prepared.

**2011.0123E: Peninsula Pipelines Seismic Upgrade Project -** The San Francisco Public Utilities Commission (SFPUC), operator of the Hetch Hetchy Regional Water System, is proposing the Peninsula Pipelines Seismic Upgrade (PPSU) project, which includes six project components at five different locations on the San Francisco Peninsula in San Mateo County, in the cities of Colma, South San Francisco, San Bruno, and Millbrae. The proposed project consists of upgrades to three Regional Water System water transmission pipelines — San Andreas Pipeline No. 2 (SAPL2), San Andreas Pipeline No. 3 (SAPL3), and Sunset Supply Branch Pipeline (SSBPL) — to increase pipeline reliability during potential seismic events. The proposed PPSU project (project or proposed project) is one of several pipeline and facility improvement projects that the SFPUC proposes to implement under the SFPUC's Water System Improvement Program (WSIP) to meet system objectives and service goals.

Notice is hereby given to the general public as follows:

1) A Notice of Preparation of an EIR was published on November 9, 2011, by the San Francisco Planning Department in connection with this project. A copy of the NOP can be obtained for public review and comment at the Planning Department offices at 1660 Mission Street, 1st Floor Planning Information Center. The report can also be viewed on-line starting November 9, 2011, at http://www.sf-planning.org/index.aspx?page=1829. Referenced materials are available for review by appointment at the Planning Department's office at 1650 Mission Street, 4th Floor. Call Timothy Johnston at (415) 575-9035 to schedule an appointment.

2) The San Francisco Planning Department will hold a public scoping meeting on November 30, 2011, at 6:30 p.m. (starting promptly), at the San Bruno Chinese Church, 250 Courtland Drive, San Bruno, CA, 94066, to receive comments on the scope and content of the EIR.

3) Public comments concerning the scope of the EIR will be accepted from

!A000002418041!

November 9, 2011, to 5:00 p.m. on December 9, 2011. Written comments should be sent to the San Francisco Planning Department, Attn: Bill Wycko, Environmental Review Officer, PPSU EIR Scoping Comments, 1650 Mission Street, Suite 400, San Francisco, CA 94103-2414, by fax to (415) 558-6409, or by email to timothy.johnston@sfgov.org.

### NOTICE OF PREPARATION OF EIR

The initial evaluation conducted by the Planning Department determined that the following project(s) may have significant effects on the environment and that an Environmental Impact Report (EIR) must be prepared.

**2011.0558E: Transit Effectiveness Project (TEP)** -To make Muni service more convenient, reliable and attractive to existing and potential customers, the San Francisco Municipal Transportation Agency (SFMTA) and the San Francisco Office of the Controller have launched a comprehensive detailed analysis of existing travel patterns and a review of service options. The resultant Transit Effectiveness Project (TEP) is a program within SFMTA that is comprised of individual projects or categories of projects proposed for the Muni System. The TEP proposals include a series of service improvements and concurrent necessary capital investments designed to improve safety and service reliability and reduce travel time. The TEP is comprised of four major categories: service policy framework, service improvements, service-related capital projects, and travel time reduction proposals. More information concerning the project is available online at http://tepeir.sfplanning.org. [Dwyer]

Notice is hereby given to the general public as follows:

1) A Notice of Preparation of an EIR was published on November 9, 2011 by the Planning Department in connection with this project. A copy of the NOP can be obtained for public review and comment at the Planning Department offices at 1660 Mission Street, 1st Floor Planning Information Center. The report can also be viewed on-line starting November 9, 2011 at http://tepeir.sfplanning.org. Referenced materials are available for review by appointment at the Planning Department's office at 1650 Mission Street, 4th Floor. (Call 575-9031, Debra Dwyer, to schedule an appointment.)

2) The Planning Department will hold **two public scoping meetings** on Tuesday and Wednesday, December 6 and 7, 2011, at 6:30 pm, at One South Van Ness Ave, 2nd Floor to receive oral comments on the scope and content of the EIR. Translation services in Spanish and Chinese will be provided at the meetings.

3) Public comments concerning the scope of the EIR will be accepted from November 10, 2011 to 5:00 p.m. on December 9, 2011. Mail written comments to the San Francisco Planning Department, Attn. Bill Wycko, Environmental Review Officer, 1650 Mission Street, Suite 400, San Francisco, CA 94103.

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# APPENDIX C

# SCOPING MEETING MATERIALS

SEAL OF THE CITY AND COUNTY OF SAN FRANCISCO

# WSIP Peninsula Pipelines
# Seismic Upgrade Project

## San Francisco Planning Department Scoping Meeting

**Wednesday, November 30, 2011 at 6:30 PM**
**San Bruno Chinese Church, 250 Courtland Avenue, San Bruno, CA**

Thank you for attending tonight's environmental review scoping meeting on the Peninsula Pipelines Seismic Upgrade Project. If you are interested in making a formal scoping comment at tonight's meeting, please fill out a yellow speaker card and hand it to a project representative. In addition to making scoping comments tonight, attendees are encouraged to submit written comments by December 9, 2011. You are also invited to view informational exhibits and speak with technical staff regarding the proposed project both before and after the meeting.

## Agenda

6:30 p.m. SF Planning & SFPUC Presentation

- Welcome and Introductions
- Environmental Review Overview
- Description of Proposed Project
- Public Comments

---

## Deadline for Submitting Scoping Comments

EIR scoping comments will be accepted through December 9, 2011 at 5:00 p.m.

**Comment letters may be submitted:**

| By Mail | By Fax | By E-Mail |
|---|---|---|
| SF Planning Department<br>Attn: Bill Wycko, Environmental Review Officer<br>PPSU Scoping Comment<br>1650 Mission Street, Suite 400, San Francisco, CA 94103 | (415) 558-6409 | timothy.johnston@sfgov.org |

## For More Information

| On the Environmental Review | On the Proposed PPSU Project |
|---|---|
| Tim Johnston, San Francisco Planning Department<br>(415) 575-9035 or timothy.johnston@sfgov.org | Alison Kastama, SFPUC Communications<br>(415) 554-0712 or akastama@sfwater.org |

## Public Scoping Meeting

**San Francisco Planning Department**
**Environmental Planning Division**

# SCOPING MEETING

**Peninsula Pipelines Seismic Upgrade Project**
**Environmental Impact Report**

***November 30, 2011***

---

## Peninsula Pipelines Seismic Upgrade Project – EIR Scoping Meeting

- Sign in at the table near the entrance.
- Pick up copies of meeting materials.
- If you would like to speak tonight, fill out a speaker card.
- To make written comments, pick up comment cards.
  - ***Drop off at the end of the meeting***
  - ***Mail or fax later***
- Please hold all comments until the end of the overview/presentation.

## Meeting Agenda

- Introductions
- Environmental Review Process Overview (Planning)
- Proposed Project Overview (SFPUC)
  - ***Hetch Hetchy Regional Water System***
  - ***Water System Improvement Program (WSIP)***
  - ***Peninsula Pipelines Seismic Upgrade Project***
- Public Comments
- Closing Remarks

## Project Team Introductions

San Francisco Planning Department

- ***Timothy Johnston, Environmental Review Coordinator***
- ***Denise Heick, Environmental Consultant Lead, URS***

San Francisco Public Utilities Commission (SFPUC)

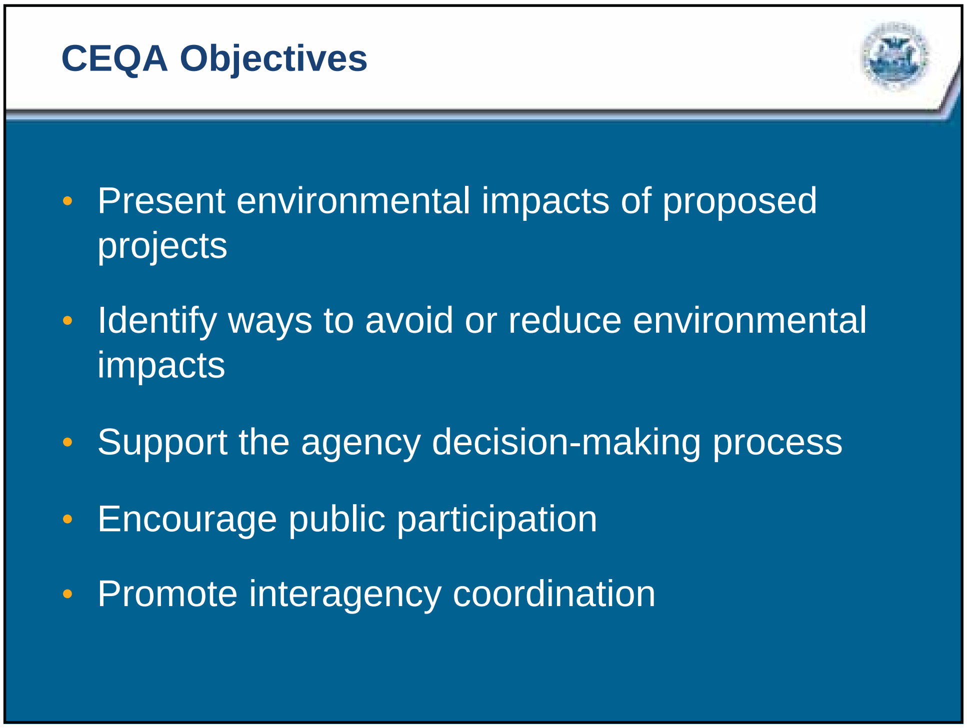
- ***Susan Hou, PE, Project Manager***
- ***Sam Young, PE, Regional Project Engineer***
- ***Anna Roche, Environmental Project Manager***
- ***Alison Kastama, Communications***

# ENVIRONMENTAL REVIEW PROCESS

## California Environmental Quality Act

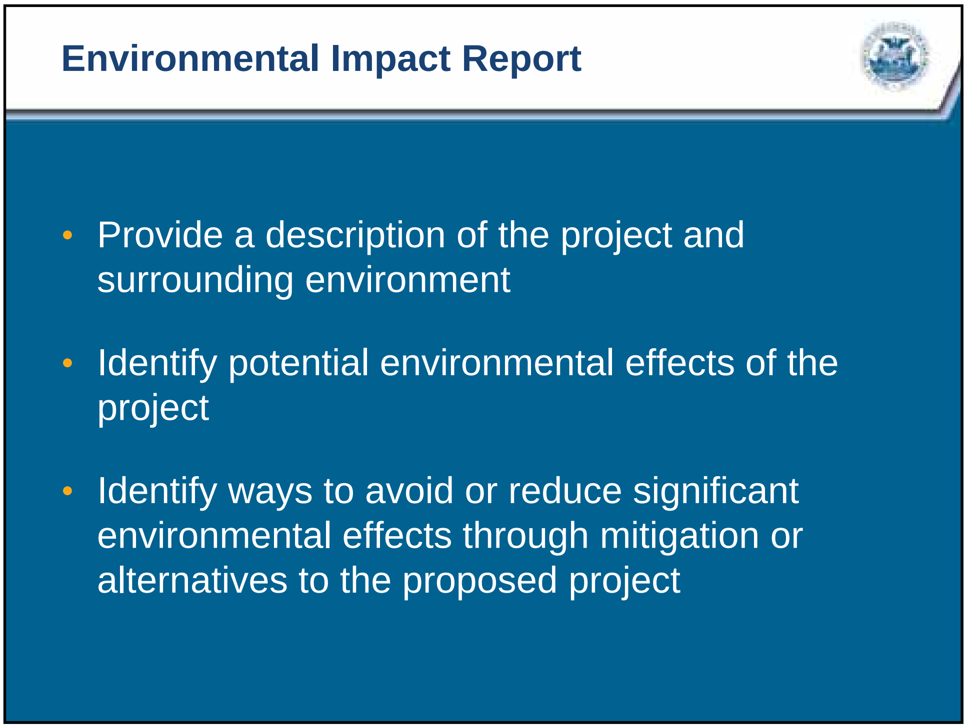
Projects require environmental review under the California Environmental Quality Act (CEQA) before they can be considered for approval.

For SFPUC projects, CEQA is implemented by the San Francisco Planning Department



## CEQA Objectives

- Present environmental impacts of proposed projects
- Identify ways to avoid or reduce environmental impacts
- Support the agency decision-making process
- Encourage public participation
- Promote interagency coordination



## Environmental Impact Report

- Provide a description of the project and surrounding environment
- Identify potential environmental effects of the project
- Identify ways to avoid or reduce significant environmental effects through mitigation or alternatives to the proposed project

## Proposed Environmental Review Schedule

- Notice of Preparation – November 9, 2011
- Public Scoping Meeting – November 30, 2011
- Scoping Period Ends – December 9, 2011

### Tentative EIR schedule

- Public Review of Draft EIR – Early 2013
- Certification of Final EIR – Late Summer 2013

## Meeting Purpose

- Hear your comments on the proposed scope and focus of the environmental review for the Peninsula Pipelines Seismic Upgrade Project
- Potentially providing information on:
  - *Environmental effects (biology, transportation, etc.)*
  - *Range of alternatives*
  - *Methods of assessment*
  - *Potential mitigation measures*

## Peninsula Pipelines Seismic Upgrade Project

Overview

*Hetch Hetchy Regional Water System*

*Water System Improvement Program*

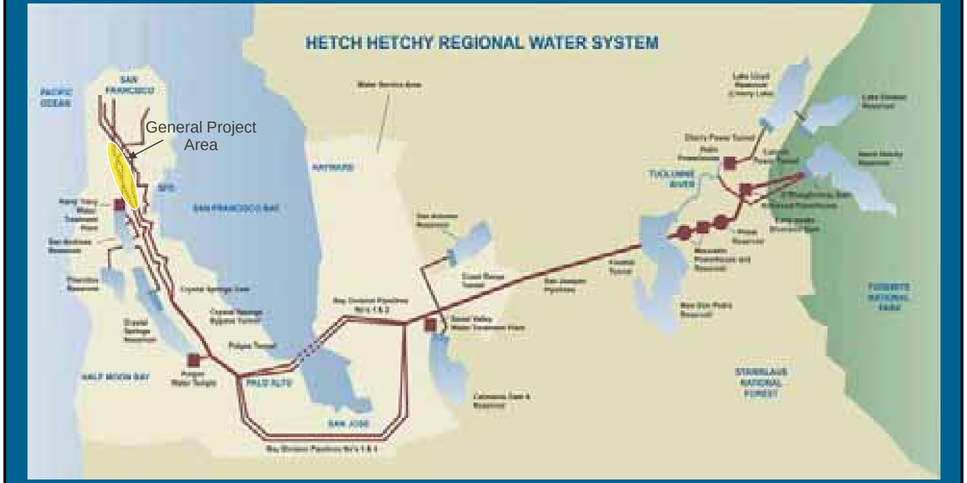
Alison Kastama, Communications

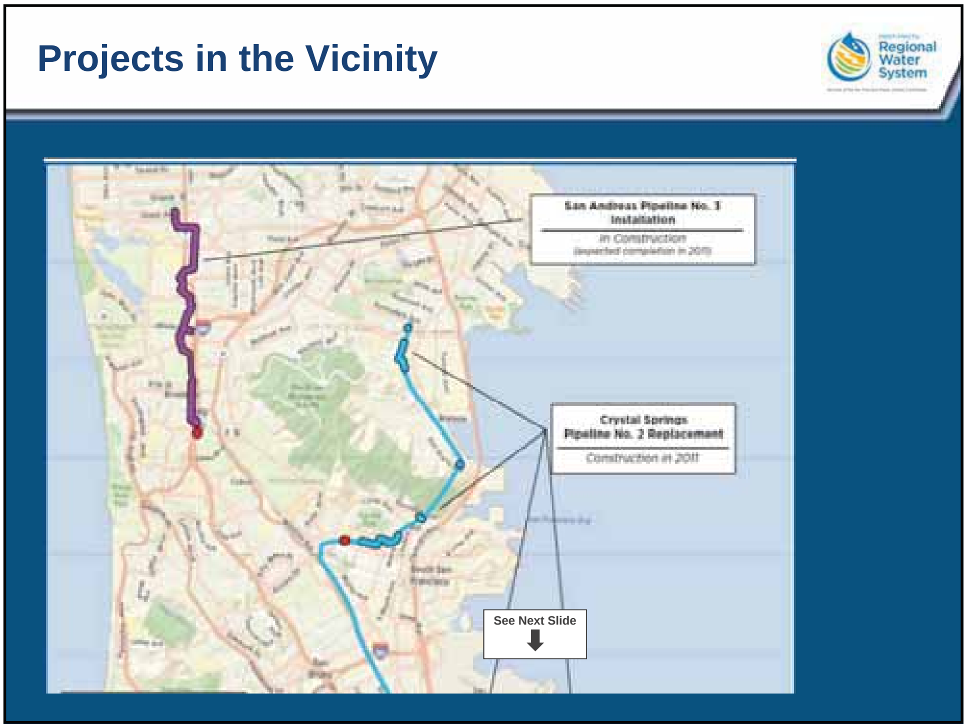
Project Overview

*Project Objectives, Components, Site Details*

Susan Hou, Project Manager

## Hetch Hetchy Regional Water System





## Projects in the Vicinity

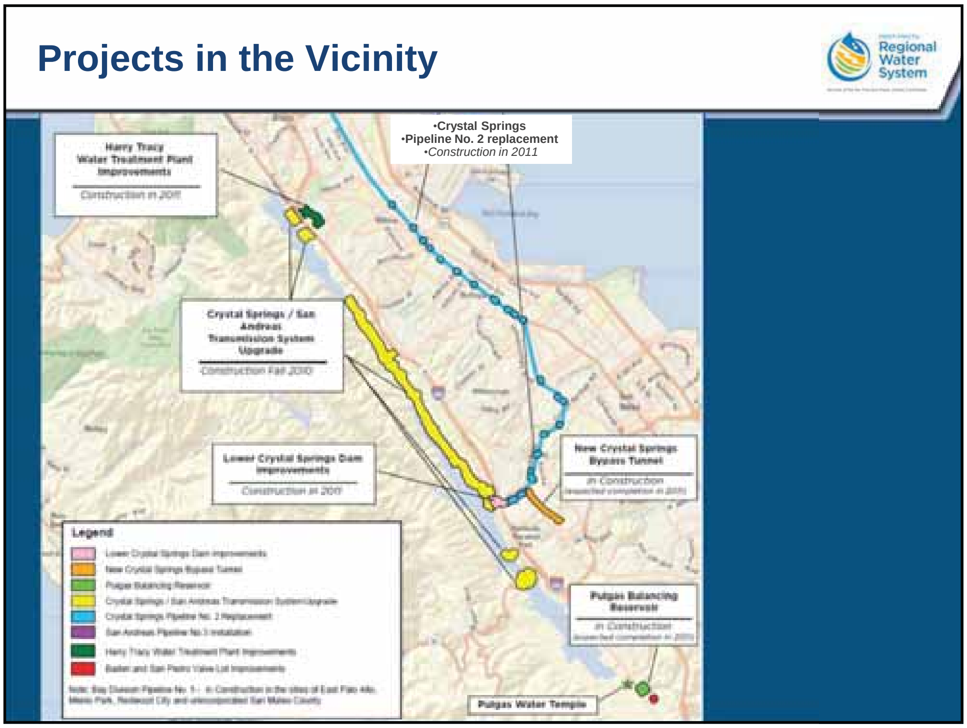
**San Andreas Pipeline No. 3 Installation**

*In Construction*
*(expected completion in 2011)*

**Crystal Springs Pipeline No. 2 Replacement**

*Construction in 2011*

See Next Slide ⬇



## Projects in the Vicinity

- Crystal Springs
- Pipeline No. 2 replacement
- *Construction in 2011*

**Harry Tracy Water Treatment Plant Improvements**

*Construction in 2011*

**Crystal Springs / San Andreas Transmission System Upgrade**

*Construction Fall 2010*

**Lower Crystal Springs Dam Improvements**

*Construction in 2011*

**New Crystal Springs Bypass Tunnel**

*In Construction*
*(expected completion in 2011)*

**Pulgas Balancing Reservoir**

*In Construction*
*(expected completion in 2011)*

**Pulgas Water Temple**

**Legend**

- Lower Crystal Springs Dam Improvements
- New Crystal Springs Bypass Tunnel
- Pulgas Balancing Reservoir
- Crystal Springs / San Andreas Transmission System Upgrade
- Crystal Springs Pipeline No. 2 Replacement
- San Andreas Pipeline No 3 Installation
- Harry Tracy Water Treatment Plant Improvements
- Baden and San Pedro Valve Lot Improvements

Note: Bay Division Pipeline No. 5 - In Construction in the cities of East Palo Alto, Menlo Park, Redwood City and unincorporated San Mateo County

## Peninsula Pipelines Seismic Upgrade Project Goals

- *Aging system*
- *Serra faults crossings, liquefaction, landslides, and ground shaking*

*Ensuring water delivery for your community after a major earthquake.*

## Project Area Overview

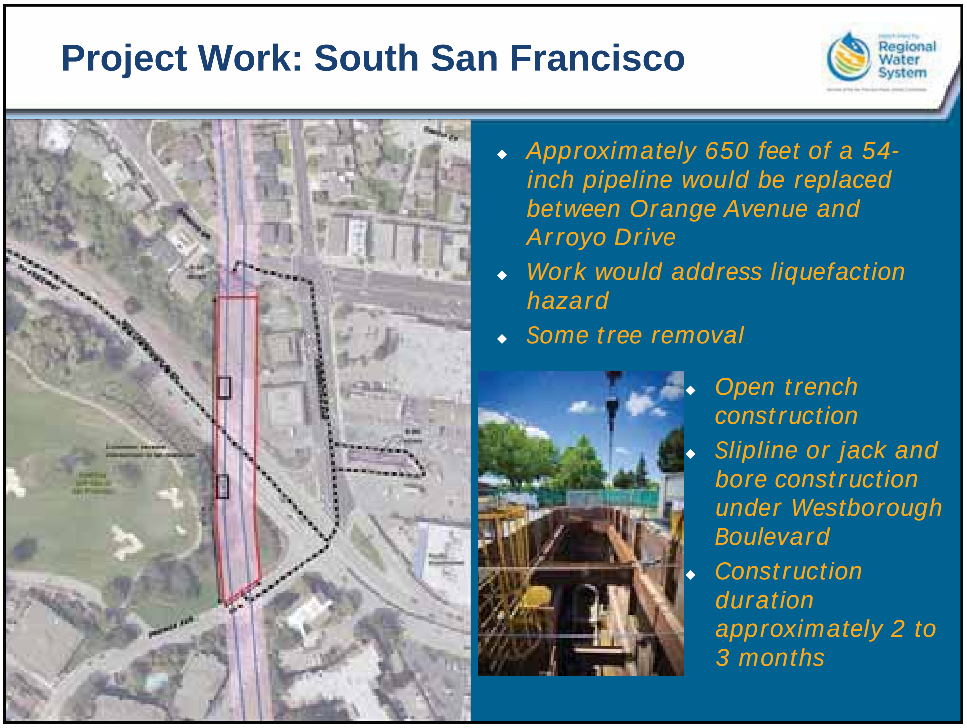
- Six Project Components at Five Different Sites
  - *Colma*
  - *South San Francisco*
  - *San Bruno North and South*
  - *Millbrae*

## Proposed Project Components

- *Fault Crossing and Landslide*
  - Replace approximately 3,200 feet of pipelines at two fault crossing locations in the cities of San Bruno and Millbrae
- *Liquefaction*
  - Replace approximately 1,350 feet of pipelines in the cities of Colma and South San Francisco
- *Groundshaking*
  - Structural support of a pipe inside an existing tunnel in the City of San Bruno

## Project Work: Colma

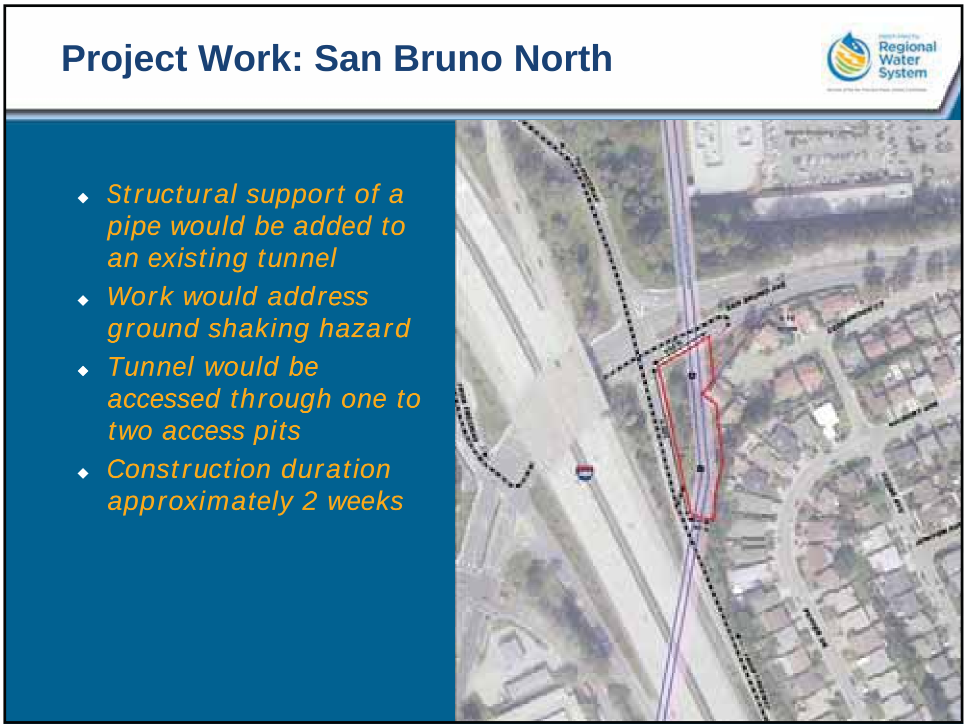
- *Approximately 700 feet of a 54-inch pipeline would be replaced between Serramonte Boulevard and Collins Avenue*
- *Work would address liquefaction hazard*
- *Open trench construction*
- *Construction duration approximately 2 to 3 months*



## Project Work: South San Francisco

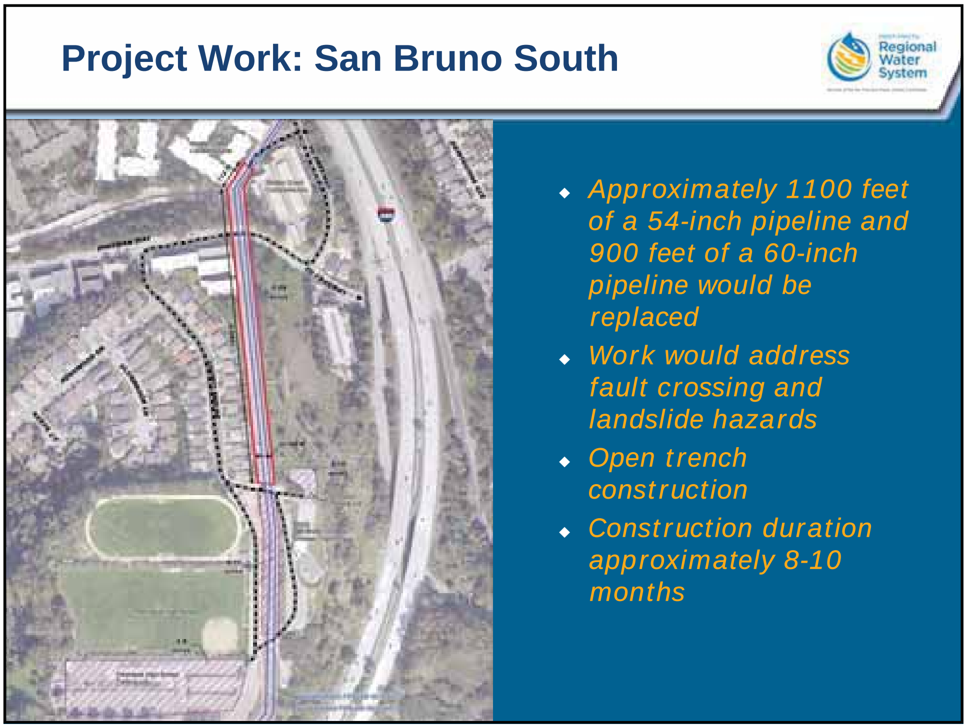
- Approximately 650 feet of a 54-inch pipeline would be replaced between Orange Avenue and Arroyo Drive
- Work would address liquefaction hazard
- Some tree removal

- Open trench construction
- Slipline or jack and bore construction under Westborough Boulevard
- Construction duration approximately 2 to 3 months



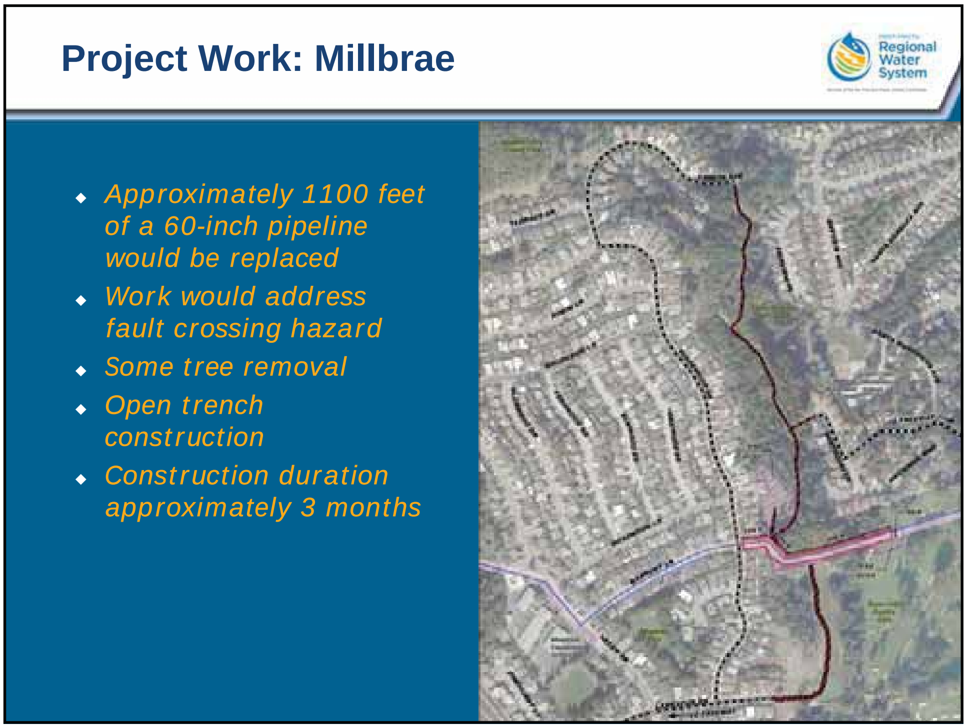
## Project Work: San Bruno North

- Structural support of a pipe would be added to an existing tunnel
- Work would address ground shaking hazard
- Tunnel would be accessed through one to two access pits
- Construction duration approximately 2 weeks



## Project Work: San Bruno South

- *Approximately 1100 feet of a 54-inch pipeline and 900 feet of a 60-inch pipeline would be replaced*
- *Work would address fault crossing and landslide hazards*
- *Open trench construction*
- *Construction duration approximately 8-10 months*



## Project Work: Millbrae

- *Approximately 1100 feet of a 60-inch pipeline would be replaced*
- *Work would address fault crossing hazard*
- *Some tree removal*
- *Open trench construction*
- *Construction duration approximately 3 months*

## Estimated Project Schedule

**Environmental Review & Permitting:**

*Summer 2011 – Fall 2013*

**Project Design:**

*Spring 2011 – Summer 2013*

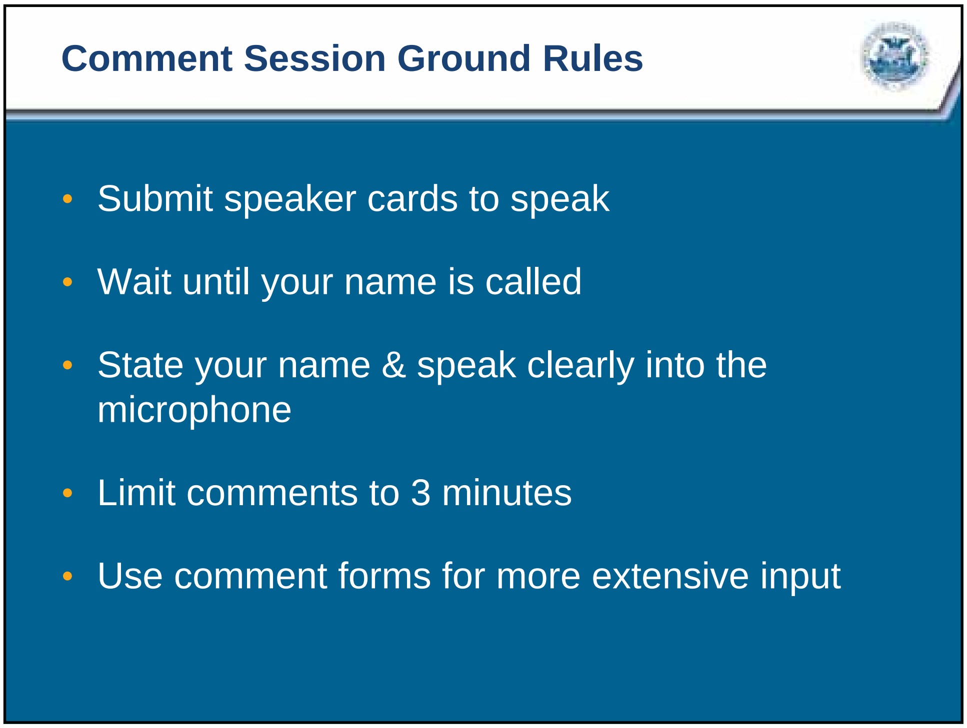
**Project Construction:**

*Winter of 2014 – Fall of 2015*

## Project Goal

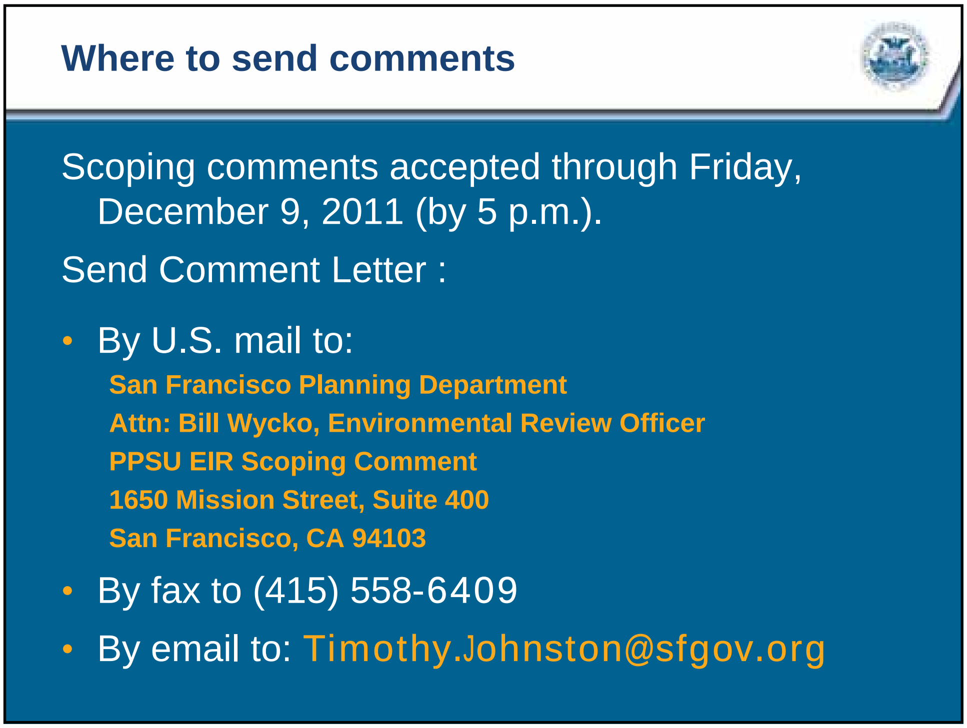
- Ensuring water delivery for your community after a major earthquake.

# PUBLIC COMMENTS



## Comment Session Ground Rules

- Submit speaker cards to speak
- Wait until your name is called
- State your name & speak clearly into the microphone
- Limit comments to 3 minutes
- Use comment forms for more extensive input



## Where to send comments

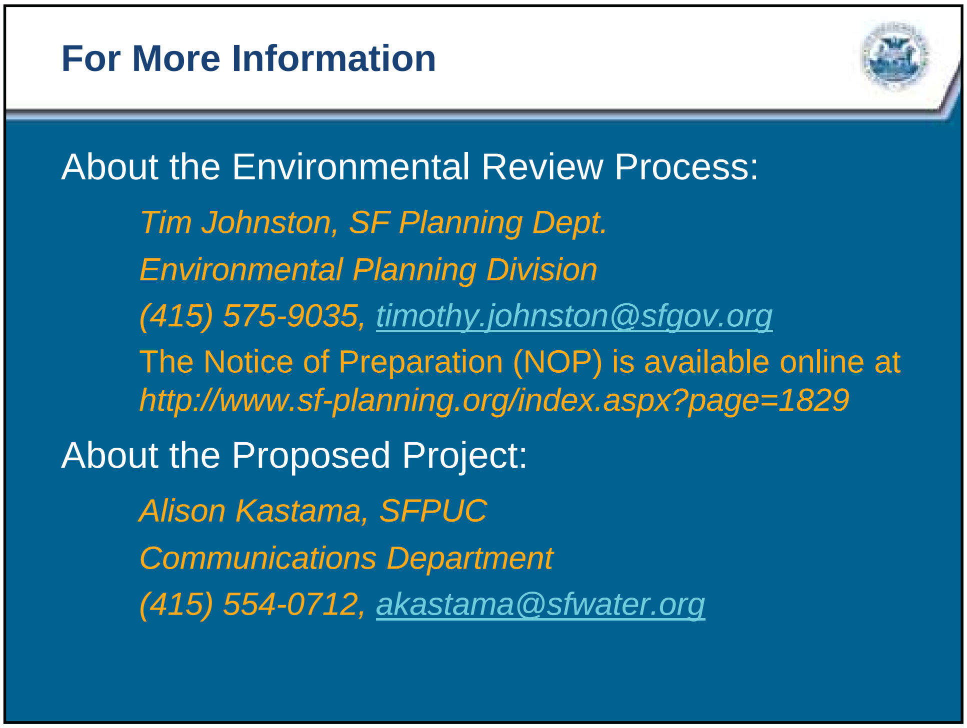
Scoping comments accepted through Friday, December 9, 2011 (by 5 p.m.).

Send Comment Letter :

- By U.S. mail to:

  **San Francisco Planning Department**
  **Attn: Bill Wycko, Environmental Review Officer**
  **PPSU EIR Scoping Comment**
  **1650 Mission Street, Suite 400**
  **San Francisco, CA 94103**

- By fax to (415) 558-6409
- By email to: Timothy.Johnston@sfgov.org



## For More Information

About the Environmental Review Process:

*Tim Johnston, SF Planning Dept.*
*Environmental Planning Division*
*(415) 575-9035, timothy.johnston@sfgov.org*

The Notice of Preparation (NOP) is available online at *http://www.sf-planning.org/index.aspx?page=1829*

About the Proposed Project:

*Alison Kastama, SFPUC*
*Communications Department*
*(415) 554-0712, akastama@sfwater.org*

SEAL OF THE CITY AND COUNTY OF SAN FRANCISCO

# WSIP Peninsula Pipelines Seismic Upgrade Project

## ENVIRONMENTAL IMPACT REPORT / CEQA SCOPING MEETING

*November 30, 2011*

## COMMENT CARD

**Privacy Notice:** Before including your name, address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information become part of the public record. Unless indicated by you otherwise, you will automatically be added to the official EIR mailing list by submitting this form.

Name Title

Organization or business (if applicable)

Address

City, State, Zip

Phone Fax

E-Mail

**Your input on the proposed project is greatly appreciated. Please provide your comments on the scope of the Environmental Impact Report to be prepared for the Peninsula Pipelines Seismic Upgrade Project, including potentially significant impacts, ways to mitigate those impacts, and feasible alternatives. Comments will be accepted until 5:00pm on <u>December 9, 2011.</u>**

**Please leave your comments in the designated comment box or send by mail/fax/email to:**
San Francisco Planning Department, Attn: Bill Wycko, Environmental Review Officer, 1650 Mission Street, Suite 400,
San Francisco, CA 94103. Comment letters may also be faxed to (415) 558-6409, or sent by email to timothy.johnston@sfgov.org

# WSIP Peninsula Pipelines Seismic Upgrade Project

**ENVIRONMENTAL IMPACT REPORT / CEQA SCOPING MEETING**

*November 30, 2011*

## SPEAKER CARD

**To make a verbal comment, please fill out the following information and submit the completed card to a Project Representative. Speakers' names will be called in groups of three at which time those called should line up near the microphone. Depending on the number of speaker cards submitted, each speaker's comments *may* be limited to 3 minutes.**

Name Title

Organization or business (if applicable)

Address

City, State, Zip

Phone Fax

E-Mail

# WSIP Peninsula Pipelines Seismic Upgrade Project

**ENVIRONMENTAL IMPACT REPORT / CEQA SCOPING MEETING**

*November 30, 2011*

## SPEAKER CARD

**To make a verbal comment, please fill out the following information and submit the completed card to a Project Representative. Speakers' names will be called in groups of three at which time those called should line up near the microphone. Depending on the number of speaker cards submitted, each speaker's comments *may* be limited to 3 minutes.**

Name Title

Organization or business (if applicable)

Address

City, State, Zip

Phone Fax

E-Mail

SEAL OF THE CITY AND COUNTY OF SAN FRANCISCO

# WSIP Peninsula Pipelines Seismic Upgrades Project

Public Scoping Meeting, Wednesday, November 30, 2011, San Bruno Chinese Church, 250 Courtland Avenue, San Brun

**SIGN-IN SHEET**

Name Laist Henry Cash Title Organization
Address (City, State, Zip) 1094 Ridgewood Dr. Millbrae, CA
Phone 588-3180 Fax 588-3184 E-Mail Hcashproperties@Gmail.com

Name EVA TONG Title Organization
Address (City, State, Zip) 1086 Ridgewood DR, Millbrae, CA 94030
Phone (415) 867-4606 Fax E-Mail evantong@yahoo.com

Name ERNEST TRESSITTE Title Mill Brae CA 94030 Organization
Address (City, State, Zip) 1100 Ridgewood DR.
Phone Fax E-Mail

Name Mary K Baird Title Organization
Address (City, State, Zip) 1104 Shelter Creek Lane San Bruno CA 94066-3833
Phone 650 873 4569 Fax E-Mail

Name [illegible] Wong Title Pastor SB Chinese Church Organization
Address (City, State, Zip) 250 Courtland DR. San Bruno
Phone Fax E-Mail

SEAL OF THE CITY AND COUNTY OF SAN FRANCISCO

# WSIP Peninsula Pipelines Seismic Upgrades Project

Public Scoping Meeting, Wednesday, November 30, 2011, San Bruno Chinese Church, 250 Courtland Avenue, San Brun

## SIGN-IN SHEET

Name Michael Laughlin Title Acting City Planner Organization Town of Colma
Address (City, State, Zip)
Phone Fax E-Mail Michaellaughlin@colma.ca.gov

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Name Title Organization
Address (City, State, Zip)
Phone Fax E-Mail

Name Title Organization
Address (City, State, Zip)
Phone Fax E-Mail

SEAL OF THE CITY AND COUNTY OF SAN FRANCISCO

# WSIP Peninsula Pipelines Seismic Upgrades Project

Public Scoping Meeting, Wednesday, November 30, 2011, San Bruno Chinese Church, 250 Courtland Avenue, San Brun

**SIGN-IN SHEET**

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Name Steve Balchios Title Organization
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Name JOHNSON WONG Title Organization
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Phone Fax E-Mail

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# APPENDIX D

# SCOPING MEETING TRANSCRIPT

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STATE OF CALIFORNIA

CITY AND COUNTY OF SAN FRANCISCO

SAN FRANCISCO PUBLIC UTILITIES COMMISSION

# PENINSULA PIPELINES SEISMIC UPGRADE PROJECT

## PUBLIC ENVIRONMENTAL SCOPING MEETING

WEDNESDAY, NOVEMBER 30, 2011

San Bruno Chinese Church
250 Courtland Drive
San Bruno, California

6:30 P.M.

JOB NO. 16037

REPORTED BY: E. BRUIHL, CLR, RPR, CSR NO. 3077

A REGISTERED PROFESSIONAL REPORTER

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## A P P E A R A N C E S

MODERATOR: Timothy Johnston
Environmental Review Coordinator

PROJECT LEADERS:

Alison Kastama, Communications

Susan Hou, PE, Project Manager

COMMENTORS:

Steve Balchior

Eva Tong

Silvia Pratt

Alan Wong

Mara Feeney, Community Relations & Socioeconomic Analyst

Rev. Andrew Wu, Senior Pastor

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PROCEEDINGS

WEDNESDAY, NOVEMBER 30, 2011

MR. JOHNSTON: So, let me start by welcoming you all and, again, thanking you all for coming out tonight.

This is the public scoping meeting for the SFPUC's proposed peninsula pipeline seismic upgrade project.

My name is Tim Johnston and I am an Environmental Planner with the San Francisco Planning Department. The San Francisco Planning Department is the lead agency for environmental review for this project, and I will be moderating the meeting tonight.

Let's see. So, if you haven't yet, please sign in at the table in the back. We would like to keep in touch with you as this project continues. Make sure you are on our mailing list.

We pick up copies of reading materials. If you would like to speak and offer comments tonight, we would appreciate it if you could fill out a speaker card. That way we can get the correct spelling of your name and make sure you get a copy of the Draft Environmental Impact Report when it comes out or certainly be made aware that it's available.

You don't have to speak tonight. You can submit comments up until December 9th at the close of business, 5:00

p.m., and you can -- if you want to submit written comments, you can do so tonight. You can drop them off before you leave or you can mail or fax them later or you can email them but we would like you to hold your comments for right now.

We're going to go through an overview of the environmental review process. Then the SFPUC is going to give you an overview of the project that they are proposing.

So, let's go to the next slide then. As far as introductions go, again, my name is Timothy Johnston and we also have here tonight Susan Hou with the SF Public Utilities Commission, Denise Heick with URS. They are a consulting -- URS is a consulting firm that is assisting the Planning Department and developing the Environmental Impact Report.

Anna Roche is the Environmental Project Manager for the SFPUC and then we also have here tonight Alison Kastama who some of you already know. She's with the Communications Department at the SFPUC.

We are awaiting a court reporter who will be here at any moment because we do want to get an accurate transcript of this proceeding. Of course, that will be most important once you all start offering your comments to us. So, we're hoping -- apparently, she's going to get here at any minute now but you're going to see her come and set up. So, don't be surprised.

Let's see. I went through the introductions.

Regarding the Environmental Review Process, this process is required by the California Environmental Quality Act. For shorthand, we refer to it as "CEQA".

This process is intended to produce informational documents about projects and potential environmental impacts. Therefore, the main reason for this scoping meeting tonight is to solicit comments from you either verbally or in writing as to what should be the proper scope of our environmental analysis. In other words, we're looking for you to tell us what you would like us to analyze in the environmental impact report.

So, for projects sponsored by the City of San Francisco such as those proposed by the SFPUC, the San Francisco Planning Department is lead agency under CEQA and is, therefore, responsible for implementing the environmental review process in this case.

So, the CEQA objectives are to present environmental impacts of a proposed project, identify ways to avoid or reduce environmental impacts, to support the agency decision-making process, to encourage public participation, and to promote interagency coordination.

Let's move on regarding the Environmental Impact Report as described in the Notice of Preparation which some of you may have received, if not, it's available here tonight. You can get the full Notice of Preparation.

As we indicate in the NOP, the Environmental Review document that we will be preparing for this project is an environmental impact report which is the more detailed version of the environmental review process under the California Environmental Quality Act.

So, the EIR will analyze and disclose the physical environmental effects of the proposed project and it will identify ways to avoid or minimize the environmental impacts that we've identified.

It is an informational document used by decision-makers as part of the project review process. However, completion of the EIR does not represent approval of the project, okay? It's just the first step. Once we produce an EIR, then it goes to the SFPUC Commission which takes that information into consideration when they're considering whether or not to approve the project.

So, your input at this meeting or during the comment period will affect the content of the EIR.

The EIRs are written using proposed project information, established scientific data and analysis techniques as well as local area concerns, interests and recommendations received during the public comment period which, again, extends until December 9th.

I've spoken to you tonight regarding the schedule of the EIR. We expect to have a draft EIR ready for your review in early 2013 and then by late Summer of 2013, we expect to have -- be ready for certification of a final EIR.

Again, for those of you who are not familiar with this process or who have not attended a scoping meeting before, your input is important. This is your opportunity to provide it up until December 9th and, again, your comments will help us determine the proper scope for our Environmental Impact Report

With that, I'm going to turn it over to the SFPUC who will provide you a more detailed overview of the proposed project.

MS. KASTAMA: If I can, I'm going to move myself closer to the slides here as we get going.

So, I'm Alison Kastama. I'm in Communications with the San Francisco Public Utilities Commission, also known as the Hetch Hetchy Regional Water System.

So, we are a regional water provider here in the San Francisco Bay Area. So, I'm going to give you a background into the regional water system and projects that are occurring in the area and then Susan Hou, the Project Manager for this project, will talk more specifically about the sites and the work involved with this proposed project.

So, first of all, as I mentioned, the Hetch Hetchy Regional Water System is a regional water system. We deliver water from Hetchy Reservoir in Yosemite National Park, a hundred and sixty-seven miles across the State primarily by gravity.

That delivery from the Hetch Hetchy across the State is all by gravity.  Once we get into the local areas for deliveries to homes, there's a little bit of pumping but the majority of that water moves across the State solely by gravity.

This system delivers 265,000,000 gallons a day to 2.5 million residents and businesses in the San Francisco Bay Area.  That includes Southern Alameda County.  So, the City of Hayward, Alameda County Water District, portions of Santa Clara, Northern Santa Clara County, San Mateo County, as well as the City and County of San Francisco.

We are actually a wholesale provider to twenty-six agencies and cities in the areas outside of San Francisco and the retail provider of water in the City of San Francisco. This system has been in operation for seventy-seven years. The Hetchy Reservoir was originally built in about 1923 when construction was started.

Water started coming across the State in the '30s. In the history of that system, we've never failed to deliver water.  So, it's a very phenomenal system.  I'm actually really happy to talk about it quite frequently and I do this presentation a lot.  So, I enjoy it.

Obviously, these are large diameter pipelines delivering this water because it's moving a lot of water. A lot of our pipelines are about six foot in diameter, some are smaller.

Susan will talk a little bit more in detail about the pipelines that are related to this project.

This water -- 85% of the water comes from Hetch Hetchy Reservoir. We do not collect water in the Alameda Creek Watershed which is Calavares Dam and Reservoir there in -- let me see if I can get a pointer going. There! I do this more easily this way.

So, the Alameda Creek Watershed is here (indicates), Calavares Dam and Reservoir along the San Antonio Reservoir. We actually also collect, of course, water right here in the Crystal Springs Reservoirs which is a combination -- which this Reservoir is San Andreas Lake, upper and lower Crystal Springs Reservoirs.

Those are a part of the regional system. These two local water supplies contribute about 15% of the water but, again, the primary source, 85% comes from Hetch Hetchy. Two-thirds of that water in the entire system is actually delivered outside the City and County of San Francisco. So, that's used by those wholesale customers, including San Mateo County where you are all getting your water.

The Hetchy source is actually an unfiltered source. We meet all surface water requirements, so we do not have to filter that water. It's a very unique characteristic of the reservoir. That means the system water is not filtered. It is treated for -- it's disinfected so that we don't have any waterborne illness or disease that's carried but primarily unique also because it does not require filtration which means this is a very clean efficient system.

We also generate hydroelectric power from the water coming downhill from Yosemite National Park.

So, as we get closer here (indicates) -- I'm going to go to the next slide -- I'm going to talk a little bit about projects that exist, that are in construction here in the local area of San Mateo County.

We are in the midst of a $4.6 billion water system improvement program. This is an infrastructure upgrade. It is intended primarily for reliability and seismic reliability. That means, you know, this system actually crosses three seismic faults.

They cover -- it would be across the Calavares fault, the Hayward fault, and the San Andreas fault. So, we are very conscious of the fact that this system is critical to the whole Bay Area and we need to make sure that we can deliver water following a major seismic event and maintain the system through continued useful life.

So, the projects you see here in San Mateo County and there's a second slide that I'll show you are part of the water system improvement program.

We have eighty-six projects in that program. We are already midway through. We are in the highest point of construction now. We expect the program to complete by approximately 2015 mid-year early 2016. So, the peninsula pipeline project will be one of these projects.

So, some of this is already completely did. Some of it is by Pipeline No. 3. There in purple, that work is actually complete. We've already finished that project.

Crystal Springs Pipeline No. 2, you see here in the blue has a number of areas, including work along El Camino Real. That work is currently in progress.

There's a series of projects around the Crystal Springs reservoirs. The yellow you see there is work in all the inlet and outlet structures and the water transmission lines that move water between the lower Crystal Springs Reservoirs and up to San Andreas Lake and into the water transmission system.

We also did a bypass tunnel. We did work on the Crystal Springs Dam which is one of the oldest dams in our system. 1890 it was built and actually survived the 1906 Earthquake with no movement. So, it's a critical part of the infrastructure; very interesting thing.

Harry Tracy Water Treatment Plant also which is something that you may recognize which is across the street or across 280. That is a water treatment plant that treats the water that comes out of these reservoirs.

So, these reservoirs are a backup emergency water supply for San Mateo County. So, if we -- we do use this water, we use it and blend it in frequently but there are points in time when we do maintenance on the Hetch Hetchy aqueduct that we rely solely on this water and the Alameda Creek water to serve the system and, most importantly, the work that we are doing to upgrade that transmission that, you know, capacity of all pipelines.

In case there is an actual break in the aqueduct getting it down from Yosemite National Park, this area will be relying on the water above Crystal Springs and the San Andreas Lake for the short term until the system is restored.

So, that's the majority of overview of what you may be seeing around you. I am more than happy to answer more detailed questions on projects afterwards.

I'm going to turn this over to Susan now so she can talk more specifically about the areas that you've seen here in the Peninsula Pipelines Project.

MS. HOU: Thank you, Alison, and I'll just put this back here.

Okay, good evening. Again, my name is Susan Hou and I'm the Project Manager for this Peninsula Pipeline Seismic Upgrade Project.

So, as Alison mentioned earlier we are the aging facilities here, the system here for the PUC where some of the facilities were constructed a long time ago in the 1900s and during the geotechnical investigation for the Harry Tracy Water Treatment Plant improvement long-term program which is also one of the WSIP program, we found out there are like some of the Serra fault crosses three of our facilities and our concern is that during the earthquake and one of these fault will rupture and then they will damage -- possibly damage the pipelines.

So, with that, we have created this project as one of the last project in the WSIP program.

so, besides the Serra fault crossing, we also identified some other issues along the pipeline where we found out we might have potential liquefaction issues, landslide issues, and also ground shaking.

So, it is the PUC goal to make sure that we have a safe water delivery after a seismic event. So, that's why we have this project in place.

Now, this slide shows you -- we have six project components identified for the projects and these six project components are located at five different sites. The first one is in Colma where we have one project component and then we have South San Francisco which we also have one project component.

Moving down here, we have San Bruno North where we also have one project component and in San Bruno's South site, we have two components that we need to address in there and the last item which is the Millbrae site where we also have one project component.

Further down the slide, I'm going to kind of go through details what each site entails. So, for the project component, our goal is to address four of the seismic issues where we might have earthquake-induced hazard.

So, the first one is fault crossing and landslides. So, what we propose to do is to replace approximately 3,200 feet of pipelines at two fault crossing locations in the City of San Bruno and also Millbrae and then for the second issue which is the liquefaction, we also identified two sites where we need to replace approximately 1,350 feet of pipelines in the Cities of Colma and South San Francisco and, for the last hazard which is ground-shaking, we need to provide structural support of a pipe inside tunnel which is in the City of San Bruno and we call that a San Bruno North site.

Now, this is the first site that we will be looking at. In terms of sequence, it all depends on when the project comes on board, what is the most appropriate way to do it, and also these are all tied into the shut-down schedule and I'll just kind of go through it by geographic location.

First site which is the Colma site which is the northernmost reference site and this site here when you look at those box here, this is the area where we need to replace approximately seven hundred feet of pipes.

Now, we have two pipelines parallel to each other. The pipes that needs to be replaced is the 54-inch pipeline which is on the -- I believe it's on the left-hand side of the site and we will need to replace this portion of the pipes because of the liquefaction issues that we have identified.

So, the boundary of the work will be between Serra Monte Boulevard and Collins Avenue. We will be doing open trench construction method here, meaning like we'll excavate pipes and then we will take out pipes and put it back in place and construction duration right now is estimated to be about approximately two to three months.

If you're familiar, we have Kohl's here and also we have a car dealership here.

Now, going down south, we have the next site which we call the South San Francisco site. We are going work here also to address liquefaction issues on the 54-inch pipeline which is the same pipeline as we talked about for the Colma site.

Again, this box which is the area that we need to be placed, we have approximately six hundred fifty feet of pipes that need to be replaced between Orange Avenue here and Arroyo in South San Francisco.

For this one is slightly different than the previous one.  There is a site in here which is about approximately one hundred fifty feet of pipes where we will be doing jack and bore or sliplining beneath the street.  The main reason is because we have a culvert there and also we want to avoid heavy traffic in that area.  There will be also some tree removals.

In here, we have some groves right there and we need to clear the trees away on top of our right-of-way.

The construction duration for this is approximately two to three months.  Now, this photo shows you an example of how the jack-and-bore we've done.  Basically, these two black box here, we're going to be opening up these two box to allow -- to drop in the new pipes.

We are doing sliplining like that we will be dropping down new pipe into an existing pipe, if we were to do jack-and-bore, we'd be using the same slips here but we'd be lowering the pipes way much deeper and then push it through the soil to the other side.

So that would be called -- considered the jack-and-bore where we push the pipes through.  The other one would be like a receiving pits where we'd be pulling pipes up.

At this time, we still haven't determined whether it'll be sliplined or jack-and-bore.  Our design is going to start next year and then we'll have more information at that time and outside of these two boxes here, these areas north here and south here, we'll be doing open trench as we discussed before.

So, going further down south, we have another site called San Bruno North.  Now, this site we will not be doing any pipeline replacement.

This site is mainly to address the ground-shaking hazard.  So what's happening right now is we have a 54-inch pipeline again, like the pipeline for the other two sites where it is sitting in tunnel without any lateral support.

So, our proposed project here is to provide a structural support for the pipe inside tunnel.  The way we do it is we'll be digging two pits here which is a much smaller size, approximately 10 x 10, and we will either put grout through it to inject it to the support the pipes or we'll probably put some heavy sand bags in there and the construction duration for this is much shorter which is two weeks period of time because we're not replacing pipes.

Now, further down south also in the same city we call the site San Bruno south.  This is the one that will involve the most work in here.

We'll be replacing approximately 1,100 feet of 54-inch pipeline.  Again, the same pipe as the one that we talked about but, in addition to that, there'll be a pipe next to it which is 60 -- actually, I'm sorry.  It's a typo.  It's a 66-inch pipeline sitting right next to the 54-inch, so we would be replacing these two together for this project.

On that piece, we need to replace about nine hundred feet and these two lengths would be situated inside this box as well and the sequence to do this work, we will not be doing these two pipelines together because of the shutdown constraints.

So, one pipe will be shut down first and when we're done, we will back-fill it and then we will proceed to the other pipes and shut it down and do the other one.

This work here is meant to address the Serra fault crossing issues and we also extend the length to each end to address some of the land slide hazard that we found in this area.

This site here, we will be doing open trench construction work mainly to dig it out and we will put it back in the same place.

As I mentioned earlier, construction duration will be a little bit longer because the pipe, you know, we had two pipes that we needed to deal with will take about eight to ten months which is a total duration for the two pipes together.

Our last site in here, we call it our Millbrae site. This one will be replacing about 1100 feet of pipes which is a 60-inch pipeline in this red box.

Now, this will be going through like two houses, two neighbors, and then go down slope a little bit and then go onto one of the -- go into the golf course which I think will be cutting through the golf hole No. 5 if you play golf in that area.

This site is to address the fault crossing issues, mainly. We have -- I'm sure a lot of you are aware we have a lot of trees in this area. We will need to remove all those trees before construction starts. This one will be open trench, similar to the other one. Construction duration is approximately three months for this site.

Now, this is the estimated schedule for the entire project. As Tim mentioned earlier, we have started the environmental review in the Summer this year and it will be continued through Summer to Fall of 2013.

We are almost done with the planning phase. Design phase is going to start -- design includes the planning phase which was started in the Spring and it will be concluded in the Summer 2013.

Now, at this time we're planning to start construction in Winter 2014 and it will be for approximately for a duration of 12 to 18 months and we estimate it to be completed in the Fall 2015.

Again, just to recapture, our goal here is to make sure we do all the proper fixes to ensure you have a safe way out of the water to be delivered to you after a major seismic earthquake.  So, it's very crucial for us to have this project implemented as soon as we could.

Now, I'm going to turn over -- this back to Tim Johnston to conduct, for public comments.

MR. JOHNSTON:  All right.  Thanks, Susan.

So, as far as we're concerned, this is the main part of the meeting where we get to hear from you now that you've had the overview of the environmental review process, an overview of the project.

So, please remember that we're here tonight to receive comments related to what you would like to see analyzed in the EIR.

For those of you who want to speak tonight, if you haven't yet filled out a speaker card, please do so now.

So, yes.  As I mentioned earlier, this is an opportunity for you to assist the San Francisco Planning Department in conducting the environmental review of the project by sharing any information or comments you may have.

The public comment session of this meeting, of this portion of the meeting, it's not a question-and-answer session.  We're here to hear from you.

If you pose your comments as a question, we will interpret that as a comment and, again, for your comments to be included formally as part of the record, we need to receive them verbally tonight during this portion of the meeting or in writing via email, fax, or snail mail.

Any comments or questions or discussions you had before the meeting started are informal and off-the-record and any comments or questions you may have with any of us after the meeting would be informal and off-the-record.

So, let's go over some ground rules. Looks like we have two people that wish to speak tonight. Is that correct? Okay, yeah, yeah. Okay. So, this should be short.

We will not limit you to three minutes, given that there are only two of you, so but please be concise and clear so we can capture the essence of what you're concerned about and can analyze it all.

So, we've got three people tonight. Okay. So, after the formal part of the meeting finishes, we will remain around for half an-hour in case anyone has any comments or questions that you want to ask afterwards but, with that, I would like to open it up and, let's see.

Do we have Steve Balchior?

MR. BALCHIOR: Was that "Steve"?

MR. JOHNSTON: Steve.

MR. BALCHIOR: Yeah. I had some questions. No comments, though.

MR. JOHNSON: Okay.

MR. BALCHIOR: I'll wait until after the meeting is over and ask some questions then.

MR. JOHNSTON: Okay. They will not be part of the record but if they help you to form comments you would like to make, you have until December 9th to offer those comments.

Eva, would you like to speak, to offer your comments?

MS. TONG: Yes.

MR. JOHNSTON: Okay. Why don't you -- would you like her to use the microphone?

VOICE: I don't -- I think she'll be fine.

MS. TONG: I think I'm okay.

MR. JOHNSTON: Well, it's helpful for the Court Reporter to more accurately report your comments.

VOICE: Oh, you could just repeat the question to us.

MS. TONG: I'm really concerned about any gas pipelines around and then will it be make a mistake like the recent San Bruno explosion, okay? That's what I'm concerned about that.

MR. JOHNSTON: Okay. So, again, we're going to interpret that as a comment and we understand that you are concerned about gas pipelines.

MS. TONG: Yeah.

MR. JOHNSTON: And, of course, we are going to analyze that in the EIR. We are going to analyze that issue. So, let's go to Silvia.

MS. PRATT: Okay.

My question is between the beginning of one project and the other project, how are you going to meet them together? Like I'm seeing that in San Bruno from the North and the South and you are going to be opening the Shelter Creek Lane. So, is that going to be completely -- because we are almost 3,000 people in that --

MR. JOHNSTON: Okay.

MS. PRATT: -- in those condominiums.

MR. JOHNSTON: Uh-huh.

MS. PRATT: So, how can -- see that between -- I don't know. They will be No. 6 I think it is, and the parking building if you are going to go through. So, we are going to be, you know, in the middle of that.

MR. JOHNSTON: Yeah, right.

MS. PRATT: So, how are you going to --

MR. JOHNSTON: Okay.

Again, we're not going to answer questions tonight but your concern will be answered in the Environmental Impact Report that we'll be producing.

So, we're going to interpret that as a comment that you are concerned about impacts at the Shelter Creek condominiums.

MS. PRATT: Yes.

MR. JOHNSTON: And we will for sure be analyzing those impacts in the EIR.

MS. PRATT: Because all the entrance and exists are only through the Shelter --

MR. JOHNSTON: Limited, yeah, for sure. So, yes. That will be analyzed in the EIR.

MS. PRATT: Thank you.

MR. JOHNSTON: Alan Wong?

MR. WONG: Well, I'm concerned, you know, what's that term? What's the meaning of that term, "liquefaction"?

MR. JOHNSTON: Okay.

So, we're going to interpret that that you're concerned about liquefaction and we will definitely analyze impacts from liquefaction in the EIR but the SFPUC staff that are here tonight, they can respond to that informally tonight after the meeting and explain liquefaction to you.

MR. WONG: The second thing is that since the San Bruno South project was taking eight to ten months and using a lot of the land on this area and some of that land belongs to San Bruno Chinese Church and we were just concerned there will be any kind of interference and activity and alteration of the church congregation and we should be discuss some other time.

MR. JOHNSTON: Yeah. Okay, so --

MR. WONG: Main concern.

MR. JOHNSTON: Yes, and so we will interpret that as that you are concerned about impacts to surrounding land uses, including the Chinese Church and there is a whole chapter in the EIR that discusses impacts to adjacent land uses.

So that will be analyzed in the EIR.  Any other questions or comments, preferably comments tonight?  Yes, sir.

MR. BALCHIOR:  My comment is, for the record, you answered questions as best you can.  We were concerned now about --

MR. JOHNSTON:  Yes.

MR. BALCHIOR:  -- roads that are going to be torn up and what's going to happen and you commented that we're going to hear about this a little bit later.

MR. JOHNSTON:  Okay.

Well, just to -- let me just go into a little bit more detail about how the process works.

Tonight, we will receive comments from the public as to what you want to see analyzed in the EIR.  We're going to go away for a year and work on this Environmental Impact Report.

When it's ready, we're going to circulate it.  We're going to let all of you know.  We're going to send out mailers and there will be a 45-day comment period on the Draft Environmental Impact Report.

We're going to have another hearing like we're having here tonight here.  There will be another one, a hearing at the San Francisco Planning Commission as well and, at that hearing, you will have had a chance to review the Draft EIR and you will have a chance to let us know at that time if you think we addressed your concerns adequately and, if not, why not.

So, this is really just the beginning of the process and there's going to be another hearing once the draft is released and you will have another chance to comment on that Draft Environmental Impact Report once that's been released for review.

Very well. With that, we can bring this meeting to an end. So, here's the information on where to mail, where to fax, where to email your comments and if at any time throughout the process you have questions, you can call me. You can email me.

I've got business cards at the table there. If you have any questions about the environmental review process that may occur to you later, please feel free to get in touch.

If you have questions about the proposed project and what the PUC has in mind, those questions should be directed to Alison and, with that, we're done.

Thank you very much for coming.

(CONCLUDED AT 7:10 P.M.)

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## REPORTER'S CERTIFICATE

I, EASTELLER BRUIHL, CSR No. 3077, a California Certified Shorthand Court Reporter for Star Reporting Service, Inc., 703 Market Street, Suite 1005, San Francisco, California 94013, do hereby certify:

That the foregoing proceedings were tape recorded at the time and place therein set forth, monitor unknown, and that all discernibly audible comments, objections and statements made at the time of the proceedings were thereafter transcribed;

That the foregoing is a true and correct transcript to the best of my ability of the taped hearing proceedings.

I further certify that I am not a relative or employee of any attorney of the parties nor financially interested in the action.

I declare under penalty of perjury by the laws of the State of California that the foregoing is true and correct.

Dated: FRIDAY, DECEMBER 16, 2011.

______________________________________

Easteller Bruihl, RPR, CSR No. 3077

# APPENDIX E

# WRITTEN COMMENTS RECEIVED DURING THE SCOPING PERIOD

STATE OF CALIFORNIA
Governor's Office of Planning and Research
State Clearinghouse and Planning Unit

Edmund G. Brown Jr.
Governor

Ken Alex
Director

RECEIVED

NOV 21 2011

CITY & COUNTY OF S.F.
PLANNING DEPARTMENT
MEA

**Notice of Preparation**

November 8, 2011

To: Reviewing Agencies

Re: Peninsula Pipelines Seismic Upgrade Project
SCH# 2011112028

Attached for your review and comment is the Notice of Preparation (NOP) for the Peninsula Pipelines Seismic Upgrade Project draft Environmental Impact Report (EIR).

Responsible agencies must transmit their comments on the scope and content of the NOP, focusing on specific information related to their own statutory responsibility, within 30 days of receipt of the NOP from the Lead Agency. This is a courtesy notice provided by the State Clearinghouse with a reminder for you to comment in a timely manner. We encourage other agencies to also respond to this notice and express their concerns early in the environmental review process.

Please direct your comments to:

**Timothy Johnston**
**San Francisco Planning Department**
**1650 Mission St. Suite 400**
**San Francisco, CA 94103**

with a copy to the State Clearinghouse in the Office of Planning and Research. Please refer to the SCH number noted above in all correspondence concerning this project.

If you have any questions about the environmental document review process, please call the State Clearinghouse at (916) 445-0613.

Sincerely,

Scott Morgan
Director, State Clearinghouse

Attachments
cc: Lead Agency

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
TEL (916) 445-0613 FAX (916) 323-3018 www.opr.ca.gov

# Document Details Report
# State Clearinghouse Data Base

| | |
|---|---|
| ***SCH#*** | **2011112028** |
| ***Project Title*** | Peninsula Pipelines Seismic Upgrade Project |
| ***Lead Agency*** | San Francisco, City and County of |

| | |
|---|---|
| ***Type*** | **NOP** Notice of Preparation |
| ***Description*** | The San Francisco Public Utilities Commission (SFPUC) is proposing the Peninsula Pipelines Seismic Upgrade project, which includes six project components at five different locations on the San Francisco Peninsula in San Mateo County, in the cities of Colma, South San Francisco, San Bruno and Millbrae. The proposed project consists of upgrades to three Regional Water System water transmission pipelines, San Andreas Pipelines No. 2 and 3 as well as Sunset Supply Branch Pipeline, to increase pipeline reliability during potential seismic events. The proposed project is one of several pipeline and facility improvement projects that the SFPUC proposes to implement under the SFPUC's Water System Improvement Program. |

## Lead Agency Contact

| | | | | | |
|---|---|---|---|---|---|
| ***Name*** | Timothy Johnston | | | | |
| ***Agency*** | San Francisco Planning Department | | | | |
| ***Phone*** | 415 575 9035 | ***Fax*** | | | |
| ***email*** | | | | | |
| ***Address*** | 1650 Mission St. Suite 400 | | | | |
| ***City*** | San Francisco | ***State*** | CA | ***Zip*** | 94103 |

## Project Location

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ***County*** | San Mateo | | | | | | |
| ***City*** | Colma, South San Francisco, San Bruno, Millbrae | | | | | | |
| ***Region*** | | | | | | | |
| ***Cross Streets*** | Serramonte Blvd. Westborough Blvd. Whitman Way, Ridgewood Dr | | | | | | |
| ***Lat / Long*** | 37° 39' 16" N / 122° 26' 16" W | | | | | | |
| ***Parcel No.*** | multiple | | | | | | |
| ***Township*** | | ***Range*** | | ***Section*** | | ***Base*** | |

## Proximity to:

| | |
|---|---|
| ***Highways*** | I-280, 380, Hwy 101, Route 82 |
| ***Airports*** | SFO |
| ***Railways*** | Caltrain, BART |
| ***Waterways*** | Colma Creek, Twelve Mile Creek, Green Hills Creek |
| ***Schools*** | Yes |
| ***Land Use*** | N/A project is predominately within San Francisco Public Utilities Commission right-of-way |

| | |
|---|---|
| ***Project Issues*** | Aesthetic/Visual; Air Quality; Archaeologic-Historic; Biological Resources; Drainage/Absorption; Geologic/Seismic; Minerals; Noise; Population/Housing Balance; Public Services; Recreation/Parks; Soil Erosion/Compaction/Grading; Solid Waste; Toxic/Hazardous; Traffic/Circulation; Vegetation; Water Quality; Water Supply; Growth Inducing; Landuse; Cumulative Effects; Other Issues |

| | |
|---|---|
| ***Reviewing Agencies*** | Resources Agency; Department of Parks and Recreation; San Francisco Bay Conservation and Development Commission; Department of Fish and Game, Region 3; Office of Emergency Management Agency, California; Native American Heritage Commission; Public Utilities Commission; Caltrans, Division of Aeronautics; California Highway Patrol; Caltrans, District 4; Regional Water Quality Control Board, Region 2 |

| | | | | | |
|---|---|---|---|---|---|
| ***Date Received*** | 11/08/2011 | ***Start of Review*** | 11/08/2011 | ***End of Review*** | 12/07/2011 |

Note: Blanks in data fields result from insufficient information provided by lead agency.

Print Form

*Appendix C*

## Notice of Completion & Environmental Document Transmittal

*Mail to:* State Clearinghouse, P.O. Box 3044, Sacramento, CA 95812-3044 (916) 445-0613
*For Hand Delivery/Street Address:* 1400 Tenth Street, Sacramento, CA 95814

SCH # 2011112028

**Project Title:** Peninsula Pipelines Seismic Upgrade Project

Lead Agency: San Francisco Planning Department
Contact Person: Timothy Johnston
Mailing Address: 1650 Mission St. Suite 400
Phone: (415) 575-9035
City: San Francisco
Zip: 94103
County: San Francisco

**Project Location:** County: San Mateo
City/Nearest Community: Colma/So San Francisco/San Bruno/Millbrae
Cross Streets: Serramonte Blvd, Westborough Blvd, Whitman Way, Ridgewood Dr
Zip Code: N/A
Longitude/Latitude (degrees, minutes and seconds): 37 ° 39 ′ 16 ″ N / 122 ° 26 ′ 16 ″ W Total Acres:
Assessor's Parcel No.: multiple
Section: N/A Twp.: N/A Range: N/A Base: N/A
Within 2 Miles: State Hwy #: I-280, I-380, Hwy 101, Rte 82
Waterways: Colma Creek, Twelve Mile Creek, Green Hills Creek
Airports: SFO
Railways: Caltrain, BART
Schools: Meadows Elementary Schoo Glen Oaks/Millbrae Montessori, Baden High School, San Mateo Union/Peninsula High School, Crestmoor

**Document Type:**

CEQA: ☒ NOP ☐ Early Cons ☐ Neg Dec ☐ Mit Neg Dec ☐ Draft EIR ☐ Supplement/Subsequent EIR (Prior SCH No.) Other:

NEPA: ☐ NOI ☐ EA ☐ Draft EIS ☐ FONSI

Other: ☐ Joint Document ☐ Final Document ☐ Other:

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STATE CLEARING HOUSE

**Local Action Type:**

☐ General Plan Update
☐ General Plan Amendment
☐ General Plan Element
☐ Community Plan
☐ Specific Plan
☐ Master Plan
☐ Planned Unit Development
☐ Site Plan
☐ Rezone
☐ Prezone
☐ Use Permit
☐ Land Division (Subdivision, etc.)
☐ Annexation
☐ Redevelopment
☐ Coastal Permit
☐ Other:

**Development Type:**

☐ Residential: Units Acres
☐ Office: Sq.ft. Acres Employees
☐ Commercial: Sq.ft. Acres Employees
☐ Industrial: Sq.ft. Acres Employees
☐ Educational:
☐ Recreational:
☒ Water Facilities: Type See other MGD
☐ Transportation: Type
☐ Mining: Mineral
☐ Power: Type MW
☐ Waste Treatment: Type MGD
☐ Hazardous Waste: Type
☒ Other: Retrofit of existing water transmission pipelines

**Project Issues Discussed in Document:**

☒ Aesthetic/Visual
☐ Agricultural Land
☒ Air Quality
☒ Archeological/Historical
☒ Biological Resources
☐ Coastal Zone
☒ Drainage/Absorption
☐ Economic/Jobs
☐ Fiscal
☐ Flood Plain/Flooding
☐ Forest Land/Fire Hazard
☒ Geologic/Seismic
☒ Minerals
☒ Noise
☒ Population/Housing Balance
☒ Public Services/Facilities
☒ Recreation/Parks
☐ Schools/Universities
☐ Septic Systems
☐ Sewer Capacity
☒ Soil Erosion/Compaction/Grading
☒ Solid Waste
☒ Toxic/Hazardous
☒ Traffic/Circulation
☒ Vegetation
☒ Water Quality
☒ Water Supply/Groundwater
☐ Wetland/Riparian
☒ Growth Inducement
☒ Land Use
☒ Cumulative Effects
☒ Other: GHG Emissions

**Present Land Use/Zoning/General Plan Designation:**

N/A project is predominately within San Francisco Public Utilities Commission right-of-way

**Project Description:** *(please use a separate page if necessary)*

The San Francisco Public Utilities Commission (SFPUC) is proposing the Peninsula Pipelines Seismic Upgrade project, which includes six project components at five different locations on the San Francisco Peninsula in San Mateo County, in the cities of Colma, South San Francisco, San Bruno and Millbrae. The proposed project consists of upgrades to three Regional Water System water transmission pipelines, San Andreas Pipelines No. 2 and 3 as well as Sunset Supply Branch Pipeline, to increase pipeline reliability during potential seismic events. The proposed project is one of several pipeline and facility improvement projects that the SFPUC proposes to implement under the SFPUC's Water System Improvement Program (WSIP).

*Note: The State Clearinghouse will assign identification numbers for all new projects. If a SCH number already exists for a project (e.g. Notice of Preparation or previous draft document) please fill in.*

Revised 2010

# NOP Distribution List

**County:** San Mateo

**SCH#** 2011112028

## Resources Agency

☒ **Resources Agency**
Nadell Gayou

☐ **Dept. of Boating & Waterways**
Nicole Wong

☐ **California Coastal Commission**
Elizabeth A. Fuchs

☐ **Colorado River Board**
Gerald R. Zimmerman

☐ **Dept. of Conservation**
Elizabeth Carpenter

☐ **California Energy Commission**
Eric Knight

☐ **Cal Fire**
Allen Robertson

☐ **Central Valley Flood Protection Board**
James Herota

☐ **Office of Historic Preservation**
Ron Parsons

☒ **Dept of Parks & Recreation**
Environmental Stewardship Section

☐ **California Department of Resources, Recycling & Recovery**
Sue O'Leary

☒ **S.F. Bay Conservation & Dev't. Comm.**
Steve McAdam

☐ **Dept. of Water Resources** Resources Agency
Nadell Gayou

## Fish and Game

☐ **Depart. of Fish & Game**
Scott Flint
Environmental Services Division

☐ **Fish & Game Region 1**
Donald Koch

☐ **Fish & Game Region 1E**
Laurie Harnsberger

☐ **Fish & Game Region 2**
Jeff Drongesen

☒ **Fish & Game Region 3**
Charles Armor

☐ **Fish & Game Region 4**
Julie Vance

☐ **Fish & Game Region 5**
Leslie Newton-Reed
Habitat Conservation Program

☐ **Fish & Game Region 6**
Gabrina Gatchel
Habitat Conservation Program

☐ **Fish & Game Region 6 I/M**
Brad Henderson
Inyo/Mono, Habitat Conservation Program

☐ **Dept. of Fish & Game M**
George Isaac
Marine Region

## Other Departments

☐ **Food & Agriculture**
Sandra Schubert
Dept. of Food and Agriculture

☐ **Depart. of General Services**
Public School Construction

☐ **Dept. of General Services**
Anna Garbeff
Environmental Services Section

☐ **Dept. of Public Health**
Bridgette Binning
Dept. of Health/Drinking Water

☐ **Delta Stewardship Council**
**Terry Macaulay**

## Independent Commissions,Boards

☐ **Delta Protection Commission**
Linda Flack

☒ **Cal EMA (Emergency Management Agency)**
Dennis Castrillo

☒ **Native American Heritage Comm.**
Debbie Treadway

☒ **Public Utilities Commission**
Leo Wong

☐ **Santa Monica Bay Restoration**
Guangyu Wang

☐ **State Lands Commission**
Jennifer Deleong

☐ **Tahoe Regional Planning Agency (TRPA)**
Cherry Jacques

## Business, Trans & Housing

☒ **Caltrans - Division of Aeronautics**
Philip Crimmins

☐ **Caltrans - Planning**
Terri Pencovic

☒ **California Highway Patrol**
Suzann Ikeuchi
Office of Special Projects

☐ **Housing & Community Development**
CEQA Coordinator
Housing Policy Division

## Dept. of Transportation

☐ **Caltrans, District 1**
Rex Jackman

☐ **Caltrans, District 2**
Marcelino Gonzalez

☐ **Caltrans, District 3**
Bruce de Terra

☒ **Caltrans, District 4**
Lisa Carboni

☐ **Caltrans, District 5**
David Murray

☐ **Caltrans, District 6**
Michael Navarro

☐ **Caltrans, District 7**
Elmer Alvarez

☐ **Caltrans, District 8**
Dan Kopulsky

☐ **Caltrans, District 9**
Gayle Rosander

☐ **Caltrans, District 10**
Tom Dumas

☐ **Caltrans, District 11**
Jacob Armstrong

☐ **Caltrans, District 12**
Marlon Regisford

## Cal EPA

**Air Resources Board**

☐ Airport/Energy Projects
Jim Lerner

☐ Transportation Projects
Douglas Ito

☐ Industrial Projects
Mike Tollstrup

☐ **State Water Resources Control Board**
Regional Programs Unit
Division of Financial Assistance

☐ **State Water Resources Control Board**
Student Intern, 401 Water Quality Certification Unit
Division of Water Quality

☐ **State Water Resouces Control Board**
Phil Crader
Division of Water Rights

☐ **Dept. of Toxic Substances Control**
CEQA Tracking Center

☐ **Department of Pesticide Regulation**
CEQA Coordinator

## Regional Water Quality Control Board (RWQCB)

☐ **RWQCB 1**
Cathleen Hudson
North Coast Region (1)

☒ **RWQCB 2**
Environmental Document Coordinator
San Francisco Bay Region (2)

☐ **RWQCB 3**
Central Coast Region (3)

☐ **RWQCB 4**
Teresa Rodgers
Los Angeles Region (4)

☐ **RWQCB 5S**
Central Valley Region (5)

☐ **RWQCB 5F**
Central Valley Region (5)
Fresno Branch Office

☐ **RWQCB 5R**
Central Valley Region (5)
Redding Branch Office

☐ **RWQCB 6**
Lahontan Region (6)

☐ **RWQCB 6V**
Lahontan Region (6)
Victorville Branch Office

☐ **RWQCB 7**
Colorado River Basin Region (7)

☐ **RWQCB 8**
Santa Ana Region (8)

☐ **RWQCB 9**
San Diego Region (9)

☐ **Other** ____________________
____________________
____________________

☐ ____________________
Conservancy

Last Updated 9/29/11

BAWSCA
Bay Area Water Supply & Conservation Agency

December 8, 2011

Mr. Bill Wycko
Environmental Review Officer
Peninsula Pipelines Seismic Upgrade Project EIR Scoping Comments
San Francisco Planning Department
1650 Mission Street, Suite 400
San Francisco, CA 94103-2479

**Subject:** **Case No. 2011.0123E – Notice of Preparation (NOP) of an EIR for the SFPUC Peninsula Pipelines Seismic Upgrade Project**

Dear Mr. Wycko,

Thank you for the opportunity to provide the following comments from the Bay Area Water Supply & Conservation Agency (BAWSCA). BAWSCA represents the interests of 25 cities and water districts, an investor-owned utility, and a university, that purchase water wholesale from the San Francisco Regional Water System. These agencies, in turn, provide water to 1.7 million people, businesses and community organizations in Alameda, Santa Clara and San Mateo Counties. These comments are in response to the Notice of Preparation of an Environmental Impact Report (EIR) for the Peninsula Pipelines Seismic Upgrade project dated November 9, 2011. They are intended as input to the scope and focus of the project.

The comments below follow the report organization and do not reflect the level or priority.

1. **Section 2.3 – Proposed Facilities and Operation**
   The description of the work at the Millbrae Site refers to "an approximately 890-foot segment of SSBPL." This description is not entirely consistent with the Peninsula Pipelines Seismic Upgrade Final Alternatives Analysis Report (SFPUC, September 2011) that describes the recommended alternative for that location as "replace 1,075 feet of pipe and encase the bends in reinforced concrete" (see page 6-42 of AAR). The delineation of the pipeline construction zone at this site in the EIR should be consistent with the corresponding pipeline segment currently under study in the Peninsula Pipelines Seismic Upgrade Conceptual Engineering Report.

2. **Section 3.1 – Environmental Issues to be Discussed in the EIR**
   The Utilities and Services section of the EIR should provide a thorough discussion of the construction phase impacts on all SFPUC wholesale customer turnouts located on the affected pipeline segments, especially during periods when service will not be available from these turnouts.

3. **Section 3.2 – Alternatives**
   Project alternatives discussed in the EIR should quantify the degree to which the seismic reliability goal can be met as well as any differences in normal operating performance from the existing facilities (e.g., hydraulic capacity).

Thank you for the opportunity to provide these comments on the Notice of Preparation dated November 9, 2011 regarding the Peninsula Pipelines Seismic Upgrade project. If you have any questions, please contact me at (650) 349-3000.

Sincerely,

Nicole M. Sandkulla

Nicole M. Sandkulla, P.E.
Water Resources Planning Manager

cc: S. Hou, SFPUC
A. Jensen, BAWSCA
T. Roberts, Terry Roberts Consulting
File

"Aaron Aknin" <AAknin@sanbruno.ca.gov> 12/09/2011 09:38 AM

To <timothy.johnston@sfgov.org>

cc "Klara Fabry" <KFabry@ci.sanbruno.ca.us>, "Connie Jackson" <CJackson@ci.sanbruno.ca.us>

bcc

Subject
Peninsula Pipeline Seismic Upgrade Project - NOP Comments

Hi Mr. Johnston:

Thank you providing the NOP for the proposed Peninsula Pipeline Seismic Upgrade Project.

I have not had a chance to review the proposed project in detail, however we would appreciate the following areas being analyzed in the EIR.

Noise Levels and Impacts on Adjacent Neighborhoods
Parking and Traffic Impacts
Dust Impacts
Stormwater impacts
Impact on other utilities and public right of way

In addition to the areas above, we would appreciate the Draft EIR stating how neighborhood outreach will be handled and who neighbors will contact if they have an issue.

Since you know the project well, please also use your best judgment in identifying issues that San Bruno residents would be concerned about. I would also suggest you change the name of the project to identify which type of pipelines you are upgrading. Although the project description identifies the work will be done on water lines, the title does not.

Thank you, and I look forward to hearing from you throughout the EIR process.

Aaron

Aaron J. Aknin, AICP
Community Development Director
Community Development Department
City of San Bruno
(650) 616-7039 phone
(650) 873-6749 fax

Aaron J. Aknin, AICP
Community Development Director
Community Development Department
City of San Bruno
(650) 616-7039 phone
(650) 873-6749 fax

TOWN OF COLMA
PLANNING DEPARTMENT

1190 El Camino Real • Colma, California 94014
Phone: (650) 757-8888 • FAX: (650) 757-8890

December 9, 2011

Mr. Timothy Johnston, EIR Coordinator
San Francisco Planning Department
1650 Mission Street, Suite 400
San Francisco, CA 94103-2479

Re: Case No. 2011.0123E - Peninsula Pipeline Seismic Upgrade Project Comments

Dear Mr. Johnston,

Thank you for the opportunity to comment on items we would like addressed in the EIR for the Peninsula Pipeline Seismic Upgrade Project. After attending the public scoping meeting and discussing the project with our Public Works Department, we would like to request that the EIR include a discussion of the following items:

*SFPUC ownership interest in the Fifth Avenue Right-of-Way and 60′ easement.* The existing pipeline and improvements are contained within a 60′ easement and a 25′ wide area that is half of the Fifth Avenue Right-of-Way (there may be additional easements). I have attached a copy of the Assessor's Parcel map to show the 25′ wide area of Fifth Avenue (the other half of Fifth Avenue was abandoned to the adjoining property owners). A brief discussion of the history of the establishment of the 60′ easement and the 25′ Right-of-Way and fee or easement ownership interest in these areas and other easements held in the vicinity by the SFPUC would be appreciated.

*Enhanced Site Plan.* We would also appreciate seeing an enhanced site plan or survey which shows the location of improvements to include the pipelines and other improvements (including the fence on the west side and retaining wall on the east side of the easement) and the location of the legal easement lines and the Fifth Avenue Right-of-Way line. The Figure 3 Colma Site diagram shows the construction area extending beyond the combined easement and Fifth Avenue Right-of-Way by 10 feet (85′ vs. 95′ on Figure 3). A discussion of this discrepancy would be appreciated.

*Staging and Spoils Area Options.* On Figure 3, Staging and Spoils locations are shown. We have concerns about the appearance and location of the staging area adjacent to Serramonte Boulevard which is a significant commercial corridor. This area may also impact Kohl's operations and customers. We would appreciate a discussion in the EIR of other feasible staging and spoils locations. Our preference would be to see more of the staging in the easement area, behind Kohl's and Enterprise, and/or further south, closer to Collins Avenue.

*Construction and Access.* Two access routes are also shown on Figure 3. We would appreciate a discussion of the total use of these access routes and the provisions that will be made to keep streets clean during construction and for any potential damage to the Kohl's parking lot, Collins Avenue or Serramonte Boulevard during construction. We assume that during the construction process new sections of pipe will be brought to the site on flatbed trucks. We would like to understand when these deliveries will be made and how they may impact traffic. Our preference would be that deliveries be made during non-peak periods and possibly later in the evening. The access route also shows the making of left turns from the Kohl's parking lot onto Serramonte Boulevard across oncoming traffic. This could significantly impact traffic and will require several flagmen to assist, depending on the types and numbers of trucks. The EIR should explore the making of only right turns in and right turns out of the Kohl's parking lot and construction route alternatives.

*Construction Schedule:* As presented, project construction is anticipated between Winter of 2014 and Fall of 2015. As you are aware, Colma is a regional shopping destination for automobiles (along Serramonte Boulevard) and other retail establishments. From Thanksgiving weekend through New Year's, traffic increases for holiday shopping – especially on weekends. While construction of the project could take place during this timeframe, additional provisions would need to be made to manage the project so as not to impact businesses during this time. Weekend construction, if proposed, could be problematic. Use of the Kohl's parking lot for staging during this time could also be problematic. In addition, construction during the winter months will require additional erosion control measures due to the potential for rain.

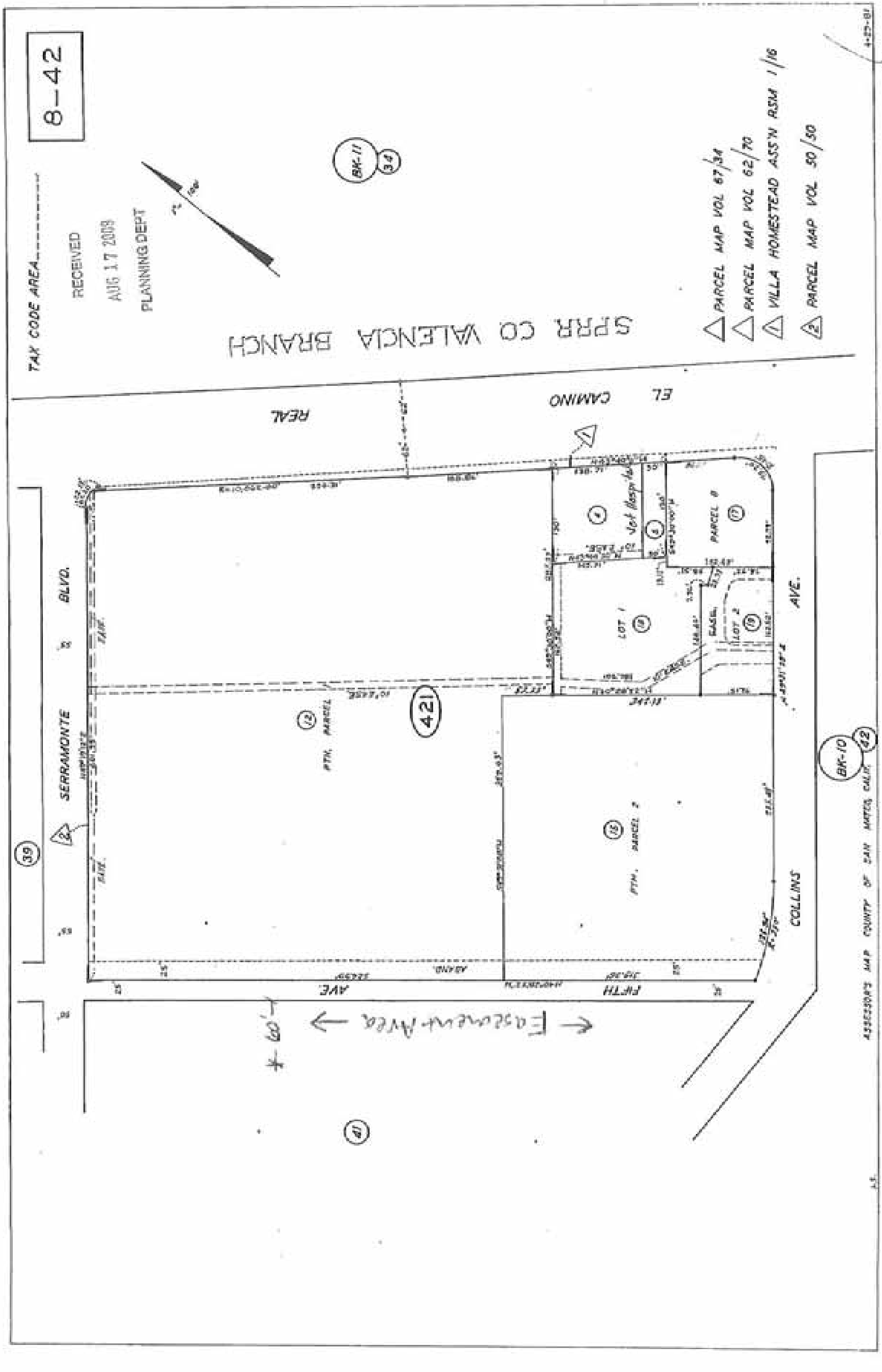
*Landscaping and Maintenance:* We would appreciate a discussion of any plans that the SFPUC has to provide landscaping after the project is completed and the schedule for maintenance. Currently, the easement contains weeds and grass which is mowed periodically. We would like the project to include provisions for improved landscaping and maintenance since the easement bisects our Serramonte commercial corridor.

Please feel free to contact me if you have any further questions.

Sincerely,

Michael P. Laughlin, AICP
Acting City Planner

Attachment: Assessor Parcel Map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PLANNING DEPT
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34
S.P.R.R. CO. VALENCIA BRANCH
1 PARCEL MAP VOL 67/34
PARCEL MAP VOL 62/70
VILLA HOMESTEAD ASS'N RSM 1/16
2 PARCEL MAP VOL 50/50
4-25-01
EL CAMINO REAL
SERRAMONTE BLVD.
FIFTH AVE.
COLLINS AVE.
421
PTN. PARCEL
12
PTN. PARCEL 2
13
LOT 1
18
LOT 2
19
PARCEL B
17
4
BK-10
42
39
41
Easement Area
± 60'
ASSESSOR'S MAP COUNTY OF SAN MATEO, CALIF.

Page 1 of 2

RECEIVED
DEC 0 8 2011
CITY & COUNTY OF S.F.
PLANNING DEPARTMENT
MEA

# WSIP Peninsula Pipelines Seismic Upgrade Project

## ENVIRONMENTAL IMPACT REPORT / CEQA SCOPING MEETING

*November 30, 2011*

## COMMENT CARD

**Privacy Notice:** Before including your name, address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information become part of the public record. Unless indicated by you otherwise, you will automatically be added to the official EIR mailing list by submitting this form.

| | |
|---|---|
| Name EVA TONG | Title Homeowner |
| Organization or business (if applicable) | |
| Address 1086 Ridgewood DR. | Phone (415) 867 4606 |
| City, State, Zip Millbrae CA - 94030 | Fax |
| E-Mail evastong @ yahoo.com | |

**Your input on the proposed project is greatly appreciated. Please provide your comments on the scope of the Environmental Impact Report to be prepared for the Peninsula Pipelines Seismic Upgrade Project, including potentially significant impacts, ways to mitigate those impacts, and feasible alternatives. Comments will be accepted until 5:00pm on December 9, 2011.** *(Continue on other side if necessary).*

① Mobilization of the site including removal of vegetation and grading & trench evacuation and shoring ; they will induce landslide esp. rainy season. my house will slip down the slope.

② In case of adverse effects where should we complain to and get compensation

③ The big trucks and cars keep passing Ridgewood drive and parking on the sidewalk outside my house ; this will contribute to damage or shorten the life span of the sidewalk, curb and the road. The owners are responsible for maintenance of side walk asplat road curb fronting my property.

④ The PG&E gas pipes are close to the construction site, explosion will occur if some mistakes are mad like SAN BRUNO explosion last year

⑤ Dust or operation of big machine will pollute the environ

**Please leave your comments in the designated comment box or send by mail/fax/email to:**
San Francisco Planning Department, Attn: Bill Wycko, Acting Environmental Review Officer, 1650 Mission Street, Suite 400, San Francisco, CA 94103. Comment letters may also be faxed to (415) 558-6409, or sent by email to timothy.johnston@sfgov.org

Page 2 of 2

# WSIP Peninsula Pipelines
# Seismic Upgrade Project

# Seismic Upgrade Project

## ENVIRONMENTAL IMPACT REPORT / CEQA SCOPING MEETING

*November 30, 2011*

## COMMENT CARD

**Privacy Notice:** Before including your name, address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information become part of the public record. Unless indicated by you otherwise, you will automatically be added to the official EIR mailing list by submitting this form.

| | |
|---|---|
| Name EVA TONG | Title Homeowner |
| Organization or business (if applicable) | |
| Address 1086 Ridgewood DR. | Phone (415) 867 6606 |
| City, State, Zip Millbrae, CA 94030 | Fax |
| E-Mail evamtong@yahoo.com | |

**Your input on the proposed project is greatly appreciated. Please provide your comments on the scope of the Environmental Impact Report to be prepared for the Peninsula Pipelines Seismic Upgrade Project, including potentially significant impacts, ways to mitigate those impacts, and feasible alternatives. Comments will be accepted until 5:00pm on December 9, 2011.** *(Continue on other side if necessary).*

⑥ Privacy intruded – workers working on the site can see interior of my house.

⑦ Big construction project and duration of 3 – 6 months or longer period will impact the value of my property

⑧ I am concerned about the security of my property due to open space created by construction.

⑨ Portable restroom and construction debris should be restricted to the staging room.

⑩ Once project starts an aggressive vector control must be in place and active.

**Please leave your comments in the designated comment box or send by mail/fax/email to:**
San Francisco Planning Department, Attn: Bill Wycko, Acting Environmental Review Officer, 1650 Mission Street, Suite 400, San Francisco, CA 94103. Comment letters may also be faxed to (415) 558-6409, or sent by email to timothy.johnston@sfgov.org

*H & L Cash*

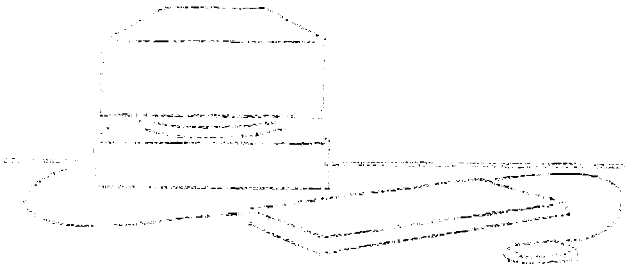
1094 Ridgewood Drive
Millbrae, CA 94030-1025
*Phone:* (650) 588-3180
*Fax:* (650) 588-3187
*Email:* lohcash@Hotmail.Com

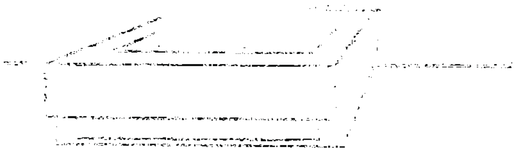
# FAX COVER SHEET

**To:** Timothy Johnston
(415) 558-6409

**Number of pages including this one** 8

**Comment:** PPSU Project EIR Scoping Comments





December 5, 2011

Henry L. Cash
Lais Henderson-Cash
1094 Ridgewood Drive
Millbrae, CA 94030

San Francisco Planning Department
Attn: Bill Wycko
Environmental Review Officer,
PPSU EIR Scoping Comments,
1650 Mission Street, Suite 400
San Francisco, CA 94103-2479

RE: CASE NO.2011.0123E-Peninsula Pipelines Seismic Upgrade Project

Locations: **1094-1100 Ridgewood Drive Millbrae, CA**

Dear Mr. Wycko:

Thank you for the opportunity to provide our comments, in writing and at the public scoping meeting held on November 30, 2011 in San Bruno, California.

The proposed project (Sunset Supply Line-San Andreas Branch) is located partially our property at 1094 Ridgewood Drive Millbrae, CA. This letter is to address our comments and concerns regarding issues that are associated with construction, operation and how the project directly affects our daily lives.

1. Weather permitting the Sunset Supply Line Branch Seismic Upgrade Project will take a maximum three months (3) to complete at the Millbrae sites. The project will begin in the fall of 2014 or early 2015. By beginning the project at this time of year, the fire access road off Lomita Avenue will require extensive preparation, in-order for the ground to support the weight of construction equipment and vehicles.
2. As the landowners, we are concerned about our property values and are requesting pre and post-construction property appraisals for our

property that will be impacted by the Sunset Supply Line-San Andreas Branch Seismic Upgrade Project. Including a paired real estate sales analysis to determine the value added or value lost because of the SFPUC easement.

3. Safety Considerations - The San Francisco Public Utilities Commission to secure the 50' easement with chain-link fencing, appropriate path control, clearly mark trenches and post and maintain warning signage at all times during the construction project. Our concern is that no pedestrian or animal should inadveterately walk into an open trench.

4. Risk Management - This is a SFPUC project and therefore we require an **Indemnification clause**: The SFPUC shall indemnify, hold harmless and defend the property owners from any and all claims or causes of action arising either directly or indirectly from the operations of the SFPUC or any person acting in or on behalf of the SFPUC in carrying out the operations connected directly or indirectly with the replacement, repair, relay, construction, reconstruction, maintain, operate, patrol, renew, replace, remove, increase and or change the number and size or pipes, pipe lines, conduits and/or connections, appurtenances and appliances, for the conveyance, distribution, supply and/or sale or water across the 25' easement strip of land.

5. Relocation - Given the worst-case scenario that we are unable to stay in our home during construction project, due to continuous/high impact noise and or exacerbation of medical conditions. Is the San Francisco Public Utilities Commission going to pay all the costs incurred for us to re-locate in comparable housing for the duration of the project?

6. Request to amend and record the SFPUC's 25' easement to include the above indemnification clause and agreement to pay all re-location costs for the property owners to acquire comparable housing for the duration of the project.

7. No information has been provided by the SFPUC as to whether either 1094 or 1100 Ridgewood Drive side yards will be used as a haul

route. It is a disturbing thought to think of excavated soil and spoils being transported through our yards.

8. It is highly probable that the proposed seismic upgrade project will interfere with our activities and diminish the quality of our lives. We are retired, and neither one of us is looking forward to the possibility of being relocation, contractors ringing the doorbell at 7:00 A.M., the lack of quite enjoyment of our home, not being able to having the grandchildren over to play outside, perhaps over-hearing individuals having conversations in our yard when you are trying to sleep at 9:00 A.M., trucks idling around the perimeter of the house, back-up alarms blaring, the dust and noise etc.

9. Planning Stage – We realize that the project is in its initial planning stages. However, when this information becomes available we would like to know when the scheduled Sunset Supply Line-San Andreas Branch construction project in our area is to begin on ____ (specific date) and will be completed by _____ (specific date).

10. Aesthetics - We have resided in our home since 1970, and we take pride in maintaining our property. We would not like to see our property become a neighborhood eyesore due to this construction project. We recommend that the project areas be cleaned-up daily at the end of each shift to prevent the accumulation of construction debris on the job site. In addition, the portable restroom (i.e. Porta-Potty, Port John, and or Porta-Loo) should be located on the staging site.

11. Our neighborhood is quiet, and we thoroughly enjoy living here. We also realize that the construction equipment is a major generator of noise. The project will require effective noise, sound, and vibration control. What is the typical decibel level of generated construction noise level (dBA) at 7'6" from the source during construction?

12. Air Quality - The surrounding site air space will inevitably be filled with dust particles due to the excavating and will create an environment that requires effective dust control.

13. De-watering - Land erosion is a serious concern to all property owners with homes on the hillsides of Millbrae and we are no exception. The soil on the slopes behind Ridgewood Drive is highly subject to landslides and we are concerned that the upmost attention be given to

compacting and drainage of the slopes during and after construction. Consequently, who is the **on-site** person, which is responsible for Sunset Supply Line Branch dust and erosion controls?

14. There are other public utilities located on or adjacent to the SFPUC's easement; do you know if these utilities will also be replaced concurrently with the Sunset Supply Line Branch 60" pipeline?

15. Ridgewood Drive is a major North-South thoroughfare, as well the main route for the Meadows Elementary School traffic for parents that are picking up and dropping off their children at school. What are the plans to mitigate the impact on traffic during the construction project? Also, keep in mind that there is an elementary school a block for the construction site.

16. The scheduled hours and days of operation for the construction crews on the project are 7:00 A.M.-5:00 PM Monday – Friday; and the SFPUC will notify us in advance if there will be any planned weekend or evening work.

17. Given that, the SFPUC's contractors will be working in close proximity (7'6") away from our home and these vibrations could possibly compromise the foundation of our home; what safety precautions is the SFPUC going to put in place to protect our home from damage?

18. Staging Area - The Spur Property (open space) that is adjacent to our homes is the designated staging area for the heavy equipment (backhoes, bulldozer, front-end loaders, scrapers or pans, compactors, etc.), work crew's vehicles, fuel, and stockpiles of construction materials, including excavated dirt be stored or parked during the construction project. What plans have been made to insure this will happen?

19. The **on-site** contact person's name _________and telephone number __________ that is assigned to help the impacted residents in obtaining immediate answers to their questions and resolution to our complaints about the project's activity. Will this person act in that capacity throughout the project?

20. Clean up and Restoration - We expect the San Francisco Public Utilities Commission to restore the 50' easement to the condition it was in prior

to the Sunset Supply Line Branch seismic upgrade took place. The restoration shall include our yards, lawns, landscaping, fences, sprinkler system, drainpipes, and masonry works to their original condition, quality, and design.

21. Tree Removal - The Eucalyptus trees and the underbrush that are to be removed from the 50' San Francisco Public Utilities Commission easement. These Eucalyptus trees naturally re-seed themselves and they are currently 75-150 feet tall. Is the SFPUC going to maintain this area and keep it free of seedling and new growth in accordance with the San Francisco Public Utilities Commission's Integrated Vegetation Management Policy, section 13.002-1.0.

22. We have concerns about the removal of these trees regarding soil erosion and removal of the downed trees. All too frequently, tree cutters down-trees, but they abandon the clearing and grubbing processes.

23. Once the excavation starts, pests (i.e. insects, vectors, and rodents) will scatter all over the neighborhood and an environmentally sensitive pest control program must be in place.

24. The worker's need use caution in handling and removal of the noxious weeds (i.e. pampas grasses, cheat grass) and poison oak. There is a tremendous amount of Poison oak on and around the Spur Property staging area. Moreover, the poison oak is very difficult to discern during the late fall and winter.

25. Impact on Plant Growth –Jim Wilson of Peters & Wilson Nursery and Garden spread wildflowers in this area for many years, and you will undoubtedly find some rare and native plant species in the area.

26. We cannot possibly emphasize enough the importance of employing both mechanical and vegetation stabilization measures to prevent land erosion, slippage, and un-controlled water runoff on the hilsides behind our home.

27. There is currently no drainage system, v-ditch and or catch basin on the last section of the San Francisco Public Utilities Commission easement on the point; is the SFPUC going to install a drainage system

during the construction replacement project to properly and effectively control rain runoff in this area?

28. The construction project will encroach on the biological habit of our local wildlife (i.e. pair of red tail hawks, owls, foxes [are tagged and monitored by Wild Life Department], deer, coyote including the large number of black squirrels that reside in the undergrowth). What are the plans to minimize the impact on our local wildlife?

29. In the Notice of Preparation (NOP), there are several subjective terms that we would like the SFPUC to define: short-term (i.e. minutes, hours, days) potentially significant effect, urban area, potential noise and vibration impacts. If you are operating heavy equipment on a construction site there is noise and vibration associated with the operation.

30. How will the Sunset Supply Line Branch Seismic Upgrade Project affect the accessibility to our home?

31. What is the likelihood that parking in front of our homes maybe blocked or restricted in during the construction project?

32. Notification of any scheduled utility interruption, including the estimated time length and frequency of occurrence.

33. Will the street area from 1000-1100 block of Ridgewood Drive be used to park construction equipment, employees' vehicles, and contractor's vehicles during the construction project?

34. Prior to construction, we would like to see an illustrative plan and development program of how the SFPUC would like to see the two affected properties to look like when the project is completed. Our concern is that the results will be visually compatible with the surrounding neighborhood.

35. Construction Traffic - In order to limit the disruption in the community, please consider directing all truck, heavy equipment traffic onto the streets with the fewest homes.

36. We are requesting a timely and accurate disclosure of all the material facts known to the San Francisco Public Utilities Commission that may affect our property's value and desirability.

Again, thank you for this opportunity to make comments concerning the scope of the Environmental Impact Report. We are sending our comments by both electronic and hard copy formats. Please place us on Peninsula Pipeline mailing list for all notices and documents relating to this project.

Sincerely,

Henry L. Cash
Lais Henderson-Cash

Henry L. Cash
Lais Henderson-Cash

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# Appendix C
# Transportation

**SFPUC PPSU**

**Construction Vehicles - Daily and Peak Hour**

| | Daily | | | | | | | | | | | Average Hour (trucks) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Trucks | | Workers | Total | | AM Peak Hour | | | PM Peak Hour | | | | |
| | Average | Max | Max | Average | Max | Inbound | Outbound | Total | Inbound | Outbound | Total | Average | Max |
| Colma | 11 | 44 | 20 | 62 | 128 | 26 | 6 | 31 | 6 | 26 | 31 | 3 | 11 |
| South San Francisco | 27 | 80 | 20 | 94 | 200 | 30 | 10 | 40 | 10 | 30 | 40 | 7 | 20 |
| San Bruno North | 2 | 8 | 20 | 44 | 56 | 21 | 1 | 22 | 1 | 21 | 22 | 1 | 2 |
| San Bruno South | 21 | 118 | 20 | 82 | 276 | 35 | 15 | 50 | 15 | 35 | 50 | 5 | 30 |
| Millbrae | 12 | 65 | 20 | 64 | 170 | 28 | 8 | 36 | 8 | 28 | 36 | 3 | 16 |
| Common Staging Area | 0 | 0 | 20 | 40 | 40 | 20 | 0 | 20 | 0 | 20 | 20 | 0 | 0 |

Notes:

1. Contruction truck trips based on Table 3-2 in Project Description. (one way trips)
2. Construction activities would occur between 7 AM and 5 PM. Assume construction trucks arrive and depart over an 8-hr period. As a conservative estimate, assume that truck trips would occur during the AM and PM peak hours.
3. Construction worker trips estimated based on one crew with 20 personnel arriving and departing during the AM and PM peak hours. Workforce at each site is anticipated to consist of one crew, with up to 20 personnel per crew.

Source: URS and LCW Consulting, October 2012

**Common Staging Area**

| | Average Daily Traffic Volumes | Max Daily Vehicle Trips | |
|---|---|---|---|
| **South San Francisco** | | | |
| El Camino Real (SR 82 at Chestnut) | 42,000 | 60 | 0.14% |
| Westborough Blvd | 36,800 | 60 | 0.16% |

**SFPUC PPSU**

**On-Street Parking Supply and Occupancy Surveys**

| **SITE** | **Supply** | | **Midday Occupancy** | | | |
|---|---|---|---|---|---|---|
| **COLMA** | north | south | north | | south | |
| **Collins Avenue** | | | | | | |
| El Camino to SFPUC ROW | 18 | 12 | 9 | 51% | 5 | 41% |
| **SOUTH SAN FRANCISCO** | | | | | | |
| **West Orange Avenue** | north | south | north | | south | |
| Westborough to Golf Course Driveway | 13 | 17 | 9 | 71% | 7 | 41% |
| **Arroyo Avenue** | north | south | north | | south | |
| Camaritas to Del Monte Avenue | 15 | 15 | 5 | 33% | 4 | 27% |
| **Camaritas Avenue** | east | west | east | | west | |
| Westborough to Arroyo | 0 | 9 | 0 | -- | 3 | 33% |
| **COMMON STAGING AREA** | | | | | | |
| **West Orange Avenue** | north | south | north | | south | |
| El Camino Real to Fairway Drive | 10 | 10 | 6 | 60% | 4 | 40% |
| **SAN BRUNO SOUTH** | | | | | | |
| **Whitman Way** | north | south | north | | south | |
| Shelter Creek to Courtland | 20 | 10 | 5 | 25% | 5 | 50% |
| **Shelter Creek Lane** | east | west | east | | west | |
| Whitman Way to SB Avenue West | 80 | 79 | 60 | 75% | 52 | 66% |
| **Courtland Drive** | east | west | east | | west | |
| Whitman Way to Church Driveway | 21 | 23 | 10 | 48% | 7 | 30% |
| **MILLBRAE** | | | | | | |
| **Banbury Lane** | north | south | north | | south | |
| Rridewood Drive to Helen Drive | 29 | 30 | 11 | 38% | 13 | 43% |

Occupancy surveys conducted by LCW Consulting on October 4, 2012

```
MITIG8 - Default Scenario  Thu Jan 5, 2012 05:32:35               Page 1-1
-------------------------------------------------------------------------------
              SFPUC - Peninsula Pipelines Seismic Upgrade Project
                              Existing Conditions
                                 AM Peak Hour
-------------------------------------------------------------------------------
                      Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #1 West Orange/Westborough/Camaritas
*******************************************************************************
Cycle (sec):        130                  Critical Vol./Cap.(X):         1.213
Loss Time (sec):      8                  Average Delay (sec/veh):        31.2
Optimal Cycle:      130                  Level Of Service:                  C
*******************************************************************************
Street Name:  West Orange Ave/Camaritas Ave            Westborough Blvd
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Permitted        Permitted       Prot+Permit      Prot+Permit
Rights:          Include          Include          Include          Include
Min. Green:   33   33    33   33   33    33   36   65    65   21   50    50
Y+R:          4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
Lanes:         1  0  0  1  0   1  1  0  0  1   1  0  2  0  1   1  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      16    9    14  140   97   142  125 1072   208   14  874   204
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:   16    9    14  140   97   142  125 1072   208   14  874   204
Added Vol:      0    0     0    0    0     0    0    0     0    0    0     0
PasserByVol:    0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:   16    9    14  140   97   142  125 1072   208   14  874   204
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     0.83 0.83  0.83 0.83 0.83  0.83 0.83 0.83  0.83 0.83 0.83  0.83
PHF Volume:    19   11    17  169  117   171  151 1292   251   17 1053   246
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:   19   11    17  169  117   171  151 1292   251   17 1053   246
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume:   19   11    17  169  117   171  151 1292   251   17 1053   246
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment:  0.58 0.71  0.70 0.61 0.62  0.64 0.93 0.93  0.64 0.93 0.93  0.64
Lanes:       1.00 0.39  0.61 1.19 0.81  1.00 1.00 2.00  1.00 1.00 2.00  1.00
Final Sat.:  1096  523   814 1383  958  1225 1769 3538  1220 1769 3538  1214
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.02 0.02  0.02 0.12 0.12  0.14 0.09 0.37  0.21 0.01 0.30  0.20
Crit Moves:                             ****  ****                  ****
Green/Cycle: 0.25 0.25  0.25 0.25 0.25  0.25 0.70 0.52  0.52 0.57 0.41  0.41
Volume/Cap:  0.07 0.08  0.08 0.48 0.48  0.55 0.26 0.71  0.40 0.04 0.73  0.50
Delay/Veh:   37.3 37.4  37.4 44.0 44.0  48.9 13.7 26.2  20.9 13.9 35.8  32.1
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh:  37.3 37.4  37.4 44.0 44.0  48.9 13.7 26.2  20.9 13.9 35.8  32.1
LOS by Move:    D    D     D    D    D     D    B    C     C    B    D     C
HCM2kAvgQ:      1    1     1    5    5     7    2   21     6    0   19     8
*******************************************************************************

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MITIG8 - Default Scenario  Thu Jan 5, 2012 05:32:48                Page 1-1
-------------------------------------------------------------------------------
              SFPUC - Peninsula Pipelines Seismic Upgrade Project
                              Existing Conditions
                                 AM Peak Hour
-------------------------------------------------------------------------------
                       Level Of Service Computation Report
             2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #2 I-280 Northbound Ramps/San Bruno Ave
*******************************************************************************
Cycle (sec):          130                Critical Vol./Cap.(X):         0.573
Loss Time (sec):        8                Average Delay (sec/veh):        31.9
Optimal Cycle:        130                Level Of Service:                  C
*******************************************************************************
Street Name:              I-280 Ramps                     San Bruno Ave
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:    0     0     0    0     0     0    0     0     0    0     0     0
Y+R:         4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0
Lanes:        1  0  1! 0  1   0  0  0  0  0   2  0  2  0  0   0  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:    109   127   284    0     0     0  304   685     0    0   498   192
Growth Adj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Initial Bse: 109   127   284    0     0     0  304   685     0    0   498   192
Added Vol:     0     0     0    0     0     0    0     0     0    0     0     0
PasserByVol:   0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut: 109   127   284    0     0     0  304   685     0    0   498   192
User Adj:   1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:    0.87  0.87  0.87 0.87  0.87  0.87 0.87  0.87  0.87 0.87  0.87  0.87
PHF Volume:  125   146   326    0     0     0  349   787     0    0   572   221
Reduct Vol:    0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol: 125   146   326    0     0     0  349   787     0    0   572   221
PCE Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
FinalVolume: 125   146   326    0     0     0  349   787     0    0   572   221
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment: 0.78  0.70  0.78 1.00  1.00  1.00 0.90  0.84  1.00 1.00  0.93  0.67
Lanes:      1.16  0.42  1.42 0.00  0.00  0.00 2.00  2.00  0.00 0.00  2.00  1.00
Final Sat.: 1730   558  2114    0     0     0 3432  3184     0    0  3538  1266
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.07  0.26  0.15 0.00  0.00  0.00 0.10  0.25  0.00 0.00  0.16  0.17
Crit Moves:       ****                        ****                         ****
Green/Cycle: 0.46 0.46  0.46 0.00  0.00  0.00 0.18  0.48  0.00 0.00  0.30  0.30
Volume/Cap: 0.16  0.57  0.34 0.00  0.00  0.00 0.57  0.51  0.00 0.00  0.53  0.57
Delay/Veh:  20.7  26.8  22.8  0.0   0.0   0.0 50.3  23.5   0.0  0.0  38.1  40.2
User DelAdj: 1.00 1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh: 20.7  26.8  22.8  0.0   0.0   0.0 50.3  23.5   0.0  0.0  38.1  40.2
LOS by Move:   C     C     C    A     A     A    D     C     A    A     D     D
HCM2kAvgQ:     2    11     6    0     0     0    7    11     0    0    10     8
*******************************************************************************

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MITIG8 - Default Scenario  Thu Jan 5, 2012 05:32:59               Page 1-1
---------------------------------------------------------------------------
          SFPUC - Peninsula Pipelines Seismic Upgrade Project
                         Existing Conditions
                            AM Peak Hour
---------------------------------------------------------------------------
                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
***************************************************************************
Intersection #3 Crestmoor/San Bruno Ave/Shelter Creek Way
***************************************************************************
Cycle (sec):         130              Critical Vol./Cap.(X):         0.570
Loss Time (sec):       8              Average Delay (sec/veh):        39.4
Optimal Cycle:       130              Level Of Service:                  D
***************************************************************************
Street Name:   Crestmoor/Shelter Creek Way             San Bruno Ave
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:    L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    0    0    0    0    0    0    0    0    0    0    0    0
Y+R:         4.0  4.0  4.0  4.0  4.0  4.0  4.0  4.0  4.0  4.0  4.0  4.0
Lanes:       0  1  0  0  1   0  1  0  1  0   1  0  2  0  1   1  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      27    5  272   99   21    9   10  440   23   98  191   63
Growth Adj:  1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Initial Bse:   27    5  272   99   21    9   10  440   23   98  191   63
Added Vol:      0    0    0    0    0    0    0    0    0    0    0    0
PasserByVol:    0    0    0    0    0    0    0    0    0    0    0    0
Initial Fut:   27    5  272   99   21    9   10  440   23   98  191   63
User Adj:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Adj:     0.86 0.86 0.86 0.86 0.86 0.86 0.86 0.86 0.86 0.86 0.86 0.86
PHF Volume:    31    6  316  115   24   10   12  512   27  114  222   73
Reduct Vol:     0    0    0    0    0    0    0    0    0    0    0    0
Reduced Vol:   31    6  316  115   24   10   12  512   27  114  222   73
PCE Adj:     1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
MLF Adj:     1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
FinalVolume:   31    6  316  115   24   10   12  512   27  114  222   73
------------|---------------||---------------||---------------||---------------
Saturation Flow Module:
Sat/Lane:    1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900
Adjustment:  0.94 0.94 0.67 0.80 0.80 0.80 0.93 0.93 0.67 0.93 0.81 0.81
Lanes:       0.84 0.16 1.00 1.00 0.70 0.30 1.00 2.00 1.00 1.00 1.50 0.50
Final Sat.:  1508  279 1266 1518 1062  455 1769 3538 1266 1769 2306  761
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.02 0.02 0.25 0.08 0.02 0.02 0.01 0.14 0.02 0.06 0.10 0.10
Crit Moves:            **** ****                  ****      ****
Green/Cycle: 0.27 0.44 0.44 0.13 0.30 0.30 0.02 0.25 0.25 0.11 0.34 0.34
Volume/Cap:  0.08 0.05 0.57 0.57 0.08 0.08 0.28 0.57 0.08 0.57 0.28 0.28
Delay/Veh:   35.3 21.0 28.7 55.8 32.6 32.6 66.1 43.2 37.1 58.5 31.2 31.2
User DelAdj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
AdjDel/Veh:  35.3 21.0 28.7 55.8 32.6 32.6 66.1 43.2 37.1 58.5 31.2 31.2
LOS by Move:    D    C    C    E    C    C    E    D    D    E    C    C
HCM2kAvgQ:      1    1   10    5    1    1    1   10    1    5    4    4
***************************************************************************

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```

```
MITIG8 - Default Scenario  Thu Jan 5, 2012 05:33:07                   Page 1-1
-------------------------------------------------------------------------------
             SFPUC - Peninsula Pipelines Seismic Upgrade Project
                             Existing Conditions
                                AM Peak Hour
-------------------------------------------------------------------------------
                      Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
*******************************************************************************
Intersection #4 Shelter Creek Way/Whitman
*******************************************************************************
Average Delay (sec/veh):       3.8       Worst Case Level Of Service: B[ 13.4]
*******************************************************************************
Street Name:            Shelter Creek                        Whitman
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign        Uncontrolled      Uncontrolled
Rights:           Include          Include          Include           Include
Lanes:        0  0  0  0  0   0  0  1! 0  0   1  0  1  0  0   0  0  1  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0     93    0    22     83  197     0      0   82    93
Growth Adj:  1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00
Initial Bse:    0    0     0     93    0    22     83  197     0      0   82    93
Added Vol:      0    0     0      0    0     0      0    0     0      0    0     0
PasserByVol:    0    0     0      0    0     0      0    0     0      0    0     0
Initial Fut:    0    0     0     93    0    22     83  197     0      0   82    93
User Adj:    1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00
PHF Adj:     0.89 0.89  0.89   0.89 0.89  0.89   0.89 0.89  0.89   0.89 0.89  0.89
PHF Volume:     0    0     0    104    0    25     93  221     0      0   92   104
Reduct Vol:     0    0     0      0    0     0      0    0     0      0    0     0
FinalVolume:    0    0     0    104    0    25     93  221     0      0   92   104
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx    6.4  6.5   6.2    4.1 xxxx xxxxx xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx    3.5  4.0   3.3    2.2 xxxx xxxxx xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    500  500    92    197 xxxx xxxxx  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx    534  476   971   1388 xxxx xxxxx  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx    507  444   971   1388 xxxx xxxxx  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx   0.21 0.00  0.03   0.07 xxxx  xxxx  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx    0.2 xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx    7.8 xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *      A    *     *     *    *     *
Movement:    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx   xxxx  558 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx  0.9 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx 13.4 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    B     *      *    *     *     *    *     *
ApproachDel:     xxxxxx              13.4             xxxxxx            xxxxxx
ApproachLOS:        *                 B                 *                 *
*******************************************************************************
Note: Queue reported is the number of cars per lane.
*******************************************************************************

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```

```
-------------------------------------------------------------------------------
             SFPUC - Peninsula Pipelines Seismic Upgrade Project
                             Existing Conditions
                                AM Peak Hour
-------------------------------------------------------------------------------
                       Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
*******************************************************************************
Intersection #5 Courtland Dr/Whitman
*******************************************************************************
Average Delay (sec/veh):         4.5     Worst Case Level Of Service: A[  9.8]
*******************************************************************************
Street Name:                 Courtland Dr                         Whitman
Approach:        North Bound       South Bound       East Bound        West Bound
Movement:       L  -  T  -  R     L  -  T  -  R     L  -  T  -  R     L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Stop Sign         Stop Sign        Uncontrolled      Uncontrolled
Rights:            Include           Include           Include           Include
Lanes:          0  0  1! 0  0     0  0  0  0  0     0  0  1  0  0     0  1  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        5     0   101     0     0     0     0   138     0    66    37     0
Growth Adj:   1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Initial Bse:     5     0   101     0     0     0     0   138     0    66    37     0
Added Vol:       0     0     0     0     0     0     0     0     0     0     0     0
PasserByVol:     0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:     5     0   101     0     0     0     0   138     0    66    37     0
User Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:      0.86  0.86  0.86  0.86  0.86  0.86  0.86  0.86  0.86  0.86  0.86  0.86
PHF Volume:      6     0   117     0     0     0     0   160     0    77    43     0
Reduct Vol:      0     0     0     0     0     0     0     0     0     0     0     0
FinalVolume:     6     0   117     0     0     0     0   160     0    77    43     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:   6.4   6.5   6.2 xxxxx  xxxx xxxxx xxxxx  xxxx xxxxx   4.1  xxxx xxxxx
FollowUpTim:   3.5   4.0   3.3 xxxxx  xxxx xxxxx xxxxx  xxxx xxxxx   2.2  xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:   357   357   160  xxxx  xxxx xxxxx  xxxx  xxxx xxxxx   160  xxxx xxxxx
Potent Cap.:   645   572   890  xxxx  xxxx xxxxx  xxxx  xxxx xxxxx  1431  xxxx xxxxx
Move Cap.:     618   540   890  xxxx  xxxx xxxxx  xxxx  xxxx xxxxx  1431  xxxx xxxxx
Volume/Cap:   0.01  0.00  0.13  xxxx  xxxx  xxxx  xxxx  xxxx  xxxx  0.05  xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    xxxx  xxxx xxxxx  xxxx  xxxx xxxxx  xxxx  xxxx xxxxx   0.2  xxxx xxxxx
Control Del:xxxxx  xxxx xxxxx xxxxx  xxxx xxxxx xxxxx  xxxx xxxxx   7.7  xxxx xxxxx
LOS by Move:     *     *     *     *     *     *     *     *     *     A     *     *
Movement:       LT  - LTR  - RT    LT  - LTR  - RT    LT  - LTR  - RT    LT  - LTR  - RT
Shared Cap.:  xxxx   872 xxxxx  xxxx  xxxx xxxxx  xxxx  xxxx xxxxx  xxxx  xxxx xxxxx
SharedQueue:xxxxx   0.5 xxxxx xxxxx  xxxx xxxxx xxxxx  xxxx xxxxx   0.2  xxxx xxxxx
Shrd ConDel:xxxxx   9.8 xxxxx xxxxx  xxxx xxxxx xxxxx  xxxx xxxxx   7.7  xxxx xxxxx
Shared LOS:      *     A     *     *     *     *     *     *     *     A     *     *
ApproachDel:           9.8            xxxxxx            xxxxxx            xxxxxx
ApproachLOS:             A                 *                 *                 *
*******************************************************************************
Note: Queue reported is the number of cars per lane.
*******************************************************************************
```

```
MITIG8 - Default Scenario  Thu Jan 5, 2012 05:33:23                Page 1-1
-------------------------------------------------------------------------------
             SFPUC - Peninsula Pipelines Seismic Upgrade Project
                             Existing Conditions
                                AM Peak Hour
-------------------------------------------------------------------------------
                      Level Of Service Computation Report
           2000 HCM 4-Way Stop Method (Future Volume Alternative)
*******************************************************************************
Intersection #6 Helen/Larkspur
*******************************************************************************
Cycle (sec):          100               Critical Vol./Cap.(X):         0.706
Loss Time (sec):        0               Average Delay (sec/veh):        17.8
Optimal Cycle:          0               Level Of Service:                  C
*******************************************************************************
Street Name:                Helen                           Larkspur
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:    L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Stop Sign        Stop Sign        Stop Sign        Stop Sign
Rights:          Include          Include          Include          Include
Min. Green:    0     0     0     0     0     0     0     0     0     0     0     0
Lanes:       0  0  1! 0  0    0  0  0  1  0    0  0  1! 0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:    179  112    41     0  134   122    78   56   182    69   84     1
Growth Adj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse: 179  112    41     0  134   122    78   56   182    69   84     1
Added Vol:     0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:   0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut: 179  112    41     0  134   122    78   56   182    69   84     1
User Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:    0.85 0.85  0.85  0.85 0.85  0.85  0.85 0.85  0.85  0.85 0.85  0.85
PHF Volume:  211  132    48     0  158   144    92   66   214    81   99     1
Reduct Vol:    0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol: 211  132    48     0  158   144    92   66   214    81   99     1
PCE Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume: 211  132    48     0  158   144    92   66   214    81   99     1
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Adjustment: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:      0.54 0.34  0.12  0.00 0.52  0.48  0.25 0.18  0.57  0.45 0.54  0.01
Final Sat.:  298  187    68     0  285   259   138   99   323   206  250     3
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.71 0.71  0.71  xxxx 0.55  0.55  0.66 0.66  0.66  0.39 0.39  0.39
Crit Moves:      ****             ****        ****                   ****
Delay/Veh:  21.1 21.1  21.1   0.0 15.3  15.3  18.5 18.5  18.5  13.3 13.3  13.3
Delay Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh: 21.1 21.1  21.1   0.0 15.3  15.3  18.5 18.5  18.5  13.3 13.3  13.3
LOS by Move:   C    C     C     *    C     C     C    C     C     B    B     B
ApproachDel:      21.1             15.3             18.5             13.3
Delay Adj:        1.00             1.00             1.00             1.00
ApprAdjDel:       21.1             15.3             18.5             13.3
LOS by Appr:        C                C                C                B
AllWayAvgQ:  1.8  1.8   1.8   0.9  0.9   0.9   1.5  1.5   1.5   0.4  0.4   0.4
*******************************************************************************

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```
-------------------------------------------------------------------------------
               SFPUC - Peninsula Pipelines Seismic Upgrade Project
                               Existing Conditions
                                  AM Peak Hour
-------------------------------------------------------------------------------
                        Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
*******************************************************************************
Intersection #7 Ridgewood/Banbury
*******************************************************************************
Average Delay (sec/veh):        2.0       Worst Case Level Of Service: A[  9.3]
*******************************************************************************
Street Name:                Ridgewood                          Banbury
Approach:        North Bound       South Bound       East Bound        West Bound
Movement:       L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Uncontrolled      Uncontrolled       Stop Sign         Stop Sign
Rights:             Include           Include           Include           Include
Lanes:          0  1  0  0  0    0  0  0  1  0    0  0  1! 0  0    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        27   71     0     0   96     7     8    0    18     0    0     0
Growth Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:     27   71     0     0   96     7     8    0    18     0    0     0
Added Vol:        0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:      0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:     27   71     0     0   96     7     8    0    18     0    0     0
User Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:       0.85 0.85  0.85  0.85 0.85  0.85  0.85 0.85  0.85  0.85 0.85  0.85
PHF Volume:      32   84     0     0  113     8     9    0    21     0    0     0
Reduct Vol:       0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:     32   84     0     0  113     8     9    0    21     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:    4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4  6.5   6.2 xxxxx xxxx xxxxx
FollowUpTim:    2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:    121 xxxx xxxxx  xxxx xxxx xxxxx   264  264   117  xxxx xxxx xxxxx
Potent Cap.:   1479 xxxx xxxxx  xxxx xxxx xxxxx   729  645   940  xxxx xxxx xxxxx
Move Cap.:     1479 xxxx xxxxx  xxxx xxxx xxxxx   717  631   940  xxxx xxxx xxxxx
Volume/Cap:    0.02 xxxx  xxxx  xxxx xxxx  xxxx  0.01 0.00  0.02  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:      0.1 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:    7.5 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:      A    *     *     *    *     *     *    *     *     *    *     *
Movement:       LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  858 xxxxx  xxxx xxxx xxxxx
SharedQueue:    0.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.1 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:    7.5 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  9.3 xxxxx xxxxx xxxx xxxxx
Shared LOS:       A    *     *     *    *     *     *    A     *     *    *     *
ApproachDel:      xxxxxx            xxxxxx              9.3            xxxxxx
ApproachLOS:         *                 *                 A                 *
*******************************************************************************
Note: Queue reported is the number of cars per lane.
*******************************************************************************
```

```
-------------------------------------------------------------------------------
             SFPUC - Peninsula Pipelines Seismic Upgrade Project
                             Existing Conditions
                                AM Peak Hour
-------------------------------------------------------------------------------
                      Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
*******************************************************************************
Intersection #8 Santa Margarita/Cappuchino
*******************************************************************************
Average Delay (sec/veh):        5.1       Worst Case Level Of Service: A[  8.7]
*******************************************************************************
Street Name:           Santa Margarita                     Cappuchino
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------'
Control:          Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:            Include          Include          Include          Include
Lanes:          0  0  0  0  0   0  0  1! 0  0   0  1  0  0  0   0  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:          0    0     0    23    0     2    4    6     0    0    3    11
Growth Adj:     1.00 1.00  1.00  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:       0    0     0    23    0     2    4    6     0    0    3    11
Added Vol:         0    0     0     0    0     0    0    0     0    0    0     0
PasserByVol:       0    0     0     0    0     0    0    0     0    0    0     0
Initial Fut:       0    0     0    23    0     2    4    6     0    0    3    11
User Adj:       1.00 1.00  1.00  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:        0.77 0.77  0.77  0.77 0.77  0.77 0.77 0.77  0.77 0.77 0.77  0.77
PHF Volume:        0    0     0    30    0     3    5    8     0    0    4    14
Reduct Vol:        0    0     0     0    0     0    0    0     0    0    0     0
FinalVolume:       0    0     0    30    0     3    5    8     0    0    4    14
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   6.4  6.5   6.2  4.1 xxxx xxxxx xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx   3.5  4.0   3.3  2.2 xxxx xxxxx xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    29   29    11   18 xxxx xxxxx  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx   990  868  1076 1612 xxxx xxxxx  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx   988  865  1076 1612 xxxx xxxxx  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  0.03 0.00  0.00 0.00 xxxx  xxxx  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  0.0 xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx  7.2 xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:     *    *     *     *    *     *    A    *     *    *    *     *
Movement:    LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx  994 xxxxx xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx  0.1 xxxxx  0.0 xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx  8.7 xxxxx  7.2 xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:      *    *     *     *    A     *    A    *     *    *    *     *
ApproachDel:      xxxxxx              8.7            xxxxxx           xxxxxx
ApproachLOS:         *                 A                *                *
*******************************************************************************
Note: Queue reported is the number of cars per lane.
*******************************************************************************
```

```
------------------------------------------------------------------------------
           SFPUC - Peninsula Pipelines Seismic Upgrade Project
                          Existing Conditions
                             AM Peak Hour
------------------------------------------------------------------------------
                  Level Of Service Computation Report
         2000 HCM Unsignalized Method (Future Volume Alternative)
******************************************************************************
Intersection #9 Shelter Creek Lane/Condo Driveway
******************************************************************************
Average Delay (sec/veh):       2.3       Worst Case Level Of Service: B[ 10.5]
******************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
-----------|----------------||----------------||----------------||----------------|
Control:      Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:          Include          Include          Include          Include
Lanes:        0  1  0  0  0    0  0  0  1  0    0  0  1! 0  0    0  0  0  0  0
-----------|----------------||----------------||----------------||----------------|
Volume Module:
Base Vol:        7  175     0     0   90    11    48    0    25     0    0     0
Growth Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:     7  175     0     0   90    11    48    0    25     0    0     0
Added Vol:       0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:     7  175     0     0   90    11    48    0    25     0    0     0
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.85 0.85  0.85  0.85 0.85  0.85  0.85 0.85  0.85  0.85 0.85  0.85
PHF Volume:      8  206     0     0  106    13    56    0    29     0    0     0
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:     8  206     0     0  106    13    56    0    29     0    0     0
-----------|----------------||----------------||----------------||----------------|
Critical Gap Module:
Critical Gp:   4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4  6.5   6.2 xxxxx xxxx xxxxx
FollowUpTim:   2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
-----------|----------------||----------------||----------------||----------------|
Capacity Module:
Cnflict Vol:   119 xxxx xxxxx  xxxx xxxx xxxxx   335  335   112  xxxx xxxx xxxxx
Potent Cap.:  1482 xxxx xxxxx  xxxx xxxx xxxxx   665  589   946  xxxx xxxx xxxxx
Move Cap.:    1482 xxxx xxxxx  xxxx xxxx xxxxx   662  586   946  xxxx xxxx xxxxx
Volume/Cap:   0.01 xxxx  xxxx  xxxx xxxx  xxxx  0.09 0.00  0.03  xxxx xxxx  xxxx
-----------|----------------||----------------||----------------||----------------|
Level Of Service Module:
2Way95thQ:     0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:   7.4 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:     A    *     *     *    *     *     *    *     *     *    *     *
Movement:      LT - LTR - RT   LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.:  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  738 xxxxx  xxxx xxxx xxxxx
SharedQueue:   0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.4 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:   7.4 xxxx xxxxx xxxxx xxxx xxxxx xxxxx 10.5 xxxxx xxxxx xxxx xxxxx
Shared LOS:      A    *     *     *    *     *     *    B     *     *    *     *
ApproachDel:     xxxxxx           xxxxxx             10.5             xxxxxx
ApproachLOS:        *                *                B                 *
******************************************************************************
Note: Queue reported is the number of cars per lane.
******************************************************************************
```

```
MITIG8 - Default Scenario  Tue Oct 9, 2012 03:56:50                    Page 1-1
--------------------------------------------------------------------------------

              SFPUC - Peninsula Pipelines Seismic Upgrade Project
                              Existing Conditions
                                 AM Peak Hour

--------------------------------------------------------------------------------

                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #10 Whitman/Shelter Creek Condo Driveway/Eastburn
********************************************************************************
Average Delay (sec/veh):       2.7       Worst Case Level Of Service: B[ 10.7]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:          Include          Include          Include          Include
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       7    0    11     35    0    16      3  108     4      4   87     8
Growth Adj:  1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00
Initial Bse:    7    0    11     35    0    16      3  108     4      4   87     8
Added Vol:      0    0     0      0    0     0      0    0     0      0    0     0
PasserByVol:    0    0     0      0    0     0      0    0     0      0    0     0
Initial Fut:    7    0    11     35    0    16      3  108     4      4   87     8
User Adj:    1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00
PHF Adj:     0.71 0.71  0.71   0.71 0.71  0.71   0.71 0.71  0.71   0.71 0.71  0.71
PHF Volume:    10    0    15     49    0    23      4  152     6      6  123    11
Reduct Vol:     0    0     0      0    0     0      0    0     0      0    0     0
FinalVolume:   10    0    15     49    0    23      4  152     6      6  123    11
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  7.1  6.5   6.2    7.1  6.5   6.2    4.1 xxxx xxxxx    4.1 xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3    3.5  4.0   3.3    2.2 xxxx xxxxx    2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  314  308   155    311  306   128    134 xxxx xxxxx    158 xxxx xxxxx
Potent Cap.:  642  609   896    646  611   927   1463 xxxx xxxxx   1434 xxxx xxxxx
Move Cap.:    624  605   896    631  607   927   1463 xxxx xxxxx   1434 xxxx xxxxx
Volume/Cap:  0.02 0.00  0.02   0.08 0.00  0.02   0.00 xxxx  xxxx   0.00 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx   xxxx xxxx xxxxx    0.0 xxxx xxxxx    0.0 xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx    7.5 xxxx xxxxx    7.5 xxxx xxxxx
LOS by Move:    *    *     *      *    *     *      A    *     *      A    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx  766 xxxxx   xxxx  702 xxxxx   xxxx xxxx xxxxx   xxxx xxxx xxxxx
SharedQueue:xxxxx  0.1 xxxxx xxxxx  0.3 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx  9.9 xxxxx xxxxx 10.7 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    A     *      *    B     *      *    *     *      *    *     *
ApproachDel:         9.9              10.7               xxxxxx           xxxxxx
ApproachLOS:          A                 B                   *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************


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```

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MITIG8 - Default Scenario  Thu Oct 11, 2012 10:00:37                  Page 1-1
--------------------------------------------------------------------------------
                  SFPUC - Peninsula Pipelines Seismic Upgrade Project
                                 Existing Conditions
                                    AM Peak Hour
--------------------------------------------------------------------------------

                        Level Of Service Computation Report
               2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #11 Serramonte/Junipero Serra Blvd
********************************************************************************
Cycle (sec):        120                 Critical Vol./Cap.(X):         0.673
Loss Time (sec):      8                 Average Delay (sec/veh):        35.2
Optimal Cycle:       46                 Level Of Service:                  D
********************************************************************************
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|----------------||----------------||----------------||----------------|
Control:       Split Phase      Split Phase      Prot+Permit      Prot+Permit
Rights:           Include          Include          Include          Include
Min. Green:    0     0     0    0     0     0    0     0     0    0     0     0
Y+R:          4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0
Lanes:         2  0  2  0  1    1  0  1  1  0    2  0  2  0  1    1  0  1  1  1
------------|----------------||----------------||----------------||----------------|
Volume Module:
Base Vol:     393   265   155  141   462    65  141   559   427  106   127   223
Growth Adj:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Initial Bse:  393   265   155  141   462    65  141   559   427  106   127   223
Added Vol:      0     0     0    0     0     0    0     0     0    0     0     0
PasserByVol:    0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:  393   265   155  141   462    65  141   559   427  106   127   223
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     0.96  0.96  0.96 0.96  0.96  0.96 0.96  0.96  0.96 0.96  0.96  0.96
PHF Volume:   409   276   161  147   481    68  147   582   445  110   132   232
Reduct Vol:     0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:  409   276   161  147   481    68  147   582   445  110   132   232
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
FinalVolume:  409   276   161  147   481    68  147   582   445  110   132   232
------------|----------------||----------------||----------------||----------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment:  0.90  0.93  0.80 0.93  0.91  0.91 0.90  0.93  0.81 0.93  0.84  0.82
Lanes:       2.00  2.00  1.00 1.00  1.75  0.25 2.00  2.00  1.00 1.00  1.07  1.93
Final Sat.:  3432  3538  1518 1769  3044   428 3417  3538  1545 1766  1708  3000
------------|----------------||----------------||----------------||----------------|
Capacity Analysis Module:
Vol/Sat:     0.12  0.08  0.11 0.08  0.16  0.16 0.04  0.16  0.29 0.06  0.08  0.08
Crit Moves:  ****                          ****                  **** ****
Green/Cycle: 0.18  0.18  0.18 0.24  0.24  0.24 0.54  0.43  0.43 0.43  0.34  0.34
Volume/Cap:  0.67  0.44  0.60 0.35  0.67  0.67 0.13  0.38  0.67 0.26  0.23  0.23
Delay/Veh:   49.1  44.5  49.2 38.8  43.9  43.9 13.5  23.7  30.3 21.2  28.8  28.8
User DelAdj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:  49.1  44.5  49.2 38.8  43.9  43.9 13.5  23.7  30.3 21.2  28.8  28.8
LOS by Move:    D     D     D    D     D     D    B     C     C    C     C     C
HCM2kAvgQ:      8     5     6    5    11    11    1     8    14    3     3     3
********************************************************************************
Note: Queue reported is the number of cars per lane.

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```

```
-------------------------------------------------------------------------------
              SFPUC - Peninsula Pipelines Seismic Upgrade Project
                              Existing Conditions
                                 PM Peak Hour
-------------------------------------------------------------------------------
                      Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #1 West Orange/Westborough/Camaritas
*******************************************************************************
Cycle (sec):          130                 Critical Vol./Cap.(X):         1.213
Loss Time (sec):        8                 Average Delay (sec/veh):        32.7
Optimal Cycle:        130                 Level Of Service:                  C
*******************************************************************************
Street Name:  West Orange Ave/Camaritas Ave           Westborough Blvd
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:          Permitted        Permitted       Prot+Permit      Prot+Permit
Rights:            Include          Include          Include          Include
Min. Green:    33    33    33    33    33    33    36    65    65    21    50    50
Y+R:          4.0   4.0   4.0   4.0   4.0   4.0   4.0   4.0   4.0   4.0   4.0   4.0
Lanes:        1  0  0  1  0   1  1  0  0  1   1  0  2  0  1   1  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      40    15    35    93    60   230   113   788   156    67  1071   303
Growth Adj:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Initial Bse:   40    15    35    93    60   230   113   788   156    67  1071   303
Added Vol:      0     0     0     0     0     0     0     0     0     0     0     0
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:   40    15    35    93    60   230   113   788   156    67  1071   303
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.95  0.95  0.95  0.95  0.95  0.95  0.95  0.95  0.95  0.95  0.95  0.95
PHF Volume:    42    16    37    98    63   242   119   829   164    71  1127   319
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:   42    16    37    98    63   242   119   829   164    71  1127   319
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
FinalVolume:   42    16    37    98    63   242   119   829   164    71  1127   319
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  0.68  0.70  0.69  0.60  0.60  0.64  0.93  0.93  0.64  0.93  0.93  0.64
Lanes:       1.00  0.30  0.70  1.22  0.78  1.00  1.00  2.00  1.00  1.00  2.00  1.00
Final Sat.:  1288   394   918  1385   894  1225  1769  3538  1220  1767  3538  1214
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.03  0.04  0.04  0.07  0.07  0.20  0.07  0.23  0.13  0.04  0.32  0.26
Crit Moves:                               ****  ****                    ****
Green/Cycle: 0.25  0.25  0.25  0.25  0.25  0.25  0.70  0.52  0.52  0.57  0.41  0.41
Volume/Cap:  0.13  0.16  0.16  0.28  0.28  0.78  0.21  0.45  0.26  0.13  0.78  0.64
Delay/Veh:   38.2  38.7  38.7  40.1  40.1  62.4  14.3  20.6  18.5  12.8  37.7  37.3
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  38.2  38.7  38.7  40.1  40.1  62.4  14.3  20.6  18.5  12.8  37.7  37.3
LOS by Move:    D     D     D     D     D     E     B     C     B     B     D     D
HCM2kAvgQ:      1     2     2     3     3    11     2    11     4     1    22    11
*******************************************************************************
```

```
-------------------------------------------------------------------------------
              SFPUC - Peninsula Pipelines Seismic Upgrade Project
                              Existing Conditions
                                 PM Peak Hour
-------------------------------------------------------------------------------
                       Level Of Service Computation Report
             2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #2 I-280 Northbound Ramps/San Bruno Ave
*******************************************************************************
Cycle (sec):           130               Critical Vol./Cap.(X):          0.764
Loss Time (sec):         8               Average Delay (sec/veh):         28.9
Optimal Cycle:         130               Level Of Service:                   C
*******************************************************************************
Street Name:                 I-280 Ramps                     San Bruno Ave
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:   0     0     0    0     0     0    0     0     0    0     0     0
Y+R:         4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0
Lanes:        1  0  1! 0  1    0  0  0  0  0    2  0  2  0  0    0  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     153   207   240    0     0     0   169   508     0     0   793   441
Growth Adj:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Initial Bse:  153   207   240    0     0     0   169   508     0     0   793   441
Added Vol:      0     0     0    0     0     0     0     0     0     0     0     0
PasserByVol:    0     0     0    0     0     0     0     0     0     0     0     0
Initial Fut:  153   207   240    0     0     0   169   508     0     0   793   441
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.95  0.95  0.95  0.95  0.95  0.95  0.95  0.95  0.95  0.95  0.95  0.95
PHF Volume:   161   218   253    0     0     0   178   535     0     0   835   464
Reduct Vol:     0     0     0    0     0     0     0     0     0     0     0     0
Reduced Vol:  161   218   253    0     0     0   178   535     0     0   835   464
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
FinalVolume:  161   218   253    0     0     0   178   535     0     0   835   464
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  0.80  0.71  0.80  1.00  1.00  1.00  0.90  0.84  1.00  1.00  0.93  0.67
Lanes:       1.18  0.54  1.28  0.00  0.00  0.00  2.00  2.00  0.00  0.00  2.00  1.00
Final Sat.:  1785   731  1939    0     0     0  3432  3184     0     0  3538  1266
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.09  0.30  0.13  0.00  0.00  0.00  0.05  0.17  0.00  0.00  0.24  0.37
Crit Moves:        ****                          ****                          ****
Green/Cycle: 0.39  0.39  0.39  0.00  0.00  0.00  0.07  0.55  0.00  0.00  0.48  0.48
Volume/Cap:  0.23  0.76  0.33  0.00  0.00  0.00  0.76  0.31  0.00  0.00  0.49  0.76
Delay/Veh:   26.6  38.7  27.9   0.0   0.0   0.0  73.5  16.1   0.0   0.0  23.2  33.5
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  26.6  38.7  27.9   0.0   0.0   0.0  73.5  16.1   0.0   0.0  23.2  33.5
LOS by Move:    C     D     C    A     A     A     E     B     A     A     C     C
HCM2kAvgQ:      4    15     5    0     0     0     5     6     0     0    12    17
*******************************************************************************
```

```
-------------------------------------------------------------------------------
             SFPUC - Peninsula Pipelines Seismic Upgrade Project
                             Existing Conditions
                                PM Peak Hour
-------------------------------------------------------------------------------
                       Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #3 Crestmoor/San Bruno Ave/Shelter Creek Way
*******************************************************************************
Cycle (sec):          130                Critical Vol./Cap.(X):         0.426
Loss Time (sec):        8                Average Delay (sec/veh):        33.6
Optimal Cycle:       130                 Level Of Service:                  C
*******************************************************************************
Street Name:   Crestmoor/Shelter Creek Way             San Bruno Ave
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    0     0     0    0     0     0    0     0     0    0     0     0
Y+R:          4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0
Lanes:        0  1  0  0  1    0  1  0  1  0    1  0  2  0  1    1  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      27    12   140   89    14    13   13   301    28  221   461   112
Growth Adj:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Initial Bse:   27    12   140   89    14    13   13   301    28  221   461   112
Added Vol:      0     0     0    0     0     0    0     0     0    0     0     0
PasserByVol:    0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:   27    12   140   89    14    13   13   301    28  221   461   112
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95  0.95
PHF Volume:    28    13   147   94    15    14   14   317    29  233   485   118
Reduct Vol:     0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:   28    13   147   94    15    14   14   317    29  233   485   118
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
FinalVolume:   28    13   147   94    15    14   14   317    29  233   485   118
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment:  0.95  0.95  0.67 0.79  0.79  0.79 0.93  0.93  0.67 0.93  0.81  0.81
Lanes:       0.69  0.31  1.00 1.00  0.52  0.48 1.00  2.00  1.00 1.00  1.61  0.39
Final Sat.:  1247   554  1266 1507   781   726 1769  3538  1266 1769  2487   604
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.02  0.02  0.12 0.06  0.02  0.02 0.01  0.09  0.02 0.13  0.20  0.20
Crit Moves:              **** ****                       ****      ****
Green/Cycle: 0.23  0.27  0.27 0.15  0.19  0.19 0.02  0.21  0.21 0.31  0.50  0.50
Volume/Cap:  0.10  0.08  0.43 0.43  0.10  0.10 0.39  0.43  0.11 0.43  0.39  0.39
Delay/Veh:   39.6  35.2  39.7 51.6  43.5  43.5 70.0  44.9  41.7 36.3  20.4  20.4
User DelAdj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:  39.6  35.2  39.7 51.6  43.5  43.5 70.0  44.9  41.7 36.3  20.4  20.4
LOS by Move:    D     D     D    D     D     D    E     D     D    D     C     C
HCM2kAvgQ:      1     1     5    4     1     1    1     6     1    7     8     8
*******************************************************************************
```

```
------------------------------------------------------------------------------
           SFPUC - Peninsula Pipelines Seismic Upgrade Project
                           Existing Conditions
                              PM Peak Hour
------------------------------------------------------------------------------
                    Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #4 Shelter Creek Way/Whitman
********************************************************************************
Average Delay (sec/veh):       3.3      Worst Case Level Of Service: B[ 10.6]
********************************************************************************
Street Name:           Shelter Creek                      Whitman
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------
Control:         Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:            Include          Include          Include          Include
Lanes:          0  0  0  0  0    0  0  1! 0  0    1  0  1  0  0    0  0  1  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        0    0     0     59    0    61    42   87     0     0  138    95
Growth Adj:   1.00 1.00  1.00   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:     0    0     0     59    0    61    42   87     0     0  138    95
Added Vol:       0    0     0      0    0     0     0    0     0     0    0     0
PasserByVol:     0    0     0      0    0     0     0    0     0     0    0     0
Initial Fut:     0    0     0     59    0    61    42   87     0     0  138    95
User Adj:     1.00 1.00  1.00   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.95 0.95  0.95   0.95 0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95
PHF Volume:      0    0     0     62    0    64    44   92     0     0  145   100
Reduct Vol:      0    0     0      0    0     0     0    0     0     0    0     0
FinalVolume:     0    0     0     62    0    64    44   92     0     0  145   100
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   6.4  6.5   6.2   4.1 xxxx xxxxx xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx   3.5  4.0   3.3   2.2 xxxx xxxxx xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx   325  325   145   245 xxxx xxxxx  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx   673  596   907  1333 xxxx xxxxx  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx   656  576   907  1333 xxxx xxxxx  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  0.09 0.00  0.07  0.03 xxxx  xxxx  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.1 xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.8 xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     A    *     *     *    *     *
Movement:      LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx  763 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx  0.6 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx 10.6 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    B     *     *    *     *     *    *     *
ApproachDel:     xxxxxx             10.6            xxxxxx           xxxxxx
ApproachLOS:        *                 B                *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

```
-------------------------------------------------------------------------------
             SFPUC - Peninsula Pipelines Seismic Upgrade Project
                            Existing Conditions
                               PM Peak Hour
-------------------------------------------------------------------------------
                     Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #5 Courtland Dr/Whitman
********************************************************************************
Average Delay (sec/veh):       4.0      Worst Case Level Of Service: A[  9.0]
********************************************************************************
Street Name:              Courtland Dr                         Whitman
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign      Uncontrolled     Uncontrolled
Rights:          Include          Include          Include          Include
Lanes:        0  0  1! 0  0    0  0  0  0  0    0  0  0  1  0    0  1  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       5    0    61     0    0     0     0   57     2    86  100     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    5    0    61     0    0     0     0   57     2    86  100     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    5    0    61     0    0     0     0   57     2    86  100     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93
PHF Volume:     5    0    66     0    0     0     0   61     2    92  108     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    5    0    66     0    0     0     0   61     2    92  108     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  6.4  6.5   6.2 xxxxx xxxx xxxxx xxxxx xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3 xxxxx xxxx xxxxx xxxxx xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  355  355    62  xxxx xxxx xxxxx  xxxx xxxx xxxxx    63 xxxx xxxxx
Potent Cap.:  647  574  1008  xxxx xxxx xxxxx  xxxx xxxx xxxxx  1552 xxxx xxxxx
Move Cap.:    616  538  1008  xxxx xxxx xxxxx  xxxx xxxx xxxxx  1552 xxxx xxxxx
Volume/Cap:  0.01 0.00  0.07  xxxx xxxx  xxxx  xxxx xxxx  xxxx  0.06 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.2 xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.5 xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     *     A    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx  962 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx  0.2 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   0.2 xxxx xxxxx
Shrd ConDel:xxxxx  9.0 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.5 xxxx xxxxx
Shared LOS:     *    A     *     *    *     *     *    *     *     A    *     *
ApproachDel:        9.0            xxxxxx           xxxxxx           xxxxxx
ApproachLOS:         A                *                *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

```
MITIG8 - Default Scenario  Thu Jan 5, 2012 05:43:40              Page 1-1
-------------------------------------------------------------------------------
            SFPUC - Peninsula Pipelines Seismic Upgrade Project
                           Existing Conditions
                              PM Peak Hour
-------------------------------------------------------------------------------

                     Level Of Service Computation Report
          2000 HCM 4-Way Stop Method (Future Volume Alternative)
*******************************************************************************
Intersection #6 Helen/Larkspur
*******************************************************************************
Cycle (sec):          100               Critical Vol./Cap.(X):         0.461
Loss Time (sec):        0               Average Delay (sec/veh):        10.4
Optimal Cycle:          0               Level Of Service:                  B
*******************************************************************************
Street Name:                 Helen                         Larkspur
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Stop Sign        Stop Sign        Stop Sign        Stop Sign
Rights:          Include          Include          Include          Include
Min. Green:    0     0     0    0     0     0    0     0     0    0     0     0
Lanes:        0  0  1! 0  0   0  1  0  0  0   0  0  1! 0  0   0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     81    47   189   15    28     0    2    42    34  121    66    32
Growth Adj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:  81    47   189   15    28     0    2    42    34  121    66    32
Added Vol:     0     0     0    0     0     0    0     0     0    0     0     0
PasserByVol:   0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:  81    47   189   15    28     0    2    42    34  121    66    32
User Adj:   1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:    0.89 0.89  0.89 0.89 0.89  0.89 0.89 0.89  0.89 0.89 0.89  0.89
PHF Volume:   91    53   212   17    31     0    2    47    38  136    74    36
Reduct Vol:    0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:  91    53   212   17    31     0    2    47    38  136    74    36
PCE Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume:  91    53   212   17    31     0    2    47    38  136    74    36
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Adjustment: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:      0.25 0.15  0.60 0.35 0.65  0.00 0.02 0.54  0.44 0.55 0.30  0.15
Final Sat.:  197   114   460  222   413     0   17   363   294  379   207   100
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.46 0.46  0.46 0.08 0.08  xxxx 0.13 0.13  0.13 0.36 0.36  0.36
Crit Moves:            ****      ****              ****              ****
Delay/Veh:  11.0 11.0  11.0  8.6  8.6   0.0  8.6  8.6   8.6 10.5 10.5  10.5
Delay Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh: 11.0 11.0  11.0  8.6  8.6   0.0  8.6  8.6   8.6 10.5 10.5  10.5
LOS by Move:   B    B     B    A    A     *    A    A     A    B    B     B
ApproachDel:      11.0              8.6              8.6             10.5
Delay Adj:        1.00             1.00             1.00             1.00
ApprAdjDel:       11.0              8.6              8.6             10.5
LOS by Appr:         B                A                A                B
AllWayAvgQ:   0.8  0.8   0.8  0.1  0.1   0.1  0.1  0.1   0.1  0.5  0.5   0.5
*******************************************************************************

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--------------------------------------------------------------------------------
            SFPUC - Peninsula Pipelines Seismic Upgrade Project
                             Existing Conditions
                                PM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
         2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #7 Ridgewood/Banbury
********************************************************************************
Average Delay (sec/veh):       0.6      Worst Case Level Of Service: A[  8.7]
********************************************************************************
Street Name:              Ridgewood                           Banbury
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:            Include          Include          Include          Include
Lanes:        0  0  1  0  0    0  0  1  0  0    0  0  1! 0  0    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0   53     0     0   33     0     2    0     4     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0   53     0     0   33     0     2    0     4     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0   53     0     0   33     0     2    0     4     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.85 0.85  0.85  0.85 0.85  0.85  0.85 0.85  0.85  0.85 0.85  0.85
PHF Volume:     0   62     0     0   39     0     2    0     5     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0   62     0     0   39     0     2    0     5     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   6.4  6.5   6.2 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx   101  101    39  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx   902  793  1039  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   902  793  1039  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  0.00 0.00  0.00  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  989 xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.0 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  8.7 xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    A     *     *    *     *
ApproachDel:      xxxxxx           xxxxxx             8.7           xxxxxx
ApproachLOS:         *                *                A               *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

```
-------------------------------------------------------------------------------
            SFPUC - Peninsula Pipelines Seismic Upgrade Project
                            Existing Conditions
                               PM Peak Hour
-------------------------------------------------------------------------------

                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
*******************************************************************************
Intersection #8 Santa Margarita/Cappuchino
*******************************************************************************
Average Delay (sec/veh):       3.2       Worst Case Level Of Service: A[  8.6]
*******************************************************************************
Street Name:          Santa Margarita                     Cappuchino
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:         0  0  0  0  0   0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      0    0     0    10    0     6     2    6     0     0   11    12
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   0    0     0    10    0     6     2    6     0     0   11    12
Added Vol:     0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:   0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   0    0     0    10    0     6     2    6     0     0   11    12
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.77 0.77  0.77  0.77 0.77  0.77  0.77 0.77  0.77  0.77 0.77  0.77
PHF Volume:    0    0     0    13    0     8     3    8     0     0   14    16
Reduct Vol:    0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:   0    0     0    13    0     8     3    8     0     0   14    16
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   6.4  6.5   6.2   4.1 xxxx xxxxx xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx   3.5  4.0   3.3   2.2 xxxx xxxxx xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    35   35    22    30 xxxx xxxxx  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx   983  861  1061  1596 xxxx xxxxx  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx   982  860  1061  1596 xxxx xxxxx  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  0.01 0.00  0.01  0.00 xxxx  xxxx  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:   *    *     *     *    *     *     A    *     *     *    *     *
Movement:     LT - LTR - RT   LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx 1010 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx  0.1 xxxxx   0.0 xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx  8.6 xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:    *    *     *     *    A     *     A    *     *     *    *     *
ApproachDel:     xxxxxx              8.6           xxxxxx           xxxxxx
ApproachLOS:       *                  A               *                *
*******************************************************************************
Note: Queue reported is the number of cars per lane.
*******************************************************************************
```

```
MITIG8 - Default Scenario  Tue Oct 9, 2012 03:59:25                  Page 1-1
------------------------------------------------------------------------------
               SFPUC - Peninsula Pipelines Seismic Upgrade Project
                           Existing Plus Project
                               AM Peak Hour
------------------------------------------------------------------------------
                      Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
******************************************************************************
Intersection #10 Whitman/Shelter Creek Condo Drveway/Eastburn
******************************************************************************
Average Delay (sec/veh):       3.9      Worst Case Level Of Service: B[ 11.4]
******************************************************************************
Approach:      North Bound       South Bound        East Bound        West Bound
Movement:    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign         Stop Sign        Uncontrolled      Uncontrolled
Rights:          Include           Include           Include           Include
Lanes:       0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       7    0    11    35    0    16     3  108     4     4   87     8
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    7    0    11    35    0    16     3  108     4     4   87     8
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PPSU:           0    0     0    27    0    13     3    0     0     0    0     8
Initial Fut:    7    0    11    62    0    29     6  108     4     4   87    16
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.71 0.71  0.71  0.71 0.71  0.71  0.71 0.71  0.71  0.71 0.71  0.71
PHF Volume:    10    0    15    87    0    41     8  152     6     6  123    23
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:   10    0    15    87    0    41     8  152     6     6  123    23
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  7.1  6.5   6.2   7.1  6.5   6.2   4.1 xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3   3.5  4.0   3.3   2.2 xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  337  328   155   325  320   134   145 xxxx xxxxx   158 xxxx xxxxx
Potent Cap.:  620  594   896   632  600   921  1450 xxxx xxxxx  1434 xxxx xxxxx
Move Cap.:    588  588   896   617  594   921  1450 xxxx xxxxx  1434 xxxx xxxxx
Volume/Cap:  0.02 0.00  0.02  0.14 0.00  0.04  0.01 xxxx  xxxx  0.00 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx   0.0 xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.5 xxxx xxxxx   7.5 xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     A    *     *     A    *     *
Movement:      LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx  745 xxxxx  xxxx  689 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx  0.1 xxxxx xxxxx  0.7 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx 10.0 xxxxx xxxxx 11.4 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    B     *     *    B     *     *    *     *     *    *     *
ApproachDel:       10.0              11.4             xxxxxx            xxxxxx
ApproachLOS:         B                 B                 *                 *
******************************************************************************
Note: Queue reported is the number of cars per lane.
******************************************************************************

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```
MITIG8 - Default Scenario  Thu Oct 11, 2012 10:06:15                Page 1-1
------------------------------------------------------------------------------
                 SFPUC - Peninsula Pipelines Seismic Upgrade Project
                             Existing Conditions
                                PM Peak Hour
------------------------------------------------------------------------------

                      Level Of Service Computation Report
               2000 HCM Operations Method (Future Volume Alternative)
******************************************************************************
Intersection #11 Serramonte/Junipero Serra Blvd
******************************************************************************
Cycle (sec):         120              Critical Vol./Cap.(X):         0.635
Loss Time (sec):       8              Average Delay (sec/veh):        36.6
Optimal Cycle:        42              Level Of Service:                  D
******************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Split Phase      Split Phase      Prot+Permit      Prot+Permit
Rights:          Include          Include          Include          Include
Min. Green:    0     0     0    0     0     0    0     0     0    0     0     0
Y+R:          4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0
Lanes:        2  0  2  0  1    1  0  1  1  0    2  0  2  0  1    1  0  1  1  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     435   486   123  107   333   116  383   553   281  205   329   504
Growth Adj:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Initial Bse:  435   486   123  107   333   116  383   553   281  205   329   504
Added Vol:      0     0     0    0     0     0    0     0     0    0     0     0
PasserByVol:    0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:  435   486   123  107   333   116  383   553   281  205   329   504
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     0.96  0.96  0.96 0.96  0.96  0.96 0.96  0.96  0.96 0.96  0.96  0.96
PHF Volume:   453   506   128  111   347   121  399   576   293  214   343   525
Reduct Vol:     0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:  453   506   128  111   347   121  399   576   293  214   343   525
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
FinalVolume:  453   506   128  111   347   121  399   576   293  214   343   525
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment:  0.90  0.93  0.80 0.93  0.89  0.89 0.90  0.93  0.81 0.93  0.85  0.82
Lanes:       2.00  2.00  1.00 1.00  1.48  0.52 2.00  2.00  1.00 1.00  1.16  1.84
Final Sat.:  3432  3538  1528 1769  2516   876 3426  3538  1536 1768  1871  2866
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.13  0.14  0.08 0.06  0.14  0.14 0.12  0.16  0.19 0.12  0.18  0.18
Crit Moves:        ****             ****                   ****  ****
Green/Cycle: 0.23  0.23  0.23 0.22  0.22  0.22 0.51  0.30  0.30 0.49  0.30  0.30
Volume/Cap:  0.59  0.63  0.37 0.29  0.63  0.63 0.44  0.54  0.63 0.45  0.61  0.61
Delay/Veh:   42.6  43.7  40.0 39.7  44.5  44.5 17.7  35.7  39.2 20.0  36.8  36.8
User DelAdj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:  42.6  43.7  40.0 39.7  44.5  44.5 17.7  35.7  39.2 20.0  36.8  36.8
LOS by Move:    D     D     D    D     D     D    B     D     D    B     D     D
HCM2kAvgQ:      8    10     4    4     9     9    5    10    10    5    10    10
******************************************************************************
Note: Queue reported is the number of cars per lane.

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```

```
-------------------------------------------------------------------------------
             SFPUC - Peninsula Pipelines Seismic Upgrade Project
                             Existing Conditions
                                PM Peak Hour
-------------------------------------------------------------------------------
                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
*******************************************************************************
Intersection #9 Shelter Creek Lane/Condo Driveway
*******************************************************************************
Average Delay (sec/veh):       1.4       Worst Case Level Of Service: A[ 10.0]
*******************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:      Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Rights:          Include          Include          Include          Include
Lanes:        0  1  0  0  0   0  0  0  1  0   0  0  1! 0  0   0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      14  122     0     0  114    39    22    0    12     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   14  122     0     0  114    39    22    0    12     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   14  122     0     0  114    39    22    0    12     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.96 0.96  0.96  0.96 0.96  0.96  0.96 0.96  0.96  0.96 0.96  0.96
PHF Volume:    15  127     0     0  119    41    23    0    13     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:   15  127     0     0  119    41    23    0    13     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4  6.5   6.2 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  159 xxxx xxxxx  xxxx xxxx xxxxx   295  295   139  xxxx xxxx xxxxx
Potent Cap.: 1432 xxxx xxxxx  xxxx xxxx xxxxx   700  619   914  xxxx xxxx xxxxx
Move Cap.:   1432 xxxx xxxxx  xxxx xxxx xxxxx   694  613   914  xxxx xxxx xxxxx
Volume/Cap:  0.01 xxxx  xxxx  xxxx xxxx  xxxx  0.03 0.00  0.01  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:  7.5 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    A    *     *     *    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  759 xxxxx  xxxx xxxx xxxxx
SharedQueue:  0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.1 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:  7.5 xxxx xxxxx xxxxx xxxx xxxxx xxxxx 10.0 xxxxx xxxxx xxxx xxxxx
Shared LOS:     A    *     *     *    *     *     *    A     *     *    *     *
ApproachDel:     xxxxxx           xxxxxx            10.0            xxxxxx
ApproachLOS:        *                *                A                *
*******************************************************************************
Note: Queue reported is the number of cars per lane.
*******************************************************************************
```

```
MITIG8 - Default Scenario  Mon Jun 25, 2012 10:40:30                Page 1-1
-------------------------------------------------------------------------------
              SFPUC - Peninsula Pipelines Seismic Upgrade Project
                            Existing Plus Project
                                AM Peak Hour
-------------------------------------------------------------------------------

                       Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #1 West Orange/Westborough/Camaritas
*******************************************************************************
Cycle (sec):          130               Critical Vol./Cap.(X):          1.213
Loss Time (sec):        8               Average Delay (sec/veh):         31.2
Optimal Cycle:        130               Level Of Service:                   C
*******************************************************************************
Street Name:  West Orange Ave/Camaritas Ave          Westborough Blvd
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Permitted        Permitted       Prot+Permit      Prot+Permit
Rights:          Include          Include          Include          Include
Min. Green:    33   33    33   33   33    33   36   65    65   21   50    50
Y+R:          4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
Lanes:        1  0  0  1  0   1  1  0  0  1   1  0  2  0  1   1  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      16    9    14  140   97   142  125 1072   208   14  874   204
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:   16    9    14  140   97   142  125 1072   208   14  874   204
Added Vol:      0    0     0    0    0     0    0    0     0    0    0     0
PPSU:           6    0     0    0    0     6   13    0    13    0    0     0
Initial Fut:   22    9    14  140   97   148  138 1072   221   14  874   204
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     0.83 0.83  0.83 0.83 0.83  0.83 0.83 0.83  0.83 0.83 0.83  0.83
PHF Volume:    27   11    17  169  117   178  166 1292   266   17 1053   246
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:   27   11    17  169  117   178  166 1292   266   17 1053   246
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume:   27   11    17  169  117   178  166 1292   266   17 1053   246
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment:  0.58 0.71  0.70 0.61 0.62  0.64 0.93 0.93  0.64 0.93 0.93  0.64
Lanes:       1.00 0.39  0.61 1.19 0.81  1.00 1.00 2.00  1.00 1.00 2.00  1.00
Final Sat.:  1096  523   814 1383  958  1225 1769 3538  1220 1769 3538  1214
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.02 0.02  0.02 0.12 0.12  0.15 0.09 0.37  0.22 0.01 0.30  0.20
Crit Moves:                             **** ****                  ****
Green/Cycle: 0.25 0.25  0.25 0.25 0.25  0.25 0.70 0.52  0.52 0.57 0.41  0.41
Volume/Cap:  0.10 0.08  0.08 0.48 0.48  0.57 0.29 0.71  0.42 0.04 0.73  0.50
Delay/Veh:   37.8 37.4  37.4 44.0 44.0  49.8 14.2 26.2  21.4 13.9 35.8  32.1
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh:  37.8 37.4  37.4 44.0 44.0  49.8 14.2 26.2  21.4 13.9 35.8  32.1
LOS by Move:    D    D     D    D    D     D    B    C     C    B    D     C
HCM2kAvgQ:      1    1     1    5    5     7    3   21     7    0   19     8
*******************************************************************************

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```

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------------------------------------------------------------------------------
             SFPUC - Peninsula Pipelines Seismic Upgrade Project
                           Existing Plus Project
                               AM Peak Hour
------------------------------------------------------------------------------

                     Level Of Service Computation Report
             2000 HCM Operations Method (Future Volume Alternative)
******************************************************************************
Intersection #2 I-280 Northbound Ramps/San Bruno Ave
******************************************************************************
Cycle (sec):          130               Critical Vol./Cap.(X):         0.594
Loss Time (sec):        8               Average Delay (sec/veh):        32.4
Optimal Cycle:        130               Level Of Service:                  C
******************************************************************************
Street Name:               I-280 Ramps                     San Bruno Ave
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:   0     0     0    0     0     0    0     0     0    0     0     0
Y+R:         4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0
Lanes:        1  0  1! 0  1   0  0  0  0  0   2  0  2  0  0   0  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     109   127   284    0     0     0   304   685     0    0   498   192
Growth Adj:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Initial Bse:  109   127   284    0     0     0   304   685     0    0   498   192
Added Vol:      0     0     0    0     0     0     0     0     0    0     0     0
PPSU:          22     0    10    0     0     0     1    11     0    0     0     1
Initial Fut:  131   127   294    0     0     0   305   696     0    0   498   193
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.87  0.87  0.87  0.87  0.87  0.87  0.87  0.87  0.87  0.87  0.87  0.87
PHF Volume:   151   146   338    0     0     0   351   800     0    0   572   222
Reduct Vol:     0     0     0    0     0     0     0     0     0    0     0     0
Reduced Vol:  151   146   338    0     0     0   351   800     0    0   572   222
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
FinalVolume:  151   146   338    0     0     0   351   800     0    0   572   222
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  0.78  0.69  0.78  1.00  1.00  1.00  0.89  0.83  1.00  1.00  0.92  0.66
Lanes:       1.18  0.40  1.42  0.00  0.00  0.00  2.00  2.00  0.00  0.00  2.00  1.00
Final Sat.:  1744   526  2082    0     0     0  3400  3155     0    0  3505  1255
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.09  0.28  0.16  0.00  0.00  0.00  0.10  0.25  0.00  0.00  0.16  0.18
Crit Moves:        ****                          ****                         ****
Green/Cycle: 0.47  0.47  0.47  0.00  0.00  0.00  0.17  0.47  0.00  0.00  0.30  0.30
Volume/Cap:  0.18  0.59  0.35  0.00  0.00  0.00  0.59  0.54  0.00  0.00  0.55  0.59
Delay/Veh:   20.2  26.5  22.2   0.0   0.0   0.0  51.1  24.7   0.0   0.0  38.9  41.5
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  20.2  26.5  22.2   0.0   0.0   0.0  51.1  24.7   0.0   0.0  38.9  41.5
LOS by Move:    C     C     C    A     A     A     D     C     A    A     D     D
HCM2kAvgQ:      3    11     6    0     0     0     7    12     0    0    10     8
******************************************************************************
```

```
--------------------------------------------------------------------------------
                 SFPUC - Peninsula Pipelines Seismic Upgrade Project
                      Existing Plus Project - ramp lane closure
                                    AM Peak Hour
--------------------------------------------------------------------------------

                        Level Of Service Computation Report
               2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #2 I-280 Northbound Ramps/San Bruno Ave
********************************************************************************
Cycle (sec):          130                 Critical Vol./Cap.(X):         0.747
Loss Time (sec):        8                 Average Delay (sec/veh):        40.1
Optimal Cycle:        130                 Level Of Service:                  D
********************************************************************************
Street Name:                I-280 Ramps                    San Bruno Ave
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    0    0     0    0    0     0    0    0     0    0    0     0
Y+R:         4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
Lanes:       1  0  1! 0  0   0  0  0  0  0   2  0  2  0  0   0  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     109  127   284    0    0     0  304  685     0    0  498   192
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:  109  127   284    0    0     0  304  685     0    0  498   192
Added Vol:      0    0     0    0    0     0    0    0     0    0    0     0
PPSU:          22    0    10    0    0     0    1   11     0    0    0     1
Initial Fut:  131  127   294    0    0     0  305  696     0    0  498   193
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     0.87 0.87  0.87 0.87 0.87  0.87 0.87 0.87  0.87 0.87 0.87  0.87
PHF Volume:   151  146   338    0    0     0  351  800     0    0  572   222
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:  151  146   338    0    0     0  351  800     0    0  572   222
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume:  151  146   338    0    0     0  351  800     0    0  572   222
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment:  0.78 0.69  0.69 1.00 1.00  1.00 0.89 0.83  1.00 1.00 0.92  0.66
Lanes:       1.12 0.27  0.61 0.00 0.00  0.00 2.00 2.00  0.00 0.00 2.00  1.00
Final Sat.:  1651  347   803    0    0     0 3400 3155     0    0 3505  1255
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.09 0.42  0.42 0.00 0.00  0.00 0.10 0.25  0.00 0.00 0.16  0.18
Crit Moves:       ****                      ****                            ****
Green/Cycle: 0.56 0.56  0.56 0.00 0.00  0.00 0.14 0.37  0.00 0.00 0.24  0.24
Volume/Cap:  0.16 0.75  0.75 0.00 0.00  0.00 0.75 0.68  0.00 0.00 0.69  0.75
Delay/Veh:   13.6 25.0  25.0  0.0  0.0   0.0 60.3 35.6   0.0  0.0 47.7  55.9
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh:  13.6 25.0  25.0  0.0  0.0   0.0 60.3 35.6   0.0  0.0 47.7  55.9
LOS by Move:    B    C     C    A    A     A    E    D     A    A    D     E
HCM2kAvgQ:      3   18    18    0    0     0    9   15     0    0   12    10
********************************************************************************
```

```
MITIG8 - Default Scenario  Tue Feb 5, 2013 10:25:08                  Page 1-1
--------------------------------------------------------------------------------
           SFPUC - Peninsula Pipelines Seismic Upgrade Project
        Existing Plus Project - SB Ave West eastbound lane closure
                                AM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
             2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #2 I-280 Northbound Ramps/San Bruno Ave
********************************************************************************
Cycle (sec):          130                Critical Vol./Cap.(X):          0.873
Loss Time (sec):        8                Average Delay (sec/veh):         33.8
Optimal Cycle:        130                Level Of Service:                   C
********************************************************************************
Street Name:                 I-280 Ramps                    San Bruno Ave
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected         Protected         Protected         Protected
Rights:          Include           Include           Include           Include
Min. Green:    0     0     0    0     0     0    0     0     0    0     0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
Lanes:        1  0  1! 0  1   0  0  0  0  0   2  0  1  0  0   0  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     109  127   284     0    0     0   304  685     0     0  498   192
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:  109  127   284     0    0     0   304  685     0     0  498   192
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PPSU:          22    0    10     0    0     0     1   11     0     0    0     1
Initial Fut:  131  127   294     0    0     0   305  696     0     0  498   193
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.87 0.87  0.87  0.87 0.87  0.87  0.87 0.87  0.87  0.87 0.87  0.87
PHF Volume:   151  146   338     0    0     0   351  800     0     0  572   222
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  151  146   338     0    0     0   351  800     0     0  572   222
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:  151  146   338     0    0     0   351  800     0     0  572   222
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  0.78 0.69  0.78  1.00 1.00  1.00  0.89 0.78  1.00  1.00 0.92  0.66
Lanes:       1.18 0.40  1.42  0.00 0.00  0.00  2.00 1.00  0.00  0.00 2.00  1.00
Final Sat.:  1744  526  2082     0    0     0  3400 1476     0     0 3505  1255
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.09 0.28  0.16  0.00 0.00  0.00  0.10 0.54  0.00  0.00 0.16  0.18
Crit Moves:       ****                              ****        ****
Green/Cycle: 0.32 0.32  0.32  0.00 0.00  0.00  0.23 0.62  0.00  0.00 0.39  0.39
Volume/Cap:  0.27 0.87  0.51  0.00 0.00  0.00  0.45 0.87  0.00  0.00 0.42  0.45
Delay/Veh:   33.2 53.2  36.5   0.0  0.0   0.0  43.5 29.7   0.0   0.0 28.9  29.8
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  33.2 53.2  36.5   0.0  0.0   0.0  43.5 29.7   0.0   0.0 28.9  29.8
LOS by Move:    C    D     D     A    A     A     D    C     A     A    C     C
HCM2kAvgQ:      4   17     8     0    0     0     6   29     0     0    9     7
********************************************************************************

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```

```
MITIG8 - Default Scenario  Tue Feb 5, 2013 10:32:21                 Page 1-1
------------------------------------------------------------------------------
             SFPUC - Peninsula Pipelines Seismic Upgrade Project
            Existing plus Project - SB Ave West and ramp closure
                                 PM Peak Hour
------------------------------------------------------------------------------

                     Level Of Service Computation Report
           2000 HCM Operations Method (Future Volume Alternative)
******************************************************************************
Intersection #2 I-280 Northbound Ramps/San Bruno Ave
******************************************************************************
Cycle (sec):         130               Critical Vol./Cap.(X):         0.897
Loss Time (sec):       8               Average Delay (sec/veh):        41.0
Optimal Cycle:       130               Level Of Service:                  D
******************************************************************************
Street Name:               I-280 Ramps                     San Bruno Ave
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    0    0     0    0    0     0    0    0     0    0    0     0
Y+R:         4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
Lanes:        1  0  1! 0  0   0  0  0  0  0   2  0  1  0  0   0  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:    153  207   240    0    0     0  169  508     0    0  793   441
Growth Adj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse: 153  207   240    0    0     0  169  508     0    0  793   441
Added Vol:     0    0     0    0    0     0    0    0     0    0    0     0
PPSU:         12    0     0    0    0     0    1    1     0    0   11    10
Initial Fut: 165  207   240    0    0     0  170  509     0    0  804   451
User Adj:   1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:    0.95 0.95  0.95 0.95 0.95  0.95 0.95 0.95  0.95 0.95 0.95  0.95
PHF Volume:  174  218   253    0    0     0  179  536     0    0  846   475
Reduct Vol:    0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol: 174  218   253    0    0     0  179  536     0    0  846   475
PCE Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume: 174  218   253    0    0     0  179  536     0    0  846   475
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment: 0.79 0.70  0.70 1.00 1.00  1.00 0.89 0.78  1.00 1.00 0.92  0.66
Lanes:      1.14 0.40  0.46 0.00 0.00  0.00 2.00 1.00  0.00 0.00 2.00  1.00
Final Sat.: 1711  530   615    0    0     0 3400 1476     0    0 3505  1255
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.10 0.41  0.41 0.00 0.00  0.00 0.05 0.36  0.00 0.00 0.24  0.38
Crit Moves:      ****                       ****                         ****
Green/Cycle: 0.46 0.46  0.46 0.00 0.00  0.00 0.06 0.48  0.00 0.00 0.42  0.42
Volume/Cap: 0.22 0.90  0.90 0.00 0.00  0.00 0.90 0.76  0.00 0.00 0.57  0.90
Delay/Veh:  21.3 46.4  46.4  0.0  0.0   0.0 97.5 32.2   0.0  0.0 29.2  52.8
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh: 21.3 46.4  46.4  0.0  0.0   0.0 97.5 32.2   0.0  0.0 29.2  52.8
LOS by Move:   C    D     D    A    A     A    F    C     A    A    C     D
HCM2kAvgQ:     4   23    23    0    0     0    6   19     0    0   14    21
******************************************************************************

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```

```
MITIG8 - Default Scenario  Wed Jun 27, 2012 07:00:24              Page 1-1
--------------------------------------------------------------------------------
            SFPUC - Peninsula Pipelines Seismic Upgrade Project
                          Existing Plus Project
                              AM Peak Hour
--------------------------------------------------------------------------------
                    Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #3 Crestmoor/San Bruno Ave/Shelter Creek Way
********************************************************************************
Cycle (sec):          130              Critical Vol./Cap.(X):         0.604
Loss Time (sec):        8              Average Delay (sec/veh):        40.5
Optimal Cycle:        130              Level Of Service:                  D
********************************************************************************
Street Name:    Crestmoor/Shelter Creek Way               San Bruno Ave
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|----------------||----------------||----------------||----------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    0    0     0    0    0     0    0    0     0    0    0     0
Y+R:         4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
Lanes:       0  1  0  0  1   0  1  0  1  0    1  0  2  0  1    1  0  1  1  0
------------|----------------||----------------||----------------||----------------|
Volume Module:
Base Vol:     27    5   272   99   21     9   10  440    23   98  191    63
Growth Adj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:  27    5   272   99   21     9   10  440    23   98  191    63
Added Vol:     0    0     0    0    0     0    0    0     0    0    0     0
PPSU:          0    0    13    0    0     0    0    0     0   23    0     0
Initial Fut:  27    5   285   99   21     9   10  440    23  121  191    63
User Adj:   1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:    0.86 0.86  0.86 0.86 0.86  0.86 0.86 0.86  0.86 0.86 0.86  0.86
PHF Volume:   31    6   331  115   24    10   12  512    27  141  222    73
Reduct Vol:    0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:  31    6   331  115   24    10   12  512    27  141  222    73
PCE Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume:  31    6   331  115   24    10   12  512    27  141  222    73
------------|----------------||----------------||----------------||----------------|
Saturation Flow Module:
Sat/Lane:   1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment: 0.93 0.93  0.66 0.79 0.79  0.79 0.92 0.92  0.66 0.92 0.80  0.80
Lanes:      0.84 0.16  1.00 1.00 0.70  0.30 1.00 2.00  1.00 1.00 1.50  0.50
Final Sat.: 1494  277  1255 1504 1053   451 1753 3505  1255 1753 2285   754
------------|----------------||----------------||----------------||----------------|
Capacity Analysis Module:
Vol/Sat:    0.02 0.02  0.26 0.08 0.02  0.02 0.01 0.15  0.02 0.08 0.10  0.10
Crit Moves:            ****  ****                  ****        ****
Green/Cycle: 0.27 0.44  0.44 0.13 0.30  0.30 0.02 0.24  0.24 0.13 0.35  0.35
Volume/Cap: 0.08 0.05  0.60 0.60 0.08  0.08 0.28 0.60  0.09 0.60 0.28  0.28
Delay/Veh:  35.6 21.1  29.9 57.9 33.0  33.0 65.9 45.0  38.3 57.6 30.5  30.5
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh: 35.6 21.1  29.9 57.9 33.0  33.0 65.9 45.0  38.3 57.6 30.5  30.5
LOS by Move:   D    C     C    E    C     C    E    D     D    E    C     C
HCM2kAvgQ:     1    1    11    5    1     1    1   10     1    6    4     4
********************************************************************************

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```

```
------------------------------------------------------------------------------
              SFPUC - Peninsula Pipelines Seismic Upgrade Project
                             Existing Plus Project
                                 AM Peak Hour
------------------------------------------------------------------------------
                       Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
******************************************************************************
Intersection #9 Shelter Creek Lane/Condo Driveway
******************************************************************************
Average Delay (sec/veh):        2.3       Worst Case Level Of Service: B[ 10.8]
******************************************************************************
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:            Include          Include          Include          Include
Lanes:         0  1  0  0  0   0  0  0  1  0   0  0  1! 0  0   0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        7  175     0     0   90    11    48    0    25     0    0     0
Growth Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:     7  175     0     0   90    11    48    0    25     0    0     0
Added Vol:       0    0     0     0    0     0     0    0     0     0    0     0
PPSU:            0   10     0     0   10     3     3    0     0     0    0     0
Initial Fut:     7  185     0     0  100    14    51    0    25     0    0     0
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.85 0.85  0.85  0.85 0.85  0.85  0.85 0.85  0.85  0.85 0.85  0.85
PHF Volume:      8  218     0     0  118    16    60    0    29     0    0     0
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:     8  218     0     0  118    16    60    0    29     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:   4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4  6.5   6.2 xxxxx xxxx xxxxx
FollowUpTim:   2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:   134 xxxx xxxxx  xxxx xxxx xxxxx   360  360   126  xxxx xxxx xxxxx
Potent Cap.:  1450 xxxx xxxxx  xxxx xxxx xxxxx   639  567   925  xxxx xxxx xxxxx
Move Cap.:    1450 xxxx xxxxx  xxxx xxxx xxxxx   636  564   925  xxxx xxxx xxxxx
Volume/Cap:   0.01 xxxx  xxxx  xxxx xxxx  xxxx  0.09 0.00  0.03  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:     0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:   7.5 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:     A    *     *     *    *     *     *    *     *     *    *     *
Movement:      LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.:  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  709 xxxxx  xxxx xxxx xxxxx
SharedQueue:   0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.4 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:   7.5 xxxx xxxxx xxxxx xxxx xxxxx xxxxx 10.8 xxxxx xxxxx xxxx xxxxx
Shared LOS:      A    *     *     *    *     *     *    B     *     *    *     *
ApproachDel:      xxxxxx           xxxxxx              10.8           xxxxxx
ApproachLOS:         *                *                  B               *
******************************************************************************
Note: Queue reported is the number of cars per lane.
******************************************************************************
```

```
--------------------------------------------------------------------------------
              SFPUC - Peninsula Pipelines Seismic Upgrade Project
                             Existing Plus Project
                                 AM Peak Hour
--------------------------------------------------------------------------------

                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #4 Shelter Creek Way/Whitman
********************************************************************************
Average Delay (sec/veh):      4.2       Worst Case Level Of Service: B[ 13.8]
********************************************************************************
Street Name:               Shelter Creek                        Whitman
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:        0  0  0  0  0    0  0  1! 0  0    1  0  1  0  0    0  0  1  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0     93    0     22    83  197     0     0   82    93
Growth Adj:  1.00 1.00  1.00   1.00 1.00   1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0    0     0     93    0     22    83  197     0     0   82    93
Added Vol:      0    0     0      0    0      0     0    0     0     0    0     0
PPSU:           0    0     0      0    0     20    10    2     0     0   12     0
Initial Fut:    0    0     0     93    0     42    93  199     0     0   94    93
User Adj:    1.00 1.00  1.00   1.00 1.00   1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.89 0.89  0.89   0.89 0.89   0.89  0.89 0.89  0.89  0.89 0.89  0.89
PHF Volume:     0    0     0    104    0     47   104  224     0     0  106   104
Reduct Vol:     0    0     0      0    0      0     0    0     0     0    0     0
FinalVolume:    0    0     0    104    0     47   104  224     0     0  106   104
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx    6.4  6.5    6.2   4.1 xxxx xxxxx xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx    3.5  4.0    3.3   2.2 xxxx xxxxx xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    538  538    106   210 xxxx xxxxx  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx    504  450    949  1361 xxxx xxxxx  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx    474  415    949  1361 xxxx xxxxx  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx   0.22 0.00   0.05  0.08 xxxx  xxxx  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx   xxxx xxxx xxxxx    0.2 xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx    7.9 xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *      *    *     *     A    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx   xxxx  562 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx  1.1 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx 13.8 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *      *    B     *     *    *     *     *    *     *
ApproachDel:     xxxxxx             13.8             xxxxxx           xxxxxx
ApproachLOS:        *                 B                 *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

```
MITIG8 - Default Scenario  Wed Jun 27, 2012 07:01:49              Page 1-1
---------------------------------------------------------------------------
             SFPUC - Peninsula Pipelines Seismic Upgrade Project
                          Existing Plus Project
                              AM Peak Hour
---------------------------------------------------------------------------

                     Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
***************************************************************************
Intersection #5 Courtland Dr/Whitman
***************************************************************************
Average Delay (sec/veh):        5.0      Worst Case Level Of Service: A[ 10.0]
***************************************************************************
Street Name:              Courtland Dr                      Whitman
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:          Include          Include          Include          Include
Lanes:        0  0  1! 0  0   0  0  0  0  0   0  0  1  0  0   0  1  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       5    0   101    0    0     0    0  138     0   66   37     0
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:    5    0   101    0    0     0    0  138     0   66   37     0
Added Vol:      0    0     0    0    0     0    0    0     0    0    0     0
PPSU:           0    0    12    0    0     0    0    0     0   32    0     0
Initial Fut:    5    0   113    0    0     0    0  138     0   98   37     0
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     0.86 0.86  0.86 0.86 0.86  0.86 0.86 0.86  0.86 0.86 0.86  0.86
PHF Volume:     6    0   131    0    0     0    0  160     0  114   43     0
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
FinalVolume:    6    0   131    0    0     0    0  160     0  114   43     0
------------|---------------||---------------,|---------------||---------------,
Critical Gap Module:
Critical Gp:  6.4  6.5   6.2 xxxxx xxxx xxxxx xxxxx xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3 xxxxx xxxx xxxxx xxxxx xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------'
Capacity Module:
Cnflict Vol:  431  431   160  xxxx xxxx xxxxx  xxxx xxxx xxxxx   160 xxxx xxxxx
Potent Cap.:  581  517   885  xxxx xxxx xxxxx  xxxx xxxx xxxxx  1419 xxxx xxxxx
Move Cap.:    543  473   885  xxxx xxxx xxxxx  xxxx xxxx xxxxx  1419 xxxx xxxxx
Volume/Cap:  0.01 0.00  0.15  xxxx xxxx  xxxx  xxxx xxxx  xxxx  0.08 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.3 xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.8 xxxx xxxxx
LOS by Move:    *    *     *    *    *     *    *    *     *     A    *     *
Movement:     LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.: xxxx  862 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx  0.6 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   0.3 xxxx xxxxx
Shrd ConDel:xxxxx 10.0 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.8 xxxx xxxxx
Shared LOS:     *    A     *    *    *     *    *    *     *     A    *     *
ApproachDel:       10.0           xxxxxx           xxxxxx           xxxxxx
ApproachLOS:         A               *                *                *
***************************************************************************
Note: Queue reported is the number of cars per lane.
***************************************************************************

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```
MITIG8 - Default Scenário  Mon Jun 25, 2012 10:45:16                Page 1-1
--------------------------------------------------------------------------------
             SFPUC - Peninsula Pipelines Seismic Upgrade Project
                          Existing Plus Project
                              AM Peak Hour
--------------------------------------------------------------------------------
                     Level Of Service Computation Report
          2000 HCM 4-Way Stop Method (Future Volume Alternative)
********************************************************************************
Intersection #6 Helen/Larkspur
********************************************************************************
Cycle (sec):         100               Critical Vol./Cap.(X):         0.727
Loss Time (sec):       0               Average Delay (sec/veh):        19.4
Optimal Cycle:         0               Level Of Service:                  C
********************************************************************************
Street Name:                 Helen                         Larkspur
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign        Stop Sign        Stop Sign
Rights:          Include          Include          Include          Include
Min. Green:    0     0     0    0     0     0    0     0     0    0     0     0
Lanes:       0  0  1! 0  0   0  0  0  1  0   0  0  1! 0  0   0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     179  112    41     0  134   122    78   56   182    69   84     1
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:  179  112    41     0  134   122    78   56   182    69   84     1
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PPSU:           0    0     0     0    0     0     0   25     0     0    7     0
Initial Fut:  179  112    41     0  134   122    78   81   182    69   91     1
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.85 0.85  0.85  0.85 0.85  0.85  0.85 0.85  0.85  0.85 0.85  0.85
PHF Volume:   211  132    48     0  158   144    92   95   214    81  107     1
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  211  132    48     0  158   144    92   95   214    81  107     1
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:  211  132    48     0  158   144    92   95   214    81  107     1
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.54 0.34  0.12  0.00 0.52  0.48  0.23 0.24  0.53  0.43 0.56  0.01
Final Sat.:   290  181    66     0  275   250   127  132   296   191  252     3
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.73 0.73  0.73  xxxx 0.57  0.57  0.72 0.72  0.72  0.42 0.42  0.42
Crit Moves:       ****             ****             ****             ****
Delay/Veh:   22.6 22.6  22.6   0.0 16.1  16.1  21.5 21.5  21.5  14.0 14.0  14.0
Delay Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  22.6 22.6  22.6   0.0 16.1  16.1  21.5 21.5  21.5  14.0 14.0  14.0
LOS by Move:    C    C     C     *    C     C     C    C     C     B    B     B
ApproachDel:      22.6             16.1             21.5             14.0
Delay Adj:        1.00             1.00             1.00             1.00
ApprAdjDel:       22.6             16.1             21.5             14.0
LOS by Appr:         C                C                C                B
AllWayAvgQ:   2.0  2.0   2.0   1.0  1.0   1.0   1.9  1.9   1.9   0.5  0.5   0.5
********************************************************************************

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```

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--------------------------------------------------------------------------------
                SFPUC - Peninsula Pipelines Seismic Upgrade Project
                              Existing Plus Project
                                  AM Peak Hour
--------------------------------------------------------------------------------

                        Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #7 Ridgewood/Banbury
********************************************************************************
Average Delay (sec/veh):        1.9       Worst Case Level Of Service: A[  9.4]
********************************************************************************
Street Name:                Ridgewood                          Banbury
Approach:       North Bound      South Bound       East Bound        West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign         Stop Sign
Rights:           Include          Include          Include           Include
Lanes:         0  1  0  0  0    0  0  0  1  0    0  0  1! 0  0    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       27   71    0     0   96    7     8    0   18     0    0    0
Growth Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    27   71    0     0   96    7     8    0   18     0    0    0
Added Vol:       0    0    0     0    0    0     0    0    0     0    0    0
PPSU:            0    3    0     0    1    0     0    0    0     0    0    0
Initial Fut:    27   74    0     0   97    7     8    0   18     0    0    0
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.85 0.85  0.85  0.85 0.85  0.85  0.85 0.85  0.85  0.85 0.85  0.85
PHF Volume:     32   87    0     0  114    8     9    0   21     0    0    0
Reduct Vol:      0    0    0     0    0    0     0    0    0     0    0    0
FinalVolume:    32   87    0     0  114    8     9    0   21     0    0    0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:   4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4  6.5   6.2 xxxxx xxxx xxxxx
FollowUpTim:   2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:   122 xxxx xxxxx  xxxx xxxx xxxxx   269  269   118  xxxx xxxx xxxxx
Potent Cap.:  1465 xxxx xxxxx  xxxx xxxx xxxxx   720  637   934  xxxx xxxx xxxxx
Move Cap.:    1465 xxxx xxxxx  xxxx xxxx xxxxx   708  623   934  xxxx xxxx xxxxx
Volume/Cap:   0.02 xxxx  xxxx  xxxx xxxx  xxxx  0.01 0.00  0.02  xxxx xxxx  xxxx
------------|---------------||---------------||---------------  |---------------|
Level Of Service Module:
2Way95thQ:     0.1 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:   7.5 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:     A    *     *     *    *     *     *    *     *     *    *     *
Movement:      LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.:  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  850 xxxxx  xxxx xxxx xxxxx
SharedQueue:   0.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.1 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:   7.5 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  9.4 xxxxx xxxxx xxxx xxxxx
Shared LOS:      A    *     *     *    *     *     *    A     *     *    *     *
ApproachDel:      xxxxxx           xxxxxx              9.4           xxxxxx
ApproachLOS:         *                *                 A                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

```
-----------------------------------------------------------------------------
              SFPUC - Peninsula Pipelines Seismic Upgrade Project
                            Existing Plus Project
                                AM Peak Hour
-----------------------------------------------------------------------------

                       Level Of Service Computation Report
              2000 HCM Unsignalized Method (Future Volume Alternative)
*****************************************************************************
Intersection #8 Santa Margarita/Cappuchino
*****************************************************************************
Average Delay (sec/veh):       4.7      Worst Case Level Of Service: A[  8.8]
*****************************************************************************
Street Name:           Santa Margarita                     Cappuchino
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:          Include          Include          Include          Include
Lanes:        0  0  0  0  0   0  0  1! 0  0   0  1  0  0  0   0  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0    23    0     2     4    6     0     0    3    11
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0    0     0    23    0     2     4    6     0     0    3    11
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PPSU:           0    0     0     0    0     0     0    1     0     0    3     0
Initial Fut:    0    0     0    23    0     2     4    7     0     0    6    11
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.77 0.77  0.77  0.77 0.77  0.77  0.77 0.77  0.77  0.77 0.77  0.77
PHF Volume:     0    0     0    30    0     3     5    9     0     0    8    14
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0    0     0    30    0     3     5    9     0     0    8    14
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   6.4  6.5   6.2   4.1 xxxx xxxxx xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx   3.5  4.0   3.3   2.2 xxxx xxxxx xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    34   34    15    22 xxxx xxxxx  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx   979  858  1065  1593 xxxx xxxxx  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx   976  855  1065  1593 xxxx xxxxx  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  0.03 0.00  0.00  0.00 xxxx  xxxx  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     A    *     *     *    *     *
Movement:     LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx  983 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx  0.1 xxxxx   0.0 xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx  8.8 xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    A     *     A    *     *     *    *     *
ApproachDel:     xxxxxx             8.8            xxxxxx           xxxxxx
ApproachLOS:        *                A                *                *
*****************************************************************************
Note: Queue reported is the number of cars per lane.
*****************************************************************************
```

```
--------------------------------------------------------------------------------
                   SFPUC - Peninsula Pipelines Seismic Upgrade Project
                                Existing plus Project
                                    PM Peak Hour
--------------------------------------------------------------------------------
                         Level Of Service Computation Report
              2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #10 Whitman/Shelter Creek Condo Driveway/Eastburn
********************************************************************************
Average Delay (sec/veh):        2.3     Worst Case Level Of Service: B[ 10.9]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:        0  0  1! 0  0   0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       3    0     8   11    0     6    12   76     8     8   92    21
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    3    0     8   11    0     6    12   76     8     8   92    21
Added Vol:      0    0     0    0    0     0     0    0     0     0    0     0
PPSU:           0    0     0    8    0     4    13    0     0     0    0    23
Initial Fut:    3    0     8   19    0    10    25   76     8     8   92    44
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.71 0.71  0.71 0.71 0.71  0.71  0.71 0.71  0.71  0.71 0.71  0.71
PHF Volume:     4    0    11   27    0    14    35  107    11    11  130    62
Reduct Vol:     0    0     0    0    0     0     0    0     0     0    0     0
FinalVolume:    4    0    11   27    0    14    35  107    11    11  130    62
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  7.1  6.5   6.2  7.1  6.5   6.2   4.1 xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3  3.5  4.0   3.3   2.2 xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  373  397   113  372  372   161   192 xxxx xxxxx   118 xxxx xxxxx
Potent Cap.:  587  543   946  589  561   890  1394 xxxx xxxxx  1482 xxxx xxxxx
Move Cap.:    563  525   946  567  543   890  1394 xxxx xxxxx  1482 xxxx xxxxx
Volume/Cap:  0.01 0.00  0.01 0.05 0.00  0.02  0.03 xxxx  xxxx  0.01 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx xxxx xxxx xxxxx   0.1 xxxx xxxxx   0.0 xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.6 xxxx xxxxx   7.4 xxxx xxxxx
LOS by Move:    *    *     *    *    *     *     A    *     *     A    *     *
Movement:     LT - LTR - RT   LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx  798 xxxxx xxxx  648 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx  0.1 xxxxx xxxxx  0.2 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx  9.6 xxxxx xxxxx 10.9 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    A     *    *    B     *     *    *     *     *    *     *
ApproachDel:         9.6              10.9             xxxxxx           xxxxxx
ApproachLOS:          A                 B                *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

```
MITIG8 - Default Scenario  Thu Oct 11, 2012 09:59:31                 Page 1-1
-------------------------------------------------------------------------------
                SFPUC - Peninsula Pipelines Seismic Upgrade Project
                              Existing Plus Project
                                  AM Peak Hour
-------------------------------------------------------------------------------

                        Level Of Service Computation Report
              2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #11 Serramonte/Junipero Serra Blvd
*******************************************************************************
Cycle (sec):          120               Critical Vol./Cap.(X):         0.674
Loss Time (sec):        8               Average Delay (sec/veh):        35.3
Optimal Cycle:         46               Level Of Service:                  D
*******************************************************************************
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Split Phase      Split Phase      Prot+Permit      Prot+Permit
Rights:          Include          Include          Include          Include
Min. Green:    0    0     0    0    0     0    0    0     0    0    0     0
Y+R:         4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
Lanes:       2  0  2  0  1    1  0  1  1  0    2  0  2  0  1    1  0  1  1  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:    393  265   155  141  462    65  141  559   427  106  127   223
Growth Adj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse: 393  265   155  141  462    65  141  559   427  106  127   223
Added Vol:     0    0     0    0    0     0    0    0     0    0    0     0
PPSU:          0    0    12    7    0     0    0    7     0    2    2     2
Initial Fut: 393  265   167  148  462    65  141  566   427  108  129   225
User Adj:   1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:    0.96 0.96  0.96 0.96 0.96  0.96 0.96 0.96  0.96 0.96 0.96  0.96
PHF Volume:  409  276   174  154  481    68  147  590   445  113  134   234
Reduct Vol:    0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol: 409  276   174  154  481    68  147  590   445  113  134   234
PCE Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume: 409  276   174  154  481    68  147  590   445  113  134   234
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment: 0.90 0.93  0.80 0.93 0.91  0.91 0.90 0.93  0.81 0.93 0.84  0.82
Lanes:      2.00 2.00  1.00 1.00 1.75  0.25 2.00 2.00  1.00 1.00 1.07  1.93
Final Sat.: 3432 3538  1518 1769 3044   428 3417 3538  1545 1766 1718  2996
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.12 0.08  0.11 0.09 0.16  0.16 0.04 0.17  0.29 0.06 0.08  0.08
Crit Moves: ****                  ****                    **** ****
Green/Cycle: 0.18 0.18  0.18 0.23 0.23  0.23 0.54 0.43  0.43 0.43 0.34  0.34
Volume/Cap: 0.67 0.44  0.65 0.37 0.67  0.67 0.13 0.39  0.67 0.26 0.23  0.23
Delay/Veh:  49.1 44.6  51.3 39.1 44.0  44.0 13.4 23.8  30.4 21.0 28.7  28.7
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh: 49.1 44.6  51.3 39.1 44.0  44.0 13.4 23.8  30.4 21.0 28.7  28.7
LOS by Move:   D    D     D    D    D     D    B    C     C    C    C     C
HCM2kAvgQ:     8    5     7    5   11    11    1    8    14    3    3     3
*******************************************************************************
Note: Queue reported is the number of cars per lane.

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MITIG8 - Default Scenario  Mon Jun 25, 2012 10:50:02                Page 1-1
-------------------------------------------------------------------------------
             SFPUC - Peninsula Pipelines Seismic Upgrade Project
                            Existing plus Project
                                PM Peak Hour
-------------------------------------------------------------------------------
                      Level Of Service Computation Report
           2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #1 West Orange/Westborough/Camaritas
*******************************************************************************
Cycle (sec):          130                Critical Vol./Cap.(X):        1.213
Loss Time (sec):        8                Average Delay (sec/veh):       33.7
Optimal Cycle:        130                Level Of Service:                 C
*******************************************************************************
Street Name:  West Orange Ave/Camaritas Ave           Westborough Blvd
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Permitted        Permitted       Prot+Permit      Prot+Permit
Rights:          Include          Include          Include          Include
Min. Green:   33   33    33   33   33    33   36   65    65   21   50    50
Y+R:         4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
Lanes:        1  0  0  1  0   1  1  0  0  1   1  0  2  0  1   1  0  2  0  1
------------|---------------||---------------,|---------------||---------------|
Volume Module:
Base Vol:     40   15    35   93   60   230  113  788   156   67 1071   303
Growth Adj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:  40   15    35   93   60   230  113  788   156   67 1071   303
Added Vol:     0    0     0    0    0     0    0    0     0    0    0     0
PPSU:         13    0     0    0    0    13    3    0     3    0    0     0
Initial Fut:  53   15    35   93   60   243  116  788   159   67 1071   303
User Adj:   1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:    0.95 0.95  0.95 0.95 0.95  0.95 0.95 0.95  0.95 0.95 0.95  0.95
PHF Volume:   56   16    37   98   63   256  122  829   167   71 1127   319
Reduct Vol:    0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:  56   16    37   98   63   256  122  829   167   71 1127   319
PCE Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume:  56   16    37   98   63   256  122  829   167   71 1127   319
------------|---------------'|---------------||---------------  |---------------,
Saturation Flow Module:
Sat/Lane:   1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment: 0.68 0.70  0.69 0.60 0.60  0.65 0.93 0.93  0.64 0.93 0.93  0.64
Lanes:      1.00 0.30  0.70 1.22 0.78  1.00 1.00 2.00  1.00 1.00 2.00  1.00
Final Sat.: 1290  394   919 1387  895  1226 1769 3538  1220 1767 3538  1214
------------|---------------||---------------||---------------,|---------------,
Capacity Analysis Module:
Vol/Sat:    0.04 0.04  0.04 0.07 0.07  0.21 0.07 0.23  0.14 0.04 0.32  0.26
Crit Moves:                            ****  ****                   ****
Green/Cycle: 0.26 0.26  0.26 0.26 0.26  0.26 0.69 0.51  0.51 0.57 0.40  0.40
Volume/Cap: 0.17 0.15  0.15 0.27 0.27  0.80 0.22 0.46  0.27 0.13 0.80  0.66
Delay/Veh:  38.1 37.9  37.9 39.2 39.2  63.1 15.0 21.1  19.0 13.4 39.1  38.6
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh: 38.1 37.9  37.9 39.2 39.2  63.1 15.0 21.1  19.0 13.4 39.1  38.6
LOS by Move:   D    D     D    D    D     E    B    C     B    B    D     D
HCM2kAvgQ:     2    2     2    3    3    12    2   11     4    1   22    11
*******************************************************************************

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MITIG8 - Default Scenario  Wed Jun 27, 2012 06:42:04             Page 1-1
-------------------------------------------------------------------------------
              SFPUC - Peninsula Pipelines Seismic Upgrade Project
                             Existing plus Project
                                 PM Peak Hour
-------------------------------------------------------------------------------
                      Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #2 I-280 Northbound Ramps/San Bruno Ave
*******************************************************************************
Cycle (sec):          130                Critical Vol./Cap.(X):        0.785
Loss Time (sec):        8                Average Delay (sec/veh):       29.4
Optimal Cycle:        130                Level Of Service:                 C
*******************************************************************************
Street Name:                I-280 Ramps                      San Bruno Ave
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:    0     0     0    0     0     0    0     0     0    0     0     0
Y+R:          4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0
Lanes:        1  0  1! 0  1   0  0  0  0  0   2  0  2  0  0   0  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     153   207   240    0     0     0  169   508     0    0   793   441
Growth Adj:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Initial Bse:  153   207   240    0     0     0  169   508     0    0   793   441
Added Vol:      0     0     0    0     0     0    0     0     0    0     0     0
PPSU:          12     0     0    0     0     0    1     1     0    0    11    10
Initial Fut:  165   207   240    0     0     0  170   509     0    0   804   451
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95  0.95
PHF Volume:   174   218   253    0     0     0  179   536     0    0   846   475
Reduct Vol:     0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:  174   218   253    0     0     0  179   536     0    0   846   475
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
FinalVolume:  174   218   253    0     0     0  179   536     0    0   846   475
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment:  0.79  0.70  0.79 1.00  1.00  1.00 0.89  0.83  1.00 1.00  0.92  0.66
Lanes:       1.19  0.53  1.28 0.00  0.00  0.00 2.00  2.00  0.00 0.00  2.00  1.00
Final Sat.:  1784   713  1913    0     0     0 3400  3155     0    0  3505  1255
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.10  0.31  0.13 0.00  0.00  0.00 0.05  0.17  0.00 0.00  0.24  0.38
Crit Moves:        ****                        ****                          ****
Green/Cycle: 0.39  0.39  0.39 0.00  0.00  0.00 0.07  0.55  0.00 0.00  0.48  0.48
Volume/Cap:  0.25  0.78  0.34 0.00  0.00  0.00 0.78  0.31  0.00 0.00  0.50  0.78
Delay/Veh:   26.9  39.9  28.0  0.0   0.0   0.0 76.0  16.0   0.0  0.0  23.2  34.7
User DelAdj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:  26.9  39.9  28.0  0.0   0.0   0.0 76.0  16.0   0.0  0.0  23.2  34.7
LOS by Move:    C     D     C    A     A     A    E     B     A    A     C     C
HCM2kAvgQ:      4    16     6    0     0     0    5     6     0    0    12    17
*******************************************************************************

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```

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MITIG8 - Default Scenario  Tue Feb 5, 2013 10:29:32                 Page 1-1
-------------------------------------------------------------------------------
              SFPUC - Peninsula Pipelines Seismic Upgrade Project
                   Existing plus Project - ramp lane closure
                                 PM Peak Hour
-------------------------------------------------------------------------------

                      Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #2 I-280 Northbound Ramps/San Bruno Ave
*******************************************************************************
Cycle (sec):         130                Critical Vol./Cap.(X):         0.897
Loss Time (sec):       8                Average Delay (sec/veh):        38.9
Optimal Cycle:       130                Level Of Service:                  D
*******************************************************************************
Street Name:           I-280 Ramps                     San Bruno Ave
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
Lanes:        1  0  1! 0  0    0  0  0  0  0    2  0  2  0  0    0  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     153  207   240     0    0     0   169  508     0     0  793   441
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:  153  207   240     0    0     0   169  508     0     0  793   441
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PPSU:          12    0     0     0    0     0     1    1     0     0   11    10
Initial Fut:  165  207   240     0    0     0   170  509     0     0  804   451
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.95 0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95
PHF Volume:   174  218   253     0    0     0   179  536     0     0  846   475
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  174  218   253     0    0     0   179  536     0     0  846   475
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:  174  218   253     0    0     0   179  536     0     0  846   475
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  0.79 0.70  0.70  1.00 1.00  1.00  0.89 0.83  1.00  1.00 0.92  0.66
Lanes:       1.14 0.40  0.46  0.00 0.00  0.00  2.00 2.00  0.00  0.00 2.00  1.00
Final Sat.:  1711  530   615     0    0     0  3400 3155     0     0 3505  1255
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.10 0.41  0.41  0.00 0.00  0.00  0.05 0.17  0.00  0.00 0.24  0.38
Crit Moves:       ****                         ****                        ****
Green/Cycle: 0.46 0.46  0.46  0.00 0.00  0.00  0.06 0.48  0.00  0.00 0.42  0.42
Volume/Cap:  0.22 0.90  0.90  0.00 0.00  0.00  0.90 0.35  0.00  0.00 0.57  0.90
Delay/Veh:   21.3 46.4  46.4   0.0  0.0   0.0  97.5 21.3   0.0   0.0 29.2  52.8
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  21.3 46.4  46.4   0.0  0.0   0.0  97.5 21.3   0.0   0.0 29.2  52.8
LOS by Move:    C    D     D     A    A     A     F    C     A     A    C     D
HCM2kAvgQ:      4   23    23     0    0     0     6    7     0     0   14    21
*******************************************************************************

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```

```
--------------------------------------------------------------------------------
             SFPUC - Peninsula Pipelines Seismic Upgrade Project
       Existing plus Project - SB Ave West eastbound lane closure
                                PM Peak Hour
--------------------------------------------------------------------------------

                     Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #2 I-280 Northbound Ramps/San Bruno Ave
********************************************************************************
Cycle (sec):         130                Critical Vol./Cap.(X):          0.785
Loss Time (sec):       8                Average Delay (sec/veh):         30.7
Optimal Cycle:       130                Level Of Service:                   C
********************************************************************************
Street Name:               I-280 Ramps                      San Bruno Ave
Approach:       North Bound       South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected         Protected         Protected         Protected
Rights:          Include           Include           Include           Include
Min. Green:    0     0     0     0     0     0     0     0     0     0     0     0
Y+R:         4.0   4.0   4.0   4.0   4.0   4.0   4.0   4.0   4.0   4.0   4.0   4.0
Lanes:        1  0  1! 0  1    0  0  0  0  0    2  0  1  0  0    0  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     153   207   240     0     0     0   169   508     0     0   793   441
Growth Adj:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Initial Bse:  153   207   240     0     0     0   169   508     0     0   793   441
Added Vol:      0     0     0     0     0     0     0     0     0     0     0     0
PPSU:          12     0     0     0     0     0     1     1     0     0    11    10
Initial Fut:  165   207   240     0     0     0   170   509     0     0   804   451
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.95  0.95  0.95  0.95  0.95  0.95  0.95  0.95  0.95  0.95  0.95  0.95
PHF Volume:   174   218   253     0     0     0   179   536     0     0   846   475
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:  174   218   253     0     0     0   179   536     0     0   846   475
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
FinalVolume:  174   218   253     0     0     0   179   536     0     0   846   475
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  0.79  0.70  0.79  1.00  1.00  1.00  0.89  0.78  1.00  1.00  0.92  0.66
Lanes:       1.19  0.53  1.28  0.00  0.00  0.00  2.00  1.00  0.00  0.00  2.00  1.00
Final Sat.:  1784   713  1913     0     0     0  3400  1476     0     0  3505  1255
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.10  0.31  0.13  0.00  0.00  0.00  0.05  0.36  0.00  0.00  0.24  0.38
Crit Moves:        ****                          ****                          ****
Green/Cycle: 0.39  0.39  0.39  0.00  0.00  0.00  0.07  0.55  0.00  0.00  0.48  0.48
Volume/Cap:  0.25  0.78  0.34  0.00  0.00  0.00  0.78  0.66  0.00  0.00  0.50  0.78
Delay/Veh:   26.9  39.9  28.0   0.0   0.0   0.0  76.0  22.8   0.0   0.0  23.2  34.7
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  26.9  39.9  28.0   0.0   0.0   0.0  76.0  22.8   0.0   0.0  23.2  34.7
LOS by Move:    C     D     C     A     A     A     E     C     A     A     C     C
HCM2kAvgQ:      4    16     6     0     0     0     5    16     0     0    12    17
********************************************************************************
```

```
MITIG8 - Default Scenario  Tue Feb 5, 2013 10:32:21                    Page 1-1
--------------------------------------------------------------------------------
               SFPUC - Peninsula Pipelines Seismic Upgrade Project
              Existing plus Project - SB Ave West and ramp closure
                                  PM Peak Hour
--------------------------------------------------------------------------------

                       Level Of Service Computation Report
             2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #2 I-280 Northbound Ramps/San Bruno Ave
********************************************************************************
Cycle (sec):          130                Critical Vol./Cap.(X):         0.897
Loss Time (sec):        8                Average Delay (sec/veh):        41.0
Optimal Cycle:        130                Level Of Service:                  D
********************************************************************************
Street Name:                I-280 Ramps                      San Bruno Ave
Approach:       North Bound      South Bound      East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected         Protected
Rights:           Include          Include          Include           Include
Min. Green:    0    0     0    0    0     0    0    0     0    0    0     0
Y+R:         4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
Lanes:       1  0  1! 0  0   0  0  0  0  0   2  0  1  0  0   0  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:    153  207   240    0    0     0  169  508     0    0  793   441
Growth Adj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse: 153  207   240    0    0     0  169  508     0    0  793   441
Added Vol:     0    0     0    0    0     0    0    0     0    0    0     0
PPSU:         12    0     0    0    0     0    1    1     0    0   11    10
Initial Fut: 165  207   240    0    0     0  170  509     0    0  804   451
User Adj:   1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:    0.95 0.95  0.95 0.95 0.95  0.95 0.95 0.95  0.95 0.95 0.95  0.95
PHF Volume:  174  218   253    0    0     0  179  536     0    0  846   475
Reduct Vol:    0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol: 174  218   253    0    0     0  179  536     0    0  846   475
PCE Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume: 174  218   253    0    0     0  179  536     0    0  846   475
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment: 0.79 0.70  0.70 1.00 1.00  1.00 0.89 0.78  1.00 1.00 0.92  0.66
Lanes:      1.14 0.40  0.46 0.00 0.00  0.00 2.00 1.00  0.00 0.00 2.00  1.00
Final Sat.: 1711  530   615    0    0     0 3400 1476     0    0 3505  1255
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.10 0.41  0.41 0.00 0.00  0.00 0.05 0.36  0.00 0.00 0.24  0.38
Crit Moves:      ****                       ****                           ****
Green/Cycle: 0.46 0.46  0.46 0.00 0.00  0.00 0.06 0.48  0.00 0.00 0.42  0.42
Volume/Cap: 0.22 0.90  0.90 0.00 0.00  0.00 0.90 0.76  0.00 0.00 0.57  0.90
Delay/Veh:  21.3 46.4  46.4  0.0  0.0   0.0 97.5 32.2   0.0  0.0 29.2  52.8
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh: 21.3 46.4  46.4  0.0  0.0   0.0 97.5 32.2   0.0  0.0 29.2  52.8
LOS by Move:   C    D     D    A    A     A    F    C     A    A    C     D
HCM2kAvgQ:     4   23    23    0    0     0    6   19     0    0   14    21
********************************************************************************

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```
-----------------------------------------------------------------------------
            SFPUC - Peninsula Pipelines Seismic Upgrade Project
                          Existing plus Project
                              PM Peak Hour
-----------------------------------------------------------------------------

                     Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
*****************************************************************************
Intersection #3 Crestmoor/San Bruno Ave/Shelter Creek Way
*****************************************************************************
Cycle (sec):          130             Critical Vol./Cap.(X):         0.459
Loss Time (sec):        8             Average Delay (sec/veh):        34.6
Optimal Cycle:        130             Level Of Service:                  C
*****************************************************************************
Street Name:   Crestmoor/Shelter Creek Way             San Bruno Ave
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:     0    0    0    0    0    0    0    0    0    0    0    0
Y+R:          4.0  4.0  4.0  4.0  4.0  4.0  4.0  4.0  4.0  4.0  4.0  4.0
Lanes:        0  1  0  0  1   0  1  0  1  0   1  0  2  0  1   1  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      27   12  140   89   14   13   13  301   28  221  461  112
Growth Adj:  1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Initial Bse:   27   12  140   89   14   13   13  301   28  221  461  112
Added Vol:      0    0    0    0    0    0    0    0    0    0    0    0
PPSU:           0    0   23    0    0    0    0    0    0   13    0    0
Initial Fut:   27   12  163   89   14   13   13  301   28  234  461  112
User Adj:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Adj:     0.95 0.95 0.95 0.95 0.95 0.95 0.95 0.95 0.95 0.95 0.95 0.95
PHF Volume:    28   13  172   94   15   14   14  317   29  246  485  118
Reduct Vol:     0    0    0    0    0    0    0    0    0    0    0    0
Reduced Vol:   28   13  172   94   15   14   14  317   29  246  485  118
PCE Adj:     1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
MLF Adj:     1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
FinalVolume:   28   13  172   94   15   14   14  317   29  246  485  118
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900
Adjustment:  0.94 0.94 0.66 0.79 0.79 0.79 0.92 0.92 0.66 0.92 0.81 0.81
Lanes:       0.69 0.31 1.00 1.00 0.52 0.48 1.00 2.00 1.00 1.00 1.61 0.39
Final Sat.:  1235  549 1255 1493  774  719 1753 3505 1255 1753 2465  599
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.02 0.02 0.14 0.06 0.02 0.02 0.01 0.09 0.02 0.14 0.20 0.20
Crit Moves:            ****  ****                ****        ****
Green/Cycle: 0.24 0.30 0.30 0.14 0.20 0.20 0.02 0.20 0.20 0.31 0.48 0.48
Volume/Cap:  0.10 0.08 0.46 0.46 0.10 0.10 0.41 0.46 0.12 0.46 0.41 0.41
Delay/Veh:   38.7 32.8 38.0 52.9 42.8 42.8 70.9 46.6 43.1 37.0 21.7 21.7
User DelAdj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
AdjDel/Veh:  38.7 32.8 38.0 52.9 42.8 42.8 70.9 46.6 43.1 37.0 21.7 21.7
LOS by Move:    D    C    D    D    D    D    E    D    D    D    C    C
HCM2kAvgQ:      1    1    6    4    1    1    1    6    1    8    8    8
*****************************************************************************
```

```
-------------------------------------------------------------------------------
           SFPUC - Peninsula Pipelines Seismic Upgrade Project
                         Existing plus Project
                             PM Peak Hour
-------------------------------------------------------------------------------

                   Level Of Service Computation Report
        2000 HCM Unsignalized Method (Future Volume Alternative)
*******************************************************************************
Intersection #9 Shelter Creek Lane/Condo Driveway
*******************************************************************************
Average Delay (sec/veh):       1.4      Worst Case Level Of Service: B[ 10.3]
*******************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Lanes:        0  1  0  0  0   0  0  0  1  0    0  0  1! 0  0    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      14  122     0     0  114    39    22     0    12     0     0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   14  122     0     0  114    39    22     0    12     0     0     0
Added Vol:      0    0     0     0    0     0     0     0     0     0     0     0
PPSU:           0   20     0     0   10     3     3     0     0     0     0     0
Initial Fut:   14  142     0     0  124    42    25     0    12     0     0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.96 0.96  0.96  0.96 0.96  0.96  0.96 0.96  0.96  0.96 0.96  0.96
PHF Volume:    15  148     0     0  129    44    26     0    13     0     0     0
Reduct Vol:     0    0     0     0    0     0     0     0     0     0     0     0
FinalVolume:   15  148     0     0  129    44    26     0    13     0     0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4  6.5   6.2 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  173 xxxx xxxxx  xxxx xxxx xxxxx   328  328   151  xxxx xxxx xxxxx
Potent Cap.: 1404 xxxx xxxxx  xxxx xxxx xxxxx   666  591   895  xxxx xxxx xxxxx
Move Cap.:   1404 xxxx xxxxx  xxxx xxxx xxxxx   661  584   895  xxxx xxxx xxxxx
Volume/Cap:  0.01 xxxx  xxxx  xxxx xxxx  xxxx  0.04 0.00  0.01  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:  7.6 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    A    *     *     *    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT   LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  722 xxxxx  xxxx xxxx xxxxx
SharedQueue:  0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.2 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:  7.6 xxxx xxxxx xxxxx xxxx xxxxx xxxxx 10.3 xxxxx xxxxx xxxx xxxxx
Shared LOS:     A    *     *     *    *     *     *    B     *     *    *     *
ApproachDel:     xxxxxx           xxxxxx             10.3           xxxxxx
ApproachLOS:        *                *                 B               *
*******************************************************************************
Note: Queue reported is the number of cars per lane.
*******************************************************************************
```

```
-------------------------------------------------------------------------------
              SFPUC - Peninsula Pipelines Seismic Upgrade Project
                            Existing plus Project
                                PM Peak Hour
-------------------------------------------------------------------------------

                      Level Of Service Computation Report
         2000 HCM Unsignalized Method (Future Volume Alternative)
*******************************************************************************
Intersection #4 Shelter Creek Way/Whitman
*******************************************************************************
Average Delay (sec/veh):       3.7       Worst Case Level Of Service: B[ 11.1]
*******************************************************************************
Street Name:            Shelter Creek                       Whitman
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:         0  0  0  0  0    0  0  1! 0  0    1  0  1  0  0    0  0  1  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        0    0     0    59    0    61    42   87     0     0  138    95
Growth Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:     0    0     0    59    0    61    42   87     0     0  138    95
Added Vol:       0    0     0     0    0     0     0    0     0     0    0     0
PPSU:            0    0     0     0    0    10    20   12     0     0    2     0
Initial Fut:     0    0     0    59    0    71    62   99     0     0  140    95
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.95 0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95
PHF Volume:      0    0     0    62    0    75    65  104     0     0  147   100
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:     0    0     0    62    0    75    65  104     0     0  147   100
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   6.4  6.5   6.2   4.1 xxxx xxxxx xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx   3.5  4.0   3.3   2.2 xxxx xxxxx xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx   382  382   147   247 xxxx xxxxx  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx   620  551   900  1318 xxxx xxxxx  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx   597  524   900  1318 xxxx xxxxx  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  0.10 0.00  0.08  0.05 xxxx  xxxx  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.2 xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.9 xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     A    *     *     *    *     *
Movement:      LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx  731 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx  0.7 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx 11.1 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    B     *     *    *     *     *    *     *
ApproachDel:      xxxxxx             11.1             xxxxxx           xxxxxx
ApproachLOS:         *                 B                *                *
*******************************************************************************
Note: Queue reported is the number of cars per lane.
*******************************************************************************
```

```
-------------------------------------------------------------------------------
              SFPUC - Peninsula Pipelines Seismic Upgrade Project
                            Existing plus Project
                                PM Peak Hour
-------------------------------------------------------------------------------
                       Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
*******************************************************************************
Intersection #5 Courtland Dr/Whitman
*******************************************************************************
Average Delay (sec/veh):        4.6      Worst Case Level Of Service: A[  9.2]
*******************************************************************************
Street Name:            Courtland Dr                         Whitman
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:          Include          Include          Include          Include
Lanes:        0  0  1! 0  0   0  0  0  0  0   0  0  0  1  0   0  1  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       5    0    61     0    0     0     0   57     2    86  100     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    5    0    61     0    0     0     0   57     2    86  100     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PPSU:           0    0    32     0    0     0     0    0     0    12    0     0
Initial Fut:    5    0    93     0    0     0     0   57     2    98  100     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93
PHF Volume:     5    0   100     0    0     0     0   61     2   105  108     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    5    0   100     0    0     0     0   61     2   105  108     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  6.4  6.5   6.2 xxxxx xxxx xxxxx xxxxx xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3 xxxxx xxxx xxxxx xxxxx xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  381  381    62  xxxx xxxx xxxxx  xxxx xxxx xxxxx    63 xxxx xxxxx
Potent Cap.:  622  552  1002  xxxx xxxx xxxxx  xxxx xxxx xxxxx  1539 xxxx xxxxx
Move Cap.:    587  512  1002  xxxx xxxx xxxxx  xxxx xxxx xxxxx  1539 xxxx xxxxx
Volume/Cap:  0.01 0.00  0.10  xxxx xxxx  xxxx  xxxx xxxx  xxxx  0.07 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.2 xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.5 xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     *     A    *     *
Movement:     LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.: xxxx  967 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx  0.4 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   0.2 xxxx xxxxx
Shrd ConDel:xxxxx  9.2 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.5 xxxx xxxxx
Shared LOS:     *    A     *     *    *     *     *    *     *     A    *     *
ApproachDel:         9.2          xxxxxx           xxxxxx           xxxxxx
ApproachLOS:          A              *                *                *
*******************************************************************************
Note: Queue reported is the number of cars per lane.
*******************************************************************************
```

```
-------------------------------------------------------------------------------
            SFPUC - Peninsula Pipelines Seismic Upgrade Project
                         Existing plus Project
                             PM Peak Hour
-------------------------------------------------------------------------------

                    Level Of Service Computation Report
         2000 HCM 4-Way Stop Method (Future Volume Alternative)
*******************************************************************************
Intersection #6 Helen/Larkspur
*******************************************************************************
Cycle (sec):         100              Critical Vol./Cap.(X):         0.473
Loss Time (sec):       0              Average Delay (sec/veh):        10.7
Optimal Cycle:         0              Level Of Service:                  B
*******************************************************************************
Street Name:                 Helen                          Larkspur
Approach:     North Bound      South Bound      East Bound       West Bound
Movement:    L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Stop Sign        Stop Sign        Stop Sign        Stop Sign
Rights:          Include          Include          Include          Include
Min. Green:    0     0     0    0     0     0    0     0     0    0     0     0
Lanes:       0  0  1! 0  0   0  1  0  0  0   0  0  1! 0  0   0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     81    47   189   15    28     0    2    42    34  121    66    32
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:  81    47   189   15    28     0    2    42    34  121    66    32
Added Vol:     0     0     0    0     0     0    0     0     0    0     0     0
PPSU:          0     0     0    0     0     0    0     7     0    0    25     0
Initial Fut:  81    47   189   15    28     0    2    49    34  121    91    32
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.89 0.89  0.89  0.89 0.89  0.89  0.89 0.89  0.89  0.89 0.89  0.89
PHF Volume:   91    53   212   17    31     0    2    55    38  136   102    36
Reduct Vol:    0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:  91    53   212   17    31     0    2    55    38  136   102    36
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:  91    53   212   17    31     0    2    55    38  136   102    36
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.25 0.15  0.60  0.35 0.65  0.00  0.02 0.58  0.40  0.50 0.37  0.13
Final Sat.:  192   112   449  215   402     0   16   383   265  339   255    90
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.47 0.47  0.47  0.08 0.08  xxxx  0.14 0.14  0.14  0.40 0.40  0.40
Crit Moves:             ****       ****              ****              ****
Delay/Veh:   11.3 11.3  11.3   8.7  8.7   0.0   8.7  8.7   8.7  11.0 11.0  11.0
Delay Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  11.3 11.3  11.3   8.7  8.7   0.0   8.7  8.7   8.7  11.0 11.0  11.0
LOS by Move:    B    B     B    A    A     *    A    A     A    B    B     B
ApproachDel:      11.3              8.7              8.7              11.0
Delay Adj:        1.00             1.00             1.00              1.00
ApprAdjDel:       11.3              8.7              8.7              11.0
LOS by Appr:        B                A                A                 B
AllWayAvgQ:    0.8  0.8   0.8   0.1  0.1   0.1   0.1  0.1   0.1   0.6  0.6   0.6
*******************************************************************************
```

```
--------------------------------------------------------------------------------
              SFPUC - Peninsula Pipelines Seismic Upgrade Project
                             Existing plus Project
                                 PM Peak Hour
--------------------------------------------------------------------------------

                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #7 Ridgewood/Banbury
********************************************************************************
Average Delay (sec/veh):       0.5       Worst Case Level Of Service: A[  8.7]
********************************************************************************
Street Name:               Ridgewood                          Banbury
Approach:        North Bound      South Bound       East Bound       West Bound
Movement:       L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:             Include          Include          Include          Include
Lanes:          0  0  1  0  0   0  0  1  0  0   0  0  1! 0  0   0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        0   53    0     0   33    0     2    0    4     0    0    0
Growth Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:     0   53    0     0   33    0     2    0    4     0    0    0
Added Vol:       0    0    0     0    0    0     0    0    0     0    0    0
PPSU:            0    1    0     0    3    0     0    0    0     0    0    0
Initial Fut:     0   54    0     0   36    0     2    0    4     0    0    0
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.85 0.85  0.85  0.85 0.85  0.85  0.85 0.85  0.85  0.85 0.85  0.85
PHF Volume:      0   64    0     0   42    0     2    0    5     0    0    0
Reduct Vol:      0    0    0     0    0    0     0    0    0     0    0    0
FinalVolume:     0   64    0     0   42    0     2    0    5     0    0    0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   6.4  6.5   6.2 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx   106  106    42  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx   892  784  1028  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   892  784  1028  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  0.00 0.00  0.00  xxxx xxxx  xxxx
------------|--------------- |---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:     *    *     *     *    *     *     *    *     *     *    *     *
Movement:       LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  978 xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.0 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  8.7 xxxxx xxxxx xxxx xxxxx
Shared LOS:      *    *     *     *    *     *     *    A     *     *    *     *
ApproachDel:      xxxxxx           xxxxxx              8.7           xxxxxx
ApproachLOS:         *                *                 A                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

```
MITIG8 - Default Scenario  Wed Jun 27, 2012 06:55:11             Page 1-1
---------------------------------------------------------------------------
           SFPUC - Peninsula Pipelines Seismic Upgrade Project
                          Existing plus Project
                              PM Peak Hour
---------------------------------------------------------------------------
                     Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
***************************************************************************
Intersection #8 Santa Margarita/Cappuchino
***************************************************************************
Average Delay (sec/veh):       3.0       Worst Case Level Of Service: A[  8.7]
***************************************************************************
Street Name:          Santa Margarita                     Cappuchino
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:            Include          Include          Include          Include
Lanes:          0  0  0  0  0    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:         0    0     0    10    0     6     2    6     0     0   11    12
Growth Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:      0    0     0    10    0     6     2    6     0     0   11    12
Added Vol:        0    0     0     0    0     0     0    0     0     0    0     0
PPSU:             0    0     0     0    0     0     0    3     0     0    1     0
Initial Fut:      0    0     0    10    0     6     2    9     0     0   12    12
User Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:       0.77 0.77  0.77  0.77 0.77  0.77  0.77 0.77  0.77  0.77 0.77  0.77
PHF Volume:       0    0     0    13    0     8     3   12     0     0   16    16
Reduct Vol:       0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:      0    0     0    13    0     8     3   12     0     0   16    16
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   6.4  6.5   6.2   4.1 xxxx xxxxx xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx   3.5  4.0   3.3   2.2 xxxx xxxxx xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    40   40    23    31 xxxx xxxxx  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx   971  852  1053  1581 xxxx xxxxx  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx   970  850  1053  1581 xxxx xxxxx  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  0.01 0.00  0.01  0.00 xxxx  xxxx  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     A    *     *     *    *     *
Movement:       LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx 1000 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx  0.1 xxxxx   0.0 xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx  8.7 xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    A     *     A    *     *     *    *     *
ApproachDel:     xxxxxx              8.7            xxxxxx           xxxxxx
ApproachLOS:        *                 A                *                *
***************************************************************************
Note: Queue reported is the number of cars per lane.
***************************************************************************

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-------------------------------------------------------------------------------
               SFPUC - Peninsula Pipelines Seismic Upgrade Project
                              Existing Conditions
                                 PM Peak Hour
-------------------------------------------------------------------------------

                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
*******************************************************************************
Intersection #10 Whitman/Shelter Creek Condo Driveway/Eastburn
*******************************************************************************
Average Delay (sec/veh):      1.8     Worst Case Level Of Service: B[ 10.3]
*******************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:          Include          Include          Include          Include
Lanes:        0  0  1! 0  0   0  0  1! 0  0   0  0  1! 0  0   0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       3    0     8   11    0     6   12   76     8    8   92    21
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:    3    0     8   11    0     6   12   76     8    8   92    21
Added Vol:      0    0     0    0    0     0    0    0     0    0    0     0
PasserByVol:    0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:    3    0     8   11    0     6   12   76     8    8   92    21
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     0.71 0.71  0.71 0.71 0.71  0.71 0.71 0.71  0.71 0.71 0.71  0.71
PHF Volume:     4    0    11   15    0     8   17  107    11   11  130    30
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
FinalVolume:    4    0    11   15    0     8   17  107    11   11  130    30
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  7.1  6.5   6.2  7.1  6.5   6.2  4.1 xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3  3.5  4.0   3.3  2.2 xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  318  328   113  319  319   144  159 xxxx xxxxx   118 xxxx xxxxx
Potent Cap.:  639  594   946  638  601   908 1433 xxxx xxxxx  1482 xxxx xxxxx
Move Cap.:    624  582   946  621  589   908 1433 xxxx xxxxx  1482 xxxx xxxxx
Volume/Cap:  0.01 0.00  0.01 0.02 0.00  0.01 0.01 xxxx  xxxx  0.01 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx xxxx xxxx xxxxx  0.0 xxxx xxxxx   0.0 xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx  7.5 xxxx xxxxx   7.4 xxxx xxxxx
LOS by Move:    *    *     *    *    *     *    A    *     *     A    *     *
Movement:     LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.: xxxx  829 xxxxx xxxx  699 xxxxx xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx  0.1 xxxxx xxxxx  0.1 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx  9.4 xxxxx xxxxx 10.3 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    A     *    *    B     *    *    *     *     *    *     *
ApproachDel:         9.4             10.3            xxxxxx           xxxxxx
ApproachLOS:          A                B                *                *
*******************************************************************************
Note: Queue reported is the number of cars per lane.
*******************************************************************************
```

```
MITIG8 - Default Scenario  Thu Oct 11, 2012 10:08:02              Page 1-1
----------------------------------------------------------------------------
            SFPUC - Peninsula Pipelines Seismic Upgrade Project
                          Existing plus Project
                              PM Peak Hour
----------------------------------------------------------------------------

                   Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
****************************************************************************
Intersection #11 Serramonte/Junipero Serra Blvd
****************************************************************************
Cycle (sec):         120               Critical Vol./Cap.(X):        0.642
Loss Time (sec):       8               Average Delay (sec/veh):       36.7
Optimal Cycle:        43               Level Of Service:                 D
****************************************************************************
Approach:      North Bound     South Bound      East Bound      West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Split Phase     Split Phase      Prot+Permit     Prot+Permit
Rights:          Include         Include          Include         Include
Min. Green:    0    0     0    0    0     0    0    0     0    0    0     0
Y+R:         4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
Lanes:        2  0  2  0  1   1  0  1  1  0   2  0  2  0  1   1  0  1  1  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:    435  486   123  107  333   116  383  553   281  205  329   504
Growth Adj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse: 435  486   123  107  333   116  383  553   281  205  329   504
Added Vol:     0    0     0    0    0     0    0    0     0    0    0     0
PPSU:          0    0     2    2    0     0    0    2     0   12    7     7
Initial Fut: 435  486   125  109  333   116  383  555   281  217  336   511
User Adj:   1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:    0.96 0.96  0.96 0.96 0.96  0.96 0.96 0.96  0.96 0.96 0.96  0.96
PHF Volume:  453  506   130  114  347   121  399  578   293  226  350   532
Reduct Vol:    0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol: 453  506   130  114  347   121  399  578   293  226  350   532
PCE Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume: 453  506   130  114  347   121  399  578   293  226  350   532
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment: 0.90 0.93  0.80 0.93 0.89  0.89 0.90 0.93  0.81 0.93 0.85  0.82
Lanes:      2.00 2.00  1.00 1.00 1.48  0.52 2.00 2.00  1.00 1.00 1.17  1.83
Final Sat.: 3432 3538  1527 1769 2515   876 3425 3538  1536 1768 1882  2862
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.13 0.14  0.09 0.06 0.14  0.14 0.12 0.16  0.19 0.13 0.19  0.19
Crit Moves:      ****                  ****                  **** ****
Green/Cycle: 0.22 0.22  0.22 0.21 0.21  0.21 0.49 0.30  0.30 0.51 0.30  0.30
Volume/Cap: 0.59 0.64  0.38 0.30 0.64  0.64 0.44 0.55  0.64 0.46 0.61  0.61
Delay/Veh:  43.0 44.1  40.3 40.0 44.9  44.9 18.4 36.1  39.8 18.7 36.4  36.4
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh: 43.0 44.1  40.3 40.0 44.9  44.9 18.4 36.1  39.8 18.7 36.4  36.4
LOS by Move:   D    D     D    D    D     D    B    D     D    B    D     D
HCM2kAvgQ:     8   10     4    4    9     9    5   10    10    6   10    10
****************************************************************************
Note: Queue reported is the number of cars per lane.

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# Appendix D
# Noise

# Appendix D-1
# Noise and Vibration Fundamentals

# NOISE AND VIBRATION FUNDAMENTALS

Noise is commonly defined as unwanted sound. For the purposes of this analysis, it has been assumed that all project construction activities should be considered as noise-generating activities.

Potential noise impacts are analyzed in terms of sound levels using the decibel (dB). The decibel is a logarithmic unit indicating the ratio of a sound pressure level relative to the reference sound pressure of 20 micro-Pascals.

The root-mean-square (RMS) amplitude of a sound is the square root of the time average of the square of the instantaneous amplitude over a specified time interval. The RMS sound pressure level, or noise level, is the level in dB of the RMS sound pressure level divided by the reference sound pressure level of 20 micro-Pascals. The RMS noise data in this report were collected using the "Slow" sound level meter response, which has a time interval of one second.

For environmental noise analyses, the A-weighted sound level (dBA) is typically used. The A-weighted sound level is obtained by weighting the frequency response of the collected data to more closely represent the frequency response of the human ear to low-level sound. The A-weighted sound level has a strong correlation to human response to sound and is used by CEQA to determine noise impacts. All noise data presented in this report are A-weighted.

The noise level of an environment can be measured over varying periods of time; relevant noise descriptors are described below.

- The Equivalent Level (LEQ) is the level of constant noise energy that is equivalent to the time-varying sound energy over a specified time period; an hourly LEQ refers to the energy equivalent level of sound for each one-hour period.
- The Day-Night Level (LDN) is the A-weighted LEQ noise level over a 24-hour period with a 10 dB penalty applied to sound levels between 10pm~7am to account for the higher potential for disturbance to human activities in the nighttime. Because of the 10 dB penalty during nighttime hours, the LDN is very sensitive to late night noise events.
- The Community Noise Equivalent Level (CNEL) is similar to the LDN with an additional 5 dB penalty applied to sound levels between 7pm~10pm. Typically, in environments where transportation sources are the primary noise source, the difference between the CNEL and the LDN is trivial (1 dB or less). Based on this assumption, all data presented in this report are LDN rather than CNEL.

## Sound Propagation

Airborne noise sources attenuate as a function of the distance due to geometric spreading. Sound from point sources, such as an excavator, decreases at a rate of 6 dB per doubling of distance (this phenomenon is known as the "inverse square law"). Sound from line sources, such as highways, decreases at a rate of 3 dB per doubling of distance.

Topography (hills), buildings, and other barriers can further decrease noise levels by interrupting the line-of-sight. The decrease varies but could be as high as 20 dB for large hills or buildings.

## NOISE AND VIBRATION TERMINOLOGY DEFINITIONS

**A-Weighted Sound Level (dBA):** The sound pressure level in decibels obtained by applying the internationally standardized A-weighting filter. Human hearing is not as sensitive at low and high frequencies; the A-weighting filter de-emphasizes these components of the sound to better correlate with how people hear. As A-weighted sound levels have a close relationship with subjective reactions of people to noise, they are universally used for community noise evaluations.

**Airborne Sound:** Sound that travels through the air as opposed to through structures (see *structure-borne sound*) or through the ground (see *groundborne sound*).

**Ambient Noise or Vibration:** The general noise or vibration existing in a given environment at a specified time, consisting of a composite of noise or vibration from many sources near and far, including the noise source of interest.

**Background Noise or Vibration:** The general noise or vibration existing in a given environment at a specified time, consisting of a composite of noise or vibration from many sources near and far, not including the noise source of interest.

**Community Noise Equivalent Level (CNEL):** The A-weighted $L_{EQ}$ noise level over a 24-hour period with a 5 dB penalty applied to sound levels between 7pm~10pm and a 10 dB penalty applied to sound levels between 10pm~7am.

**Crest Factor:** The ratio of the peak amplitude to the root-mean-square (rms) amplitude. The crest factor is typically assumed to be 4 for random vibration.

**Day-Night Equivalent Level ($L_{DN}$):** The A-weighted $L_{EQ}$ noise level over a 24-hour period with a 10 dB penalty applied to sound levels between 10pm~7am.

**Decibel (dB):** The decibel is a unit of level based on a logarithmic scale denoting the ratio of two quantities, the quantity of interest and a standardized reference quantity. For sound pressure, the reference in air is 20 µPa; for vibration velocity, the reference is 1 µinch/sec.

**Energy Equivalent Level ($L_{EQ}$):** The level of a steady sound that would have the same energy as the time-varying noise level within a stated time period, and is widely used as a single-number descriptor of environmental noise. The $L_{EQ}$ is based on energy summation, which gives more weight to periods of high noise levels than does $L_{50}$ or an arithmetic average of noise level over time.

**Frequency (Hz):** The cycles per second of a periodic noise (or vibration).

**Groundborne Sound:** Sounds that arrive at a point of interest by vibration propagated through soil and building structures.

**Groundborne Vibration:** Vibration propagated through soil and building structures.

**Pascal (Pa):** A unit of pressure, 1 Newton per square meter.

**Peak Particle Velocity (PPV):** The maximum instantaneous positive or negative peak of the vibration signal.

**Root Mean Square (RMS):** The square root of the average of the squares of the amplitudes.

**Sound Pressure Level (SPL):** The sound pressure level in decibels is 20 times the base 10 logarithm of the given sound pressure to the reference sound pressure of 20 μPa.

**Statistical Distribution Descriptors ($L_1$, $L_{10}$, $L_{50}$, $L_{90}$, etc):** Also called “exceedance levels”, they represent the level of noise or vibration that is exceeded a percentage of the measurement period. For example, $L_{10}$ is the level of the noise or vibration exceeded for 10% of the measurement period.

**Structure-Borne Sound:** Sound that is generated by vibration propagating through a structure rather than the air (see also *airborne sound*).

**Velocity:** The rate of change of displacement with respect to time.

**Velocity Level:** The velocity level in decibels is 20 times the base 10 logarithm of the given velocity to the reference velocity of 1 μinch/sec.

**Vibration:** The motion of the ground or a structure in response to a force excitation.

## TYPICAL SOUND LEVELS

| OUTDOOR SOURCES | **dBA** | INDOOR SOURCES |
|---|---|---|
| Threshold of pain | **120** | |
| Thunder | **110** | Rock band |
| Jackhammer, 10 ft | **100** | Nightclub |
| Motorcycle, 25 ft | **90** | Food blender, 3 ft |
| Noisy urban daytime,<br>Heavy traffic | **80** | Garbage disposal, 3 ft |
| | | Car interior, 70 mph |
| | **70** | Vacuum cleaner, 10 ft |
| | | Normal conversation, 3 ft |
| | **60** | |
| | | Large office |
| Quiet urban daytime | | Dishwasher in next room |
| | **50** | |
| Quiet urban nighttime | **40** | Small theater, large conference room |
| Quiet suburban nighttime | | |
| Quiet rural nighttime | **30** | Soft whisper, bedroom at night |
| | | Concert hall background |
| | **20** | |
| | | Broadcast/recording studio |
| | **10** | |
| Threshold of hearing | **0** | |

Sources: Caltrans, 1998; Foreman, 1990; Harris, 1998; Long, 2006

## HEALTH EFFECTS OF NOISE AND VIBRATION

### Noise

Short-term exposure to noise levels exceeding 115 dBA and long-term exposure to noise levels exceeding 80 dBA can damage the hearing systems of humans, resulting in temporary or permanent hearing loss. In addition, exposure to loud noise levels can create physiological and psychological responses such as increases in muscle tension, elevated heart rates, changes in respiratory function and circulation, increases in gastrointestinal motility, and emotional distress.

For much of the project work areas, exposure to very high noise levels will be limited to the construction workers. Dangers from high noise levels for workers are regulated by the California Occupational Safety and Health Administration (Cal-OSHA) and are not addressed in this report. However, project work areas near the Park Plaza Apartments and Shelter Creek Condominiums (San Bruno site) and 1094 and 1100 Ridgewood Drive (Millbrae site) may be close enough that residents would be exposed to high noise levels for periods of 8 hours.

### Vibration

Long-term exposure to high levels of vibration can cause changes in tendons, muscles, bones and joints, fatigue, insomnia, stomach problems, headaches, and can affect the nervous system. Studies show that whole-body vibration can increase heart rate, oxygen uptake and respiratory rate, and can produce changes in blood and urine and could contribute to a number of circulatory, bowel, respiratory, muscular and back disorders. For this project, exposure to high levels of vibration will be limited to the construction workers. Dangers from high vibration levels for workers are regulated by the California Occupational Safety and Health Administration (Cal-OSHA) and are not addressed in this report.

## REFERENCES

Caltrans (California Department of Transportation), 1998. *Technical Noise Supplement*.

Foreman, John E.K., 1990. *Sound Analysis and Noise Control.* Van Nostrand Reinhold, New York.

Harris, Cyril M., 1998. *Handbook of Acoustical Measurements and Noise Control, Third Edition.* McGraw-Hill, Inc., New York.

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# Appendix D-2
# Existing Noise Environment

# EXISTING NOISE ENVIRONMENT

To characterize the existing noise environment, short- and long-term noise measurements (denoted ST and LT, respectively) were conducted in the study area between May 25, 2011 and December 2, 2011. Data collection during rainy weather or in high wind conditions was avoided to prevent data contamination. A total of 12 long-term measurements and 22 short-term measurements were conducted at the sensitive receptors adjacent to the five project sites (see Figures 5.7-1 through 5.7-5 in Section 5.7). Measurements were previously conducted at the common staging area as part of the approved Baden and San Pedro Valve Lots Improvement Project Mitigated Negative Declaration (SF Planning, 2008), which was completed for improvements previously proposed by the SFPUC for the Baden Valve Lot.

This appendix provides a brief explanation of the existing noise environment based on these short-and long-term measurements. Long-term measurement data time history plots are also provided for each project site (see Figures 1 to 5 below).

### Colma Site

The Colma site is located in a primarily commercial area situated between Serramonte Boulevard and Collins Avenue, near El Camino Real. The ambient noise environment is dominated by local traffic on El Camino Real and Serramonte Boulevard. Additionally, noise from Interstate 280 (I-280) and aircraft flyovers contribute to the ambient environment.

### South San Francisco Site

The South San Francisco site is located in a mixed residential/commercial area and is bisected by Westborough Boulevard. Westborough Boulevard was the dominant noise source, with local traffic and aircraft flyovers also contributing to the noise field. LT-SSF1 was located at the northwestern façade of the Clubview Apartments, approximately 125 feet from the construction zone/SFPUC ROW. The ambient noise environment was dominated by local traffic on Westborough Boulevard and West Orange Avenue, and by aircraft flyovers. LT-SSF2 was located at the rear balcony of the single-family residence at 109 Arroyo Drive, approximately 150 feet from the northern boundary of the construction zone/SFPUC ROW. This site overlooks Westborough Boulevard which, along with aircraft flyovers, dominated the ambient noise levels. The $L_{dn}$ at LT-SSF1 and LT-SSF2 varied from 62 to 65 dBA, with the average daytime $L_{eq}$ varying from 60 to 62 dBA

LT-SSF1 was located at the western façade of the Westborough Royale Assisted Living building, approximately 300 feet from the construction zone/ROW. This site is just off Westborough Boulevard which, along with aircraft flyovers, dominated the ambient noise levels. ST-SSF2 was located at the property line of the California Golf Club of San Francisco Golf Course, within the construction zone/SFPUC ROW. This site overlooks Westborough Boulevard which, along with aircraft flyovers, dominated the ambient noise levels. ST-SSF3 was located at the façade of the two multi-family residential buildings at 82 and 90 Arroyo Drive, approximately 60 feet from the access route and 200 feet from the construction zone/SFPUC ROW. During the measurement period, the traffic on Arroyo Drive and Camaritas Avenue was fairly heavy and dominated the ambient noise environment. ST-SSF4 was located at the front lawn of the single-family residence at 110 Arroyo Drive, approximately 210 feet from the construction zone/SFPUC ROW. During the measurement period, local traffic on Arroyo Drive was the dominant noise source; however, I-280 and Westborough Boulevard contributed significantly to the ambient noise environment. The measured hourly $L_{eq}$ of the short-term measurements varied from 59 to 66 dBA with an estimated $L_{dn}$ of 61 to 68 dBA.

**San Bruno North Site**

The San Bruno North site is located between and adjacent single-family residential neighborhood and I-280, south of San Bruno West and the Bayhill Shopping Center. For all of the short- and long-term measurements, I-280 was the dominant noise source, with local traffic on San Bruno Avenue West and aircraft flyovers also contributing to the noise field. LT-SBN1 was located in the back yard of the single-family residence at 789 Pepper Drive, approximately 65 feet from the construction zone. This site overlooks I-280 which, along with aircraft flyovers, dominated the ambient noise levels. The $L_{dn}$ at LT-SBN1 was 66 dBA, with an average daytime $L_{eq}$ of 65 dBA.

ST-SBN1 was located in the back yard of the single-family residence at 1841 Cedarwood Court, approximately 20 feet from the construction zone. ST-SBN2 was located in the driveway of the single-family residence at 1820 Cedarwood Court, approximately 20 feet from the proposed staging area. ST-SBN3 was located in the front yard of the single-family residence at 780 Cedar Avenue, approximately 350 feet from the construction zone. The measured hourly $L_{eq}$ of the short-term measurements varied from 57 to 63 dBA with an estimated $L_{dn}$ of 60 to 70 dBA.

**San Bruno South Site**

The San Bruno South site is located east of Interstate 280 in a residential area in the San Bruno hills, in the vicinity of Shelter Creek Lane and Whitman Way. Except for ST-SBS5, I-280 was the dominant noise source, with local traffic and aircraft flyovers also contributing to the noise field. LT-SBS1 was located at the Peninsula High School, at the southern edge of the proposed staging area. LT-SBS2 was located at the San Bruno Chinese Church, at the eastern edge of the proposed staging area. LT-SBS3 was located in the back yard of the single-family residence at 326 Courtland Drive, near the western boundary of the construction zone/SFPUC ROW. Local traffic on Courtland Drive contributed more significantly to the overall noise levels at this location. LT-SBS4 was located at the Shelter Creek Condominiums, within the proposed construction zone/staging area. Local parking lot traffic within the Condominium development substantially contributed to the overall noise levels at this location. The $L_{dn}$ at the long-term measurement locations varied from 55 to 62 dBA, with the average daytime $L_{eq}$ varying from 53 to 62 dBA.

ST-SBS1 was located in the baseball infield at the Peninsula High School Athletic Fields, approximately 150 feet west of the proposed staging area/SFPUC ROW. ST-SBS2 was located at the eastern façade of the Park Plaza Apartments, along the western boundary of the construction zone/SFPUC ROW. ST-SBS3 was located at the western façade of the apartment building at 2001 Jenevein Avenue, approximately 200 feet east of the proposed staging/spoils area. ST-SBS4 was located at the multi-family residential building at 20 Shelter Creek Lane, at the same setback from Shelter Creek Lane as the proposed access route. ST-SBS5 was located at the western façade of the Park Plaza Apartments, at the same setback from Whitman Way as the proposed access route. For this location, local traffic on Courtland Drive and Whitman Way was the dominant noise source rather than I-280. ST-SBS6 was located in the front yard of the single-family residence at 331 Courtland Drive, approximately 10 feet from Courtland Drive (the proposed access route). The measured hourly $L_{eq}$ of the short-term measurements varied from 54 to 65 dBA with an estimated $L_{dn}$ of 57 to 68 dBA.

**Millbrae Site**

The Millbrae site is located in a single-family residential neighborhood and extends through an open space area and golf course. Except as noted below, the ambient noise levels were dominated by El Camino Real, U.S. Highway 101 (U.S. 101), and flight activities at the San Francisco International Airport (SFIA), located in the distance to the east. LT-M1 was located in the back yard of the single-family residence at 1120 Ridgewood Drive, near the western edge of the proposed staging area. LT-M2 was located in the back yard of the single-family residence at 1086 Ridgewood Drive. LT-M3 was located in the back yard of the single-family residence at 877 Hacienda Way, approximately 120 feet from the northern boundary of the construction zone/SFPUC ROW.

LT-M4 was located near the western property line of the single-family residence at 18 Fairview Place, approximately 75 feet from the proposed access route through the City of Millbrae Open Space and approximately 1,400 feet from the proposed staging area. The $L_{dn}$ at the long-term measurement locations varied from 53 to 56 dBA, with the average daytime $L_{eq}$ varying from 50 to 57 dBA.

ST-M1 was placed in the front yard of the single-family residence at 25 Bertocchi Lane, along the proposed alternate access route and approximately 425 feet to the edge of the proposed staging area. ST-M2 was located in the courtyard near the western property line at the Glen Oaks and Millbrae Montessori Schools, approximately 580 feet from the staging area. ST-M3 was located in the front yard of the single-family residence at 780 Lomita Avenue, with the same setback to the proposed access route and approximately 1,700 feet north of the proposed staging area. At this location, local traffic on Lomita Avenue dominated the ambient noise levels. ST-M4 was located near a bunker on Hole 5 at the Green Hills Country Club Golf Course, approximately 100 feet south of the proposed staging area. This is a quiet site; noise from El Camino Real, U.S. 101, and SFIA was still audible, but noise from grounds keeping equipment and wildlife dominated the ambient noise levels. ST-M5 was located in the front yard of the single-family residence at 916 Larkspur Drive, along the proposed access route and approximately 1,100 feet from the construction zone/SFPUC ROW. At this location, local traffic on Larkspur Drive and Helen Drive was the dominant noise source. ST-M6 was located in the front yard of the single-family residence at 1206 Ridgewood Drive, along the proposed access route and approximately 1,000 feet from the proposed staging area. ST-M7 was located in the front yard of the single-family residence at 1235 Ridgewood Drive, along the proposed access route and approximately 1,500 feet from the proposed staging area. ST-M8 was located in the playground at Meadows Elementary School, approximately 440 feet from the proposed access route and 1,000 feet from the construction zone/SFPUC ROW. At this location, traffic on I-280 was the dominant noise source. The measured hourly $L_{eq}$ of the short-term measurements varied from 48 to 63 dBA with an estimated $L_{dn}$ of 51 to 67 dBA.

### Common Staging Area

The $L_{dn}$ at the western and southern boundaries of the SFPUC's Baden Valve Lot on which the common staging area is located range between 65 and 70 dBA, with the average daytime $L_{eq}$ varying from 58 to 66 dBA (SF Planning, 2008).

## LONG-TERM MEASUREMENT DATA TIME HISTORY PLOTS

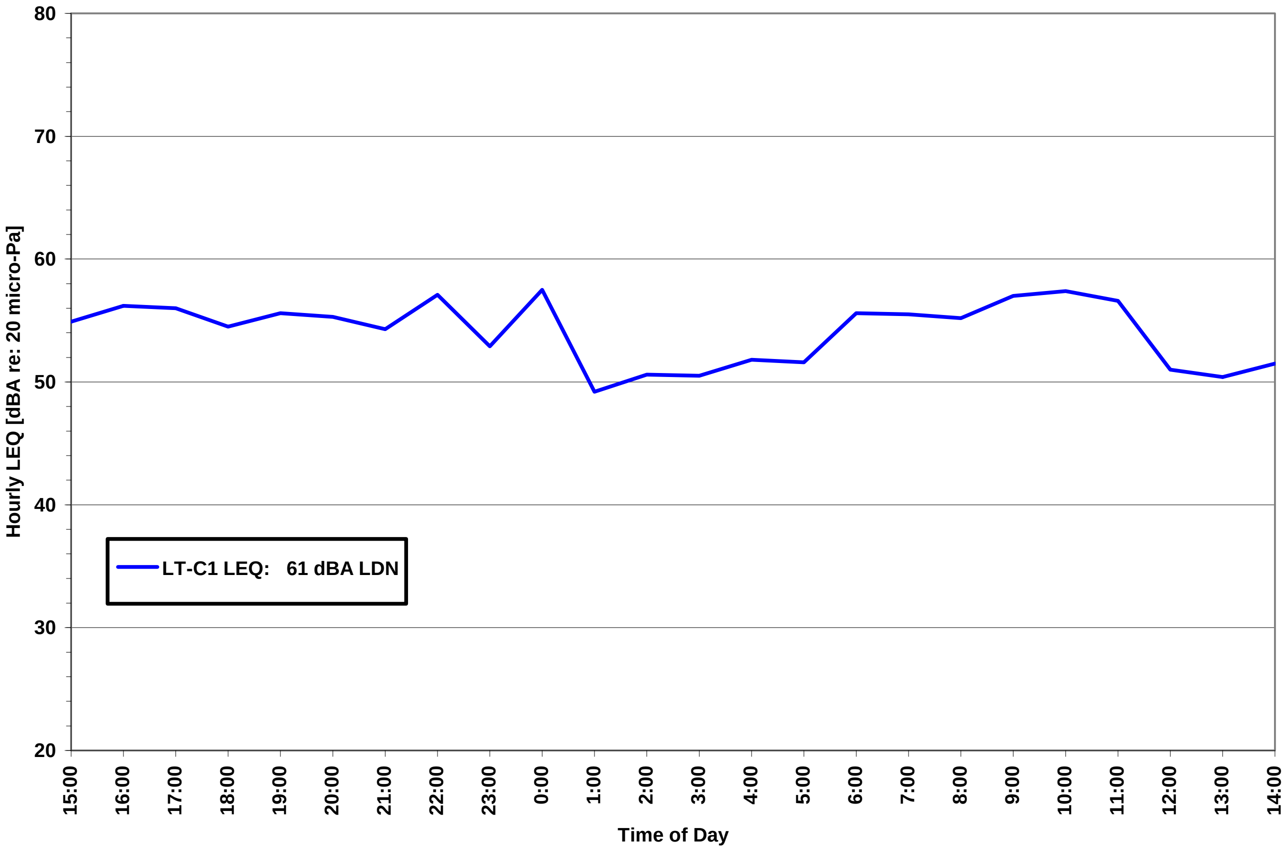

**Figure 1: Colma Site Time History of Noise Levels**

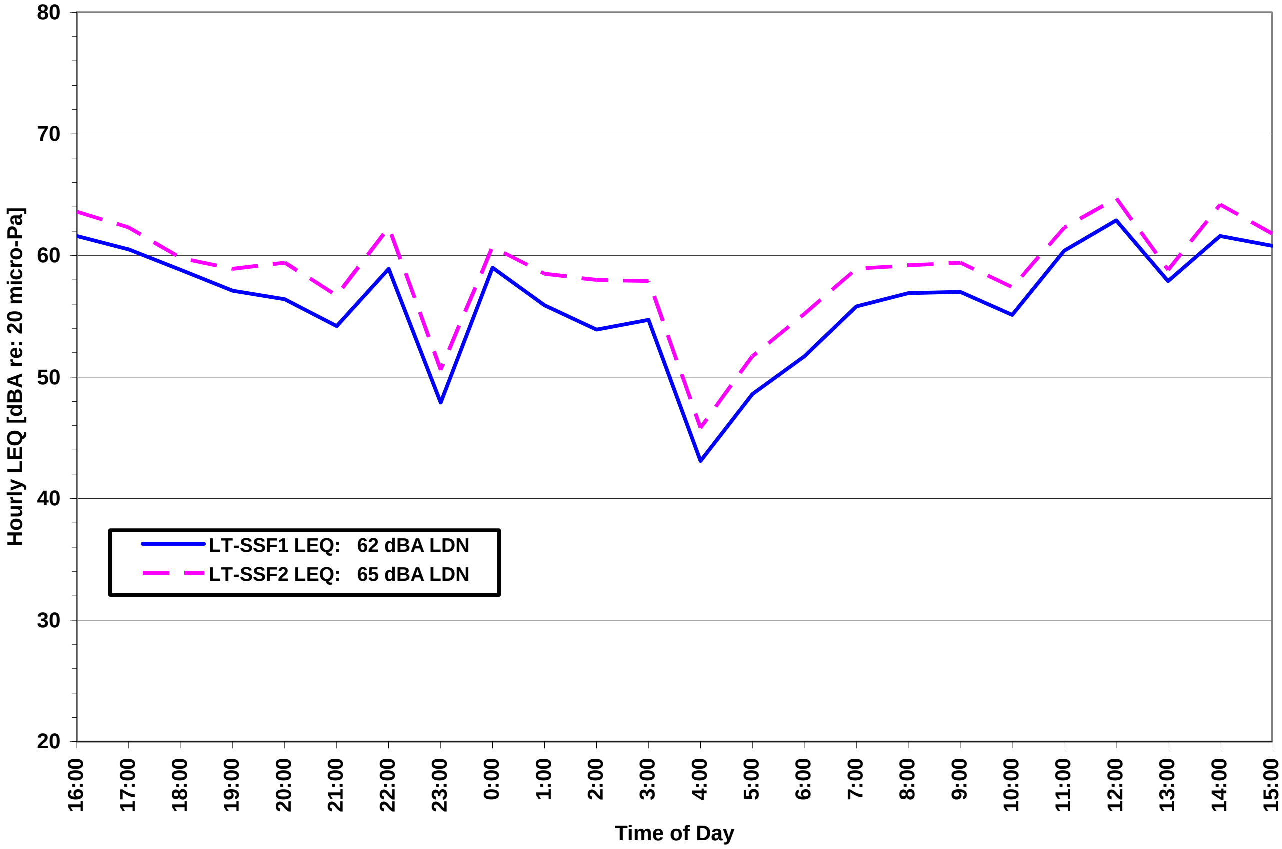

**Figure 2: South San Francisco Site Time History of Noise Levels**

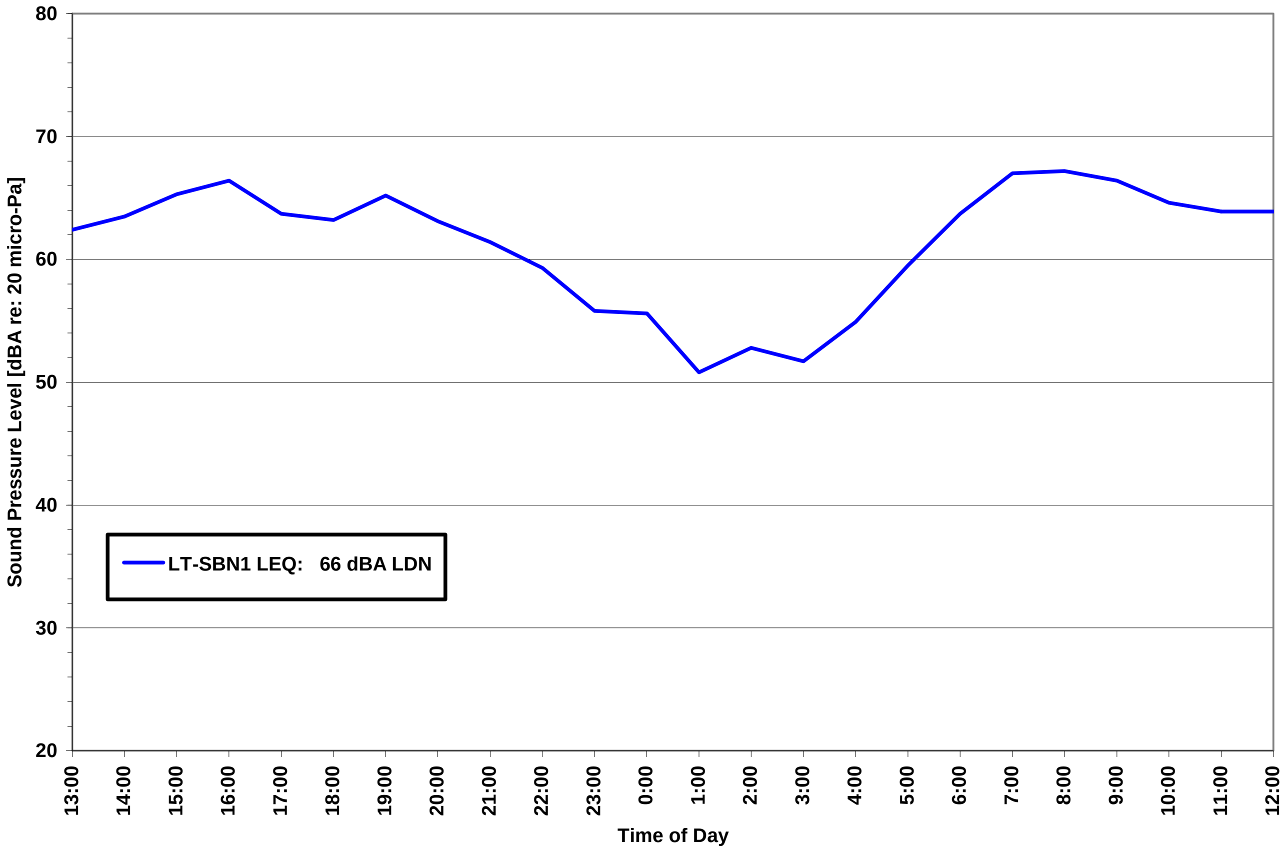

**Figure 3: San Bruno North Site Time History of Noise Levels**

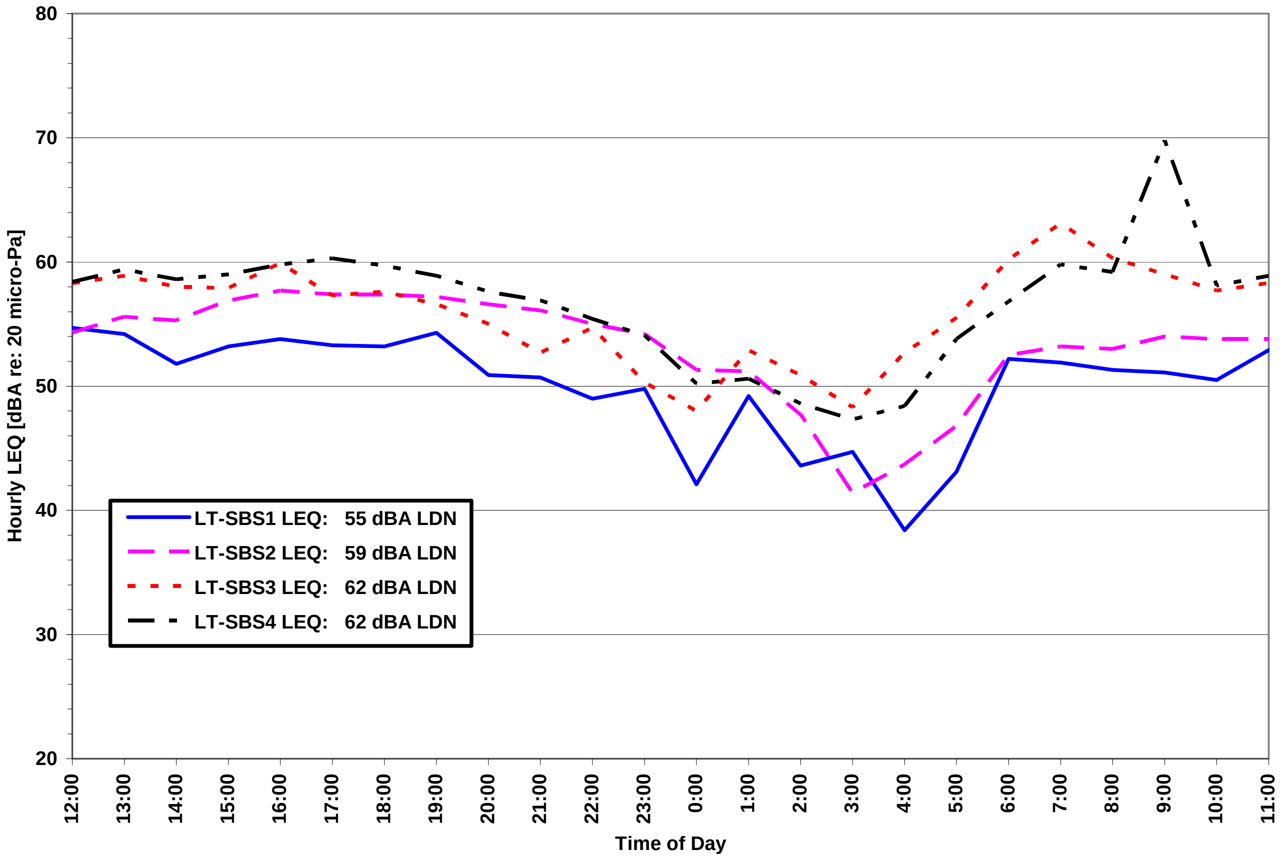

**Figure 4: San Bruno South Site Time History of Noise Levels**

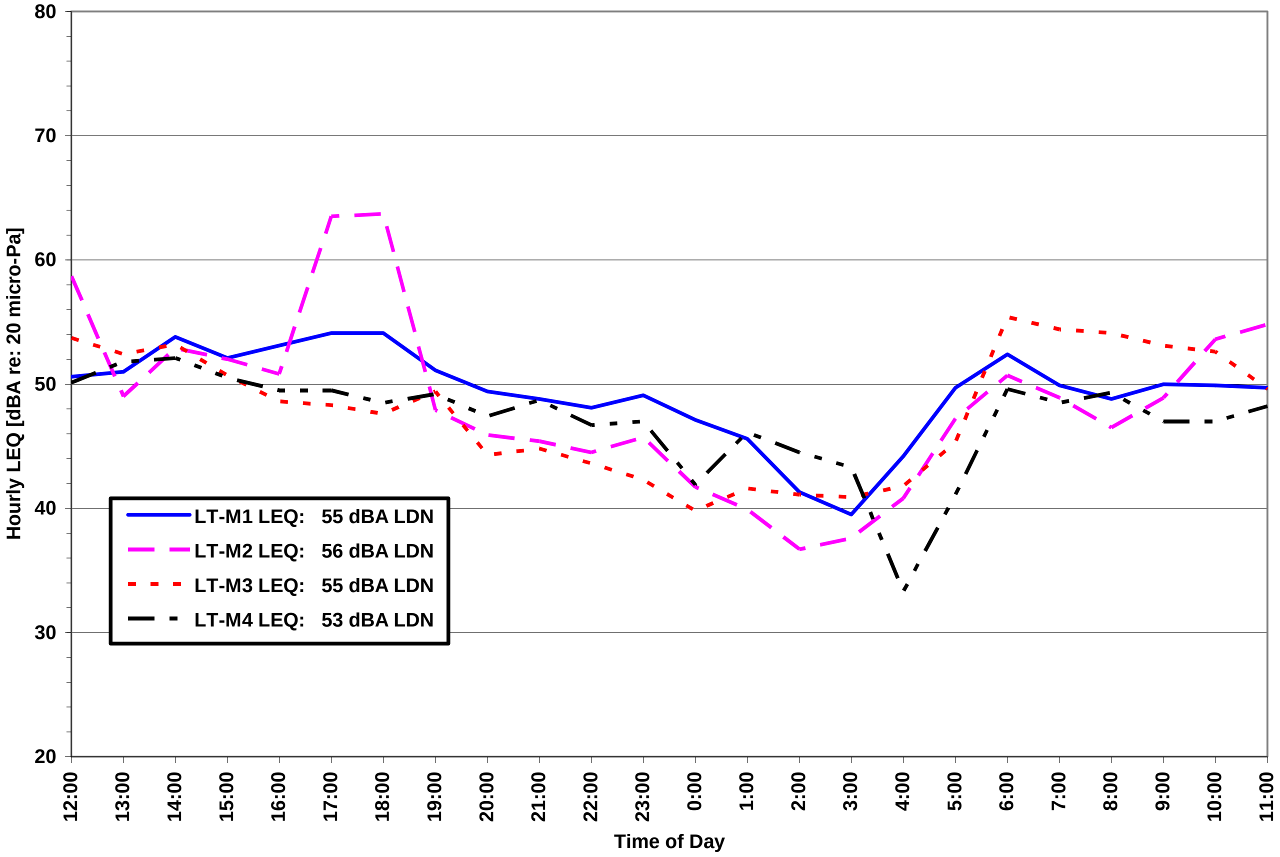

**Figure 5: Millbrae Site Time History of Noise Levels**

# Appendix D-3
# Estimates of Construction-Related Noise Levels at the Closest Sensitive Receptors

## Table D-3.1
## Estimated Daytime Construction Noise Levels (dBA) at the Colma Site — Home Sweet Home Assisted Living

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Speech Interference Criterion[c] | Daytime Ambient Noise Level | Daytime Noise Ordinance Limit[d] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mobilization | Flatbed Truck | 70 | 380 | -18 | 52 | 70 | 55 | NA | Not Required | Not Required | NA |
| | Haul Truck | 72 | 380 | -18 | 54 | 70 | 55 | NA | Not Required | Not Required | NA |
| | Pickup Truck | 70 | 380 | -18 | 52 | 70 | 55 | NA | Not Required | Not Required | NA |
| Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration | Backhoe | 74 | 380 | -18 | 56 | 70 | 55 | NA | Not Required | Not Required | NA |
| | Cement Drum Mixer | 77 | 380 | -18 | 59 | 70 | 55 | NA | Not Required | Not Required | NA |
| | Cement Mixer Truck | 75 | 380 | -18 | 57 | 70 | 55 | NA | Not Required | Not Required | NA |
| | Compactor | 76 | 380 | -18 | 58 | 70 | 55 | NA | Not Required | Not Required | NA |
| | Crane | 73 | 380 | -18 | 55 | 70 | 55 | NA | Not Required | Not Required | NA |
| | Dozer | 78 | 380 | -18 | 60 | 70 | 55 | NA | Not Required | Not Required | NA |
| | Dump Truck | 72 | 380 | -18 | 54 | 70 | 55 | NA | Not Required | Not Required | NA |
| | Flatbed Truck | 70 | 380 | -18 | 52 | 70 | 55 | NA | Not Required | Not Required | NA |
| | Forklift | 62 | 380 | -18 | 44 | 70 | 55 | NA | Not Required | Not Required | NA |
| | Grader | 81 | 380 | -18 | 63 | 70 | 55 | NA | Not Required | Not Required | NA |
| | Generator, >25kVA | 81 | 380 | -18 | 63 | 70 | 55 | NA | Not Required | Not Required | NA |
| | Loader | 75 | 380 | -18 | 57 | 70 | 55 | NA | Not Required | Not Required | NA |
| | Pickup Truck | 70 | 380 | -18 | 52 | 70 | 55 | NA | Not Required | Not Required | NA |
| | Pump, Water | 78 | 380 | -18 | 60 | 70 | 55 | NA | Not Required | Not Required | NA |
| | Vacuum Street Sweeper | 72 | 380 | -18 | 54 | 70 | 55 | NA | Not Required | Not Required | NA |
| | Vibratory Pile Driver | 88 | 380 | -18 | 70 | 70 | 55 | NA | Not Required | Not Required | NA |
| | Water Truck | 70 | 380 | -18 | 52 | 70 | 55 | NA | Not Required | Not Required | NA |
| | Welder, Diesel | 70 | 380 | -18 | 52 | 70 | 55 | NA | Not Required | Not Required | NA |

NOTES: Construction noise would not exceed the 70 dBA speech interference criterion (Impact NO-1) at the identified receptor.

NA = Not Applicable

[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.

[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).

[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.

[d] The Town of Colma Noise Ordinance exempts work on utilities.

## Table D-3.2
## Estimated Daytime Construction Noise Levels (dBA) at the Colma Site – Cypress Lawn Memorial Cemetery

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Speech Interference Criterion[c] | Daytime Ambient Noise Level | Daytime Noise Ordinance Limit[d] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mobilization | Flatbed Truck | 70 | 110 | -7 | 63 | 66 | 54 | NA | 0 | -5 | 58 |
| | Haul Truck | 72 | 110 | -7 | 65 | 66 | 54 | NA | -1 | -5 | 59 |
| | Pickup Truck | 70 | 110 | -7 | 63 | 66 | 54 | NA | 0 | -5 | 58 |
| Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration | Backhoe | 74 | 110 | -7 | **67** | 66 | 54 | NA | -3 | -5 | 59 |
| | Cement Drum Mixer | 77 | 500 | -20 | 57 | 66 | 54 | NA | -8 | -10 | 39 |
| | Cement Mixer Truck | 75 | 500 | -20 | 55 | 66 | 54 | NA | 0 | -5 | 50 |
| | Compactor | 76 | 500 | -20 | 56 | 66 | 54 | NA | -4 | -5 | 47 |
| | Crane | 73 | 110 | -7 | 66 | 66 | 54 | NA | -6 | -5 | 55 |
| | Dozer | 78 | 110 | -7 | **71** | 66 | 54 | NA | -7 | -5 | 59 |
| | Dump Truck | 72 | 110 | -7 | 65 | 66 | 54 | NA | -1 | -5 | 59 |
| | Flatbed Truck | 70 | 110 | -7 | 63 | 66 | 54 | NA | 0 | -5 | 58 |
| | Forklift | 62 | 110 | -7 | 55 | 66 | 54 | NA | 0 | -5 | 50 |
| | Grader | 81 | 500 | -20 | 61 | 66 | 54 | NA | -10 | -5 | 46 |
| | Generator, >25kVA | 81 | 110 | -7 | **74** | 66 | 54 | NA | -6 | -10 | 58 |
| | Loader | 75 | 110 | -7 | **68** | 66 | 54 | NA | -4 | -5 | 59 |
| | Pickup Truck | 70 | 110 | -7 | 63 | 66 | 54 | NA | 0 | -5 | 58 |
| | Pump, Water | 78 | 110 | -7 | **71** | 66 | 54 | NA | -6 | -10 | 55 |
| | Vacuum Street Sweeper | 72 | 500 | -20 | 52 | 66 | 54 | NA | 0 | -5 | 47 |
| | Vibratory Pile Driver | 88 | 500 | -20 | 68 | 66 | 54 | NA | -10 | -5 | 53 |
| | Water Truck | 70 | 110 | -7 | 63 | 66 | 54 | NA | 0 | -5 | 58 |
| | Welder, Diesel | 70 | 110 | -7 | 63 | 66 | 54 | NA | 0 | -10 | 53 |

NOTES: **Bolded** values indicate construction noise levels that would exceed the 66 dBA speech interference criterion (Impact NO-1) at the identified receptor.

NA = Not Applicable

[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.

[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).

[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.

[d] The Town of Colma Noise Ordinance exempts work on utilities.

## Table D-3.3
## Estimated Daytime Construction Noise Levels (dBA) at the South San Francisco Site – 105 Arroyo Drive

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Speech Interference Criterion[c] | Daytime Ambient Noise Level | Daytime Noise Ordinance Limit[d] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tree Removal | Brush Chipper | 76 | 30 | 4 | **80** | 70 | 62 | 90 | 0 | -5 | **75** |
| | Chain Saw | 82 | 30 | 4 | **86** | 70 | 62 | 90 | 0 | -5 | **81** |
| | Flatbed Truck | 70 | 30 | 4 | **74** | 70 | 62 | 90 | 0 | -5 | 69 |
| | Haul Truck | 72 | 30 | 4 | **76** | 70 | 62 | 90 | -1 | -5 | 70 |
| | Skid Loader | 75 | 30 | 4 | **79** | 70 | 62 | 90 | -4 | -5 | 70 |
| | Track Loader | 81 | 30 | 4 | **85** | 70 | 62 | 90 | -5 | -5 | **75** |
| | Whole Tree Chipper | 83 | 30 | 4 | **87** | 70 | 62 | 90 | -4 | -5 | **78** |
| Mobilization | Flatbed Truck | 70 | 30 | 4 | **74** | 70 | 62 | 90 | 0 | -5 | 69 |
| | Haul Truck | 72 | 30 | 4 | **76** | 70 | 62 | 90 | -1 | -5 | 70 |
| | Pickup Truck | 70 | 30 | 4 | **74** | 70 | 62 | 90 | 0 | -5 | 69 |
| Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration | Backhoe | 74 | 30 | 4 | **78** | 70 | 62 | 90 | -3 | -5 | 70 |
| | Cement Drum Mixer | 77 | 30 | 4 | **81** | 70 | 62 | 90 | -8 | -10 | 63 |
| | Cement Mixer Truck | 75 | 30 | 4 | **79** | 70 | 62 | 90 | 0 | -5 | **74** |
| | Compactor | 76 | 30 | 4 | **80** | 70 | 62 | 90 | -4 | -5 | **71** |
| | Crane | 73 | 30 | 4 | **77** | 70 | 62 | 90 | -6 | -5 | 66 |
| | Dozer | 78 | 30 | 4 | **82** | 70 | 62 | 90 | -7 | -5 | 70 |
| | Dump Truck | 72 | 30 | 4 | **76** | 70 | 62 | 90 | -1 | -5 | 70 |
| | Flatbed Truck | 70 | 30 | 4 | **74** | 70 | 62 | 90 | 0 | -5 | 69 |
| | Forklift | 62 | 30 | 4 | 66 | 70 | 62 | 90 | 0 | -5 | 61 |
| | Grader | 81 | 30 | 4 | **85** | 70 | 62 | 90 | -10 | -5 | 70 |
| | Generator, >25kVA | 81 | 30 | 4 | **85** | 70 | 62 | 90 | -6 | -10 | 69 |
| | Loader | 75 | 30 | 4 | **79** | 70 | 62 | 90 | -4 | -5 | 70 |
| | Pickup Truck | 70 | 30 | 4 | **74** | 70 | 62 | 90 | 0 | -5 | 69 |
| | Pump, Water | 78 | 30 | 4 | **82** | 70 | 62 | 90 | -6 | -10 | 66 |
| | Vacuum Street Sweeper | 72 | 450 | -19 | 53 | 70 | 62 | 90 | 0 | -5 | 48 |
| | Vibratory Pile Driver | 88 | 30 | 4 | **92** | 70 | 62 | 90 | -10 | -5 | **77** |
| | Water Truck | 70 | 30 | 4 | **74** | 70 | 62 | 90 | 0 | -5 | 69 |
| | Welder, Diesel | 70 | 30 | 4 | **74** | 70 | 62 | 90 | 0 | -10 | 64 |

NOTES: **Bolded** values indicate construction noise levels that would exceed the 70 dBA speech interference criterion (Impact NO-1) at the identified receptor.

[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.

[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).

[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.

[d] The City of South San Francisco Noise Ordinance states that the noise level at any point outside the project boundary is limited to 90 dBA.

## Table D-3.4
## Estimated Daytime Construction Noise Levels (dBA) at the South San Francisco Site – Clubview Apartments

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Speech Interference Criterion[c] | Daytime Ambient Noise Level | Daytime Noise Ordinance Limit[d] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tree Removal | Brush Chipper | 76 | 550 | -21 | 55 | 70 | 60 | 90 | 0 | 0 | 55 |
| | Chain Saw | 82 | 550 | -21 | 61 | 70 | 60 | 90 | 0 | 0 | 61 |
| | Flatbed Truck | 70 | 550 | -21 | 49 | 70 | 60 | 90 | 0 | 0 | 49 |
| | Haul Truck | 72 | 550 | -21 | 51 | 70 | 60 | 90 | -1 | 0 | 50 |
| | Skid Loader | 75 | 550 | -21 | 54 | 70 | 60 | 90 | -4 | 0 | 50 |
| | Track Loader | 81 | 550 | -21 | 60 | 70 | 60 | 90 | -5 | 0 | 55 |
| | Whole Tree Chipper | 83 | 550 | -21 | 62 | 70 | 60 | 90 | -4 | 0 | 58 |
| Mobilization | Flatbed Truck | 70 | 125 | -8 | 62 | 70 | 60 | 90 | 0 | 0 | 62 |
| | Haul Truck | 72 | 125 | -8 | 64 | 70 | 60 | 90 | -1 | 0 | 63 |
| | Pickup Truck | 70 | 125 | -8 | 62 | 70 | 60 | 90 | 0 | 0 | 62 |
| Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration | Backhoe | 74 | 125 | -8 | 66 | 70 | 60 | 90 | -3 | 0 | 63 |
| | Cement Drum Mixer | 77 | 125 | -8 | 69 | 70 | 60 | 90 | -8 | 0 | 61 |
| | Cement Mixer Truck | 75 | 125 | -8 | 67 | 70 | 60 | 90 | 0 | 0 | 67 |
| | Compactor | 76 | 125 | -8 | 68 | 70 | 60 | 90 | -4 | 0 | 64 |
| | Crane | 73 | 125 | -8 | 65 | 70 | 60 | 90 | -6 | 0 | 59 |
| | Dozer | 78 | 125 | -8 | 70 | 70 | 60 | 90 | -7 | 0 | 63 |
| | Dump Truck | 72 | 125 | -8 | 64 | 70 | 60 | 90 | -1 | 0 | 63 |
| | Flatbed Truck | 70 | 125 | -8 | 62 | 70 | 60 | 90 | 0 | 0 | 62 |
| | Forklift | 62 | 125 | -8 | 54 | 70 | 60 | 90 | 0 | 0 | 54 |
| | Grader | 81 | 125 | -8 | **73** | 70 | 60 | 90 | -10 | 0 | 63 |
| | Generator, >25kVA | 81 | 125 | -8 | **73** | 70 | 60 | 90 | -6 | 0 | 67 |
| | Loader | 75 | 125 | -8 | 67 | 70 | 60 | 90 | -4 | 0 | 63 |
| | Pickup Truck | 70 | 125 | -8 | 62 | 70 | 60 | 90 | 0 | 0 | 62 |
| | Pump, Water | 78 | 125 | -8 | 70 | 70 | 60 | 90 | -6 | 0 | 64 |
| | Vacuum Street Sweeper | 72 | 530 | -21 | 51 | 70 | 60 | 90 | 0 | 0 | 51 |
| | Vibratory Pile Driver | 88 | 125 | -8 | **80** | 70 | 60 | 90 | -10 | 0 | 70 |
| | Water Truck | 70 | 125 | -8 | 62 | 70 | 60 | 90 | 0 | 0 | 62 |
| | Welder, Diesel | 70 | 125 | -8 | 62 | 70 | 60 | 90 | 0 | 0 | 62 |

NOTES: **Bolded** values indicate construction noise levels that would exceed the 70 dBA speech interference criterion (Impact NO-1) at the identified receptor.

[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.

[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).

[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.

[d] The City of South San Francisco Noise Ordinance states that the noise level at any point outside the project boundary is limited to 90 dBA.

## Table D-3.5
## Estimated Daytime Construction Noise Levels (dBA) at the South San Francisco Site – Golf Club of San Francisco

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Speech Interference Criterion[c] | Daytime Ambient Noise Level | Daytime Noise Ordinance Limit[d] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tree Removal | Brush Chipper | 76 | 180 | -11 | 65 | 66 | 59 | 90 | 0 | -5 | 65 |
| | Chain Saw | 82 | 180 | -11 | **71** | 66 | 59 | 90 | 0 | -5 | **71** |
| | Flatbed Truck | 70 | 180 | -11 | 59 | 66 | 59 | 90 | 0 | -5 | 59 |
| | Haul Truck | 72 | 180 | -11 | 61 | 66 | 59 | 90 | -1 | -5 | 60 |
| | Skid Loader | 75 | 180 | -11 | 64 | 66 | 59 | 90 | -4 | -5 | 60 |
| | Track Loader | 81 | 180 | -11 | **70** | 66 | 59 | 90 | -5 | -5 | 65 |
| | Whole Tree Chipper | 83 | 180 | -11 | **72** | 66 | 59 | 90 | -4 | -5 | 68 |
| Mobilization | Flatbed Truck | 70 | 30 | 4 | **74** | 66 | 59 | 90 | 0 | -5 | 69 |
| | Haul Truck | 72 | 30 | 4 | **76** | 66 | 59 | 90 | -1 | -5 | 70 |
| | Pickup Truck | 70 | 30 | 4 | **74** | 66 | 59 | 90 | 0 | -5 | 69 |
| Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration | Backhoe | 74 | 30 | 4 | **78** | 66 | 59 | 90 | -3 | -5 | 70 |
| | Cement Drum Mixer | 77 | 30 | 4 | **81** | 66 | 59 | 90 | -8 | -10 | 63 |
| | Cement Mixer Truck | 75 | 30 | 4 | **79** | 66 | 59 | 90 | 0 | -5 | **74** |
| | Compactor | 76 | 30 | 4 | **80** | 66 | 59 | 90 | -4 | -5 | **71** |
| | Crane | 73 | 30 | 4 | **77** | 66 | 59 | 90 | -6 | -5 | 66 |
| | Dozer | 78 | 30 | 4 | **82** | 66 | 59 | 90 | -7 | -5 | 70 |
| | Dump Truck | 72 | 30 | 4 | **76** | 66 | 59 | 90 | -1 | -5 | 70 |
| | Flatbed Truck | 70 | 30 | 4 | **74** | 66 | 59 | 90 | 0 | -5 | 69 |
| | Forklift | 62 | 30 | 4 | 66 | 66 | 59 | 90 | 0 | -5 | 61 |
| | Grader | 81 | 30 | 4 | **85** | 66 | 59 | 90 | -10 | -5 | 70 |
| | Generator, >25kVA | 81 | 30 | 4 | **85** | 66 | 59 | 90 | -6 | -10 | 69 |
| | Loader | 75 | 30 | 4 | **79** | 66 | 59 | 90 | -4 | -5 | 70 |
| | Pickup Truck | 70 | 30 | 4 | **74** | 66 | 59 | 90 | 0 | -5 | 69 |
| | Pump, Water | 78 | 30 | 4 | **82** | 66 | 59 | 90 | -6 | -10 | 66 |
| | Vacuum Street Sweeper | 72 | 30 | 4 | **76** | 66 | 59 | 90 | 0 | -5 | **71** |
| | Vibratory Pile Driver | 88 | 30 | 4 | **92** | 66 | 59 | 90 | -10 | -5 | **77** |
| | Water Truck | 70 | 30 | 4 | **74** | 66 | 59 | 90 | 0 | -5 | 69 |
| | Welder, Diesel | 70 | 30 | 4 | **74** | 66 | 59 | 90 | 0 | -10 | 64 |

NOTES: **Bolded** values indicate construction noise levels that would exceed the 66 dBA speech interference criterion (Impact NO-1) at the identified receptor.

[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.

[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).

[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.

[d] The City of South San Francisco Noise Ordinance states that the noise level at any point outside the project boundary is limited to 90 dBA.

## Table D-3.6
## Estimated Daytime Construction Noise Levels (dBA) at the San Bruno North Site – 1840 Cedarwood Court

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Speech Interference Criterion[c] | Daytime Ambient Noise Level | Daytime Noise Ordinance Limit[d] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mobilization | Flatbed Truck | 70 | 15 | 10 | **80** | 70 | 61 | 101 | 0 | -5 | **75** |
| | Haul Truck | 72 | 15 | 10 | **82** | 70 | 61 | 101 | -1 | -5 | **76** |
| | Pickup Truck | 70 | 15 | 10 | **80** | 70 | 61 | 101 | 0 | -5 | **75** |
| Shoring and Excavation, Pipeline Stabilization, Intermittent Dewatering, Backfill and Restoration | Backhoe | 74 | 15 | 10 | **84** | 70 | 61 | 101 | -3 | -5 | **76** |
| | Cement Drum Mixer | 77 | 15 | 10 | **87** | 70 | 61 | 101 | -8 | -10 | 69 |
| | Cement Mixer Truck | 75 | 15 | 10 | **85** | 70 | 61 | 101 | 0 | -5 | **80** |
| | Compactor | 76 | 15 | 10 | **86** | 70 | 61 | 101 | -4 | -5 | **77** |
| | Crane | 73 | 15 | 10 | **83** | 70 | 61 | 101 | -6 | -5 | **72** |
| | Dump Truck | 72 | 15 | 10 | **82** | 70 | 61 | 101 | -1 | -5 | **76** |
| | Flatbed Truck | 70 | 15 | 10 | **80** | 70 | 61 | 101 | 0 | -5 | **75** |
| | Forklift | 62 | 15 | 10 | **72** | 70 | 61 | 101 | 0 | -5 | 67 |
| | Generator, >25kVA | 81 | 15 | 10 | **91** | 70 | 61 | 101 | -6 | -10 | **75** |
| | Loader | 75 | 15 | 10 | **85** | 70 | 61 | 101 | -4 | -5 | **76** |
| | Pickup Truck | 70 | 15 | 10 | **80** | 70 | 61 | 101 | 0 | -5 | **75** |
| | Pump, Water | 78 | 15 | 10 | **88** | 70 | 61 | 101 | -6 | -10 | **72** |
| | Vacuum Street Sweeper | 72 | 15 | 10 | **82** | 70 | 61 | 101 | 0 | -5 | **77** |
| | Vibratory Pile Driver | 88 | 15 | 10 | **98** | 70 | 61 | 101 | -10 | -5 | **83** |
| | Water Truck | 70 | 15 | 10 | **80** | 70 | 61 | 101 | 0 | -5 | **75** |
| | Welder, Diesel | 70 | 15 | 10 | **80** | 70 | 61 | 101 | 0 | -10 | 70 |

NOTES **Bolded** values indicate construction noise levels that would exceed the 70 dBA speech interference criterion (Impact NO-1) at the identified receptor.:

[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.

[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).

[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.

[d] The City of San Bruno Noise Ordinance states that construction noise is limited to 85 dBA at 100 feet, the values shown are the equivalent at the typical distance from the closest receptor.

## Table D-3.7

## Estimated Daytime Construction Noise Levels (dBA) at the San Bruno South Site – Park Plaza Apartments and Shelter Creek Condominiums

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Speech Interference Criterion[c] | Daytime Ambient Noise Level | Daytime Noise Ordinance Limit[d] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dewatering (Shutdown, Hydrostatic Testing, Disinfection) | Dewatering Pump | 65 | 55 | -1 | 64 | 70 | 59 | 87 | 0 | 0 | 64 |
| Mobilization | Flatbed Truck | 70 | 10 | 14 | **84** | 70 | 59 | 105 | 0 | 0 | **84** |
| | Haul Truck | 72 | 10 | 14 | **86** | 70 | 59 | 105 | -1 | 0 | **85** |
| | Pickup Truck | 70 | 10 | 14 | **84** | 70 | 59 | 105 | 0 | 0 | **84** |
| Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration | Backhoe | 74 | 10 | 14 | **88** | 70 | 59 | 105 | -3 | 0 | **85** |
| | Cement Drum Mixer | 77 | 10 | 14 | **91** | 70 | 59 | 105 | -8 | 0 | **83** |
| | Cement Mixer Truck | 75 | 10 | 14 | **89** | 70 | 59 | 105 | 0 | 0 | **89** |
| | Compactor | 76 | 10 | 14 | **90** | 70 | 59 | 105 | -4 | 0 | **86** |
| | Crane | 73 | 10 | 14 | **87** | 70 | 59 | 105 | -6 | 0 | **81** |
| | Dozer | 78 | 10 | 14 | **92** | 70 | 59 | 105 | -7 | 0 | **85** |
| | Dump Truck | 72 | 10 | 14 | **86** | 70 | 59 | 105 | -1 | 0 | **85** |
| | Flatbed Truck | 70 | 10 | 14 | **84** | 70 | 59 | 105 | 0 | 0 | **84** |
| | Forklift | 62 | 10 | 14 | **76** | 70 | 59 | 105 | 0 | 0 | **76** |
| | Grader | 81 | 10 | 14 | **95** | 70 | 59 | 105 | -10 | 0 | **85** |
| | Generator, >25kVA | 81 | 10 | 14 | **95** | 70 | 59 | 105 | -6 | 0 | **89** |
| | Loader | 75 | 10 | 14 | **89** | 70 | 59 | 105 | -4 | 0 | **85** |
| | Pickup Truck | 70 | 10 | 14 | **84** | 70 | 59 | 105 | 0 | 0 | **84** |
| | Pump, Water | 78 | 10 | 14 | **92** | 70 | 59 | 105 | -6 | 0 | **86** |
| | Vacuum Street Sweeper | 72 | 690 | -23 | 49 | 70 | 59 | 68 | 0 | 0 | 49 |
| | Vibratory Pile Driver | 88 | 10 | 14 | **102** | 70 | 59 | 105 | -10 | 0 | **92** |
| | Water Truck | 70 | 10 | 14 | **84** | 70 | 59 | 105 | 0 | 0 | **84** |
| | Welder, Diesel | 70 | 10 | 14 | **84** | 70 | 59 | 105 | 0 | 0 | **84** |

NOTES: **Bolded** values indicate construction noise levels that would exceed the 70 dBA speech interference criterion (Impact NO-1) at the identified receptor.

[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.

[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).

[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.

[d] The City of San Bruno Noise Ordinance states that construction noise is limited to 85 dBA at 100 feet, the values shown are the equivalent at the typical distance from the closest receptor.

## Table D-3.8
## Estimated Daytime Construction Noise Levels (dBA) at the San Bruno South Site – Residences along Courtland Drive

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Speech Interference Criterion[c] | Daytime Ambient Noise Level | Daytime Noise Ordinance Limit[d] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dewatering (Shutdown, Hydrostatic Testing, Disinfection) | Dewatering Pump | 65 | 315 | -16 | 49 | 70 | 59 | 75 | 0 | 0 | 49 |
| Mobilization | Flatbed Truck | 70 | 10 | 14 | **84** | 70 | 59 | 105 | 0 | -5 | **79** |
| | Haul Truck | 72 | 10 | 14 | **86** | 70 | 59 | 105 | -1 | -5 | **80** |
| | Pickup Truck | 70 | 10 | 14 | **84** | 70 | 59 | 105 | 0 | -5 | **79** |
| Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration | Backhoe | 74 | 10 | 14 | **88** | 70 | 59 | 105 | -3 | -5 | **80** |
| | Cement Drum Mixer | 77 | 10 | 14 | **91** | 70 | 59 | 105 | -8 | -10 | **73** |
| | Cement Mixer Truck | 75 | 10 | 14 | **89** | 70 | 59 | 105 | 0 | -5 | **84** |
| | Compactor | 76 | 10 | 14 | **90** | 70 | 59 | 105 | -4 | -5 | **81** |
| | Crane | 73 | 10 | 14 | **87** | 70 | 59 | 105 | -6 | -5 | **76** |
| | Dozer | 78 | 10 | 14 | **92** | 70 | 59 | 105 | -7 | -5 | **80** |
| | Dump Truck | 72 | 10 | 14 | **86** | 70 | 59 | 105 | -1 | -5 | **80** |
| | Flatbed Truck | 70 | 10 | 14 | **84** | 70 | 59 | 105 | 0 | -5 | **79** |
| | Forklift | 62 | 10 | 14 | **76** | 70 | 59 | 105 | 0 | -5 | **71** |
| | Grader | 81 | 10 | 14 | **95** | 70 | 59 | 105 | -10 | -5 | **80** |
| | Generator, >25kVA | 81 | 10 | 14 | **95** | 70 | 59 | 105 | -6 | -10 | **79** |
| | Loader | 75 | 10 | 14 | **89** | 70 | 59 | 105 | -4 | -5 | **80** |
| | Pickup Truck | 70 | 10 | 14 | **84** | 70 | 59 | 105 | 0 | -5 | **79** |
| | Pump, Water | 78 | 10 | 14 | **92** | 70 | 59 | 105 | -6 | -10 | **76** |
| | Vacuum Street Sweeper | 72 | 55 | -1 | **71** | 70 | 59 | 90 | 0 | -5 | 66 |
| | Vibratory Pile Driver | 88 | 10 | 14 | **102** | 70 | 59 | 105 | -10 | -5 | **87** |
| | Water Truck | 70 | 10 | 14 | **84** | 70 | 59 | 105 | 0 | -5 | **79** |
| | Welder, Diesel | 70 | 10 | 14 | **84** | 70 | 59 | 105 | 0 | -10 | **74** |

NOTES: **Bolded** values indicate construction noise levels that would exceed the 70 dBA speech interference criterion (Impact NO-1) at the identified receptor.

[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.

[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).

[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.

[d] The City of San Bruno Noise Ordinance states that construction noise is limited to 85 dBA at 100 feet, the values shown are the equivalent at the typical distance from the closest receptor.

## Table D-3.9
## Estimated Daytime Construction Noise Levels (dBA) at the San Bruno South Site – Peninsula High School

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Speech Interference Criterion[c] | Daytime Ambient Noise Level | Daytime Noise Ordinance Limit[d] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dewatering (Shutdown, Hydrostatic Testing, Disinfection) | Dewatering Pump | 65 | 1830 | -31 | 34 | 70 | 53 | 60 | 0 | 0 | 34 |
| Mobilization | Flatbed Truck | 70 | 150 | -10 | 60 | 70 | 53 | 85 | 0 | -5 | 55 |
| | Haul Truck | 72 | 150 | -10 | 62 | 70 | 53 | 85 | -1 | -5 | 56 |
| | Pickup Truck | 70 | 150 | -10 | 60 | 70 | 53 | 85 | 0 | -5 | 55 |
| Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration | Backhoe | 74 | 150 | -10 | 64 | 70 | 53 | 85 | -3 | -5 | 56 |
| | Cement Drum Mixer | 77 | 1000 | -26 | 51 | 70 | 53 | 65 | -8 | -10 | 33 |
| | Cement Mixer Truck | 75 | 1000 | -26 | 49 | 70 | 53 | 65 | 0 | -5 | 44 |
| | Compactor | 76 | 1000 | -26 | 50 | 70 | 53 | 65 | -4 | -5 | 41 |
| | Crane | 73 | 1000 | -26 | 47 | 70 | 53 | 65 | -6 | -5 | 36 |
| | Dozer | 78 | 1000 | -26 | 52 | 70 | 53 | 65 | -7 | -5 | 40 |
| | Dump Truck | 72 | 150 | -10 | 62 | 70 | 53 | 85 | -1 | -5 | 56 |
| | Flatbed Truck | 70 | 150 | -10 | 60 | 70 | 53 | 85 | 0 | -5 | 55 |
| | Forklift | 62 | 150 | -10 | 52 | 70 | 53 | 85 | 0 | -5 | 47 |
| | Grader | 81 | 1000 | -26 | 55 | 70 | 53 | 65 | -10 | -5 | 40 |
| | Generator, >25kVA | 81 | 150 | -10 | **71** | 70 | 53 | 85 | -6 | -10 | 55 |
| | Loader | 75 | 1000 | -26 | 49 | 70 | 53 | 65 | -4 | -5 | 40 |
| | Pickup Truck | 70 | 150 | -10 | 60 | 70 | 53 | 85 | 0 | -5 | 55 |
| | Pump, Water | 78 | 150 | -10 | 68 | 70 | 53 | 85 | -6 | -10 | 52 |
| | Vacuum Street Sweeper | 72 | 150 | -10 | 62 | 70 | 53 | 85 | 0 | -5 | 57 |
| | Vibratory Pile Driver | 88 | 1000 | -26 | 62 | 70 | 53 | 65 | -10 | -5 | 47 |
| | Water Truck | 70 | 150 | -10 | 60 | 70 | 53 | 85 | 0 | -5 | 55 |
| | Welder, Diesel | 70 | 150 | -10 | 60 | 70 | 53 | 85 | 0 | -10 | 50 |

NOTES: **Bolded** values indicate construction noise levels that would exceed the 70 dBA speech interference criterion (Impact NO-1) at the identified receptor.

[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.

[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).

[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.

[d] The City of San Bruno Noise Ordinance states that construction noise is limited to 85 dBA at 100 feet, the values shown are the equivalent at the typical distance from the closest receptor.

## Table D-3.10
## Estimated Daytime Construction Noise Levels (dBA) at the San Bruno South Site – Peninsula High School Athletic Fields

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Speech Interference Criterion[c] | Daytime Ambient Noise Level | Daytime Noise Ordinance Limit[d] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dewatering (Shutdown, Hydrostatic Testing, Disinfection) | Dewatering Pump | 65 | 950 | -26 | 39 | 66 | 54 | 65 | 0 | 0 | 39 |
| Mobilization | Flatbed Truck | 70 | 40 | 2 | **72** | 66 | 54 | 93 | 0 | -5 | 67 |
| | Haul Truck | 72 | 40 | 2 | **74** | 66 | 54 | 93 | -1 | -5 | 68 |
| | Pickup Truck | 70 | 40 | 2 | **72** | 66 | 54 | 93 | 0 | -5 | 67 |
| Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration | Backhoe | 74 | 40 | 2 | **76** | 66 | 54 | 93 | -3 | -5 | 68 |
| | Cement Drum Mixer | 77 | 140 | -9 | 68 | 66 | 54 | 82 | -8 | -10 | 50 |
| | Cement Mixer Truck | 75 | 140 | -9 | 66 | 66 | 54 | 82 | 0 | -5 | 61 |
| | Compactor | 76 | 140 | -9 | 67 | 66 | 54 | 82 | -4 | -5 | 58 |
| | Crane | 73 | 140 | -9 | 64 | 66 | 54 | 82 | -6 | -5 | 53 |
| | Dozer | 78 | 140 | -9 | 69 | 66 | 54 | 82 | -7 | -5 | 57 |
| | Dump Truck | 72 | 40 | 2 | **74** | 66 | 54 | 93 | -1 | -5 | 68 |
| | Flatbed Truck | 70 | 40 | 2 | **72** | 66 | 54 | 93 | 0 | -5 | 67 |
| | Forklift | 62 | 40 | 2 | 64 | 66 | 54 | 93 | 0 | -5 | 59 |
| | Grader | 81 | 140 | -9 | **72** | 66 | 54 | 82 | -10 | -5 | 57 |
| | Generator, >25kVA | 81 | 40 | 2 | **83** | 66 | 54 | 93 | -6 | -10 | 67 |
| | Loader | 75 | 140 | -9 | 66 | 66 | 54 | 82 | -4 | -5 | 57 |
| | Pickup Truck | 70 | 40 | 2 | **72** | 66 | 54 | 93 | 0 | -5 | 67 |
| | Pump, Water | 78 | 40 | 2 | **80** | 66 | 54 | 93 | -6 | -10 | 64 |
| | Vacuum Street Sweeper | 72 | 40 | 2 | **74** | 66 | 54 | 93 | 0 | -5 | 69 |
| | Vibratory Pile Driver | 88 | 140 | -9 | **79** | 66 | 54 | 82 | -10 | -5 | 64 |
| | Water Truck | 70 | 40 | 2 | **72** | 66 | 54 | 93 | 0 | -5 | 67 |
| | Welder, Diesel | 70 | 40 | 2 | **72** | 66 | 54 | 93 | 0 | -10 | 62 |

NOTES: **Bolded** values indicate construction noise levels that would exceed the 70 dBA speech interference criterion (Impact NO-1) at the identified receptor.

[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.

[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).

[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.

[d] The City of San Bruno Noise Ordinance states that construction noise is limited to 85 dBA at 100 feet, the values shown are the equivalent at the typical distance from the closest receptor.

## Table D-3.11
## Estimated Daytime Construction Noise Levels (dBA) at the South San Bruno Site – San Bruno Chinese Church

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Speech Interference Criterion[c] | Daytime Ambient Noise Level | Daytime Noise Ordinance Limit[d] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dewatering (Shutdown, Hydrostatic Testing, Disinfection) | Dewatering Pump | 65 | 1050 | -26 | 39 | 70 | 59 | 65 | 0 | 0 | 39 |
| Mobilization | Flatbed Truck | 70 | 30 | 4 | **74** | 70 | 59 | 93 | 0 | -5 | 69 |
| | Haul Truck | 72 | 30 | 4 | **76** | 70 | 59 | 93 | -1 | -5 | 70 |
| | Pickup Truck | 70 | 30 | 4 | **74** | 70 | 59 | 93 | 0 | -5 | 69 |
| Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration | Backhoe | 74 | 30 | 4 | **78** | 70 | 59 | 93 | -3 | -5 | 70 |
| | Cement Drum Mixer | 77 | 190 | -12 | 65 | 70 | 59 | 82 | -8 | -10 | 47 |
| | Cement Mixer Truck | 75 | 190 | -12 | 63 | 70 | 59 | 82 | 0 | -5 | 58 |
| | Compactor | 76 | 190 | -12 | 64 | 70 | 59 | 82 | -4 | -5 | 55 |
| | Crane | 73 | 190 | -12 | 61 | 70 | 59 | 82 | -6 | -5 | 50 |
| | Dozer | 78 | 190 | -12 | 66 | 70 | 59 | 82 | -7 | -5 | 54 |
| | Dump Truck | 72 | 30 | 4 | **76** | 70 | 59 | 93 | -1 | -5 | 70 |
| | Flatbed Truck | 70 | 30 | 4 | **74** | 70 | 59 | 93 | 0 | -5 | 69 |
| | Forklift | 62 | 30 | 4 | 66 | 70 | 59 | 93 | 0 | -5 | 61 |
| | Grader | 81 | 190 | -12 | 69 | 70 | 59 | 82 | -10 | -5 | 54 |
| | Generator, >25kVA | 81 | 30 | 4 | **85** | 70 | 59 | 93 | -6 | -10 | 69 |
| | Loader | 75 | 190 | -12 | 63 | 70 | 59 | 82 | -4 | -5 | 54 |
| | Pickup Truck | 70 | 30 | 4 | **74** | 70 | 59 | 93 | 0 | -5 | 69 |
| | Pump, Water | 78 | 30 | 4 | **82** | 70 | 59 | 93 | -6 | -10 | 66 |
| | Vacuum Street Sweeper | 72 | 120 | -8 | 64 | 70 | 59 | 93 | 0 | -5 | 59 |
| | Vibratory Pile Driver | 88 | 190 | -12 | **76** | 70 | 59 | 82 | -10 | -5 | 61 |
| | Water Truck | 70 | 30 | 4 | **74** | 70 | 59 | 93 | 0 | -5 | 69 |
| | Welder, Diesel | 70 | 30 | 4 | **74** | 70 | 59 | 93 | 0 | -10 | 64 |

NOTES: **Bolded** values indicate construction noise levels that would exceed the 70 dBA speech interference criterion (Impact NO-1) at the identified receptor.

[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.

[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).

[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.

[d] The City of San Bruno Noise Ordinance states that construction noise is limited to 85 dBA at 100 feet, the values shown are the equivalent at the typical distance from the closest receptor.

## Table D-3.12
## Estimated Daytime Construction Noise Levels (dBA) at the Millbrae Site – Residences at Ridgewood Drive

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Speech Interference Criterion[c] | Daytime Ambient Noise Level | Daytime Noise Ordinance Limit[d] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tree Removal | Brush Chipper | 76 | 50 | 0 | **76** | 70 | 52 | NA | 0 | -5 | **71** |
| | Chain Saw | 82 | 70 | -3 | **79** | 70 | 52 | NA | 0 | -5 | **74** |
| | Flatbed Truck | 70 | 10 | 14 | **84** | 70 | 52 | NA | 0 | -5 | **79** |
| | Haul Truck | 72 | 10 | 14 | **86** | 70 | 52 | NA | -1 | -5 | **80** |
| | Skid Loader | 75 | 10 | 14 | **89** | 70 | 52 | NA | -4 | -5 | **80** |
| | Track Loader | 81 | 10 | 14 | **95** | 70 | 52 | NA | -5 | -5 | **85** |
| | Whole Tree Chipper | 83 | 50 | 0 | **83** | 70 | 52 | NA | -4 | -5 | **74** |
| Dewatering (Shutdown, Hydrostatic Testing, Disinfection) | Dewatering Pump | 65 | 625 | -22 | 43 | 70 | 52 | NA | 0 | 0 | 43 |
| Mobilization | Flatbed Truck | 70 | 10 | 14 | **84** | 70 | 52 | NA | 0 | -5 | **79** |
| | Haul Truck | 72 | 10 | 14 | **86** | 70 | 52 | NA | -1 | -5 | **80** |
| | Pickup Truck | 70 | 10 | 14 | **84** | 70 | 52 | NA | 0 | -5 | **79** |
| Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration | Backhoe | 74 | 10 | 14 | **88** | 70 | 52 | NA | -3 | -5 | **80** |
| | Cement Drum Mixer | 77 | 10 | 14 | **91** | 70 | 52 | NA | -8 | -10 | **73** |
| | Cement Mixer Truck | 75 | 10 | 14 | **89** | 70 | 52 | NA | 0 | -5 | **84** |
| | Compactor | 76 | 10 | 14 | **90** | 70 | 52 | NA | -4 | -5 | **81** |
| | Crane | 73 | 10 | 14 | **87** | 70 | 52 | NA | -6 | -5 | **76** |
| | Dozer | 78 | 10 | 14 | **92** | 70 | 52 | NA | -7 | -5 | **80** |
| | Dump Truck | 72 | 10 | 14 | **86** | 70 | 52 | NA | -1 | -5 | **80** |
| | Flatbed Truck | 70 | 10 | 14 | **84** | 70 | 52 | NA | 0 | -5 | **79** |
| | Forklift | 62 | 10 | 14 | **76** | 70 | 52 | NA | 0 | -5 | **71** |
| | Grader | 81 | 10 | 14 | **95** | 70 | 52 | NA | -10 | -5 | **80** |
| | Generator, >25kVA | 81 | 10 | 14 | **95** | 70 | 52 | NA | -6 | -10 | **79** |
| | Loader | 75 | 10 | 14 | **89** | 70 | 52 | NA | -4 | -5 | **80** |
| | Pickup Truck | 70 | 10 | 14 | **84** | 70 | 52 | NA | 0 | -5 | **79** |
| | Pump, Water | 78 | 10 | 14 | **92** | 70 | 52 | NA | -6 | -10 | **76** |
| | Vacuum Street Sweeper | 72 | 10 | 14 | **86** | 70 | 52 | NA | 0 | -5 | **81** |
| | Vibratory Pile Driver | 88 | 10 | 14 | **102** | 70 | 52 | NA | -10 | -5 | **87** |
| | Water Truck | 70 | 10 | 14 | **84** | 70 | 52 | NA | 0 | -5 | **79** |
| | Welder, Diesel | 70 | 10 | 14 | **84** | 70 | 52 | NA | 0 | -10 | **74** |

NOTES: **Bolded** values indicate construction noise levels that would exceed the 70 dBA speech interference criterion (Impact NO-1) at the identified receptor.

[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.

[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).

[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.

[d] The City of Millbrae Noise Ordinance does not limit construction noise within the approved hours.

## Table D-3.13
## Estimated Daytime Construction Noise Levels (dBA) at the Millbrae Site – Green Hills Country Club

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Speech Interference Criterion[c] | Daytime Ambient Noise Level | Daytime Noise Ordinance Limit[d] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tree Removal | Brush Chipper | 76 | 10 | 14 | **90** | 66 | 48 | NA | 0 | -5 | **85** |
| | Chain Saw | 82 | 10 | 14 | **96** | 66 | 48 | NA | 0 | -5 | **91** |
| | Flatbed Truck | 70 | 10 | 14 | **84** | 66 | 48 | NA | 0 | -5 | **79** |
| | Haul Truck | 72 | 10 | 14 | **86** | 66 | 48 | NA | -1 | -5 | **80** |
| | Skid Loader | 75 | 10 | 14 | **89** | 66 | 48 | NA | -4 | -5 | **80** |
| | Track Loader | 81 | 10 | 14 | **95** | 66 | 48 | NA | -5 | -5 | **85** |
| | Whole Tree Chipper | 83 | 10 | 14 | **97** | 66 | 48 | NA | -4 | -5 | **88** |
| Dewatering (Shutdown, Hydrostatic Testing, Disinfection) | Dewatering Pump | 65 | 10 | 14 | **79** | 66 | 48 | NA | 0 | -10 | **69** |
| Mobilization | Flatbed Truck | 70 | 10 | 14 | 84 | 66 | 48 | NA | 0 | -5 | **79** |
| | Haul Truck | 72 | 10 | 14 | 86 | 66 | 48 | NA | -1 | -5 | **80** |
| | Pickup Truck | 70 | 10 | 14 | 84 | 66 | 48 | NA | 0 | -5 | **79** |
| Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration | Backhoe | 74 | 10 | 14 | **88** | 66 | 48 | NA | -3 | -5 | **80** |
| | Cement Drum Mixer | 77 | 10 | 14 | **91** | 66 | 48 | NA | -8 | -10 | **73** |
| | Cement Mixer Truck | 75 | 10 | 14 | **89** | 66 | 48 | NA | 0 | -5 | **84** |
| | Compactor | 76 | 10 | 14 | **90** | 66 | 48 | NA | -4 | -5 | **81** |
| | Crane | 73 | 10 | 14 | **87** | 66 | 48 | NA | -6 | -5 | **76** |
| | Dozer | 78 | 10 | 14 | **92** | 66 | 48 | NA | -7 | -5 | **80** |
| | Dump Truck | 72 | 10 | 14 | **86** | 66 | 48 | NA | -1 | -5 | **80** |
| | Flatbed Truck | 70 | 10 | 14 | **84** | 66 | 48 | NA | 0 | -5 | **79** |
| | Forklift | 62 | 10 | 14 | **76** | 66 | 48 | NA | 0 | -5 | **71** |
| | Grader | 81 | 10 | 14 | **95** | 66 | 48 | NA | -10 | -5 | **80** |
| | Generator, >25kVA | 81 | 10 | 14 | **95** | 66 | 48 | NA | -6 | -10 | **79** |
| | Loader | 75 | 10 | 14 | **89** | 66 | 48 | NA | -4 | -5 | **80** |
| | Pickup Truck | 70 | 10 | 14 | **84** | 66 | 48 | NA | 0 | -5 | **79** |
| | Pump, Water | 78 | 10 | 14 | **92** | 66 | 48 | NA | -6 | -10 | **76** |
| | Vacuum Street Sweeper | 72 | 10 | 14 | **86** | 66 | 48 | NA | 0 | -5 | **81** |
| | Vibratory Pile Driver | 88 | 10 | 14 | **102** | 66 | 48 | NA | -10 | -5 | **87** |
| | Water Truck | 70 | 10 | 14 | **84** | 66 | 48 | NA | 0 | -5 | **79** |
| | Welder, Diesel | 70 | 10 | 14 | **84** | 66 | 48 | NA | 0 | -10 | **74** |

NOTES: **Bolded** values indicate construction noise levels that would exceed the 66 dBA outdoor speech interference criterion (Impact NO-1) at the identified receptor.

[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.

[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).

[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.

[d] The City of Millbrae Noise Ordinance does not limit construction noise within the approved hours.

## Table D-3.14
## Estimated Daytime Construction Noise Levels (dBA) at the Millbrae Site – Residences along Hacienda Way

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Speech Interference Criterion[c] | Daytime Ambient Noise Level | Daytime Noise Ordinance Limit[d] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tree Removal | Brush Chipper | 76 | 115 | -7 | 69 | 70 | 52 | NA | 0 | 0 | 69 |
| | Chain Saw | 82 | 115 | -7 | **75** | 70 | 52 | NA | 0 | 0 | **75** |
| | Flatbed Truck | 70 | 115 | -7 | 63 | 70 | 52 | NA | 0 | 0 | 63 |
| | Haul Truck | 72 | 115 | -7 | 65 | 70 | 52 | NA | -1 | 0 | 64 |
| | Skid Loader | 75 | 115 | -7 | 68 | 70 | 52 | NA | -4 | 0 | 64 |
| | Track Loader | 81 | 115 | -7 | **74** | 70 | 52 | NA | -5 | 0 | 69 |
| | Whole Tree Chipper | 83 | 115 | -7 | **76** | 70 | 52 | NA | -4 | 0 | **72** |
| Dewatering (Shutdown, Hydrostatic Testing, Disinfection) | Dewatering Pump | 65 | 250 | -14 | 51 | 70 | 52 | NA | 0 | 0 | 51 |
| Mobilization | Flatbed Truck | 70 | 115 | -7 | 63 | 70 | 52 | NA | 0 | 0 | 63 |
| | Haul Truck | 72 | 115 | -7 | 65 | 70 | 52 | NA | -1 | 0 | 64 |
| | Pickup Truck | 70 | 115 | -7 | 63 | 70 | 52 | NA | 0 | 0 | 63 |
| Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration | Backhoe | 74 | 115 | -7 | 67 | 70 | 52 | NA | -3 | 0 | 64 |
| | Cement Drum Mixer | 77 | 115 | -7 | 70 | 70 | 52 | NA | -8 | 0 | 62 |
| | Cement Mixer Truck | 75 | 115 | -7 | 68 | 70 | 52 | NA | 0 | 0 | 68 |
| | Compactor | 76 | 115 | -7 | 69 | 70 | 52 | NA | -4 | 0 | 65 |
| | Crane | 73 | 115 | -7 | 66 | 70 | 52 | NA | -6 | 0 | 60 |
| | Dozer | 78 | 115 | -7 | **71** | 70 | 52 | NA | -7 | 0 | 64 |
| | Dump Truck | 72 | 115 | -7 | 65 | 70 | 52 | NA | -1 | 0 | 64 |
| | Flatbed Truck | 70 | 115 | -7 | 63 | 70 | 52 | NA | 0 | 0 | 63 |
| | Forklift | 62 | 115 | -7 | 55 | 70 | 52 | NA | 0 | 0 | 55 |
| | Grader | 81 | 115 | -7 | **74** | 70 | 52 | NA | -10 | 0 | 64 |
| | Generator, >25kVA | 81 | 115 | -7 | **74** | 70 | 52 | NA | -6 | 0 | 68 |
| | Loader | 75 | 115 | -7 | 68 | 70 | 52 | NA | -4 | 0 | 64 |
| | Pickup Truck | 70 | 115 | -7 | 63 | 70 | 52 | NA | 0 | 0 | 63 |
| | Pump, Water | 78 | 115 | -7 | **71** | 70 | 52 | NA | -6 | 0 | 65 |
| | Vacuum Street Sweeper | 72 | 115 | -7 | 65 | 70 | 52 | NA | 0 | 0 | 65 |
| | Vibratory Pile Driver | 88 | 115 | -7 | **81** | 70 | 52 | NA | -10 | 0 | **71** |
| | Water Truck | 70 | 115 | -7 | 63 | 70 | 52 | NA | 0 | 0 | 63 |
| | Welder, Diesel | 70 | 115 | -7 | 63 | 70 | 52 | NA | 0 | 0 | 63 |

NOTES: **Bolded** values indicate construction noise levels that would exceed the 70 dBA speech interference criterion (Impact NO-1) at the identified receptor.

[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.

[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).

[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.

[d] The City of Millbrae Noise Ordinance does not limit construction noise within the approved hours.

## Table D-3.15
## Estimated Daytime Construction Noise Levels (dBA) at the Millbrae Site – Meadows Elementary School

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Speech Interference Criterion[c] | Daytime Ambient Noise Level | Daytime Noise Ordinance Limit[d] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tree Removal | Brush Chipper | 76 | 1250 | -28 | 48 | 70/66 | 52 | NA | 0 | 0 | 48 |
| | Chain Saw | 82 | 1250 | -28 | 54 | 70/66 | 52 | NA | 0 | 0 | 54 |
| | Flatbed Truck | 70 | 1250 | -28 | 42 | 70/66 | 52 | NA | 0 | 0 | 42 |
| | Haul Truck | 72 | 1250 | -28 | 44 | 70/66 | 52 | NA | -1 | 0 | 43 |
| | Skid Loader | 75 | 1250 | -28 | 47 | 70/66 | 52 | NA | -4 | 0 | 43 |
| | Track Loader | 81 | 1250 | -28 | 53 | 70/66 | 52 | NA | -5 | 0 | 48 |
| | Whole Tree Chipper | 83 | 1250 | -28 | 55 | 70/66 | 52 | NA | -4 | 0 | 51 |
| Dewatering (Shutdown, Hydrostatic Testing, Disinfection) | Dewatering Pump | 65 | 45 | 1 | 66 | 70/66 | 52 | NA | 0 | 0 | 66 |
| Mobilization | Flatbed Truck | 70 | 1275 | -28 | 42 | 70/66 | 52 | NA | 0 | 0 | 42 |
| | Haul Truck | 72 | 1275 | -28 | 44 | 70/66 | 52 | NA | -1 | 0 | 43 |
| | Pickup Truck | 70 | 1275 | -28 | 42 | 70/66 | 52 | NA | 0 | 0 | 42 |
| Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration | Backhoe | 74 | 1130 | -27 | 47 | 70/66 | 52 | NA | -3 | 0 | 44 |
| | Cement Drum Mixer | 77 | 1130 | -27 | 50 | 70/66 | 52 | NA | -8 | 0 | 42 |
| | Cement Mixer Truck | 75 | 1130 | -27 | 48 | 70/66 | 52 | NA | 0 | 0 | 48 |
| | Compactor | 76 | 1130 | -27 | 49 | 70/66 | 52 | NA | -4 | 0 | 45 |
| | Crane | 73 | 1130 | -27 | 46 | 70/66 | 52 | NA | -6 | 0 | 40 |
| | Dozer | 78 | 1130 | -27 | 51 | 70/66 | 52 | NA | -7 | 0 | 44 |
| | Dump Truck | 72 | 1130 | -27 | 45 | 70/66 | 52 | NA | -1 | 0 | 44 |
| | Flatbed Truck | 70 | 1130 | -27 | 43 | 70/66 | 52 | NA | 0 | 0 | 43 |
| | Forklift | 62 | 1130 | -27 | 35 | 70/66 | 52 | NA | 0 | 0 | 35 |
| | Grader | 81 | 1130 | -27 | 54 | 70/66 | 52 | NA | -10 | 0 | 44 |
| | Generator, >25kVA | 81 | 1130 | -27 | 54 | 70/66 | 52 | NA | -6 | 0 | 48 |
| | Loader | 75 | 1130 | -27 | 48 | 70/66 | 52 | NA | -4 | 0 | 44 |
| | Pickup Truck | 70 | 1130 | -27 | 43 | 70/66 | 52 | NA | 0 | 0 | 43 |
| | Pump, Water | 78 | 1130 | -27 | 51 | 70/66 | 52 | NA | -6 | 0 | 45 |
| | Vacuum Street Sweeper | 72 | 1130 | -27 | 45 | 70/66 | 52 | NA | 0 | 0 | 45 |
| | Vibratory Pile Driver | 88 | 1130 | -27 | 61 | 70/66 | 52 | NA | -10 | 0 | 51 |
| | Water Truck | 70 | 1130 | -27 | 43 | 70/66 | 52 | NA | 0 | 0 | 43 |
| | Welder, Diesel | 70 | 1130 | -27 | 43 | 70/66 | 52 | NA | 0 | 0 | 43 |

NOTES: Construction noise would not exceed the 70 dBA or 66 dBA speech interference criteria (Impact NO-1) at the identified receptor.

[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.

[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).

[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.

[d] The City of Millbrae Noise Ordinance does not limit construction noise within the approved hours.

## Table D-3.16
## Estimated Daytime Construction Noise Levels (dBA) at the Millbrae Site – Glen Oaks and Millbrae Montessori Schools

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Speech Interference Criterion[c] | Daytime Ambient Noise Level | Daytime Noise Ordinance Limit[d] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tree Removal | Brush Chipper | 76 | 750 | -24 | 52 | 70/66 | 52 | NA | 0 | 0 | 52 |
| | Chain Saw | 82 | 750 | -24 | 58 | 70/66 | 52 | NA | 0 | 0 | 58 |
| | Flatbed Truck | 70 | 750 | -24 | 46 | 70/66 | 52 | NA | 0 | 0 | 46 |
| | Haul Truck | 72 | 750 | -24 | 48 | 70/66 | 52 | NA | -1 | 0 | 47 |
| | Skid Loader | 75 | 750 | -24 | 51 | 70/66 | 52 | NA | -4 | 0 | 47 |
| | Track Loader | 81 | 750 | -24 | 57 | 70/66 | 52 | NA | -5 | 0 | 52 |
| | Whole Tree Chipper | 83 | 750 | -24 | 59 | 70/66 | 52 | NA | -4 | 0 | 55 |
| Dewatering (Shutdown, Hydrostatic Testing, Disinfection) | Dewatering Pump | 65 | 825 | -24 | 41 | 70/66 | 52 | NA | 0 | 0 | 41 |
| Mobilization | Flatbed Truck | 70 | 615 | -22 | 48 | 70/66 | 52 | NA | 0 | 0 | 48 |
| | Haul Truck | 72 | 615 | -22 | 50 | 70/66 | 52 | NA | -1 | 0 | 49 |
| | Pickup Truck | 70 | 615 | -22 | 48 | 70/66 | 52 | NA | 0 | 0 | 48 |
| Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration | Backhoe | 74 | 750 | -24 | 50 | 70/66 | 52 | NA | -3 | 0 | 47 |
| | Cement Drum Mixer | 77 | 750 | -24 | 53 | 70/66 | 52 | NA | -8 | 0 | 45 |
| | Cement Mixer Truck | 75 | 750 | -24 | 51 | 70/66 | 52 | NA | 0 | 0 | 51 |
| | Compactor | 76 | 750 | -24 | 52 | 70/66 | 52 | NA | -4 | 0 | 48 |
| | Crane | 73 | 750 | -24 | 50 | 70/66 | 52 | NA | -6 | 0 | 44 |
| | Dozer | 78 | 750 | -24 | 54 | 70/66 | 52 | NA | -7 | 0 | 47 |
| | Dump Truck | 72 | 750 | -24 | 48 | 70/66 | 52 | NA | -1 | 0 | 47 |
| | Flatbed Truck | 70 | 750 | -24 | 46 | 70/66 | 52 | NA | 0 | 0 | 46 |
| | Forklift | 62 | 750 | -24 | 38 | 70/66 | 52 | NA | 0 | 0 | 38 |
| | Grader | 81 | 750 | -24 | 57 | 70/66 | 52 | NA | -10 | 0 | 47 |
| | Generator, >25kVA | 81 | 750 | -24 | 57 | 70/66 | 52 | NA | -6 | 0 | 51 |
| | Loader | 75 | 750 | -24 | 51 | 70/66 | 52 | NA | -4 | 0 | 47 |
| | Pickup Truck | 70 | 750 | -24 | 46 | 70/66 | 52 | NA | 0 | 0 | 46 |
| | Pump, Water | 78 | 750 | -24 | 54 | 70/66 | 52 | NA | -6 | 0 | 48 |
| | Vacuum Street Sweeper | 72 | 750 | -24 | 48 | 70/66 | 52 | NA | 0 | 0 | 48 |
| | Vibratory Pile Driver | 88 | 750 | -24 | 64 | 70/66 | 52 | NA | -10 | 0 | 54 |
| | Water Truck | 70 | 750 | -24 | 46 | 70/66 | 52 | NA | 0 | 0 | 46 |
| | Welder, Diesel | 70 | 750 | -24 | 46 | 70/66 | 52 | NA | 0 | 0 | 46 |

NOTES: Construction noise would not exceed the 70 dBA or 66 dBA speech interference criteria (Impact NO-1) at the identified receptor.

[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.

[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).

[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.

[d] The City of Millbrae Noise Ordinance does not limit construction noise within the approved hours.

## Table D-3.17
## Estimated Daytime Construction Noise Levels (dBA) at the Common Staging Area – Residences along Fairway Drive

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Speech Interference Criterion[c] | Daytime Ambient Noise Level | Daytime Noise Ordinance Limit[d] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mobilization | Flatbed Truck | 70 | 30 | 4 | **74** | 70 | 58 | 90 | 0 | -5 | 69 |
| | Haul Truck | 72 | 30 | 4 | **76** | 70 | 58 | 90 | -1 | -5 | 70 |
| | Pickup Truck | 70 | 30 | 4 | **74** | 70 | 58 | 90 | 0 | -5 | 69 |

NOTES: **Bolded** values indicate construction noise levels that would exceed the 70 dBA speech interference criterion (Impact NO-1) at the identified receptor.

[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.

[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).

[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.

[d] The City of South San Francisco Noise Ordinance states that the noise level at any point outside the project boundary is limited to 90 dBA.

## Table D-3.18
## Estimated Nighttime Dewatering Noise Levels (dBA) at SAPL2-1 Whitman Way

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Sleep Interference Criterion[c] | Nighttime Ambient Noise Level[d] | Nighttime Noise Ordinance Limit[e] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dewatering (Shutdown, Hydrostatic Testing, Disinfection) | Dewatering Pump | 65 | 55 | -1 | **64** | 60 | 53 | 66 | 0 | -5 | 59 |

NOTES: **Bolded** values indicate construction noise levels that would exceed the 60 dBA sleep interference criterion (Impact NO-2) at the identified receptor.

NA = Not Applicable

See Table D-3.7 for information pertaining to daytime dewatering activities.

[a] Reference noise levels represent noise levels for Godwin NC150 pump used by the SFPUC for dewatering. The usage factor is considered to be 100%. Level based on manufacturer noise data for 30 feet.

[b] This distance is the minimum distance from the receptor to the dewatering pump located on the street at the curb.

[c] The sleep interference criterion for sensitive receptors is 60 dBA.

[d] The nighttime ambient noise level is based on the noise data recorded at Location LT-SBS4.

[e] The City of San Bruno Noise Ordinance states that nighttime construction noise is limited to 60 dBA at 100 feet, the value shown is the equivalent at the typical distance from the closest receptor.

## Table D-3.19
## Estimated Nighttime Dewatering Noise Levels (dBA) at SAPL3-1 Shelter Creek Lane

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Sleep Interference Criterion[c] | Nighttime Ambient Noise Level[d] | Nighttime Noise Ordinance Limit[e] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dewatering (Shutdown, Hydrostatic Testing, Disinfection) | Dewatering Pump | 65 | 75 | -4 | **61** | 60 | 53 | 66 | 0 | -1 | 60 |

NOTES: **Bolded** values indicate construction noise levels that would exceed the 60 dBA sleep interference criterion (Impact NO-2) at the identified receptor.

NA = Not Applicable

See Table D-3.7 for information pertaining to daytime dewatering activities.

[a] Reference noise levels represent noise levels for Godwin NC150 pump used by the SFPUC for dewatering. The usage factor is considered to be 100%. Level based on manufacturer noise data for 30 feet.

[b] This distance is the minimum distance from the receptor to the dewatering pump located on the street at the curb.

[c] The sleep interference criterion for sensitive receptors is 60 dBA.

[d] The nighttime ambient noise level is based on the noise data recorded at Location LT-SBS4.

[e] The City of San Bruno Noise Ordinance states that nighttime construction noise is limited to 60 dBA at 100 feet, the value shown is the equivalent at the typical distance from the closest receptor.

## Table D-3.20
## Estimated Nighttime Dewatering Noise Levels (dBA) at SAPL3-2 Shelter Creek Lane

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Sleep Interference Criterion[c] | Nighttime Ambient Noise Level[d] | Nighttime Noise Ordinance Limit[e] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dewatering (Shutdown, Hydrostatic Testing, Disinfection) | Dewatering Pump | 65 | 120 | -8 | 57 | 60 | 53 | 66 | 0 | 0 | 57 |

NOTES: Construction noise would not exceed the 60 dBA sleep interference criterion (Impact NO-2) at the identified receptor.

NA = Not Applicable

See Table D-3.7 for information pertaining to daytime dewatering activities.

[a] Reference noise levels represent noise levels for Godwin NC150 pump used by the SFPUC for dewatering. The usage factor is considered to be 100%. Level based on manufacturer noise data for 30 feet.

[b] This distance is the minimum distance from the receptor to the dewatering pump located on the street at the curb.

[c] The sleep interference criterion for sensitive receptors is 60 dBA.

[d] The nighttime ambient noise level is based on the noise data recorded at Location LT-SBS4.

[e] The City of San Bruno Noise Ordinance states that nighttime construction noise is limited to 60 dBA at 100 feet, the value shown is the equivalent at the typical distance from the closest receptor.

## Table D-3.21
## Estimated Daytime and Nighttime Dewatering Noise Levels (dBA) at SSBPL-1 Helen Drive

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Speech/Sleep Interference Criterion[c] | Ambient Noise Level | Noise Ordinance Limit[d] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Daytime**<br>Dewatering (Shutdown, Hydrostatic Testing, Disinfection) | Dewatering Pump | 65 | 36 | 3 | 67 | 70 | 59[e] | NA | 0 | 0 | 67 |
| **Nighttime**<br>Dewatering (Shutdown, Hydrostatic Testing, Disinfection) | Dewatering Pump | 65 | 36 | 3 | **67** | 60 | 50[f] | NA | 0 | -10 | 57 |

NOTES: **Bolded** values indicate construction noise levels that would exceed the 60 dBA sleep interference criterion (Impact NO-2) at the identified receptor.

NA = Not Applicable

[a] Reference noise levels represent noise levels for Godwin NC150 pump used by the SFPUC for dewatering. The usage factor is considered to be 100%. Level based on manufacturer noise data for 30 feet.

[b] This distance is the minimum distance from the receptor to the dewatering pump located on the street at the curb.

[c] The speech inteference criterion for sensitive receptors is 70 dBA; the sleep interference criterion for sensitive receptors is 60 dBA.

[d] The City of Millbrae Noise Ordinance does not limit construction noise levels during daytime hours and does not address permissible construction noise levels during nighttime hours.

[e] The daytime ambient noise level is based on the noise data recorded at Location ST-M8.

[f] The nighttime ambient noise level is based on the average of noise data recorded at Locations LT-M1 and LT-M2.

## Table D-3.22
## Estimated Nighttime Dewatering Noise Levels (dBA) at SSBPL-2 Residences along Hacienda Drive

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Sleep Interference Criterion[c] | Nighttime Ambient Noise Level[d] | Nighttime Noise Ordinance Limit[e] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dewatering (Shutdown, Hydrostatic Testing, Disinfection) | Dewatering Pump | 65 | 250 | -14 | 51 | 60 | 45 | NA | 0 | 0 | 51 |

NOTES: Construction noise would not exceed the 60 dBA sleep interference criterion (Impact NO-2) at the identified receptor.

NA = Not Applicable

See Table D-3.14 for information pertaining to daytime dewatering activities.

[a] Reference noise levels represent noise levels for Godwin NC150 pump used by the SFPUC for dewatering. The usage factor is considered to be 100%. Level based on manufacturer noise data for 30 feet.

[b] This distance is the minimum distance from the receptor to the dewatering pump located near bunker on Hole 5, just south of the staging/spoils area.

[c] The sleep interference criterion for sensitive receptors is 60 dBA.

[d] The nighttime ambient noise level is based on the noise data recorded at Location LT-M3.

[e] The City of Millbrae Noise Ordinance does not address permissible construction noise levels during nighttime hours.

## Table D-3-23
## Estimated Daytime and Nighttime Dewatering Noise Levels (dBA) at SSBPL-3 Millwood Drive and Barcelona Drive

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Speech/Sleep Interference Criterion[c] | Ambient Noise Level | Noise Ordinance Limit[d] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Daytime** Dewatering (Shutdown, Hydrostatic Testing, Disinfection) | Dewatering Pump | 65 | 40 | 2 | 67 | 70 | 60[e] | NA | 0 | 0 | 67 |
| **Nighttime** Dewatering (Shutdown, Hydrostatic Testing, Disinfection) | Dewatering Pump | 65 | 40 | 2 | **67** | 60 | 45[f] | NA | 0 | -10 | 57 |

NOTES: **Bolded** values indicate construction noise levels that would exceed the 60 dBA sleep interference criterion (Impact NO-2) at the identified receptor.

NA = Not Applicable

[a] Reference noise levels represent noise levels for Godwin NC150 pump used by the SFPUC for dewatering. The usage factor is considered to be 100%. Level based on manufacturer noise data for 30 feet.

[b] This distance is the minimum distance from the receptor to the dewatering pump located on the street at the curb.

[c] The speech inteference criterion for sensitive receptors is 70 dBA; the sleep interference criterion for sensitive receptors is 60 dBA.

[d] The City of Millbrae Noise Ordinance does not limit construction noise levels during daytime hours and does not address permissible construction noise levels during nighttime hours.

[e] The daytime ambient noise level is based on the average of noise data recorded at Locations ST-3 and ST-M5 through ST-M8.

[f] The nighttime ambient noise level is based on the average of noise data recorded at Locations LT-M3 and LT-M4.

## Table D-3.24
## Estimated Daytime and Nighttime Dewatering Noise Levels (dBA) at SSBPL-4 Millwood Drive and Magnolia Avenue

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Speech/Sleep Interference Criterion[c] | Ambient Noise Level | Noise Ordinance Limit[d] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Daytime**<br>Dewatering (Shutdown, Hydrostatic Testing, Disinfection) | Dewatering Pump | 65 | 88 | -5 | 60 | 70 | 60[e] | NA | 0 | 0 | 60 |
| **Nighttime**<br>Dewatering (Shutdown, Hydrostatic Testing, Disinfection) | Dewatering Pump | 65 | 88 | -5 | 60 | 60 | 45[f] | NA | 0 | 0 | 60 |

NOTES: Construction noise would not exceed the 70 dBA speech interference or 60 dBA sleep interference criteria (Impacts NO-1 and NO-2) at the identified receptor.

NA = Not Applicable

[a] Reference noise levels represent noise levels for Godwin NC150 pump used by the SFPUC for dewatering. The usage factor is considered to be 100%. Level based on manufacturer noise data for 30 feet.

[b] This distance is the minimum distance from the receptor to the dewatering pump located on the street at the curb.

[c] The speech inteference criterion for sensitive receptors is 70 dBA; the sleep interference criterion for sensitive receptors is 60 dBA.

[d] The City of Millbrae Noise Ordinance does not limit construction noise levels during daytime hours and does not address permissible construction noise levels during nighttime hours.

[e] The daytime ambient noise level is based on the average of noise data recorded at Locations ST-3 and ST-M5 through ST-M8.

[f] The nighttime ambient noise level is based on the average of noise data recorded at Locations LT-M3 and LT-M4.

## Table D-3.25
## Estimated Nighttime Construction Noise Levels (dBA) at San Bruno North - 1840 Cedarwood Court

| Project Component | Noise Source | Reference Hourly Leq in dBA at 50 feet[a] | Minimum Distance Between Closest Receptor and Source[b] | Distance Adjustment | Adjusted Hourly Leq | Exterior Sleep Interference Criterion[c] | Nighttime Ambient Noise Level[d] | Nighttime Noise Ordinance Limit[e] | With Mitigation Measure M-NO-1 | With Noise Barrier Walls | Mitigated Hourly Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mobilization | Flatbed Truck | 70 | 15 | 10 | **80** | 60 | 58 | 76 | 0 | -5 | **75** |
| | Haul Truck | 72 | 15 | 10 | **82** | 60 | 58 | 76 | -1 | -5 | **76** |
| | Pickup Truck | 70 | 15 | 10 | **80** | 60 | 58 | 76 | 0 | -5 | **75** |
| Shoring and Excavation, Pipeline Stabilization, Intermittent Dewatering, Backfill and Restoration | Backhoe | 74 | 15 | 10 | **84** | 60 | 58 | 76 | -3 | -5 | **76** |
| | Cement Drum Mixer | 77 | 15 | 10 | **87** | 60 | 58 | 76 | -8 | -10 | **69** |
| | Cement Mixer Truck | 75 | 15 | 10 | **85** | 60 | 58 | 76 | 0 | -5 | **80** |
| | Crane | 73 | 15 | 10 | **83** | 60 | 58 | 76 | -6 | -5 | **72** |
| | Dump Truck | 72 | 15 | 10 | **82** | 60 | 58 | 76 | -1 | -5 | **76** |
| | Flatbed Truck | 70 | 15 | 10 | **80** | 60 | 58 | 76 | 0 | -5 | **75** |
| | Forklift | 62 | 15 | 10 | **72** | 60 | 58 | 76 | 0 | -5 | **67** |
| | Generator, >25kVA | 81 | 15 | 10 | **91** | 60 | 58 | 76 | -6 | -10 | **75** |
| | Loader | 75 | 15 | 10 | **85** | 60 | 58 | 76 | -4 | -5 | **76** |
| | Pickup Truck | 70 | 15 | 10 | **80** | 60 | 58 | 76 | 0 | -5 | **75** |
| | Pump, Water | 78 | 15 | 10 | **88** | 60 | 58 | 76 | -6 | -10 | **72** |
| | Vacuum Street Sweeper | 72 | 15 | 10 | **82** | 60 | 58 | 76 | 0 | -5 | **77** |
| | Water Truck | 70 | 15 | 10 | **80** | 60 | 58 | 76 | 0 | -5 | **75** |
| | Welder, Diesel | 70 | 15 | 10 | **80** | 60 | 58 | 76 | 0 | -10 | **70** |

NOTES **Bolded** values indicate construction noise levels that would exceed the 70 dBA speech interference criterion (Impact NO-1) at the identified receptor.:

[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.

[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).

[c] The sleep interference criterion for indoor receptors is 60 dBA.

[d] The nighttime ambient noise level is based on the noise data recorded at Location LT-SBN1.

[e] The City of San Bruno Noise Ordinance states that nighttime construction noise is limited to 85 dBA at 100 feet, the values shown are the equivalent at the typical distance from the closest receptor.

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# Appendix E
# Air Quality Technical Report

Hetch Hetchy
Regional
Water
System

Services of the San Francisco
Public Utilities Commission

# San Francisco Public Utilities Commission

# Peninsula Pipelines Seismic Upgrade Project

## Air Quality Technical Report

## Final

June 2012

Hetch Hetchy
Regional
Water
System

Services of the San Francisco
Public Utilities Commission

SEAL OF THE CITY AND COUNTY OF SAN FRANCISCO

# San Francisco Public Utilities Commission
# Peninsula Pipelines Seismic Upgrade Project

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# Air Quality Technical Report
# Final

*Prepared for:*
San Francisco Public Utilities Commission
San Francisco Planning Department, Environmental Planning Division

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June 2012

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## ACRONYMS

| | |
|---|---|
| AADT | annual average daily traffic |
| ABAG | Association of Bay Area Governments |
| AQTR | air quality technical report |
| ASF | age sensitivity factor |
| BAAQMD | Bay Area Air Quality Management District |
| BMP | best management practice |
| CARB | California Air Resources Board |
| CEHTP | California Environmental Health Tracking Program |
| CEQA | California Environmental Quality Act |
| CO | carbon monoxide |
| CRAF | cancer risk adjustment factor |
| DPM | diesel particulate matter |
| Environmental Planning | San Francisco Planning Department, Environmental Planning Division |
| g/s | gram per second |
| GSR | Groundwater Storage and Recovery |
| HI | hazard index |
| HQ | hazard quotient |
| HRA | health risk assessment |
| HTWTP | Harry Tracy Water Treatment Plant |
| I-280 | Interstate 280 |
| ISCST3 | Industrial Source Complex Short Term |
| KSFO | San Francisco International Airport |
| lbs/day | pounds per day |
| mg/kg/day | milligram per kilogram of body weight per day |
| mg/kg/day$^{-1}$ | milligram per kilogram of body weight-day, expressed in units of inverse dose |
| μg/m$^3$ | micrograms per cubic meter |
| mph | miles per hour |
| $NO_X$ | oxides of nitrogen |
| OEHHA | California Office of Environmental Health Hazard Assessment |
| $PM_{10}$ | particulate matter less than or equal to 10 microns in diameter |
| $PM_{2.5}$ | particulate matter less than or equal to 2.5 microns in diameter |
| POM | polycyclic organic matter |
| ppm | parts per million |
| PPSU | Peninsula Pipelines Seismic Upgrade |
| REL | Reference Exposure Level |
| ROG | reactive organic gases |
| ROW | right-of-way |
| SAPL2 | San Andreas Pipeline No. 2 |
| SAPL3 | San Andreas Pipeline No. 3 |
| SFBAAB | San Francisco Bay Area Air Basin |
| SFPUC | San Francisco Public Utilities Commission |
| $SO_2$ | sulfur dioxide |
| SOW | scope of work |
| SSBPL | Sunset Supply Branch Pipeline |
| TAC | toxic air contaminants |
| TOG | total organic gases |
| URS | URS Corporation |
| U.S. EPA | U.S. Environmental Protection Agency |

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# 1.0 INTRODUCTION

At the request of the San Francisco Public Utilities Commission (SFPUC), URS Corporation (URS) prepared this air quality technical report (AQTR), which describes the air quality analysis and impacts for the Peninsula Pipelines Seismic Upgrade (PPSU) project.

The document is consistent with the guidelines prepared by the San Francisco Planning Department, Environmental Planning Division (Environmental Planning) to comply with the California Environmental Quality Act (CEQA) and the latest Bay Area Air Quality Management District (BAAQMD) CEQA guidance (BAAQMD, 2011a). This report will provide the background documentation for the air quality section in the CEQA document and be included in the administrative record supporting any impact determinations for the proposed project.

The report is based on the AQTR scope of work (SOW), approved by Environmental Planning on November 22, 2011 (see Appendix 1). Any deviation from the approved SOW, based on the consultations with the BAAQMD staff, is documented in this report.

The report is divided into seven sections as follows:

**Section 1.0, Introduction,** describes the purpose and scope of this AQTR.

**Section 2.0, Project Description,** describes the proposed project and the existing land uses, identifies all emissions sources and air pollutants emitted, and discusses the introduction of any sources from the proposed project to nearby sensitive receptors.

**Section 3.0, Project Setting,** identifies the closest sensitive receptor and all existing or reasonably foreseeable future emissions sources (stationary, mobile, and/or construction) and air pollutants within the project's zone of influence.

**Section 4.0, Criteria Air Pollutants,** identifies the methodology used for the analysis, including assumptions regarding the project baseline and the models use to estimate project emissions; presents the average daily criteria pollutants emission rate results for the proposed project; and compares those emission rates to significance thresholds.

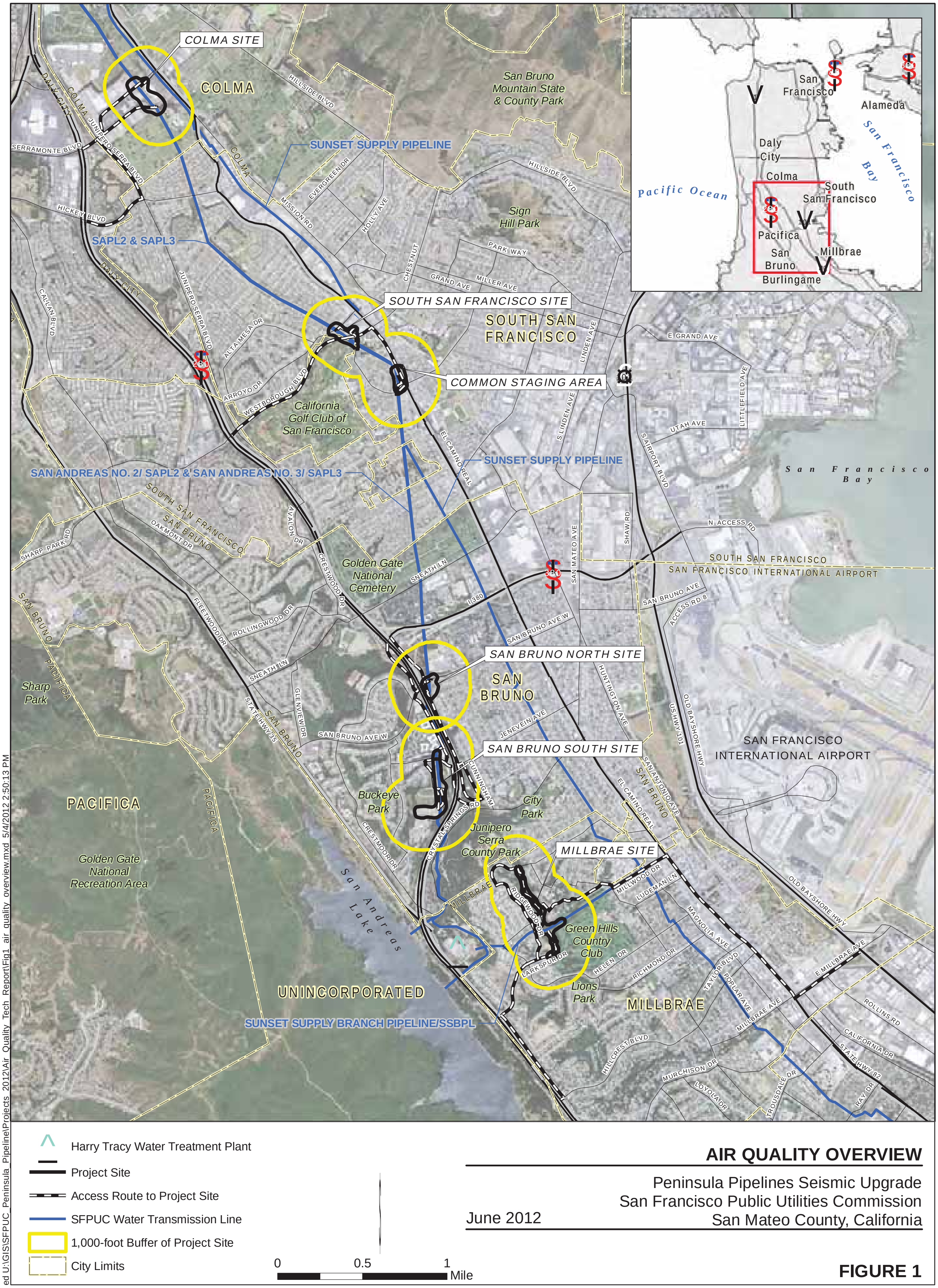
**Section 5.0, Health Risk Analysis,** discusses the modeling approach, assumptions, and all input parameters for individual and cumulative impacts of emissions from construction activities on nearby sensitive receptors; presents the estimated excess lifetime cancer risks, chronic and acute noncancer hazard index (HI), and concentrations of particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$) for the project; and compares these individual and cumulative health risks to their respective significance thresholds.

**Section 6.0, Conclusion,** summarizes the approach used and impacts of the criteria air pollutant emission rates and health risks for the proposed project.

**Section 7.0, References,** includes a listing of all references cited in this report.

# 2.0 PROJECT DESCRIPTION

The proposed project would entail upgrades of six components at five different locations or sites along the regional water system pipelines in the town of Colma and the cities of South San Francisco, San Bruno, and Millbrae, in San Mateo County on the San Francisco Peninsula, as shown in Figure 1.



## AIR QUALITY OVERVIEW

Peninsula Pipelines Seismic Upgrade
San Francisco Public Utilities Commission
San Mateo County, California

June 2012

FIGURE 1

Source: SFPUC, 2009/ 2011.

The proposed project would result in seismic upgrades to three drinking water transmission pipelines: the San Andreas Pipeline No. 2 (SAPL2), San Andreas Pipeline No. 3 (SAPL3), and Sunset Supply Branch Pipeline (SSBPL). These transmission pipelines deliver potable water from the Harry Tracy Water Treatment Plant (HTWTP) to the SFPUC's regional water distribution system. Portions of these pipelines traverse the Serra Fault—a secondary fault along the peninsula in San Mateo County that may experience movement in the future, possibly coincident with a large earthquake along the San Andreas Fault (G&E/GTC Joint Venture, 2011b). As a result of recent geotechnical investigations performed on behalf of the SFPUC for its HTWTP Long-Term Improvement Project, the SFPUC determined that fault offset on the Serra fault during a San Andreas design event may cause pipeline failure at the fault crossings (G&E/GTC Joint Venture, 2011b). SAPL2, constructed circa 1928, uses lockbar joints for longitudinal joints and rivets for circumferential joints, which are highly seismically vulnerable to joint failure (G&E/GTC Joint Venture, 2011a). In addition to the fault crossings, there are other areas where the pipelines are susceptible to liquefaction, ground shaking, and landslides (G&E/GTC Joint Venture, 2011b). The proposed project would upgrade six segments of these pipes at five locations that are susceptible to failure during such events.

The proposed PPSU project would entail upgrades of six pipeline components at five different locations or sites, as summarized below and shown on Figures 2 through 6:

- Colma site (SAPL2)
  - Replace approximately 700 feet[1] of pipe between Serramonte Boulevard and Collins Avenue.
  - Construction would entail open-trench techniques.
  - Replace a customer service connection.

- South San Francisco site (SAPL2)
  - Remove a dense stand of trees within the SFPUC project right-of-way (ROW).
  - Replace approximately 720 feet of pipe between Arroyo Drive and West Orange Avenue.
  - Construction would entail open-trench and jack-and-bore techniques.
  - Replace a customer service connection.

- San Bruno North site (SAPL2)
  - Structural support of SAPL2 within an existing tunnel to stabilize existing pipe in an existing tunnel between San Bruno Avenue West and the Interstate 280 (I-280) off-ramp.
  - Construction would entail excavation of access pits to the top of the tunnel and stabilization activities within the tunnel.

- San Bruno South site (SAPL2 and SAPL3)
  - Replace an approximately 1,170-foot segment of SAPL2 and an approximately 1,050-foot segment of SAPL3 at Whitman Way.
  - Construction would entail open-trench techniques.

- Millbrae site (SSBPL)
  - Remove approximately 300 trees within the SFPUC project ROW.
  - Develop access routes to the site through the adjacent park and golf course.
  - Replace approximately 900 feet of pipe east of Banbury Lane.
  - Construction would entail open-trench techniques.

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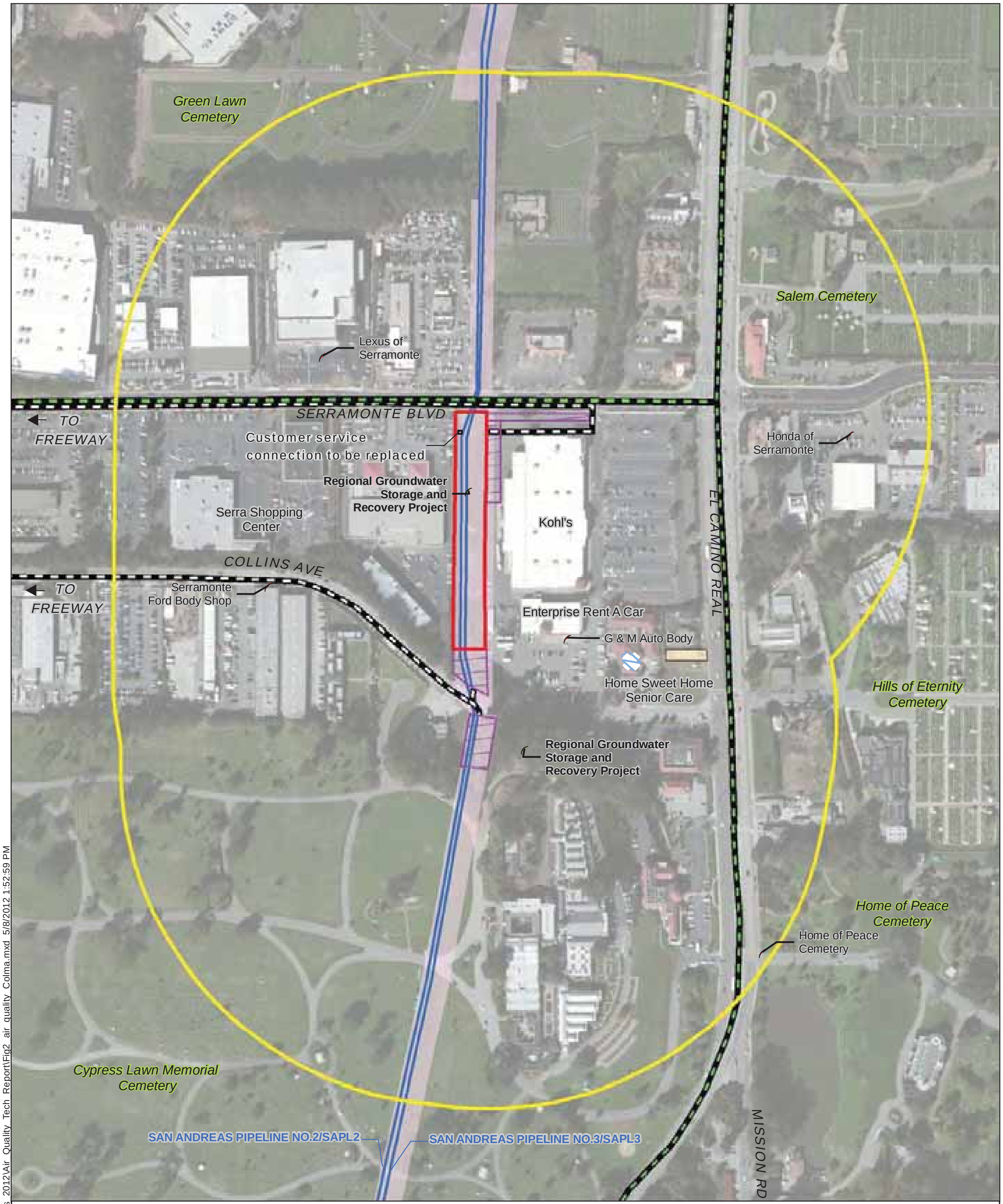
[1] Throughout this report, approximate pipe replacement lengths are provided as horizontal distances. The total length of pipe to be replaced may be longer, due to the vertical changes along the pipeline.



( Regional Groundwater Storage and Recovery Project Construction Emission Source
( Stationary Emission Source
Ñ Health Care Facility
Average Annual Daily Traffic >10,000 Cars per Day
1,000-foot Buffer of Project Site
Residential Sensitive Receptor

Project Components
🟥 Construction Zone
▨ Staging and Spoils Area
Access Route
SFPUC Water Transmission Line
SFPUC Parcels - Right-of-Way

0 200 400
Feet

# AIR QUALITY COLMA SITE

Peninsula Pipelines Seismic Upgrade
San Francisco Public Utilities Commission
June 2012 San Mateo County, California

FIGURE 2

Source: SFPUC, 2011.

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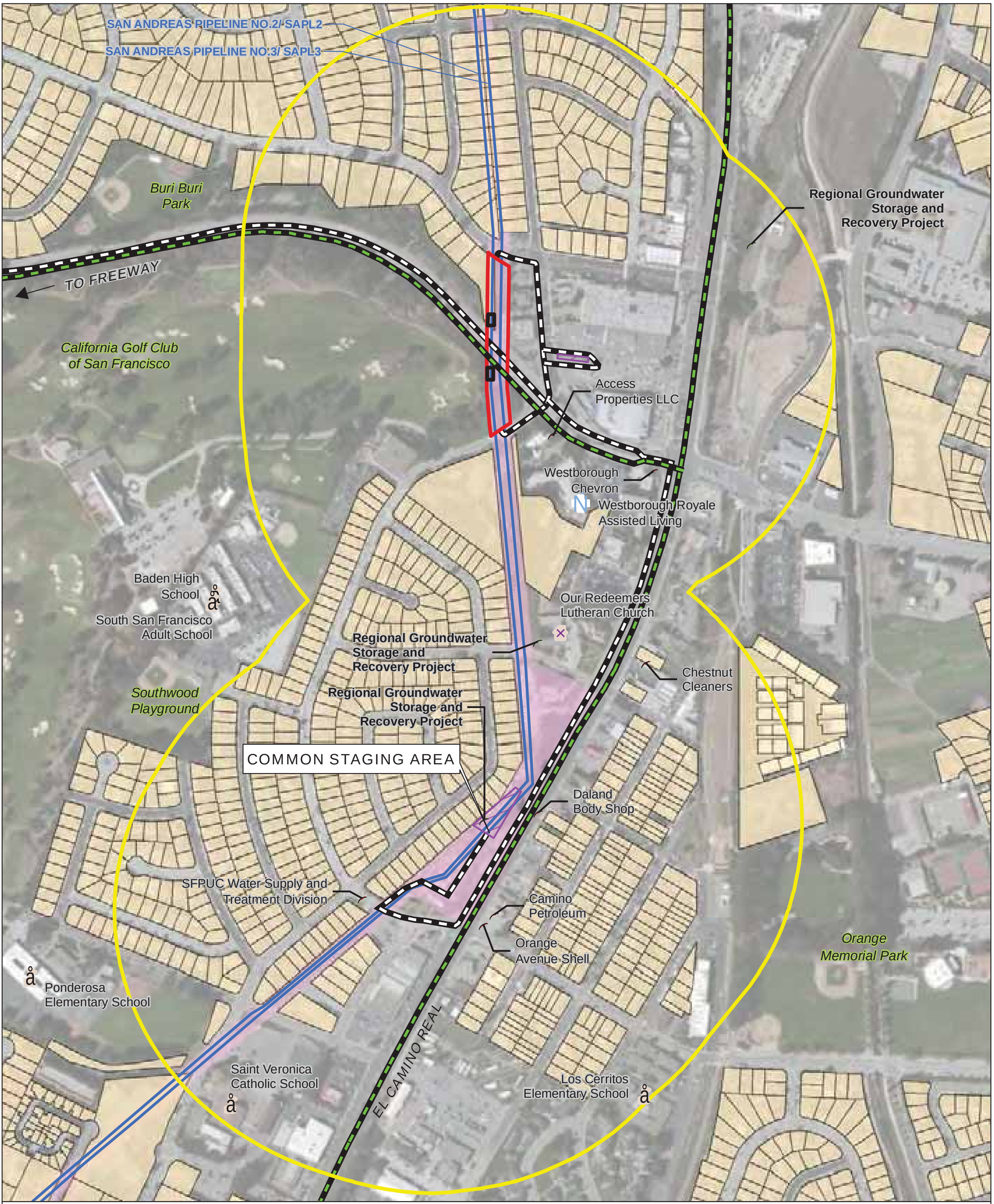

( Regional Groundwater Storage and Recovery Project Construction Emission Source

( Stationary Emission Source

× Church

å School

Ñ Health Care Facility

▬ Average Annual Daily Traffic >10,000 Cars per Day

▭ 1,000-foot Buffer of Project Site

0 200 400 Feet

▭ Residential Sensitive Receptor

Project Components

▭ Construction Zone

▨ Staging and Spoils Area

▭ Boring Pit

▬ Access Route

▬ SFPUC Water Transmission Line

▭ SFPUC Parcels - Right-of-Way

## AIR QUALITY
## SOUTH SAN FRANCISCO SITE

Peninsula Pipelines Seismic Upgrade
San Francisco Public Utilities Commission
San Mateo County, California

June 2012

FIGURE 3

Source: SFPUC, 2011.

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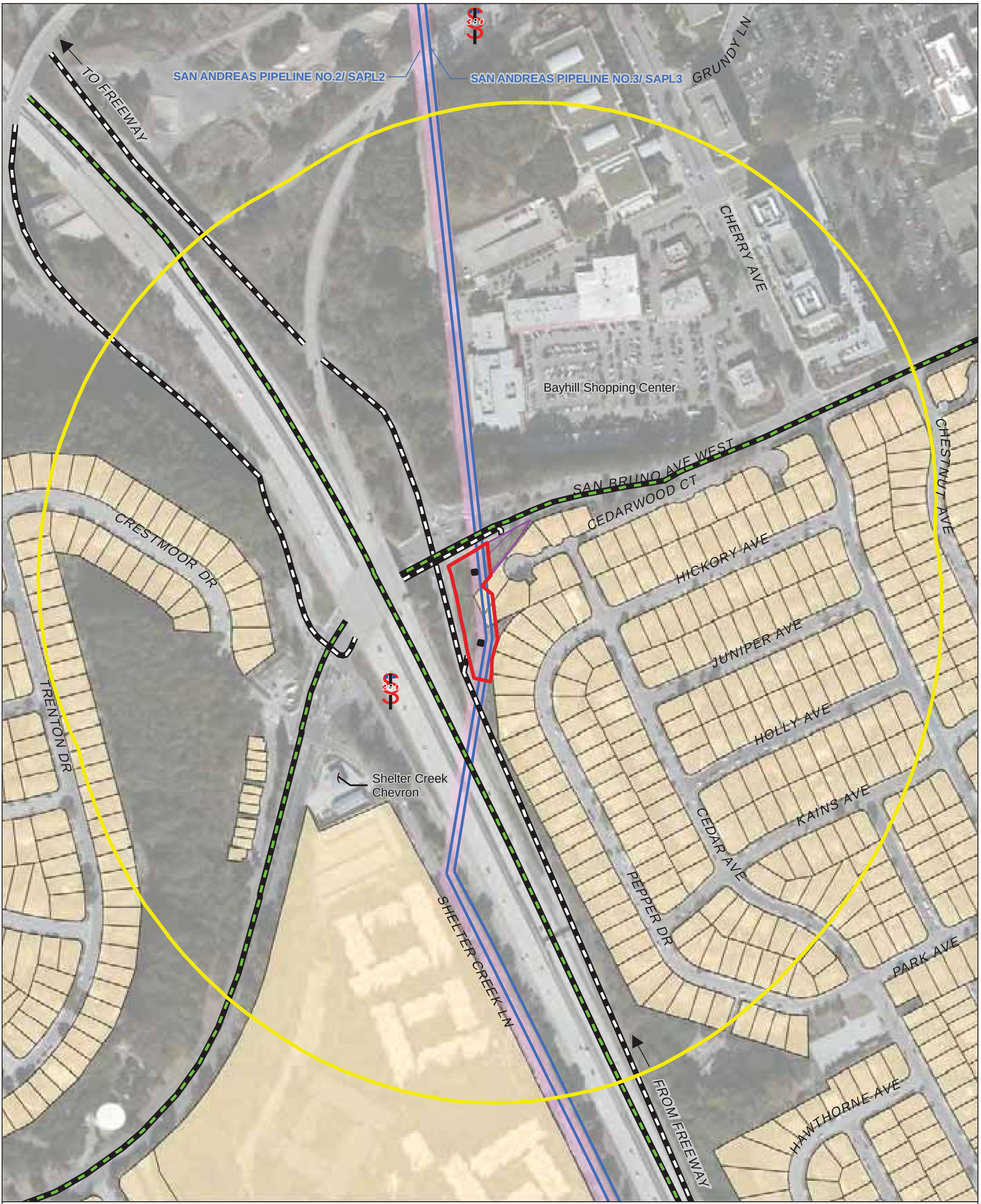

## AIR QUALITY
## SAN BRUNO NORTH SITE

Peninsula Pipelines Seismic Upgrade
San Francisco Public Utilities Commission
June 2012 San Mateo County, California

**FIGURE 4**

Source: SFPUC, 2011.

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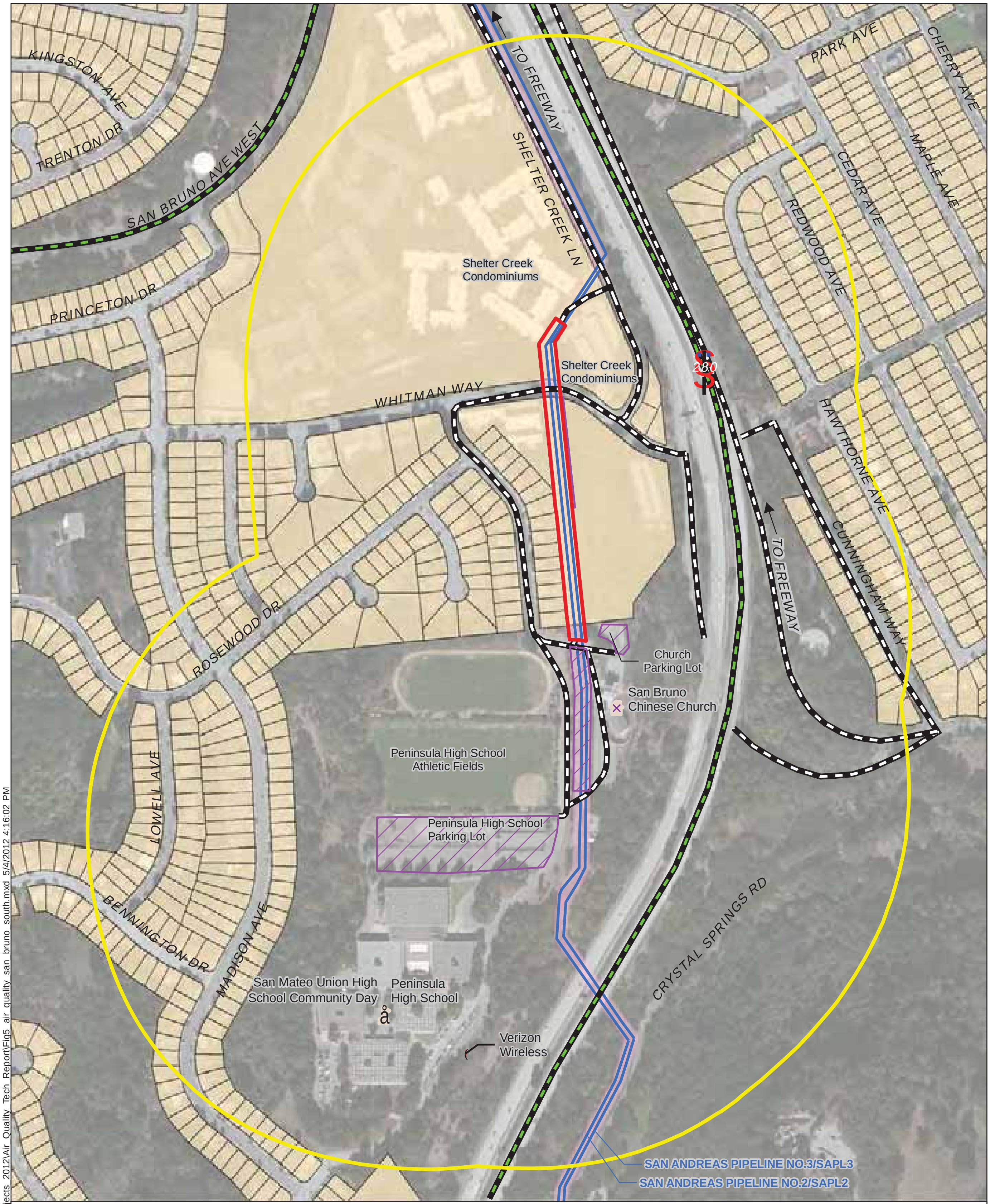

( Stationary Emission Source
× Church
å School
▬ Average Annual Daily Traffic >10,000 Cars per Day
▭ 1,000-foot Buffer of Project Site
▭ Residential Sensitive Receptor

Project Components
▭ Construction Zone
▨ Staging and Spoils Area
▬ Access Route
— SFPUC Water Transmission Line
▭ SFPUC Parcels - Right-of-Way

0 200 400 Feet

# AIR QUALITY
# SAN BRUNO SOUTH SITE

Peninsula Pipelines Seismic Upgrade
San Francisco Public Utilities Commission
San Mateo County, California

June 2012

FIGURE 5

Source:SFPUC 2011

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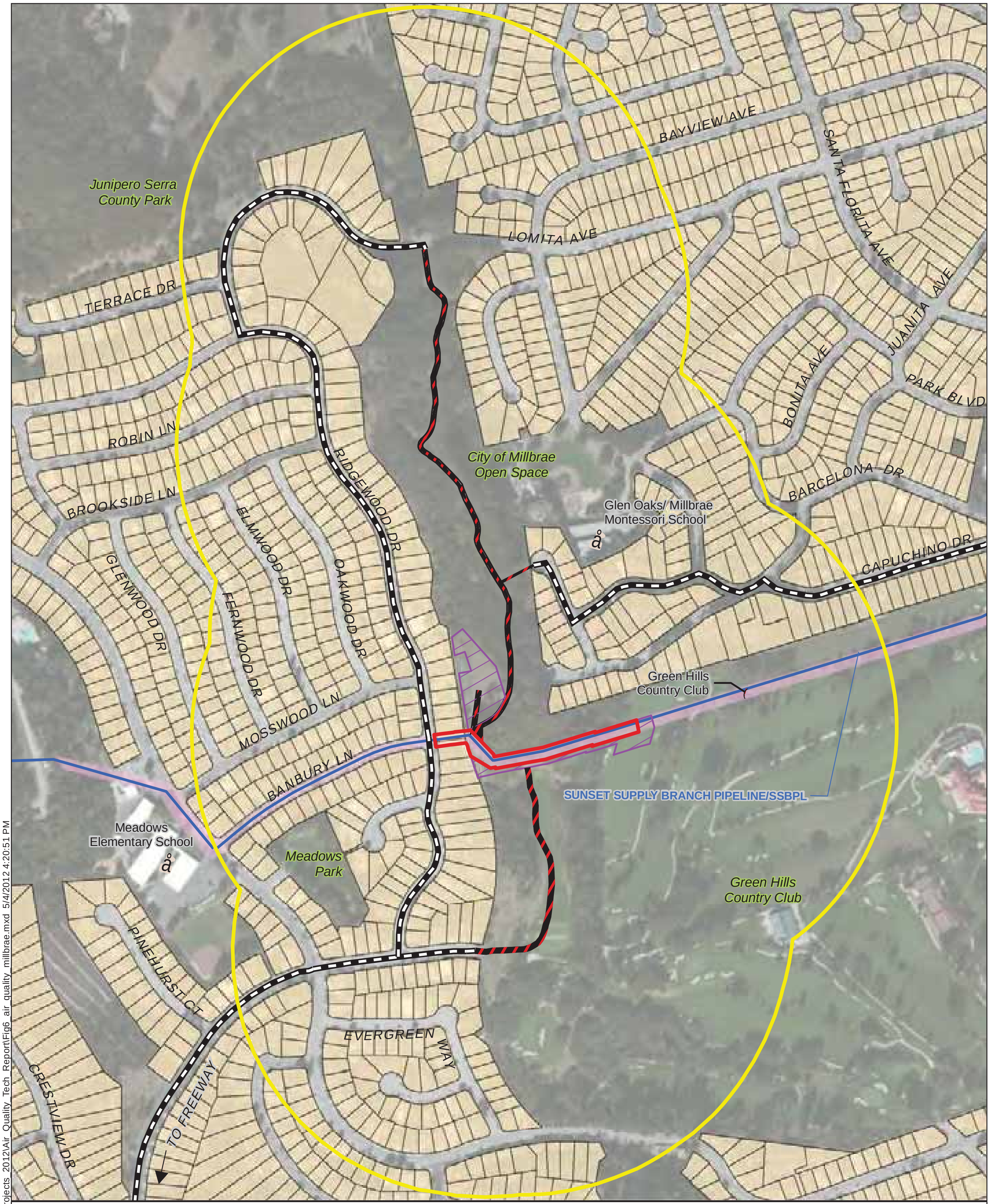

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( Stationary Emission Source
å School
▭ 1,000-foot Buffer of Project Site
▭ Residential Sensitive Receptor

Project Components
▭ Construction Zone
▨ Staging and Spoils Area
▬ Access Route Requiring Upgrade
▬ Access Route
— SFPUC Water Transmission Line
▬ SFPUC Parcels - Right-of-Way

0 200 400 Feet

## AIR QUALITY
## MILLBRAE SITE

Peninsula Pipelines Seismic Upgrade
San Francisco Public Utilities Commission
San Mateo County, California

June 2012

**FIGURE 6**

Source: Bing Aerial Maps/ SFPUC 2011

In addition to the staging areas at or near each site, a common staging area on the northern portion of the SFPUC's Baden Value Lot (near the South San Francisco site) would be used for the duration of the project construction at all of the PPSU sites. This staging area would be used for temporary construction offices (trailers) and worker parking. Trailers would be installed on the site and gravel would be placed in areas used for worker parking.

## 2.1 PROJECT ASSUMPTIONS

Construction of the proposed project would result in direct emissions of criteria air pollutants that include carbon monoxide (CO), ozone precursors (oxides of nitrogen [$NO_X$] and reactive organic gases [ROG]), particulate matter less than or equal to 10 microns in diameter ($PM_{10}$), $PM_{2.5}$, and sulfur dioxide ($SO_2$). Construction equipment would also emit the seven priority toxic air contaminants (TACs) identified by the U.S. Environmental Protection Agency, which include acrolein, benzene, 1,3-butadiene, diesel particulate matter (DPM), formaldehyde, naphthalene, and polycyclic organic matter (POM) (U.S. EPA, 2007). In addition, the BAAQMD modeling guidance lists the individual toxicity of speciated total organic gases (TOG) from tailpipe emissions, such as acetaldehyde and ethylbenzene (BAAQMD, 2011d).

Subsequent to approval of the AQTR SOW, URS has had conversations with the BAAQMD about the inclusion of acrolein in the health risk analysis. Because the California Air Resources Board (CARB) does not have certified emission factors or an analytical test method for acrolein, the appropriate tools needed to implement and enforce acrolein emission limits are not available. Therefore the BAAQMD does not require a health risk analysis for acrolein (BAAQMD, 2011c); however, because the BAAQMD includes acrolein in the on-road emission profile, it was included in the health risk assessment (HRA) for on-road sources. Additionally, California Office of Environmental Health Hazard Assessment (OEHHA) states that there are inadequate epidemiological studies regarding the carcinogenicity of benzo[a]pyrene[2] to humans, and data from animal bioassays must be extrapolated to estimate the human cancer risk (OEHHA, 1994). Therefore, POMs were not evaluated in this HRA.

During project construction, a small number of gasoline-powered engines would be used, but toxic emissions from these engines are expected to be minimal. There will not be any stationary sources at the project sites. Additionally, the proposed project will not introduce any new sensitive receptors to the site. The mobile and construction sources, and their associated pollutant emissions, are listed below.

- Mobile Sources:
  - On-Road Haul Trucks (Criteria pollutants: CO, $NO_X$, ROG, $PM_{10}$ [combustion and fugitive dust], $PM_{2.5}$ [combustion and fugitive dust], $SO_2$; TACs: acrolein, acetaldehyde, benzene, 1,3-butadiene, DPM, ethylbenzene, formaldehyde, and naphthalene[3]).
  - On-Road Worker Vehicles (Criteria pollutants: CO, $NO_X$, ROG, $PM_{10}$ [combustion and fugitive dust], $PM_{2.5}$ [combustion and fugitive dust], $SO_{2;}$ TACs: acrolein, acetaldehyde, benzene, 1,3-butadiene, DPM, ethylbenzene, formaldehyde, and naphthalene[3]).

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[2] The most common category of POM is the polycyclic aromatic hydrocarbons, also known as polynuclear aromatics, which include benzo[a]pyrene.

[3] Acetaldehyde, benzene, 1,3-butadiene, ethylbenzene, formaldehyde, and naphthalene are TACs emitted from gasoline tailpipe emissions, while DPM is a TAC emitted from diesel exhaust emissions. On-road haul trucks are gasoline and diesel powered, while the Off-road Construction Equipment is only diesel powered. Therefore, acetaldehyde, benzene, 1,3-butadiene, ethylbenzene, formaldehyde, DPM and naphthalene are the TACs evaluated in the HRA for on-road haul trucks, while DPM is the TAC evaluated in the HRA for off-road construction equipment.

- Construction Sources:
  - Off-road Construction Equipment (Criteria pollutants: CO, $NO_X$, ROG, $PM_{10}$ [combustion and fugitive dust], $PM_{2.5}$ [combustion and fugitive dust], $SO_2$; TACs: DPM[2]).
  - Earth Moving (Criteria pollutants: $PM_{10}$ [fugitive dust], $PM_{2.5}$ [fugitive dust])
  - Dirt Piling and Material Handling ($PM_{10}$ [fugitive dust], $PM_{2.5}$ [fugitive dust])

Discussions with BAAQMD staff confirmed that projects that employ Best Management Practices (BMPs) do not have to quantify their fugitive dust emissions (BAAQMD, 2011b; BAAQMD, 2012a). The project will employ BMPs during construction; therefore, this report only assesses impacts from exhaust $PM_{10}$ and $PM_{2.5}$ emissions.

The operation of the proposed project would not increase emissions of criteria pollutants, precursors, or TACs, because it would not result in changes to the operation of the existing pipelines.

## 2.2 CONSTRUCTION SCHEDULE

Construction is estimated to begin in 2014 and end in 2015, as shown in Figure 7. The duration of construction activities at each project site would range from approximately 2 weeks to 9.5 months, as shown in Table 1. The total duration of construction is estimated to be 12 months.

There would be three phases of construction activities, with initial tree removal activities at a few project sites, as shown in Table 2. Initial tree removal would be completed at the South San Francisco and Millbrae project sites, where dense trees grow in the SFPUC ROW. The first construction phase would entail shutdown and dewatering of the pipeline, and mobilization at the project site (such as installation of fencing, grubbing, and preparation of laydown areas). This phase would last up to 10 days (1 to 2 weeks). The second phase would include excavation; pipeline removal and installation; hydrostatic testing; and backfill, landscaping, and site restoration, and would last for 24 to 81 days (2 to 4 months), depending on the project site. The third phase would include disinfection of the pipelines and would last 10 days (2 weeks).

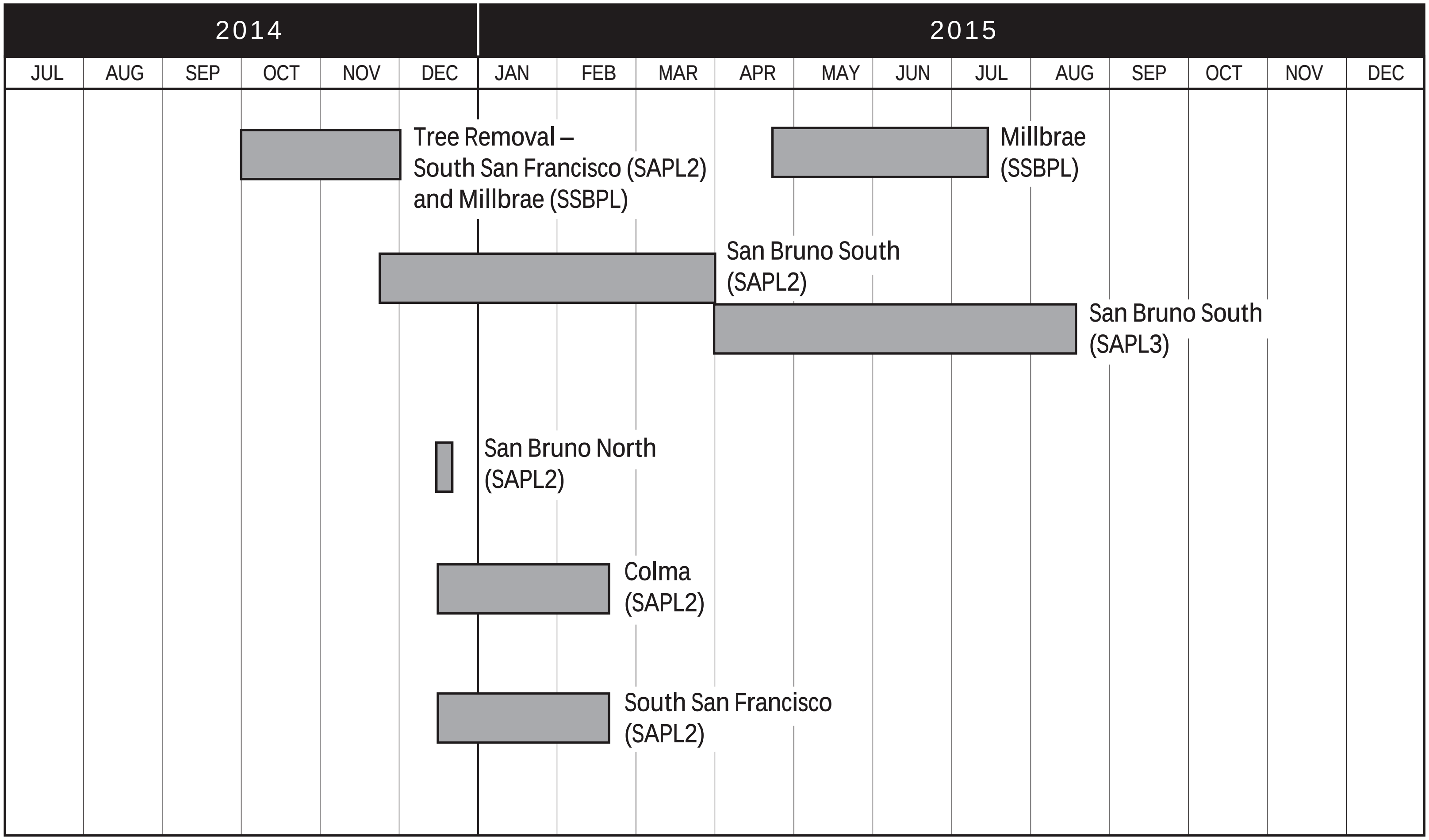
The workforce for each project site is anticipated to consist of one or three crews, with up to 20 personnel per crew. Tree removal at the Millbrae project site would require one crew. Construction employee parking is anticipated to be on paved parking lots or streets adjacent to the project sites.

# 3.0 PROJECT SETTING

This section summarizes the sensitive receptors in the project study area, as well as emissions sources. Figures 2 through 6 show the locations of the project sites and pipelines, and the various project components, including construction zones, site access, and staging and spoils areas.

The figures also show the locations of sensitive receptors, permitted stationary sources, and all major roadways within 1,000 feet of the project sites. There will be a number of receptors that could be exposed to project emissions at each of the project sites. The proposed project sites are located in predominantly residential areas that also include schools, churches, and parks. These sensitive receptors are evaluated for potential air quality impacts from the proposed project activities.

The proposed project would result in new sources of construction-related emissions; however, it would not introduce new sensitive receptors. Therefore, this section reviews the closest sensitive receptors and



Note: The pipeline shutdown and disinfection activities for the San Bruno North site (SAPL2) are the same as those activities for the San Bruno South site (SAPL2) and are included in the San Bruno South site duration only.

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**CONSTRUCTION PHASING**

Peninsula Pipelines Seismic Upgrade
San Francisco Public Utilities Commission
San Mateo County, California
June 2012

**FIGURE 7**

### Table 1
### Construction Duration at Each Project Site

| Project Site | Construction Duration |
|---|---|
| Colma Project Site (SAPL2) | 2.5 months |
| South San Francisco Project Site (SAPL2) | 3 months[1] |
| San Bruno North Project Site (SAPL2) | 2 weeks[2] |
| San Bruno South Project Site (SAPL2 and SAPL3) | 9.5 months |
| Millbrae Project Site (SSBPL) | 4.5 months[3] |

Notes:

[1] The 3-month duration of construction at South San Francisco includes approximately 2 weeks required for tree removal, which will be completed separately and in advance of the 2.5-month construction at the site.

[2] The shutdown, dewatering, and disinfection activities for the San Bruno North Project Site (SAPL2) are the same as those activities for the San Bruno South Project Site (SAPL2) and are, therefore, not included in the construction duration.

[3] The 4.5-month duration of construction at Millbrae includes the 1.5 months required for tree removal, which will be completed separately and in advance of the 3-month construction at the site.

SAPL2 = San Andreas Pipeline No. 2
SAPL3 = San Andreas Pipeline No. 3
SSBPL = Sunset Supply Branch Pipeline

### Table 2
### Typical Construction Activities

| Construction Activities | Estimated Duration |
|---|---|
| Tree Removal (South San Francisco and Millbrae sites only; at other sites, only a few tree removals may be required) | Approximately 2 months[1] |
| Shutdown and dewatering | Approximately 1 week |
| Mobilization[2] | Approximately 2 weeks |
| Shoring and excavation, pipeline removal and installation, intermittent dewatering, hydrostatic testing, backfill and restoration | Approximately 2 to 3 months, depending on site |
| Disinfection | Approximately 2 weeks |

Notes:

[1] Tree removal activities would occur at the South San Francisco and Millbrae project sites. Estimated duration for tree removal activities would be 2 months, inclusive of both the South San Francisco and Millbrae project sites.

[2] Mobilization would occur concurrently with shutdown and dewatering.

existing sources within the project's zone of influence.[4] The population in San Mateo County is expected to increase by 17.7 percent between 2010 and 2030 (ABAG, 2009), and there could be reasonably foreseeable future projects in the vicinity. Reasonably foreseeable future projects are evaluated as part of the cumulative impacts analysis in Section 4.0.

The figures also show the location of permitted stationary sources and the location of all major roadways within 1,000 feet of the project sites that have annual average daily traffic (AADT) greater than 10,000, which is used for the cumulative health risk analysis (see Section 5.0).

Table 3 presents the stationary sources permitted by the BAAQMD, and major roadway sources (greater than 10,000 AADT) that are within 1,000 feet of project facility sites.[5] These identified permitted sources and roadways are used in the cumulative health risk analysis (see Section 5.4 for methodology). No major nonpermitted sources (e.g., train yards, distribution facilities, and high-volume fueling stations) are located within 1,000 feet of project sites.

## 4.0 CRITERIA AIR POLLUTANT ANALYSIS

These pollutants are called "criteria" air pollutants because standards have been established for each of them to meet specific public health and welfare criteria set forth in the Federal Clean Air Act. California has adopted more stringent ambient air quality standards for the criteria air pollutants (referred to as State Ambient Air Quality Standards, or state standards), and has adopted air quality standards for some pollutants for which there is no corresponding federal standard. Table 4 shows current federal and state ambient air quality standards, as well as the Bay Area attainment status and common sources for each pollutant. The pollutants of particular concern for which the Bay Area is nonattainment of federal and state standards—ozone and particulate matter—are described in greater detail below.

### 4.1 OZONE

Ozone is not emitted directly into the atmosphere, but is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving ROG and $NO_X$. ROG and $NO_X$ are known as precursor compounds for ozone. Significant ozone production generally requires ozone precursors to be present in a stable atmosphere with strong sunlight for approximately 3 hours. Ozone is a regional air pollutant because it is not emitted directly by sources, but is formed downwind of sources of ROG and $NO_X$ under the influence of wind and sunlight.

The main sources of $NO_X$ and ROG are combustion processes (including motor vehicle engines); the evaporation of solvents, paints, and fuels; and biogenic sources. Automobiles are the single largest source of ozone precursors in the San Francisco Bay Area Air Basin (SFBAAB). Tailpipe emissions of ROG are highest during cold starts, hard acceleration, stop-and-go conditions, and slow speeds. They decline as speeds increase up to about 50 miles per hour (mph), then increase again at high speeds and high engine loads. ROG emissions associated with evaporation of unburned fuel depend on vehicle and ambient temperature cycles. Nitrogen oxide emissions exhibit a different curve; emissions decrease as the vehicle approaches 30 mph and then begin to increase with increasing speeds (BAAQMD, 2011a).

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[4] Zone of influence is defined as the area within a 1,000-foot radius of the proposed project.

[5] Please note that additional stationary sources and major roadway sources (greater than 10,000 AADT) within 1,000 feet of the common staging area of the South San Francisco site are included in Table 3. These additional sources were not included in the AQTR SOW because the common staging area was added to the project subsequent to the approval of the Final AQTR SOW in November 2011.

## Table 3
## Preliminary Identification of Existing Stationary Sources and Roadways

| Project Site | Facility Name | Street Address/Location | City |
|---|---|---|---|
| **Stationary Sources (within 1,000-foot buffer)** | | | |
| Colma Site (SAPL2) | Lexus of Serramonte | 700 Serramonte Boulevard | Colma |
| | Serramonte Ford Body Shop | 500 Collins Avenue | Colma |
| | G & M Auto Body | 245 Collins Avenue | Colma |
| | Honda of Serramonte | 485 Serramonte Boulevard | Colma |
| | Home of Peace Cemetery | 1299 El Camino Real | Colma |
| South San Francisco Site (SAPL2) | Westborough Chevron | 1 Westborough Boulevard | South San Francisco |
| | Access Properties LLC | 91 Westborough Boulevard | South San Francisco |
| | Daland Body Shop[1] | 890 El Camino Real | South San Francisco |
| | SFPUC Water Supply and Treatment Division[1] | 609 West Orange Avenue | South San Francisco |
| | Chestnut Cleaners[1] | 26 Chestnut Avenue | South San Francisco |
| | Camino Petroleum[1] | 698 El Camino Real | South San Francisco |
| | Orange Avenue Shell[1] | 710 El Camino Real | South San Francisco |
| San Bruno North Site (SAPL2) | Shelter Creek Chevron | 2101 San Bruno Avenue West | San Bruno |
| San Bruno South Site (SAPL2/SAPL3) | Verizon Wireless | 250 Courtland Drive | San Bruno |
| Millbrae Site (SSBPL) | Green Hills Country Club | End of Ludeman Lane | Millbrae |
| **Roadway Sources (roadways within the 1,000-foot buffer with > 10,000 vehicles per day)** | | | |
| Colma Site (SAPL2) | El Camino Real | Between Villa Avenue and Mission Road | Colma |
| | Serramonte Boulevard | Between Junipero Serra Boulevard and El Camino Real | Colma |
| South San Francisco Site (SAPL2) | El Camino Real | Between El Paseo Drive and Ponderosa Drive | South San Francisco |
| | Westborough Boulevard | Between Junipero Serra Boulevard and El Camino Real | South San Francisco |
| San Bruno North Site (SAPL2), San Bruno South Site (SAPL2 and SAPL3) | Interstate 280 South | Between San Bruno Avenue West and Crestmoor Drive | San Bruno |

Notes:

[1] These stationary sources are found within 1,000 feet of the common staging area on the SFPUC's Baden Valve Lot near the South San Francisco site.

Source: BAAQMD, 2012e

SAPL2 = San Andreas Pipeline No. 2
SAPL3 = San Andreas Pipeline No. 3
SFPUC = San Francisco Public Utilities Commission
SSBPL = Sunset Supply Branch Pipeline

## Table 4
## Ambient Air Quality Standards and Bay Area Attainment Status

| Pollutant | Averaging Time | State Standard | Bay Area Attainment Status for California Standard | Federal Primary Standard | Bay Area Attainment Status for Federal Standard | Major Pollutant Sources |
|---|---|---|---|---|---|---|
| Ozone | 8 hour | 0.070 ppm | Nonattainment | 0.075 ppm | Nonattainment | Formed when ROG and $NO_X$ react in the presence of sunlight. Major sources include on-road motor vehicles, solvent evaporation, and commercial/industrial mobile equipment. |
| | 1 hour | 0.090 ppm | Nonattainment | —[1] | — | |
| Carbon Monoxide | 8 hour | 9.0 ppm | Attainment | 9.0 ppm | Attainment | Internal combustion engines, primarily gasoline-powered motor vehicles |
| | 1 hour | 20 ppm | Attainment | 35 ppm | Attainment | |
| Nitrogen Dioxide | Annual Average | 0.030 ppm | — | 0.053 ppm | Attainment | Motor vehicles, petroleum refining operations, industrial sources, aircraft, ships, and railroads |
| | 1 hour | 0.180 ppm | Attainment | 0.100 ppm | Unclassified | |
| Sulfur Dioxide | Annual Average | — | — | 0.03 ppm | Attainment | Fuel combustion, chemical plants, sulfur recovery plants, and metal processing |
| | 24 hour | 0.04 ppm | Attainment | 0.14 ppm | Attainment | |
| | 3 hour | — | — | 0.5 ppm[2] | Attainment | |
| | 1 hour | 0.25 ppm | Attainment | 0.075 ppm | Attainment | |
| Particulate Matter ($PM_{10}$) | Annual Arithmetic Mean | 20 $\mu g/m^3$ | Nonattainment | — | — | Dust- and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays) |
| | 24 hour | 50 $\mu g/m^3$ | Nonattainment | 150 $\mu g/m^3$ | Unclassified | |
| Particulate Matter ($PM_{2.5}$) | Annual Arithmetic Mean | 12 $\mu g/m^3$ | Nonattainment | 15 $\mu g/m^3$ | Attainment | Fuel combustion in motor vehicles, equipment, and industrial sources; residential and agricultural burning; also, formed from photochemical reactions of other pollutants, including $NO_X$, sulfur oxides, and organics. |
| | 24 hour | — | — | 35 $\mu g/m^3$ | Nonattainment | |
| Lead | Calendar Quarter | — | — | 1.5 $\mu g/m^3$ | Attainment | Present source: lead smelters, battery manufacturing and recycling facilities. Past source: combustion of leaded gasoline. |
| | Rolling 3-Month Average | — | — | 0.15 $\mu g/m^3$ | —[3] | |
| | 30-Day Average | 1.5 $\mu g/m^3$ | Attainment | — | — | |
| Hydrogen Sulfide | 1 hour | 0.03 ppm | Unclassified | No federal standard | — | Geothermal power plants, petroleum production, and refining |
| Visibility Reducing Particles | 8 hour | Extinction of 0.23/km; visibility of 10 miles or more | Unclassified | No federal standard | — | See $PM_{2.5}$. |

Notes:

[1] The national 1-hour ozone standard was revoked by the U.S. Environmental Protection Agency on June 15, 2005.

[2] There is no primary federal standard for 3-hour standard for $SO_2$; this value represents the secondary standard. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[3] National lead standard, rolling 3-month average: final rule signed October 15, 2008. Final designations expected October 2011.

km = kilometer
$\mu g/m^3$ = micrograms per cubic meter
$NO_X$ = oxides of nitrogen
ppm = parts per million
ROG = reactive organic gases
$SO_2$ = sulfur dioxide

Source: CARB, 2012; BAAQMD, 2012b

Ozone concentrations tend to be higher in the late spring, summer, and fall, when the long sunny days combine with regional subsidence inversions to create conditions conducive to the formation and accumulation of secondary photochemical compounds, like ozone. Short-term exposure to ozone can irritate the eyes and cause constriction of the airways. Besides causing shortness of breath, ozone can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema.

## 4.2 PARTICULATE MATTER

$PM_{10}$ and $PM_{2.5}$ consist of particulate matter that is 10 microns or less in diameter and 2.5 microns or less in diameter, respectively. (A micron is one-millionth of a meter.) $PM_{10}$ and $PM_{2.5}$ represent fractions of particulate matter that can be inhaled into the air passages and the lungs and can cause adverse health effects. Very small particles of certain substances (e.g., sulfates and nitrates) can cause lung damage directly, or can contain adsorbed gases (e.g., chlorides or ammonium) that may be injurious to health. Particulates also can damage materials and reduce visibility. Large dust particles (diameter greater than 10 microns) settle out rapidly and are easily filtered by human breathing passages. This large dust is of more concern as a soiling nuisance rather than a health hazard. The remaining fraction, $PM_{10}$ and $PM_{2.5}$, are a health concern particularly at levels above the federal and state ambient air quality standards. $PM_{2.5}$ (including diesel exhaust particles) is thought to have greater effects on health, because these particles are so small that they are able to penetrate to the deepest parts of the lungs.

In the SFBAAB, most particulate matter is caused by combustion, factories, construction, grading, demolition, agricultural activities, and motor vehicles. Motor vehicles are currently responsible for about half of the particulates in the SFBAAB. Wood burning in fireplaces and stoves is another large source of fine particulates (BAAQMD, 2011a).

Scientific studies have suggested links between fine particulate matter and numerous health problems including asthma, bronchitis, and acute and chronic respiratory symptoms such as shortness of breath and painful breathing. Recent studies have shown an association between morbidity and mortality, and daily concentrations of particulate matter in the air. Children are more susceptible to the health risks of $PM_{10}$ and $PM_{2.5}$ because their immune and respiratory systems are still developing.

Mortality studies since the 1990s have shown a statistically significant direct association between mortality (premature deaths) and daily concentrations of particulate matter in the air. Despite important gaps in scientific knowledge, a comprehensive evaluation of the research findings provides persuasive evidence that exposure to fine particulate air pollution has adverse effects on cardiopulmonary health (Dockery and Pope, 2006; Bhatia and Rivard, 2008).

## 4.3 TOXIC AIR CONTAMINANTS

In addition to the criteria air pollutants listed above, TACs or hazardous air pollutants may lead to serious illness or increased mortality, even when present in relatively low concentrations. There are hundreds of different types of TACs with varying degrees of toxicity. Many TACs are confirmed or suspected carcinogens, or are known or suspected to cause birth defects or neurological damage. Additionally, many TACs can be toxic at very low concentrations. For some chemicals, such as carcinogens, there are no thresholds below which exposure can be considered risk-free.

Industrial facilities and mobile sources are significant sources of TACs. Automobile exhaust also contains TACs such as benzene and 1,3-butadiene. Most recently, DPM was identified as a TAC by CARB. DPM differs from other TACs in that it is not a single substance but rather a complex mixture of hundreds of substances. BAAQMD research indicates that mobile-source emissions of DPM, benzene, and 1,3-butadiene represent a substantial portion of the ambient background risk from TACs in the SFBAAB.

For the proposed project, the TAC of greatest concern is DPM, which would be emitted by heavy construction equipment. Additional TACs emitted by the proposed project would be acrolein (for on-road sources only), acetaldehyde, benzene, 1,3-butadiene, ethylbenzene, formaldehyde, and naphthalene.

## 4.4 CRITERIA AIR POLLUTANT METHODOLOGY

BAAQMD adopted and then revised CEQA Air Quality Guidelines, including new thresholds of significance, in May 2011 (BAAQMD, 2011a). Based on a writ mandated by the Alameda Superior Court, these thresholds have currently been set aside and the BAAQMD has to cease dissemination of them until the BAAQMD complies with CEQA for the adoption of the thresholds. As a result, the BAAQMD is no longer recommending the 2011 thresholds be used to measure a project's significant air quality impacts. Instead, the BAAQMD suggests that lead agencies use the 1999 CEQA thresholds to make determinations regarding the significance of an individual project's air quality impacts. However, Environmental Planning has decided that the 2011 thresholds are more conservative than the 1999 thresholds, and recommends their use for impact determinations (Environmental Planning 2012b).

This analysis uses the methodologies from the BAAQMD CEQA Air Quality Guidelines to determine the potential impacts of the proposed project.

### 4.4.1 Thresholds of Significance

Average project emissions were calculated without considering the implementation of mitigation measures using the methodology described below, and compared to the 2011 CEQA construction thresholds of significance, shown in Table 5.

**Table 5**
**Construction Emission Significance Thresholds**

| Pollutant/Precursor | Daily Average Emissions (lbs/day) |
|---|---|
| ROG | 54 |
| $NO_X$ | 54 |
| $PM_{10}$ | 82 |
| $PM_{2.5}$ | 54 |

Notes:

lbs/day = pounds per day
$NO_X$ = oxides of nitrogen
$PM_{10}$ = particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
ROG = reactive organic gases

Source: BAAQMD, 2011a.

Project-related air quality impacts fall into two categories: short-term impacts due to construction and long-term impacts due to project operation. During construction (short-term), the project would affect local particulate concentrations primarily due to fugitive dust sources, as well as the generation of exhaust emissions of both criteria pollutants and TACs from off-road construction equipment, on-road haul trucks, and on-road worker vehicles. Criteria air pollutant emissions were calculated as average construction emissions, which are calculated as total construction emissions divided by number of construction days.

Operation of the proposed project will not generate air emissions.

### 4.4.2 Off-Road Construction Equipment (Exhaust Emissions)

URS estimated construction equipment exhaust emissions using emission factors from CARB's OFFROAD2011 model.[6] URS selected inputs for the OFFROAD model for emission factors for the year 2014.[7]

URS calculated off-road exhaust emissions by combining the OFFROAD emission factors and project-specific construction information (such as construction equipment type, number of pieces of equipment, engine horsepower rating, engine duty load, hours of operation per day, and days of operation per week). Project-specific information for each construction phase is listed in Appendix 2.

Construction phase equipment lists were provided for each activity, except for the soil excavation and installation of concrete pipe support at the San Bruno North site. Because these data were not available and these emissions cannot be considered negligible, the equipment list for shoring and excavation, pipeline removal and installation, intermittent dewatering, hydrostatic testing, backfill and restoration was conservatively assumed to be similar and was used as a proxy for emission calculations for soil excavation and installation of concrete pipe support.

### 4.4.3 On-Road Haul Trucks

URS calculated haul truck exhaust and idling emissions using the EMFAC2011 model. URS selected inputs required by EMFAC, including analysis years, location, vehicle class (heavy duty trucks), and vehicle speeds. As described above, URS selected inputs for the OFFROAD model for emission factors for the year 2014.[6]

URS used EMFAC to generate running emissions (in units of grams of pollutant per mile) and idling emissions (in units of grams of pollutant per minute). Haul distances were estimated from the highway to the project area based on project maps. The daily number of trucks trips was provided by the SFPUC project engineers. It was assumed that trucks would not idle along the access routes, and that the trucks would only idle during material loading and unloading at the staging and spoils areas. Idling time at the staging and spoils areas were assumed to be 5 minutes, which is the maximum idling time allowed by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations.

### 4.4.4 On-Road Vehicles Used for Construction Worker Commuting

URS calculated worker commute exhaust emissions using the EMFAC2011 model. We selected inputs required by EMFAC, including analysis years, location, vehicle class, and vehicle speeds. As described above, URS selected inputs for the OFFROAD model for emission factors for the year 2014.[6]

EMFAC generates emissions in units of grams of pollutant per mile. Project-specific information about the number of construction workers commuting and worker schedules was used to estimate the total number of vehicle miles traveled.

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[6] Based on URS experience with OFFROAD2011 and conversations with CARB, the OFFROAD2011 model only provides emission factors for $NO_X$, ROG, and particulate matter, and does not provide emission factors for CO and oxides of sulfur. Therefore, URS used the OFFROAD2007 emission factors along with updated OFROAD2011 activity data for those pollutants. Although CARB has indicated that an update to the OFFROAD2011 model would provide emission factors for CO and oxides of sulfur, this updated model is not available at this time (CARB, 2011).

[7] While URS proposed the use of off-road emission factors for years 2014 and 2015 in the AQTR SOW, use of off-road emission factors for year 2014 only provided a more conservative estimate.

## 4.5 CRITERIA AIR POLLUTANT RESULTS

Emissions of criteria air pollutants would occur during construction activities at the sites. These construction activities include off-road construction equipment, on-road haul trucks, and on-road worker vehicles, as described above. In cases where emission factors were only provided for $PM_{10}$, a ratio is used to estimate emissions for $PM_{2.5}$.

Criteria pollutant construction emissions presented below in Table 6 were estimated for the proposed project using the methodology described in Section 4.4.2 through 4.4.4. Detailed model outputs and emission worksheet calculations are included in Appendix 2.

### Table 6
### Total Construction Criteria Air Pollutant Emissions

| Emission Source | ROG | CO | $NO_X$ | Exhaust $PM_{10}$[1] | Exhaust $PM_{2.5}$[1] | $SO_2$ |
|---|---|---|---|---|---|---|
| Construction Equipment (total tons)[2] | <1 | 3 | 4 | <1 | <1 | <1 |
| Haul Trucks (total tons) | <1 | <1 | <1 | <1 | <1 | <1 |
| Worker Commute (total tons) | 1 | 2 | <1 | <1 | <1 | <1 |
| **Total construction emissions (tons)** | **1** | **5** | **4** | **<1** | **<1** | **<1** |
| **Average daily construction emissions (lbs/day)** | **5** | **42** | **36** | **2** | **2** | **<1** |
| ***Construction Threshold*** | ***54*** | ***N/A*** | ***54*** | ***82*** | ***54*** | ***N/A*** |
| Significant Impact? | No | No | No | No | No | No |

Notes:

[1] BAAQMD's proposed construction-related significance thresholds for $PM_{10}$ and $PM_{2.5}$ apply to exhaust emissions only and not to fugitive dust.

[2] $PM_{2.5}$ emission factors are not available using OFFROAD2011, so the emissions for $PM_{2.5}$ were based on the CEIDARS 0.92 $PM_{10}/PM_{2.5}$ conversion ratio (SCAQMD, 2006).

CO = carbon monoxide
lbs/day = pounds per day
N/A = not applicable
$NO_X$ = oxides of nitrogen
$PM_{10}$ = particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter
ROG = reactive organic gases
$SO_2$ = sulfur dioxide

As shown in Table 6, average construction criteria air pollutant emissions would not exceed the construction thresholds of significance. Therefore, air quality impacts from the proposed project would be less than significant.

For all proposed construction projects, BAAQMD recommends implementing all the Basic Construction Mitigation Measures, listed in Table 8-1 of the 20011 BAAQMD CEQA Guidance (BAAQMD, 2011a), to meet the BMP threshold for fugitive dust, regardless of significance determination. SFPUC shall require construction contractors to implement the following BMPs:

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.

2. All haul trucks transporting soil, sand, or other loose material off site shall be covered.
3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
4. All vehicle speeds on unpaved roads shall be limited to 15 mph.
5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
6. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations). Clear signage shall be provided for construction workers at all access points.
7. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified visible emissions evaluator.
8. A publicly visible sign shall be posted with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

Based on guidance from the BAAQMD staff, fugitive dust emissions were not quantified because compliance with the BAAQMD-recommended BMPs would ensure that construction-related fugitive dust impacts of the proposed project would be less than significant (BAAQMD, 2011b).

### 4.6 SUMMARY OF PROPOSED PROJECT CRITERIA AIR POLLUTANT IMPACTS

Construction exhaust emissions from off-road construction equipment, on-road haul trucks, and on-road commute worker vehicles would be less than the thresholds of significance (see Table 6). Therefore, construction exhaust emission impacts would be less than significant.

By implementing the BAAQMD BMPs during the construction period, fugitive dust emissions from construction activities would be less than significant.

## 5.0 HEALTH RISK ANALYSIS

As described in Section 4.0, Criteria Air Pollutants, site preparation activities and other construction work would affect localized air quality. Emissions from construction equipment would include particulate matter ($PM_{10}$ and $PM_{2.5}$) as well as TACs such as DPM, which represents a portion of the overall particulate emissions. As shown in Table 6, emissions of $PM_{10}$ and $PM_{2.5}$ in equipment exhaust would not exceed the significance criteria for regional emissions of criteria pollutants. However, localized $PM_{2.5}$ and TAC emissions could expose sensitive receptors to substantial concentrations, resulting in health risks. Acetaldehyde, benzene, 1,3-butadiene, DPM, ethylbenzene, formaldehyde, and naphthalene are the only TACs identified for inclusion in the cancer risk as well as acute and chronic noncancer hazard evaluation. In addition, acrolein was included for acute and chronic noncancer risk for on-road sources.[8]

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[8] Cancer potency factors were not available for acrolein, so cancer risk for acrolein was not estimated.

The construction health risk analysis evaluated the potential risk to existing sensitive receptors in the vicinity of the proposed construction areas. Emission estimates, modeled emissions, risk characterization, and model results are discussed in this section. Detailed modeling files are provided on the electronic CD that accompanies this report (in Appendix 2).

The thresholds for individual project risks and hazards are:

- An excess lifetime cancer risk level of more than 10 in one million;
- A noncancer (both chronic or acute) HI greater than 1.0; and
- An incremental increase in the annual average $PM_{2.5}$ concentration greater than 0.3 micrograms per cubic meter ($\mu g/m^3$).

## 5.1 HEALTH RISK METHODOLOGY

### 5.1.1 Emission Estimates

Construction-related emissions of DPM (using exhaust $PM_{10}$ as a surrogate), TOG (for the gasoline-related TACs), and $PM_{2.5}$ were calculated using the OFFROAD2011 and EMFAC2011 models, as described in Section 4.1, Criteria Air Pollutant Methodology. This is a conservative assumption, and consistent with regulatory guidance, because DPM represents a portion of total particulate emissions from exhaust. Exhaust and evaporative TOGs from gasoline-fueled vehicles were evaluated based on the speciation profiles presented in the BAAQMD Recommended Method for Screening and Modeling Local Risk and Hazards (BAAQMD, 2011d) and used in the cancer risk, as well as the acute and chronic noncancer analyses.

Health risks were estimated based on the projected annual construction-related exhaust emissions at each site, of $PM_{2.5}$, DPM, and TACs (such as acrolein [for on-road sources only], acetaldehyde, benzene, 1,3-butadiene, ethylbenzene, formaldehyde, and naphthalene) from gasoline engines. It was conservatively assumed that the maximum emissions would be uniform over the duration of construction. In reality, emissions would vary by day and phase. Emissions were modeled using the $\chi/Q$ method, such that the entire construction scenario had unit emission rates (i.e., 1 gram per second [g/s]), and the model estimates dispersion factors (with units of [$\mu g/m^3$]/[g/s]). The schedule (see Figure 7) and hours of operation[9] for each site were used to convert annual emissions to the unit emission rates. The annual and unit (g/s) emission rates for each project site are presented in Table 7 below.

### 5.1.2 Dispersion Modeling

The approved AQTR SOW recommended using a Tier 1 SCREEN3 modeling approach to evaluate worst-case project health risks. SCREEN3 is a single source Gaussian plume model that provides maximum ground-level concentrations for point, area, flare, and volume sources.

However, in subsequent conversations with the BAAQMD staff, it was determined that the SCREEN3 model was unable to estimate short-term to annual average concentrations, given that SCREEN3 only provided short-term concentrations (maximum 1-hour concentrations). Therefore, BAAQMD recommended modeling $PM_{2.5}$ and TAC concentrations using a Tier 2 model, such as the Industrial Source Complex Short Term (ISCST3) model, instead (BAAQMD, 2012c). Typically, AERMOD is the preferred regulatory dispersion model because it uses a refined meteorology and topography input. However, AERMOD-ready

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[9] The maximum daily hours of operation provided by SFPUC engineers was 8 hours per day.

### Table 7
### Site-Specific Construction Criteria Air Pollutant Emissions

| Project Site | $PM_{2.5}$ | DPM | TOG |
|---|---|---|---|
| **Colma** | | | |
| Annual Emissions (tons/year) | 0.037 | 0.040 | 4.15E-04 |
| Unit Emissions (grams/second) | 0.017 | 0.018 | 1.89E-04 |
| **South San Francisco (including common staging area)** | | | |
| Annual Emissions (tons/year) | 0.038 | 0.042 | 4.15E-04 |
| Unit Emissions (grams/second) | 0.015 | 0.017 | 1.65E-04 |
| **San Bruno North** | | | |
| Annual Emissions (tons/year) | 8.62E-03 | 7.93E-03 | 0.00 |
| Unit Emissions (grams/second) | 0.012 | 0.014 | 0.00 |
| **San Bruno South** | | | |
| Annual Emissions (tons/year) | 0.11 | 0.12 | 8.29E-04 |
| Unit Emissions (grams/second) | 0.022 | 0.024 | 1.66E-04 |
| **Millbrae** | | | |
| Annual Emissions (tons/year) | 0.050 | 0.055 | 4.15E-04 |
| Unit Emissions (grams/second) | 0.014 | 0.016 | 1.19E-04 |

meteorological data are not available for the stations in proximity to the sites; therefore, the ISCST3 model was recommended by the BAAQMD staff. Air dispersion models such as ISCST3 require a variety of inputs such as source parameters, meteorological parameters, topography information, and receptor parameters. The modeling parameters used in ISCST3 are described below.

## Meteorological Data

Meteorological data representing the conditions for the project site were obtained from the closest meteorological reporting site: San Francisco International Airport (KSFO) (Site ID: 23234, 300-meter mixing height). BAAQMD staff stated that the only ISCST3-model ready data for the KSFO station was the 5-year period from 1991 through 1995 (BAAQMD, 2012d). The 1992 meteorological data were found to be invalid; therefore, only 4 years of meteorological data were used in the health risk analysis.

## Terrain

Surface conditions and topographic features generate turbulence, modify vertical and horizontal winds, and change the temperature and humidity distributions in the boundary layer of the atmosphere. These in turn affect pollutant dispersion, and various models differ in their needs to adjust for these variables. Terrain elevation is defined as the elevation relative to the facility base elevation. For the purposes of this model, it was assumed that the sites will have simple flat terrain, because the terrain heights do not exceed stack base elevation (BAAQMD, 2011d). Additionally, the terrain surrounding the sites was modeled as an urban area.

## Source Characterization

Emission rates used in the health risk analysis are described in Section 4.1, Criteria Air Pollutant Methodology. Construction and staging areas at the well sites were represented by a series of adjacent area sources. In addition, segments of I-280 adjacent to the pipeline construction area were included in the modeling analysis and also were represented as a series of adjacent area sources. Each area source was modeled with a release height of 2 meters. Area sources representing the pipeline alignment were 16 meters in width,[10] representing the maximum trench construction corridor. Area sources representing I-280 varied in width from 48 to 72 meters, based on the number of lanes, median width, and on- and off-ramps associated with each segment. The location of the area sources, along with discrete receptor locations and the Cartesian receptor grid, are shown in Figure 8. The Cartesian receptor grid allows for the setup of a receptor grid with uniform north-south and east-west spacing. The Cartesian grid was used whenever possible to represent receptors. Discrete receptors were used in locations where it was difficult to set up a Cartesian grid, such as certain residences located northeast of Interstate 210, where the interstate runs northwest to southeast. All staging area emissions were assumed to originate from the Peninsula High School Parking Lot staging area and the SFPUC ROW in front of the San Bruno Chinese Church, because they are located adjacent to sensitive receptors and represent a conservative scenario. Because this scenario did not show significant concentrations within the high school parking lot, SFPUC ROW, or at nearby receptors, modeling of the church parking lot staging area was determined to be unnecessary.

Daily emissions from construction equipment and truck trips were accounted for in the pipeline construction area sources. Daily emissions from I-280 were based on estimates of the average annual daily trips related to project construction activities, for this road segment. Ten percent of the maximum daily emissions modeled for the construction areas were assumed to occur in the staging areas, and 90 percent in the construction areas. This 90 percent of total construction emissions was uniformly distributed across each of the active construction area sources. Because construction activities are anticipated to occur 5 days a week for 8 hours, variable emissions profiles were applied to each area source to accurately reflect construction activity. Emissions from I-280 were assumed to occur 7 days a week for 24 hours per day.

## Receptors

According to the BAAQMD Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 2.0, sensitive receptors are defined as residential dwellings, including apartments, houses, and condominiums; schools, colleges, and universities; daycares; hospitals; and senior-care facilities.

All sites, with the exception of the Colma site, are located within residential areas. Figures 2 through 5 identify the sensitive receptors within 1,000 feet of the sites.

As shown on Figure 2, sensitive receptors at the Colma site include Home Sweet Home Senior Care center and the adjacent residence along El Camino Real, east of the construction zone.

As shown on Figure 3, sensitive receptors within the 1,000-foot buffer at the South San Francisco site are residences along West Orange Avenue, Fairway Drive, and Southwood Drive to the south of the project construction zone and east of the staging and spoils area; and residences along Arroyo Drive, Alta Mesa

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[10] The 16-meter (48-foot) corridor represents the average area from which emissions would be generated, including the trench and areas adjacent to it.

6/04/12 vsa...T:\SFPUC CS-116 Peninsula Pipelines\Air Quality Tech Rpt\Fig8_receptors_grid.ai

+ Discrete Receptors

☐ Cartesian Grid Receptor

⬚ Area Sources

Note:
The Cartesian receptor grid includes the Peninsula High School. Discrete receptors were used to denote other receptors where it was not possible to use the Cartesian receptor grid.

## AREA SOURCE, RECEPTOR LOCATIONS AND RECEPTOR GRID

Peninsula Pipelines Seismic Upgrade
San Francisco Public Utilities Commission
San Mateo County, California
June 2012

**FIGURE 8**

Drive, Indio Drive, Del Monte Drive, Camaritas Avenue, Del Paso Drive, Hermosa Lane, and Chico Court to the north of the project construction zone and the staging and spoils area. There are also residences along A Street, B Street, and C Street to the south of the project construction area and west of the staging and spoils area. Other sensitive receptors identified on Figure 3 within the 1,000-foot buffer zone include the Westborough Royale Assisted Living Center and Our Redeemers Lutheran Church. Baden High School, South San Francisco Adult School, and Los Cerritos Elementary School are located just outside the 1,000-foot buffer zone.

As shown on Figure 4, sensitive receptors within a 1,000-foot buffer zone at the San Bruno North site include residences along Crestwood Drive, Cunningham Highway, and Hawthorne Avenue to the east of the project construction zone and the staging and spoils area; residences along Cedarwood Court, Hickory Avenue, Juniper Avenue, Holly Avenue, and Pepper Drive to the east of the project construction zone and the staging and spoils area; and the Shelter Creek condominiums to the southwest of the project construction zone.

As shown on Figure 5, the San Bruno South site includes sensitive receptors within a 1,000-foot buffer zone, such as residences along Rosewood Drive, Madison Avenue, and Glenbrook Lane to the west of the project construction zone and the staging and spoils area; the San Mateo Union Community Daycare and Peninsula High School to the south of the project construction zone and the staging and spoils area; and the San Bruno Chinese Church to the east of the project staging and spoil area.

As shown on Figure 6, sensitive receptors near the construction area and the staging and spoils areas at the Millbrae site include the residences along Lomita Avenue, Terrance Drive, Ridgewood Drive, Robin Lane, Brookside Lane, Glenwood Drive, Fernwood Drive, Elmwood Drive, Oakwood Lane, and Banbury Lane to the west of the project construction zone and the staging and spoils area; residences along Parkview Drive, Bayview Avenue, Santa Barbara Avenue, Guadalupe Avenue, and Santa Margarita Avenue to the east of the project staging and spoils area; and residences along Ridgewood Drive, Helen Drive, and Evergreen Way to the south of the project construction zone and the staging and spoils area. Other notable sensitive receptors within the 1,000-foot area of the emission sources at the Millbrae site include the Glen Oaks Montessori School and Millbrae Montessori School north of the construction zone. Meadows Elementary School is identified as a sensitive receptor on Figure 6 even though it is outside of the 1,000-foot buffer zone because of potential impacts, given the proximity to the project.

## 5.2 HEALTH RISK ASSESSMENT RESULTS

The following section describes the various components of the HRA.

### 5.2.1 Exposure Assumptions

The exposure assessment estimates human exposure to substances that can increase cancer risk or cause acute and chronic noncancer health risks. The TACs evaluated in this HRA are emitted into the air, so the primary exposure pathway is through inhalation.

Dose-response assessment is the process of characterizing the relationship between exposure to an agent and incidence of an adverse health effect in exposed populations. In quantitative carcinogenic risk assessments, the dose-response relationship is expressed in terms of a potency slope that is used to calculate the probability or risk of cancer associated with an estimated exposure. Cancer potency factor is expressed as the 95th percent upper confidence limit of the slope of the dose response curve, and assumes continuous lifetime exposure to a substance at a dose of 1 milligram per kilogram of body weight per day (mg/kg/day), commonly expressed in units of inverse dose (i.e., mg/kg/day$^{-1}$). It is assumed in cancer risk assessments that risk is directly proportional to dose, and that there is no threshold for carcinogenesis. OEHHA has compiled cancer potency factors, which should be used in risk assessments (OEHHA, 2011).

For noncarcinogenic effects, dose-response data developed from animal or human studies are used to develop acute and chronic noncancer Reference Exposure Levels (RELs). The acute and chronic RELs are defined as the concentration at which no adverse noncancer health effects are anticipated. The most sensitive health effect is chosen to determine the REL if the chemical affects multiple organ systems. Unlike cancer health effects, noncancer acute and chronic health effects are generally assumed to have thresholds for adverse effects. In other words, acute or chronic injury from a pollutant will not occur until exposure to that pollutant has reached or exceeded a certain concentration (i.e., threshold). The acute and chronic RELs are intended to be below the threshold for health effects in the general population.

Risk characterization is the final step of risk assessment. Modeled concentrations and public exposure information, which are determined through exposure assessment, are combined with potency factors and RELs that are developed through dose-response assessment.

### 5.2.2 Cancer Risk

The maximum incremental cancer risk from exposure to TACs was calculated by estimating exposure to carcinogenic chemicals and multiplying the dose times the cancer potency factor. The following equation was used to determine cancer risk:

**Cancer Risk = (Dose * CRAF * Cancer Potency Factor)**, where:

Cancer Risk = risk (potential chances per million)
Dose = dose through inhalation (mg/kg/day)
CRAF = Cancer risk adjustment factor (10 for infant receptors over a period of 2 years)[11]
Cancer Potency Factor = toxicity factor (mg/kg/day$^{-1}$)

Dose is estimated using the following equation:

**Dose = (Cair * DBR * EF * ED * CF)/AT**, where:

Dose = dose through inhalation (mg/kg/day)
Cair = annual air concentration (µg/m$^3$) from air dispersion model
DBR = daily breathing rate (302 liters per kilogram body weight-day for adults and 581 liters per kilogram per day for children)
EF = exposure frequency (350 days/year)
ED = exposure duration (9 months)
CF = conversion factor (10-$^6$ ([milligrams per microgram] * [cubic meters per liter])
AT = averaging time (25,550 days or 70 years)

For the construction HRA, the BAAQMD-recommended 581 liters per kilogram per day was used for child receptors at identified schools and daycare centers (BAAQMD, 2011c). The exposure frequency was assumed to be 350 days per year for residents (adults and children), 180 days for child receptors in school, and 245 days for child receptors at daycare. Exposure duration for each project site was based on the construction schedule presented in Figure 7. To determine incremental cancer risk, the estimated dose

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[11] Based on conversations with the BAAQMD staff, because the construction period for the project is less than 70 years, a CRAF of 10 was suggested for exposures that occur at construction sites to child receptors (BAAQMD, 2012c).

through inhalation was multiplied by the OEHHA-established cancer potency slope factor of 1.1 $(mg/kg/day)^{-1}$ for DPM.

To estimate the cancer risk from TOG, the different compounds that make up the toxic portions of TOG are speciated using the BAAQMD breakdown tables (BAAQMD, 2011d). A weighted toxicity value was then developed that incorporates the individual toxicity of each speciated compound that makes up TOG. The weighted toxicity values are then developed for each emission source by multiplying the TOG speciated percentage of each individual compound by its corresponding toxicity value.

Analyses conducted by the OEHHA indicate that both the prenatal and postnatal life stages can be, but are not always, much more susceptible to developing cancer than the adult life stage. The analyses also indicated that the age sensitivity factors (ASFs) for these age windows vary by chemical, gender, and species. ASFs for prenatal, postnatal, and juvenile exposures is complicated by the limited database of chemicals and studies available for analysis, and the broad distribution of results for different chemicals. U.S. Environmental Protection Agency and OEHHA have proposed to apply a default ASF of 10 for the third trimester to age 2 years, and a factor of 3 for ages 2 through 15 years to account for potential increased sensitivity to carcinogens during childhood and applied to all carcinogens, regardless of the theorized mode of action. For estimating cancer risk for residential receptors, the incorporation of the ASFs results in a cancer risk adjustment factor (CRAF) of 1.7. For estimating cancer risk for child receptors at school, a CRAF of 3 should be applied (BAAQMD, 2011d). The CRAF for child receptors near construction would sites would be 10, because the construction period is less than 70 years (BAAQMD, 2012c)

Existing receptors in the vicinity of the project site would be exposed to TAC emissions generated during construction of the project. It should be noted that this is a conservative assumption because it assumes that the maximally exposed individual would be exposed to the annual average concentration throughout the construction period, when during the actual construction process equipment location would vary within the project area (and TAC concentrations around the sites would change). The receptor grids, in combination with discrete receptors described above, allows the examination of TAC concentrations throughout the area surrounding the construction sites.

Results for cancer risk impacts were modeled for the San Bruno South site, because this site had the longest construction period. If the health risk for the San Bruno South site was above the significance thresholds, the site with the second-longest construction period would have been modeled. Because the health risks for the San Bruno South project site were below the significance thresholds, the health risks for other project sites were based on the modeling results for the San Bruno South site.

Based on the assessment described above, it was determined that the maximally exposed individual would be exposed to an incremental cancer risk of 6.9 in one million at the San Bruno South site, which is below the threshold of 10 in one million. Thus, incremental cancer risks at the various project sites would be below the cancer risk threshold (as presented in Table 8). The impact would be less than significant. Detailed modeling results are presented on the accompanying CD (in Appendix 2).

### 5.2.3 Chronic Noncancer Hazard Index

The potential for exposure to result in chronic noncancer effects is evaluated by comparing the estimated annual average air concentration (which is equivalent to the average daily air concentration) to the chemical-specific noncancer chronic RELs. The chronic REL is the inhalation exposure concentration at which no adverse chronic health effects would be anticipated following exposure. When calculated for a

## Table 8
## Construction Period Health Risk Assessment Results

| Site | Project Impact (Unmitigated) | | | |
|---|---|---|---|---|
| | Annual Average $PM_{2.5}$ ($\mu g/m^3$) | Cancer Risk (per million)[3] | Chronic Hazard Quotient[4] | Acute Hazard Quotient[5] |
| Colma[1] | 0.024 | 2.3 | 0.005 | 2.280E-07 |
| South SF[1] | 0.025 | 2.4 | 0.006 | 2.280E-07 |
| San Bruno North[1,2] | 0.005 | 0.5 | 0.001 | 0.000E+00 |
| San Bruno South | 0.072 | 6.9 | 0.016 | 4.561E-07 |
| Millbrae[1] | 0.033 | 3.2 | 0.007 | 2.280E-08 |
| **Thresholds[3]** | **0.3** | **10** | **1** | **1** |

Notes:

[1] Only the San Bruno South site was modeled using ISCST3. $PM_{2.5}$ and DPM concentrations for the other sites were calculated by using the ratio of each site's total emissions to the San Bruno South site's total emissions. The nearest sensitive receptor to the San Bruno South site was adjacent to the construction area; therefore, these results present a worst case scenario at each of the other sites. Meteorological conditions are similar at all sites.

[2] The San Bruno North site Acute Hazard is zero because no gasoline operated equipment would be used during construction at the site. DPM does not cause acute health effects.

[3] The cancer risk was estimated for DPM and TOG at the Colma, South San Francisco, San Bruno South, and Millbrae sites. The cancer risk was estimated for DPM only at the San Bruno North site because there would be no gasoline-operated equipment at that site. The cancer risk for speciated TOG, such as acetaldehyde, benzene, 1,3-butadiene, ethylbenzene, formaldehyde, and naphthalene, was estimated based on the TOG dose multiplied by the individual speciated TOG cancer potency factor (BAAQMD, 2011d). There is no cancer potency factor available for acrolein, so cancer risks from acrolein were not estimated.

[4] The chronic hazard quotient was estimated for DPM at all sites by dividing the modeled DPM concentration at each site by the DPM chronic inhalation REL. The chronic hazard quotient for speciated TOG, such as acrolein (for on-road sources only), acetaldehyde, benzene, 1,3-butadiene, ethylbenzene, formaldehyde, and naphthalene, was estimated at all sites except San Bruno North, because the San Bruno North site would not have any gasoline equipment onsite. The chronic hazard quotient for speciated TOG was estimated by multiplying the modeled TOG concentration by the EMFAC speciated TOG percent, and dividing it by the speciated TOG chronic inhalation REL.

[5] There is no acute inhalation REL for DPM, 1,3-butadiene, ethylbenzene, and naphthalene, so an acute hazard quotient for those pollutants was not estimated. An acute hazard quotient was estimated for speciated TOGs, such as acrolein (for on-road sources only), acetaldehyde, benzene, and formaldehyde, at all sites except San Bruno North, because the San Bruno North site does not operate any gasoline equipment onsite. An acute hazard quotient for speciated TOG was estimated by multiplying the modeled TOG concentration by the EMFAC speciated TOG percent, and dividing it by the speciated TOG acute inhalation REL.

$\mu g/m^3$ = micrograms per cubic meter
$PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter

single chemical, the comparison yields a ratio termed a hazard quotient (HQ). To evaluate the potential for adverse chronic noncancer health effects from simultaneous exposure to multiple chemicals, the HQs for all chemicals are summed, yielding a HI.

The chronic risk level is calculated as follows:

**Inhalation chronic risk = Cair / cREL**, where:

Cair = annual concentration (μg/$m^3$)
cREL = Chronic noncancer REL (μg/$m^3$)

The results are presented in Table 8. As shown in the table, TAC exposure from the project's construction emissions would result in a maximum chronic HI of 0.016 at the San Bruno South site, which is well below the threshold of 1.0; therefore, chronic noncancer health impacts at existing receptors would be less than significant.

### 5.2.4 Acute Noncancer Hazard Index

The potential exposure to emissions of pollutants resulting in acute noncancer effects is evaluated by comparing the estimated 1-hour maximum air concentration to the chemical-specific noncancer acute RELs. The acute REL is the inhalation exposure concentration at which no adverse acute health effects would be anticipated following exposure. When calculated for a single chemical, the comparison yields a ratio termed a HQ. To evaluate the potential for adverse acute noncancer health effects from simultaneous exposure to multiple chemicals, the HQs for all chemicals are summed, yielding an HI.

The acute risk level is calculated as follows:

**Inhalation chronic risk = Cair / aREL**, where:

Cair = 1-hour concentration (μg/$m^3$)
aREL = Acute Noncancer REL (μg/$m^3$)

There is currently no acute noncancer toxicity value available for DPM. TAC exposure from the project's construction emissions would result in an acute HI of 4.6E-7 at the San Bruno South site (see Table 8), which is well below the threshold of 1.0; therefore, acute noncancer health impacts at existing receptors would be less than significant.

### 5.2.5 Ambient $PM_{2.5}$ Increase

The $PM_{2.5}$ increase was modeled in ISCST3, based on the unit concentration of $PM_{2.5}$. Results of the analysis also indicate that the incremental increase in annual average $PM_{2.5}$ concentration would be 0.072 μg/$m^3$ near the construction site, which is below the significance threshold of 0.3 μg/$m^3$ (see Table 8). Therefore, $PM_{2.5}$ concentrations from construction-related emissions would be less than significant. No mitigation would be required.

## 5.3 CUMULATIVE HEALTH RISK

A cumulative health risk analysis is conducted for each site, and results are compared to the thresholds for cumulative effects:

- An excess lifetime cancer risk level of more than 100 in one million;
- A chronic noncancer HI greater than 10; and
- An incremental increase in the annual average $PM_{2.5}$ of greater than 0.8 $\mu g/m^3$.

The incremental increase in $PM_{2.5}$ concentrations, incremental cancer risk, and chronic HI from all past, present, and foreseeable future sources (including stationary sources, roadways with greater than 10,000 AADT, and construction projects) within a 1,000-foot radius from the project fenceline of the sources, plus the contribution from the project, are analyzed for the cumulative HRA. Stationary sources, interstates, and surface roadways with traffic greater than 10,000 AADT within the 1,000-foot buffer zone of each project site are presented in Table 3.

There is only one construction project within the project’s 1,000-foot buffer zone: the Regional Groundwater Storage and Recovery (GSR) Project, which will be constructed from February 2013 through November 2015 and coincide with the project’s construction period.

**Stationary Sources.** The screening $PM_{2.5}$ concentration, cancer risks, and hazards values for permitted stationary sources were obtained from the BAAQMD county-specific files for Google Earth$^{TM}$ (BAAQMD, 2012e). The BAAQMD gas station cancer risk and chronic hazard distance multipliers were used for gas stations, such as the Westborough Chevron, Comino Petroleum, Orange Avenue Shell, and the Shelter Creek Chevron. The multiplier is based on the distance between the gas station and the nearest sensitive receptor. There was one diesel generator for which BAAQMD did not provide screening values. The $PM_{2.5}$ concentrations, cancer risks, and hazards values for that source was included in the cumulative analysis by modeling permitted emission rates, provided by the BAAQMD, in ISCST3.

**Major Roadways.** The screening $PM_{2.5}$ concentration, cancer risks, and hazards values for highways and major roadways greater than 10,000 AADT were obtained from the BAAQMD county-specific files for Google Earth$^{TM}$ (BAAQMD, 2012e), based on distance from the nearest sensitive receptor. Traffic data for major surface roadways were obtained from the California Environmental Health Tracking Program traffic tool (CEHTP, 2012).

**Other Construction Projects.** As mentioned above, the only construction project within the 1,000-foot buffer zone that is anticipated to be constructed during the PPSU construction period is the Regional GSR Project. The construction emission estimates for GSR were not available for use in the PPSU cumulative HRA. However, Environmental Planning recommended inference of GSR emissions based on Groundwater Supply Project construction emissions (Environmental Planning, 2012a). Using the emissions and average well flow rate for the Groundwater Supply Project, emission rates per well for the GSR were estimated. These emissions rates were modeled in the ISCST3 model to estimate $PM_{2.5}$ concentrations, cancer risks, and HIs per well. Two GSR wells are proposed to be constructed within the Colma site’s 1,000-foot buffer zone, and three GSR wells are proposed to be constructed within the South San Francisco site’s 1,000-foot buffer zone. The health risk values per well were multiplied by the number of wells surrounding the project sites to obtain construction cumulative health risk values.

Table 9 shows the cumulative cancer risk, $PM_{2.5}$ concentrations, and chronic hazard indices from all sources within the 1,000-foot buffer zone. As shown in the table, the maximum cumulative health risk impacts at the San Francisco South site would result in a $PM_{2.5}$ concentration of 0.421 $\mu g/m^3$, a cancer risk of 83 in one million, and a chronic HI of 0.154. Therefore, the project’s construction would not result in a substantial health risk, nor would it make a considerable contribution to cumulative health risk impacts. Therefore, cumulative risks, including the project’s incremental contribution, would not be considerable.

## Table 9
## Construction Period Cumulative Health Risk Assessment Results

| | Nearby Sources[8] | | | | Nearby Construction Projects[1] | | | | Cumulative Analysis | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Site** | **Plant Number/Roadway/Interstate** | **Annual Average $PM_{2.5}$ ($\mu g/m^3$)** | **Cancer Risk (per million)** | **Chronic Hazard** | **Project Name** | **Annual Average $PM_{2.5}$ ($\mu g/m^3$)[5]** | **Cancer Risk (per million)** | **Chronic Hazard** | **Annual Average $PM_{2.5}$ ($\mu g/m^3$)** | **Cancer Risk (per million)** | **Chronic Hazard** |
| Colma Site[4] | G11198: Lexus of Serramonte | N/A | 8.722 | 0.012 | Regional Groundwater Storage and Recovery Project | 0.046 | 4.3 | 0.01 | 0.199 | 19 | 0.087 |
| | 8758: Serramonte Ford Body Shop | 0.018 | 0.000 | 0.000 | | | | | | | |
| | 12251: G & M Auto Body | 0.000 | 0.040 | 0.000 | | | | | | | |
| | 12368: Honda of Serramonte | 0.000 | 0.000 | 0.000 | | | | | | | |
| | G8650: Home of Peace Cemetery | N/A | 0.222 | 0.000 | | | | | | | |
| | El Camino Real[2] | 0.077 | 2.571 | 0.030 | | | | | | | |
| | Serramonte Boulevard[2] | 0.034 | 1.161 | 0.030 | | | | | | | |
| South San Francisco Site (including common staging area)[4] | G11428[10]: Westborough Chevron | N/A | 0.331 | 0.001 | Regional Groundwater Storage and Recovery Project | 0.068 | 6.5 | 0.015 | 0.421 | 83 | 0.154 |
| | 19316[6] : Access Properties LLC | 0.000 | 0.008 | 0.000 | | | | | | | |
| | El Camino Real[2] | 0.020 | 0.804 | 0.030 | | | | | | | |
| | Westborough Boulevard[2] | 0.204 | 5.903 | 0.030 | | | | | | | |
| | 5611: Daland Body Shop | 0.000 | 0.000 | 0.000 | | | | | | | |
| | 14240: SFPUC Water Supply and Treatment Division | 0.104 | 58.80 | 0.021 | | | | | | | |
| | 19842: Chestnut Cleaners | 0.000 | 7.490 | 0.020 | | | | | | | |
| | G11391[10]: Camino Petroleum | N/A | 0.214 | 0.019 | | | | | | | |
| | G12394[10]: Orange Avenue Shell | N/A | 0.149 | 0.013 | | | | | | | |
| San Bruno North Site[4,7] | G3134[10]: Shelter Creek Chevron | N/A | 0.618 | 0.001 | N/A | N/A | N/A | N/A | 0.123 | 8 | 0.011 |
| | I-280[3] | 0.118 | 6.843 | 0.009 | | | | | | | |
| San Bruno South Site | 16280: Verizon Wireless Highway 35/280 | 0.003 | 11.140 | 0.004 | N/A | N/A | N/A | N/A | 0.109 | 20 | 0.022 |
| | I-280[3] | 0.034 | 2.008 | 0.002 | | | | | | | |
| Millbrae Site[4] | G7549: Green Hills Country Club | N/A | 0.635 | 0.001 | N/A | N/A | N/A | N/A | 0.033 | 4 | 0.008 |
| **Thresholds**[9] | | | | | | | | | **0.8** | **100** | **10** |

Notes:

[1] All nearby construction projects (within 1,000 feet of the construction area) were assumed to comply with the BAAQMD thresholds for project construction.

[2] Roadway annual average $PM_{2.5}$ and cancer risk for surface streets >10,000 AADT were estimated from screening tables provided by BAAQMD (BAAQMD, 2012e) and traffic data from the California Environmental Health Tracking Program traffic tool (CEHTP, 2012). The maximum acute and chronic HI for roadways will be less than 0.03.

Interstate annual average $PM_{2.5}$, cancer risk, and chronic hazard values were estimated from the BAAQMD highway screening analysis tool for San Mateo County (BAAQMD, 2012e).

[4] $PM_{2.5}$ and DPM concentrations were modeled using ISCST3 only for the San Bruno South site. The remaining sites' $PM_{2.5}$ and DPM concentrations were calculated by using the ratio of each site's total emissions to the San Bruno South site's total emissions. The nearest sensitive receptor to the San Bruno South site was adjacent to the construction area; therefore, these results present a worst case scenario at each of the other sites. Meteorological conditions are similar at all sites.

[5] While the BAAQMD threshold for project construction $PM_{2.5}$ concentrations is 0.3 $\mu g/m^3$, in order to meet a cancer risk value of 10 in a million, $PM_{2.5}$ concentrations from diesel exhaust cannot exceed 0.101 $\mu g/m^3$. Therefore, the worst possible impact from $PM_{2.5}$ concentrations at any receptor must be equal to or less than 0.101 $\mu g/m^3$ to comply with BAAQMD new source thresholds.

[6] For Source #19316, URS was provided average daily emissions, and not annual average $PM_{2.5}$, cancer risk, or chronic hazard. Consequently, the annual $PM_{2.5}$ concentration, cancer risk, and chronic hazard were estimated by assuming this source was located at the construction site, and the same ratio methodology described in footnote 4 was used to calculate a worst case impact.

[7] Acute hazard for the San Bruno North site is zero because no gasoline-operated equipment would be used during construction. DPM does not impact acute hazard.

[8] Some nearby sources emit $PM_{2.5}$, but in quantities below the significant figures reported to the BAAQMD. These are represented by zero. Sources that do not emit $PM_{2.5}$ (e.g., gas stations) have N/A for $PM_{2.5}$ concentrations. In addition, for cancer risk and chronic hazard, some sites register values below the significant figures used by the BAAQMD.

[9] The BAAQMD has acute hazard significance thresholds for individual projects, but not for cumulative impacts. Consequently, cumulative acute hazards were not estimated.

[10] The BAAQMD gas station cancer risk and chronic hazard distance multipliers were used where appropriate using the distance between the gas station and the nearest sensitive receptor.

AADT = annual average daily traffic
BAAQMD = Bay Area Air Quality Management District
DPM = diesel particulate matter
I-280 = Interstate 280
$\mu g/m^3$ = micrograms per cubic meter
$PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter
SFPUC = San Francisco Public Utilities Commission

## 6.0 CONCLUSION

Project-related construction emissions were estimated using the CARB OFFROAD 2011 and EMFAC 2011 models, and then compared to the thresholds of significance. The proposed project would not result in significant construction criteria air pollutant emissions, nor would it make a considerable contribution to a cumulative criteria pollutant air quality impact.

Individual and cumulative health risk impacts were analyzed by modeling site unit emissions in the ISCST3 dispersion model. Individual site $PM_{2.5}$, cancer and noncancer risks for DPM and gasoline-related TACs, such as acetaldehyde, benzene, 1,3-butadiene, ethylbenzene, formaldehyde, and naphthalene, were compared to the significance thresholds. $PM_{2.5}$, cancer, and noncancer health risks from project construction would be below the applicable thresholds. Therefore, the project's individual health risk impacts would be less than significant.

Cumulative health risk impacts from stationary sources and roadways with greater than 10,000 AADT within 1,000 feet of the site were analyzed using the BAAQMD screening values. For stationary sources without screening values, and construction projects within 1,000 feet of the site, the $PM_{2.5}$, cancer and noncancer risks were modeled using the ISCST3 dispersion model. The $PM_{2.5}$, cancer, and noncancer health risks from cumulative projects within the 1,000-foot buffer zone, including the proposed project, were compared to and found to be below the applicable thresholds. Therefore, cumulative health risks impacts would be less than significant.

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# APPENDIX 1
# APPROVED AIR QUALITY TECHNICAL REPORT SCOPE OF WORK

# SAN FRANCISCO PUBLIC UTILITIES COMMISSION
# PENINSULA PIPELINES SEISMIC UPGRADE
# ENVIRONMENTAL ANALYSIS SERVICES
# AGREEMENT NO. CS-116A

## FINAL AIR QUALITY TECHNICAL REPORT
## SCOPE OF WORK

*Prepared for:*

**San Francisco Public Utilities Commission**
**San Francisco Planning Department, Major Environmental Analysis Division**

*Prepared by:*

**URS Corporation**
**One Montgomery Street, Suite 900**
**San Francisco, CA 94104**

**November 22, 2011**

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## ACRONYMS

| | |
|---|---|
| AADT | annual average daily traffic |
| ABAG | Association of Bay Area Governments |
| BAAQMD | Bay Area Air Quality Management District |
| CEQA | California Environmental Quality Act |
| CO | carbon monoxide |
| DPM | diesel particulate matter |
| HRA | health risk assessment |
| HTWTP | Harry Tracy Water Treatment Plant |
| lbs/day | pounds per day |
| $\mu g/m^3$ | microgram per cubic meter |
| MEI | maximally exposed individual |
| $NO_X$ | oxides of nitrogen |
| OEHHA | Office of Environmental Health Hazard Assessment |
| $PM_{10}$ | particulate matter less than or equal to 10 microns in diameter |
| $PM_{2.5}$ | particulate matter less than or equal to 2.5 microns in diameter |
| POM | polycyclic organic matter |
| PPSU | Peninsula Pipelines Seismic Upgrade |
| ROG | reactive organic gases |
| SAPL2 | San Andreas Pipeline No. 2 |
| SAPL3 | San Andreas Pipeline No. 3 |
| SFEP | San Francisco Planning Department, Environmental Planning Division |
| SFPUC | San Francisco Public Utilities Commission |
| $SO_2$ | sulfur dioxide |
| SOW | scope of work |
| SSBPL | Sunset Supply Branch Pipeline |
| TAC | toxic air contaminants |
| URS | URS Corporation |
| U.S. EPA | U.S. Environmental Protection Agency |

# 1.0 INTRODUCTION

This document describes URS Corporation's (URS) proposed scope of work (SOW) for preparing the Air Quality Technical Report for the San Francisco Public Utilities Commission's (SFPUC's) Peninsula Pipelines Seismic Upgrade (PPSU) project. This document is required per guidelines from the San Francisco Planning Department, Environmental Planning Division (SFEP) to comply with the California Environmental Quality Act (CEQA) and the latest Bay Area Air Quality Management District (BAAQMD) CEQA guidance (BAAQMD, 2011a).

This SOW contains the following sections:

1. Project Description Assumptions
2. Project Setting Assumptions (including project area map showing sensitive receptors and existing major emissions sources in the project area)
3. Criteria Air Pollutant Methodology
4. Health Risk and Hazards Methodology
5. Potential Mitigation Measures
6. Contents of the Air Quality Technical Report
7. Assumptions for Reviewing and Finalizing the Technical Report

# 2.0 PROJECT DESCRIPTION ASSUMPTIONS

The proposed project is the seismic upgrade of SFPUC water pipelines at five locations within the cities of Colma, South San Francisco, San Bruno, and Millbrae in San Mateo County on the San Francisco Peninsula, as shown in Figure 1.

The proposed project would result in seismic upgrades to three water transmission pipelines: the San Andreas Pipeline No. 2 (SAPL2) and San Andreas Pipeline No. 3 (SAPL3) and the Sunset Supply Branch Pipeline (SSBPL). These transmission pipelines deliver potable water from the Harry Tracy Water Treatment Plant (HTWTP) to the SFPUC's regional water distribution system. Portions of these pipelines traverse the Serra Fault—a secondary fault along the peninsula in San Mateo County that may experience movement in the future, possibly coincident with a large earthquake along the San Andreas Fault. During recent geotechnical investigations performed for the HTWTP Long-Term Improvement Project, it was determined that fault offset on the Serra fault during a San Andreas design event may cause pipeline failure at the fault crossings. Additionally, SAPL2, constructed circa 1928, uses lockbar joints for longitudinal joints and rivets for circumferential joints, which are highly seismically vulnerable to joint failure. In addition to the fault crossings, there are other areas where the pipelines cross potential liquefaction and landslide zones. The proposed project would replace/stabilize segments of these pipes at five locations that are susceptible to failure during such events. The overall project goal for the upgrades to SAPL2, SAPL3, and SSBPL is to increase the seismic reliability of water delivery from HTWTP to downstream customers after a major earthquake on the San Andreas Fault.

Construction activities of the proposed project would be anticipated to result in direct emissions of criteria air pollutants such as carbon monoxide (CO), oxides of nitrogen ($NO_X$), reactive organic gases (ROG), particulate matter less than or equal to 10 microns in diameter ($PM_{10}$), particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), and sulfur dioxide ($SO_2$). These activities will also result in emissions of the seven priority toxic air contaminant (TAC) identified by the U.S. Environmental Protection Agency (U.S. EPA), which include acrolein, benzene, 1,3-butadiene, diesel particulate matter (DPM), formaldehyde, naphthalene, and polycyclic organic matter (POM) from the operation of diesel construction equipment (U.S. EPA, 2007). There will be a small number of gasoline powered engines, but toxic emissions from these engines are expected to be minimal. There will not be any stationary sources at the project site.

Additionally, the proposed project will not introduce any new sensitive receptors to the site. The mobile and construction sources, and their associated pollutant emissions, are listed below.

- Mobile Sources:
  - On-Road Haul Trucks (Criteria pollutants: CO, $NO_X$, ROG, $PM_{10}$ [combustion and fugitive dust], $PM_{2.5}$ [combustion and fugitive dust], $SO_2$; Toxic air contaminants: acrolein, benzene, 1,3-butadiene, DPM, formaldehyde, naphthalene, and POM).
  - On-Road Worker Vehicles (Criteria pollutants: CO, $NO_X$, ROG, $PM_{10}$ [combustion and fugitive dust], $PM_{2.5}$ [combustion and fugitive dust], $SO_2$; Toxic air contaminants: acrolein, benzene, 1,3-butadiene, DPM, formaldehyde, naphthalene, and POM).

- Construction Sources:
  - Off-road Construction Equipment (Criteria pollutants: CO, $NO_X$, ROG, $PM_{10}$ [combustion and fugitive], $PM_{2.5}$ [combustion and fugitive dust], $SO_2$; Toxic air contaminants: acrolein, benzene, 1,3-butadiene, DPM, formaldehyde, naphthalene, and POM).
  - Earth Moving (Criteria pollutants: $PM_{10}$ [fugitive dust], $PM_{2.5}$ [fugitive dust])
  - Dirt Piling and Material Handling (Criteria pollutants: , $PM_{10}$ [fugitive dust], $PM_{2.5}$ [fugitive dust])

However, operation of the proposed project would not be expected to increase emissions of criteria pollutants, precursors, or TACs, because it would not result in changes to the operations of the existing pipelines.

Proposed construction activities are summarized below for each project site, from north to south:

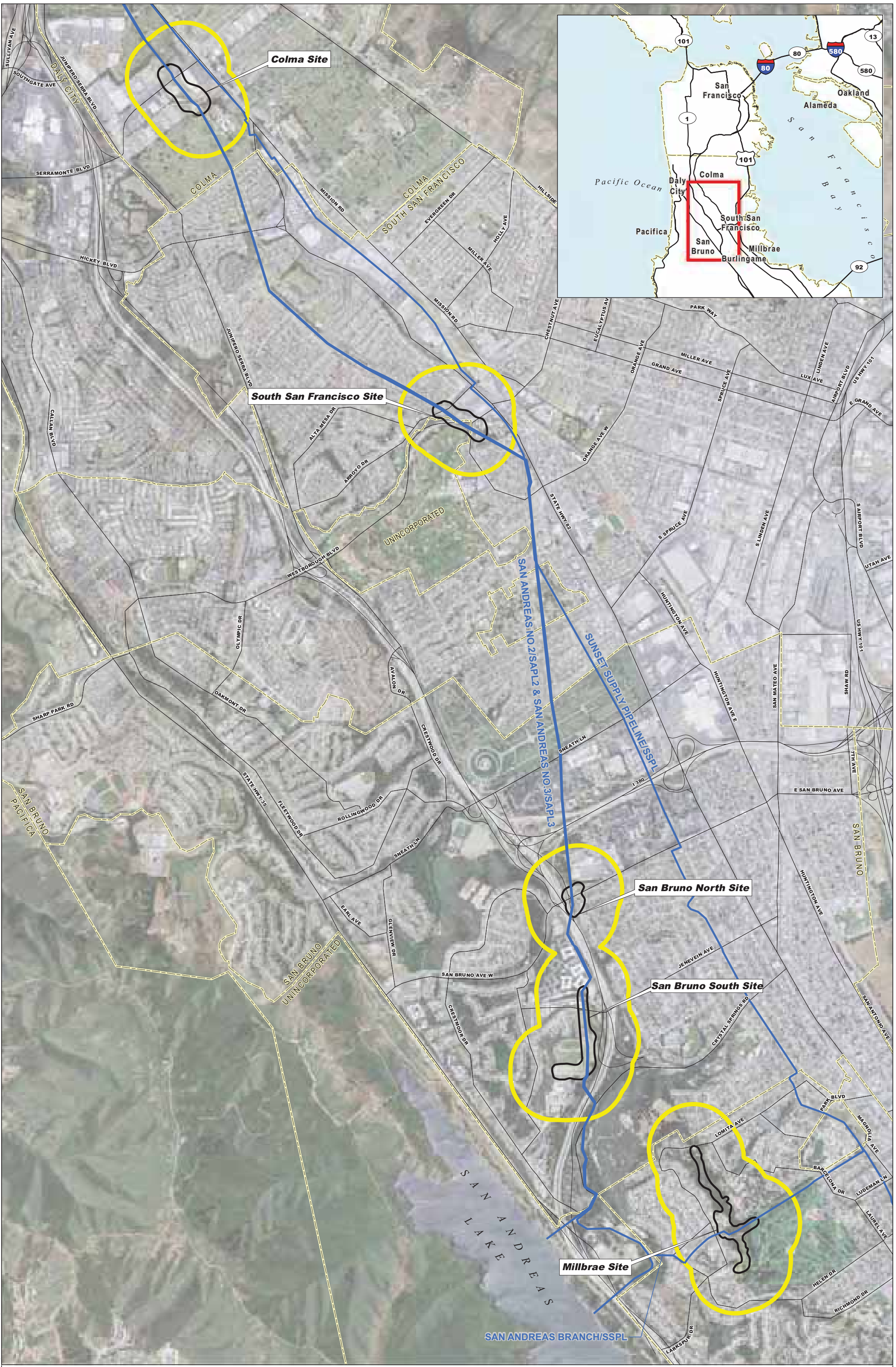
- **Colma Project Site (SAPL2):** The proposed pipe upgrade would entail replacement of 700 feet of pipe south of Serramonte Boulevard, extending to approximately 150 feet north of Collins Avenue in the City of Colma. The existing 54-inch-diameter pipeline would be replaced with a new double lap welded 54-inch-diameter steel pipe. The construction method would be open trench.

- **South San Francisco Project Site (SAPL2):** The proposed pipe upgrade would entail replacement of 650 feet of pipe at Westborough Boulevard between Arroyo Drive and Orange Avenue in South San Francisco. The existing 54-inch-diameter pipeline would be replaced with a new double lap welded 54-inch-diameter steel pipe. The construction methods would include open trench for the portion of the pipe that is located north and south of Westborough Boulevard, and may entail either open trench, sliplining, or jack and bore, for the pipe section that is under Westborough Boulevard.

- **San Bruno North Project Site (SAPL2):** The proposed project would include excavating two access portals (10 feet by 10 feet) to the top of the tunnel in which the pipeline is located; removing a portion of the tunnel to gain access inside the tunnel; and installing pipe support (likely concrete) or grouting. The construction would take place between San Bruno Avenue and the Interstate 280 offramp.

- **San Bruno South Project Site (SAPL2 and SAPL3):** The proposed project would involve removing existing pipes sections and replacing them with thick-walled welded steel pipes. For SAPL2, a new 54-inch-diameter welded steel pipeline would be installed to replace the existing 54-inch-diameter lockbar riveted steel pipeline for an approximately 1,170-foot segment of the pipeline. For SAPL3, a new 66-inch-diameter steel pipeline segment would be installed to replace an approximately 1,050-foot portion of the existing 66-inch-diameter steel pipe. The construction method would be open trench.

- **Millbrae Project Site (SSBPL):** The proposed project would include the replacement of an 890-foot segment of the 61-inch-diameter steel SSBPL, east from the curb of Ridgewood Drive. The construction method would be open trench. Prior to pipe replacement, access routes to the project construction zone would require minor improvements. Four potential access routes to the construction area are under consideration, and include: (1) the SFPUC easement through the side yards of residences at 1100 and 1080 Ridgewood Drive; (2) from Larkspur Drive through the Green



- General Study Area
- 1,000-foot Buffer of Project Sites
- SFPUC Water Transmission Line
- City Limits

N

0 1,000 2,000
Feet

## AIR QUALITY- OVERVIEW

Peninsula Pipelines Seismic Upgrade
San Francisco Public Utilities Commission
San Mateo County, California

November 2011

FIGURE 1

Source: Aerial Imagery, NAIP 2009

U:\GIS\SFPUC_Peninsula_Pipeline\Projects\air_quality\FIG1_AQ_SFPUC_overview.mxd 11/4/2011 10:44:13 AM

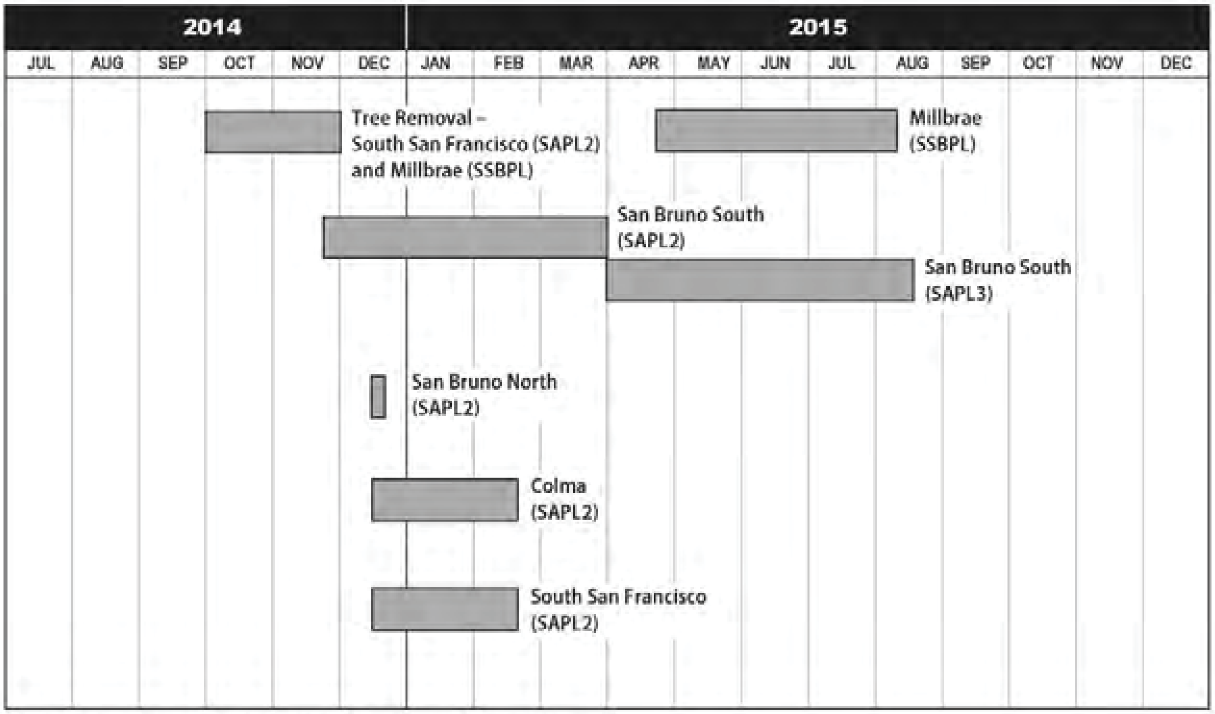
Hills Country Club golf course driving range; (3) from Lomita Avenue along an unpaved trail through City of Millbrae open space; and (4) an alternative route from Bertocchi Lane through the open space. In addition, the proposed project would entail removal of a portion of a grove of eucalyptus trees within the SFPUC right-of-way to allow access to the underlying pipeline.

Construction is estimated to begin in 2014 and end in 2015, as shown in Table 1. The duration of construction activities at each project site would range from approximately 2 weeks to 9.5 months, as shown in Table 2. The total duration of construction is estimated to be 12 months.

There would be three phases of construction activities, with initial tree removal activities at a few project sites, as shown in Table 3. Initial tree removal would be completed at the South San Francisco and Millbrae project sites where dense trees grow in the SFPUC ROW. The first construction phase would entail shutdown and dewatering of the pipeline and mobilization at the project site, such as installation of fencing, grubbing, and preparation of laydown areas. This phase would last up to 10 days (1 to 2 weeks). The second phase would include excavation, pipeline removal and installation, hydrostatic testing, and backfill, landscaping and site restoration, and would last for 24 to 81 days (2 to 4 months), depending on the project site. The third phase would include disinfection of the pipelines and would last 10 days (2 weeks).

The workforce for each project site is anticipated to consist of one or three crews, with up to 20 personnel per crew. Tree removal at the Millbrae project site would require one crew. Construction employee parking is anticipated to be on paved parking lots or streets adjacent to the project sites.

**Table 1**
**Construction Phasing**



Note: The pipeline shutdown and disinfection activities for the San Bruno North project site (SAPL2) are the same as those activities for the San Bruno South project site (SAPL2) and are included in the San Bruno South project site duration only.

## Table 2
## Construction Duration at Each Project Site

| Project Site | Construction Duration |
|---|---|
| Colma Project Site (SAPL2) | 2.5 months |
| South San Francisco Project Site (SAPL2) | 3 months[1] |
| San Bruno North Project Site (SAPL2) | 2 weeks[2] |
| San Bruno South Project Site (SAPL2 and SAPL3) | 9.5 months |
| Millbrae Project Site (SSBPL) | 4.5 months[3] |

Notes:

[1] The 3-month duration of construction at South San Francisco includes approximately 2 weeks required for tree removal, which will be completed separately and in advance of the 2.5-month construction at the site.

[2] The shutdown, dewatering, and disinfection activities for the San Bruno North Project Site (SAPL2) are the same as those activities for the San Bruno South Project Site (SAPL2) and are, therefore, not included in the construction duration.

[3] The 4.5-month duration of construction at Millbrae includes the 1.5 months required for tree removal, which will be completed separately and in advance of the 3-month construction at the site.

SAPL2 = San Andreas Pipeline No. 2
SAPL3 = San Andreas Pipeline No. 3
SSBPL = Sunset Supply Branch Pipeline

## Table 3
## Typical Construction Activities

| Construction Activities | Estimated Duration |
|---|---|
| Tree Removal (South San Francisco and Millbrae project sites only) | Approximately 2 months[1] |
| Shutdown and dewatering | Approximately 1 week |
| Mobilization[2] | Approximately 2 weeks |
| Shoring and excavation, pipeline removal and installation, intermittent dewatering, hydrostatic testing, backfill and restoration | Approximately 2 to 3 months depending on site |
| Disinfection | Approximately 2 weeks |

Notes:

[1] Tree removal activities would occur at the South San Francisco and Millbrae project sites. Estimated duration for tree removal activities would be 2 months, inclusive of both the South San Francisco and Millbrae project sites.

[2] Mobilization would occur concurrently with shutdown and dewatering.

## 3.0 PROJECT SETTING ASSUMPTIONS

Implementation of the proposed project would result in new sources of construction-related emissions; however, it would not introduce new sensitive receptors. Therefore, this section reviews the closest sensitive receptors and existing sources within the project's zone of influence.[1] The population in San Mateo county is expected to increase by 17.7 percent between 2010 and 2030 (ABAG, 2009), and there could be reasonably foreseeable future projects in the vicinity. Reasonably foreseeable future projects will be evaluated as part of the cumulative impacts analysis in Section 4.0.

There will be a number of receptors that could be exposed to project emissions at each of the project sites. The proposed project areas are located in predominantly residential areas that also include schools, churches, and parks. These sensitive receptors will be evaluated for potential air quality impacts from the proposed project activities. Figures 2 through 5 show the locations of the project sites and pipelines, along with sensitive receptors within 1,000 feet of the sites.

These figures show the locations of the project components, including construction zones, site access, and staging and spoils areas; and the location of the sensitive receptors. The figures also show the location of permitted stationary sources; and the location of all major roadways within 1,000 feet of the project sites that have annual average daily traffic (AADT) greater than 10,000, which will be used for the cumulative health risk analysis.

Table 4 presents the preliminary identification of stationary sources permitted by the BAAQMD, and major roadway sources (>10,000 AADT) that are within 1,000 feet of project facility sites. These identified permitted sources and roadways will be used in the cumulative health risk analysis (see Section 5.1.2 for methodology). No major non-permitted sources (e.g., train yards, distribution facilities, and high-volume fueling stations) are located within 1,000 feet of project sites.

## 4.0 CRITERIA AIR POLLUTANT METHODOLOGY

This SOW assumes that all air emissions generated by the PPSU project will be temporary and associated with construction activities. In addition, this scope assumes that there will be no new operational air emission sources (mobile or stationary) associated with the proposed project. Therefore, the construction-related criteria air pollutants will be evaluated for the proposed project, as outlined below.

The PPSU project would generate several criteria air pollutants: CO, $SO_2$, $PM_{10}$, $PM_{2.5}$, and ozone precursors, which include ROG and $NO_X$. The project would also generate greenhouse gas emissions, to be evaluated in a separate greenhouse gas memorandum.

PPSU project activities will occur at the project sites described above, all of which are located in San Mateo County. The project falls under the jurisdiction of the BAAQMD. The air basin is considered nonattainment for the federal and state 8-hour ozone standard, the state annual and 24-hour $PM_{10}$ standard, the federal 24-hour $PM_{2.5}$, and the state annual $PM_{2.5}$ standard.

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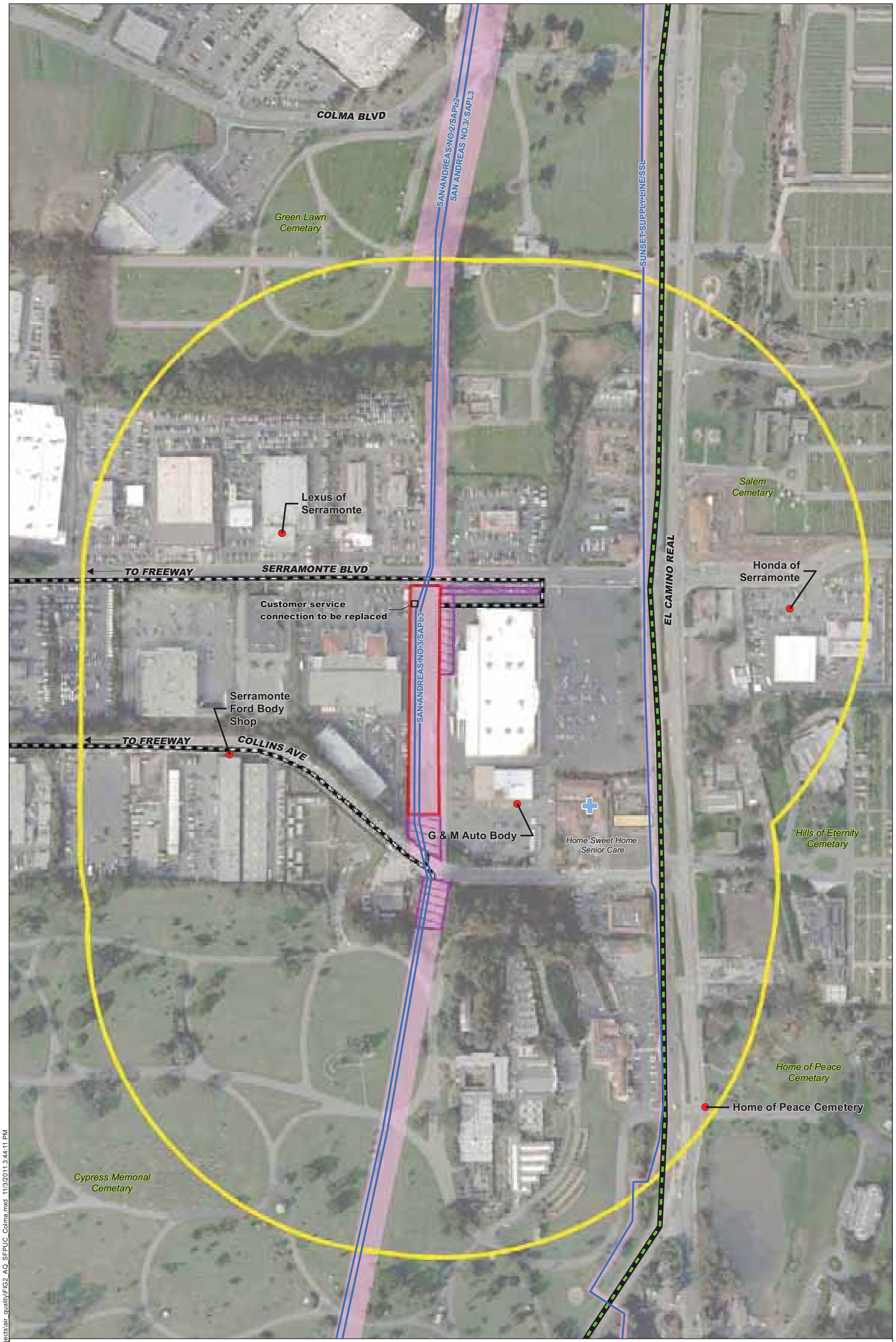
[1] Zone of influence is defined as the area within a 1,000-foot radius of the proposed project.

## Table 4
## Preliminary Identification of Existing Stationary Sources and Roadways

| Project Site | Facility Name | Street Address | City |
|---|---|---|---|
| **Stationary Sources** | | | |
| Colma Project Site (SAPL2) | Lexus of Serramonte | 700 Serramonte Boulevard | Colma |
| | Serramonte Ford Body Shop | 500 Collins Avenue | Colma |
| | G & M Auto Body | 245 Collins Avenue | Colma |
| | Honda of Serramonte | 485 Serramonte Boulevard | Colma |
| | Home of Peace Cemetery | 1299 El Camino Real | Colma |
| South San Francisco Project Site (SAPL2) | Westborough Chevron | 1 Westborough Boulevard | South San Francisco |
| | Access Properties LLC | 91 Westborough Boulevard | South San Francisco |
| San Bruno North Project Site (SAPL2) | Shelter Creek Chevron | 2101 San Bruno Avenue West | San Bruno |
| San Bruno South Project Site (SAPL2/SAPL3) | Verizon Wireless | 250 Courtland Drive | San Bruno |
| Millbrae Project Site (SSBPL) | Green Hills Country Club | End of Ludeman Lane | Millbrae |
| **Roadway Sources (roadways within the 1,000-foot buffer with > 10,000 vehicles per day)** | | | |
| Colma Project Site (SAPL2) | El Camino Real between Villa Avenue and Mission Road | | Colma |
| South San Francisco Project Site (SAPL2) | El Camino Real between Kaiser Foundation Hospital Drive and Southwood Drive | | South San Francisco |
| San Bruno North Project Site (SAPL2), San Bruno South Project Site (SAPL2 and SAPL3) | Interstate 280 South between San Bruno Avenue and Crestmoor Drive | | San Bruno |

Notes:

SAPL2 = San Andreas Pipeline No. 2
SAPL3 = San Andreas Pipeline No. 3
SSBPL = Sunset Supply Branch Pipeline



| | |
|---|---|
| ● Stationary Emission Source | Residential Sensitive Receptor |
| ✚ Health Care Facility | SFPUC Right-of-Way |
| 1,000-foot Buffer of Project Sites | City Limits |
| Average Annual Daily Traffic >10,000 Cars per Day | Project Area |
| SFPUC Water Transmission Line | Construction Zone |
| | Staging and Spoils Area |
| | Access Route |

N

0 200 400 Feet

## AIR QUALITY- COLMA PROJECT SITE

Peninsula Pipelines Seismic Upgrade
San Francisco Public Utilities Commission
San Mateo County, California

November 2011

FIGURE 2

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Source: SF PUC Water Transmission line, November 2010
Aerial Imagery, Bing Imagery 2009
Emission sources: BAAQMD

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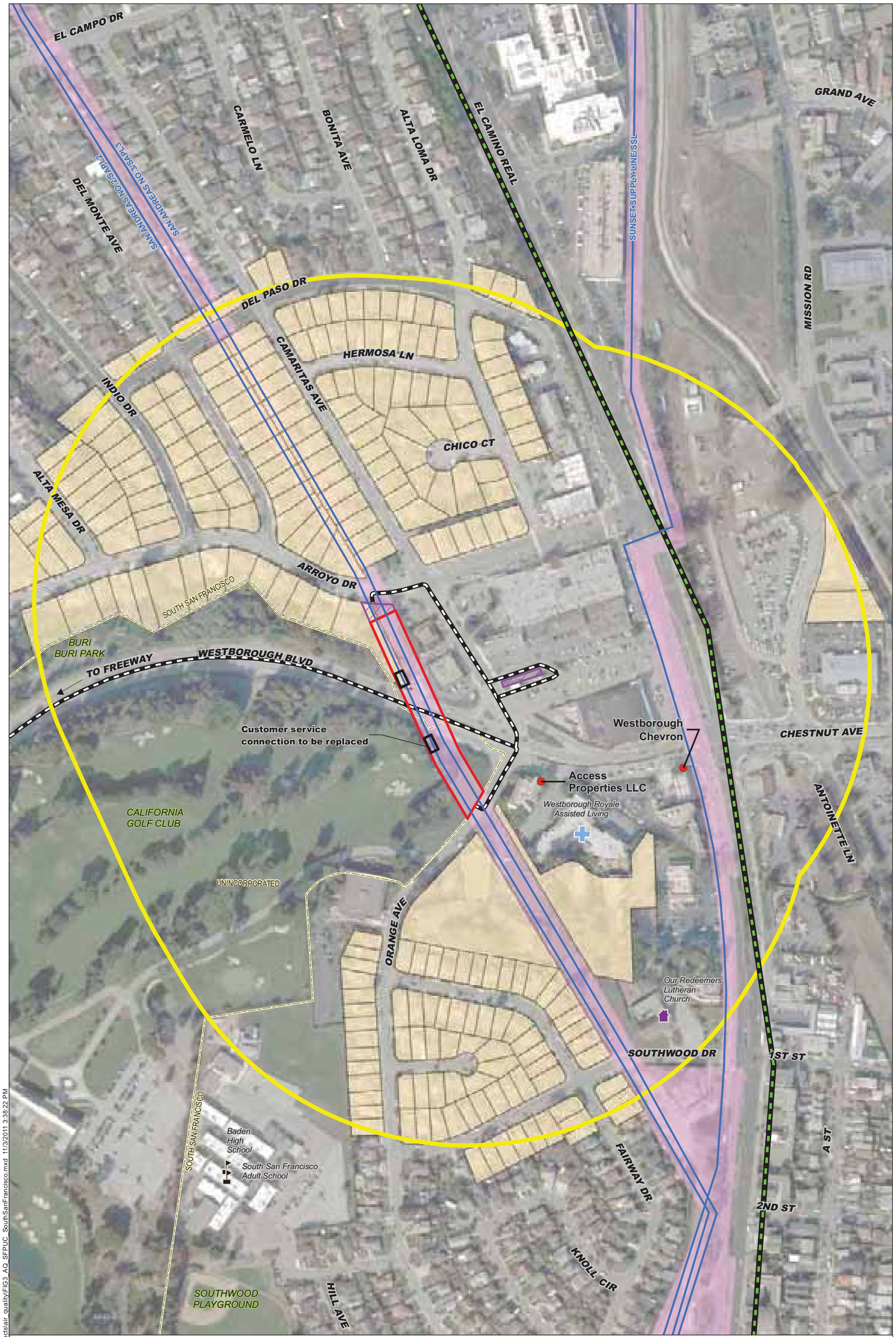

- ● Stationary Emission Source
- ⌂ Church
- School
- ✚ Health Care Facility
- 1,000-foot Buffer of Project Sites
- Average Annual Daily Traffic >10,000 Cars per Day
- SFPUC Water Transmission Line
- ▭ Residential Sensitive Receptor
- ▭ SFPUC Right-of-Way
- City Limits

Project Area

- ▭ Construction Zone
- ▨ Staging and Spoils Area
- ▭ Boring Pit (~ 50' x 20')
- Access Route

## AIR QUALITY-
## SOUTH SAN FRANCISCO PROJECT SITE

Peninsula Pipelines Seismic Upgrade
San Francisco Public Utilities Commission
San Mateo County, California

November 2011

FIGURE 3

Source: SF PUC Water Transmission line, November 2010
Aerial Imagery, Bing Imagery 2009
Emission sources: BAAQMD

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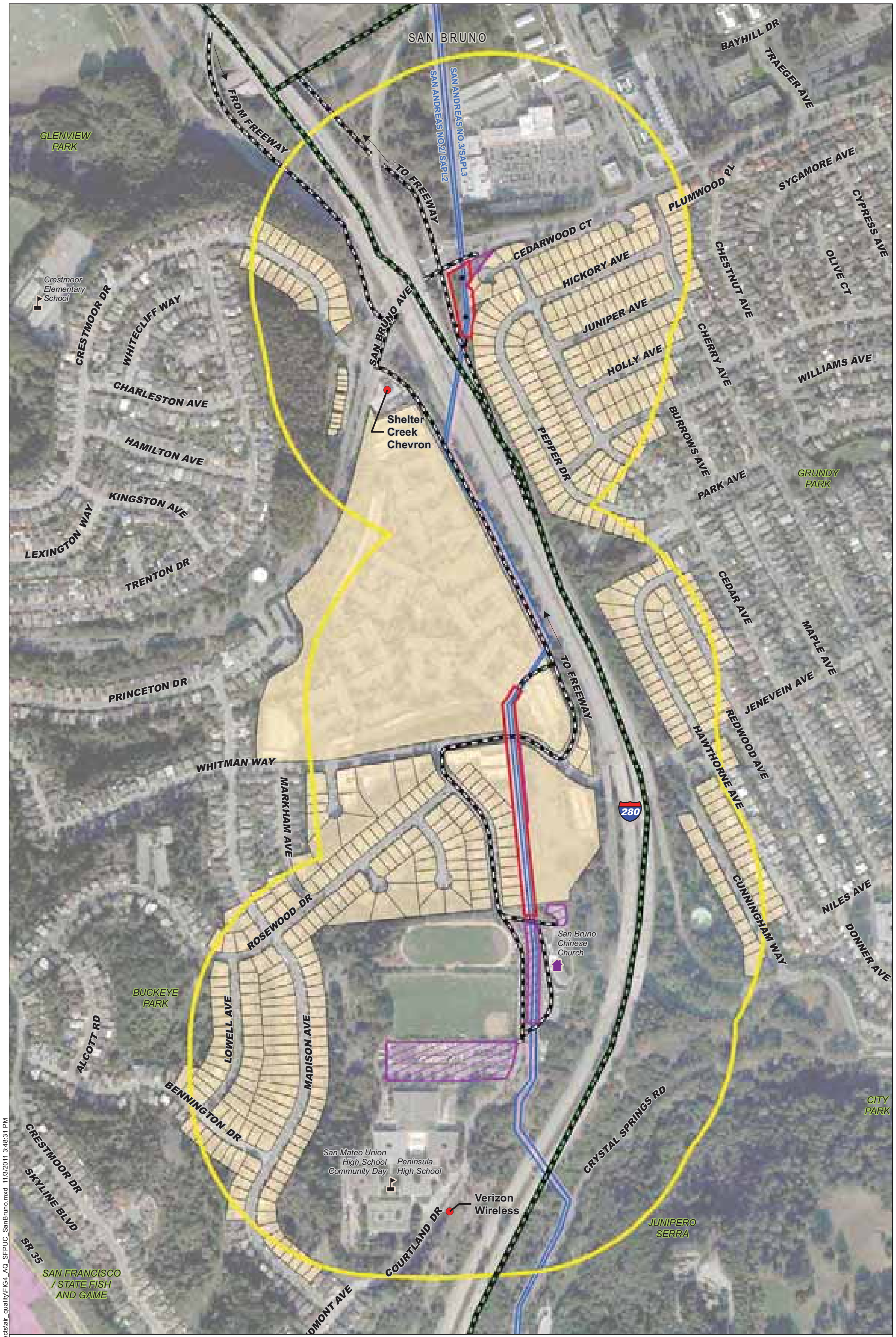

● Stationary Emission Source

Church

School

1,000-foot Buffer of Project Sites

Average Annual Daily Traffic >10,000 Cars per Day

SFPUC Water Transmission Line

Residential Sensitive Receptor

SFPUC Right-of-Way

Project Area

Construction Zone

Staging and Spoils Area

Pit (10' x 10')

Access Route

N

0 250 500 Feet

## AIR QUALITY-
## SAN BRUNO NORTH & SOUTH PROJECT SITES

Peninsula Pipelines Seismic Upgrade
San Francisco Public Utilities Commission
San Mateo County, California

November 2011

**FIGURE 4**

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Source: SF PUC Water Transmission line, November 2010
Aerial Imagery, Bing Imagery 2009
Emission sources: BAAQMD

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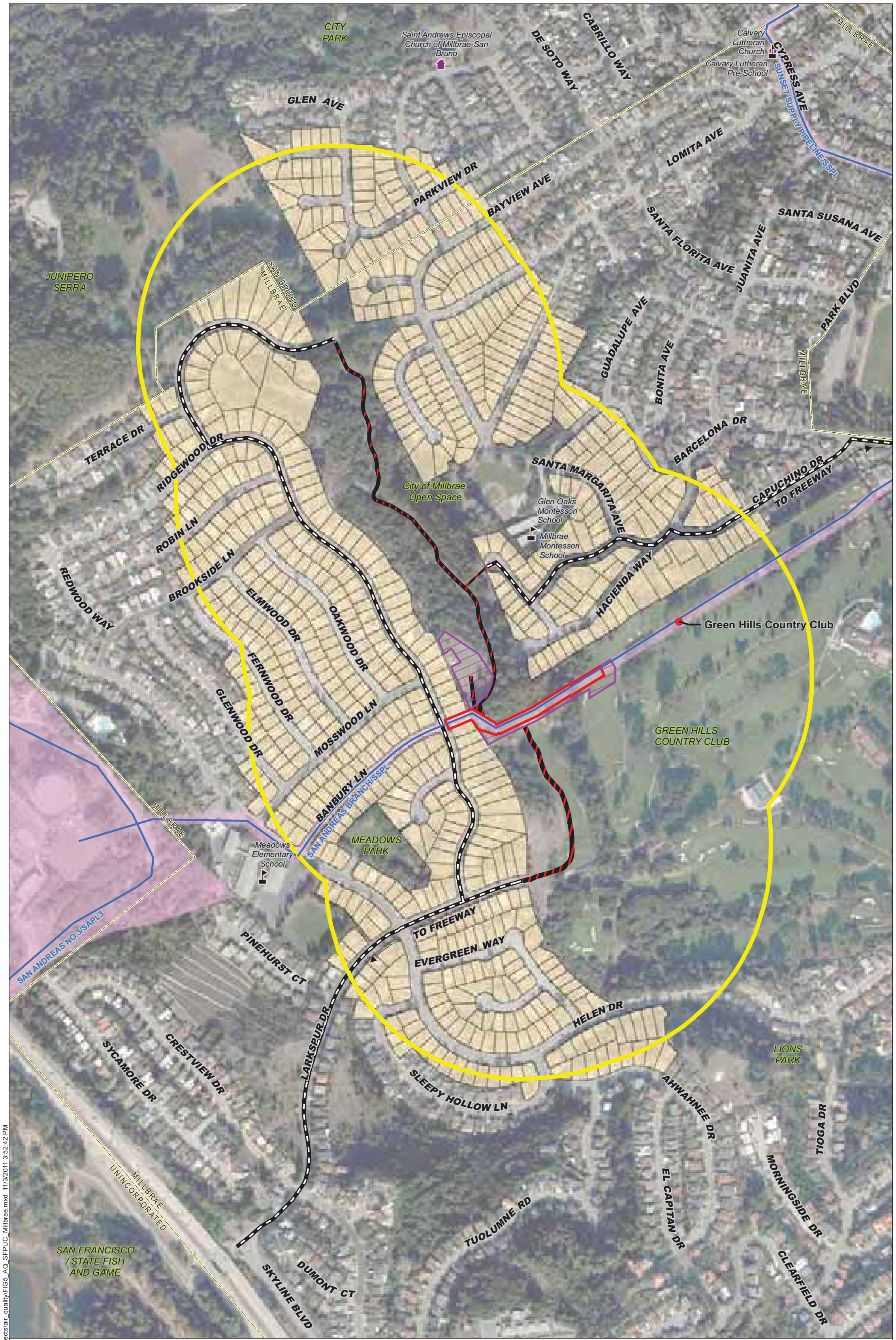

● Stationary Emission Source
Church
School
1,000-foot Buffer of Project Sites
Average Annual Daily Traffic >10,000 Cars per Day
SFPUC Water Transmission Line

Residential Sensitive Receptor
SFPUC Right-of-Way
City Limits
Project Area
Construction Zone
Staging and Spoils Area
Access Route
Access Route Requiring Upgrade

N

0 250 500
Feet

# AIR QUALITY- MILLBRAE PROJECT SITE

Peninsula Pipelines Seismic Upgrade
San Francisco Public Utilities Commission
San Mateo County, California

November 2011

FIGURE 5

Source: SF PUC Water Transmission line, November 2010
Aerial Imagery, Bing Imagery 2009
Emission sources: BAAQMD

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URS will calculate PPSU project emissions for the following emissions categories:

- Off-road construction equipment;
- On-road haul trucks; and
- On-road vehicles used for construction worker commuting.

For each category of emissions, the methodology and assumptions used to calculate emissions are discussed below.

Because the project will employ Best Management Practices, the fugitive dust emissions do not need to be quantified (BAAQMD, 2011b).

### 4.1.1 Off-Road Construction Equipment (Exhaust Emissions)

URS will estimate construction equipment exhaust emissions using emission factors from the California Air Resources Board's OFFROAD2011 model[2]. URS will select inputs for the OFFROAD model that will produce emission factors for the years 2014 and 2015. URS will calculate off-road exhaust emissions by combining the OFFROAD emission factors and project-specific construction information (such as construction equipment type, number of pieces of equipment, engine horsepower rating, engine duty load, hours of operation per day, and days of operation per week). If project-specific information is not available, a typical construction equipment list will be created for certain construction activities (like earth moving, vegetation removal, site grading, and pipeline excavation).

### 4.1.2 On-Road Haul Trucks

URS will calculate haul truck exhaust and idling emissions using the EMFAC2011 model. URS will select inputs required by EMFAC, including analysis years (2014 and 2015), location, vehicle class (heavy duty trucks), and vehicle speeds. URS will also identify average temperature and relative humidity for the project area based on weather station data from the Western Regional Climate Center. URS will use EMFAC to generate running emissions (in units of grams of pollutant per mile) and idling emissions (in units of grams of pollutant per minute). Haul distance will be estimated from the highway to the project area based on project maps. The daily number of trucks trips will be provided by the SFPUC project engineers, or will be estimated based on the amount of spoil material and capacity of the trucks. It is assumed that trucks would not idle along the access routes, and that the trucks would only idle during material loading and unloading at the staging and spoils area. Idling time at the staging and spoils area will be assumed to be 5 minutes, which is the maximum idling time allowed by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations.

### 4.1.3 On-Road Vehicles Used for Construction Worker Commuting

URS will calculate worker commute exhaust emissions using the EMFAC2011 model. We will select inputs required by EMFAC, including analysis years (2014 and 2015), location, vehicle class, and vehicle speeds. We will also identify average temperature and relative humidity for the project area based on weather station data from the Western Regional Climate Center. EMFAC generates emissions in units of grams of pollutant per mile. Project-specific information about the number of construction workers commuting and worker schedules will be used to estimate the total number of vehicle miles traveled.

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[2] Based on URS experience with OFFROAD2011 and conversations with the California Air Resources Board (CARB), the OFFROAD2011 model only provides emission factors for $NO_X$, ROG, and PM, and does not provide emission factors for CO and $SO_X$. Therefore, URS proposes to use OFFROAD2007 emission factors along with updated OFROAD2011 activity data for those pollutants. Although CARB has indicated that an update to the OFFROAD2011 model would provide emission factors for CO and $SO_X$, this model is not anticipated to be available at the time that the analysis for the PPSU project is undertaken (CARB, 2011).

### 4.1.4 Thresholds of Significance

Average project emissions (total construction emissions divided by number of construction days) will be calculated (without considering the implementation of mitigation measures) using the methodology described above, and compared to the BAAQMD construction thresholds of significance, shown in Table 5.

**Table 5**
**BAAQMD Construction Emission Significance Thresholds**

| Pollutant/Precursor | Daily Average Emissions (lbs/day) |
|---|---|
| ROG | 54 |
| $NO_X$ | 54 |
| $PM_{10}$ | 82 |
| $PM_{2.5}$ | 54 |

Source: BAAQMD, 2011.

Notes:

BAAQMD = Bay Area Air Quality Management District
lbs/day = pounds per day
$NO_X$ = oxides of nitrogen
$PM_{10}$ = particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
ROG = reactive organic gases

## 5.0 HEALTH RISK AND HAZARDS METHODOLOGY

### 5.1.1 Individual Health Risk Analysis

This SOW assumes that all air emissions generated by the PPSU project will be temporary and associated with construction activities. In addition, this scope assumes that there will be no new operational air emission sources (mobile or stationary) associated with the proposed project. Therefore, the TACs and their related health-risk impacts will be evaluated for the proposed project, as outlined below.

Pipeline construction will generate exhaust emissions that include TACs and $PM_{2.5}$ (see emission methodology described in Section 4.0). TACs and $PM_{2.5}$ pose potential health risks to nearby sensitive receptors. BAAQMD recommends that projects be evaluated for their potential health risk impacts to sensitive receptors located within 1,000 feet of an emission source.

According to the BAAQMD Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 2.0, sensitive receptors are defined as residential dwellings, including apartments, houses, and condominiums; schools, colleges, and universities; daycares; hospitals; and senior-care facilities.

All project sites, with the exception of the Colma project site, are located within residential areas. Figures 2 through 5 identify the sensitive receptors within 1,000 feet of the project area.

As shown on Figure 2, sensitive receptors at the Colma project site include Home Sweet Home Senior Care center and the adjacent residence along El Camino Real, east of the construction zone.

As shown on Figure 3, sensitive receptors within the 1,000-foot buffer at the South San Francisco project site are residences along Orange Avenue, Fairway Drive, and Southwood Drive to the south of the project construction zone and the staging and spoils area; and residences along Arroyo Drive, Alta Mesa Drive, Indio Drive, Del Monte Drive, Camaritas Avenue, Del Paso Drive, Hermosa Lane, and Chico Court to the north of the project construction zone and the staging and spoils area. Other sensitive receptors identified on Figure 3 within the 1,000-foot buffer include the Westborough Royale Assisted Living Center, Our Redeemers Lutheran Church, Baden High School, and South San Francisco Adult School.

As shown on Figure 4, sensitive receptors within a 1,000-foot buffer at the San Bruno North project site include residences along Crestwood Drive and San Bruno Avenue to the west of the project construction zone and the staging and spoils area; residences along Cedarwood Court, Hickory Avenue, Juniper Avenue, Holly Avenue, and Pepper Drive to the east of the project construction zone and the staging and spoils area; and the Shelter Creek condominiums to the southwest of the project construction zone.

As shown on Figure 4, the San Bruno South project site includes sensitive receptors within a 1,000-foot buffer, such as residences along Rosewood Drive, Madison Avenue, and Glenbrook Lane to the west of the project construction zone and the staging and spoils area; the San Mateo Union Community Daycare and Peninsula High School to the south of the project construction zone and the staging and spoils area; and the San Bruno Chinese Church to the east of the project staging and spoil area.

As shown on Figure 5, sensitive receptors near the construction area and the staging and spoils areas at the Millbrae project site include the residences along Lomita Avenue, Terrance Drive, Ridgewood Drive, Robin Lane, Brookside Lane, Glenwood Drive, Fernwood Drive, Elmwood Drive, Oakwood Lane, and Banbury Lane to the west of the project construction zone and the staging and spoils area; residences along Parkview Drive, Bayview Avenue, Santa Barbara Avenue, Guadalupe Avenue, and Santa Margarita Avenue to the east of the project staging and spoils area; and residences along Ridgewood Drive, Helen Drive, and Evergreen Way to the south of the project construction zone and the staging and spoils area. Other notable sensitive receptors within the 1,000-foot area of the emission sources at the Millbrae project site include the Glen Oaks Montessori School and Millbrae Montessori School north of the construction zone. Meadows Elementary School is identified as a sensitive receptor on Figure 5 even though it is outside of the 1,000-foot buffer because of potential impacts, given the proximity to the project.

URS will base the health risk assessment (HRA) on BAAQMD's Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 2.0. BAAQMD considers a significant health risk to be any of the following:

- Noncompliance with a qualified risk reduction plan; or
- An excess cancer risk level of more than 10 in one million, or a noncancer (i.e., chronic or acute) hazard index greater than 1.0 (which would be a cumulatively considerable contribution); or
- An incremental increase of greater than 0.3 microgram per cubic meter ($\mu g/m^3$) annual average $PM_{2.5}$ (which would be a cumulatively considerable contribution).

To evaluate the significance of the project's TAC and $PM_{2.5}$ emissions, URS will use the BAAQMD's tiered modeling approach. Based on consultation with BAAQMD staff (BAAQMD, 2010), URS recommends a modeling approach instead of using the BAAQMD screening tables, which were created for development projects and are not appropriate to evaluate potential health risks for linear infrastructure projects.

URS will first perform a Tier 1 analysis using BAAQMD's Tier 1 SCREEN3 modeling approach to evaluate project health risks. URS will estimate the construction project's maximum grams per second emissions for each pollutant: TACs and $PM_{2.5}$, emitted from off-road construction equipment and truck idling. TACs such as such as acrolein, benzene, 1,3-butadiene, DPM, formaldehyde, naphthalene, and POM will be analyzed because U.S. EPA has listed these compounds as priority toxics (U.S. EPA, 2007). URS does not expect a large number of gasoline-powered engines to be used during construction, and speciated total organic gas emissions from gasoline-powered engines are expected to be minimal. These emissions will only be included in the health risk analysis if the analysis using diesel engine emissions is close to or at the BAAQMD health risk threshold.

It will be assumed that truck emissions along access routes where upgrades to the routes are not required (e.g., paved roads) would not expose sensitive receptors to toxic emissions, given the short exposure time as the truck passes along the access route. However, in areas where access routes require upgrades (e.g., unpaved roads), heavy construction equipment and trucks used for upgrade activities could potentially expose sensitive receptors to toxic emissions. Because the duration and intensity of the upgrade activity is unknown at this time, the access routes that require upgrades will be included in the health risk analysis. In addition, it is possible that truck idling at the staging and spoils area could expose sensitive receptors to TACs over a longer exposure period, and therefore these areas will also be included in the health risk analysis.

URS will then run the SCREEN3 model using project emissions described above as an input to estimate maximum hourly concentrations. We will convert SCREEN3's hourly concentrations to annual values using BAAQMD's standard conversion factors. Assuming the maximum estimated concentrations, we will estimate acute, chronic, and carcinogenic health risks using the methodology described in the California Office of Environmental Health Hazard Assessment's (OEHHA) HRA guidelines. For $PM_{2.5}$, we will compare estimated concentrations to the BAAQMD's threshold of 0.3 $\mu g/m^3$. If the analysis finds no health risks, then we will document the results. Tier 1 modeling uses a nondirectional model; therefore, URS will not prepare a receptor map for this analysis. If the Tier 1 analysis finds potential health risks, then URS will schedule a meeting with SFEP to discuss the Tier 1 results and which Tier 2 model would be the most appropriate for refined health risk modeling.

Under the Tier 2 analysis, we will model the project's ambient concentration emissions using models that are more complex. Based on the discussion with SFEP, URS will use either the ISCST3 or AERMOD model to estimate the project's ambient concentrations at all sensitive receptors within a 1,000-foot radius of the project. URS will identify and submit a draft receptor grid for all project locations requiring a refined health risk analysis. URS will also provide receptor heights. If appropriate meteorological data are available to run AERMOD, then we will use AERMOD. Otherwise, we will use ISCST3 to estimate maximum hourly and annual concentrations. We will use CAL3QHC to estimate maximum hourly and annual concentrations from the on-road haul trucks on the access roads. Once we have estimated total concentrations at all sensitive receptors, we will convert them to health risks using OEHHA's guidelines. If the results of the Tier 2 analysis show that the project would not create significant health risks, then we will document the results. However, if the Tier 2 analysis finds significant health risks, we will conduct a Tier 3 analysis.

The Tier 3 analysis consists of using the same models as in the Tier 2 analysis, but refining the modeling assumptions to better represent on-the-ground conditions, and local factors such as topography. If, using the Tier 3 analysis, we identify significant health risks, then we will examine whether mitigation measures can reduce those risks. This could include using newer, cleaner equipment, or limiting construction hours. We will then rerun the analysis to determine whether mitigation would eliminate health risks.

### 5.1.2 Cumulative Health Risk Analysis

The individual project-level construction health-risk analysis will then be used as a basis for the cumulative impact analysis to determine the project's contribution to significant cumulative impacts associated with TAC emissions from project construction, and from other past, present, and reasonably foreseeable future projects in the vicinity.

The cumulative impact analysis will consider all existing permitted stationary sources, roadway emissions sources with more than 10,000 vehicles per day, and foreseeable construction projects located within 1,000 feet of the project site. Screening levels for permitted stationary sources, presented in Table 4, were obtained from the BAAQMD and have been provided in Appendix A. Screening levels for roadways, presented in Table 4, will be provided to SFEP when the maximally exposed individual (MEI) has been identified through the individual health risk analysis. The distance between each roadway and the MEI is needed to determine the appropriate screening levels from the BAAQMD screening tables. URS will prepare a list of foreseeable construction projects in the vicinity, and will consult SFEP to identify which projects would be included in the cumulative health risk analysis. Once the list has been determined, screening levels for the construction projects will be determined from BAAQMD *Screening Tables for Air Toxics Evaluation during Construction, Table 2*. If the sum of the screening levels for the permitted stationary sources, roadways with more than 10,000 vehicles per day and foreseeable construction projects within 1,000 feet of the project site exceed the cumulative impact thresholds, then a refined cumulative health risk analysis will be prepared. URS will discuss project-level modeling results and how to address cumulative impacts with SFEP by looking at the MEI at one project location.

If a refined cumulative health risk analysis is required, URS will consult with SFEP on the appropriate methodologies for analysis and, if required, will recommend appropriate mitigation measures for significant cumulative impacts. URS will provide SFPUC with a list of these mitigation measures to be reviewed for feasibility.

## 6.0 POTENTIAL MITIGATION MEASURES

Should any of the daily average criteria pollutant emissions exceed the thresholds shown in Table 5, mitigation measures will be identified that could reduce the emissions below the threshold.

Mitigation Measures may include those listed in the BAAQMD CEQA Air Quality Guidelines, Tables 8-2 and 8-3.

Appendix B of the BAAQMD CEQA Air Quality Guidelines states that Mitigation Measures 1 through 8 in Table 8-3 would provide a total reduction of 75 percent for fugitive dust emissions when implemented. Mitigation Measure 10 in Table 8-3 would provide a reduction of 20 percent for $NO_X$ emissions and 45 percent for PM emissions, when controls are installed such as late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, or add-on devices such as particulate filters. Mitigation measures will be developed in consultation with SFEP, and the mitigation effectiveness will be used to determine the mitigation emissions and health risks, if warranted.

## 7.0 CONTENTS OF THE AIR QUALITY TECHNICAL REPORT

The technical report will include the following sections, consistent with SFEP and BAAQMD CEQA 2011 Guidelines (BAAQMD, 2011):

- Project Description

- Project Setting
- Criteria Air Pollutants
  - Criteria Air Pollutant Methodology
  - Criteria Air Pollutant Results
  - Mitigation Measures
  - Summary
- Health Risk Analysis
  - Health Risk Methodology
  - Health Risk Results
  - Mitigation Measures
  - Summary
- Conclusion
- Approved Scope of Work: The approved SOW will be included as an appendix to the technical report.
- Technical Appendices: Copies of model outputs including emissions information, if provided, and any permits obtained from BAAQMD or other regulatory entity (if applicable) will be included as technical appendices.

## 8.0 ASSUMPTIONS FOR REVIEWING AND FINALIZING THE TECHNICAL REPORT

Prior to preparation of the air quality technical report, the SFPUC, as the project sponsor, will confirm that the project description and associated assumptions for construction are correct. It is assumed that there will be no further changes in the project description. During preparation of the first draft technical report, URS will work with the SFPUC as needed to ensure that proposed mitigation measures are feasible.

URS will prepare two rounds of the Draft Air Quality Technical Report for the proposed project sites in San Mateo County, with the contents as described above, for review by SFEP. URS will respond to comments and incorporate edits by the reviewers in each subsequent submittal. It is assumed that SFEP will provide one set of non-conflicting comments on each draft submittal, and that resolution of any outstanding issues will be conducted through conference calls or meetings, as needed. URS will then prepare a Final Air Quality Technical Report that will serve as the basis for the CEQA air quality analysis, in the form of either a reference document or an appendix included as part of the CEQA document.

# 9.0 REFERENCES

ABAG (Association of Bay Area Governments), 2009. Projections 2009, December, 2009.

BAAQMD (Bay Area Air Quality Management District), 2010. Personal communication via phone between Tim Rimpo (URS Corporation, Senior Air Quality Scientist) and Sigalle Michael (BAAQMD, Senior Environmental Planner). December 2010.

BAAQMD (Bay Area Air Quality Management District), 2011a. California Environmental Quality Act Air Quality Guidelines. Updated May 2011.

BAAQMD (Bay Area Air Quality Management District), 2011b. Personal communication via phone between Avanti Tamhane (URS Corporation, Air Quality Engineer) and Alison Kirk (BAAQMD, Senior Environmental Planner). October 2011.

CARB (California Air Resources Board), 2011. Personal communication via phone between Jon Tamimi (URS Corporation, Air Quality Specialist) and Nicole Doney (CARB, Manager – Off-road Diesel Analysis Section). November.

U.S. EPA (U.S. Environmental Protection Agency), 2007. Federal Registry, Vol. 72, No. 37, page 8430, February 2007.

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# APPENDIX A

Appendix A

| Project Locations | Plant Number | Plant Name | Plant Address | City | County | UTM East | UTM North | Plant Cancer Risk (millions) | Plant Chronic Hazard | Plant PM2.5 Concentration (ug/m3) |
|---|---|---|---|---|---|---|---|---|---|---|
| Colma Project Site (SAPL2) | G11198 | Lexus of Serramonte - Attn: Ray Chin | 700 Serramonte Blvd | Colma | San Mateo | 547609 | 4169820 | 8.722 | 0.012 | na |
| | 8758 | Serramonte Ford Body Shop | 500 COLLINS AVE | Colma | San Mateo | 547670 | 4169453 | 0.00 | 0.000 | 0.018 |
| | 12251 | G & M Auto Body | 245 COLLINS AVE | Colma | San Mateo | 547931 | 4169803 | 0.04 | 0.000 | 0.000 |
| | 12368 | Honda of Serramonte | 485 SERRAMONTE BLVD | Colma | San Mateo | 547994 | 4169994 | 0.00 | 0.000 | 0.000 |
| | G8650 | Home of Peace Cemetery | 1299 El Camino Real | Colma | San Mateo | 548070 | 4169774 | 0.222 | 0.000 | na |
| South San Francisco Project Site (SAPL2) | G11428 | Westborough Chevron | 1 Westborough Boulevard | South San Francisco | San Mateo | 549896 | 4167671 | 22.056 | 0.037 | na |
| | 19316 | Access Properties LLC | 91 WESTBOROUGH BOULEVARD | South San Francisco | San Mateo | 549800 | 4167600 | No data | No data | No data |
| San Bruno North Project Site (SAPL2) | G3134 | Shelter Creek Chevron | 2101 W San Bruno Ave | San Bruno | San Mateo | 550301 | 4163667 | 15.446 | 0.026 | na |
| San Bruno South Project Site (SAPL2/SAPL3) | 16280 | Verizon Wireless- HWY 35/280 | 250 COURTLAND DRIVE | San Bruno | San Mateo | 550538 | 4162877 | 11.14 | 0.004 | 0.003 |
| Millbrae Project Site (SSBPL) | G7549 | Green Hills Country Club | End of Ludeman Lane | Millbrae | San Mateo | 551952 | 4162183 | 0.635 | 0.001 | na |

# APPENDIX 2
# DETAILED CONSTRUCTION INFORMATION AND CALCULATIONS

## SFPUC Peninsula Pipelines Air Quality Health Risk Analysis

| | Project Scenario | | | | Cumulative Scenario | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Project Impact (Unmitigated) | | | | Nearby Sources[8] | | | | Nearby Construction Projects[1] | | | | Cumulative Analysis | | |
| Site | Annual Average $PM_{2.5}$ ($\mu g/m^3$) | Cancer Risk (per million) | Chronic Hazard | Acute Hazard | Plant Number/ Roadway/ Interstate | Annual Average $PM_{2.5}$ ($\mu g/m^3$) | Cancer Risk (per million) | Chronic Hazard | Project Name | Annual Average $PM_{2.5}$ ($\mu g/m^3$)[5] | Cancer Risk (per million) | Chronic Hazard | Annual Average $PM_{2.5}$ ($\mu g/m^3$) | Cancer Risk (per million) | Chronic Hazard |
| Colma[4] | 0.024 | 2.3 | 0.005 | 2.280E-07 | G11198 | N/A | 8.722 | 0.012 | Regional Groundwater Storage and Recovery Project | 0.046 | 4.3 | 0.01 | 0.199 | 19 | 0.087 |
| | | | | | 8758 | 0.018 | 0.000 | 0.000 | | | | | | | |
| | | | | | 12251 | 0.000 | 0.040 | 0.000 | | | | | | | |
| | | | | | 12368 | 0.000 | 0.000 | 0.000 | | | | | | | |
| | | | | | G8650 | N/A | 0.222 | 0.000 | | | | | | | |
| | | | | | El Camino Real[2] | 0.077 | 2.571 | 0.030 | | | | | | | |
| | | | | | Serramonte Blvd[2] | 0.034 | 1.161 | 0.030 | | | | | | | |
| South SF[4] | 0.025 | 2.4 | 0.006 | 2.280E-07 | G11428[10] | N/A | 0.331 | 0.001 | Regional Groundwater Storage and Recovery Project | 0.068 | 6.5 | 0.015 | 0.421 | 83 | 0.154 |
| | | | | | 19316[6] | 0.000 | 0.008 | 0.000 | | | | | | | |
| | | | | | El Camino Real[2] | 0.020 | 0.804 | 0.030 | | | | | | | |
| | | | | | Westborough Blvd[2] | 0.204 | 5.903 | 0.030 | | | | | | | |
| | | | | | 5611 | 0.000 | 0.000 | 0.000 | | | | | | | |
| | | | | | 14240 | 0.104 | 58.80 | 0.021 | | | | | | | |
| | | | | | 19842 | 0.000 | 7.490 | 0.020 | | | | | | | |
| | | | | | G11391[10] | N/A | 0.214 | 0.019 | | | | | | | |
| | | | | | G12394[10] | N/A | 0.149 | 0.013 | | | | | | | |
| San Bruno North[4,7] | 0.005 | 0.5 | 0.001 | 0.000E+00 | G3134[10] | N/A | 0.618 | 0.001 | N/A | N/A | N/A | N/A | 0.123 | 8 | 0.011 |
| | | | | | I-280[3] | 0.118 | 6.843 | 0.009 | | | | | | | |
| San Bruno South | 0.072 | 6.9 | 0.016 | 4.561E-07 | 16280 | 0.003 | 11.140 | 0.004 | N/A | N/A | N/A | N/A | 0.109 | 20 | 0.022 |
| | | | | | I-280[3] | 0.034 | 2.008 | 0.002 | | | | | | | |
| Millbrae[4] | 0.033 | 3.2 | 0.007 | 2.280E-07 | G7549 | N/A | 0.635 | 0.001 | N/A | N/A | N/A | N/A | 0.033 | 4 | 0.008 |
| **Thresholds[9]** | **0.3** | **10** | **1** | **1** | | | | | | | | | **0.8** | **100** | **10** |

Notes:

[1] Only the Regional Groundwater Storage and Recovery Project was considered. Emissions were estimated by comparing a similar project and scaling the emission rates per well. For health risk, the emissions were treated as if they occurred at the construction site to estimate worst case impact.

[2] Roadway Annual Average PM2.5 and Cancer Risk, for surface streets >10,000 AADT, estimated from screening tables provided by BAAQMD (http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/County%20Surface%20Street%20Screening%20Tables%20Dec%202011.ashx?la=en) and traffic data from the California Environmental Health Tracking Program (CEHTP) Traffic Tool (http://www.ehib.org/traffic_tool.jsp). The maximum acute and chronic hazard index for roadways will be less than 0.03.

[3] Interstate Annual Average PM2.5, Cancer Risk, and Chronic Hazard values estimated from BAAQMD Highway Screening Analysis Tool for San Mateo County (http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/SanMateo-6ft.ashx?la=en).

[4] Only the San Bruno South Site was modeled using ISC. The remaining sites' PM2.5 and DPM concentrations were calculated by ratioing each sites total emissions to the San Bruno South Site's total emissions. The nearest sensitve receptor to the San Bruno South Site was adjacent to the construction area, therefore these results present a worst case scenario at each of the other sites. Meteorological conditions are similar at all sites.

[5] While the BAAQMD threshold for project construction PM2.5 concentrations is 0.3 (μg/m3), in order to meet a cancer risk value of 10 in a million, PM2.5 concentrations from Diesel exhaust cannot exceed 0.101 (μg/m3). Therefore, the worst possible impact from PM2.5 concentrations at any receptor must be equal to or less than 0.101 (μg/m3) to comply with BAAQMD new source thresholds.

[6] For Source #19316, we were provided average daily emissions, and not Annual Average PM2.5, Cancer Risk, or Chronic Hazard. These values were estimated by assuming this source was located at the construction site, and the same methodology using modeling results was used to calculate a worst case impact.

[7] San Bruno North Site Acute Hazard is zero because no gasoline operated equipment operates at the construction site during construction. DPM does not impact Acute Hazard.

[8] Some nearby sources emit PM2.5, but in quantities below the signifcant figures reported to the BAAQMD, these are represented by zero. Sources that do not emit PM2.5 (e.g., gas stations) have N/A for PM2.5 concentrations. Again, for cancer risk and chronic hazard, some sites register values below the significant figures used by the BAAQMD.

[9] The BAAQMD has acute hazard significance thresholds for individual projects, but not for cumulative impacts. Consequently, acute hazards have not been estimated for nearby sources and nearby construction projects.

[10] The BAAQMD gas station cancer risk and chronic hazard distance multipliers were used where appropriate using the distance between the gas station and the nearest sensitive receptor.

## SFPUC Peninsula Pipelines - Health Risk Summary

| SFPUC Peninsula Pipeline Upgrade | Annual Average $PM_{2.5}$ Concentration at Nearest Receptor | Diesel Particulate Matter Cancer Risk | Gasoline TOG Emissions Cancer Risk |
|---|---|---|---|
| Site | $\mu g/m^3$ | Increase Per Million | Increase Per Million |
| Colma | 0.02 | 2 | 1.37E-04 |
| South SF | 0.03 | 2 | 1.37E-04 |
| San Bruno South | 0.07 | 7 | 2.74E-04 |
| San Bruno North | 0.01 | 0 | 0.00E+00 |
| Millbrae | 0.03 | 3 | 1.37E-04 |
| Threshold | 0.3 | 10 | 10 |

| SFPUC Peninsula Pipeline Upgrade | Acute Hazard Index | Chronic Hazard Index |
|---|---|---|
| Site | | |
| Colma | 2.28E-06 | 5.30E-03 |
| South SF | 2.28E-06 | 5.53E-03 |
| San Bruno South | 4.56E-06 | 1.57E-02 |
| San Bruno North | 0.00E+00 | 1.14E-03 |
| Millbrae | 2.28E-06 | 7.24E-03 |
| Threshold | 1 | 1 |

| SFPUC Peninsula Pipeline Upgrade | Concentration at Nearest Receptor - Colma Site | Cancer Risk - Colma Site |
|---|---|---|
| Compound | $\mu g/m^3$ | Increase Per Million |
| Acetaldehyde | 7.67E-07 | 6.11E-07 |
| Acrolein | 3.56E-07 | - |
| Benzene | 6.77E-06 | 5.39E-05 |
| 1,3-Butadiene | 1.51E-06 | 7.20E-05 |
| Ethylbenzene | 2.88E-06 | 1.99E-06 |
| Formaldehyde | 4.33E-06 | 7.24E-06 |
| Naphthalene | 1.37E-07 | 1.31E-06 |
| Total TOG Tailpipe Cancer Rick Increase | | **1.37E-04** |

## SFPUC Peninsula Pipelines - Health Risk Summary

| SFPUC Peninsula Pipeline Upgrade | Concentration at Nearest Receptor - South SF Site | Cancer Risk - South SF Site |
|---|---|---|
| Compound | µg/m$^3$ | Increase Per Million |
| Acetaldehyde | 7.67E-07 | 6.11E-07 |
| Acrolein | 3.56E-07 | - |
| Benzene | 6.77E-06 | 5.39E-05 |
| 1,3-Butadiene | 1.51E-06 | 7.20E-05 |
| Ethylbenzene | 2.88E-06 | 1.99E-06 |
| Formaldehyde | 4.33E-06 | 7.24E-06 |
| Naphthalene | 1.37E-07 | 1.31E-06 |
| Total Gasoline TOG Cancer Rick Increase | | **1.37E-04** |

| SFPUC Peninsula Pipeline Upgrade | Concentration at Nearest Receptor - South San Bruno | Cancer Risk - South San Bruno Site |
|---|---|---|
| Compound | µg/m$^3$ | Increase Per Million |
| Acetaldehyde | 1.53E-06 | 1.22E-06 |
| Acrolein | 7.12E-07 | - |
| Benzene | 1.35E-05 | 1.08E-04 |
| 1,3-Butadiene | 3.01E-06 | 1.44E-04 |
| Ethylbenzene | 5.75E-06 | 3.98E-06 |
| Formaldehyde | 8.66E-06 | 1.45E-05 |
| Naphthalene | 2.74E-07 | 2.62E-06 |
| Total Gasoline TOG Cancer Rick Increase | | **2.74E-04** |

| SFPUC Peninsula Pipeline Upgrade | Concentration at Nearest Receptor - San Bruno North Site | Cancer Risk - San Bruno North Site |
|---|---|---|
| Compound | µg/m$^3$ | Increase Per Million |
| Acetaldehyde | 0.00E+00 | 0.00E+00 |
| Acrolein | 0.00E+00 | - |
| Benzene | 0.00E+00 | 0.00E+00 |
| 1,3-Butadiene | 0.00E+00 | 0.00E+00 |
| Ethylbenzene | 0.00E+00 | 0.00E+00 |
| Formaldehyde | 0.00E+00 | 0.00E+00 |
| Naphthalene | 0.00E+00 | 0.00E+00 |
| Total Gasoline TOG Cancer Rick Increase | | **0.00E+00** |

## SFPUC Peninsula Pipelines - Health Risk Summary

| SFPUC Peninsula Pipeline Upgrade | Concentration at Nearest Receptor - Millbrae Site | Cancer Risk - Millbrae Site |
|---|---|---|
| Compound | µg/m$^3$ | Increase Per Million |
| Acetaldehyde | 7.67E-07 | 6.11E-07 |
| Acrolein | 3.56E-07 | - |
| Benzene | 6.77E-06 | 5.39E-05 |
| 1,3-Butadiene | 1.51E-06 | 7.20E-05 |
| Ethylbenzene | 2.88E-06 | 1.99E-06 |
| Formaldehyde | 4.33E-06 | 7.24E-06 |
| Naphthalene | 1.37E-07 | 1.31E-06 |
| Total Gasoline TOG Cancer Rick Increase | | **1.37E-04** |

# SFPUC Peninsula Pipelines - Health Risk Data

## Cancer Risk

| Site | DPM AA Conc µg/m3 | Dose | DPM Cancer Risk |
|---|---|---|---|
| Colma | 0.026 | 1.48E-05 | 2.32E-06 |
| South SF | 0.028 | 1.54E-05 | 2.42E-06 |
| San Bruno South | 0.078 | 4.36E-05 | 6.86E-06 |
| San Bruno North | 0.006 | 3.17E-06 | 4.99E-07 |
| Millbrae | 0.036 | 2.02E-05 | 3.17E-06 |

| Site | TOG AA Conc µg/m3 | Dose | TOG Cancer Risk |
|---|---|---|---|
| Colma | 0.0003 | 1.53E-07 | 1.37E-10 |
| South SF | 0.0003 | 1.53E-07 | 1.37E-10 |
| San Bruno South | 0.0005 | 3.05E-07 | 2.74E-10 |
| San Bruno North | 0.0000 | 0.00E+00 | 0.00E+00 |
| Millbrae | 0.0003 | 1.53E-07 | 1.37E-10 |

| Constants | | |
|---|---|---|
| DBR | 302 | L/kg-day Adult |
| | 581 | L/kg-day Child |
| EF | 350 | days/year |
| ED | 70 | years |
| CF | 0.000001 | |
| AT | 25550 | days |
| ASF | 10 | |

## Colma Site Speciated TOG Speciated Cancer Risk

| Compound | TOG AA Conc µg/m3 | Dose | Cancer Risk |
|---|---|---|---|
| Acetaldehyde | 0.026491873 | 4.2742E-10 | 6.11E-07 |
| Acrolein | 0.000000767 | 1.98445E-10 | - |
| Benzene | 0.000000356 | 3.77045E-09 | 5.39E-05 |
| 1,3-Butadiene | 0.000006768 | 8.39575E-10 | 7.20E-05 |
| Ethylbenzene | 0.000001507 | 1.60282E-09 | 1.99E-06 |
| Formaldehyde | 0.000002877 | 2.41187E-09 | 7.24E-06 |
| Naphthalene | 0.000004329 | 7.6325E-11 | 1.31E-06 |
| **Total** | | | 1.37E-04 |

# SFPUC Peninsula Pipelines - Health Risk Data

## Chronic and Acute Inhalation Hazard

### Colma Site

| Compound | Chronic Inhalation REL | Colma Concentration | Hazard Quotient |
|---|---|---|---|
| DPM | 5 | 0.026491873 | 0.005298375 |
| Acetaldehyde | 1.40E+02 | 7.67191E-07 | 5.48E-09 |
| Acrolein | 3.50E-01 | 3.56196E-07 | 1.02E-06 |
| Benzene | 6.00E+01 | 6.76772E-06 | 1.13E-07 |
| 1,3-Butadiene | 2.00E+01 | 1.50698E-06 | 7.53491E-08 |
| Ethylbenzene | 2.00E+03 | 2.87697E-06 | 1.43848E-09 |
| Formaldehyde | 9.00E+00 | 4.32915E-06 | 4.81E-07 |
| Naphthalene | 9.00E+00 | 1.36998E-07 | 1.5222E-08 |
| **Total** | | | 0.005300084 |

| Compound | Acute Inhalation REL | Colma Concentration | Hazard Quotient |
|---|---|---|---|
| DPM | - | 0.026491873 | - |
| Acetaldehyde | 4.70E+02 | 7.67191E-07 | 1.63E-09 |
| Acrolein | 2.50E+00 | 3.56196E-07 | 1.42478E-07 |
| Benzene | 1.30E+03 | 6.76772E-06 | 5.21E-09 |
| 1,3-Butadiene | - | 1.50698E-06 | - |
| Ethylbenzene | - | 2.87697E-06 | - |
| Formaldehyde | 5.50E+01 | 4.32915E-06 | 7.87118E-08 |
| Naphthalene | - | 1.36998E-07 | - |
| **Total** | | | 2.28028E-07 |

### South San Francisco Site

| Compound | Chronic Inhalation REL | SSF Concentration | Hazard Quotient |
|---|---|---|---|
| DPM | 5 | 0.027621286 | 0.005524257 |
| Acetaldehyde | 1.40E+02 | 7.67191E-07 | 5.47993E-09 |
| Acrolein | 3.50E-01 | 3.56196E-07 | 1.0177E-06 |
| Benzene | 6.00E+01 | 6.76772E-06 | 1.13E-07 |
| 1,3-Butadiene | 2.00E+01 | 1.50698E-06 | 7.53491E-08 |
| Ethylbenzene | 2.00E+03 | 2.87697E-06 | 1.43848E-09 |
| Formaldehyde | 9.00E+00 | 4.32915E-06 | 4.81016E-07 |
| Naphthalene | 9.00E+00 | 1.36998E-07 | 1.5222E-08 |
| **Total** | | | 0.005525966 |

## SFPUC Peninsula Pipelines - Health Risk Data

| Compound | Acute Inhalation REL | SSF Concentration | Hazard Quotient |
|---|---|---|---|
| DPM | - | 0.027621286 | - |
| Acetaldehyde | 4.70E+02 | 7.67191E-07 | 1.63232E-09 |
| Acrolein | 2.50E+00 | 3.56196E-07 | 1.42478E-07 |
| Benzene | 1.30E+03 | 6.76772E-06 | 5.21E-09 |
| 1,3-Butadiene | - | 1.50698E-06 | - |
| Ethylbenzene | - | 2.87697E-06 | - |
| Formaldehyde | 5.50E+01 | 4.32915E-06 | 7.87118E-08 |
| Naphthalene | - | 1.36998E-07 | - |
| **Total** | | | 2.28028E-07 |

San Bruno South Site

| Compound | Chronic Inhalation REL | SBS Concentration | Hazard Quotient |
|---|---|---|---|
| DPM | 5 | 0.078300000 | 0.01566 |
| Acetaldehyde | 1.40E+02 | 1.53438E-06 | 1.09599E-08 |
| Acrolein | 3.50E-01 | 7.12392E-07 | 2.0354E-06 |
| Benzene | 6.00E+01 | 1.35354E-05 | 2.26E-07 |
| 1,3-Butadiene | 2.00E+01 | 3.01396E-06 | 1.50698E-07 |
| Ethylbenzene | 2.00E+03 | 5.75393E-06 | 2.87697E-09 |
| Formaldehyde | 9.00E+00 | 8.6583E-06 | 9.62033E-07 |
| Naphthalene | 9.00E+00 | 2.73997E-07 | 3.04441E-08 |
| **Total** | | | 0.015663418 |

| Compound | Acute Inhalation REL | SBS Concentration | Hazard Quotient |
|---|---|---|---|
| DPM | - | 0.078300000 | - |
| Acetaldehyde | 4.70E+02 | 1.53438E-06 | 3.26464E-09 |
| Acrolein | 2.50E+00 | 7.12392E-07 | 2.84957E-07 |
| Benzene | 1.30E+03 | 1.35354E-05 | 1.04E-08 |
| 1,3-Butadiene | - | 3.01396E-06 | - |
| Ethylbenzene | - | 5.75393E-06 | - |
| Formaldehyde | 5.50E+01 | 8.6583E-06 | 1.57424E-07 |
| Naphthalene | - | 2.73997E-07 | - |
| **Total** | | | 4.56057E-07 |

# SFPUC Peninsula Pipelines - Health Risk Data

## San Bruno North Site

| | Chronic Inhalation REL | SBN Concentration | Hazard Quotient |
|---|---|---|---|
| DPM | 5 | 0.005696157 | 0.001139231 |
| Acetaldehyde | 1.40E+02 | 0 | 0 |
| Acrolein | 3.50E-01 | 0 | 0 |
| Benzene | 6.00E+01 | 0 | 0.00E+00 |
| 1,3-Butadiene | 2.00E+01 | 0 | 0 |
| Ethylbenzene | 2.00E+03 | 0 | 0 |
| Formaldehyde | 9.00E+00 | 0 | 0 |
| Naphthalene | 9.00E+00 | 0 | 0 |
| **Total** | | | 0.001139231 |

| | Acute Inhalation REL | SBN Concentration | Hazard Quotient |
|---|---|---|---|
| DPM | | 0.005696157 | - |
| Acetaldehyde | 4.70E+02 | 0 | 0 |
| Acrolein | 2.50E+00 | 0 | 0 |
| Benzene | 1.30E+03 | 0 | 0.00E+00 |
| 1,3-Butadiene | - | 0 | - |
| Ethylbenzene | - | 0 | - |
| Formaldehyde | 5.50E+01 | 0 | 0 |
| Naphthalene | - | 0 | - |
| **Total** | | | 0 |

## Millbrae Site

| | Chronic Inhalation REL | Millbrae Concentration | Hazard Quotient |
|---|---|---|---|
| DPM | 5 | 0.036209174 | 0.007241835 |
| Acetaldehyde | 1.40E+02 | 7.67191E-07 | 5.47993E-09 |
| Acrolein | 3.50E-01 | 3.56196E-07 | 1.0177E-06 |
| Benzene | 6.00E+01 | 6.76772E-06 | 1.13E-07 |
| 1,3-Butadiene | 2.00E+01 | 1.50698E-06 | 7.53491E-08 |
| Ethylbenzene | 2.00E+03 | 2.87697E-06 | 1.43848E-09 |
| Formaldehyde | 9.00E+00 | 4.32915E-06 | 4.81016E-07 |
| Naphthalene | 9.00E+00 | 1.36998E-07 | 1.5222E-08 |
| **Total** | | | 0.007243544 |

## SFPUC Peninsula Pipelines - Health Risk Data

| | Acute Inhalation REL | Millbrae Concentration | Hazard Quotient |
|---|---|---|---|
| DPM | | 0.036209174 | - |
| Acetaldehyde | 4.70E+02 | 7.67191E-07 | 1.63232E-09 |
| Acrolein | 2.50E+00 | 3.56196E-07 | 1.42478E-07 |
| Benzene | 1.30E+03 | 6.76772E-06 | 5.21E-09 |
| 1,3-Butadiene | - | 1.50698E-06 | - |
| Ethylbenzene | - | 2.87697E-06 | - |
| Formaldehyde | 5.50E+01 | 4.32915E-06 | 7.87118E-08 |
| Naphthalene | - | 1.36998E-07 | - |
| **Total** | | | 2.28028E-07 |

## SFPUC Peninsula Pipelines - Construction GHG Summary

| | Emissions (Tons) | | |
|---|---|---|---|
| Construction Equipment | $CH_4$ | $N_2O$ | $CO_2$ |
| 2014-2015 | 0.080 | 0.036 | 524.2 |

| | Emissions (Tons) | | |
|---|---|---|---|
| Haul Trucks | $CH_4$ | $N_2O$ | $CO_2$ |
| 2014-2015 | 0.00012 | 0.00011 | 64.5 |

| | Emissions (Tons) | | |
|---|---|---|---|
| Worker Commute | $CH_4$ | $N_2O$ | $CO_2$ |
| 2014-2015 | 0.017 | 0.030 | 204.6 |

| | Total Emissions (Tons) | | |
|---|---|---|---|
| | $CH_4$ | $N_2O$ | $CO_2$ |
| Total | 0.098 | 0.066 | 793.3 |
| GWP | 21 | 310 | 1 |
| Total $CO_2$e | 2 | 20 | 793 |

| | |
|---|---|
| **Total $CO_2$e (Metric Tons)** | **740.0** |

## SFPUC Peninsula Pipelines - Construction Emissions Summary

| | Emissions (Tons) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Construction Equipment | ROG | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
| 2014-2015 | 0.425 | 3.032 | 3.578 | 0.263 | 0.242 | 0.006 | 0.080 | 0.036 | 524.2 |

Note: PM2.5 Emissions 92% of PM10 emissions per SCAQMD Appendix A CEIDARS Table with PM2.5 Fraction

| | Emissions (Tons) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Haul Trucks | ROG | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
| 2014-2015 | 0.032 | 0.089 | 0.396 | 0.011 | 0.010 | 0.000 | 0.00012 | 0.00011 | 64.5 |

| | Emissions (Tons) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Worker Commute | ROG | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
| 2014-2015 | 0.052 | 1.678 | 0.163 | 0.002 | 0.002 | 0.000 | 0.017 | 0.030 | 204.642 |

| | Total Emissions (Tons) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | ROG | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
| Total (Tons) | 0.508 | 4.799 | 4.136 | 0.277 | 0.255 | 0.006 | 0.098 | 0.066 | 793 |
| Total (lbs/day) | 4.5 | 42.3 | 36.4 | 2.4 | 2.2 | 0.1 | 0.9 | 0.6 | 6984.9 |
| BAAQMD CEQA Threshold | 54 | - | 54 | 82 | 54 | - | - | - | - |
| Exceeds Threshold? | **No** | - | **No** | **No** | **No** | - | - | - | - |

| | |
|---|---|
| Project Start | 10/1/2014 |
| Project End | 8/15/2015 |
| Project Life | 318 |
| Construction Days | 227 |

# SFPUC Peninsula Pipelines - Construction Emissions Summary by Site

## Diesel Fuel Construction Emissions

| **Millbrae** | ROG | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| Emissions (Tons/Year) | 0.09 | 0.63 | 0.78 | 0.05 | 0.05 | 0.00 | 0.02 | 0.01 | 114.48 |
| Emissions (grams/second) | 0.0253 | 0.1810 | 0.2229 | 0.0157 | 0.0144 | 0.0004 | 0.0047 | 0.0021 | 32.7814 |

| **San Bruno North** | ROG | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| Emissions (Tons/Year) | 0.01 | 0.10 | 0.12 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 16.49 |
| Emissions (grams/second) | 0.0217 | 0.1533 | 0.1818 | 0.0136 | 0.0125 | 0.0003 | 0.0040 | 0.0018 | 25.9679 |

| **San Bruno South** | ROG | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| Emissions (Tons/Year) | 0.19 | 1.35 | 1.58 | 0.12 | 0.11 | 0.00 | 0.04 | 0.02 | 226.38 |
| Emissions (grams/second) | 0.0381 | 0.2699 | 0.3170 | 0.0238 | 0.0219 | 0.0005 | 0.0070 | 0.0031 | 45.4194 |

| **Colma** | ROG | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| Emissions (Tons/Year) | 0.06 | 0.46 | 0.53 | 0.04 | 0.04 | 0.00 | 0.01 | 0.01 | 76.55 |
| Emissions (grams/second) | 0.0294 | 0.2083 | 0.2435 | 0.0183 | 0.0168 | 0.0004 | 0.0054 | 0.0024 | 34.9464 |

| **South San Francisco** | ROG | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| Emissions (Tons/Year) | 0.07 | 0.48 | 0.57 | 0.04 | 0.04 | 0.00 | 0.01 | 0.01 | 83.09 |
| Emissions (grams/second) | 0.0268 | 0.1909 | 0.2282 | 0.0167 | 0.0153 | 0.0004 | 0.0050 | 0.0022 | 33.1286 |

## SFPUC Peninsula Pipelines - Construction Emissions Summary by Site

### Gasoline Vehicle Construction Emissions

| **Millbrae** | ROG | TOG | CO | $NO_X$ | $PM_{10}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| Emissions (Tons/Year) | 0.0003 | 0.000415 | 0.0053 | 0.0006 | 0.0000 | 0.0000 | 0.0004 | 0.0002 | 1.5827 |
| Emissions (grams/second) | 0.0001 | 0.0001 | 0.0015 | 0.0002 | 0.0000 | 0.0000 | 0.0001 | 0.0000 | 0.4532 |

| **San Bruno North** | ROG | TOG | CO | $NO_X$ | $PM_{10}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| Emissions (Tons/Year) | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Emissions (grams/second) | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

| **San Bruno South** | ROG | TOG | CO | $NO_X$ | $PM_{10}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| Emissions (Tons/Year) | 0.0006 | 0.000829 | 0.0105 | 0.0012 | 0.0000 | 0.0000 | 0.0007 | 0.0003 | 3.1654 |
| Emissions (grams/second) | 0.0001 | 0.0002 | 0.0021 | 0.0002 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.6351 |

| **Colma** | ROG | TOG | CO | $NO_X$ | $PM_{10}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| Emissions (Tons/Year) | 0.0003 | 0.000415 | 0.0053 | 0.0006 | 0.0000 | 0.0000 | 0.0004 | 0.0002 | 1.5827 |
| Emissions (grams/second) | 0.0001 | 0.0002 | 0.0024 | 0.0003 | 0.0000 | 0.0000 | 0.0002 | 0.0001 | 0.7225 |

| **South San Francisco** | ROG | TOG | CO | $NO_X$ | $PM_{10}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| Emissions (Tons/Year) | 0.000279 | 0.000415 | 0.005272 | 0.000618 | 1.3E-05 | 0 | 0.000361 | 0.000159 | 1.582699 |
| Emissions (grams/second) | 0.0001 | 0.0002 | 0.0021 | 0.0002 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.6311 |

## SFPUC Peninsula Pipelines - Construction Equipment Emissions

| | | | |
|---|---|---|---|
| Equipment List Provided in "Comprehensive Equipment List November 2011" Spreadsheet | Project Start | 10/1/2014 | 318 |
| Phase scheduling and duration from "Air Quality Technical Report Scope of Work" | Project End | 8/15/2015 | 227 |

### PPSU Equipment List

| Phase/Equipment | Engine HP (1) | Load Factor (2) | OFFROAD LF | Operating Factor | Amount | Hours/Day | Days/Week | Fuel Type | Days | Sites | Hours |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Tree Removal** | **Tree Removal Occurs at the SSF and Millbrae Sites only From Oct.-Nov. 2014** | | | | | | | | | | |
| Chain saw | 4 | 43% | | | 2 | 4 | 5 | Gasoline | 30 | 1.33 | 319 |
| Brush chipper | 49 | 43% | 42% | | 1 | 4 | 5 | Diesel | 30 | 1.33 | 160 |
| Whole tree chippers | 490 | 43% | 42% | | 1 | 4 | 5 | Diesel | 30 | 1.33 | 160 |
| Rubber tire skidder and track skid-steer loader | 125 | 54% | 37% | 75% | 1 | 2 | 5 | DIesel | 30 | 1.33 | 80 |
| Flatbed truck | 300 | 57% | 38% | 25% | 1 | 1 | 5 | Diesel | 30 | 1.33 | 40 |
| **Shutdown and dewatering** | **Shutdown and Dewatering Occurs at Each Site (5 Sites-San Bruno North and South are Same Site, but two pipelines at San Bruno) Over a 1 Week Period in Dec. 2014** | | | | | | | | | | |
| Pumps and Hoses | 7 | 43% | 40% | | 2 | 4 | 5 | Diesel | 5 | 3 | 120 |
| Generator | 108 | 43% | 34% | | 2 | 4 | 5 | Diesel | 5 | 3 | 120 |
| Pickup Truck | 175 | 80% | 100% | | 4 | 4 | 5 | Gasoline | 5 | 3 | 240 |
| Baker Tanks | NA | NA | - | NA | | NA | NA | NA | - | - | - |
| **Mobilization** | **Mobilization Occurs at Each Site Over a 1 Week Period in Dec. 2014** | | | | | | | | | | |
| Flatbed trucks | 300 | 57% | 38% | 25% | 1 | 1 | 5 | Diesel | 10 | 5 | 50 |
| Pickup trucks | 175 | 80% | 100% | | 2 | 4 | 5 | Gasoline | 10 | 5 | 400 |
| **Shoring/excavation, pipeline removal/installation, dewatering, hydrostatic testing, backfill/restoration** | **Phase Occurs at Millbrae, San Bruno South (Two Pipelines, SAPL2 and SAPL3), Colma, and South San Francisco Sites. Phase would take place in 2 months for South San Francisco site** | | | | | | | | | | |
| Backhoe-Loader | 70 | 38% | 37% | 85% | 1 | 6 | 5 | Diesel | 66 | 4.31 | 1707 |
| Cement/Mixer | 11 | 56% | 42% | 90% | 1 | 4 | 5 | Diesel | 66 | 4.31 | 1138 |
| Compactor | 75 | 59% | 42% | 85% | 1 | 2 | 5 | Diesel | 66 | 4.31 | 569 |
| Concrete Truck with Pump | 74 | 43% | 38% | 75% | 2 | 1 | 5 | Diesel | 66 | 4.31 | 569 |
| Crane (with hydraulic or diesel impact hammer attachments) | 150 | 43% | 29% | 75% | 1 | 6 | 5 | Diesel | 66 | 4.31 | 1707 |
| Excavator | 150 | 43% | 43% | 75% | 1 | 6 | 5 | Diesel | 66 | 4.31 | 1707 |
| Dozer | 150 | 59% | 40% | 85% | 1 | 2 | 5 | I se | 66 | 4.31 | 569 |
| Forklift | 70 | 35% | 20% | 65% | 1 | 1 | 5 | Diesel | 66 | 4.31 | 284 |
| Grader | 70 | 54% | 41% | 85% | 1 | 2 | 5 | Diesel | 66 | 4.31 | 569 |
| Generator | 108 | 43% | 34% | | 1 | 8 | 5 | Diesel | 66 | 4.31 | 2276 |
| Loader | 125 | 54% | 36% | 75% | 1 | 2 | 5 | Diesel | 66 | 4.31 | 569 |
| Pump | 7 | 43% | 40% | | 2 | 4 | 5 | Diesel | 66 | 4.31 | 2276 |
| Street Sweeper | 65 | 68% | 46% | 35% | 1 | 5 | 5 | Diesel | 66 | 4.31 | 1422 |
| Tractor | 70 | 38% | 37% | 85% | 1 | 2 | 5 | Diesel | 66 | 4.31 | 569 |
| Truck (water, dump, pickup, various off-road) | 300 | 57% | 38% | 25% | 1 | 5 | 5 | Diesel | 66 | 4.31 | 1422 |
| Welding Set | 20 | 45% | 42% | 75% | 1 | 2 | 5 | Diesel | 66 | 4.31 | 569 |
| Winch | 5 | 43% | 42% | | 1 | 2 | 5 | | 66 | 4.31 | 569 |
| **Disinfection** | **Phase takes place at 5 sites (SAPL2 and SAPL3 at San Bruno South, San Bruno North is covered by this, Millbrae, Colma, and South San Francisco) for two weeks** | | | | | | | | | | |
| Pumps and Hoses | 7 | 74% | 40% | | 2 | 4 | 5 | Diesel | 10 | 3 | 240 |
| Generator | 108 | 43% | 34% | | 1 | 4 | 5 | Diesel | 10 | 3 | 120 |
| Pickup Truck | 175 | 80% | 100% | | 2 | 4 | 5 | Gasoline | 10 | 3 | 240 |
| Baker Tanks | NA | NA | - | NA | | NA | NA | NA | - | - | - |

Notes:

(1) If the specific horsepower is not known, the AQ consultant can use ARB's OFFROAD state average horsepower for the given equipment types.

(2) The engine load factor is the % the engine is operated compared to the engine capacity (ie, fraction of available power)

## SFPUC Peninsula Pipelines - Construction Equipment Emissions

| | Emission Factors (lb/hr) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Phase/Equipment** | ROG | CO | $NO_X$ | $PM_{10}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
| **Tree Removal** | | | | | | | | |
| Chain saw | - | - | - | - | - | - | - | - |
| Brush chipper | 0.04 | 0.24 | 0.19 | 0.02 | 0.00 | 0.58 | 0.26 | 27.99 |
| Whole tree chippers | 0.09 | 0.65 | 1.48 | 0.05 | 0.00 | 0.58 | 0.26 | 250.21 |
| Rubber tire skidder and track skid-steer loader | 0.02 | 0.34 | 0.26 | 0.01 | 0.00 | 0.58 | 0.26 | 45.99 |
| Flatbed truck | 0.08 | 0.41 | 1.07 | 0.04 | 0.00 | 0.58 | 0.26 | 187.70 |
| **Shutdown and dewatering** | | | | | | | | |
| Pumps and Hoses | 0.03 | 0.23 | 0.15 | 0.01 | 0.00 | 0.58 | 0.26 | 21.74 |
| Generator | 0.04 | 0.33 | 0.33 | 0.03 | 0.00 | 0.58 | 0.26 | 55.13 |
| Pickup Truck | 0.00 | 0.07 | 0.01 | 0.00 | 0.00 | 0.50 | 0.22 | 22.48 |
| Baker Tanks | - | - | - | - | - | - | - | - |
| **Mobilization** | | | | | | | | |
| Flatbed trucks | 0.08 | 0.41 | 1.07 | 0.04 | 0.00 | 0.58 | 0.26 | 187.70 |
| Pickup trucks | 0.00 | 0.07 | 0.01 | 0.00 | 0.00 | 0.50 | 0.22 | 22.48 |
| **Shoring/excavation, pipeline removal/installation, dewatering, hydrostatic testing, backfill/restoration** | | | | | | | | |
| Backhoe-Loader | 0.03 | 0.28 | 0.23 | 0.02 | 0.00 | 0.58 | 0.26 | 36.46 |
| Cement/Mixer | 0.04 | 0.24 | 0.19 | 0.02 | 0.00 | 0.58 | 0.26 | 27.99 |
| Compactor | 0.04 | 0.30 | 0.30 | 0.03 | 0.00 | 0.58 | 0.26 | 46.87 |
| Concrete Truck with Pump | 0.04 | 0.34 | 0.24 | 0.02 | 0.00 | 0.58 | 0.26 | 52.53 |
| Crane (with hydraulic or diesel impact hammer attachments) | 0.06 | 0.33 | 0.70 | 0.04 | 0.00 | 0.58 | 0.26 | 66.62 |
| Excavator | 0.03 | 0.43 | 0.47 | 0.03 | 0.00 | 0.58 | 0.26 | 94.68 |
| Dozer | 0.09 | 0.55 | 1.01 | 0.07 | 0.00 | 0.58 | 0.26 | 112.92 |
| Forklift | 0.03 | 0.13 | 0.15 | 0.01 | 0.00 | 0.58 | 0.26 | 19.40 |
| Grader | 0.09 | 0.36 | 0.40 | 0.04 | 0.00 | 0.58 | 0.26 | 41.09 |
| Generator | 0.04 | 0.33 | 0.33 | 0.03 | 0.00 | 0.58 | 0.26 | 55.13 |
| Loader | 0.05 | 0.41 | 0.51 | 0.04 | 0.00 | 0.58 | 0.26 | 63.22 |
| Pump | 0.03 | 0.23 | 0.15 | 0.01 | 0.00 | 0.58 | 0.26 | 21.74 |
| Street Sweeper | 0.05 | 0.29 | 0.28 | 0.03 | 0.00 | 0.58 | 0.26 | 40.87 |
| Tractor | 0.05 | 0.41 | 0.27 | 0.02 | 0.00 | 0.58 | 0.26 | 51.38 |
| Truck (water, dump, pickup, various off-road) | 0.08 | 0.41 | 1.07 | 0.04 | 0.00 | 0.58 | 0.26 | 187.70 |
| Welding Set | 0.04 | 0.24 | 0.19 | 0.02 | 0.00 | 0.58 | 0.26 | 27.99 |
| Winch | 0.04 | 0.24 | 0.19 | 0.02 | 0.00 | 0.58 | 0.26 | 27.99 |
| **Disinfection** | | | | | | | | |
| Pumps and Hoses | 0.03 | 0.23 | 0.15 | 0.01 | 0.00 | 0.58 | 0.26 | 21.74 |
| Generator | 0.04 | 0.33 | 0.33 | 0.03 | 0.00 | 0.58 | 0.26 | 55.13 |
| Pickup Truck | 0.00 | 0.07 | 0.01 | 0.00 | 0.00 | 0.50 | 0.22 | 22.48 |
| Baker Tanks | - | - | - | - | - | | | - |

## SFPUC Peninsula Pipelines - Construction Equipment Emissions

| | Total Emissions per day (Lbs/Day) | | | | | | | | Total Emissions by Activity (Tons/Activity) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Phase/Equipment** | ROG | CO | $NO_X$ | $PM_{10}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ | ROG | CO | $NO_X$ | $PM_{10}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
| **Tree Removal** | | | | | | | | | | | | | | | | |
| Chain saw | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Brush chipper | 0.15 | 0.98 | 0.79 | 0.07 | 0.00 | 0.04 | 0.02 | 114.62 | 0.003 | 0.019 | 0.016 | 0.001 | 0.000 | 0.001 | 0.000 | 2.287 |
| Whole tree chippers | 0.36 | 2.64 | 6.05 | 0.22 | 0.01 | 0.06 | 0.03 | 1024.68 | 0.007 | 0.053 | 0.121 | 0.004 | 0.000 | 0.001 | 0.001 | 20.442 |
| Rubber tire skidder and track skid-steer loader | 0.03 | 0.75 | 0.56 | 0.03 | 0.00 | 0.01 | 0.00 | 100.67 | 0.001 | 0.015 | 0.011 | 0.001 | 0.000 | 0.000 | 0.000 | 2.008 |
| Flatbed truck | 0.03 | 0.15 | 0.40 | 0.02 | 0.00 | 0.01 | 0.01 | 70.39 | 0.001 | 0.003 | 0.008 | 0.000 | 0.000 | 0.000 | 0.000 | 1.404 |
| **Shutdown and dewatering** | | | | | | | | | | | | | | | | |
| Pumps and Hoses | 0.29 | 1.97 | 1.27 | 0.12 | 0.00 | 0.01 | 0.00 | 187.00 | 0.002 | 0.015 | 0.010 | 0.001 | 0.000 | 0.000 | 0.000 | 1.403 |
| Generator | 0.36 | 3.31 | 3.36 | 0.29 | 0.01 | 0.10 | 0.05 | 557.77 | 0.003 | 0.025 | 0.025 | 0.002 | 0.000 | 0.002 | 0.001 | 4.183 |
| Pickup Truck | 0.05 | 0.96 | 0.11 | 0.00 | 0.00 | 0.02 | 0.01 | 287.76 | 0.000 | 0.007 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 2.158 |
| Baker Tanks | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Mobilization** | | | | | | | | | | | | | | | | |
| Flatbed trucks | 0.08 | 0.41 | 1.07 | 0.04 | 0.00 | 0.01 | 0.01 | 187.70 | 0.001 | 0.004 | 0.010 | 0.000 | 0.000 | 0.000 | 0.000 | 1.760 |
| Pickup trucks | 0.03 | 0.48 | 0.06 | 0.00 | 0.00 | 0.02 | 0.01 | 143.88 | 0.001 | 0.012 | 0.001 | 0.000 | 0.000 | 0.001 | 0.000 | 3.597 |
| **Shoring/excavation, pipeline removal/installation, dewatering, hydrostatic testing, backfill/restoration** | | | | | | | | | | | | | | | | |
| Backhoe-Loader | 0.20 | 1.70 | 1.36 | 0.12 | 0.00 | 0.01 | 0.01 | 218.74 | 0.025 | 0.211 | 0.169 | 0.014 | 0.000 | 0.002 | 0.001 | 27.159 |
| Cement/Mixer | 0.15 | 0.95 | 0.77 | 0.07 | 0.00 | 0.00 | 0.00 | 111.96 | 0.026 | 0.163 | 0.132 | 0.012 | 0.000 | 0.000 | 0.000 | 19.109 |
| Compactor | 0.08 | 0.60 | 0.60 | 0.05 | 0.00 | 0.00 | 0.00 | 93.74 | 0.014 | 0.101 | 0.102 | 0.009 | 0.000 | 0.000 | 0.000 | 15.920 |
| Concrete Truck with Pump | 0.07 | 0.68 | 0.47 | 0.04 | 0.00 | 0.00 | 0.00 | 105.06 | 0.009 | 0.081 | 0.057 | 0.005 | 0.000 | 0.001 | 0.001 | 12.681 |
| Crane (with hydraulic or diesel impact hammer attachments) | 0.36 | 1.95 | 4.19 | 0.26 | 0.00 | 0.08 | 0.03 | 399.71 | 0.057 | 0.308 | 0.663 | 0.041 | 0.001 | 0.011 | 0.005 | 63.222 |
| Excavator | 0.21 | 2.57 | 2.84 | 0.16 | 0.01 | 0.08 | 0.03 | 568.06 | 0.022 | 0.274 | 0.303 | 0.017 | 0.001 | 0.011 | 0.005 | 60.596 |
| Dozer | 0.18 | 1.09 | 2.02 | 0.14 | 0.00 | 0.01 | 0.01 | 225.85 | 0.032 | 0.195 | 0.360 | 0.024 | 0.000 | 0.002 | 0.001 | 40.274 |
| Forklift | 0.03 | 0.13 | 0.15 | 0.01 | 0.00 | 0.00 | 0.00 | 19.40 | 0.005 | 0.021 | 0.025 | 0.002 | 0.000 | 0.000 | 0.000 | 3.139 |
| Grader | 0.18 | 0.73 | 0.80 | 0.08 | 0.00 | 0.01 | 0.00 | 82.18 | 0.028 | 0.116 | 0.127 | 0.013 | 0.000 | 0.001 | 0.000 | 13.085 |
| Generator | 0.28 | 2.62 | 2.66 | 0.23 | 0.01 | 0.20 | 0.09 | 441.03 | 0.051 | 0.471 | 0.478 | 0.041 | 0.001 | 0.029 | 0.013 | 79.332 |
| Loader | 0.10 | 0.82 | 1.03 | 0.08 | 0.00 | 0.01 | 0.00 | 126.45 | 0.016 | 0.131 | 0.164 | 0.014 | 0.000 | 0.001 | 0.001 | 20.232 |
| Pump | 0.27 | 1.83 | 1.18 | 0.12 | 0.00 | 0.01 | 0.00 | 173.96 | 0.041 | 0.280 | 0.181 | 0.018 | 0.000 | 0.002 | 0.001 | 26.597 |
| Street Sweeper | 0.26 | 1.47 | 1.39 | 0.14 | 0.00 | 0.02 | 0.01 | 204.35 | 0.019 | 0.108 | 0.102 | 0.010 | 0.000 | 0.002 | 0.001 | 15.038 |
| Tractor | 0.09 | 0.82 | 0.55 | 0.05 | 0.00 | 0.00 | 0.00 | 102.76 | 0.012 | 0.102 | 0.068 | 0.006 | 0.000 | 0.001 | 0.000 | 12.758 |
| Truck (water, dump, pickup, various off-road) | 0.39 | 2.05 | 5.34 | 0.22 | 0.01 | 0.06 | 0.03 | 938.52 | 0.021 | 0.109 | 0.285 | 0.012 | 0.001 | 0.008 | 0.004 | 50.057 |
| Welding Set | 0.07 | 0.48 | 0.39 | 0.03 | 0.00 | 0.00 | 0.00 | 55.98 | 0.009 | 0.054 | 0.044 | 0.004 | 0.000 | 0.000 | 0.000 | 6.398 |
| Winch | 0.07 | 0.48 | 0.39 | 0.03 | 0.00 | 0.00 | 0.00 | 55.98 | 0.011 | 0.069 | 0.056 | 0.005 | 0.000 | 0.000 | 0.000 | 8.151 |
| **Disinfection** | | | | | | | | | | | | | | | | |
| Pumps and Hoses | 0.27 | 1.83 | 1.18 | 0.12 | 0.00 | 0.01 | 0.00 | 173.96 | 0.007 | 0.051 | 0.033 | 0.003 | 0.000 | 0.000 | 0.000 | 4.827 |
| Generator | 0.14 | 1.31 | 1.33 | 0.11 | 0.00 | 0.10 | 0.05 | 220.52 | 0.003 | 0.025 | 0.025 | 0.002 | 0.000 | 0.002 | 0.001 | 4.183 |
| Pickup Truck | 0.03 | 0.48 | 0.06 | 0.00 | 0.00 | 0.02 | 0.01 | 143.88 | 0.000 | 0.007 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 2.158 |
| Baker Tanks | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | **Totals (Tons)** | | | | | | | | 0.42 | 3.03 | 3.58 | 0.26 | 0.01 | 0.08 | 0.04 | 524.16 |
| | **Total lbs/day over project duration** | | | | | | | | 3.74 | 26.69 | 31.50 | 2.32 | 0.05 | 0.71 | 0.32 | 4615.26 |

| **Emission Factors (lb/hr) (OFFROAD2011)** | **HP Bin** | **ROG** | **CO** | **$NO_X$** | **PM** | **SOX** | **$CO_2$** |
|---|---|---|---|---|---|---|---|
| **Bore/Drill Rigs** | 50 | 0.029988915 | 0.210703504 | 0.232001972 | 0.016612176 | 0.000401229 | 31.03681551 |
| | 120 | 0.024035366 | 0.441994991 | 0.38262669 | 0.022718873 | 0.000904678 | 77.12179156 |
| | 175 | 0.041867199 | 0.556592722 | 0.669014727 | 0.030608054 | 0.001587351 | 141.0764132 |
| | 250 | 0.041332965 | 0.282264052 | 0.811184119 | 0.024141949 | 0.002116469 | 188.1018818 |
| | 500 | 0.064516733 | 0.54555961 | 1.232514548 | 0.03904963 | 0.003055597 | 311.3087928 |
| | 750 | 0.087912023 | 0.824818073 | 1.608925001 | 0.054554502 | 0.006184592 | 615.093183 |
| | 1000 | 0.088347477 | 1.23683307 | 3.038339143 | 0.059349515 | 0.009333628 | 928.2828483 |
| | 9999 | 0.417798829 | 12.36709386 | 12.54139129 | 0.304281802 | 0.015469437 | 1538.524257 |
| **Cranes** | 50 | 0.045100218 | 0.180512091 | 0.157237817 | 0.015671217 | 0.000299746 | 23.18669033 |
| | 120 | 0.058120113 | 0.290843774 | 0.581981748 | 0.04321262 | 0.000588261 | 50.14795258 |
| | 175 | 0.061586794 | 0.353488445 | 0.795629119 | 0.042928154 | 0.000904015 | 80.34458438 |
| | 250 | 0.075261985 | 0.254888338 | 1.083363744 | 0.049654986 | 0.00126198 | 112.1588823 |
| | 500 | 0.085192357 | 0.597686012 | 1.337264846 | 0.055415675 | 0.001767752 | 180.1012347 |
| | 750 | 0.083332107 | 0.912483214 | 1.558943162 | 0.054300843 | 0.003047032 | 303.0446518 |
| | 1000 | 0.512805559 | 1.598316948 | 6.91862576 | 0.342914548 | 0.004315315 | 429.1825446 |
| | 9999 | 0.065101154 | 15.98157116 | 1.492080051 | 0.035572826 | 0.009759177 | 970.6062945 |
| **Crawler Tractors** | 50 | 0.083731164 | 0.334230567 | 0.257023822 | 0.029874401 | 0.000321631 | 24.87961487 |
| | 120 | 0.059963156 | 0.487378889 | 0.617821071 | 0.051602031 | 0.000771992 | 65.81059833 |
| | 175 | 0.073463064 | 0.596435747 | 0.971979511 | 0.052908323 | 0.001363571 | 121.1877854 |
| | 250 | 0.071956023 | 0.553120655 | 1.196096868 | 0.046225751 | 0.001869265 | 166.131601 |
| | 500 | 0.109696767 | 1.754687926 | 1.808754239 | 0.069953081 | 0.002544422 | 259.2294735 |
| | 750 | 0.154458371 | 2.653510757 | 2.638004533 | 0.096239124 | 0.004672298 | 464.6867796 |
| | 1000 | 0.30751652 | 4.22441392 | 5.813632206 | 0.170824226 | 0.006617073 | 658.105838 |
| | 9999 | 0.4019931 | 42.23991479 | 8.700953946 | 0.228618827 | 0.010967053 | 1090.736296 |
| **Excavators** | 50 | 0.020517344 | 0.242551308 | 0.149395432 | 0.011440439 | 0.000323415 | 25.01756254 |
| | 120 | 0.029190546 | 0.382976242 | 0.353303756 | 0.026326268 | 0.000863637 | 73.62308108 |
| | 175 | 0.039634184 | 0.466825743 | 0.572615692 | 0.028145212 | 0.001262685 | 112.2215532 |
| | 250 | 0.044725535 | 0.310089786 | 0.804530923 | 0.025524874 | 0.001785453 | 158.6827379 |
| | 500 | 0.053206189 | 0.678720636 | 0.927726604 | 0.029896261 | 0.002294189 | 233.7354288 |
| | 750 | 0.095990366 | 1.038327466 | 1.722973089 | 0.055618111 | 0.003895348 | 387.4146042 |
| | 1000 | 0.18128899 | 1.843542682 | 3.919709985 | 0.104370523 | 0.005516729 | 548.6702525 |
| | 9999 | 0.220485115 | 18.43358328 | 4.748250695 | 0.122546405 | 0.009143357 | 909.3591397 |
| **Graders** | 50 | 0.090218016 | 0.325582723 | 0.231108085 | 0.030599467 | 0.000355999 | 27.53811547 |
| | 120 | 0.086003073 | 0.455999976 | 0.818734278 | 0.068216072 | 0.000879376 | 74.96485037 |
| | 175 | 0.093301672 | 0.553281717 | 1.160023659 | 0.065103648 | 0.00139433 | 123.9215568 |
| | 250 | 0.059313252 | 0.451757268 | 1.056892157 | 0.034125547 | 0.001936569 | 172.1132158 |
| | 500 | 0.068565743 | 1.209889361 | 0.980995925 | 0.037692565 | 0.002252463 | 229.4843588 |
| | 1000 | 0.420554444 | 3.185262333 | 6.66461399 | 0.231942982 | 0.006916894 | 687.9245249 |
| | 9999 | 0.648754707 | 31.84943807 | 11.7702487 | 0.354983174 | 0.011463973 | 1140.15741 |

| **Emission Factors (lb/hr) (OFFROAD2011)** | **HP Bin** | **ROG** | **CO** | **$NO_X$** | **PM** | **SOX** | **$CO_2$** |
|---|---|---|---|---|---|---|---|
| **Off-Highway Tractors** | 50 | 0.048485333 | 0.368501131 | 0.20376866 | 0.020109039 | 0.00040393 | 34.43416935 |
| | 120 | 0.041284284 | 0.516695372 | 0.449425686 | 0.036732414 | 0.001099588 | 93.7374366 |
| | 175 | 0.053202545 | 0.633769083 | 0.762688226 | 0.039116723 | 0.001467419 | 130.4173375 |
| | 250 | 0.068659788 | 0.604997752 | 1.16225817 | 0.041704374 | 0.001467419 | 130.4172686 |
| | 500 | 0.074331322 | 2.002321824 | 1.265410018 | 0.044627292 | 0.001956559 | 173.8897453 |
| | 750 | 0.121295255 | 3.025457719 | 2.206216938 | 0.073214186 | 0.005712399 | 568.13074 |
| | 1000 | 0.067118202 | 4.793616936 | 2.188466854 | 0.052108588 | 0.008187493 | 814.2933746 |
| | 9999 | 0.539303996 | 47.93137574 | 9.631363739 | 0.308378569 | 0.013569847 | 1349.599544 |
| **Off-Highway Trucks** | 50 | 0.033567359 | 0.29680272 | 0.142620817 | 0.014839953 | 0.00037161 | 33.02701006 |
| | 120 | 0.040616176 | 0.415712818 | 0.414076131 | 0.03356964 | 0.001011606 | 89.90683729 |
| | 175 | 0.05668703 | 0.506931575 | 0.698204671 | 0.039078704 | 0.001407452 | 125.0878066 |
| | 250 | 0.070908372 | 0.332615339 | 0.966684619 | 0.041836034 | 0.001873923 | 166.5454324 |
| | 500 | 0.101951949 | 0.715343701 | 1.469242838 | 0.056294881 | 0.002673047 | 272.3338478 |
| | 750 | 0.221275578 | 1.094283045 | 3.080522253 | 0.127420131 | 0.004441561 | 441.7386497 |
| | 1000 | 0.258786788 | 1.964863462 | 4.808496491 | 0.141449959 | 0.006281426 | 624.7240418 |
| | 9999 | 0.513438855 | 19.64666976 | 8.725828062 | 0.272991528 | 0.010410755 | 1035.409729 |
| **Other Construction Equipment** | 50 | 0.03741384 | 0.238165779 | 0.193714601 | 0.017482822 | 0.000361835 | 27.98955786 |
| | 120 | 0.044969021 | 0.406285299 | 0.495436289 | 0.038667233 | 0.000948514 | 80.85871251 |
| | 175 | 0.065387175 | 0.496774856 | 0.889831813 | 0.046532108 | 0.001198486 | 106.5158387 |
| | 250 | 0.066574797 | 0.315246021 | 1.146393209 | 0.042163727 | 0.001507814 | 153.6183391 |
| | 500 | 0.089014035 | 0.659379675 | 1.490536643 | 0.054915181 | 0.002495434 | 254.238497 |
| | 750 | 0.110885162 | 1.009135786 | 2.11725649 | 0.067751052 | 0.004112958 | 419.0342873 |
| | 1000 | 0.138209527 | 1.765307551 | 3.374592221 | 0.08856136 | 0.005824916 | 593.4511651 |
| | 9999 | 0.240682859 | 17.6513102 | 5.068868383 | 0.139105963 | 0.009654143 | 983.5784581 |
| **Pavers** | 50 | 0.055487743 | 0.278262664 | 0.202219936 | 0.021032164 | 0.000361835 | 27.98957047 |
| | 120 | 0.041147118 | 0.443857429 | 0.451776752 | 0.035180426 | 0.00081171 | 69.19642095 |
| | 175 | 0.060131453 | 0.541213346 | 0.830730067 | 0.041542811 | 0.001443433 | 128.2855354 |
| | 250 | 0.033545657 | 0.473532583 | 0.808436584 | 0.020516787 | 0.002187018 | 194.3719737 |
| | 500 | 0.044626896 | 1.321572026 | 0.913641401 | 0.030339945 | 0.002289388 | 233.2464465 |
| | 750 | 0.094548636 | 2.003420773 | 1.670804037 | 0.071566353 | 0.003773356 | 384.435322 |
| **Paving Equipment** | 50 | 0.023727661 | 0.244709057 | 0.141297946 | 0.01190735 | 0.000160224 | 12.62790615 |
| | 120 | 0.038795815 | 0.380005786 | 0.441796234 | 0.033694466 | 0.000309311 | 23.92655659 |
| | 175 | 0.039859719 | 0.462137603 | 0.605963541 | 0.028908044 | 0.000639306 | 54.49936854 |
| | 250 | 0.043268294 | 0.388502939 | 0.807433198 | 0.026738365 | 0.001136686 | 101.0232984 |
| | 500 | 0.068773298 | 1.066769861 | 1.224348107 | 0.043607673 | 0.001515581 | 134.6977729 |
| | 750 | 0.085342807 | 1.619110901 | 1.866497041 | 0.042953446 | 0.002497971 | 222.0080198 |
| | 1000 | 0.118986542 | 2.693123708 | 3.014066286 | 0.072910907 | 0.003537715 | 314.4156028 |
| **Rollers** | 50 | 0.031903879 | 0.215096536 | 0.159163394 | 0.01427149 | 0.000335897 | 25.98313297 |
| | 120 | 0.041267373 | 0.371143801 | 0.459146341 | 0.034191781 | 0.000691968 | 58.98874329 |
| | 175 | 0.036156482 | 0.451106094 | 0.561797373 | 0.026056972 | 0.001216828 | 108.1460341 |
| | 250 | 0.055569574 | 0.334148352 | 0.953140355 | 0.033767576 | 0.001722523 | 153.0898359 |
| | 500 | 0.086488712 | 0.76245741 | 1.435751668 | 0.055824203 | 0.002150548 | 219.1011349 |
| | 750 | 0.218826465 | 1.163859172 | 3.703076393 | 0.137907069 | 0.00354452 | 361.1211087 |

| **Emission Factors (lb/hr) (OFFROAD2011)** | **HP Bin** | **ROG** | **CO** | **$NO_X$** | **PM** | **SOX** | **$CO_2$** |
|---|---|---|---|---|---|---|---|
| **Rough Terrain Forklifts** | 50 | 0.040937481 | 0.191451728 | 0.219016471 | 0.018266333 | 0.000437704 | 33.85834624 |
| | 120 | 0.024744855 | 0.367289655 | 0.381376168 | 0.0222782 | 0.000732568 | 62.44984678 |
| | 175 | 0.021014268 | 0.449590057 | 0.412823555 | 0.016016718 | 0.001405335 | 124.8996497 |
| | 250 | 0.028412223 | 0.283521106 | 0.550831565 | 0.016079034 | 0.001921754 | 170.7965158 |
| | 500 | 0.046589829 | 0.574822267 | 1.159676827 | 0.025231819 | 0.002518328 | 256.5710083 |
| | 750 | 0.035978202 | 0.88028138 | 0.724296682 | 0.004914795 | 0.004150693 | 422.8787178 |
| **Rubber Tired Dozers** | 50 | 0.088712637 | 0.35860866 | 0.241104992 | 0.031770056 | 0.000384649 | 34.18584395 |
| | 120 | 0.072404844 | 0.485129998 | 0.680747655 | 0.060929121 | 0.001047101 | 93.06143983 |
| | 175 | 0.103577291 | 0.595741438 | 1.282812198 | 0.073406668 | 0.001456836 | 129.47682 |
| | 250 | 0.109604856 | 0.570133897 | 1.465813294 | 0.072162945 | 0.002064545 | 183.4871497 |
| | 500 | 0.180350297 | 1.903973564 | 2.486367961 | 0.115927131 | 0.00259981 | 264.8723608 |
| | 750 | 0.215861417 | 2.876157158 | 3.638106321 | 0.131152831 | 0.00400971 | 398.7885022 |
| **Rubber Tired Loaders** | 50 | 0.058119808 | 0.29319432 | 0.202981924 | 0.022474988 | 0.000402687 | 31.14966698 |
| | 120 | 0.049281126 | 0.402520986 | 0.489883337 | 0.04252833 | 0.000691086 | 58.91350868 |
| | 175 | 0.059833316 | 0.488263019 | 0.75039378 | 0.041912381 | 0.001196228 | 106.3152085 |
| | 250 | 0.055187449 | 0.372807208 | 0.902545614 | 0.030680857 | 0.001676244 | 148.9766598 |
| | 500 | 0.088744896 | 0.92407523 | 1.32453883 | 0.049914082 | 0.002326314 | 237.0083678 |
| | 750 | 0.160734677 | 1.407481987 | 2.304024989 | 0.091047687 | 0.004881859 | 485.5286567 |
| | 1000 | 0.22818113 | 2.494032461 | 4.467025899 | 0.130155096 | 0.005971252 | 593.8751718 |
| | 9999 | 0.416194511 | 24.93783058 | 7.719196666 | 0.222738449 | 0.009896677 | 984.2812014 |
| **Scrapers** | 50 | 0.101263756 | 0.362095092 | 0.258221936 | 0.034428914 | 0.000404633 | 34.49406131 |
| | 120 | 0.053286105 | 0.530723795 | 0.63364134 | 0.047192455 | 0.001101501 | 93.90047577 |
| | 175 | 0.104893207 | 0.646526613 | 1.397335322 | 0.074006221 | 0.001666085 | 148.0737973 |
| | 250 | 0.146694815 | 0.56890906 | 2.1090713 | 0.096414458 | 0.0023569 | 209.4702603 |
| | 500 | 0.160464052 | 1.685573712 | 2.527906048 | 0.101967828 | 0.003154925 | 321.4284902 |
| | 750 | 0.183150806 | 2.55356326 | 3.011652051 | 0.113873261 | 0.005583152 | 555.2768033 |
| | 1000 | 0.980008256 | 4.199428693 | 13.53039902 | 0.630836668 | 0.007907057 | 786.4026307 |
| | 9999 | 0.861050477 | 41.9900875 | 14.96088386 | 0.561018049 | 0.013105056 | 1303.373778 |
| **Skid Steer Loaders** | 50 | 0.019392152 | 0.168233718 | 0.160353612 | 0.010087433 | 0.000329899 | 25.51915711 |
| | 120 | 0.014400341 | 0.333896172 | 0.229974894 | 0.013438785 | 0.000501618 | 42.76182448 |
| | 175 | 0.031123883 | 0.413177631 | 0.516097878 | 0.023526938 | 0.000917594 | 78.22283037 |
| | 250 | 0.034030193 | 0.230332916 | 0.599186383 | 0.021567164 | 0.001073321 | 95.39174781 |
| | 500 | 0.042055704 | 0.44786022 | 0.690330552 | 0.024286427 | 0.001431095 | 127.1890364 |
| | 750 | 0.05071406 | 0.681604493 | 1.033065663 | 0.042752973 | 0.002358721 | 209.6321677 |
| | 1000 | 0.147657954 | 1.128676344 | 3.112225144 | 0.097481934 | 0.003340504 | 296.8884837 |
| **Surfacing Equipment** | 50 | 0.022358079 | 0.163830769 | 0.128618609 | 0.010294097 | 0.000182377 | 14.10763896 |
| | 120 | 0.027232072 | 0.292442946 | 0.32539375 | 0.023035543 | 0.000748014 | 63.76655124 |
| | 175 | 0.039155267 | 0.355500791 | 0.573161908 | 0.027361951 | 0.00096511 | 85.77446386 |
| | 250 | 0.036323958 | 0.278912415 | 0.732703821 | 0.02144167 | 0.001517508 | 134.8690496 |
| | 500 | 0.047184278 | 0.636622841 | 0.938180194 | 0.030225927 | 0.002171228 | 221.2079029 |
| | 750 | 0.058700861 | 0.970291342 | 1.342764731 | 0.042182938 | 0.003489472 | 347.0479412 |
| | 1000 | 0.133110853 | 1.623969126 | 3.104490832 | 0.075798311 | 0.004941914 | 491.501558 |
| | 9999 | 0.101830148 | 16.23806729 | 2.904234794 | 0.065386882 | 0.008190666 | 814.6084682 |

| Emission Factors (lb/hr) (OFFROAD2011) | HP Bin | ROG | CO | $NO_X$ | PM | SOX | $CO_2$ |
|---|---|---|---|---|---|---|---|
| **Tractors/Loaders/Backhoes** | 50 | 0.03435074 | 0.244625835 | 0.167069991 | 0.015192351 | 0.000392312 | 30.34710008 |
| | 120 | 0.032305074 | 0.378434381 | 0.374726912 | 0.029437038 | 0.000606796 | 51.72804132 |
| | 175 | 0.040869515 | 0.460430396 | 0.577399938 | 0.029039667 | 0.001140777 | 101.3869799 |
| | 250 | 0.044824471 | 0.317792112 | 0.816554735 | 0.026336972 | 0.001932336 | 171.7369962 |
| | 500 | 0.067108406 | 0.711275287 | 1.167301218 | 0.039484846 | 0.003880192 | 344.8534574 |
| | 750 | 0.117548129 | 1.087502067 | 1.980928333 | 0.071709253 | 0.005820288 | 517.2800517 |
| | 1000 | 0.098908473 | 1.931133558 | 2.686850431 | 0.059602075 | 0.008242897 | 732.5902884 |
| | 9999 | 0.455672463 | 19.30940445 | 8.988905527 | 0.27679098 | 0.013661673 | 1214.185882 |
| **Trenchers** | 50 | 0.046175667 | 0.335072078 | 0.240398243 | 0.022055796 | 0.000425546 | 32.9178402 |
| | 120 | 0.061463232 | 0.535464327 | 0.656071441 | 0.051170068 | 0.000761253 | 64.89516582 |
| | 175 | 0.091242895 | 0.654791984 | 1.227122933 | 0.062979783 | 0.001619099 | 143.8979218 |
| | 250 | 0.099342651 | 0.594033023 | 1.569015647 | 0.062397347 | 0.002508016 | 222.9006508 |
| | 500 | 0.100402892 | 1.713394201 | 1.735722484 | 0.063986055 | 0.003055596 | 311.3087057 |
| | 750 | 0.066705276 | 2.594287842 | 1.251982463 | 0.042037408 | 0.005900894 | 586.8776746 |
| | 1000 | 0.889742609 | 4.119088678 | 12.49054333 | 0.565674487 | 0.008357054 | 831.1569013 |
| **Sweepers/Scrubbers** | 50 | 0.052210079 | 0.254578214 | 0.205580398 | 0.021546169 | 0.000407875 | 31.55095076 |
| | 120 | 0.053584631 | 0.439692512 | 0.539934925 | 0.047527788 | 0.000880259 | 75.04011146 |
| | 175 | 0.115889975 | 0.542885561 | 1.458883883 | 0.080611056 | 0.001563929 | 138.9947762 |
| | 250 | 0.085625019 | 0.306729504 | 1.376421437 | 0.054471626 | 0.001822985 | 162.0184156 |
| | 500 | 0.114815093 | 0.601926187 | 1.829759176 | 0.07904971 | 0.002430647 | 216.024621 |
| | 1000 | 0.111614522 | 1.590456689 | 3.434816864 | 0.087358734 | 0.00567369 | 504.2511835 |
| **Aerial Lifts** | 50 | 0.006744062 | 0.153267999 | 0.128317866 | 0.0049404 | 0.000253544 | 19.61275253 |
| | 120 | 0.008409682 | 0.287513613 | 0.16962825 | 0.008087334 | 0.000446602 | 38.071823 |
| | 175 | 0.014242371 | 0.351209128 | 0.285917012 | 0.011747 | 0.000816955 | 69.64356149 |
| | 250 | 0.129224652 | 0.227984526 | 1.685691444 | 0.087593211 | 0.001262387 | 128.6138718 |
| | 500 | 0.050400631 | 0.475424897 | 1.18829982 | 0.026127831 | 0.002089252 | 212.8560798 |
| **Forklifts** | 50 | 0.032825863 | 0.1061752 | 0.112872822 | 0.012334582 | 0.000189672 | 14.67194704 |
| | 120 | 0.023965262 | 0.188785823 | 0.249962367 | 0.020940764 | 0.000366284 | 31.22492091 |
| | 175 | 0.029916618 | 0.234649143 | 0.397683975 | 0.021605166 | 0.000630708 | 56.0543495 |
| | 250 | 0.046854489 | 0.127592487 | 0.671140728 | 0.030444365 | 0.000867753 | 77.12182278 |
| | 500 | 0.068141196 | 0.244562341 | 0.967570691 | 0.044031504 | 0.001089306 | 110.9801454 |
| | 1000 | 0.50167381 | 0.621909372 | 6.09118519 | 0.340176846 | 0.001542713 | 157.1740036 |
| **Other General Industrial Equipment** | 50 | 0.033239678 | 0.229001472 | 0.147647254 | 0.014381476 | 0.000281103 | 21.74457718 |
| | 120 | 0.035937219 | 0.348002063 | 0.37067456 | 0.031645216 | 0.000727714 | 62.03600068 |
| | 175 | 0.048524165 | 0.423851807 | 0.650752149 | 0.035033104 | 0.001079399 | 95.93198455 |
| | 250 | 0.063467839 | 0.278120929 | 0.968966276 | 0.040088775 | 0.001525551 | 135.583839 |
| | 500 | 0.078352102 | 0.603539686 | 1.219803936 | 0.04608038 | 0.002605102 | 265.4117198 |
| | 750 | 0.094188097 | 0.925994562 | 1.614015965 | 0.051402032 | 0.004398438 | 437.4499226 |
| | 1000 | 0.190794578 | 1.668243046 | 4.252685162 | 0.11117068 | 0.005626654 | 559.6030204 |
| | 9999 | 0.267488398 | 16.68076222 | 6.572480341 | 0.170016095 | 0.009325545 | 927.478971 |

| **Emission Factors (lb/hr) (OFFROAD2011)** | **HP Bin** | **ROG** | **CO** | **$NO_X$** | **PM** | **SOX** | **$CO_2$** |
|---|---|---|---|---|---|---|---|
| **Other Material Handling Equipment** | 50 | 0.043645101 | 0.263502851 | 0.179164486 | 0.017914474 | 0.00039215 | 30.33456104 |
| | 120 | 0.037436442 | 0.406097701 | 0.436154179 | 0.033463832 | 0.00071168 | 60.66911279 |
| | 175 | 0.055009923 | 0.494691101 | 0.730434665 | 0.039403548 | 0.001373588 | 122.0780974 |
| | 250 | 0.074698414 | 0.32498669 | 1.174221581 | 0.046056531 | 0.001631656 | 145.0140361 |
| | 500 | 0.079092755 | 0.707081099 | 1.25810373 | 0.048768636 | 0.001880869 | 191.6257044 |
| | 750 | 0.093536916 | 1.084723819 | 1.698346455 | 0.057613756 | 0.003100037 | 315.8362774 |
| | 1000 | 0.033760058 | 1.953139905 | 1.815842363 | 0.014192383 | 0.004390382 | 447.2984968 |
| | 9999 | 0.106784854 | 19.52944591 | 3.144428575 | 0.060848947 | 0.007276565 | 741.3468734 |

## SFPUC Peninsula Pipelines - Haul Truck Emissions

| PPSU Equipment List | | | Total Trips for Haul Trucks (1) | | | | | One-Way Distance (miles) (5) | | | | | Vehicle Miles Traveled | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Phase/Equipment** | **Days/Weel** | **Fuel Type** | Colma | SSF | SBN | SBS | Millbrae | Colma | SSF | SBN | SBS | Millbrae | Colma | SSF | SBN | SBS | Millbrae |
| **Tree Removal** | | | | | | | | | | | | | | | | | |
| Haul truck(2) | 5 | Diesel | 0 | 5 | 0 | 0 | 21 | 1.4 | 1.85 | 0.3 | 1.3 | 1.5 | 0 | 19 | 0 | 0 | 63 |
| **Mobilization** | | | | | | | | | | | | | | | | | |
| Haul trucks (2,3) | 5 | Diesel | 80 | 80 | 80 | 80 | 80 | 1.4 | 1.85 | 0.3 | 1.3 | 1.5 | 224 | 296 | 48 | 208 | 240 |
| **Shoring/excavation, pipeline removal/installation, dewatering, hydrostatic testing, backfill/restoration** | | | | | | | | | | | | | | | | | |
| Haul Trucks (2,4) | 5 | Diesel | 558 | 1354 | 17 | 4086 | 1026 | 1.4 | 1.85 | 0.3 | 1.3 | 1.5 | 1562 | 5010 | 10 | 10624 | 3078 |

Notes:

(1) Total trips associated with on-site or off-site hauling for haul trucks

(2) Assume haul truck capcity is 10 cubic yards; for pipe delivery and shoring materials delivery assume a 40-foot long flat bed truck

(3) Assuming 8 trips per day for 2 week period

(4) See Project Description Table 3-2 for a break-down of total trips associated with soil excavation/off-haul; backfill material on-haul; off-haul of existing pipe; on-haul of new pipe and shoring; and off-haul of shoring post-construction

Assume truck trips are one-way (i.e. don't carry material on and material off in same trip)

(5) Distances are one way from the freeway to project site

| Haul Truck Emission Factors | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Grams/Mile | | | | | | | | | |
| Vehicle/Yea | ROG | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
| T7-2014 | 1.34 | 3.79 | 16.80 | 0.47 | 0.43 | 0.00 | 0.01 | 0.00 | 2736 |
| Pounds/Mile | | | | | | | | | |
| Vehicle/Yea | ROG | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
| T7-2014 | 0.00 | 0.01 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.03 |

| | |
|---|---|
| Project Start | 10/1/2014 |
| Project End | 8/15/2015 |
| Project Life | 318 |
| Construction Days | 227 |

Notes:

EMFAC 2011 Emission factors for T7-Single Construction Trucks at 15 mph in the Bay Area

CH4 and N2O Emission factors from California Climate Action Registry General Reporting Protocol Version 3.1

## SFPUC Peninsula Pipelines - Haul Truck Emissions

| **PPSU Equipment List** | **Emission Factors (lb/mile)** | | | | | | | | | **Emissions (Tons)** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Phase/Equipment** | ROG | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ | ROG | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
| **Tree Removal** | | | | | | | | | | | | | | | | | | |
| Haul truck(2) | 0.0030 | 0.0083 | 0.0370 | 0.0010 | 0.0010 | 0.0000 | 0.0000 | 0.0000 | 6.0316 | 1.21E-04 | 3.40E-04 | 1.51E-03 | 4.25E-05 | 3.91E-05 | 0.00E+00 | 4.58E-07 | 4.31E-07 | 2.46E-01 |
| **Mobilization** | | | | | | | | | | | | | | | | | | |
| Haul trucks (2,3) | 0.00296 | 0.00835 | 0.03703 | 0.00104 | 0.00096 | 0.00000 | 0.00001 | 0.00001 | 6.03159 | 0.002 | 0.004 | 0.019 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 3.064 |
| **Shoring/excavation, pipeline removal/installation, dewatering, hydrostatic testing, backfill/restoration** | | | | | | | | | | | | | | | | | | |
| Haul Trucks (2,4) | 0.00296 | 0.00835 | 0.03703 | 0.00104 | 0.00096 | 0.00000 | 0.00001 | 0.00001 | 6.03159 | 0.03 | 0.08 | 0.38 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 61.17 |
| | **Totals (Tons)** | | | | | | | | | **0.03** | **0.09** | **0.40** | **0.01** | **0.01** | **0.00** | **0.00** | **0.00** | **64.48** |
| | **Total lbs/day over project duration** | | | | | | | | | **0.28** | **0.79** | **3.49** | **0.10** | **0.09** | **0.00** | **0.00** | **0.00** | **567.77** |

## SFPUC Peninsula Pipelines - Worker Commute Emissions

**PPSU Equipment List**

| Phase/Equipment | Workers/Crew | Crews/Site | Workers/Site | Number of Sites | Days/Site | Commute Distance (Miles) One-Way | Daily Distance | Total Distance |
|---|---|---|---|---|---|---|---|---|
| **Tree Removal** | **Tree Removal Occurs at the SSF and Millbrae Sites only From Oct.-Nov. 2014** | | | | | | | |
| Worker Commute | 20 | 2 | 40 | 1.33 | 30 | 16.8 | 1787.52 | 53625.6 |
| **Shutdown and dewatering** | **Shutdown and Dewatering Occurs at 3 Sites (One for each pipeline) Over a 1 Week Period in Dec. 2014** | | | | | | | |
| Worker Commute | 20 | 2 | 40 | 3.00 | 5 | 16.8 | 4032 | 20160 |
| **Mobilization** | **Mobilization Shutdown and Dewatering Occurs at Each Site (4 Sites-San Bruno North and South are Same Site) Over a 1 Week Period in Dec. 2014** | | | | | | | |
| Worker Commute | 20 | 2 | 40 | 5.00 | 10 | 16.8 | 6720 | 67200 |
| **Shoring and excavation, pipeline removal and installation, intermittent dewatering, hydrostatic testing, backfill and restoration** | **Phase Occurs at Millbrae, San Bruno South (Two Pipelines, SAPL2 and SAPL3), Colma, and South San Francisco Sites. Phase would take place in 2 months for South San Francisco site** | | | | | | | |
| Worker Commute | 20 | 2 | 40 | 3.875 | 81 | 16.8 | 5208 | 421848 |
| **Disinfection** | **Phase takes place at 3 sites (one for each pipeline) for two weeks** | | | | | | | |
| Worker Commute | 20 | 2 | 40 | 3.00 | 10 | 16.8 | 4032 | 40320 |

Worker Commute Emission Factors

| Grams/Mile | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Vehicle/Year | ROG | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
| LDA-2014 | 0.0428 | 1.4454 | 0.1347 | 0.0021 | 0.0019 | 0.0000 | 0.0178 | 0.0273 | 281.1868 |
| LDT-2014 | 0.1133 | 3.6032 | 0.3548 | 0.0047 | 0.0043 | 0.0000 | 0.0346 | 0.0621 | 334.4060 |
| Pounds/Mile | | | | | | | | | |
| Vehicle/Year | ROG | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
| LDA-2014 | 9.44E-05 | 3.19E-03 | 2.97E-04 | 4.59E-06 | 4.17E-06 | 0.00E+00 | 3.92E-05 | 6.02E-05 | 6.20E-01 |
| LDT-2014 | 2.50E-04 | 7.94E-03 | 7.82E-04 | 1.04E-05 | 9.49E-06 | 0.00E+00 | 7.63E-05 | 1.37E-04 | 7.37E-01 |
| Combined | 1.72E-04 | 5.57E-03 | 5.40E-04 | 7.50E-06 | 6.83E-06 | 0.00E+00 | 5.78E-05 | 9.85E-05 | 6.79E-01 |

Notes:

EMFAC 2011 Emission factors for LDA and LDT at 35 mph in the Bay Area

CH4 and N2O Emission factors from California Climate Action Registry General Reporting Protocol Version 3.1 Table C.4

Assumed a 50-50 split of LDA and LDT for worker vehicles, assumption from URBEMIS

| | |
|---|---|
| Project Start | 10/1/2014 |
| Project End | 8/15/2015 |
| Project Life | 318 |
| Construction Days | 227 |

## SFPUC Peninsula Pipelines - Worker Commute Emissions

| **PPSU Equipment List** | **Emission Factors (lb/mile)** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Phase/Equipment** | ROG | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
| **Tree Removal** | | | | | | | | | |
| Worker Commute | 0.000172 | 0.005565 | 0.000540 | 0.000007 | 0.000007 | 0.000000 | 0.000058 | 0.000099 | 0.678575 |
| **Shutdown and dewatering** | | | | | | | | | |
| Worker Commute | 0.000172 | 0.005565 | 0.000540 | 0.000007 | 0.000007 | 0.000000 | 0.000058 | 0.000099 | 0.678575 |
| **Mobilization** | | | | | | | | | |
| Worker Commute | 0.000172 | 0.005565 | 0.000540 | 0.000007 | 0.000007 | 0.000000 | 0.000058 | 0.000099 | 0.678575 |
| **Shoring and excavation, pipeline removal and installation, intermittent dewatering, hydrostatic testing, backfill and restoration** | | | | | | | | | |
| Worker Commute | 0.000172 | 0.005565 | 0.000540 | 0.000007 | 0.000007 | 0.000000 | 0.000058 | 0.000099 | 0.678575 |
| **Disinfection** | | | | | | | | | |
| Worker Commute | 0.000172 | 0.005565 | 0.000540 | 0.000007 | 0.000007 | 0.000000 | 0.000058 | 0.000099 | 0.678575 |

## SFPUC Peninsula Pipelines - Worker Commute Emissions

| PPSU Equipment List | Total Emissions per Day (Lbs/Day) | | | | | | | | | Total Emissions by Activity (Tons/Activity) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Phase/Equipment** | ROG | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ | ROG | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_X$ | $CH_4$ | $N_2O$ | $CO_2$ |
| **Tree Removal** | | | | | | | | | | | | | | | | | | |
| Worker Commute | 0.31 | 9.95 | 0.96 | 0.01 | 0.01 | 0.00 | 0.10 | 0.18 | 1213 | 0.0046 | 0.1492 | 0.0145 | 0.0002 | 0.0002 | 0.0000 | 0.0015 | 0.0026 | 18.1945 |
| **Shutdown and dewatering** | | | | | | | | | | | | | | | | | | |
| Worker Commute | 0.69 | 22.44 | 2.18 | 0.03 | 0.03 | 0.00 | 0.23 | 0.40 | 2736 | 0.0017 | 0.0561 | 0.0054 | 0.0001 | 0.0001 | 0.0000 | 0.0006 | 0.0010 | 6.8400 |
| **Mobilization** | | | | | | | | | | | | | | | | | | |
| Worker Commute | 1.16 | 37.40 | 3.63 | 0.05 | 0.05 | 0.00 | 0.39 | 0.66 | 4560 | 0.0058 | 0.1870 | 0.0181 | 0.0003 | 0.0002 | 0.0000 | 0.0019 | 0.0033 | 22.8001 |
| **Shoring and excavation, pipeline removal and installation, intermittent dewatering, hydrostatic testing, backfill and restoration** | | | | | | | | | | | | | | | | | | |
| Worker Commute | 0.90 | 28.98 | 2.81 | 0.04 | 0.04 | 0.00 | 0.30 | 0.51 | 3534 | 0.0363 | 1.1738 | 0.1138 | 0.0016 | 0.0014 | 0.0000 | 0.0122 | 0.0208 | 143.1277 |
| **Disinfection** | | | | | | | | | | | | | | | | | | |
| Worker Commute | 0.69 | 22.44 | 2.18 | 0.03 | 0.03 | 0.00 | 0.23 | 0.40 | 2736 | 0.0035 | 0.1122 | 0.0109 | 0.0002 | 0.0001 | 0.0000 | 0.0012 | 0.0020 | 13.6801 |
| | **Totals (Tons)** | | | | | | | | | **0.05** | **1.68** | **0.16** | **0.00** | **0.00** | **0.00** | **0.02** | **0.03** | **204.64** |
| | **Total lbs/day over project duration** | | | | | | | | | **0.46** | **14.78** | **1.43** | **0.02** | **0.02** | **0.00** | **0.15** | **0.26** | **1801.88** |

## SFPUC Peninsula Pipelines - Cancer Potency Factors

### Cancer Potency Factors

| Toxic Compounds | EMFAC Gasoline TOG Speciation | Unit Factor | (HARP) Residential Cancer Risk Factors | Unit Cancer Risk Weighted Factor | Cancer Potency Factor | Cancer Potency Factor Weighted | Chronic Noncancer Reference Dose | Unit Chronic Noncancer Risk Weighted Factor | Acute Noncancer Reference Dose | Unit ACUTE Noncancer Risk Weighted Factor |
|---|---|---|---|---|---|---|---|---|---|---|
| | (%TOG) | | (ug/m3)-1 | (ug/m3)-1 | (mg/kg-d)-1 | (mg/kg-d)-2 | (ug/m3) | (ug/m3) | (ug/m3) | (ug/m3) |
| Acetaldehyde | 0.28% | 0.0028 | 0.0000027 | 7.54E-09 | 1.00E-02 | 2.80E-05 | 140 | 0.39 | 470 | 1.31 |
| Acrolein | 0.13% | 0.0013 | 0 | 0 | 7.00E-02 | - | 0.35 | 0.00046 | 2.5 | 0.0033 |
| Benzene | 2.47% | 0.0247 | 0.000029 | 7.17E-07 | 1.00E-01 | 2.47E-03 | 60 | 1.48 | 1300 | 32.14 |
| 1,3-Butadiene | 0.55% | 0.0055 | 0.000174 | 9.49E-07 | 6.00E-01 | 3.30E-03 | 20 | 0.11 | 0 | 0 |
| Ethylbenzene | 1.05% | 0.0105 | 2.52E-06 | 2.64E-08 | 8.70E-03 | 9.14E-05 | 2000 | 20.97 | 0 | 0 |
| Formaldehyde | 1.58% | 0.0158 | 6.08E-06 | 9.60E-08 | 2.10E-02 | 3.32E-04 | 9 | 0.14 | 55 | 0.87 |
| Hexane | 1.60% | 0.016 | 0 | 0 | - | - | 7000 | 111.92 | 0 | 0 |
| Methanol | 0.12% | 0.0012 | 0 | 0 | - | - | 4000 | 4.89 | 28000 | 34.22 |
| MEK | 0.02% | 0.0002 | 0 | 0 | - | - | 0 | 0 | 13000 | 2.37 |
| Naphthalene | 0.05% | 0.0005 | 0.000035 | 1.64E-08 | 1.20E-01 | 6.00E-05 | 9 | 0.0042 | 0 | 0 |
| Propylene | 3.06% | 0.0306 | 0 | 0 | - | - | 3000 | 91.86 | 0 | 0 |
| Styrene | 0.12% | 0.0012 | 0 | 0 | - | - | 900 | 1.11 | 21000 | 25.79 |
| Toluene | 5.76% | 0.0576 | 0 | 0 | - | - | 300 | 17.27 | 37000 | 2129.65 |
| Xylenes | 4.80% | 0.048 | 0 | 0 | - | - | 700 | 33.61 | 22000 | 1056.22 |
| Toxicity Weighted Factor | | | | 1.81E-06 | | 6.28E-03 | | 283.77 | | 3282.58 |
| | 5.06% | | | 1.81E-06 | | | | | | |

Table from OEHHA "Air Toxis Hot Spots Program Guidance Manual for Preparation fo Health Risk Assessments"

## SFPUC Peninsula Pipelines - BAAQMD Source # P-19316

BAY AREA AIR QUALITY MANAGEMENT DISTRICT Printed: NOV 29, 2011
DETAIL POLLUTANTS - ABATED
MOST RECENT P/0 APPROVED (2011)

Access Properties LLC (P# 19316)

S# SOURCE NAME
MATERIAL SOURCE CODE
THROUGHPUT DATE
Standby Diesel Generator
C22AG098

| POLLUTANT | CODE | LBS/DAY |
|---|---|---|
| Benzene | 41 | 7.66E-05 |
| Formaldehyde | 124 | 6.34E-06 |
| Organics (part not spec el | 990 | 0.000662 |
| Arsenic (all) | 1030 | 6.67E-08 |
| Beryllium (all) pollutant | 1040 | 3.91E-08 |
| Cadmium | 1070 | 1.67E-07 |
| Chromium (hexavalent) | 1095 | 3.45E-09 |
| Lead (all) pollutant | 1140 | 1.42E-07 |
| Manganese | 1160 | 2.22E-07 |
| Nickel pollutant | 1180 | 2.7E-06 |
| Mercury (all) pollutant | 1190 | 4.72E-08 |
| Diesel Engine Exhaust Particulates | 1350 | 0.000763 |
| PAH's (non-speciated) | 1840 | 3.52E-07 |
| Nitrous Oxide (N2O) | 2030 | 2.05E-05 |
| Nitrogen (Oxides (part not | 2990 | 0.0141 |
| Sulfur Dioxide (SO2) | 3990 | 0.000025 |
| Carbon Monoxide (CO) | 4990 | 0.00617 |
| Carbon Dioxide, non-biogen | 6960 | 2.57 |
| Methane (CH4) | 6970 | 0.000103 |

Note: Data provide by BAAQMD on November 29, 2011

## SFPUC Peninsula Pipelines - Regional Groundwater Storage and Recovery Project Emissions Estimation

### SFPUC Regional Groundwater Storage and Recovery Project - Estimated Construction Emissions and DPM Cancer Risk

|  | Number of | Flow | Flow/Well | Well size ratio | Construction Emissions ($PM_{10}$) |  | Cancer Risk/Well | Number of Wells |  | Total Cancer Risk |  |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Project | Wells | (MGD) | (MGD) | (RGSRP/GWSP) | Total (lbs) | Per Well (lbs) | (Per million) | Colma | South SF | Colma | South SF |
| SFPUC GWSP | 4 | 2.5 | 0.63 |  | 410 | 103 |  |  |  |  |  |
| SFPUC RGSRP | 16 | 7.3 | 0.46 | 73% |  | 75 | 2.2 | 2 | 3 | 4.3 | 6.5 |

## SFPUC Peninsula Pipelines - Nearby Roadway and Highway Health Screening Information by Site

### Surface Streets

| Site | Roadway | AADT | Direction | Distance (ft) | $PM_{2.5}$ | Cancer Risk |
|---|---|---|---|---|---|---|
| Colma | Serramonte | 35,290 | E-W | 607 | 0.03 | 1.16 |
| | El Camino Real | 17,000 | N-S | 165 | 0.077 | 2.571 |
| South SF | El Camino Real | 25,435 | N-S | 847 | 0.02 | 0.80 |
| | Westborough | 40,672 | E-W | 131 | 0.20 | 5.90 |

### Highways

| Site | Highway | Direction | Distance (ft) | $PM_{2.5}$ | Cancer Risk | Chronic | Acute |
|---|---|---|---|---|---|---|---|
| San Bruno North | I-280 | E | 205 | 0.118 | 6.843 | 0.009 | 0.012 |
| San Bruno South | I-280 | W | 531 | 0.034 | 2.008 | 0.002 | 0.004 |

## SFPUC Peninsula Pipelines - ISC Modeling Information Summary

| San Bruno South ISC Modeling Results | | |
|---|---|---|
| Met Data Year | Annual PM10 (ug/m3) | Annual PM2.5 (ug/m3) |
| 1991 | 0.0704 | 0.0647 |
| 1992 | Invalid met data | Invalid met data |
| 1993 | 0.0829 | 0.0763 |
| 1994 | 0.0863 | 0.0794 |
| 1995 | 0.0737 | 0.0678 |
| Four year average | 0.0783 | 0.0721 |
| Significance Threshold | N/A | **0.3** |
| Meteorological data provided by Jim Cordova, BAAQMD. | | |

# SFPUC Peninsula Pipelines - EMFAC2011 HHDD Truck 2014 Emission Factors

EMFAC 2011
2014 Estimated Annual Emission Rates
EMFAC 2011 Vehicle Categories
San Mateo COUNTY
San Francisco Bay Area AIR BASIN
Bay Area AQMD
Area
San Mateo (SF)

| CalYr | Season | Veh | Fuel | MdlYr | Speed | ROG_RUNEX | CO_RUNEX | NOX_RUNEX | CO2_RUNEX( | PM10_RUNEX | PM2_5_RUNEX | SOX_RUNEX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | (Miles/hr) | (gms/mile) | (gms/mile) | (gms/mile) | (gms/mile) | (gms/mile) | (gms/mile) | (gms/mile) |
| 2014 | Annual | T7 sir | DSL | AllMYr | 15 | 1.344 | 3.787 | 16.797 | 2694.845 | 0.473 | 0.435 | 0 |

# SFPUC Peninsula Pipelines - EMFAC2011 Light Duty Automobile 2014 Emission Factors

EMFAC 2011
2014 Estimated Annual Emission Rates
EMFAC 2011 Vehicle Categories
San Mateo COUNTY
San Francisco Bay Area AIR BASIN
Bay Area AQMD
Area
San Mateo (SF)

| CalYr | Season | Veh | Fuel | MdlYr | Speed | ROG_RUNEX | CO_RUNEX | NOX_RUNEX | CO2_RUNEX(Pa | PM10_RUNEX | PM2_5_RUNEX | SOX_RUNEX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | (Miles/hr) | (gms/mile) | (gms/mile) | (gms/mile) | (gms/mile) | (gms/mile) | (gms/mile) | (gms/mile) |
| 2014 | Annual | LDA | GAS | AllMYr | 35 | 0.04275 | 1.45033 | 0.13318 | 281.23682 | 0.00192 | 0.00174 | 0.00000 |
| 2014 | Annual | LDA | DSL | AllMYr | 35 | 0.05498 | 0.25373 | 0.50897 | 268.97861 | 0.04118 | 0.03789 | 0.00000 |
| | | | | | | 0.04280 | 1.44545 | 0.13471 | 281.18681 | 0.00208 | 0.00189 | 0.00000 |

# SFPUC Peninsula Pipelines - EMFAC2011 Light Duty-1 Truck 2014 Emission Factors

EMFAC 2011
2014 Estimated Annual Emission Rates
EMFAC 2011 Vehicle Categories
San Mateo COUNTY
San Francisco Bay Area AIR BASIN
Bay Area AQMD
Area
San Mateo (SF)

| CalYr | Season | Veh | Fuel | MdlYr | Speed | ROG_RUNEX | CO_RUNEX | NOX_RUNEX | CO2_RUNEX(P | PM10_RUNEX | PM2_5_RUNEX | SOX_RUNEX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  | (Miles/hr) | (gms/mile) | (gms/mile) | (gms/mile) | (gms/mile) | (gms/mile) | (gms/mile) | (gms/mile) |
| 2014 | Annual | LDT1 | GAS | AllMYr | 35 | 0.113 | 3.608 | 0.354 | 334.458 | 0.005 | 0.004 | 0.000 |
| 2014 | Annual | LDT1 | DSL | AllMYr | 35 | 0.104 | 0.421 | 0.703 | 298.295 | 0.087 | 0.080 | 0.000 |
|  |  |  |  |  |  | 0.113 | 3.603 | 0.355 | 334.406 | 0.005 | 0.004 | 0.000 |

# SFPUC Peninsula Pipelines - EMFAC2011 Light Duty-2 Truck 2014 Emission Factors

EMFAC 2011
2014 Estimated Annual Emission Rates
EMFAC 2011 Vehicle Categories
San Mateo COUNTY
San Francisco Bay Area AIR BASIN
Bay Area AQMD
Area
San Mateo (SF)

| CalYr | Season | Veh | Fuel | MdlYr | Speed | ROG_RUNEX | CO_RUNEX | NOX_RUNEX | CO2_RUNEX | PM10_RUNEX | PM2_5_RUNEX | SOX_RUNEX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | (Miles/hr) | (gms/mile) | (gms/mile) | (gms/mile) | (gms/mile) | (gms/mile) | (gms/mile) | (gms/mile) |
| 2014 | Annual | LDT2 | GAS | AllMYr | 10 | 0.179565982 | 3.39648321 | 0.398237512 | 1093.8994 | 0.008383213 | 0.007706097 | 0 |

**SFPUC Peninsula Pipelines - OFFROAD2011 2014 Emission Factors**

| CalendarYear | AirBasin | Equipment Type | HorsepowerBin | Nox (lb/hr) | PM (lb/hr) | HC (lb/hr) |
|---|---|---|---|---|---|---|
| 2014 | SF | Bore/Drill Rigs | 50 | 0.232 | 0.017 | 0.030 |
| 2014 | SF | Bore/Drill Rigs | 120 | 0.383 | 0.023 | 0.024 |
| 2014 | SF | Bore/Drill Rigs | 175 | 0.669 | 0.031 | 0.042 |
| 2014 | SF | Bore/Drill Rigs | 250 | 0.811 | 0.024 | 0.041 |
| 2014 | SF | Bore/Drill Rigs | 500 | 1.233 | 0.039 | 0.065 |
| 2014 | SF | Bore/Drill Rigs | 750 | 1.609 | 0.055 | 0.088 |
| 2014 | SF | Bore/Drill Rigs | 1000 | 3.038 | 0.059 | 0.088 |
| 2014 | SF | Bore/Drill Rigs | 9999 | 12.541 | 0.304 | 0.418 |
| 2014 | SF | Cranes | 50 | 0.157 | 0.016 | 0.045 |
| 2014 | SF | Cranes | 120 | 0.582 | 0.043 | 0.058 |
| 2014 | SF | Cranes | 175 | 0.796 | 0.043 | 0.062 |
| 2014 | SF | Cranes | 250 | 1.083 | 0.050 | 0.075 |
| 2014 | SF | Cranes | 500 | 1.337 | 0.055 | 0.085 |
| 2014 | SF | Cranes | 750 | 1.559 | 0.054 | 0.083 |
| 2014 | SF | Cranes | 1000 | 6.919 | 0.343 | 0.513 |
| 2014 | SF | Cranes | 9999 | 1.492 | 0.036 | 0.065 |
| 2014 | SF | Crawler Tractors | 50 | 0.257 | 0.030 | 0.084 |
| 2014 | SF | Crawler Tractors | 120 | 0.618 | 0.052 | 0.060 |
| 2014 | SF | Crawler Tractors | 175 | 0.972 | 0.053 | 0.073 |
| 2014 | SF | Crawler Tractors | 250 | 1.196 | 0.046 | 0.072 |
| 2014 | SF | Crawler Tractors | 500 | 1.809 | 0.070 | 0.110 |
| 2014 | SF | Crawler Tractors | 750 | 2.638 | 0.096 | 0.154 |
| 2014 | SF | Crawler Tractors | 1000 | 5.814 | 0.171 | 0.308 |
| 2014 | SF | Crawler Tractors | 9999 | 8.701 | 0.229 | 0.402 |
| 2014 | SF | Excavators | 50 | 0.149 | 0.011 | 0.021 |
| 2014 | SF | Excavators | 120 | 0.353 | 0.026 | 0.029 |
| 2014 | SF | Excavators | 175 | 0.573 | 0.028 | 0.040 |
| 2014 | SF | Excavators | 250 | 0.805 | 0.026 | 0.045 |
| 2014 | SF | Excavators | 500 | 0.928 | 0.030 | 0.053 |
| 2014 | SF | Excavators | 750 | 1.723 | 0.056 | 0.096 |
| 2014 | SF | Excavators | 1000 | 3.920 | 0.104 | 0.181 |
| 2014 | SF | Excavators | 9999 | 4.748 | 0.123 | 0.220 |

## SFPUC Peninsula Pipelines - OFFROAD2011 2014 Emission Factors

| CalendarYear | AirBasin | Equipment Type | HorsepowerBin | Nox (lb/hr) | PM (lb/hr) | HC (lb/hr) |
|---|---|---|---|---|---|---|
| 2014 | SF | Graders | 50 | 0.231 | 0.031 | 0.090 |
| 2014 | SF | Graders | 120 | 0.819 | 0.068 | 0.086 |
| 2014 | SF | Graders | 175 | 1.160 | 0.065 | 0.093 |
| 2014 | SF | Graders | 250 | 1.057 | 0.034 | 0.059 |
| 2014 | SF | Graders | 500 | 0.981 | 0.038 | 0.069 |
| 2014 | SF | Graders | 1000 | 6.665 | 0.232 | 0.421 |
| 2014 | SF | Graders | 9999 | 11.770 | 0.355 | 0.649 |
| 2014 | SF | Off-Highway Tractors | 50 | 0.204 | 0.020 | 0.048 |
| 2014 | SF | Off-Highway Tractors | 120 | 0.449 | 0.037 | 0.041 |
| 2014 | SF | Off-Highway Tractors | 175 | 0.763 | 0.039 | 0.053 |
| 2014 | SF | Off-Highway Tractors | 250 | 1.162 | 0.042 | 0.069 |
| 2014 | SF | Off-Highway Tractors | 500 | 1.265 | 0.045 | 0.074 |
| 2014 | SF | Off-Highway Tractors | 750 | 2.206 | 0.073 | 0.121 |
| 2014 | SF | Off-Highway Tractors | 1000 | 2.188 | 0.052 | 0.067 |
| 2014 | SF | Off-Highway Tractors | 9999 | 9.631 | 0.308 | 0.539 |
| 2014 | SF | Off-Highway Trucks | 50 | 0.143 | 0.015 | 0.034 |
| 2014 | SF | Off-Highway Trucks | 120 | 0.414 | 0.034 | 0.041 |
| 2014 | SF | Off-Highway Trucks | 175 | 0.698 | 0.039 | 0.057 |
| 2014 | SF | Off-Highway Trucks | 250 | 0.967 | 0.042 | 0.071 |
| 2014 | SF | Off-Highway Trucks | 500 | 1.469 | 0.056 | 0.102 |
| 2014 | SF | Off-Highway Trucks | 750 | 3.081 | 0.127 | 0.221 |
| 2014 | SF | Off-Highway Trucks | 1000 | 4.808 | 0.141 | 0.259 |
| 2014 | SF | Off-Highway Trucks | 9999 | 8.726 | 0.273 | 0.513 |
| 2014 | SF | Other Construction Equipment | 50 | 0.194 | 0.017 | 0.037 |
| 2014 | SF | Other Construction Equipment | 120 | 0.495 | 0.039 | 0.045 |
| 2014 | SF | Other Construction Equipment | 175 | 0.890 | 0.047 | 0.065 |
| 2014 | SF | Other Construction Equipment | 250 | 1.146 | 0.042 | 0.067 |
| 2014 | SF | Other Construction Equipment | 500 | 1.491 | 0.055 | 0.089 |
| 2014 | SF | Other Construction Equipment | 750 | 2.117 | 0.068 | 0.111 |
| 2014 | SF | Other Construction Equipment | 1000 | 3.375 | 0.089 | 0.138 |
| 2014 | SF | Other Construction Equipment | 9999 | 5.069 | 0.139 | 0.241 |
| 2014 | SF | Pavers | 50 | 0.202 | 0.021 | 0.055 |

**SFPUC Peninsula Pipelines - OFFROAD2011 2014 Emission Factors**

| CalendarYear | AirBasin | Equipment Type | HorsepowerBin | Nox (lb/hr) | PM (lb/hr) | HC (lb/hr) |
|---|---|---|---|---|---|---|
| 2014 | SF | Pavers | 120 | 0.452 | 0.035 | 0.041 |
| 2014 | SF | Pavers | 175 | 0.831 | 0.042 | 0.060 |
| 2014 | SF | Pavers | 250 | 0.808 | 0.021 | 0.034 |
| 2014 | SF | Pavers | 500 | 0.914 | 0.030 | 0.045 |
| 2014 | SF | Pavers | 750 | 1.671 | 0.072 | 0.095 |
| 2014 | SF | Paving Equipment | 50 | 0.141 | 0.012 | 0.024 |
| 2014 | SF | Paving Equipment | 120 | 0.442 | 0.034 | 0.039 |
| 2014 | SF | Paving Equipment | 175 | 0.606 | 0.029 | 0.040 |
| 2014 | SF | Paving Equipment | 250 | 0.807 | 0.027 | 0.043 |
| 2014 | SF | Paving Equipment | 500 | 1.224 | 0.044 | 0.069 |
| 2014 | SF | Paving Equipment | 750 | 1.866 | 0.043 | 0.085 |
| 2014 | SF | Paving Equipment | 1000 | 3.014 | 0.073 | 0.119 |
| 2014 | SF | Rollers | 50 | 0.159 | 0.014 | 0.032 |
| 2014 | SF | Rollers | 120 | 0.459 | 0.034 | 0.041 |
| 2014 | SF | Rollers | 175 | 0.562 | 0.026 | 0.036 |
| 2014 | SF | Rollers | 250 | 0.953 | 0.034 | 0.056 |
| 2014 | SF | Rollers | 500 | 1.436 | 0.056 | 0.086 |
| 2014 | SF | Rollers | 750 | 3.703 | 0.138 | 0.219 |
| 2014 | SF | Rough Terrain Forklifts | 50 | 0.219 | 0.018 | 0.041 |
| 2014 | SF | Rough Terrain Forklifts | 120 | 0.381 | 0.022 | 0.025 |
| 2014 | SF | Rough Terrain Forklifts | 175 | 0.413 | 0.016 | 0.021 |
| 2014 | SF | Rough Terrain Forklifts | 250 | 0.551 | 0.016 | 0.028 |
| 2014 | SF | Rough Terrain Forklifts | 500 | 1.160 | 0.025 | 0.047 |
| 2014 | SF | Rough Terrain Forklifts | 750 | 0.724 | 0.005 | 0.036 |
| 2014 | SF | Rubber Tired Dozers | 50 | 0.241 | 0.032 | 0.089 |
| 2014 | SF | Rubber Tired Dozers | 120 | 0.681 | 0.061 | 0.072 |
| 2014 | SF | Rubber Tired Dozers | 175 | 1.283 | 0.073 | 0.104 |
| 2014 | SF | Rubber Tired Dozers | 250 | 1.466 | 0.072 | 0.110 |
| 2014 | SF | Rubber Tired Dozers | 500 | 2.486 | 0.116 | 0.180 |
| 2014 | SF | Rubber Tired Dozers | 750 | 3.638 | 0.131 | 0.216 |
| 2014 | SF | Rubber Tired Loaders | 50 | 0.203 | 0.022 | 0.058 |
| 2014 | SF | Rubber Tired Loaders | 120 | 0.490 | 0.043 | 0.049 |

| SFPUC Peninsula Pipelines - OFFROAD2011 2014 Emission Factors | | | | | | |
|---|---|---|---|---|---|---|
| CalendarYear | AirBasin | Equipment Type | HorsepowerBin | Nox (lb/hr) | PM (lb/hr) | HC (lb/hr) |
| 2014 | SF | Rubber Tired Loaders | 175 | 0.750 | 0.042 | 0.060 |
| 2014 | SF | Rubber Tired Loaders | 250 | 0.903 | 0.031 | 0.055 |
| 2014 | SF | Rubber Tired Loaders | 500 | 1.325 | 0.050 | 0.089 |
| 2014 | SF | Rubber Tired Loaders | 750 | 2.304 | 0.091 | 0.161 |
| 2014 | SF | Rubber Tired Loaders | 1000 | 4.467 | 0.130 | 0.228 |
| 2014 | SF | Rubber Tired Loaders | 9999 | 7.719 | 0.223 | 0.416 |
| 2014 | SF | Scrapers | 50 | 0.258 | 0.034 | 0.101 |
| 2014 | SF | Scrapers | 120 | 0.634 | 0.047 | 0.053 |
| 2014 | SF | Scrapers | 175 | 1.397 | 0.074 | 0.105 |
| 2014 | SF | Scrapers | 250 | 2.109 | 0.096 | 0.147 |
| 2014 | SF | Scrapers | 500 | 2.528 | 0.102 | 0.160 |
| 2014 | SF | Scrapers | 750 | 3.012 | 0.114 | 0.183 |
| 2014 | SF | Scrapers | 1000 | 13.530 | 0.631 | 0.980 |
| 2014 | SF | Scrapers | 9999 | 14.961 | 0.561 | 0.861 |
| 2014 | SF | Skid Steer Loaders | 50 | 0.160 | 0.010 | 0.019 |
| 2014 | SF | Skid Steer Loaders | 120 | 0.230 | 0.013 | 0.014 |
| 2014 | SF | Skid Steer Loaders | 175 | 0.516 | 0.024 | 0.031 |
| 2014 | SF | Skid Steer Loaders | 250 | 0.599 | 0.022 | 0.034 |
| 2014 | SF | Skid Steer Loaders | 500 | 0.690 | 0.024 | 0.042 |
| 2014 | SF | Skid Steer Loaders | 750 | 1.033 | 0.043 | 0.051 |
| 2014 | SF | Skid Steer Loaders | 1000 | 3.112 | 0.097 | 0.148 |
| 2014 | SF | Surfacing Equipment | 50 | 0.129 | 0.010 | 0.022 |
| 2014 | SF | Surfacing Equipment | 120 | 0.325 | 0.023 | 0.027 |
| 2014 | SF | Surfacing Equipment | 175 | 0.573 | 0.027 | 0.039 |
| 2014 | SF | Surfacing Equipment | 250 | 0.733 | 0.021 | 0.036 |
| 2014 | SF | Surfacing Equipment | 500 | 0.938 | 0.030 | 0.047 |
| 2014 | SF | Surfacing Equipment | 750 | 1.343 | 0.042 | 0.059 |
| 2014 | SF | Surfacing Equipment | 1000 | 3.104 | 0.076 | 0.133 |
| 2014 | SF | Surfacing Equipment | 9999 | 2.904 | 0.065 | 0.102 |
| 2014 | SF | Tractors/Loaders/Backhoes | 50 | 0.167 | 0.015 | 0.034 |
| 2014 | SF | Tractors/Loaders/Backhoes | 120 | 0.375 | 0.029 | 0.032 |
| 2014 | SF | Tractors/Loaders/Backhoes | 175 | 0.577 | 0.029 | 0.041 |

**SFPUC Peninsula Pipelines - OFFROAD2011 2014 Emission Factors**

| CalendarYear | AirBasin | Equipment Type | HorsepowerBin | Nox (lb/hr) | PM (lb/hr) | HC (lb/hr) |
|---|---|---|---|---|---|---|
| 2014 | SF | Tractors/Loaders/Backhoes | 250 | 0.817 | 0.026 | 0.045 |
| 2014 | SF | Tractors/Loaders/Backhoes | 500 | 1.167 | 0.039 | 0.067 |
| 2014 | SF | Tractors/Loaders/Backhoes | 750 | 1.981 | 0.072 | 0.118 |
| 2014 | SF | Tractors/Loaders/Backhoes | 1000 | 2.687 | 0.060 | 0.099 |
| 2014 | SF | Tractors/Loaders/Backhoes | 9999 | 8.989 | 0.277 | 0.456 |
| 2014 | SF | Trenchers | 50 | 0.240 | 0.022 | 0.046 |
| 2014 | SF | Trenchers | 120 | 0.656 | 0.051 | 0.061 |
| 2014 | SF | Trenchers | 175 | 1.227 | 0.063 | 0.091 |
| 2014 | SF | Trenchers | 250 | 1.569 | 0.062 | 0.099 |
| 2014 | SF | Trenchers | 500 | 1.736 | 0.064 | 0.100 |
| 2014 | SF | Trenchers | 750 | 1.252 | 0.042 | 0.067 |
| 2014 | SF | Trenchers | 1000 | 12.491 | 0.566 | 0.890 |
| 2014 | SF | Sweepers/Scrubbers | 50 | 0.206 | 0.022 | 0.052 |
| 2014 | SF | Sweepers/Scrubbers | 120 | 0.540 | 0.048 | 0.054 |
| 2014 | SF | Sweepers/Scrubbers | 175 | 1.459 | 0.081 | 0.116 |
| 2014 | SF | Sweepers/Scrubbers | 250 | 1.376 | 0.054 | 0.086 |
| 2014 | SF | Sweepers/Scrubbers | 500 | 1.830 | 0.079 | 0.115 |
| 2014 | SF | Sweepers/Scrubbers | 1000 | 3.435 | 0.087 | 0.112 |
| 2014 | SF | Aerial Lifts | 50 | 0.128 | 0.005 | 0.007 |
| 2014 | SF | Aerial Lifts | 120 | 0.170 | 0.008 | 0.008 |
| 2014 | SF | Aerial Lifts | 175 | 0.286 | 0.012 | 0.014 |
| 2014 | SF | Aerial Lifts | 250 | 1.686 | 0.088 | 0.129 |
| 2014 | SF | Aerial Lifts | 500 | 1.188 | 0.026 | 0.050 |
| 2014 | SF | Forklifts | 50 | 0.113 | 0.012 | 0.033 |
| 2014 | SF | Forklifts | 120 | 0.250 | 0.021 | 0.024 |
| 2014 | SF | Forklifts | 175 | 0.398 | 0.022 | 0.030 |
| 2014 | SF | Forklifts | 250 | 0.671 | 0.030 | 0.047 |
| 2014 | SF | Forklifts | 500 | 0.968 | 0.044 | 0.068 |
| 2014 | SF | Forklifts | 1000 | 6.091 | 0.340 | 0.502 |
| 2014 | SF | Other General Industrial Equipment | 50 | 0.148 | 0.014 | 0.033 |
| 2014 | SF | Other General Industrial Equipment | 120 | 0.371 | 0.032 | 0.036 |
| 2014 | SF | Other General Industrial Equipment | 175 | 0.651 | 0.035 | 0.049 |

## SFPUC Peninsula Pipelines - OFFROAD2011 2014 Emission Factors

| CalendarYear | AirBasin | Equipment Type | HorsepowerBin | Nox (lb/hr) | PM (lb/hr) | HC (lb/hr) |
|---|---|---|---|---|---|---|
| 2014 | SF | Other General Industrial Equipment | 250 | 0.969 | 0.040 | 0.063 |
| 2014 | SF | Other General Industrial Equipment | 500 | 1.220 | 0.046 | 0.078 |
| 2014 | SF | Other General Industrial Equipment | 750 | 1.614 | 0.051 | 0.094 |
| 2014 | SF | Other General Industrial Equipment | 1000 | 4.253 | 0.111 | 0.191 |
| 2014 | SF | Other General Industrial Equipment | 9999 | 6.572 | 0.170 | 0.267 |
| 2014 | SF | Other Material Handling Equipment | 50 | 0.179 | 0.018 | 0.044 |
| 2014 | SF | Other Material Handling Equipment | 120 | 0.436 | 0.033 | 0.037 |
| 2014 | SF | Other Material Handling Equipment | 175 | 0.730 | 0.039 | 0.055 |
| 2014 | SF | Other Material Handling Equipment | 250 | 1.174 | 0.046 | 0.075 |
| 2014 | SF | Other Material Handling Equipment | 500 | 1.258 | 0.049 | 0.079 |
| 2014 | SF | Other Material Handling Equipment | 750 | 1.698 | 0.058 | 0.094 |
| 2014 | SF | Other Material Handling Equipment | 1000 | 1.816 | 0.014 | 0.034 |
| 2014 | SF | Other Material Handling Equipment | 9999 | 3.144 | 0.061 | 0.107 |

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# SFPUC Peninsula Pipelines - OFFROAD2011 2014 CO Emission Factors

| | | HP Bin | CO EF (g/hp/hr) |
|---|---|---|---|
| 2014 | Aerial Lift | 50 | 1.3904239 |
| | | 120 | 1.086783178 |
| | | 175 | 0.910318748 |
| | | 250 | 0.413648166 |
| | | 500 | 0.431298212 |
| 2014 | Bore/Drill Rig | 50 | 1.911470038 |
| | | 120 | 1.670712961 |
| | | 175 | 1.442664067 |
| | | 250 | 0.512131282 |
| | | 500 | 0.494923353 |
| | | 750 | 0.49884158 |
| | | 1000 | 0.561018043 |
| | | 9999 | 0.561018043 |
| 2014 | Cranes | 50 | 1.637578144 |
| | | 120 | 1.099370972 |
| | | 175 | 0.916226637 |
| | | 250 | 0.462461622 |
| | | 500 | 0.542211629 |
| | | 750 | 0.551860565 |
| | | 1000 | 0.724984373 |
| | | 9999 | 0.724984373 |
| 2014 | Crawlers | 50 | 3.032088704 |
| | | 120 | 1.84226121 |
| | | 175 | 1.545935452 |
| | | 250 | 1.003565235 |
| | | 500 | 1.59182611 |
| | | 750 | 1.604816311 |
| | | 1000 | 1.916161922 |
| | | 9999 | 1.916161922 |
| 2014 | Excavators | 50 | 2.200388454 |
| | | 120 | 1.447625842 |
| | | 175 | 1.209991972 |
| | | 250 | 0.562617444 |
| | | 500 | 0.615725004 |
| | | 750 | 0.627969888 |
| | | 1000 | 0.836216894 |
| | | 9999 | 0.836216894 |
| 2014 | Forklifts | 50 | 0.963205208 |
| | | 120 | 0.713598408 |
| | | 175 | 0.608200348 |
| | | 250 | 0.231499914 |
| | | 500 | 0.221863224 |
| | | 1000 | 0.282093346 |
| 2014 | Graders | 50 | 2.95363678 |
| | | 120 | 1.723650916 |
| | | 175 | 1.434082087 |
| | | 250 | 0.8196546 |
| | | 500 | 1.097593165 |
| | | 750 | 1.111888556 |
| | | 1000 | 1.444810691 |
| | | 9999 | 1.444810691 |

# SFPUC Peninsula Pipelines - OFFROAD2011 2014 CO Emission Factors

| | | HP Bin | CO EF (g/hp/hr) |
|---|---|---|---|
| 2014 | Off Highway Tractors | 50 | 3.342986023 |
| | | 120 | 1.953075653 |
| | | 175 | 1.64270183 |
| | | 250 | 1.097689456 |
| | | 500 | 1.816475803 |
| | | 750 | 1.829766049 |
| | | 1000 | 2.174348067 |
| | | 9999 | 2.174348067 |
| 2014 | Off Highway Trucks | 50 | 2.692548982 |
| | | 120 | 1.571368018 |
| | | 175 | 1.31394454 |
| | | 250 | 0.60348712 |
| | | 500 | 0.648948889 |
| | | 750 | 0.661811253 |
| | | 1000 | 0.891247074 |
| | | 9999 | 0.891247074 |
| 2014 | Other Construction Equipment | 50 | 2.160603607 |
| | | 120 | 1.535732596 |
| | | 175 | 1.287618766 |
| | | 250 | 0.57197276 |
| | | 500 | 0.598179179 |
| | | 750 | 0.610315057 |
| | | 1000 | 0.800730036 |
| | | 9999 | 0.800730036 |
| 2014 | Other General Industrial Equipment | 50 | 2.077466406 |
| | | 120 | 1.315425671 |
| | | 175 | 1.098605404 |
| | | 250 | 0.504614125 |
| | | 500 | 0.547521993 |
| | | 750 | 0.560032091 |
| | | 1000 | 0.756702317 |
| | | 9999 | 0.756702317 |
| 2014 | Other Material Handling Equipment | 50 | 2.390457652 |
| | | 120 | 1.535023489 |
| | | 175 | 1.282217765 |
| | | 250 | 0.589645931 |
| | | 500 | 0.641453183 |
| | | 750 | 0.656029931 |
| | | 1000 | 0.885929358 |
| | | 9999 | 0.885929358 |
| 2014 | Pavers | 50 | 2.524356422 |
| | | 120 | 1.677752861 |
| | | 175 | 1.402801397 |
| | | 250 | 0.859163067 |
| | | 500 | 1.198909975 |
| | | 750 | 1.211648502 |

# SFPUC Peninsula Pipelines - OFFROAD2011 2014 CO Emission Factors

| | | HP Bin | CO EF (g/hp/hr) |
|---|---|---|---|
| 2014 | Paving Equipment | 50 | 2.219963225 |
| | | 120 | 1.436397708 |
| | | 175 | 1.197840517 |
| | | 250 | 0.704887875 |
| | | 500 | 0.967757339 |
| | | 750 | 0.979221801 |
| | | 1000 | 1.221580365 |
| 2014 | Rollers | 50 | 1.95132295 |
| | | 120 | 1.402899968 |
| | | 175 | 1.169247326 |
| | | 250 | 0.606268571 |
| | | 500 | 0.691689727 |
| | | 750 | 0.703890187 |
| 2014 | Rough Terrain Forklifts | 50 | 1.736820859 |
| | | 120 | 1.388331543 |
| | | 175 | 1.165317825 |
| | | 250 | 0.514412041 |
| | | 500 | 0.521469989 |
| | | 750 | 0.532385223 |
| 2014 | Rubber Tired Dozers | 50 | 3.253243036 |
| | | 120 | 1.833760547 |
| | | 175 | 1.544135832 |
| | | 250 | 1.034433542 |
| | | 500 | 1.727255763 |
| | | 750 | 1.739470589 |
| 2014 | Rubber Tired Loaders | 50 | 2.659814134 |
| | | 120 | 1.521503735 |
| | | 175 | 1.265556457 |
| | | 250 | 0.67641002 |
| | | 500 | 0.838306947 |
| | | 750 | 0.851230787 |
| | | 1000 | 1.131274095 |
| | | 9999 | 1.131274095 |
| 2014 | Scrapers | 50 | 3.284871418 |
| | | 120 | 2.006102199 |
| | | 175 | 1.675768792 |
| | | 250 | 1.032211236 |
| | | 500 | 1.52912675 |
| | | 750 | 1.544369081 |
| | | 1000 | 1.904828814 |
| | | 9999 | 1.904828814 |
| 2014 | Skid Steer Loaders | 50 | 1.526190615 |
| | | 120 | 1.2621063 |
| | | 175 | 1.070938405 |
| | | 250 | 0.417909014 |
| | | 500 | 0.406291957 |
| | | 750 | 0.412227463 |
| | | 1000 | 0.511958978 |

## SFPUC Peninsula Pipelines - OFFROAD2011 2014 CO Emission Factors

|  |  | HP Bin | CO EF (g/hp/hr) |
|---|---|---|---|
| 2014 | Surfacing Equipment | 50 | 1.486247739 |
|  |  | 120 | 1.105415741 |
|  |  | 175 | 0.921442551 |
|  |  | 250 | 0.506050172 |
|  |  | 500 | 0.577534527 |
|  |  | 750 | 0.586822332 |
|  |  | 1000 | 0.736620005 |
|  |  | 9999 | 0.736620005 |
| 2014 | Sweepers/Scrubbers | 50 | 2.309494708 |
|  |  | 120 | 1.66200974 |
|  |  | 175 | 1.407135705 |
|  |  | 250 | 0.55652065 |
|  |  | 500 | 0.546058251 |
|  |  | 750 | 0.553728189 |
|  |  | 1000 | 0.721419019 |
| 2014 | Tractors/Loaders/Backhoes | 50 | 2.219208242 |
|  |  | 120 | 1.430457897 |
|  |  | 175 | 1.193415512 |
|  |  | 250 | 0.57659231 |
|  |  | 500 | 0.645258086 |
|  |  | 750 | 0.657710187 |
|  |  | 1000 | 0.875947447 |
|  |  | 9999 | 0.875947447 |
| 2014 | Trenchers | 50 | 3.03972276 |
|  |  | 120 | 2.024021109 |
|  |  | 175 | 1.697192273 |
|  |  | 250 | 1.077795387 |
|  |  | 500 | 1.554365073 |
|  |  | 750 | 1.568998894 |
|  |  | 1000 | 1.868387196 |

# Appendix F
# Biological Resources

# Appendix F
# Biological Resources

## *Table 1.1*
## *Special-Status Plant Species Potentially Occurring in Study Area*

## Table 1.1
## Special-Status Plant Species Potentially Occurring in Study Area

| Scientific Name | Common Name | Status | | | Life Form and Habitat | Blooming Period | Potential for Occurrence in Study Area |
|---|---|---|---|---|---|---|---|
| | | Federal | State | CNPS | | | |
| *Acanthomintha duttonii* | San Mateo thorn-mint | FE | SE | 1B.1 | Annual herb. Chaparral, valley and foothill grassland/serpentinite. | April-June | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Allium peninsulare* var. *franciscanum* | Franciscan onion | – | – | 1B.2 | Perennial bulbiferous herb. Cismontane woodland, valley and foothill grassland/clay, volcanic, often serpentinite. | May-June | None. Marginally suitable habitat present. Not observed during appropriately timed field surveys. |
| *Amsinckia lunaris* | bent-flowered fiddleneck | – | – | 1B.2 | Annual herb. Coastal bluff scrub, cismontane woodland, valley and foothill grassland. | March-June | None. Marginally suitable habitat present. Not observed during appropriately timed field surveys. |
| *Arctostaphylos andersonii* | Santa Cruz manzanita | – | – | 1B.2 | Perennial evergreen shrub. Broadleaved upland forest, chaparral, North Coast coniferous forest/openings, edges. | November-April | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Arctostaphylos franciscana* | Franciscan manzanita | – | – | 1B.1 | Perennial evergreen shrub. Coastal scrub, serpentinite. | February-April | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Arctostaphylos imbricate* | San Bruno Mountain manzanita | – | SE | 1B.1 | Perennial evergreen shrub. Chaparral, coastal scrub, rocky. | February-May | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Arctostaphyllos Montana* ssp. *ravenii* | Presidio manzanita | FE | SE | 1B.1 | Perennial evergreen shrub. Chaparral, coastal prairie, coastal scrub, serpentine outcrop. | February-March | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Arctostaphylos montaraensis* | Montara manzanita | – | – | 1B.2 | Perennial evergreen shrub. Chaparral (maritime), coastal scrub. | January-March | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Arctostaphylos pacifica* | Pacific manzanita | – | SE | 1B.2 | Perennial evergreen shrub. Chaparral, and coastal scrub. | February-April | None. No suitable habitat present. Not observed during appropriately timed field surveys. |

**Table 1.1**
**Special-Status Plant Species Potentially Occurring in Study Area (Continued)**

| Scientific Name | Common Name | Status | | | Life Form and Habitat | Blooming Period | Potential for Occurrence in Study Area |
|---|---|---|---|---|---|---|---|
| | | Federal | State | CNPS | | | |
| *Arctostaphylos regismontana* | Kings Mountain manzanita | – | – | 1B.2 | Perennial evergreen shrub. Broadleaved upland forest, chaparral, North Coast coniferous forest/openings, edges. | January-April | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Arenaria paludicola* | marsh sandwort | FE | SE | 1B.1 | Perennial stoloniferous herb. Sandy openings, marshes and swamps. | May-August | None. No suitable habitat present. |
| *Astragalus pycnostachyus* var. *pycnostachyus* | coastal marsh milk-vetch | – | – | 1B.2 | Perennial herb. Coastal dunes (mesic), coastal scrub, Marshes and swamps (coastal salt, streamsides). | April-October | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Astragalus tener* var. *tener* | alkali milk-vetch | – | – | 1B.2 | Annual herb. Playas, valley and foothill grassland (adobe clay), alkaline vernal pools. | March-June | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Atriplex joaquiniana* | San Joaquin spearscale | – | – | 1B.2 | Annual herb. Alkaline; chenopod scrub, meadows and seeps, playas, valley and foothill grassland. | April-October | None. No suitable alkaline habitat present. Not observed during appropriately timed field surveys. |
| *California macrophylla* | round-leaved fillaree | – | – | 1B.1 | Annual herb. Cismontane woodland, valley and foothill grassland. | March-May | None. Marginally suitable habitat present. Not observed during appropriately timed field surveys. |
| *Carex comosa* | bristly sedge | – | – | 2.1 | Perennial rhizomatous herb. Coastal prairie, marshes and swamps (lake margins), valley and foothill grasslands. | May-September | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Centromadia parryi* ssp. *parryi* | papoose tarplant | – | – | 2.1 | Annual herb. Chaparral and coastal prairie. | May-November | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Chloropyron maritimum* ssp. *palustre (formerly Cordylanthus)* | Point Reyes bird's-beak | – | – | 1B.2 | Annual herb (hemiparasitic). Coastal salt marshes and swamps. | June-October | None. No suitable habitat present. |
| *Chorizanthe cuspidata* var. *cuspidate* | San Francisco Bay spineflower | – | – | 1B.2 | Annual herb. Coastal bluff scrub, coastal dunes, coastal prairie, coastal scrub/sandy. | April-July | None. No suitable habitat present. Not observed during appropriately timed field surveys. |

**Table 1.1**
**Special-Status Plant Species Potentially Occurring in Study Area (Continued)**

| Scientific Name | Common Name | Status | | | Life Form and Habitat | Blooming Period | Potential for Occurrence in Study Area |
|---|---|---|---|---|---|---|---|
| | | Federal | State | CNPS | | | |
| *Chorizanthe robusta* var. *robusta* | robust spineflower | FE | – | 1B.1 | Annual herb. Chaparral (maritime), cismontane woodland (openings), coastal dunes, coastal scrub/sandy or gravelly. | April-September | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Cirsium andrewsii* | Franciscan thistle | – | – | 1B.2 | Perennial herb. Broadleaved upland forest, ravines, seeps. | March-July | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Cirsium fontinale* var. *fontinale* | fountain thistle | FE | SE | 1B.1 | Perennial herb. Chaparral (openings), cismontane woodland, valley and foothill grassland and seeps (serpentinite). | June-October | None. No suitable habitat present. |
| *Cirsium occidentale* var. *compactum* | compact cobwebby thistle | – | – | 1B.2 | Perennial herb. Chaparral, coastal dunes, coastal scrub, coastal prairie. | April-June | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Clarkia franciscana* | Presidio clarkia | FE | SE | 1B.1 | Annual herb. Coastal scrub and valley, and foothill grassland on serpentinite. | May-July | None. No suitable serpentinite habitat present. |
| *Collinsia corymbosa* | round-headed Chinese houses | – | – | 1B.2 | Annual herb. Coastal dunes. | April-June | None. No suitable habitat present. |
| *Collinsia multicolor* | San Francisco collinsia | – | – | 1B.2 | Annual herb. Closed-cone coniferous forest, coastal scrub/ sometimes serpentinite. | March-May | None. Marginally suitable habitat present. Not observed during appropriately timed field surveys. |
| *Dirca occidentalis* | western leatherwood | – | – | 1B.2 | Broadleaved upland forest, Closed-cone coniferous forest, chaparral, cismontane woodland, North Coast coniferous forest, riparian forest, riparian woodland/mesic. | January-March (April) | None. Marginally suitable habitat present. Not observed during appropriately timed field surveys. |
| *Equisetum palustre* | Marsh horsetail | – | – | 3 | Perennial rhizomatous herb. Marshes and swamps. | unknown | None. No suitable habitat present. |
| *Eriophyllum latilobum* | San Mateo woolly sunflower | FE | SE | 1B.1 | Perennial herb. Cismontane woodland (often serpentinite, roadcuts). | May-June | None. Marginally suitable habitat present. Not observed during appropriately timed field surveys. |

**Table 1.1**
**Special-Status Plant Species Potentially Occurring in Study Area (Continued)**

| Scientific Name | Common Name | Status | | | Life Form and Habitat | Blooming Period | Potential for Occurrence in Study Area |
|---|---|---|---|---|---|---|---|
| | | Federal | State | CNPS | | | |
| *Fritillaria biflora* var. *ineziana* | Hillsborough chocolate lily | – | – | 1B.1 | Perennial bulbiferous herb. Cismontane woodland, valley and foothill grassland/serpentinite. | March-April | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Fritillaria liliacea* | fragrant fritillary | – | – | 1B.2 | Perennial bulbiferous herb. Cismontane woodland, coastal prairie, coastal scrub, valley and foothill grassland/often serpentinite. | February-April | None. Marginally suitable habitat present. Not observed during appropriately timed field surveys. |
| *Gilia capitata* ssp. *chamissonis* | dune gilia | – | – | 1B.1 | Coastal dunes, coastal scrub. | April-July | None. No suitable habitat present. |
| *Gilia millefoliata* | dark-eyed gilia | – | – | 1B.2 | Annual herb. Coastal dunes. | April-July | None. No suitable habitat present. |
| *Grindelia hirsutula* var. *maritima* | San Francisco gumplant | – | – | 1B.2 | Perennial herb. Coastal bluff scrub, coastal scrub, valley and foothill grassland (sandy or serpentinite). | June-September | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Helianthella castanea* | Diablo helianthella | – | – | 1B.2 | Perennial herb. Broadleaved upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill grassland. | March-June | None. Marginally suitable habitat present. Not observed during appropriately timed field surveys. |
| *Hemizonia congesta* ssp. *congesta* | Seaside tarplant | – | – | 1B.2 | Annual herb. Valley and foothill grasslands/sometimes roadsides. | April-November | None. Marginally suitable habitat present. Not observed during appropriately timed field surveys. |
| *Hesperolinon congestum* | Marin western flax | FT | ST | 1B.1 | Chaparral, valley and foothill grassland/serpentinite. | April-July | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Hesperevax sparsiflora* var. *brevifolia* | short-leaved evax | – | – | 2.2 | Annual herb. Coastal bluff scrub (sandy), coastal dunes. | March-June | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Holocarpha macradenia* | Santa Cruz tarplant | FT | SE | 1B.1 | Annual herb. Often clay, sandy. Coastal prairie, coastal scrub, valley and foothill grassland. | June-October | Not expected. No suitable coastal prairie or scrub present. Minimal grassland present, which had been mowed or sprayed by June 2011. |

**Table 1.1**
**Special-Status Plant Species Potentially Occurring in Study Area (Continued)**

| Scientific Name | Common Name | Status |  |  | Life Form and Habitat | Blooming Period | Potential for Occurrence in Study Area |
|---|---|---|---|---|---|---|---|
|  |  | Federal | State | CNPS |  |  |  |
| *Horkelia cuneata* ssp. *sericea* | Kellogg's horkelia | – | – | 1B.1 | Perennial herb. Closed-cone coniferous forest, chaparral (maritime), coastal dunes, coastal scrub/sandy or gravelly, openings. | April-September | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Horkelia marinensis* | Point Reyes horkelia | – | – | 1B.2 | Perennial herb. Coastal dunes, coastal prairie and scrub. | May-September | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Layia carnosa* | beach layia | FE | SE | 1B.1 | Annual herb. Coastal dunes and sandy coastal scrub. | March-July | None. No suitable habitat present. |
| *Leptosiphon croceus* | coast yellow leptosiphon | – | – | 1B.1 | Annual herb. Coastal bluff scrub and coastal prairie. | April-May | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Leptosiphon rosaceus* | rose leptosiphon | – | – | 1B.1 | Annual herb. Coastal bluff scrub. | April-July | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Lessingia arachnoidea* | Crystal Springs lessingia | – | – | 1B.2 | Annual herb. Cismontane woodland, coastal scrub, valley and foothill grassland/serpentinite, often roadsides. | July-October | None. No suitable habitat present. |
| *Lessingia germanorum* | San Francisco lessingia | FE | SE | 1B.1 | Annual herb. Remnant dunes, coastal scrub. | June-November | None. No suitable habitat present. |
| *Lessingia hololeuca* | Wooly-headed lessingia | – | – | 3 | Annual herb. Broadleaved upland forest, coastal scrub, lower montane coniferous forest, valley and foothill grassland, on serpentinite. | June-October | None. No suitable habitat present. |
| *Lilium maritimum* | coast lily | – | – | 1B.1 | Perennial bulbiferous herb. Broadleaved upland forest, closed-cone coniferous forest, coastal prairie, coastal scrub, marshes and swamps (freshwater). | May-August | None. No suitable habitat present. Not observed during appropriately timed field surveys. |

**Table 1.1**
**Special-Status Plant Species Potentially Occurring in Study Area (Continued)**

| Scientific Name | Common Name | Status | | | Life Form and Habitat | Blooming Period | Potential for Occurrence in Study Area |
|---|---|---|---|---|---|---|---|
| | | Federal | State | CNPS | | | |
| *Lupinus eximius* | San Mateo tree lupine | – | – | 3.2 | Perennial shrub. Chaparral, coastal scrub. | April-July | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Malacothamnus aboriginum* | Indian Valley bush mallow | – | – | 1B.2 | Perennial deciduous shrub. Chaparral, cismontane woodland, rocky, granitic, often on burns. | April-October | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Malacothamnus arcuatus* | arcuate bush mallow | – | – | 1B.2 | Perennial evergreen shrub. Chaparral, cismontane woodland. | April-September | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Malacothamnus davidsonii* | Davidson's bush mallow | – | – | 1B.2 | Perennial deciduous shrub. Chaparral, cismontane woodland, coastal scrub, riparian woodland. | June-January | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Malacothamnus hallii* | Hall's bush mallow | – | – | 1B.2 | Perennial evergreen shrub. Chaparral, coastal scrub. | May-September (October) | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Microseris paludosa* | marsh microseris | – | – | 1B.2 | Perennial herb. Closed-cone coniferous forest, cismontane woodland, coastal scrub, and valley and foothill grassland. | April-July | None. Marginally suitable habitat present. Not observed during appropriately timed field surveys. |
| *Monolopia gracilens* | woodland woolly-threads | – | – | 1B.2 | Annual herb. Openings in forests, chaparral, valley and foothill grassland (serpentinite). | March-July | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Pedicularis dudleyi* | Dudley’s lousewort | – | Rare | 1B.2 | Perennial herb. Maritime chaparral, North Coast coniferous forest, cismontane woodland, valley and foothill grassland. | April-June | None. Marginally suitable habitat present. Not observed during appropriately timed field surveys. |
| *Pentachaeta bellidiflora* | white-rayed pentachaeta | FE | SE | 1B.1 | Annual herb. Cismontane woodland, valley and foothill grassland (often serpentinite). | March-May | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Plagiobothrys chorisianus* var. *chorisianus* | Choris' popcorn-flower | – | – | 1B.2 | Annual herb. Chaparral, coastal prairie, coastal scrub/mesic. | March-June | None. Marginally suitable habitat present. Not observed during appropriately timed field surveys. |

**Table 1.1**
**Special-Status Plant Species Potentially Occurring in Study Area (Continued)**

| Scientific Name | Common Name | Status | | | Life Form and Habitat | Blooming Period | Potential for Occurrence in Study Area |
|---|---|---|---|---|---|---|---|
| | | Federal | State | CNPS | | | |
| *Plagiobothrys diffuses* | San Francisco popcorn-flower | – | SE | 1B.1 | Annual herb. Coastal prairie, valley and foothill grassland. | March-June | None. Marginally suitable habitat present. Not observed during appropriately timed field surveys. |
| *Plagiobothrys glaber* | hairless popcorn-flower | – | – | 1A | Annual herb. Meadows and seeps (alkaline), marshes and swamps (coastal salt). | March-May | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Polemonium carneum* | Oregon polemonium | – | – | 2.2 | Perennial herb. Coastal prairie and scrub, lower montane coniferous forest. | April-September | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Potentilla hickmanii* | Hickman's cinquefoil | FE | SE | 1B.1 | Perennial herb. Coastal bluff scrub, closed-cone coniferous forest, vernally mesic meadows and seeps, freshwater marshes and swamps. | April-August | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Sanicula maritime* | adobe sanicle | – | Rare | 1B.1 | Perennial herb. Clay, serpentinite; chaparral, coastal prairie, meadows and seeps, valley and foothill grassland. | February-May | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Silene verecunda* ssp. *verecunda* | San Francisco campion | – | – | 1B.2 | Perennial herb. Coastal bluff scrub, chaparral, coastal prairie, valley and foothill grassland (sandy). | March-June | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Stebbinsoseris decipiens* | Santa Cruz microseris | – | – | 1B.2 | Annual herb. Open areas often on serpentinite. Broad-leaved upland forest, closed-cone coniferous forest, chaparral, coastal prairie, coastal scrub, and valley and foothill grassland. | April-May | None. Marginally suitable habitat present. Not observed during appropriately timed field surveys. |
| *Streptanthus albidus* ssp. *peramoenus* | most beautiful jewel-flower | – | – | 1B.2 | Annual herb. Chaparral, cismontane woodland, valley and foothill grassland/serpentinite. | (March) April-September (October) | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Suaeda californica* | California seablight | FE | – | 1B.1 | Perennial evergreen shrub. Marshes and swamps (coastal salt marsh). | July-October | None. No suitable habitat present. |

**Table 1.1**
**Special-Status Plant Species Potentially Occurring in Study Area (Continued)**

| Scientific Name | Common Name | Status | | | Life Form and Habitat | Blooming Period | Potential for Occurrence in Study Area |
|---|---|---|---|---|---|---|---|
| | | Federal | State | CNPS | | | |
| *Trifolium hydrophilum* | saline clover | – | – | 1B.2 | Annual herb. Marshes and swamps, valley and foothill grassland (mesic, alkaline), vernal pools. | April-June | None. No suitable habitat present. Not observed during appropriately timed field surveys. |
| *Triphysaria floribunda* | San Francisco owl's-clover | – | – | 1B.2 | Annual herb. Coastal prairie, coastal scrub, valley and foothill grassland/usually serpentinite. | April-June | None. Marginally suitable habitat present. Not observed during appropriately timed field surveys. |
| *Triquetrella californica* | coastal triquetrella | – | – | 1B.2 | Moss. On soil in coastal bluff scrub, coastal scrub. | – | Not expected. No suitable coastal bluff habitat. |

**<u>Status Key:</u>**

**Federal Status**
FE = Federally listed as endangered under FESA
FT = Federally listed as threatened under FESA

**State Status**
SE = State listed as endangered under CESA
ST = State listed as threatened under CESA
Rare = Although not presently threatened with extinction, it may become endangered if its present environment worsens

**Notes:**
– = Not Applicable
CESA = California Endangered Species Act
CNPS = California Native Plant Society
FESA = Federal Endangered Species Act

**CNPS Status**

| | |
|---|---|
| 1A | Plants presumed extinct in California. |
| 1B.1 | Indicates that a plant is rare, threatened, or endangered in California and elsewhere, and that it is considered seriously threatened to a high degree or immediacy. |
| 1B.2 | Indicates that a plant is rare, threatened, or endangered in California and elsewhere and that it is fairly threatened but to a lesser degree or immediacy than the 1B.1 listing. |
| 2 | Indicates plants that are rare, threatened, or endangered in California, but more common elsewhere |
| 2.2 | As 2 above, but indicating that it is fairly threatened in California. |
| 3 | Indicates plants about which more information is needed – a review list. |

# Appendix F
# Biological Resources

## *Table 1.2*
## *Vascular Plant Species Observed in Study Area*

## Table 1.2
## Vascular Plant Species Observed in Study Area

| **CLASS**<br>**Family**<br>***Scientific Name*** | **Common Name** |
|---|---|
| **EQUISETAE** | |
| **Equisetaceae – Horsetail Family** | |
| *Equisetum arvense* | common horsetail |
| **FILICINAE** | |
| **Dennstaedtiaceae – Bracken Family** | |
| *Pteridium aquilinum* var. *pubescens* | western brackenfern |
| **Polypodiaceae – Polypody Family** | |
| *Polypodium californicum* | California polypody |
| **CONIFERAE** | |
| **Cupressaceae – Cypress Family** | |
| *Cupressus macrocarpa*** | Monterey cypress |
| **Pinaceae – Pine Family** | |
| *Pinus radiata*** | Monterey pine |
| **Taxodiaceae – Redwood Family** | |
| *Sequoia sempervirens*** | coast redwood |
| **DICOTYLEDONAE** | |
| **Aizoaceae – Carpetweed Family** | |
| *Carpobrotus edulis** | Hottentot fig |
| **Anacardiaceae – Sumac Family** | |
| *Toxicodendron diversilobum* | poison oak |
| **Apiaceae – Parsley Family** | |
| *Conium maculatum** | poison hemlock |
| *Foeniculum vulgare** | sweet fennel |
| *Sanicula crassicaulis* | Pacific sanicle |
| *Torilis arvensis** | hedge-parsley |
| **Apocynaceae – Dogbane Family** | |
| *Vinca major** | periwinkle |
| **Aquifoliaceae – Holly Family** | |
| *Ilex aquifolium** | English holly |
| **Araliaceae – Aralia Family** | |
| *Hedera helix** | English ivy |

**Table 1.2**
**Vascular Plant Species Observed in Study Area (Continued)**

| **CLASS**<br>**Family**<br>***Scientific Name*** | **Common Name** |
|---|---|
| **Asteraceae – Sunflower Family** | |
| *Arctotheca calendula** | capeweed |
| *Aster chilensis* | common California aster |
| *Baccharis pilularis* | coyote brush |
| *Bellis perennis** | English daisy |
| *Carduus pycnocephalus** | Italian thistle |
| *Cirsium vulgare** | bull thistle |
| *Conyza canadensis** | horseweed |
| *Conyza* sp.* | horseweed |
| *Filago gallica** | narrow-leaf filago |
| *Gnaphalium californicum* | California everlasting |
| *Gnaphalium luteo-album** | cudweed |
| *Hypochaeris glabra** | smooth cat's-ear |
| *Hypochaeris radicata** | rough cat's-ear |
| *Lactuca serriola** | prickly lettuce |
| *Madia sativa* | coast tarweed |
| *Picris echioides** | bristly ox-tongue |
| *Soliva sessilis** | common soliva |
| *Sonchus asper** | prickly sow-thistle |
| *Sonchus oleraceus** | common sow-thistle |
| *Taraxacum officinale** | common dandelion |
| *Tragopogon porrifolius** | salsify |
| **Brassicaceae – Mustard Family** | |
| *Brassica nigra** | black mustard |
| *Cardamine oligosperma* | bitter cress |
| *Hirschfeldia incana** | hoary mustard |
| *Raphanus raphanistrum** | jointed charlock |
| *Raphanus sativus** | wild radish |
| **Caprifoliaceae – Honeysuckle Family** | |
| *Lonicera hispidula* var. *vacillans* | California honeysuckle |
| *Symphoricarpos albus* var. *laevigatus* | snowberry |
| **Caryophyllaceae – Pink Family** | |
| *Cerastium glomeratum** | mouse-ear chickweed |
| *Polycarpon tetraphyllum** | four-leaved allseed |

**Table 1.2**
**Vascular Plant Species Observed in Study Area (Continued)**

| **CLASS** **Family** ***Scientific Name*** | **Common Name** |
|---|---|
| *Silene gallica** | common catchfly |
| *Spergula arvensis* ssp. *arvensis** | starwort |
| *Stellaria media** | common chickweed |
| **Convolvulaceae – Morning-Glory Family** | |
| *Convolvulus arvensis** | field bindweed |
| **Cucurbitaceae – Gourd Family** | |
| *Marah fabaceus* | California man-root |
| **Dipsacaceae – Teasel Family** | |
| *Dipsacus fullonum** | wild teasel |
| **Euphorbiaceae – Spurge Family** | |
| *Chamaesyce maculata** | spotted spurge |
| *Euphorbia peplus** | petty spurge |
| **Fabaceae – Pea Family** | |
| *Acacia decurrens** | green wattle |
| *Acacia longifolia** | golden wattle |
| *Acacia melanonxylon** | blackwood acacia |
| *Genista monspessulana** | French broom |
| *Lathyrus latifolius** | perennial sweet pea |
| *Lotus corniculatus** | bird's-foot trefoil |
| *Lotus purshianus* var. *purshianus* | Spanish clover |
| *Lupinus bicolor* | dove lupine |
| *Lupinus formosus* var. *formosus* | summer lupine |
| *Lupinus microcarpus* var. *densiflorus* | white annual lupine |
| *Lupinus nanus* | sky lupine |
| *Lupinus succulentus* | succulent annual lupine |
| *Medicago polymorpha** | bur-clover |
| *Trifolium campestre** | hop clover |
| *Trifolium dubium** | little hop clover |
| *Trifolium hirtum** | rose clover |
| *Trifolium incarnatum** | crimson clover |
| *Trifolium repens** | white clover |
| *Trifolium subterraneum** | subterranean clover |
| *Vicia sativa* ssp. *nigra** | common vetch |
| *Vicia sativa* ssp. *sativa** | common vetch |

**Table 1.2**
**Vascular Plant Species Observed in Study Area (Continued)**

| **CLASS**<br>**Family**<br>***Scientific Name*** | **Common Name** |
|---|---|
| *Vicia villosa* ssp. *villosa** | hairy vetch |
| **Fagaceae – Oak Family** | |
| *Quercus agrifolia* | coast live oak |
| **Geraniaceae – Geranium Family** | |
| *Erodium botrys** | long-beaked storkbill |
| *Geranium dissectum** | cranesbill |
| *Geranium molle** | dovesfoot geranium |
| *Geranium purpureum** | little robin |
| **Hippocastanaceae – Buckeye Family** | |
| *Aesculus californica* | California buckeye |
| **Linaceae – Flax Family** | |
| *Linum bienne** | narrow-leaved flax |
| **Lythraceae – Loosestrife Family** | |
| *Lythrum hyssopifolium** | loosestrife |
| **Malvaceae – Mallow Family** | |
| *Malva nicaeensis** | bull mallow |
| *Malva parviflora** | cheeseweed |
| **Myrtaceae – Myrtle Family** | |
| *Eucalyptus globulus** | blue gum |
| **Oleaceae – Olive Family** | |
| *Ligustrum lucidum** | glossy privet |
| *Olea europea** | olive |
| **Onagraceae – Evening Primrose Family** | |
| *Camissonia ovata* | sun cups |
| *Clarkia unguiculata* | elegant clarkia |
| *Clarkia purpurea* ssp. *quadrivulnera* | clarkia |
| *Clarkia rubicunda* | farewell-to-spring |
| *Epilobium brachycarpum* | fireweed |
| *Epilobium ciliatum* ssp. *ciliatum* | northern willow herb |
| *Oenothera elata* ssp. *hookeri* | Hooker's evening primrose |
| **Oxalidaceae – Oxalis Family** | |
| *Oxalis corniculata** | creeping wood sorrel |
| *Oxalis pes-caprae** | Bermuda buttercup |
| **Papaveraceae – Poppy Family** | |

**Table 1.2**
**Vascular Plant Species Observed in Study Area (Continued)**

| **CLASS**<br>**Family**<br>***Scientific Name*** | **Common Name** |
|---|---|
| *Eschscholzia californica* | California poppy |
| *Fumaria parviflora** | small-flowered fumitory |
| **Plantaginaceae – Plantain Family** | |
| *Plantago coronopus** | cut-leaved plantain |
| *Plantago lanceolata ** | English plantain |
| *Plantago major** | broadleaf plantain |
| **Polygonaceae – Buckwheat Family** | |
| *Polygonum arenastrum** | common knotweed |
| *Rumex acetosella** | sheep sorrel |
| *Rumex crispus** | curly dock |
| Rumex pulcher* | fiddle dock |
| **Portulacaceae – Purslane Family** | |
| *Claytonia perfoliata* | miner’s lettuce |
| **Primulaceae – Primrose Family** | |
| *Anagallis arvensis** | scarlet pimpernel |
| **Ranunculaceae – Buttercup Family** | |
| *Ranunculus californicus* | California buttercup |
| **Rhamnaceae – Buckthorn Family** | |
| *Rhamnus californica* ssp. *californica* | California coffeeberry |
| **Rosaceae – Rose Family** | |
| *Cotoneaster pannosa** | cotoneaster |
| *Cretaegus* sp.* | hawthorn |
| *Fragaria vesca* | wood strawberry |
| *Heteromeles arbutifolia* | toyon |
| *Horkelia cuneata* ssp. *cuneata* | wedge-leaved horkelia |
| *Prunus cerasifera** | cherry plum |
| *Pyracantha angustifolia** | common firethorn |
| *Rubus discolor** | Himalayan blackberry |
| *Rubus ursinus* | California blackberry |
| **Rubiaceae – Madder Family** | |
| *Galium aparine* | bedstraw |
| *Galium murale** | tiny bedstraw |
| *Sherardia arvensis** | field madder |
| **Salicaceae – Willow Family** | |

**Table 1.2**
**Vascular Plant Species Observed in Study Area (Continued)**

| **CLASS** **Family** ***Scientific Name*** | **Common Name** |
|---|---|
| *Populus nigra** | Lombardy poplar |
| *Salix lasiolepis* | arroyo willow |
| **Scrophulariaceae – Figwort Family** | |
| *Bellardia trixago** | bellardia |
| *Castilleja exerta* ssp. *exerta* | purple owl's-clover |
| *Collinsia heterophylla* | Chinese houses |
| **Solanaceae – Nightshade Family** | |
| *Solanum americanum** | white nightshade |
| **Vitaceae – Grape Family** | |
| *Vitis vinifera** | wine grape |
| **MONOCOTYLEDONAE** | |
| **Iridaceae – Iris Family** | |
| *Chasmanthe floribunda** | African cornflag |
| *Sisyrinchium bellum* | California blue-eyed grass |
| *Sparaxis tricolor** | harlequin flower |
| **Juncaceae – Rush Family** | |
| *Juncus bufonius* var. *bufonius* | toad rush |
| *Luzula comosa* | wood rush |
| **Liliaceae – Lily Family** | |
| *Calochortus luteus* | yellow mariposa-lily |
| *Chlorogalum pomeridianum* var. *pomeridianum* | wavy-leaf soap plant |
| *Triteleia laxa* | Ithuriel's spear |
| **Orchidaceae – Orchid Family** | |
| *Epipactis helleborine** | broad-leaf helleborine |
| **Poaceae – Grass Family** | |
| *Aira caryophyllea** | silver European hairgrass |
| *Avena barbata** | slender wild oat |
| *Avena fatua** | wild oat |
| *Briza maxima** | big quaking grass |
| *Briza minor** | little quaking grass |
| *Bromus carinatus* var. *carinatus* | California brome |
| *Bromus diandrus** | ripgut brome |
| *Bromus madritensis* ssp. *rubens** | red brome |
| *Cortaderia jubata** | pampas grass |

**Table 1.2**
**Vascular Plant Species Observed in Study Area (Continued)**

| **CLASS**<br>**Family**<br>***Scientific Name*** | **Common Name** |
|---|---|
| *Cynodon dactylon** | Bermuda grass |
| *Cynosorus echinatus** | hedgehog dogtail |
| *Dactylis glomerata** | orchard grass |
| *Danthonia californica* | California oatgrass |
| *Ehrharta erecta** | ehrharta grass |
| *Festuca pratensis** | meadow fescue |
| *Festuca rubra* | red fescue |
| *Holcus lanatus** | velvet grass |
| *Lolium multiflorum** | Italian ryegrass |
| *Phalaris aquatica** | Harding grass |
| *Poa annua** | annual bluegrass |
| *Vulpia bromoides** | six-weeks fescue |
| *Vulpia myuros** | zorro grass |

Notes:
* Indicates nonnative species or species not naturally occurring on site.
** Indicates species native to California but not naturally occurring on site.

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# Appendix F
# Biological Resources

## *Table 2.1*
## *Special-Status Wildlife Species Potentially Occurring in Study Area*

## Table 2.1
## Special-Status Wildlife Species Potentially Occurring in Study Area

| **Wildlife Species** ***Scientific Name*** **Common Name** | **Status** | | **Habitat** | **Potential for Occurrence** |
|---|---|---|---|---|
| | **Federal** | **State** | | |
| **Invertebrates** | | | | |
| *Callophrys mossii bayensis*<br>San Bruno elfin butterfly | FE | – | Coastal, mountainous areas with grassy ground cover, mainly in the vicinity of San Bruno Mountain. Colonies are located on steep, north-facing slopes within the fog belt. Larval host plant is *Sedum spathulifolium.* | No suitable habitat present. Host plant not found during 2010-2011 plant surveys. |
| *Plebejus icarioides missionensis*<br>Mission blue butterfly | FE | – | Inhabits grasslands of the San Francisco Peninsula. Three larval host plants: *Lupinus albifrons, L. variicolor, and L. formosus,* of which *L. albifrons* is favored. | Not likely to occur. Three *L. formosus* plants were found at Millbrae site but had been sprayed with herbicide. The nearest CNDDB record (occurrence 11) is for butterflies observed in 1985 by the San Andreas Lake Dam, approximately 1.9 miles south of the Millbrae site. |
| *Speyeria callippe callippe*<br>Callippe silverspot butterfly | FE | – | Restricted to the Northern Coastal Scrub of the San Francisco Peninsula. Host plant is *Viola pedunculata*. | No suitable habitat present at project sites. Host plant not found during 2010-2011 plant surveys. |
| *Speyeria zerene myrtleae*<br>Myrtle's silverspot | FE | – | Restricted to the foggy, coastal dunes/ hills of the Pt. Reyes Peninsula. | Extirpated from San Mateo County. |
| *Euphydryas editha bayensis*<br>Bay checkerspot butterfly | FT | – | Restricted to native grasslands on outcrops of serpentine soil in the vicinity of San Francisco Bay. | No suitable habitat present. |
| *Danaus plexippus*<br>monarch butterfly | – | S3 | Winter roost sites extend along the coast from northern Mendocino to Baja California, Mexico. Roosts located in wind-protected tree groves (Eucalyptus, Monterey pine, Cypress), with nectar and water sources nearby. | No monarch butterflies were observed roosting in the Eucalyptus grove at the Millbrae project site during the December 2, 2010 survey. |

### Table 2.1
### Special-Status Wildlife Species Potentially Occurring in Study Area (Continued)

| **Wildlife Species** ***Scientific Name*** **Common Name** | **Status** | | **Habitat** | **Potential for Occurrence** |
|---|---|---|---|---|
| | **Federal** | **State** | | |
| **Fish** | | | | |
| *Oncorhynchus mykiss irideus*<br>Central California Coast DPS | FT | – | Requires loose, silt-free, well-oxygenated gravel for spawning. Stream must have either perennial flow or cool intermittent pools. | No suitable habitat present. |
| *Mylopharodon conocephalus*<br>hardhead | – | SC | Low- to mid-elevation streams in the Sacramento-San Joaquin drainage. Also present in Russian River. | No suitable habitat present. |
| *Eucyclogobius newberryi*<br>tidewater goby | FE | SC | Brackish water habitats along the California Coast from Agua Hedionda Lagoon, San Diego County to the mouth of Smith River. | No suitable habitat present. |
| **Amphibians** | | | | |
| *Ambystoma californiense*<br>California tiger salamander | FT | FT | Need underground refuges, especially ground squirrel burrows and vernal pools, or other seasonal water sources for breeding. | No suitable habitat present. |
| *Rana draytonii*<br>California red-legged frog | FT | SC | Lowlands and foothills in or near permanent sources of deep water with dense, shrubby, or emergent riparian vegetation. | Not likely to occur. No suitable breeding habitat present. Suitable dispersal habitat is present in a natural drainage west of the South San Francisco site. |
| **Reptiles** | | | | |
| *Emys marmorata*<br>western pond turtle | – | SC | Thoroughly aquatic–ponds, marshes, rivers, streams, and irrigation ditches, usually with aquatic vegetation. | No suitable habitat present. |
| *Thamnophis sirtalis tetrataenia*<br>San Francisco garter snake | FE | SE | Vicinity of freshwater marshes, ponds, and slow-moving streams in San Mateo County and extreme northern Santa Cruz County | No suitable habitat present. |

### Table 2.1
### Special-Status Wildlife Species Potentially Occurring in Study Area (Continued)

| **Wildlife Species** ***Scientific Name*** **Common Name** | **Status** | | **Habitat** | **Potential for Occurrence** |
|---|---|---|---|---|
| | **Federal** | **State** | | |
| **Birds** | | | | |
| *Phalacrocorax auritus*<br>double-crested cormorant | — | – | Colonial nester on coastal cliffs, offshore islands, and along lake margins in the interior of the state. | No suitable habitat present. |
| *Ardea Herodias*<br>great blue heron | – | – | Colonial nester in tall trees, cliff sides, and sequestered spots on marshes. | No suitable habitat present. |
| *Nycticorax nycticorax*<br>black-crowned night heron | – | – | Colonial nester, usually in trees, occasionally in tule patches adjacent to lake margins, mud-bordered bays, marshy spots. | No suitable habitat present. |
| *Circus cyaneus*<br>northern harrier | – | SC | Coast salt and fresh-water marsh, nest and forage in grasslands, from salt grass in desert sink to mountain cienagas. | No suitable habitat present. |
| *Elanus leucurus*<br>white-tailed kite | – | FP | Rolling foothills and valley margins with scattered oaks and river bottomlands or marshes nest to deciduous woodland. | Suitable nesting habitat present. |
| *Rallus longirostris obsoletus*<br>California clapper rail | FE | SE | Saltwater and brackish marshes traversed by tidal sloughs in the vicinity of San Francisco Bay. | No suitable habitat present. |
| *Laterallus jamaicensis coturniculus*<br>California black rail | – | ST | Inhabits freshwater marshes, wet meadows, and shallow margins of saltwater marshes bordering larger bays. | No suitable habitat present. |
| *Charadrius alexandrinus nivosus*<br>western snowy plover | FT | SC | Sandy beaches, salt pond levees, and shores of large alkali lakes. | No suitable habitat present. |
| *Sternula antillarum browni*<br>California least tern | FE | SE | Nests along the coast on bare or sparsely vegetated substrates: sand beaches, alkali flats, land fills, or paved areas. | No suitable habitat present. |
| *Asio flammeus*<br>short-eared owl | – | SC | Found in swamp lands, both fresh and salt; lowland meadows, irrigated alfalfa fields. | No suitable habitat present. |

## Table 2.1
## Special-Status Wildlife Species Potentially Occurring in Study Area (Continued)

| **Wildlife Species**<br>***Scientific Name***<br>**Common Name** | **Status** | | **Habitat** | **Potential for Occurrence** |
|---|---|---|---|---|
| | **Federal** | **State** | | |
| *Athene cunicularia*<br>burrowing owl | – | SC | Open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably the California ground squirrel. | No suitable habitat present. No suitable burrows observed. |
| *Riparia riparia*<br>bank swallow | – | ST | Colonial nester in riparian and other lowland habitats west of the desert. Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, or ocean to dig nesting holes. | No suitable habitat present. |
| *Geothlypis trichas sinuosa*<br>saltmarsh common yellowthroat | – | SC | Resident of the San Francisco Bay region, in fresh and salt water marshes. | No suitable habitat present. |
| *Melospiza melodia pusillula*<br>Alameda song sparrow | – | SC | Resident of salt marshes bordering the southern arm of San Francisco Bay. | No suitable habitat present. |
| *Melospiza melodia samuelis*<br>San Pablo song sparrow | – | SC | Resident of salt marshes along the north side of San Francisco and San Pablo bays. | No suitable habitat present. |
| **Mammals** | | | | |
| *Sorex vagrans*<br>salt marsh wandering shrew | – | SC | Salt marshes of the southern arm of the San Francisco Bay. | No suitable habitat present. |
| *Lasiurus blossevillii*<br>western red bat | – | SC | Roosts primarily in trees, 2 to 40 feet above ground, from sea level up through mixed conifer forests. Prefers habitat edges and mosaics, with trees that are protected from above and open below, with open areas for foraging. | Suitable habitat present at the Millbrae site. |
| *Corynorhinus townsendii*<br>Townsend’s big-eared bat | – | SC | Throughout California in a wide variety of habitats. Maternity roosts are found in caves, tunnels, mines, and buildings. | No suitable habitat present. |

### Table 2.1
### Special-Status Wildlife Species Potentially Occurring in Study Area (Continued)

| **Wildlife Species** ***Scientific Name*** **Common Name** | **Status** | | **Habitat** | **Potential for Occurrence** |
|---|---|---|---|---|
| | **Federal** | **State** | | |
| *Antrozous pallidus*<br>Pallid bat | – | SC | Deserts, grasslands, shrub lands, woodlands, and forests. Most common in open, dry habitats. | Suitable habitat present in the form of hollow trees in woodlands at the Millbrae site. |
| *Nyctinomops macrotis*<br>big free-tailed bat | – | SC | Low-lying arid areas in Southern California. | No suitable habitat present. |
| *Enhydra lutris nereis*<br>southern sea otter | FT | – | Nearshore marine environments from about Año Nuevo, San Mateo County to Point Sal, Santa Barbara County. | No suitable habitat present. |
| *Taxidea taxus*<br>American badger | – | SC | Most abundant in drier open stages of most shrub, forest, and herbaceous habitats with friable soils. | No suitable habitat present. |
| *Reithrodontomys raviventris*<br>salt-marsh harvest mouse | FE | SE | Occurs only in the saline emergent wetlands of San Francisco Bay and its tributaries. | No suitable habitat present. |
| *Neotoma fuscipes annectens*<br>San Francisco dusky-footed woodrat | — | SC | Forest habitats of moderate canopy and moderate to dense understory. | Suitable habitat present at the South San Francisco and Millbrae sites. |
| *Zapus trinotatus orarius*<br>Point Reyes jumping mouse | – | SC | Primarily bunchgrass marshes on the uplands of Point Reyes. Also present in coastal scrub, grassland, and meadows. | No suitable habitat present. |

**Status Key:**
**Federal Status:**
FE = Listed as endangered under FESA
FT = Listed as threatened under FESA
–**State Status:**
SE = Listed as endangered under CESA
ST = Listed as threatened under CESA
SC = Species of special concern under CESA
FP = Fully Protected under CESA
**Notes:**
CESA = California Endangered Species Act
FESA = Federal Endangered Species Act

# Appendix F
# Biological Resources

## *Table 2.2*
## *Wildlife Species Observed in Study Area*

## Table 2.2
## Wildlife Species Observed in Study Area

| **Birds** | |
|---|---|
| **Scientific Name** | **Common Name** |
| *Cathartes aura* | turkey vulture |
| *Buteo jamaicensis* | red-tailed hawk |
| *Colaptes auratus* | northern flicker |
| *Sayornis nigricans* | black phoebe |
| *Petrochelidon pyrrhonota* | cliff swallow |
| *Aphelocoma coerulescens* | western scrub-jay |
| *Corvus brachyrhynchos* | American crow |
| *Corvus corax* | common raven |
| *Baeolophus inornatus* | oak titmouse |
| *Psaltriparus minimus* | bushtit |
| *Sitta carolinensis* | white-breasted nuthatch |
| *Thryomanes bewickii* | Bewick’s wren |
| *Mimus polyglottos* | northern mockingbird |
| *Sturnus vulgaris* | European starling |
| *Pipilo maculates* | spotted towhee |
| *Pipilo crissalis* | California towhee |
| *Euphagus cyanocephalus* | Brewer’s blackbird |
| *Carpodacus mexicanus* | house finch |
| **Other Mammals** | |
| *Sciurus niger* | fox squirrel |
| *Vulpes vulpes* | red fox |
| *Thomomys bottae* | Botta’s pocket gopher |
| *Microtus californicus* | California meadow vole |
| Note: No special-status species were observed during the survey. | |

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# Appendix G

# Historical Site Data - Sanborn Map Reports, Historical Map Reports, and Aerial Photographs

**Colma Project Site**
Serramonte Blvd and El Camino Real
Daly City, CA 94014

Inquiry Number: 3190911.16
October 24, 2011

# The EDR Aerial Photo Decade Package

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

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## Date EDR Searched Historical Sources:

Aerial Photography October 24, 2011

## Target Property:

Serramonte Blvd and El Camino Real
Daly City, CA 94014

| ***Year*** | ***Scale*** | ***Details*** | ***Source*** |
|---|---|---|---|
| 1943 | Aerial Photograph. Scale: 1"=555' | Flight Year: 1943 | Aero |
| 1956 | Aerial Photograph. Scale: 1"=655' | Flight Year: 1956 | Clyde Sunderland |
| 1965 | Aerial Photograph. Scale: 1"=333' | Flight Year: 1965 | Cartwright |
| 1977 | Aerial Photograph. Scale: 1"=601' | Flight Year: 1977 | NASA |
| 1982 | Aerial Photograph. Scale: 1"=690' | Flight Year: 1982 | USGS |
| 1993 | Aerial Photograph. Scale: 1"=500' | /Composite DOQQ - acquisition dates: 1993 | EDR |
| 1998 | Aerial Photograph. Scale: 1"=666' | Flight Year: 1998 | USGS |
| 2005 | Aerial Photograph. Scale: 1"=500' | Flight Year: 2005 | EDR |
| 2006 | Aerial Photograph. Scale: 1"=500' | Flight Year: 2006 | EDR |

**INQUIRY #:** 3190911.16

**YEAR:** 1943

= 555'

**INQUIRY #:** 3190911.16

**YEAR:** 1956

= 655'

INQUIRY #: 3190911.16

YEAR: 1965

**INQUIRY #:** 3190911.16

**YEAR:** 1977

= 601'

INQUIRY #: 3190911.16

YEAR: 1982

= 690'

**INQUIRY #:** 3190911.16

**YEAR:** 1993

= 500'

**INQUIRY #:** 3190911.16

**YEAR:** 1998

= 666'

**INQUIRY #:** 3190911.16

**YEAR:** 2005

= 500'

**INQUIRY #:** 3190911.16

**YEAR:** 2006

= 500'

**Colma Project Site**
Serramonte Blvd and El Camino Real
Daly City, CA 94014

Inquiry Number: 3190911.15
October 20, 2011

# EDR Historical Topographic Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

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# Historical Topographic Map

**N**

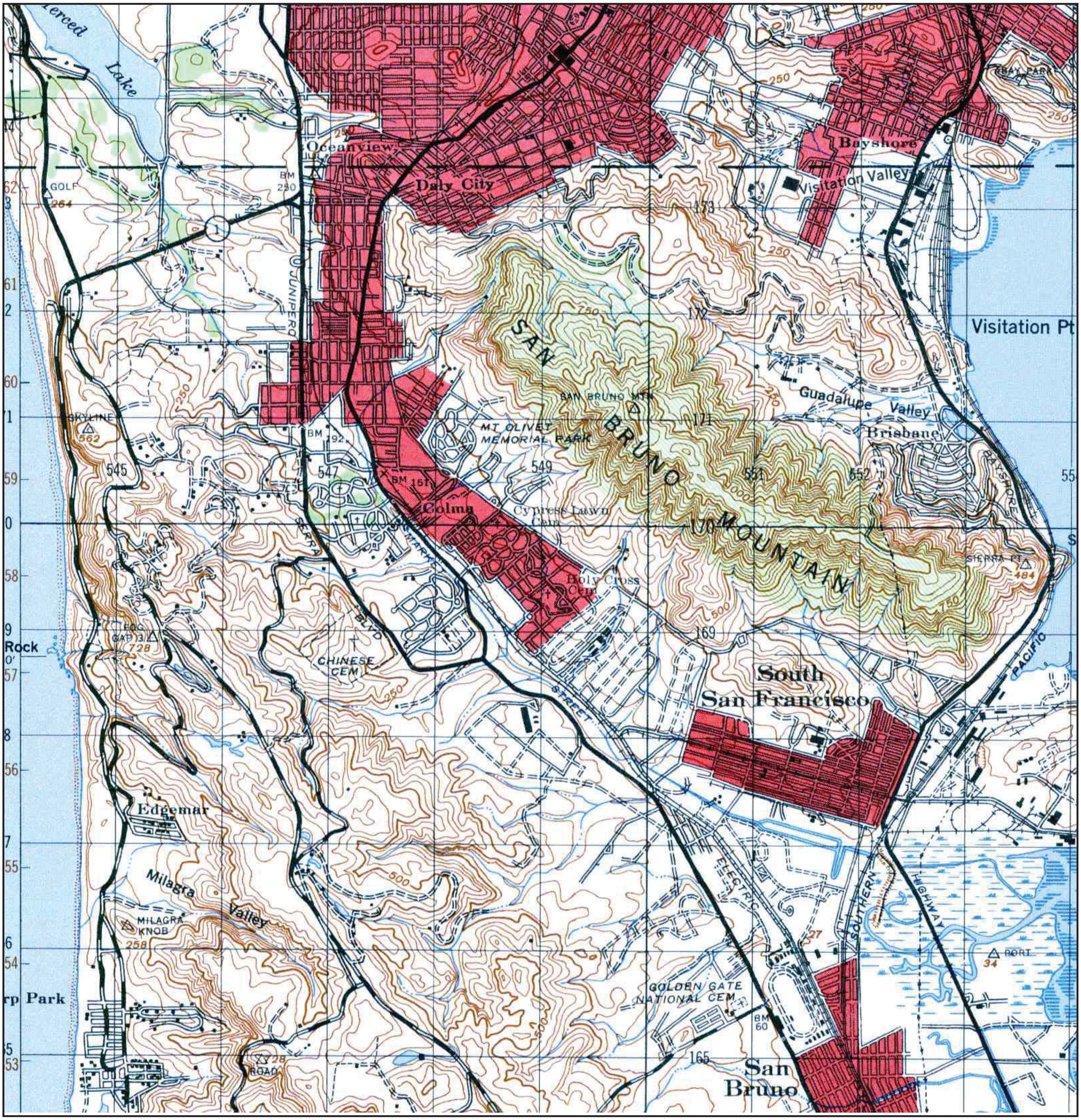
TARGET QUAD
NAME: SAN MATEO
MAP YEAR: 1899

SERIES: 15
SCALE: 1:62500

SITE NAME: Colma Project Site
ADDRESS: Serramonte Blvd and El Camino Real
Daly City, CA 94014
LAT/LONG: 37.6745 / -122.4593

CLIENT: AEW Engineering , Inc.
CONTACT: Lindsay Furuyama
INQUIRY#: 3190911.15
RESEARCH DATE: 10/20/2011

# Historical Topographic Map



N

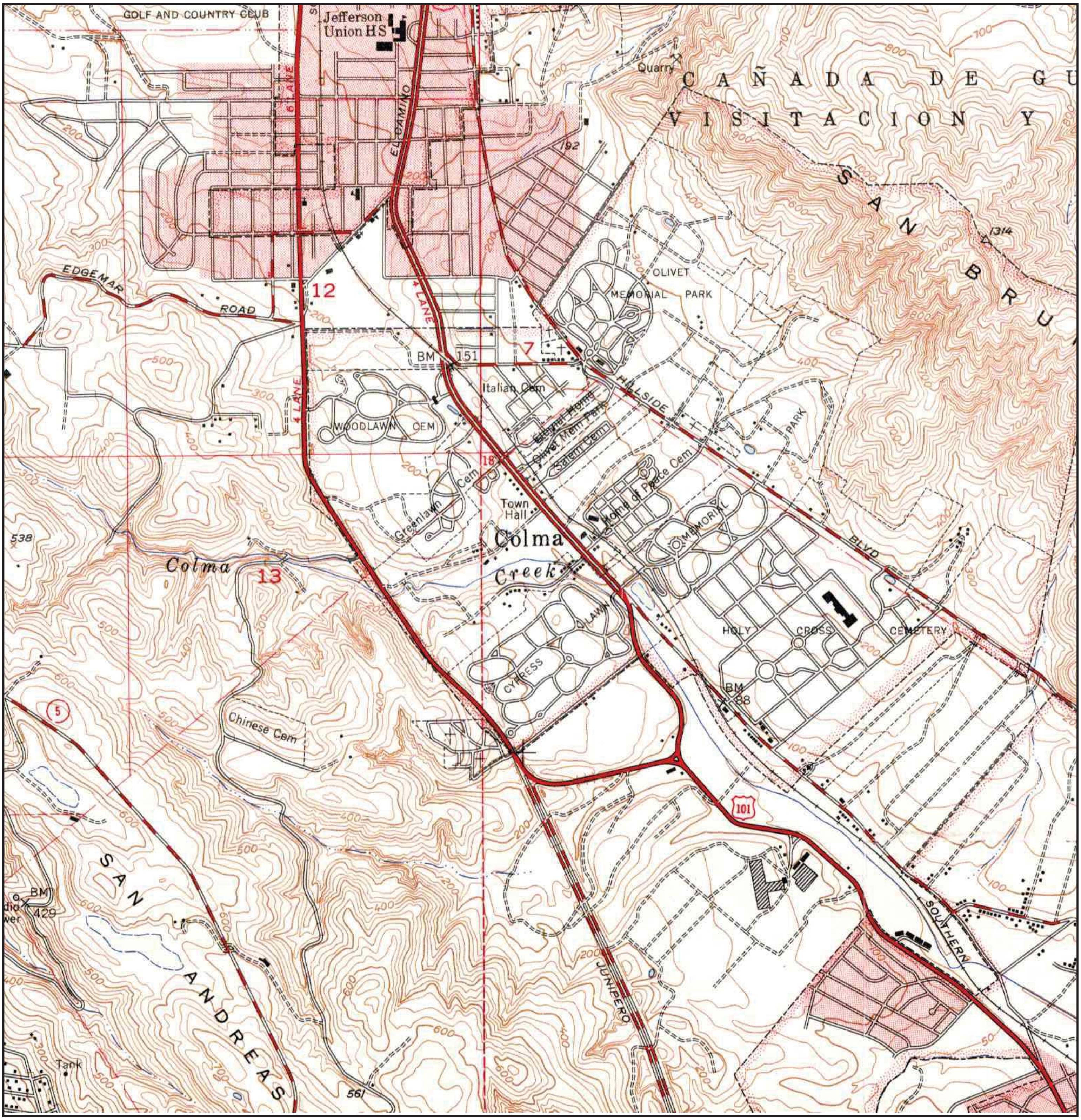
TARGET QUAD
NAME: SAN MATEO
MAP YEAR: 1947

SERIES: 15
SCALE: 1:50000

SITE NAME: Colma Project Site
ADDRESS: Serramonte Blvd and El Camino Real
Daly City, CA 94014
LAT/LONG: 37.6745 / -122.4593

CLIENT: AEW Engineering , Inc.
CONTACT: Lindsay Furuyama
INQUIRY#: 3190911.15
RESEARCH DATE: 10/20/2011

# Historical Topographic Map



N

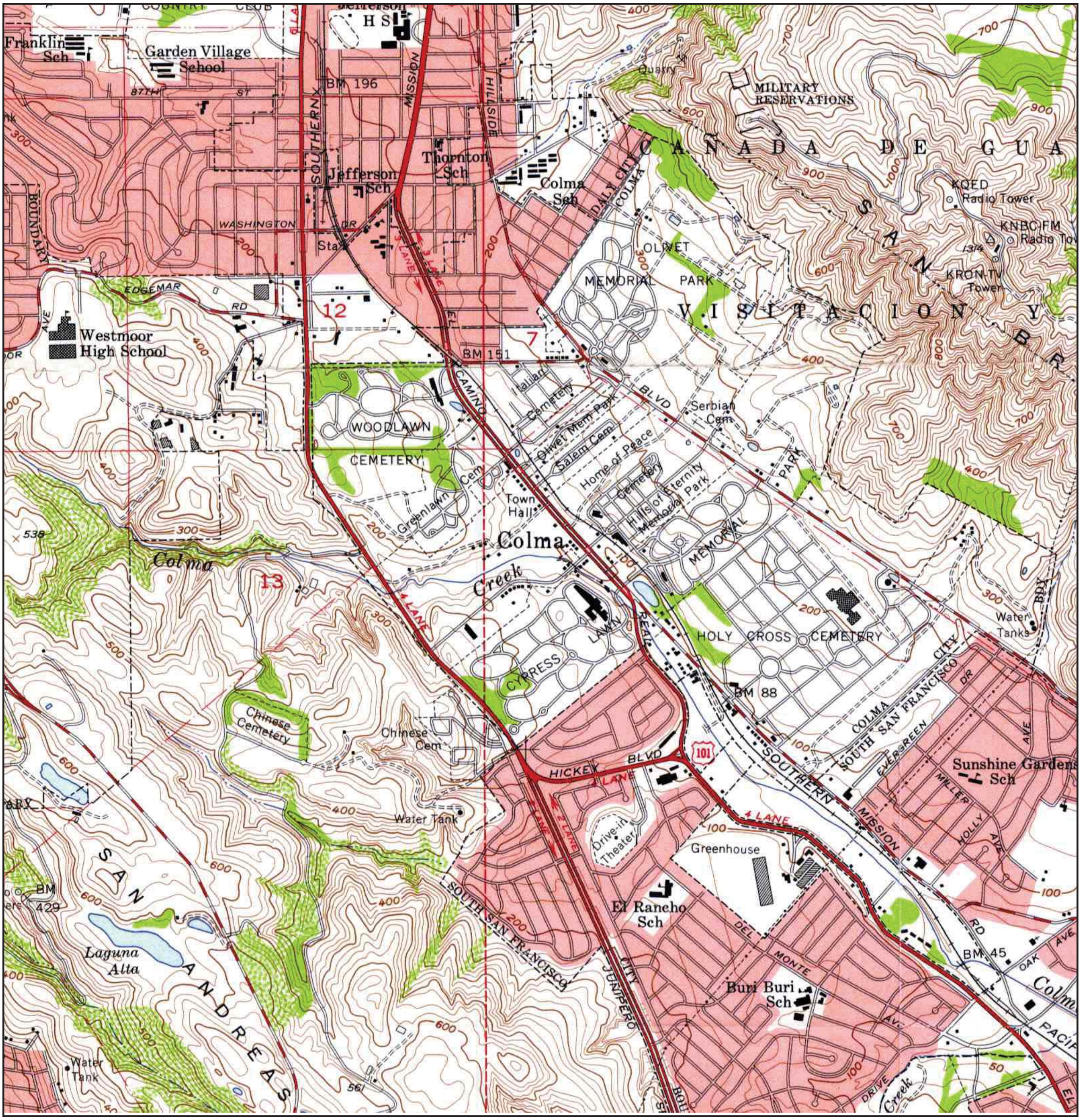
TARGET QUAD
NAME: SAN FRANCISCO SOUTH
MAP YEAR: 1950

SERIES: 7.5
SCALE: 1:24000

SITE NAME: Colma Project Site
ADDRESS: Serramonte Blvd and El Camino Real
Daly City, CA 94014
LAT/LONG: 37.6745 / -122.4593

CLIENT: AEW Engineering , Inc.
CONTACT: Lindsay Furuyama
INQUIRY#: 3190911.15
RESEARCH DATE: 10/20/2011

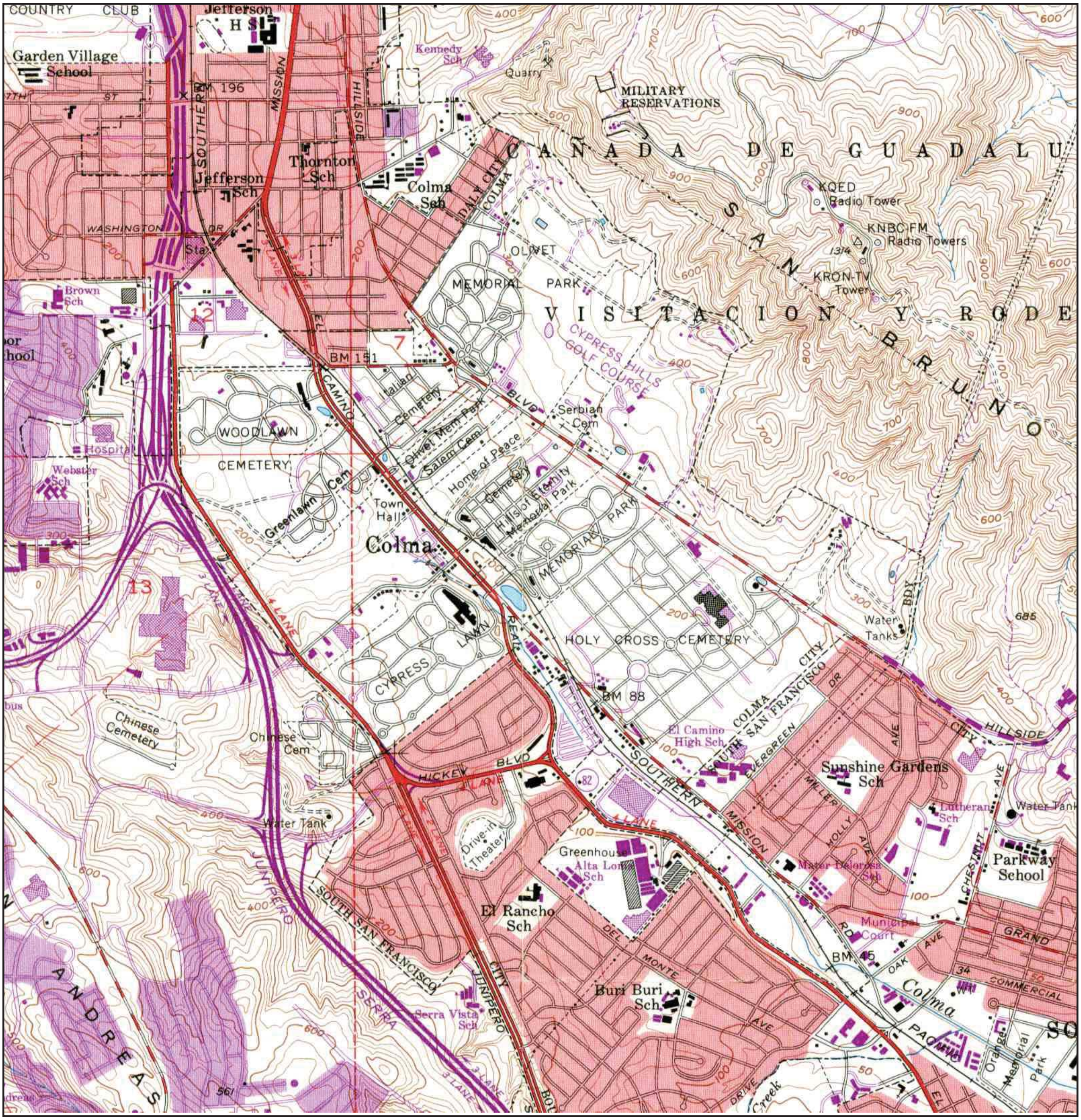
# Historical Topographic Map



N

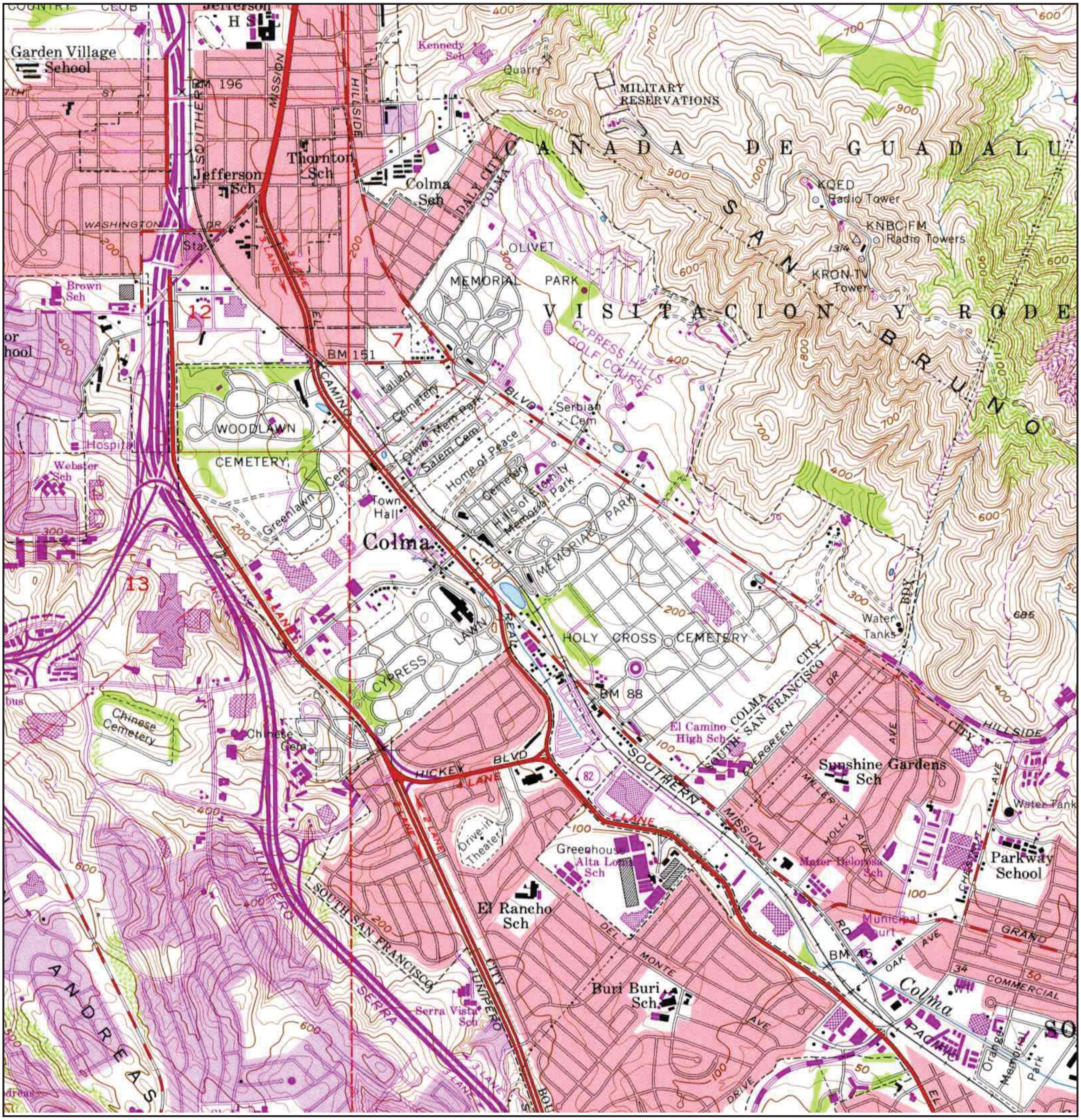
| | | |
|---|---|---|
| TARGET QUAD<br>NAME: SAN FRANCISCO SOUTH<br>MAP YEAR: 1956<br>SERIES: 7.5<br>SCALE: 1:24000 | SITE NAME: Colma Project Site<br>ADDRESS: Serramonte Blvd and El Camino Real<br>Daly City, CA 94014<br>LAT/LONG: 37.6745 / -122.4593 | CLIENT: AEW Engineering , Inc.<br>CONTACT: Lindsay Furuyama<br>INQUIRY#: 3190911.15<br>RESEARCH DATE: 10/20/2011 |

# Historical Topographic Map



|  |  |  |  |
|---|---|---|---|
| N | TARGET QUAD<br>NAME: SAN FRANCISCO SOUTH<br>MAP YEAR: 1968<br>PHOTOREVISED:1956<br>SERIES: 7.5<br>SCALE: 1:24000 | SITE NAME: Colma Project Site<br>ADDRESS: Serramonte Blvd and El Camino Real<br>Daly City, CA 94014<br>LAT/LONG: 37.6745 / -122.4593 | CLIENT: AEW Engineering , Inc.<br>CONTACT: Lindsay Furuyama<br>INQUIRY#: 3190911.15<br>RESEARCH DATE: 10/20/2011 |

# Historical Topographic Map



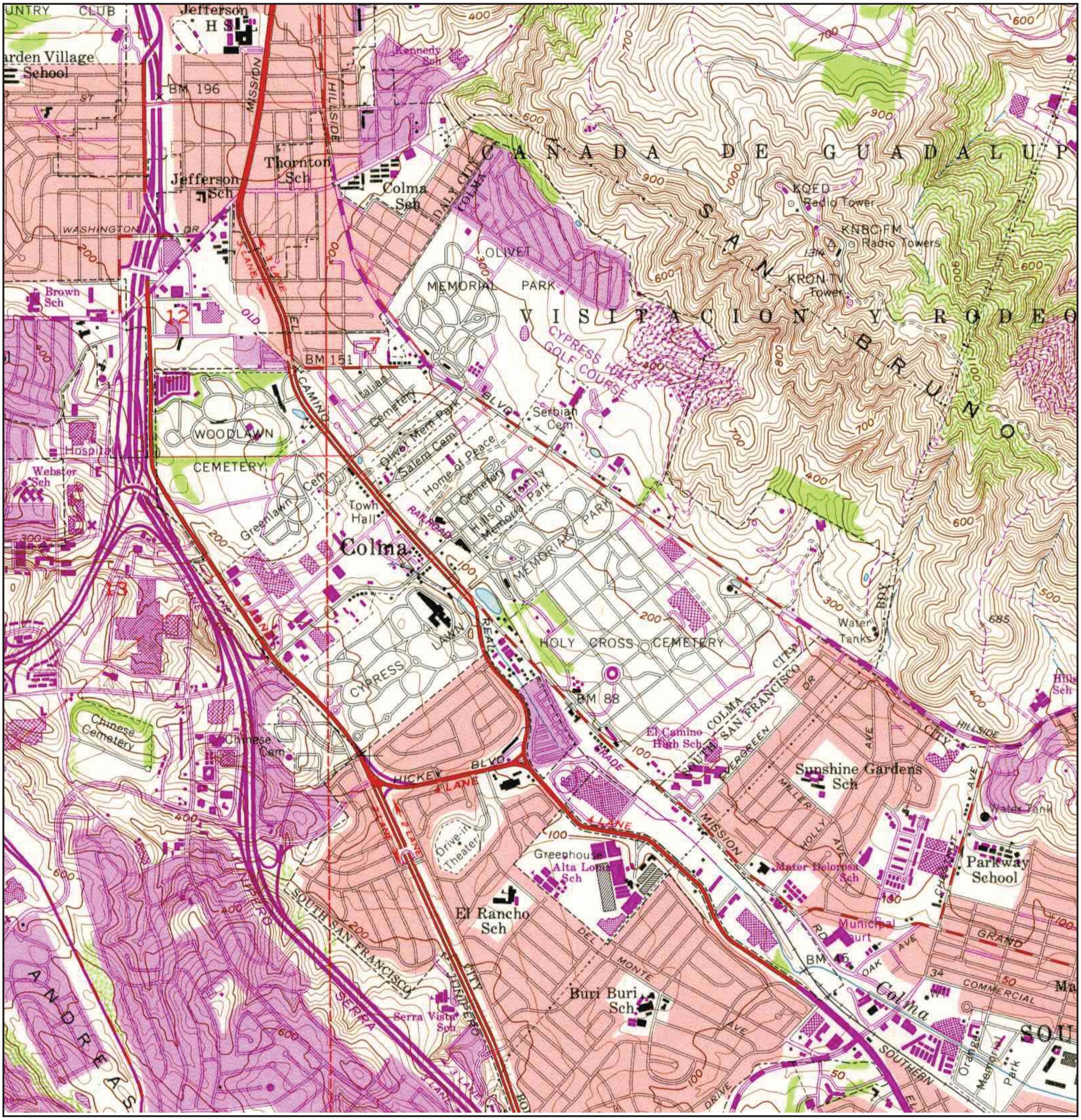
N

TARGET QUAD
NAME: SAN FRANCISCO SOUTH
MAP YEAR: 1973
PHOTOREVISED:1956
SERIES: 7.5
SCALE: 1:24000

SITE NAME: Colma Project Site
ADDRESS: Serramonte Blvd and El Camino Real
Daly City, CA 94014
LAT/LONG: 37.6745 / -122.4593

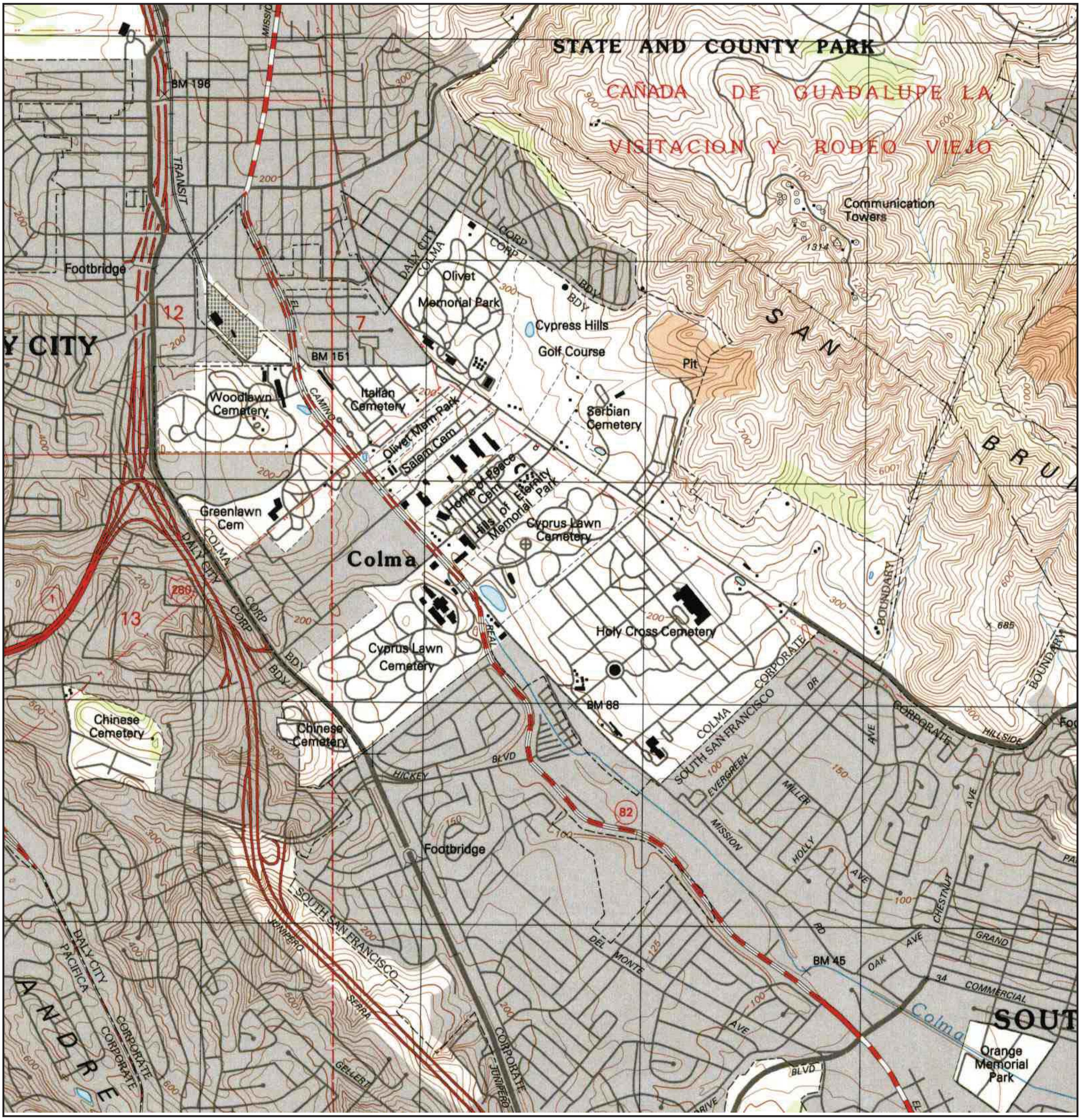
CLIENT: AEW Engineering , Inc.
CONTACT: Lindsay Furuyama
INQUIRY#: 3190911.15
RESEARCH DATE: 10/20/2011

# Historical Topographic Map



| | | | | | |
|---|---|---|---|---|---|
| N | TARGET QUAD<br>NAME: SAN FRANCISCO SOUTH<br>MAP YEAR: 1980<br>PHOTOREVISED:1956<br>SERIES: 7.5<br>SCALE: 1:24000 | SITE NAME: | Colma Project Site | CLIENT: | AEW Engineering , Inc. |
| | | ADDRESS: | Serramonte Blvd and El Camino Real<br>Daly City, CA 94014 | CONTACT: | Lindsay Furuyama |
| | | LAT/LONG: | 37.6745 / -122.4593 | INQUIRY#: | 3190911.15 |
| | | | | RESEARCH DATE: | 10/20/2011 |

# Historical Topographic Map



N

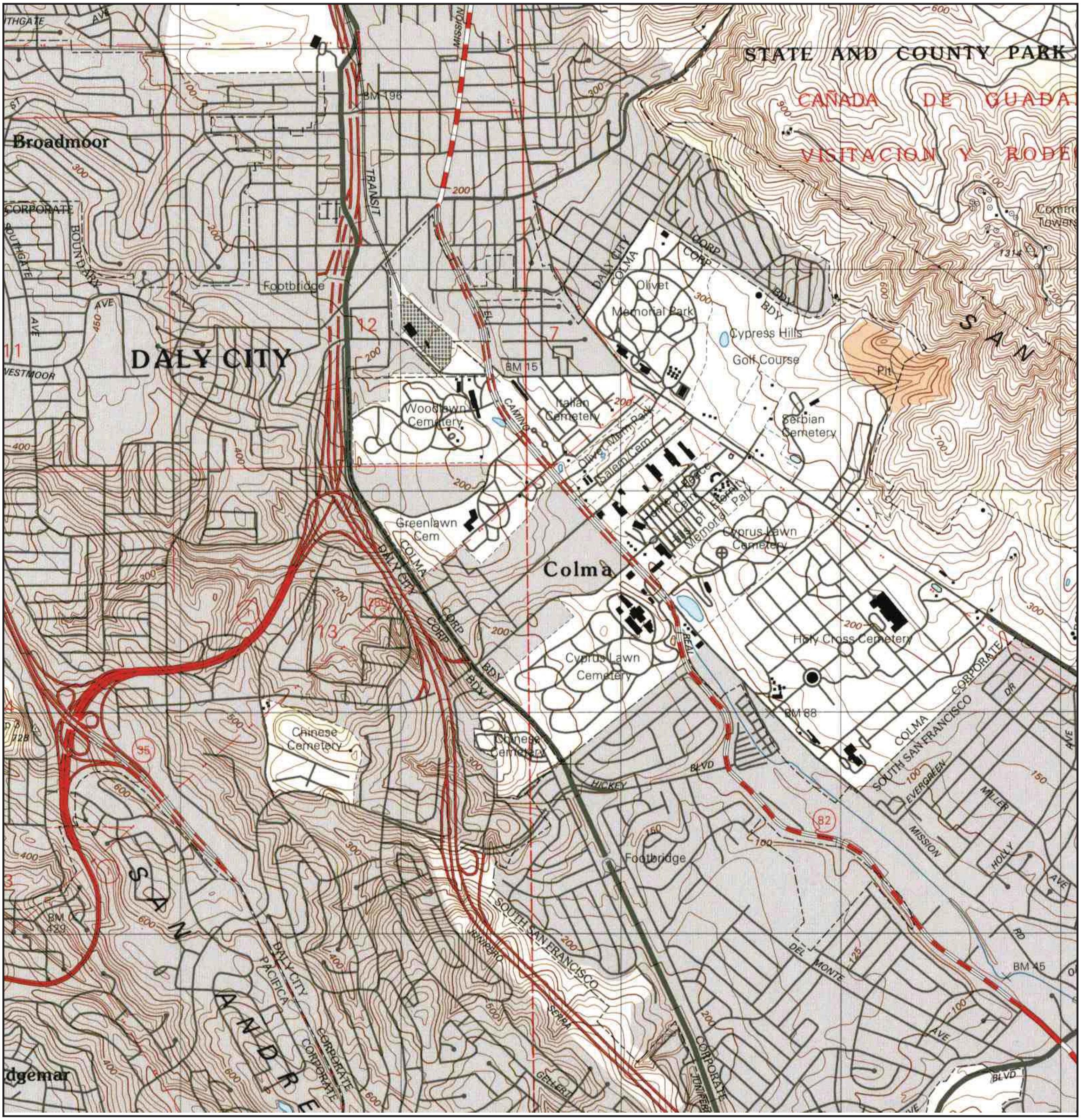
TARGET QUAD
NAME: SAN FRANCISCO SOUTH
MAP YEAR: 1993

SERIES: 7.5
SCALE: 1:24000

SITE NAME: Colma Project Site
ADDRESS: Serramonte Blvd and El Camino Real
Daly City, CA 94014
LAT/LONG: 37.6745 / -122.4593

CLIENT: AEW Engineering , Inc.
CONTACT: Lindsay Furuyama
INQUIRY#: 3190911.15
RESEARCH DATE: 10/20/2011

# Historical Topographic Map



N

TARGET QUAD
NAME: SAN FRANCISCO SOUTH
MAP YEAR: 1995

SERIES: 7.5
SCALE: 1:24000

SITE NAME: Colma Project Site
ADDRESS: Serramonte Blvd and El Camino Real
Daly City, CA 94014
LAT/LONG: 37.6745 / -122.4593

CLIENT: AEW Engineering , Inc.
CONTACT: Lindsay Furuyama
INQUIRY#: 3190911.15
RESEARCH DATE: 10/20/2011

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**Colma Project Site**
Serramonte Blvd and El Camino Real
Daly City, CA 94014

Inquiry Number: 3190911.14
October 20, 2011

# Certified Sanborn® Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

# Certified Sanborn® Map Report

10/20/11

**Site Name:**
Colma Project Site
Serramonte Blvd and El
Daly City, CA 94014

EDR Inquiry # 3190911.14

**Client Name:**
AEW Engineering , Inc.
55 New Montgomery Street
San Francisco, CA 94105

Contact: Lindsay Furuyama

EDR® Environmental Data Resources Inc

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## *Certified Sanborn Results:*

| | |
|---|---|
| **Site Name:** | Colma Project Site |
| **Address:** | Serramonte Blvd and El Camino Real |
| **City, State, Zip:** | Daly City, CA 94014 |
| **Cross Street:** | |
| **P.O. #** | 2010-024 |
| **Project:** | URS Peninsula Pipeline |
| **Certification #** | B290-4582-8171 |

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Sanborn® Library search results
Certification # B290-4582-8171

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☑ University Publications of America
☑ EDR Private Collection

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**South San Francisco Project Site**
Westborough Blvd and Orange Ave
South San Francisco, CA 94080

Inquiry Number: 3190911.5
October 24, 2011

# The EDR Aerial Photo Decade Package

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

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## Date EDR Searched Historical Sources:

Aerial Photography October 24, 2011

## Target Property:

Westborough Blvd and Orange Ave
South San Francisco, CA 94080

| ***Year*** | ***Scale*** | ***Details*** | ***Source*** |
|---|---|---|---|
| 1943 | Aerial Photograph. Scale: 1"=555' | Flight Year: 1943 | Aero |
| 1956 | Aerial Photograph. Scale: 1"=655' | Flight Year: 1956 | Clyde Sunderland |
| 1965 | Aerial Photograph. Scale: 1"=333' | Flight Year: 1965 | Cartwright |
| 1973 | Aerial Photograph. Scale: 1"=601' | Flight Year: 1973<br>Best Copy Available from original source | NASA |
| 1982 | Aerial Photograph. Scale: 1"=690' | Flight Year: 1982 | USGS |
| 1993 | Aerial Photograph. Scale: 1"=500' | /Composite DOQQ - acquisition dates: 1993 | EDR |
| 1998 | Aerial Photograph. Scale: 1"=666' | Flight Year: 1998 | USGS |
| 2005 | Aerial Photograph. Scale: 1"=500' | Flight Year: 2005 | EDR |
| 2006 | Aerial Photograph. Scale: 1"=500' | Flight Year: 2006 | EDR |

**INQUIRY #:** 3190911.5

**YEAR:** 1943

= 555'

**INQUIRY #:** 3190911.5

**YEAR:** 1956

= 655'

**INQUIRY #:** 3190911.5

**YEAR:** 1965

= 333'

**INQUIRY #:** 3190911.5

**YEAR:** 1973

= 601'

N

EDR Environmental Data Resources Inc

**INQUIRY #:** 3190911.5

**YEAR:** 1982

= 690'

**INQUIRY #:** 3190911.5

**YEAR:** 1993

= 500'

N

EDR Environmental Data Resources Inc

**INQUIRY #:** 3190911.5

**YEAR:** 1998

= 666'

**INQUIRY #:** 3190911.5

**YEAR:** 2005

= 500'

N

EDR® Environmental Data Resources Inc

**INQUIRY #:** 3190911.5

**YEAR:** 2006

= 500'

**South San Francisco Project Site**
Westborough Blvd and Orange Ave
South San Francisco, CA 94080

Inquiry Number: 3190911.4
October 20, 2011

# EDR Historical Topographic Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

# EDR Historical Topographic Map Report

Environmental Data Resources, Inc.s (EDR) Historical Topographic Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topographic Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the early 1900s.

***Thank you for your business.***
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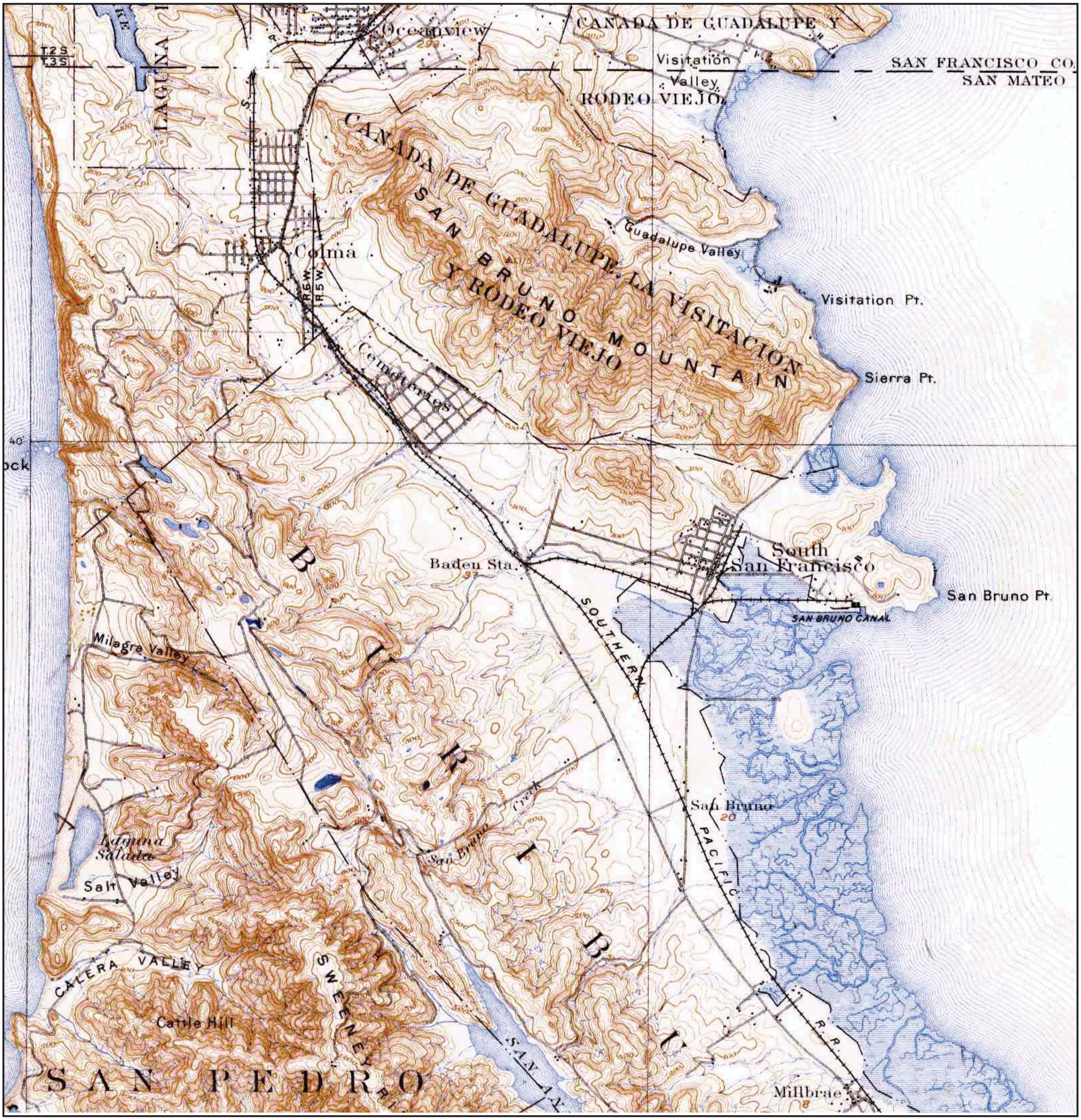
# Historical Topographic Map



N

TARGET QUAD
NAME: SAN MATEO
MAP YEAR: 1899

SERIES: 15
SCALE: 1:62500

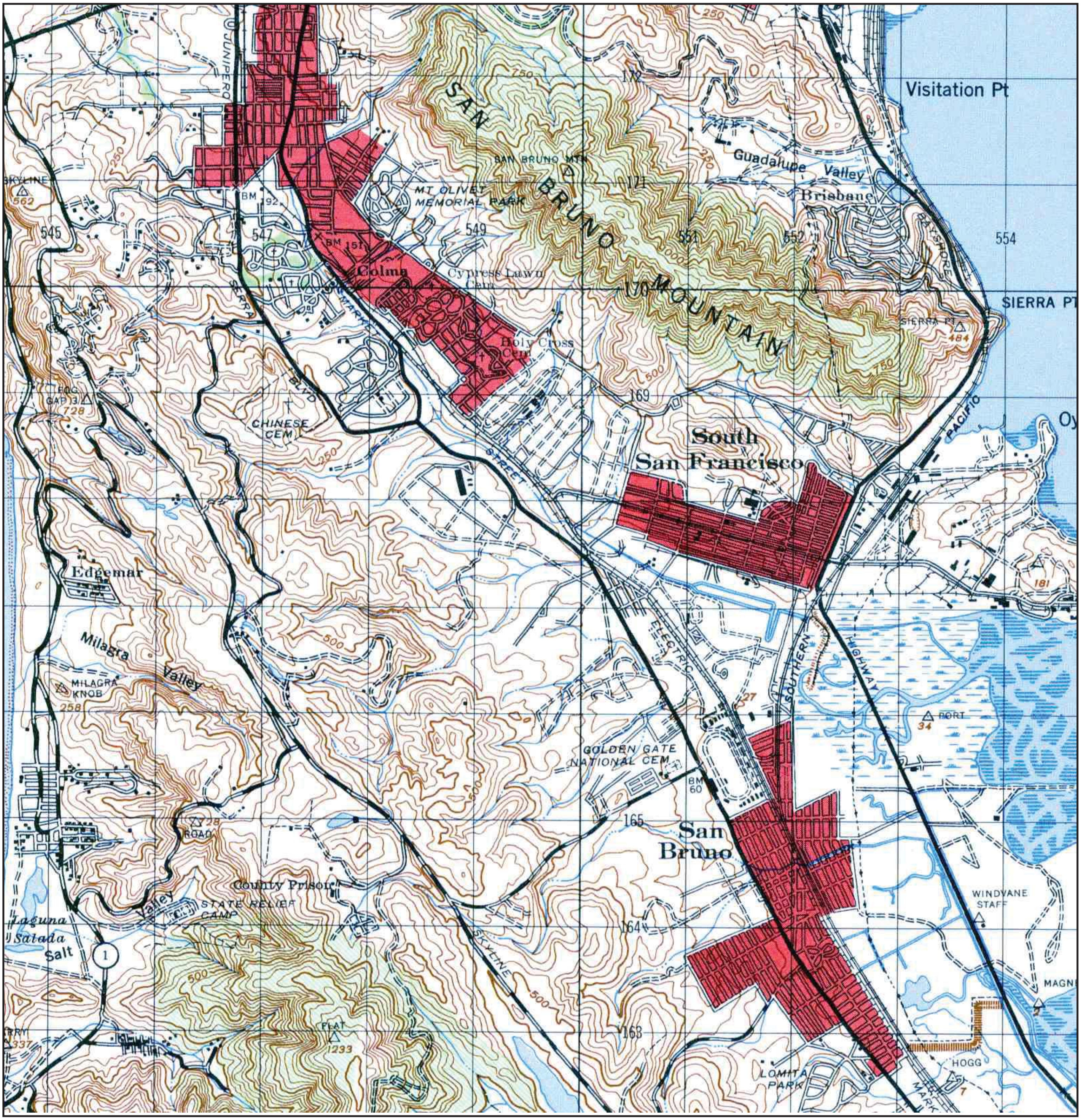
SITE NAME: South San Francisco Project Site

ADDRESS: Westborough Blvd and Orange Ave

South San Francisco, CA
LAT/LONG: 37.6544 / -122.4374

CLIENT: AEW Engineering , Inc.
CONTACT: Lindsay Furuyama
INQUIRY#: 3190911.4
RESEARCH DATE: 10/20/2011

# Historical Topographic Map



N

TARGET QUAD
NAME: SAN MATEO
MAP YEAR: 1947

SERIES: 15
SCALE: 1:50000

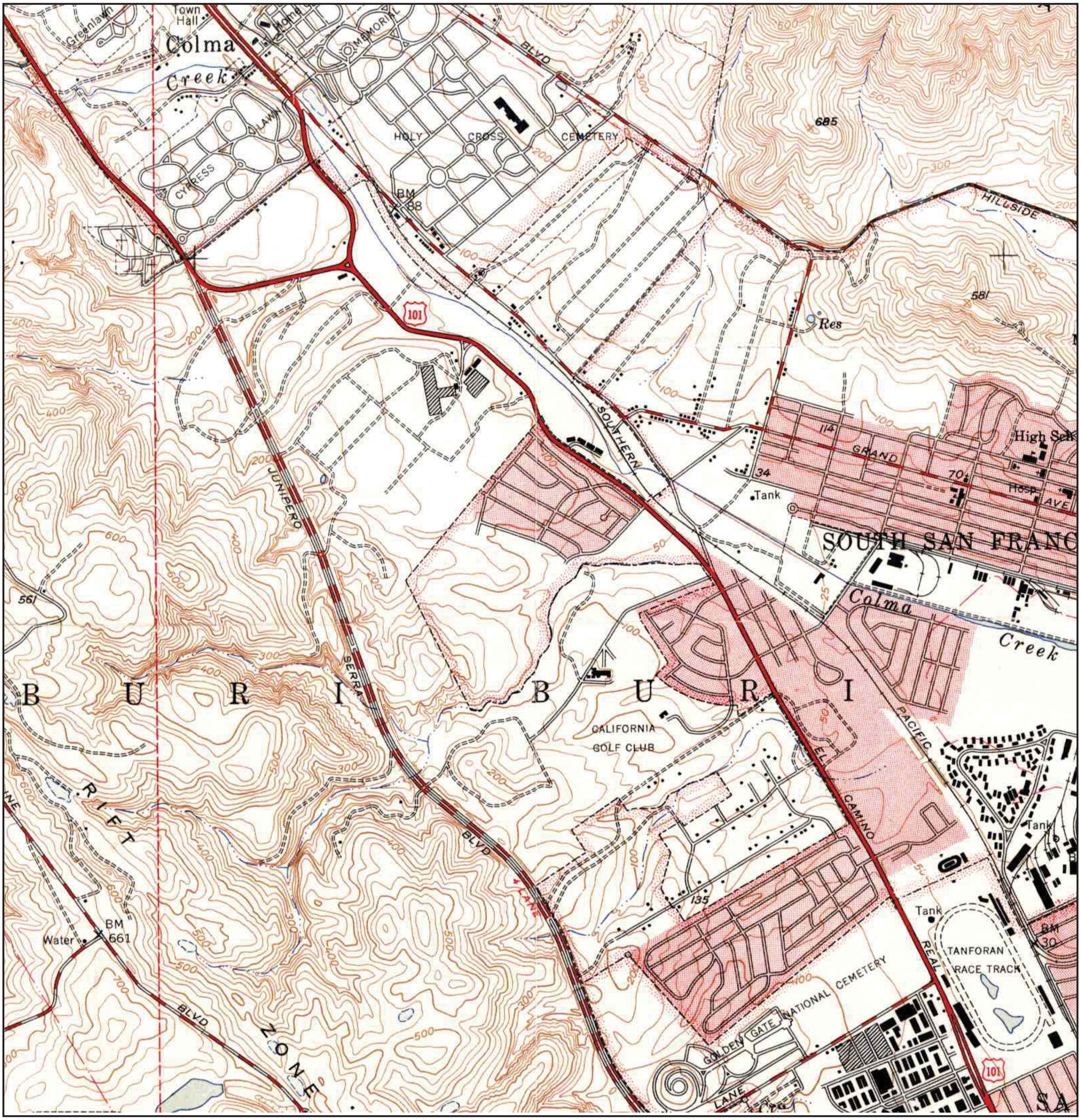
SITE NAME: South San Francisco Project Site

ADDRESS: Westborough Blvd and Orange Ave

South San Francisco, CA
LAT/LONG: 37.6544 / -122.4374

CLIENT: AEW Engineering , Inc.
CONTACT: Lindsay Furuyama
INQUIRY#: 3190911.4
RESEARCH DATE: 10/20/2011

# Historical Topographic Map



N

TARGET QUAD
NAME: SAN FRANCISCO SOUTH
MAP YEAR: 1950

SERIES: 7.5
SCALE: 1:24000

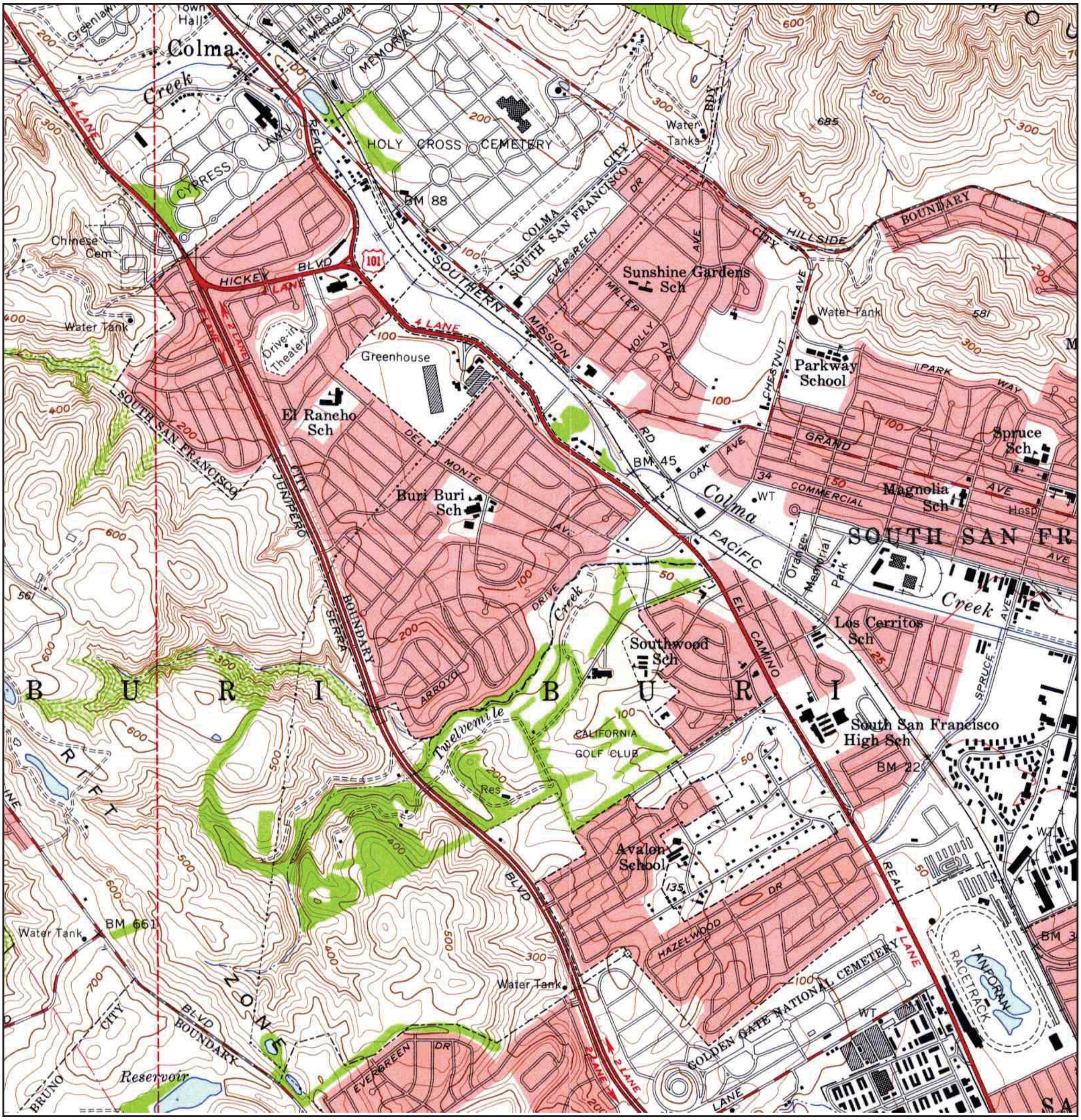
SITE NAME: South San Francisco Project Site

ADDRESS: Westborough Blvd and Orange Ave

South San Francisco, CA
LAT/LONG: 37.6544 / -122.4374

CLIENT: AEW Engineering , Inc.
CONTACT: Lindsay Furuyama
INQUIRY#: 3190911.4
RESEARCH DATE: 10/20/2011

# Historical Topographic Map



| N | | | | | |
|---|---|---|---|---|---|
| | TARGET QUAD | | SITE NAME: South South San Francisco Project Site | CLIENT: | AEW Engineering , Inc. |

TARGET QUAD
NAME: SAN FRANCISCO SOUTH
MAP YEAR: 1956

SERIES: 7.5
SCALE: 1:24000

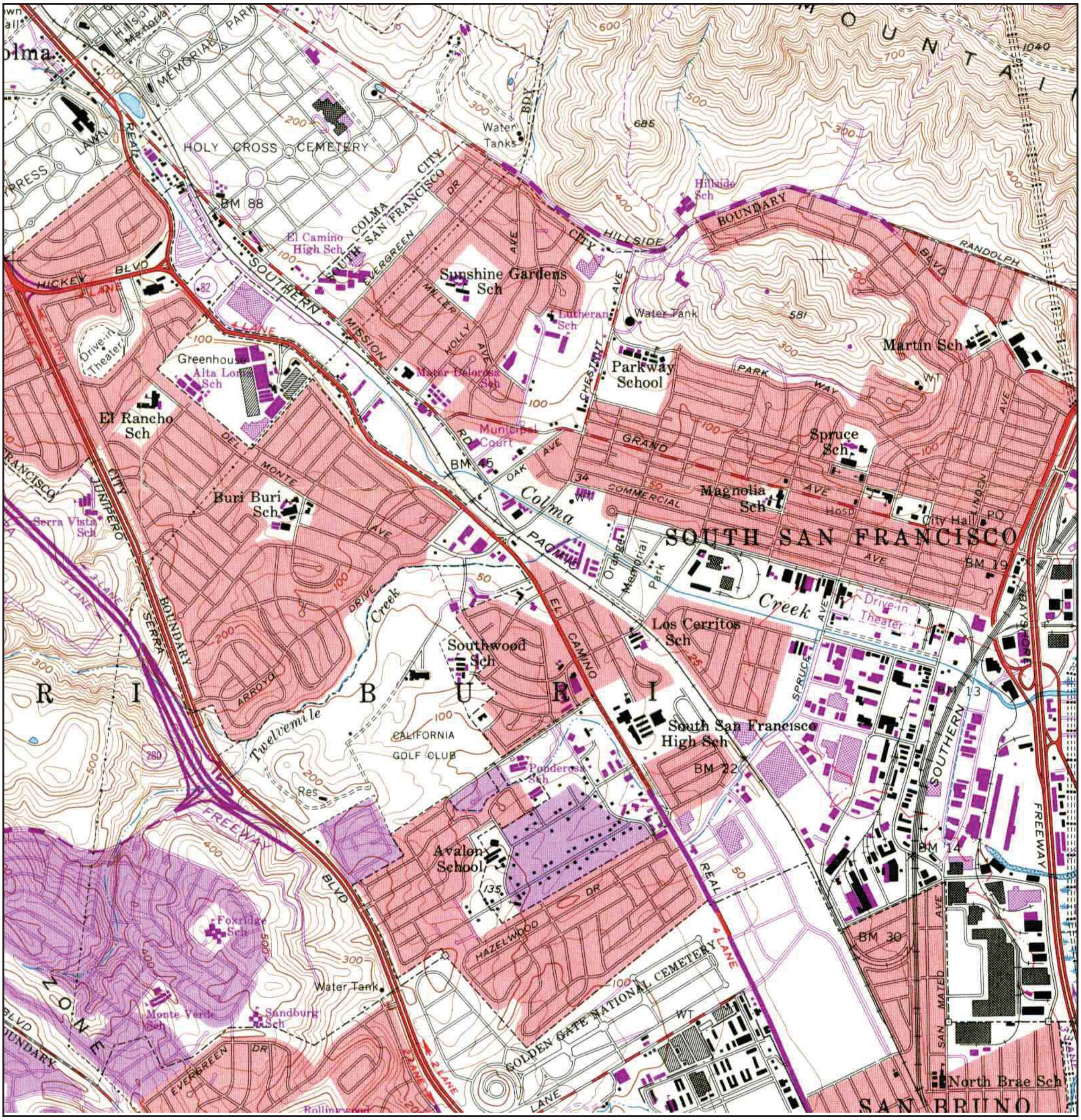
SITE NAME: South San Francisco Project Site

ADDRESS: Westborough Blvd and Orange Ave

South San Francisco, CA
LAT/LONG: 37.6544 / -122.4374

CLIENT: AEW Engineering , Inc.
CONTACT: Lindsay Furuyama
INQUIRY#: 3190911.4
RESEARCH DATE: 10/20/2011

# Historical Topographic Map



N

TARGET QUAD
NAME: SAN FRANCISCO SOUTH
MAP YEAR: 1968
PHOTOREVISED:1956
SERIES: 7.5
SCALE: 1:24000

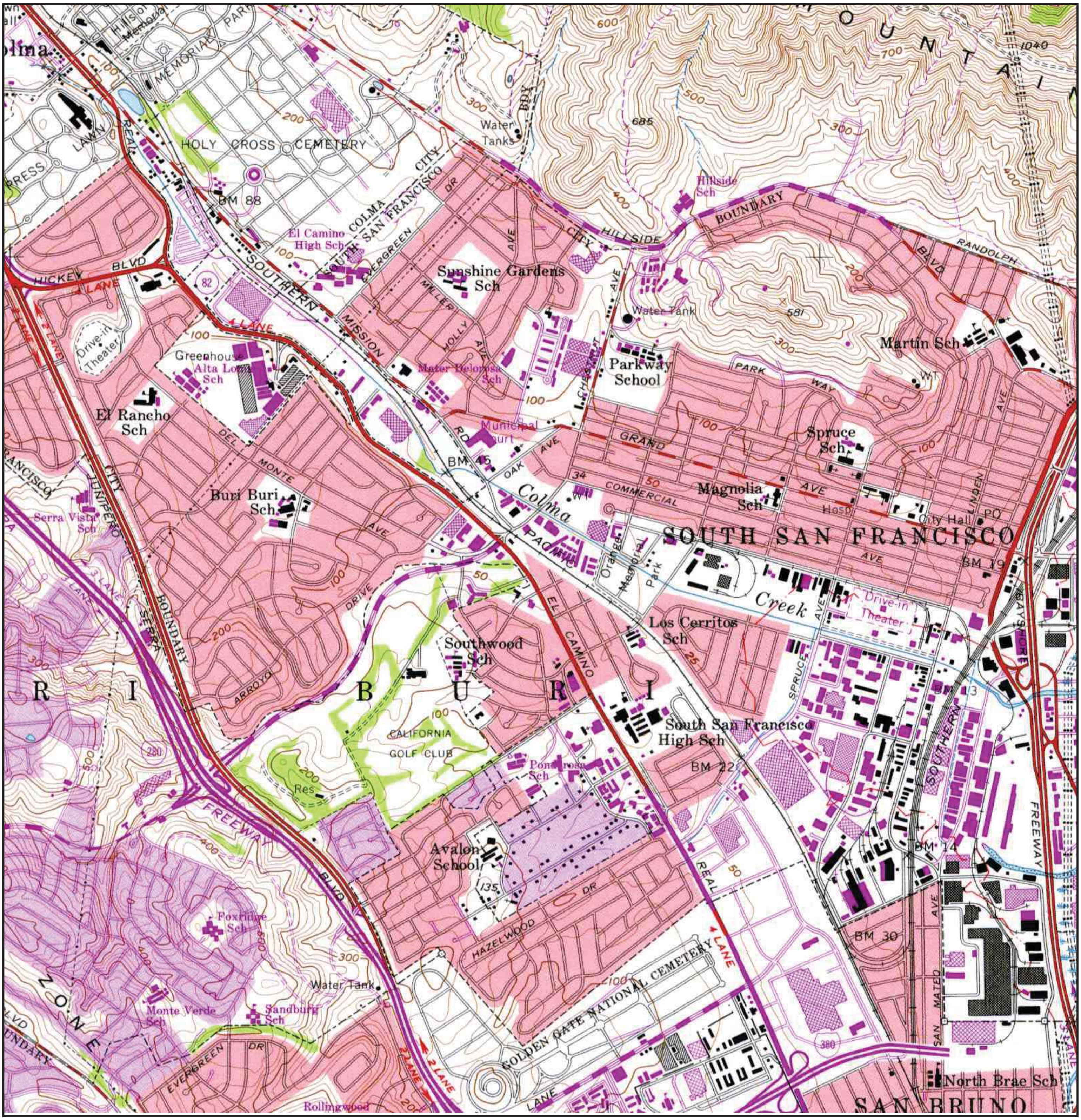
SITE NAME: South San Francisco Project Site

ADDRESS: Westborough Blvd and Orange Ave

South San Francisco, CA
LAT/LONG: 37.6544 / -122.4374

CLIENT: AEW Engineering , Inc.
CONTACT: Lindsay Furuyama
INQUIRY#: 3190911.4
RESEARCH DATE: 10/20/2011

# Historical Topographic Map



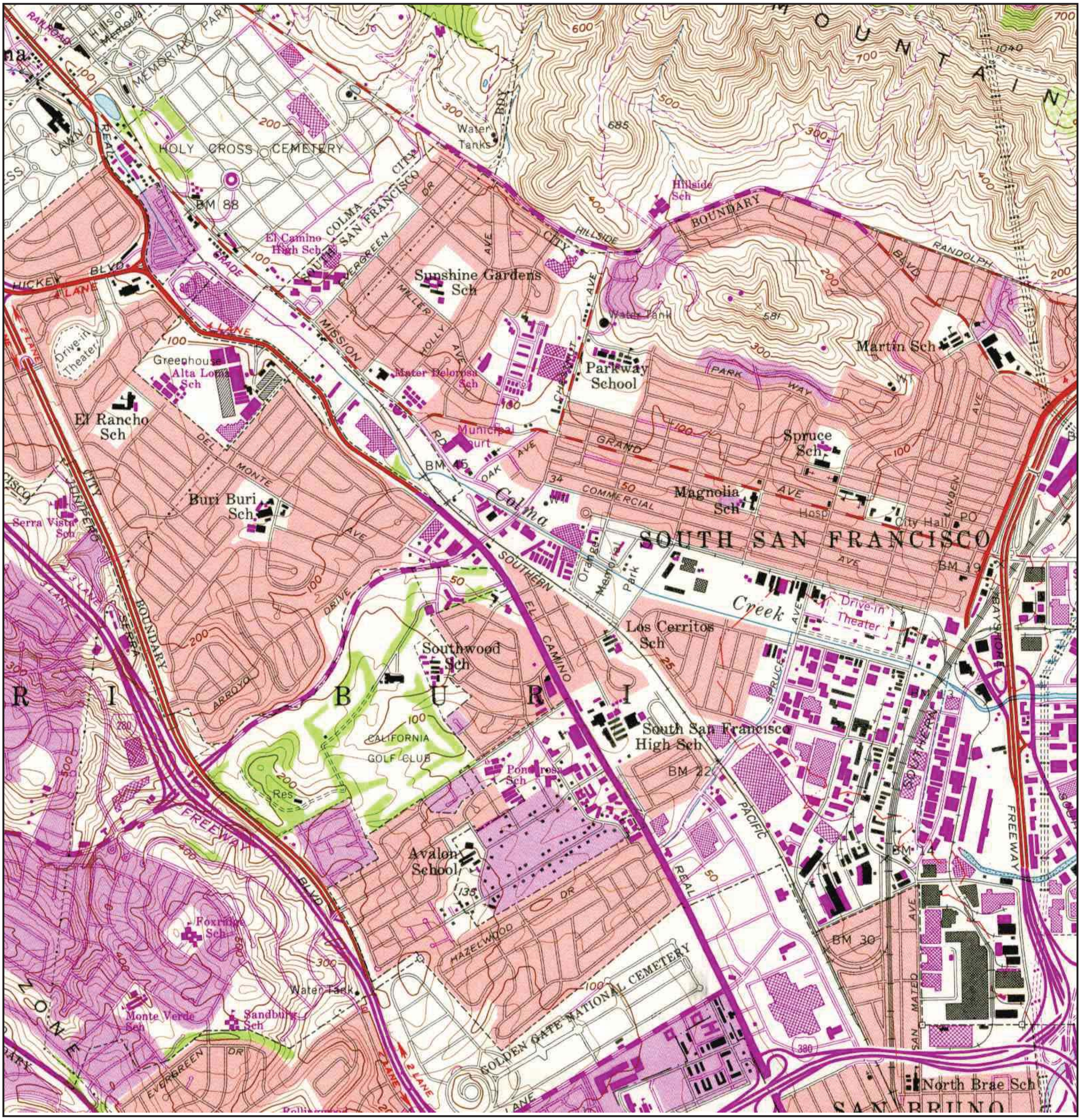
N

TARGET QUAD
NAME: SAN FRANCISCO SOUTH
MAP YEAR: 1973
PHOTOREVISED:1956
SERIES: 7.5
SCALE: 1:24000

SITE NAME: South San Francisco Project Site
ADDRESS: Westborough Blvd and Orange Ave
South San Francisco, CA
LAT/LONG: 37.6544 / -122.4374

CLIENT: AEW Engineering , Inc.
CONTACT: Lindsay Furuyama
INQUIRY#: 3190911.4
RESEARCH DATE: 10/20/2011

# Historical Topographic Map



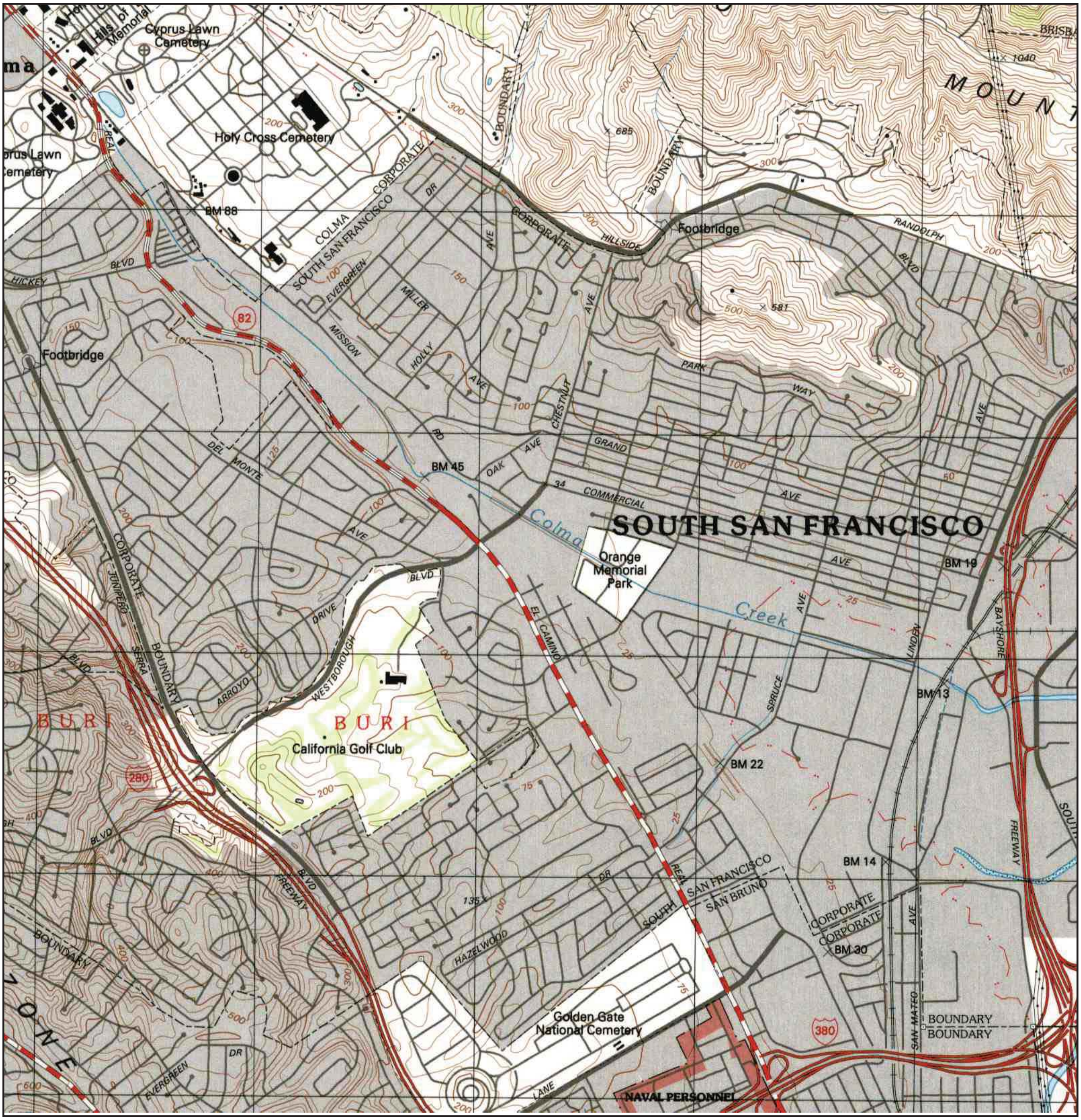
N

TARGET QUAD
NAME: SAN FRANCISCO SOUTH
MAP YEAR: 1980
PHOTOREVISED:1956
SERIES: 7.5
SCALE: 1:24000

SITE NAME: South San Francisco Project Site
ADDRESS: Westborough Blvd and Orange Ave
South San Francisco, CA
LAT/LONG: 37.6544 / -122.4374

CLIENT: AEW Engineering , Inc.
CONTACT: Lindsay Furuyama
INQUIRY#: 3190911.4
RESEARCH DATE: 10/20/2011

# Historical Topographic Map



**N** ↑

TARGET QUAD
NAME: SAN FRANCISCO SOUTH
MAP YEAR: 1993

SERIES: 7.5
SCALE: 1:24000

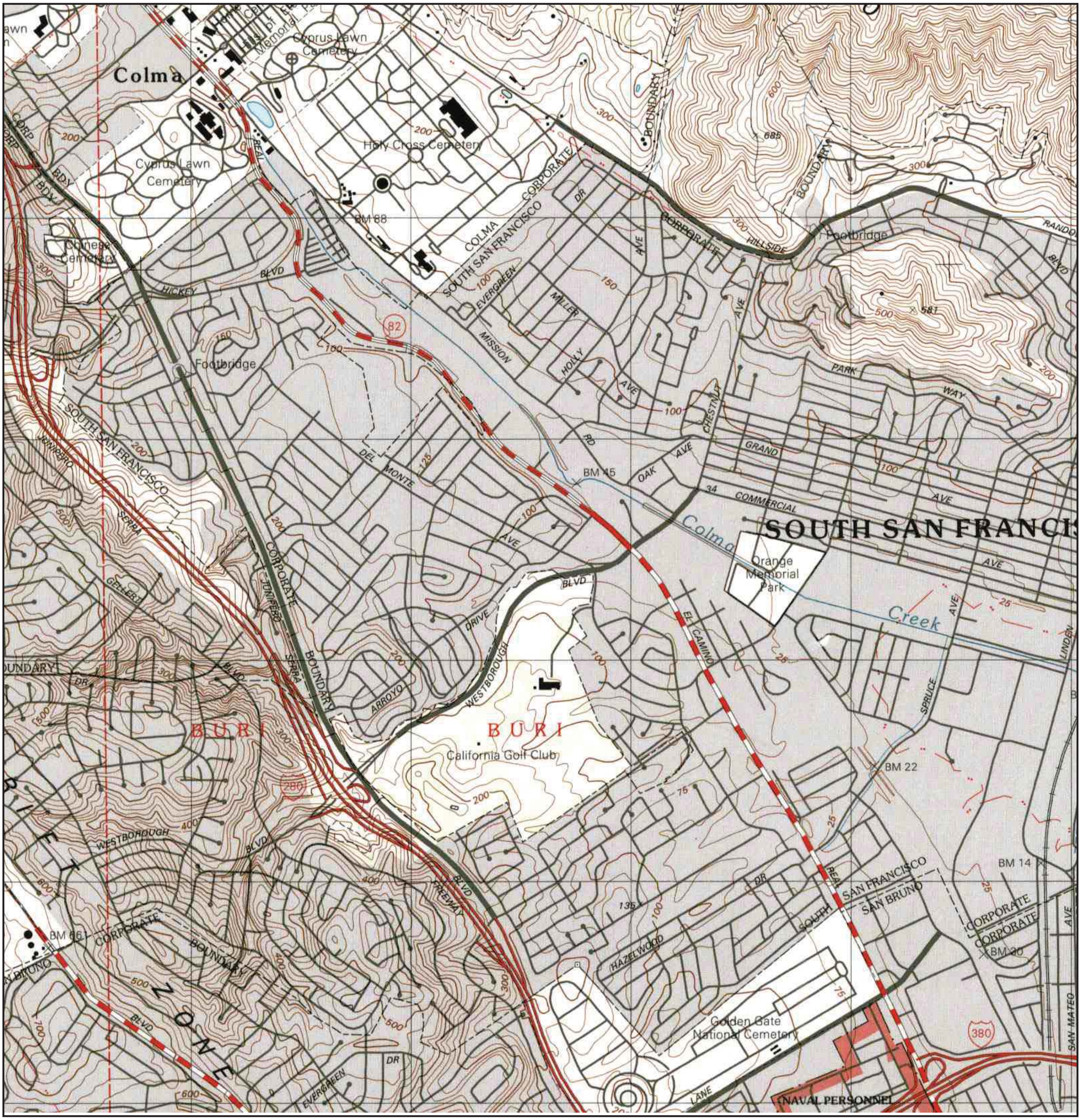
SITE NAME: South San Francisco Project Site

ADDRESS: Westborough Blvd and Orange Ave

South San Francisco, CA
LAT/LONG: 37.6544 / -122.4374

CLIENT: AEW Engineering , Inc.
CONTACT: Lindsay Furuyama
INQUIRY#: 3190911.4
RESEARCH DATE: 10/20/2011

# Historical Topographic Map



N

TARGET QUAD

NAME: SAN FRANCISCO SOUTH

MAP YEAR: 1995

SERIES: 7.5

SCALE: 1:24000

SITE NAME: South San Francisco Project Site

ADDRESS: Westborough Blvd and Orange Ave

South San Francisco, CA

LAT/LONG: 37.6544 / -122.4374

CLIENT: AEW Engineering , Inc.

CONTACT: Lindsay Furuyama

INQUIRY#: 3190911.4

RESEARCH DATE: 10/20/2011

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**South San Francisco Project Site**
Westborough Blvd and Orange Ave
South San Francisco, CA 94080

Inquiry Number: 3190911.3
October 21, 2011

# Certified Sanborn® Map Report

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Milford, CT 06461
800.352.0050
www.edrnet.com

# Certified Sanborn® Map Report

10/21/11

| | |
|---|---|
| **Site Name:** | **Client Name:** |
| South San Francisco Project | AEW Engineering , Inc. |
| Westborough Blvd and Orange | 55 New Montgomery Street |
| South San Francisco, CA | San Francisco, CA 94105 |
| EDR Inquiry # 3190911.3 | Contact: Lindsay Furuyama |

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## *Certified Sanborn Results:*

| | |
|---|---|
| **Site Name:** | South San Francisco Project Site |
| **Address:** | Westborough Blvd and Orange Ave |
| **City, State, Zip:** | South San Francisco, CA 94080 |
| **Cross Street:** | |
| **P.O. #** | 2010-024 |
| **Project:** | URS Peninsula Pipeline |
| **Certification #** | F046-42ED-846A |

**Maps Provided:**

1970

1956

Sanborn® Library search results
Certification # F046-42ED-846A

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- ☑ University Publications of America
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## *Sanborn Sheet Thumbnails*

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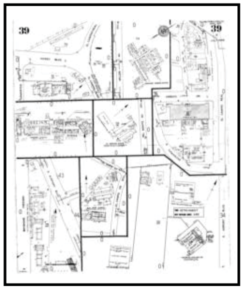
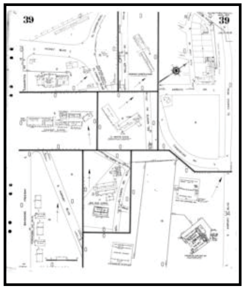
### 1970 Source Sheets



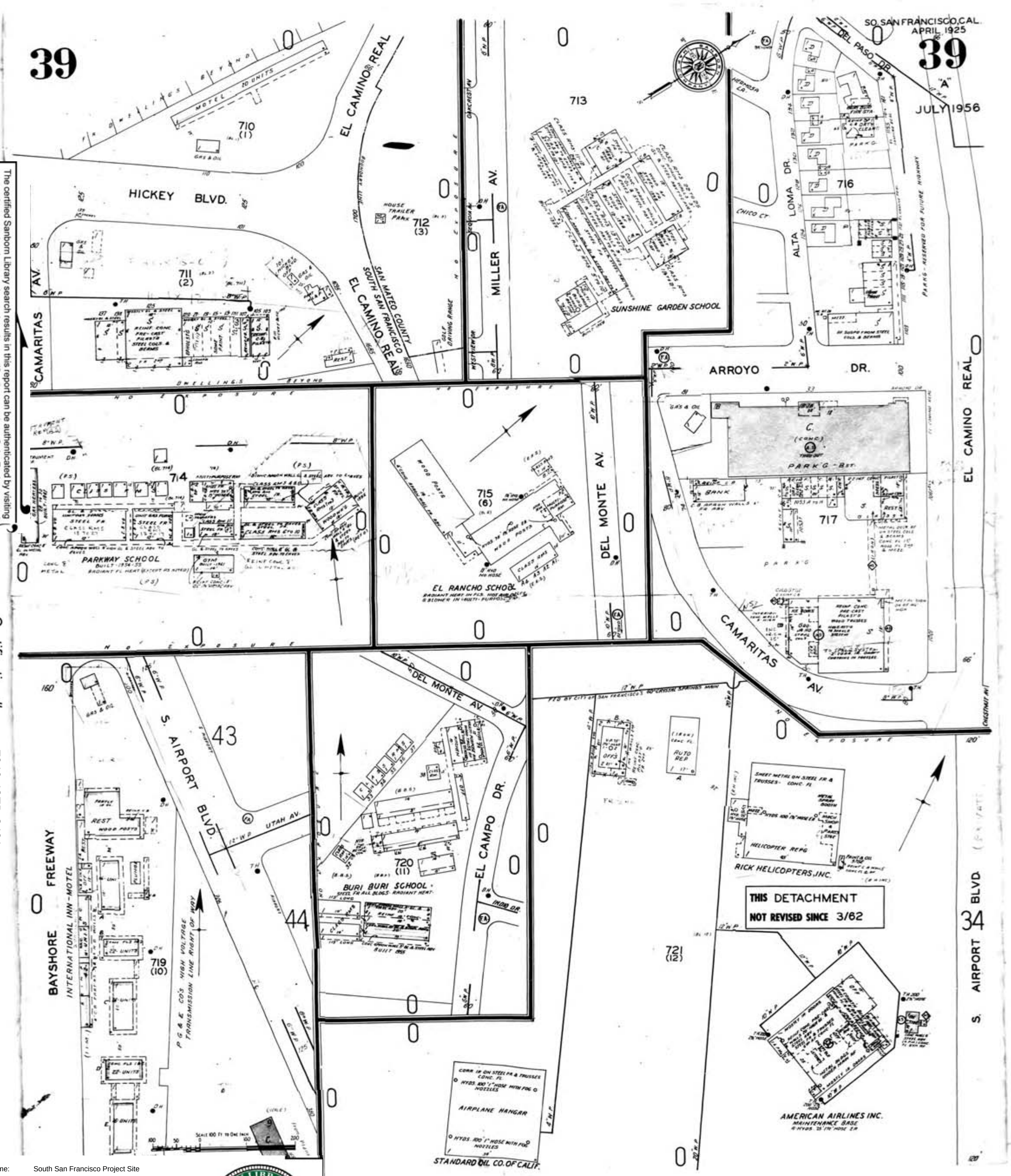
Volume 1, Sheet 39

### 1956 Source Sheets



Volume 1, Sheet 39

# 1970 Certified Sanborn Map



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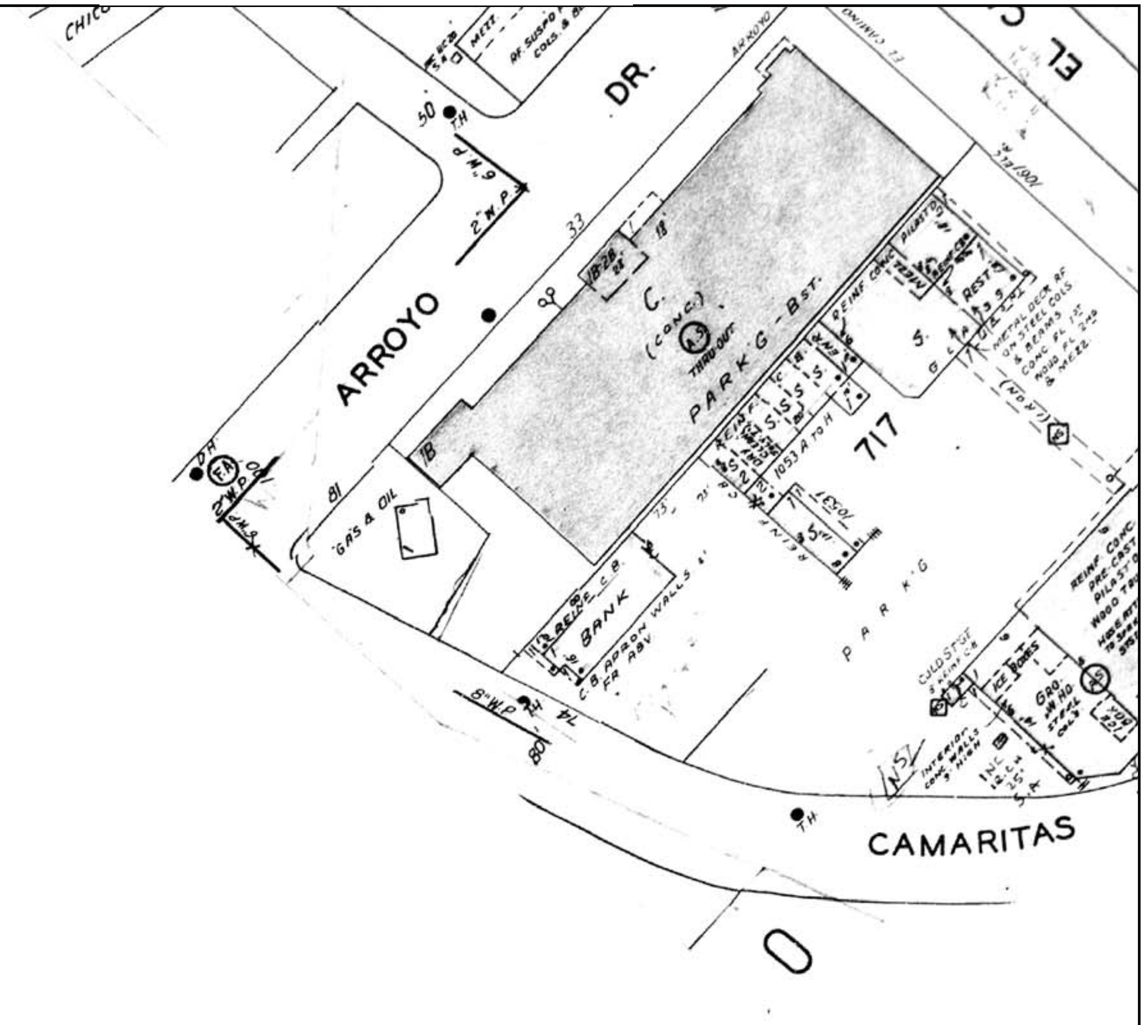
Certification # F046-42ED-846A

| | |
|---|---|
| Site Name: | South San Francisco Project Site |
| Address: | Westborough Blvd and Orange Ave |
| City, ST, ZIP: | South San Francisco CA 94080 |
| Client: | AEW Engineering , Inc. |
| EDR Inquiry: | 3190911.3 |
| Order Date: | 10/21/2011 10:50:00 AM |
| Certification # | F046-42ED-846A |
| Copyright: | 1970 |

# 1970 Certified Sanborn Map



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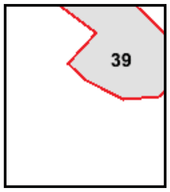
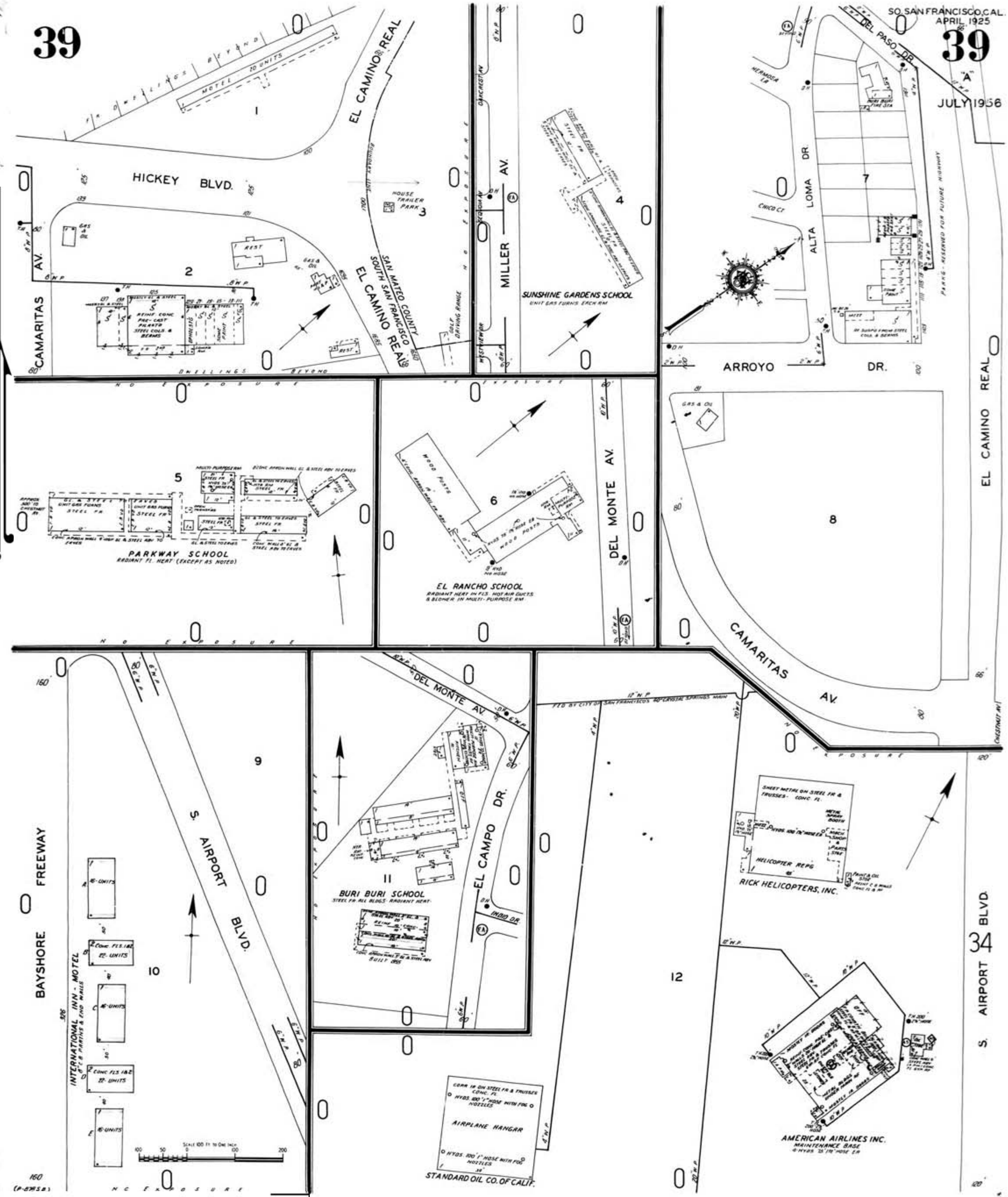
This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

0 Feet 150 300 600



Volume 1, Sheet 39

# 1956 Certified Sanborn Map



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| Site Name: | South San Francisco Project Site |
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| City, ST, ZIP: | South San Francisco CA 94080 |
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