

PIER 70 SUD INFRASTRUCTURE PLAN

September 19, 2017

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1. INTRODUCTION / PROJECT DESCRIPTION

1.1 Purpose

This Infrastructure Plan is an exhibit to the Interagency Cooperation Agreement (ICA) between Forest City Pier 70, LLC (Developer), the Port of San Francisco (Port) and relevant agencies from the City and County of San Francisco (City), Port, and Developer for the Pier 70 Special Use District (SUD) Project (Project). The Infrastructure Plan defines the Infrastructure (as referred to as Horizontal Improvements in the ICA) for the Project and identifies the responsibilities of the City, Port and Developer for design, construction and operation of the Infrastructure, including elements of sustainability, environmental management, demolition, geotechnical improvements, grading, street and transportation improvements, open space and park improvements, potable water system, non-potable water system, auxiliary water supply system, combined sewer system, stormwater management system and dry utility system.

1.2 Site Description

The Project site consists of an approximately 35-acre area bounded by Illinois Street to the west, 20th Street to the north, San Francisco Bay to the east, and 22nd Street to the south. Two development areas constitute the Project site. The "28-Acre Site" is an approximately 28 acre area generally located between 20th Street, Michigan Street, 22nd Street, and San Francisco Bay that includes a number of Port-owned parcels within the overall Pier 70 area. The "Illinois Parcels" form an approximately 7-acre site that consists of an approximately 3.4-acre Port-owned parcel along Illinois Street at 20th Street and the approximately 3.6-acre "Hoedown Yard," at Illinois and 22nd Streets, which is owned by PG&E. The Hoedown Yard includes a City-owned 0.2-acre portion of the Michigan Street right-of-way that bisects the parcel.

1.3 Land Use

Under the proposed Pier 70 Special Use District (SUD), the Project will include a mixed-use land use program that includes residential, commercial office, district parking, retail, arts, light industrial and open space uses. Several parcels are zoned to allow either residential, district parking or commercial office uses – for this reason, the Project Environmental Impact Report (EIR) analyzes both a maximum residential scenario and a maximum commercial scenario. Through the course of Project build-out, land uses will be selected for each parcel through the Phase Submittal and parcel disposition processes. In order to provide a conceptual system design that functions in either development scenario (or a blend between the two), where the scenarios impact infrastructure design, this Infrastructure Plan analyzes the scenario that conservatively controls design. The following land use tables are used to determine infrastructure demands in this document only. These numbers do not represent the final land use program and may be adjusted in the future within the limits studied under the EIR. Adjustments will not significantly change the utility demands.

Table 1.0: Land Use, Maximum Residential Scenario

Land Use	28-Acre Site	Illinois Parcels	Project Total
Residential	2,155 units	870 units	3,025 units
Commercial	884,200 gsf	11,800 gsf	896,000 gsf
Retail	234,992 gsf	33,360 gsf	268,352 gsf
Restaurant	58,748 gsf	8,340 gsf	67,088 gsf
Art/Light Industrial	143,110 gsf	-	143,110 gsf

Table 1.1: Land Use, Maximum Commercial Scenario

Land Use	28-Acre Site	Illinois Parcels	Project Total
Residential	1,326 units	518 units	1,844 units
Commercial	1,739,450 gsf	243,900 gsf	1,983,350 gsf
Retail	237,174 gsf	37,899 gsf	275,073 gsf
Restaurant	59,294 gsf	9,475 gsf	68,769 gsf
Art/Light Industrial	143,110 gsf	-	143,110 gsf

1.4 Infrastructure Plan Overview

This Infrastructure Plan describes the construction and development of Infrastructure to be provided by Developer for the Project, including associated off-site improvements needed to support the Project. The Project shall use the San Francisco Subdivision Regulations (Subdivision Regulations) and Port Building Code as the basis for design standards, criteria, specifications, and acceptance procedures for Infrastructure in the Project.

This Infrastructure Plan also describes the Project Infrastructure obligations of the City, Port and other City Agencies. As a condition of the Developer’s performance under this Infrastructure Plan, the Developer shall obtain requisite approvals in accordance with the ICA.

This Infrastructure Plan focuses on the Infrastructure required to build the Project as described in the Project EIR. The EIR also includes a number of Project variants, which may or may not be implemented. Some of these variants are also described in the Infrastructure Plan, but are not required components of the Infrastructure.

1.5 Developer's Obligations

The Development Term Sheet between the Port and the Developer includes requirements for the Developer to process entitlement approvals and environmental clearance through the EIR for the entire Pier 70 SUD Project, consisting of 35 acres in total. However, the Developer's Infrastructure obligations do not include all of the Infrastructure required within the Pier 70 SUD Site. While infrastructure planning and conceptual design has been performed for the whole Project in support of the entitlement and EIR efforts, the scope of this Infrastructure Plan is limited to only those responsibilities assigned to the Developer. Developer (or its assignee) has Infrastructure obligations that are generally limited to design and construction of Infrastructure within the Developer Obligation Area shown in Figure 1.0, which includes the 28-Acre Site and within the right-of-ways of the Numbered Streets outside the 28-Acre Site. Numbered Streets consist of 20th, 21st, and 22nd Street between Illinois Street and the western boundary of the 28-Acre Site. In addition to the improvements within the Developer Obligation Area, Developer is obligated to design and construct several offsite improvements, including: a new AWSS main in 20th Street between the connection to existing at 3rd Street and Illinois Street; a possible new AWSS main in 22nd Street between Maryland Street and the existing AWSS to the west contingent upon the conditions stated in Section 13.3; the combined sewer pump station and associated structures just north of 20th Street in the vicinity of Building 108; traffic signalization at 20th Street, 21st Street, and 22nd Street; retaining walls required to support the public right-of-way at certain locations; and a combined sewer force main replacement in Illinois Street between 20th Street and 21st Street if deemed necessary by the SFPUC (see Section 14.2), at its sole discretion, after considering the results of a condition and sizing assessment to be performed by the Developer.

The Developer's Infrastructure obligations exclude certain improvements outside of the Developer Obligation Area associated with the Remainder Area shown in Figure 1.0 to be

designed and constructed by the Port or other 3rd Parties. Specifically, exclusions to the Developer's obligations relating to the Remainder Area consist of, but are not limited to, the following work to be performed by others: 22nd Street AWSS extension between 3rd Street and Illinois Street to serve Hoedown Yard development, Illinois Streetscape Frontage; Illinois Parcels Service Infrastructure; the Irish Hill Playground; 20th Street Plaza; Michigan Street improvements; and generally scope related to environmental management, demolition & abatement, sea level rise mitigation, geotechnical improvements, site grading and drainage within the Illinois Parcels Site. In addition, the potential District Parking Structure and rehabilitation of existing Buildings 2, 12 and 21 to remain, which is not considered an element of Infrastructure, are explicitly excluded from the Developer's obligations.

1.6 Property Acquisition, Dedication, and Easements

The mapping, street vacations, property acquisition, dedication and acceptance of streets and other Infrastructure improvements will occur through the Subdivision Map process in accordance with the San Francisco Subdivision Code and San Francisco Subdivision Regulations. Improvements described in this Infrastructure Plan shall be constructed within the public right-of-way or dedicated easements within public open space areas to provide for access and maintenance of Infrastructure facilities.

Public utilities within easements will be installed in accordance with applicable City regulations for public acquisition and acceptance within dedicated public service easement areas, including provisions for maintenance access. Proposed easements are shown in this Infrastructure Plan (see Figure 14.0).

As further discussed in Section 8.2, portions of the existing site are subject to the State Lands Public Trust (Trust) including certain proposed utility zones within public right-of-way and park and open space parcels.

A tentative map will be prepared for the Developer Obligation Area as shown in Figure 1.0, and the Remainder Area will be completed in a second tentative map for the Illinois Parcel by others. Final maps will be submitted for the public right of way prior to permits for each phase of infrastructure. Final maps for each parcel (or groups of parcels) will be submitted for each development project.

1.7 Project Datum

Elevations referred to herein are based on Old City Datum plus 100-feet, referred to herein as Project Old City Datum (POCD). San Francisco Vertical Datum 13 (SFVD13) is included for reference as the Project may be subject to change of datum to SFVD13 in the future.

1.8 Master Plans

Each Infrastructure system described herein has been more fully described and evaluated in Draft Master Utility Plans (MUPs), which have been simultaneously submitted to the City as reference information for the Infrastructure Plan. These MUPs provide more detailed layouts of each Infrastructure system. The Infrastructure Plan is to be approved by the City as part of the ICA approval process. Approval of this Infrastructure Plan does not imply approval of the MUPs, which will be approved after ICA execution and prior to approval of street improvement plans for the first phase of development.

1.9 Conformance with EIR and Entitlements

This Infrastructure Plan has been developed to be consistent with the project description as well as mitigation measures contained in the EIR and other entitlement documents. Regardless of the status of their inclusion in this Infrastructure Plan, the mitigation measures of the EIR shall apply to the Project.

1.10 Applicability of Codes and Infrastructure Standards

This Infrastructure Plan may be materially modified to the extent such modifications are in conformance with the Subdivision Regulations and are mutually agreed to by the Port, City and the Developer consistent with the terms of the ICA.

1.11 Project Phasing

It is anticipated that the Project will be developed in several Phases subject to the submittal and approval process outlined in the ICA. A Project Phasing Plan will be submitted for approval with the Basis of Design at the start of each Phase. The Phasing Plan will provide a utility-by-utility schematic showing existing and proposed infrastructure, temporary and permanent connections, and demonstrate how continuity of existing services will be maintained.

Each Phase will include Development Parcel(s) and associated Infrastructure (Phase Infrastructure) to serve the incremental build-out of the Project. Phase Infrastructure will be defined in Improvement Plans and associated Public Improvement Agreement for each Phase to be approved by the City and Port prior to filing final maps for the associated Development Parcel(s). Phase infrastructure must be designed and constructed to create complete systems within each phase. The parties acknowledge that certain Infrastructure, as described in this Infrastructure Plan, such as abatement, demolition, environmental management, grading, geotechnical improvements and utility connections, may be required or desired outside the current Phase. The parties will cooperate in good faith in determining the scope and timing of such advance Infrastructure, so as not to delay the construction of Development Parcels and associated Phase Infrastructure.

Demolition or abandonment of existing infrastructure and construction of each proposed Development Parcel and associated Phase Infrastructure will impact site accessibility. During construction of each Development Parcel and associated Phase Infrastructure,

interim access shall be provided and maintained for active utility access and emergency vehicles, subject to San Francisco Fire Department (SFFD) requirements. Within active streets to remain open, pedestrian access shall be maintained on at least one side where adjacent to an active construction area.

1.12 Acceptance of Phased Infrastructure

Any Acceptance of streets and other Infrastructure Improvements will occur according to the San Francisco Subdivision Code and San Francisco Subdivision Regulations, unless otherwise approved as an exception by the City. The Acquiring Agency shall accept full, complete, and functional Streets and Infrastructure as designed in conformance with the Subdivision Regulations and utility standards, and constructed in accordance with the project plans and specifications, subject to any design modifications or exceptions that may be authorized by the Public Works Director under the San Francisco Subdivision Code.

Utilities to be accepted cannot rely on utilities constructed to a temporary standard, however they may rely on utilities constructed to a permanent standard that will be removed or replaced in a later phase subject to approval as an exception by the City.

With the consent of both the Acquiring Agency and the agency owning the existing infrastructure, certain portions of Phase Infrastructure to be accepted may rely upon existing infrastructure that is required to be replaced in a subsequent Phase provided the existing infrastructure adequately serves the present Phase demands. Existing infrastructure may not be in between two segments of new infrastructure.

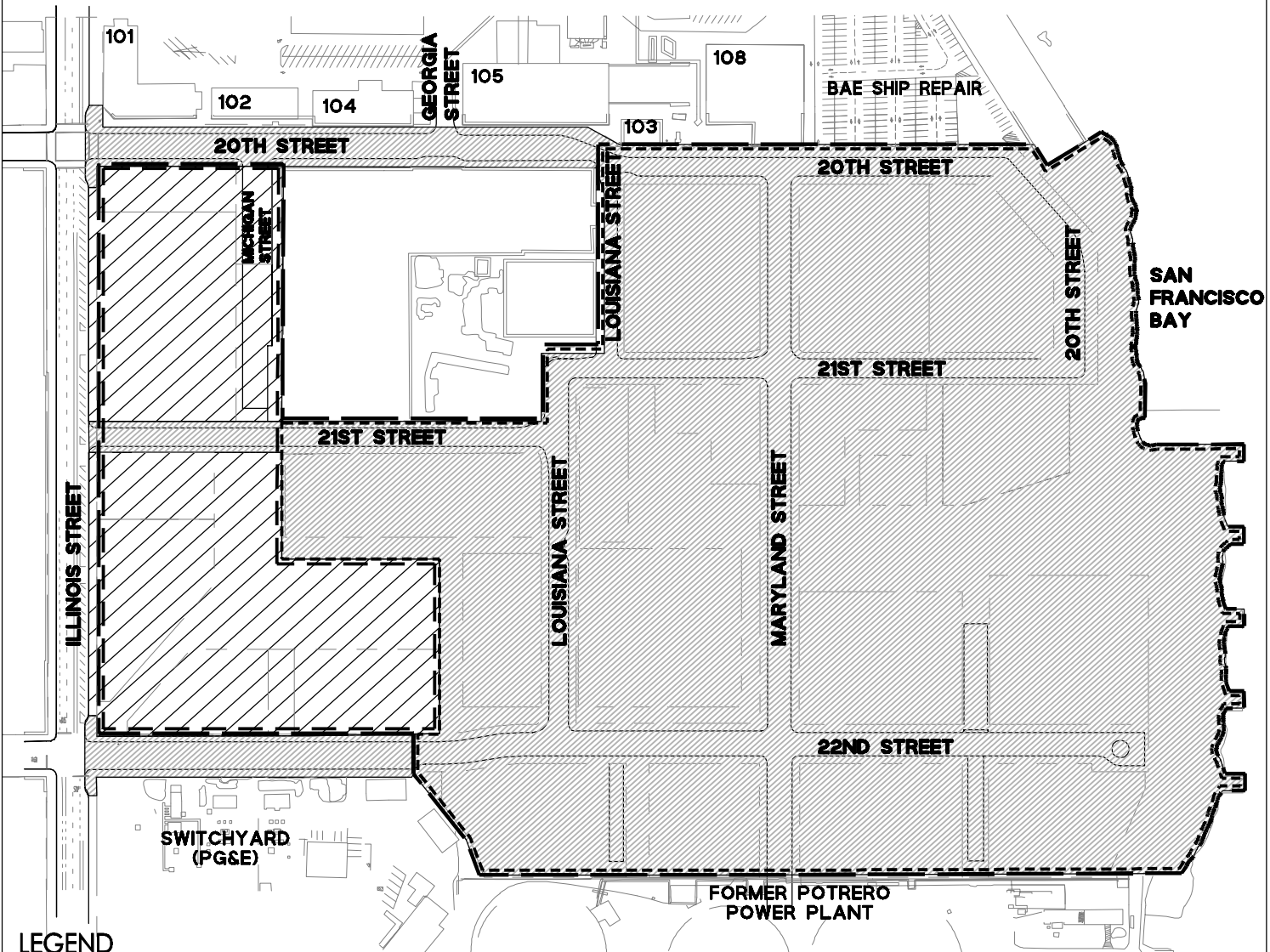
Phase Infrastructure may include improvements on Port property outside of the present Phase boundary within a subsequent Phase area (see Figure 14.0). The Acquiring Agency shall accept Phase Infrastructure that is constructed within Port property outside of the

Phase boundary, subject to a demonstration of how the subsequent Phase Infrastructure can be sequenced to avoid impacting the Phase Infrastructure.




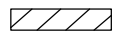
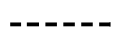

1.13 Operation and Maintenance

With the exception of certain Streetscape Improvements identified in the Draft Streetscape Master Plan (SSMP) to be privately maintained, further described in Section 8.5.4 of this plan, the Acquiring Agency will be responsible for maintenance of Infrastructure installed by the Developer upon acceptance, except as otherwise agreed to. A maintenance agreement, as required by the Public Improvement Agreement (PIA), will be prepared in conjunction with the first phase of improvement plans and may be subject to a Major Encroachment Permit (MEP).

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LEGEND

-  PIER 70 SUD BOUNDARY
-  PROPOSED DEVELOPMENT PARCEL
-  DEVELOPER OBLIGATION AREA
-  REMAINDER AREA
-  28-ACRE SITE BOUNDARY
-  ILLINOIS PARCELS BOUNDARY



2. Sustainability

2.1 Sustainable Infrastructure

A key component of Project's redevelopment is its sustainable infrastructure. This Infrastructure Plan incorporates various strategies that support the long term sustainable vision for this new urban community. Innovative street designs, efficient land planning, and modern, efficiently-sized Infrastructure serve as the cornerstones for this new sustainable community.

The Developer's Infrastructure obligations include the design and construction of certain sustainability improvements within the Developer Obligation Area identified in Section 1.5. A summary of the key sustainable strategies that are to be incorporated into Infrastructure to be installed by the Developer are as follows:

Section 3 – Environmental Management

- Environmental management to satisfy all applicable statutory and regulatory requirements for redevelopment uses

Section 4 – Demolition and Abatement

- Demolition and abatement of identified unusable and dilapidated structures
- Renovation of select historic buildings to satisfy current seismic, structural, and code requirements
- Demolition or abandonment of sub-standard utility infrastructure
- Re-use of recycled materials on-site where feasible, including exploration of use of local materials

Section 5 – Sea Level Rise

- Grading and utility infrastructure designed to provide resiliency for long term protection against sea level rise
- Financing mechanism put in place to fund continuing monitoring and future improvements at the Project site to adapt to varying amounts of sea level rise

Section 6 – Geotechnical Conditions

- Geotechnical improvements to improve seismic stability

Section 7 – Site Grading and Drainage

- Grading plans designed to remove the new proposed development areas from existing FEMA flood plain designation
- Initial grading and drainage designs to provide long term protection and future adaptability to accommodate potential sea level rise
- Grading design to minimize the need to import soil from offsite locations while accommodating grades adjacent to existing historic structures
- Erosion and sedimentation control measures during construction will be utilized consistent with an approved Storm Water Pollution Prevention Plan for the site

Section 8 – Street and Transportation Systems

- Efficient and smart site layout provides a dense, transit-oriented development that encourages shared resources, bicycling and walking for leisure and commuter transport
- New Infrastructure to improve circulation and safely support alternative transportation modes such as bicycles, buses, and shuttles to regional transit hubs.

- Livable community designed to optimize the pedestrian experiences throughout the Project area
- New public bicycle and pedestrian paths to provide connection to open spaces to support safety and wellness of visitors and dwellers
- Provide bike share stations on-site

Section 11 – Low Pressure Water System

- New reliable and efficient potable water system
- Use of water conservation fixtures to reduce potable water demands

Section 12 – Non-Potable Water System

- Use of water conservation fixtures to reduce non-potable water demands
- Option 1: Newly constructed buildings will collect graywater and rainwater as required to be reused for toilet and urinal flushing, irrigation, and cooling tower makeup
- Option 2: A District-Scale Water Treatment and Recycling System (WTRS) will treat blackwater (project generated wastewater including toilet flows) to a non-potable standard and deliver to Development Parcels via a new non-potable water distribution system

Section 13 – Auxilliary Water Supply System

- New AWSS to improve reliability of fire suppression systems and enhance resiliency during a seismic event.

Section 14 – Combined Sewer System

- Option 1: Graywater collection for non-potable reuse in buildings as required reduces demand on wastewater conveyance and treatment facilities and low pressure water infrastructure
- Option 2: Possible on-site district-scale Water Treatment and Recycling System (WTRS) will treat blackwater to a non-potable standard for reuse on site to reduce demand on off-site wastewater conveyance and existing treatment facilities and low pressure water infrastructure
- New wastewater collection system to reduce the amount of groundwater intrusion
- New low flow fixtures generating reduced discharge into the wastewater system
- Replacement of 20th Street Pump Station to accommodate existing and proposed flows from the current Pier 70 sewershed including the Project
- New stormwater collection system designed for long term protection from flooding and adaptability for sea level rise
- Designed to convey stormwater to the City Combined Sewer System for treatment downstream

Section 15 – Stormwater Management

- Stormwater management facilities included in street designs and open spaces to reduce runoff rate and volume impacting the City Combined Sewer System
- Variant: 30% of building rooftops to include green roofs in accordance with the Better Roofs Ordinance

Section 16 – Dry Utility Systems

- Replace overhead electrical distribution with a joint trench distribution system following the roadways.
- New power, gas and communication systems to serve the development

- Variant: Installation of photovoltaics on at least 15% of building rooftops in accordance with the Better Roofs Ordinance for renewable generation
- Use of energy efficient fixtures and equipment to reduce energy demands
- Variant: Renewable Energy Generation and Microgrid Distribution System with Load Management controls to enhance resiliency and reduce carbon emissions

Additional Project Infrastructure Variants

Project has also been designed with enough flexibility to consider the addition of the following district-scale sustainable facilities into the infrastructure program for the development as desired and feasible;

- District Heating and Cooling System Variant
- Vacuum Waste Collection System Variant

The Infrastructure Plan has been prepared to allow for implementation of the above variants with little to no impact to the required Infrastructure components.

3. Environmental Management

3.1 General Site Characterization

Several investigations and remediation activities have been conducted throughout the Pier 70 Master Plan Area between 1989 and 2011. The Site Investigation (SI) and Human Health Risk Assessment conducted in 2009 and 2010 included soil gas, soil and groundwater sampling and analysis. Results from that and previous investigations were evaluated with respect to applicable regulatory standards and risk-based site-specific Cleanup Levels presented in the Feasibility Study and Remedial Action Plan (FS/RAP) to identify Constituents of Concern (COCs).

3.2 Regulatory Framework and Management Approach

The FS/RAP for the Site was prepared on behalf of the Port with oversight by the San Francisco Bay Regional Water Quality Control Board (RWQCB) and the San Francisco Department of Public Health (SFDPH). The approved remedy consists of engineering controls (e.g., removing, replacing, or capping soil with durable cover) and institutional controls (e.g., deed restrictions, soil management measures, health and safety plans) to manage potential health risks. The remedy consists of the following:

- Durable Covers (defined as hardscape such as asphalt, concrete, non-moveable pavers, or a minimum of two feet of clean soil) over existing native soil that meet the remedial action objective of preventing human exposure to constituents of concern in the soil beneath the Site.
- Long-term maintenance and monitoring of durable covers to ensure that covers continue to function as designed.
- Institutional controls to minimize the potential to impact human health and the environment after installation of durable cover.

The Risk Management Plan (RMP) provides a framework for managing residual COCs in soil in a manner that protects site users under current and future land use.

3.3 Requirements for Future Excavation Work

Any future construction work that involves ground disturbing activities is subject to both the Maher Ordinance and the RMP. The RMP describes risk management measures that include notifying the Port, RWQCB, and SFDPH of planned activities; limiting access and posting signage around portions of the Site that are under construction; managing soil including soil disposal and compliance with the Dust Control Plan for the Site; managing storm water and groundwater; and reestablishing durable cover following completion of ground disturbing activities. The RMP also outlines procedures for addressing unexpected subsurface conditions encountered during development.

The Developer's Infrastructure obligations include implementation of the RMP within the areas identified in Section 1.5.

4. Demolition, Abatement and Historic Structure Stabilization

4.1 Scope of Demolition

The Developer's Infrastructure obligations include the demolition and abatement of non-retained existing buildings and demolition or abandonment infrastructure features within the Developer Obligation Area identified in Figure 1.0 (excluding Building 117, to be demolished by others in advance of the Project). This includes buildings not intended for long-term reuse, site structures (retaining walls, utility structures), streets and pavements, and existing utilities not intended for long-term reuse. In certain cases, underground utilities may be abandoned rather than demolished subject to City and Port approval.

The Developer will either: a) separate demolition debris material by type at the site and deliver to a facility that reuses or recycles those materials; or, b) process as mixed demolition debris and transport off-site by a Registered Transporter for delivery to a Registered Facility that processes mixed debris for recycling. Certain inert materials, such as concrete, may be crushed on site for reuse as engineered fill or aggregate. The feasibility of materials recycling and reuse may be limited by the requirements for abatement of hazardous materials and the potential value of the recycled material.

4.2 Existing Infrastructure Demolition or Abandonment

Existing utility demolition or abandonment scope includes storm drain, combined sewer, water and electric, gas and communications abandonment or removal. Where feasible, demolished utility materials will be recycled.

Concrete and asphalt pavements will be demolished, and where feasible, recycled and used on site or made available for use elsewhere. The recycled concrete/asphalt materials will be allowed for pavement and structural slab sub-base material, utility trench backfill, and, where feasible, concrete and asphalt mixes, as approved by the City and Geotechnical Engineer of Record.

As part of a standard vegetation grubbing and clearing operation, trees and other plant materials will be protected in place, relocated, or removed as needed from future grading areas. All trees and plants to be removed will be recycled for composting purposes.

CCSF Ordinance 175-91 restricts the use of potable water for soil compaction and dust control activities undertaken in conjunction with any construction or demolition project occurring within the boundaries of San Francisco, unless permission is obtained from San Francisco Public Utilities Commission (SFPUC). Non-potable water must be used for soil compaction and dust control activities during project construction or demolition. Recycled water is available from the SFPUC for dust control on roads and streets. However, per State regulations, recycled water cannot be used for demolition, pressure washing, or dust control through aerial spraying. Recycled water will be supplied by truck for activities that require its use.

4.3 Building 15 Retention

Building 15 is a historic building that will be retained partially over 22nd St and the Building 12 Plaza area to enhance the SUD character and maintain the relationship with Building 12. Improvements will include removal of skin from Building 15, raising of grades around base and modification of foundation, and structural retrofit of frame.

4.4 Phases of Demolition and Abatement

Demolition and abatement will occur in phases based on the principle of adjacency and as-needed to facilitate a specific proposed Development Phase. The amount of demolition will be the minimum necessary to support the Development Phase and maintain minimum required access and utility connections. The phased demolition of smaller areas will allow the existing utility services, vehicular access areas, and vegetation to remain in place as long as possible in order to reduce disruption of existing uses of the

Project site and adjacent facilities. Developer will monitor new and existing) utilities to remain within the Phase boundary pre and post demolition, as required.

5. Sea Level Rise and Adaptive Management Strategy

5.1 Sea Level Rise Introduction

Sea Level Rise (SLR) has the potential to increase flooding along shoreline areas as the 100-year high tide (Base Flood Elevation) increases over time. The Project will be built to protect against a reasonable amount of SLR and designed to accommodate higher SLR through an Adaptive Management approach that allows the Project Infrastructure to be adjusted over time in response to measured SLR.

The Sea-Level Rise Task Force of the Coastal and Ocean Working Group of the California Climate Action Team released their State of California Sea-Level Rise Guidance Document based on the June 2012 National Academy of Sciences (NAS) Sea-Level Rise for the Coasts of California, Oregon and Washington. Table 5.1 summarizes the low estimate, projected and high estimate Sea Level Rise projections for the San Francisco Bay area. These estimates are consistent with the "Guidance for Incorporating Sea Level Rise into Capital Planning in San Francisco: Assessing Vulnerability and Risk to Support Adaptation," dated December 14, 2015 as prepared by the City and County of San Francisco Sea Level Rise Committee for the San Francisco Capital Planning Committee, adopted by the Capital Planning Committee.

Table 5.1: Sea Level Rise Projections for San Francisco Bay (NAS, 2012)

Time Period	Low Estimate (Inches)	Projected (Inches)	High Estimate (Inches)
2000-2050	4.8	11.0	23.9
2000-2070	9.0	19.0	38.7
2000-2100	16.7	36.2	65.5

Source: Moffat and Nichol Memorandum "Pier 70 Development, Sea Level Rise and Proposed Improvements," December 4, 2014.

5.2 Adaptive Management Approach

Because the actual rate of future SLR is uncertain, the Adaptive Management approach will embrace a pro-active adaptive management strategy that can respond to changes that will come about in the future as a result of additional scientific study and monitoring of actual SLR conditions. The Adaptive Management strategy will include four basic fundamentals

- Initial infrastructure design to accommodate reasonable SLR scenarios,
- Infrastructure design that can be adjusted in the future in response to actual SLR,
- Monitoring of scientific updates and actual SLR data, and
- Funding mechanism to implement necessary improvements to address SLR.

5.3 Initial Grading Design

Coastal flooding at the site includes two components: 1) combined high water and wave action along the perimeter shoreline, and 2) extreme still water elevation for inland areas. The flood elevations for the perimeter shoreline areas are determined by the combined effects of high still water elevation plus a combination of tides, swell, wind, waves, tsunami, and shoreline geometry, or Total Water Level (TWL) with a 1 percent chance of occurring each year. Figure 5.0 shows graphic illustration of shoreline with elevation requirements at the perimeter and Bay Trail and includes Table 5.1 with summary of elevation for minimum design criteria for Shoreline, Bay Trail, Building Finished Floor, and Open Space.

5.3.1 Shoreline

The shoreline area east of the Bay Trail area will be improved to provide protection against the current 1 percent chance TWL caused by a combination of tides, waves and shoreline geometry. This area slopes to the water and is designed to allow for

additional inundation with future SLR. No specific allowance for SLR is provided and this area will eventually be subject to tides as sea level rises.

5.3.2 Bay Trail

The Bay Trail area will be elevated to an elevation above TWL plus an allowance for 24-inches of SLR.. The elevations in the Bay Trail area will provide perimeter protection for the project to the west. The elevation and types of protection in the Bay Trail area may vary along the length of the Project shoreline as TWL varies based on shoreline orientation and the proposed adjacent land plan.

5.3.3 Building Finished Floor

Buildings are inboard of the shoreline perimeter protection area and finished floor elevations will be design based on two conditions. The first is the 1 percent chance SWL elevation, plus an allowance for 66-inches SLR, plus 6-inches of freeboard. The second is the Bay Trail protection elevation plus additional elevation to provide for overland release of storm water from the building pad to the shoreline.

5.3.4 Open Space

Open space inboard of the shoreline perimeter protection area will be designed to allow for drainage away from building and overland release of storm water from the open space over the Bay Trail protection and shoreline.

5.4 Initial Combined Sewer System Design

The new Combined Sewer System (CSS) will be designed to conform to the requirements of the Subdivision Regulations with potential exceptions or design modifications as noted in Section 14, subject to City approval. The 2015 Subdivision Regulations require “that the hydraulic grade line shall, in general, be four feet below the pavement or ground surface, and at no point less than two feet” (referred to as freeboard). Freeboard in the vicinity of the Historic Core fronting 20th Street, Louisiana Street, and 21st Street, where grades cannot be raised because they are constrained by existing historic buildings and streets, will require exception to Subdivision Regulations requirements where freeboard may be less than the required 2-feet in its current condition and cannot be improved enough to meet the requirements of the Subdivision Regulations. At a minimum, the new CSS must maintain freeboard in these areas for all design storms. Developer will submit requests for exception for areas with less-than required freeboard for review and approval by City. See 14.2.6 Existing Condition on 20th Street for additional information. Location and sewer asset-specific design criteria for freeboard as related to SLR scenarios will be consistent with City guidelines (*Guidance for Incorporating SLR into Capital Planning in San Francisco*, 2015), where possible. The CS outfall will require a flap gate, which will be installed at the time of outfall repair.

5.4.1 Stormwater Management

Stormwater Management features will be designed with a minimum of 30 inches of freeboard between hydraulic grade in drainage/underdrainage systems and the CS system at the point of connection. Freeboard will be allowed to reduce to 6-inches with 24-inches of SLR.

5.5 Infrastructure Adaptation for Future SLR

Information relating to monitoring, decision making framework, reporting, funding and improvements are included in Section 5.6.

5.5.1 Shoreline

The shoreline area will experience more frequent inundation with SLR. Elevation in this area will not be modified, however improvements will be made to protect the area from erosion caused by wave action and runoff.

5.5.2 Bay Trail

For SLR values greater than the 24-inches, the perimeter designs will provide the ability to make future changes to the perimeter if over topping of the Bay Trail area protection becomes a nuisance or hazardous at some locations. The appropriate type of adjustments will be determined through the decision making framework described below and may include increasing the shoreline elevations through the construction of small berms or low walls, or other appropriate measures.

5.5.3 Building Finished Floor

Building finished floor elevations is not anticipated. SLR beyond an elevation that may impact building finished floor elevations will require perimeter and storm water system improvements to protect the structures.

5.5.4 Open Space

Future adaptation of open space areas is not anticipated. SLR beyond an elevation that may impact the open space will require perimeter storm water system improvements for SLR protection.

5.5.5 Combined Sewer System

The new CSS will be designed to accommodate modification in the future in response to SLR. Modification will include the addition of pump stations near the CSS diversion structures (Central Basin outfalls 30 and 30A) that allow discharge to San Francisco Bay. Ownership and operation of SLR pump stations will be determined in the development of adaptive management strategy (see Section 5.2). After 66 inches SLR, additional perimeter protection will be required for the replacement 20th Street Pump Station.

5.5.5.1 Stormwater Management

Future adaptation of Stormwater Management features is not anticipated. Beyond 24-inches SLR, the CSS modifications mentioned in the section above will also mitigate SLR impacts to the Stormwater Management features.

5.6 SLR Monitoring Program

As part of the Project, monitoring program will be created to review and synthesize SLR estimates prepared for San Francisco Bay by the National Oceanic Atmospheric Administration and State Agencies. The monitoring program will require periodic review of updated SLR guidance from Local, State and Federal regulatory agencies. The monitoring program will be managed by the Shoreline Adaptation Community Facilities District (SACFD). Monitoring program will be coordinated with City programs addressing SLR.

5.6.1 Decision Making Framework

When the data from the monitoring program demonstrates that SLR in San Francisco Bay is expected to exceed the allowances designed for in the initial improvements, a range of additional improvements can be made to protect the Project from flooding and periodic wave overtopping. Planning, design, and review

takes significant amount of time, thus work will begin on improvements before those SLR effects are problematic. In coordination with the City, the SACFD will be responsible for determination of decision on which improvements will be made at the time improvements are required, which will depend on a variety of factors, including, but not limited to:

- Consultation with the SFPUC and other local agencies,
- New Local, State or Federal requirements about how to address SLR,
- Available technology and industry best practices at the time, and
- Both the observed rate of actual SLR and updated estimates of future SLR

5.6.2 Sea Level Rise Monitoring and Implementation Report

The monitoring program will require periodic preparation of a report on the progress of the adaptive management strategy. SACFD will commission the report which will be prepared no less than every 5 years and more frequently if required by regulators. The report will include:

- The publication of the data collected and literature reviewed under the monitoring program,
- A review of changes in Local, State or Federal regulatory environment related to SLR, and a discussion of how the Project is complying with applicable new regulatory requirements.
- A discussion of the improvements recommended to be made if sea levels reach the anticipated thresholds identified in the Decision Making Frameworks within the next 5-years, and
- A report of the funds collected for implementation of the adaptive management strategy, and a projection of funds anticipated to be available in the future.

5.6.3 Funding Mechanism

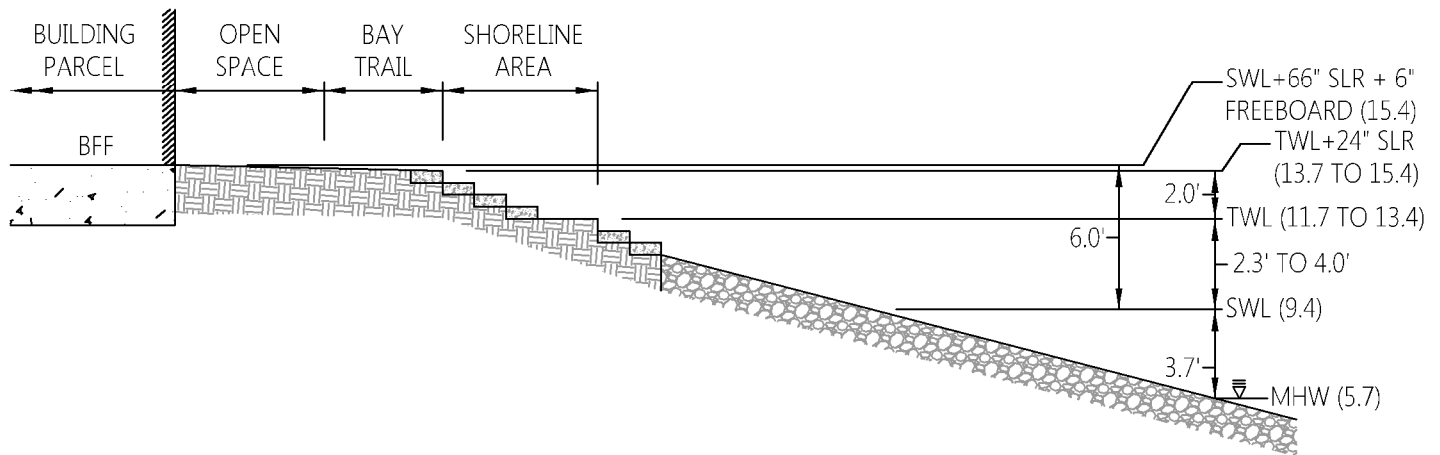
The Project's financing plan includes a Shoreline Adaptation tax to create project-generated funding that will be dedicated to paying for monitoring and flood protection improvements necessary to implement the Adaptive Management Strategy. Funds will be overseen by the SACFD.

ABBREVIATIONS:

SWL STILL WATER LEVEL
 TWL TOTAL WATER LEVEL
 BFF BUILDING FINISHED FLOOR
 MHW MEAN HIGH WATER
 SLR SEA LEVEL RISE
 ELEV ELEVATION

LEGEND:

(XX.X) ELEVATION



NOTE: 1. ELEVATIONS PROVIDED IN SFVD13 DATUM

TABLE 5.1 - MINIMUM DESIGN CRITERIA

AREA	MINIMUM DESIGN CRITERIA
SHORELINE	SHORELINE BASE FLOOD ELEVATION (TWL) + 0-INCHES SLR
BAY TRAIL	SHORELINE BASE FLOOD ELEVATION (TWL) + 24-INCHES SLR
BUILDING FINISHED FLOOR	BASE FLOOD ELEVATION (SWL) + 66-INCHES SLR + 6-INCHES FREEBOARD
OPEN SPACE	DRAINAGE AWAY FROM STRUCTURES, OVERLAND RELEASE OVER BAY TRAIL

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 PLOT DATE: 09-18-17
 PLOTTED BY: rals

6. Geotechnical Conditions

6.1 Existing Site Geotechnical Conditions

The Project Site was formerly occupied by serpentinite bluffs overlooking tidal mud flats extending into San Francisco Bay. The western portion of the site was occupied by a large hill, referred to as Irish Hill. Rock from blasting and quarrying of Potrero Point and Irish Hill during the late 1800s and early 1900s was placed in the tidal areas to extend and develop the shoreline toward the east. The Pier 70 area was previously occupied by shipbuilding and ironwork industries. The concrete ship slipways (Slipways 5 through 8) constructed in the early 1940s for ship construction and maintenance, are buried within the southeastern portion of the site. The portion of the site west of the 1869 shoreline is underlain by shallow bedrock; east of the 1869 shoreline the site is underlain by fill, Bay Mud, clay and sand, and bedrock. High groundwater level at the Project Site corresponds to the level of the San Francisco Bay. Groundwater may be present within fractures and sand seams in the bedrock at higher elevations (western portion of the site.).

6.2 Site Geotechnical Approach

The Developer's Infrastructure obligations include the design and construction of certain geotechnical improvements within the Developer Obligation Area identified in Figure 1.0.

6.2.1 Shoreline Stabilization

Preliminary analysis indicates the shoreline could be subject to lateral slope displacement under seismic loading. The amount of displacement predicted would not be tolerable for rehabilitated or proposed buildings or sensitive infrastructure within a certain distance from the shoreline. Lateral displacement can be mitigated by reinforcing this slope with a structural wall or ground improvement along the shoreline. Structural wall solutions may include but are not limited to tied-back sheet pile walls, rows of secant piles, and king-pile walls. Ground improvement may

consist of treatments such as deep soil mixing (DSM), vibro-compaction, vibro-replacement, and deep dynamic compaction.

6.2.2 Surcharging

Portions of the site are underlain by Bay Mud where artificial fill was historically placed beyond the original shoreline. Bay Mud can undergo excessive settlement over long periods of time, especially under new fill or building loads. Potential options for addressing consolidation of the Bay Mud underlying design loads include use of deep foundations to support the new loads or installation of wick drains and surcharging areas where grades will be raised or relatively light structures are planned.

The portion of the Project Site situated over the concrete slipways is not expected to undergo settlement under the weight of new fill loads as the slipways are supported by a vast number of pile foundations bearing on competent material below.

6.3 Phases of Geotechnical Stabilization

The geotechnical stabilization will be completed in phases to match the Phases of the Project. The extent of geotechnical stabilization will be the minimum necessary for the current Phase.

6.4 Schedule for Additional Geotechnical Studies

Developer will perform design-level geotechnical studies prior to commencing preparation of Phase Improvement Plans and submit to the City for review as part of the Basis of Design. The design level geotechnical studies will provide a specification for the design of the stabilization program, including monitoring of program results.

7. Site Grading and Drainage

7.1 Existing Site Conditions

The project site has varying topography, sloping up from the San Francisco Bay. From the shoreline for approximately 1,000-feet west, the site is relatively flat rising only approximately 10 feet total from the shoreline. The site then increases in grade steeply and levels off as it approaches Illinois Street with an approximately 30-foot increase in elevation at Illinois Street. Site grading is constrained along the northern boundary, the existing Port historic buildings to remain and 20th Street existing grades at the location of the lowest elevations at the site on 20th Street near the northeast corner of Buildings 113-116. Existing site topography is shown on Figure 7.0. The project site has almost no vegetation, with the exception of a multi-trunk eucalyptus tree and grasses on the Irish Hill which extends approximately 24-feet above surrounding grade, and scattered vegetation in the northeast portion of the 28-Acre Site. Impervious surface covers approximately 98 percent of 28-Acre Site and approximately 43 percent of the Illinois Parcels with most of the remainder of the Illinois Parcel being a rock knoll and compacted gravel.

7.2 Proposed Project Grading Overview

The Developer will be responsible for the design and construction of the proposed grading and retaining walls within the Developer Obligation Area shown in Figure 1.0, including transition areas at the edge of the Developer Obligation Area. Proposed Project grading is shown on Figure 7.1. Proposed grading for the Project raise from the shoreline to approximately elevation 104 POCD or 15 SFVD13 and grades gently toward the west to the approximate beginning of the existing steep slope. The site then grades up steeply, to match grade at Illinois Street. Existing grading at the eastern end of 20th Street and adjacent to the existing historic building to remain constrain grading and limit the Project

ability to modify grading and overland release in these areas. Retaining walls are required to support the public right-of-way at several locations.

7.3 Elevation and Grading Design Criteria

SLR will result in changing water levels in the San Francisco Bay that the project will need to accommodate.

7.3.1 Basic Tide Elevations

Minimum project elevations are based on the FEMA 100-year design tide elevation, or Base Flood Elevation (BFE). The project includes two design criteria. The first is the Still Water Level (SWL) that include the static 100-year tide elevation for design of Development Parcels and the Project combined sewer system. The second criteria is the BFE required Project shoreline protection, or TWL. The TWL elevation varies along the project shoreline and takes into account near shore bathymetry, shoreline grading and coincident events including tides, storm surges, and waves that result in a 1% annual chance of flooding along the shoreline. In addition, the Subdivision Regulation requires combined sewer analysis be based on a tide elevation of 96.5 POCD or 7.9 SFVD13. Required elevations are identified in Section 7.3.4. Shoreline elevations are dependent on an assumed shoreline geometry. The final geometry will be analyzed by the project shoreline engineer to confirm that elevations conform to FEMA requirements.

7.3.2 Potential Sea Level Rise

SLR will result in changing water levels in the San Francisco Bay that the project will need to accommodate. More specific discussion of SLR is included in Section 5. The design criteria employed at the time of this Infrastructure Plan are based on the best scientific forecasts and potential design strategies currently available. The

forecasts will likely change over time and will provide revised guidance for future projects. Allowance for SLR is identified in Section 7.3.4.

7.3.3 Long Term Settlement

As described in Section 6, geotechnical stabilization techniques will be utilized where required to create a stable platform for the proposed development. The stabilization techniques will reduce the potential for settlement due to liquefaction in the sandy soils and compression of the Bay Mud below the site. The final grading plans will be developed to accommodate the additional minimal amounts of long term settlement anticipated due to secondary compression of the soils.

7.3.4 Design Tide Elevations

Design tide elevations are a combination of basic tide elevation with an allowance for SLR. Design tide elevations for the Shoreline, Bay Trail and Building Pads are shown in Table 7.0.0 in reference to the POCD datum and Table 7.0.1 in reference to the SFVD13 datum. The combined sewer is generally designed with a tide elevation of 96.5 POCD or 7.9 SFVD13 and four feet of freeboard, allowing for up to 2 feet of sea level rise while maintaining a potential minimum 2 feet of freeboard. The equipment and structures of the replacement 20th Street Pump Station will be protected from 66 inches of SLR to elevation 103.5 POCD or 14.9 SFVD13. In addition, the Pump Station will be designed and protected from any potential overland flows from uplands upland areas.

Table 7.0.0: Design Tide Elevation, POCD

	Basic Tide Elevation (Feet)	SLR Allowance (Inches)	Freeboard (Inches)	Design Elevation (Feet)
Shoreline	100.3 (min.) 102.1 (max.)	0	0	100.3 (min.) 102.1 (max.)
Bay Trail	100.3 (min.) 102.1 (max.)	24	0	102.3 (min.) 104.1 (max.)
Building Pads	98.0	66	6	104.0

Table 7.0.1: Design Tide Elevation, SFVD13

	Basic Tide Elevation (Feet)	SLR Allowance (Inches)	Freeboard (Inches)	Design Elevation (Feet)
Shoreline	11.65 (min.) 13.45 (max.)	0	0	11.7 (min.) 13.5 (max.)
Bay Trail	11.65 (min.) 13.45 (max.)	24	0	13.7 (min.) 15.5 (max.)
Building Pads	9.35	66	6	15.4

7.4 Site Grading Designs

A description of the grading design for the Project is included below. The conceptual grading plan for the Project are shown on Figure 7.1. Grading may require transition slopes or retaining walls beyond the Developer Obligation Area. The parties will cooperate in good faith in determining the timing and scope of such grading so as not to delay the construction of Development Parcels and associated Phase Infrastructure.

7.4.1 Proposed Building Areas

The minimum grades for the site including the shoreline areas are influenced by the BFE. According to the FEMA requirements, in order for the proposed building areas to be above the Zone A flood plain, the proposed finished floor elevations and below grade garage entrance elevations must remain above the BFE. While FEMA does not require an allowance for sea level rise, the building finish floor elevations will be set to accommodate a minimum 66-inches of SLR plus an additional 6-inches of freeboard. Therefore, the minimum finished floor elevations and garage entrances for the proposed new buildings will be set at 104.0 POCD or 15.4 SFVD13 (BFE + 66-inches + 6-inches). In general, the final building finished floor elevations and garage entrances will increase the further they are from the shoreline to provide overland release to the Bay.

7.4.2 Existing Building 12

The existing elevation of building 12 is lower than the proposed surrounding street elevation. There are currently three grading options considered for Building 12:

- Raising the exterior grade and leaving interior grade as is
- Raising the exterior and interior grade and modifying windows and doors at base of building
- Raising the structural frame along with exterior and interior grade

7.4.3 Proposed Roadway Areas and Retaining Walls

A portion of 20th Street will be raised near the waterfront to provide SLR protection, requiring a retaining wall where there is a grade difference with the BAE Shipyard parking lot. A portion of the northern spur of the remnant of Irish Hill would be removed for construction of 21st Street. Retaining walls would be necessary along both sides of portions of 21st Street to retain Irish Hill, to address the grade

difference between 21st Street and Michigan Street and to protect the adjacent existing Building 116 to remain. The reconfigured 22nd Street would also require a retaining wall to accommodate the proposed elevation difference between the streets and the adjacent PG&E facility to the south. Retaining walls will be outside of right of way and privately owned and maintained.

Some streets will be graded using a "saw tooth" design with a minimum 0.5% slope between grade breaks. Saw toothed grading alternates between high and low points creating a pattern resembling the edge of a saw. This pattern allows for positive drainage in the streets while maintaining minimal elevation differences between the high and low points. See Figure 7.2 for illustration of saw tooth grading.

The "saw-tooth" grading plan will be developed in conjunction with the design of the stormwater system. The run-off from a 100-year storm during a 100-year tide will be contained within the storm drain system below the street curb lines.

The "saw tooth" grading plan will provide overland release paths by increasing the elevation of the high points so that the downstream high point elevation of the flow line in the gutter is equal to or lower than the top of curb elevation at the upstream low point. The downstream high point may be raised to the back of walk/right of way line if an acceptable wastewater vent trap detail, backwater valve, or other alternate design solution is approved by the SFPUC. This overland release design will protect the new building finished floors from storm/tides larger than the 5-year event or system maintenance issue such as blocked catch basin or pipes. This will continue through the downstream basins until there is capacity in the storm system or storm water is released to the open space. The new building finish floor elevations will be above the back of walk/right of way elevation and therefore

protected from flooding. Also some areas of the site are straight graded and direct overland flow to open space areas or the bay.

7.4.4 Open Space Areas

The Bay Trail along the shoreline would have minimum design elevations ranging from 102.3 to 104.1 POCD or 13.7 to 15.5 SFVD13. These elevations would allow for 24- inches of SLR. Grade will increase gradually west of the Bay Trail to provide positive overland release, including open space areas. The shoreline area east of the Bay Trail would be designed to provide safe public access to the water in the near term and allow for adaptive management over the longer term.

7.5 Proposed Site Grading Conforms

Project grading will conform to existing grades to remain at project boundaries or construct walls to address abrupt changes in grade. At the south edge of the site, roads and parcels generally conform to the property south of the project site. A portion of the reconstruction of 22nd Street will require a retaining wall or embankment to address grade change to the south, adjacent to the PG&E Switchyard. At the west edge of the site, grading will conform to existing grades at Illinois Street. At the north edge of the site, grading will generally conform to existing grades, with exception to the east end of 20th Street which transitions to proposed grades up to 3 feet higher than existing to conform to proposed grading at the Bay Trail. Grades at the Bay Trail will be raised to address future sea level rise. For additional information regarding sea level rise and adaptive management strategies refer to Section 5 of this document.

7.6 Cut/Fill Quantities

While the Developer is only responsible for grading within the Developer Obligation Area, soil from the Remainder Area will be made available for use as fill throughout the site.

Table 7.1 summarizes the cut and fill quantities for the Developer Obligation Area and Remainder Areas:

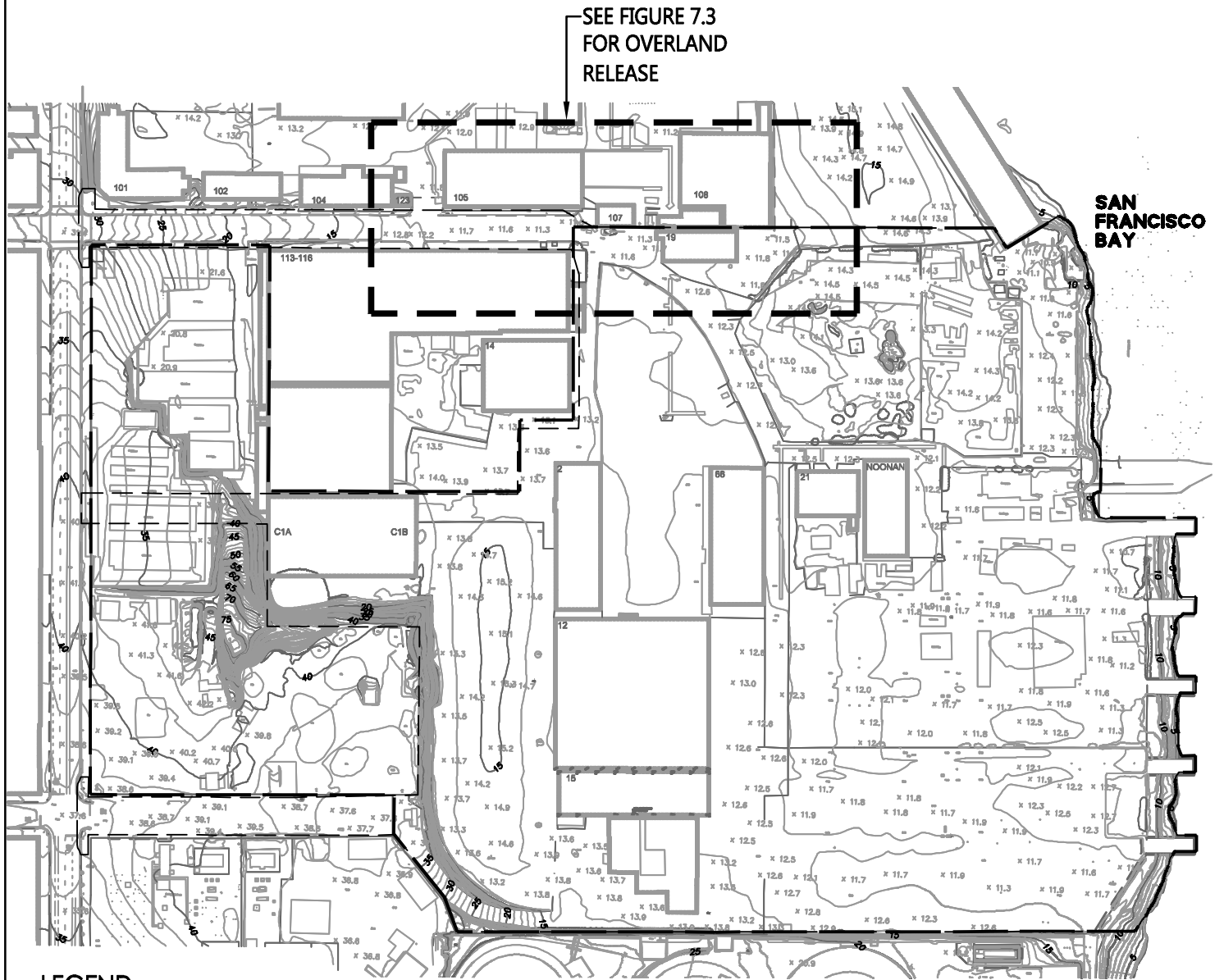
Table 7.1: Cut and Fill Summary

	Cut (Cubic Yards)	Fill (Cubic Yards)
Developer Obligation Area	115,155	119,518
Remainder Area	49,122	5,402




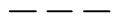
7.7 Phases of Site Earthwork

Grading will occur based on the principle of adjacency and as needed to facilitate a specific proposed Development Phase and consistent with the Project Phasing Plan to be approved with the Basis of Design. The amount and location of the grading proposed will be the minimum necessary to support the Development Phase. The new Development Phase will conform to the existing grades as close to the edge of the Development Phase area as possible while maintaining the integrity of the remainder of the Project. Interim grading will be constructed and maintained as necessary to support existing facilities impacted by proposed Development Phases.

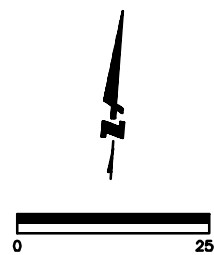
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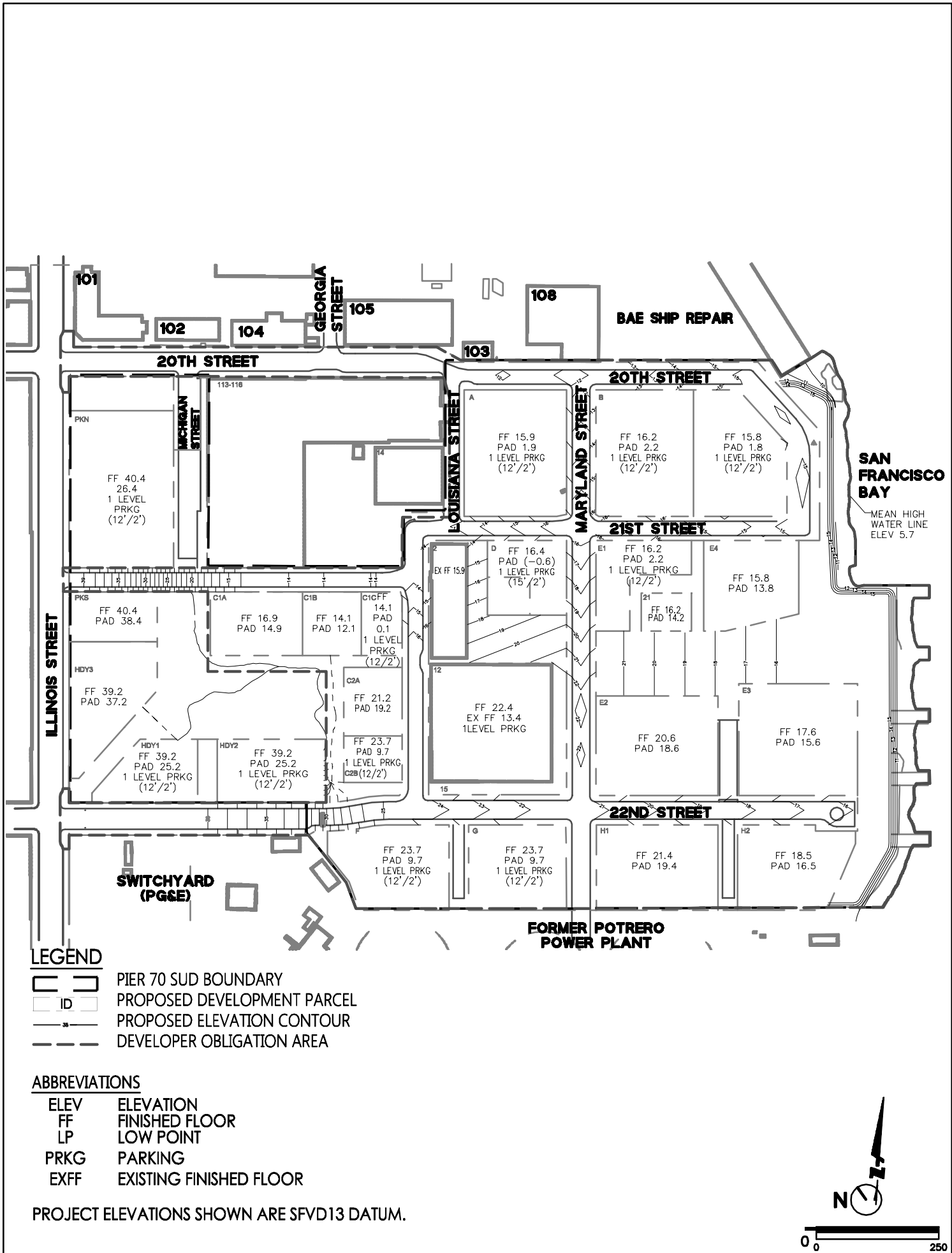
LEGEND

-  PIER 70 SUD BOUNDARY
-  EXISTING ELEVATION CONTOUR
-  DEVELOPER OBLIGATION AREA
-  28-ACRE SITE BOUNDARY

PROJECT ELEVATIONS SHOWN ARE SFVD13 DATUM.



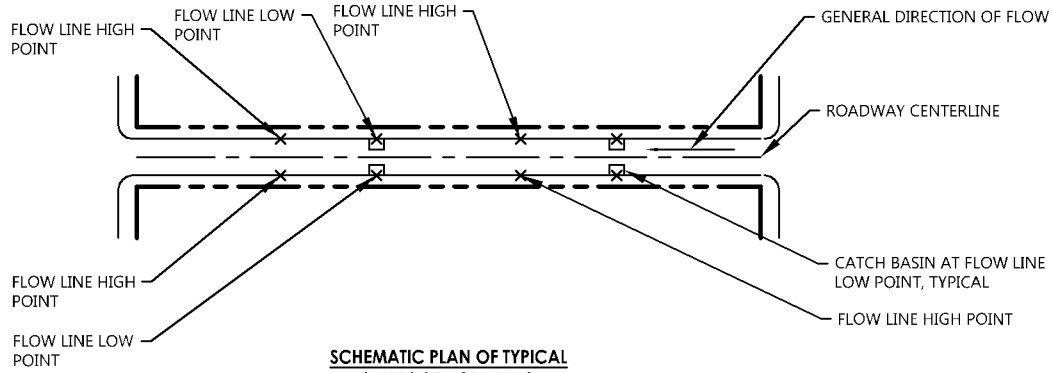
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 PLOTTED BY: rals



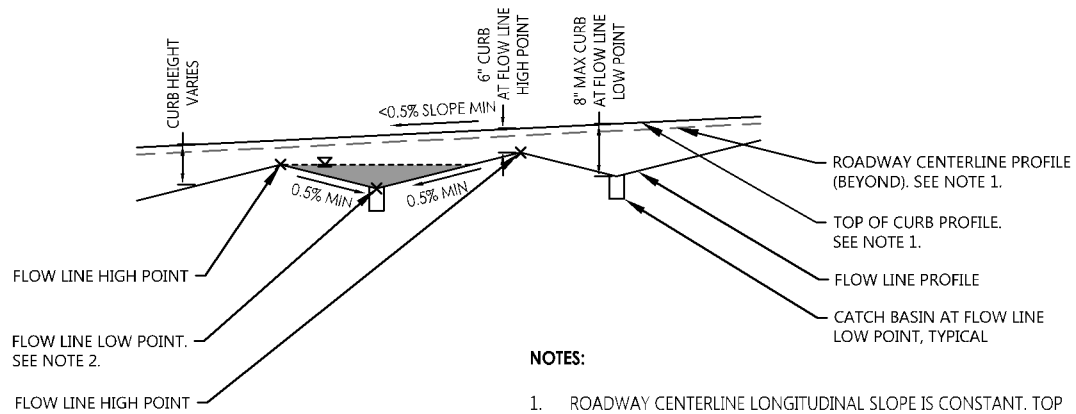
PIER 70 SUD INFRASTRUCTURE PLAN

FIGURE 7.1: PROPOSED GRADING

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SCHEMATIC PLAN OF TYPICAL SAWTOOTH GRADING



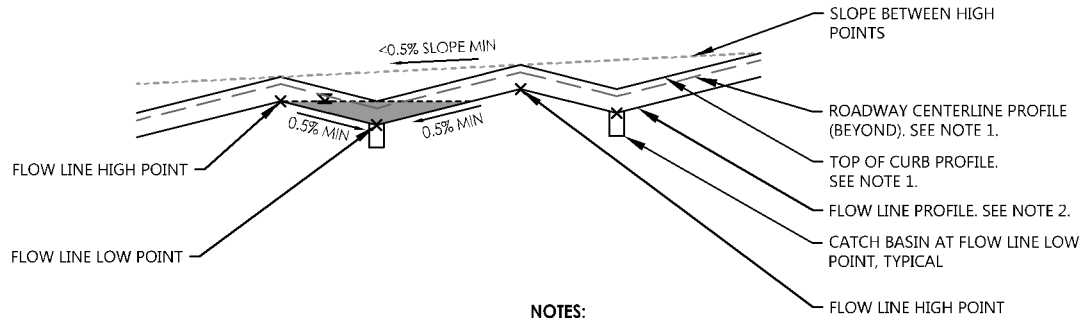
OPTION 1

SCHEMATIC PROFILE OF FLOWLINE SAWTOOTH GRADING WITH CONSTANT SLOPE CENTERLINE AND TOP OF CURB

NOTES:

1. ROADWAY CENTERLINE LONGITUDINAL SLOPE IS CONSTANT. TOP OF CURB FOLLOWS ROADWAY CENTERLINE PROFILE.

STREET CROSS SLOPE VARIES BETWEEN 2% AND 5% AND CURB HEIGHT VARIES BETWEEN 6-INCHES AND 8-INCHES (EXCEPT AT CURB RETURNS, CROSSWALKS, ACCESSIBLE PARKING SPACES, AND ACCESSIBLE PASSENGER LOADING ZONES) TO ACHIEVE A FLOW LINE WITH A 0.5% MINIMUM LONGITUDINAL SLOPE.
2. THE LOW POINT OF THE FLOW LINE COINCIDES WITH THE STEEPEST STREET CROSS SLOPE AND 8-INCH CURB.



OPTION 2

SCHEMATIC PROFILE OF FLOW LINE SAWTOOTH GRADING WITH PARALLEL SAWTOOTH ROADWAY CENTERLINE AND TOP OF CURB

NOTES:

1. ROADWAY CENTERLINE PROFILE AND TOP OF CURB FOLLOWS FLOW LINE PROFILE.
2. FLOW LINE HIGH POINT ELEVATIONS ARE LOWER THAN THE UPSTREAM TOP OF CURB LOW POINT ELEVATIONS.

8. Street and Transportation Systems

The Project Site is uniquely situated between the existing Dogpatch neighborhood and the waterfront. Its location means the new street grid is intended to serve local access only at low speeds; there are no throughways designed to move large volumes of traffic between different parts of the City. The streets in the Project Site are a closed loop that represent the end of the road. In addition to vehicular and pedestrian traffic, site infrastructure will also provide for access by bicycles, transit and emergency vehicles.

8.1 Streetscape Master Plan

The Draft Pier 70 SUD Streetscape Master Plan (SSMP), including a Roadway and Utility Sections Supplement, has been submitted for City review and provides additional detail for streetscape design for the project, building upon the Pier 70 SUD Design for Development.

8.2 Public Streets

The proposed primary streets on the project site would be 20th and 22nd streets. The proposed Maryland Street would be a secondary north-south running street, new minor streets proposed as part of the Project include a new 21st Street, running west-to-east from Illinois to the Waterfront, and Louisiana Street, running north from 22nd Street to 20th Street. A jog on Louisiana Street from 21st Street to 20th Street to accommodate existing historic structures within the 20th Street Historic Core would be provided. All proposed streets would include sidewalks, as well as street furniture. With the exception of Louisiana Street between 20th and 21st Street, all proposed streets would be two-way, with a single lane of travel in each direction. Louisiana Street between 20th and 21st Street would be one-way in the southbound direction, with a single lane of travel and a single sidewalk on the east side. The proposed streets would provide access for emergency vehicles and freight loading on the west fronting the Historic Core. Michigan Street, Louisiana Street, and 21st Street would be designed as primary on-street loading corridors.

The roadway network is designed for SU-30 vehicles. Additionally, vehicles accessing the site up to the size of a WB-40, and WB-50 on a limited path (entering 20th Street, south on Louisiana Street, exiting 22nd Street) will be subject to a Driveway and Loading Operations Plan (DLOP) to manage conflicts with truck deliveries and other roadway users. Refer to Section 2.7 of the SSMP regarding commercial truck access to the Project.

As part of the Proposed Project, Michigan Street between 21st Street and 20th Street will be vacated. Street vacation to be submitted in the future will be consistent with the approved SSMP.

Portions of the existing site are subject to the State Lands Public Trust (Trust) including existing and proposed street right of way, and proposed development parcels and open space. Proposed development parcels will be removed from the Trust in exchange for additional Trust over proposed streets and open space areas. Figure 8.0 shows streets that will be located in the future Trust and Figure for 9.0 shows open space that will be located in the future Trust.

The proposed right-of-way width will be preliminarily approved as part of the MUPs and SSMP separately, which includes a Roadway and Utility Sections Supplement providing detailed sections of each street segment. The Developer will be responsible for design and construction of streets within the Developer Obligation Area. See table 8.0 for further detail regarding street configuration and responsibility.

8.2.1 Roadway Dimensions

Table 8.0: Right-of-Way Dimensions

Street	Responsibility	Right-of-Way Width (feet)	Street Elements with Width(feet)
20 th Street between Illinois Street and Georgia Street)	Developer	66	14 SW/8 P/11 S/11 S/8 P/ 14 SW* (*Sidewalk width may vary due to historic structure encroachments)
20 th Street between Georgia Street and Louisiana Street	Developer	66	17 BT*/8 P/11 TL/11 TL/8 P/ 11 SW* (width varies due to irregular historic building frontages)
20 th Street between Louisiana Street and Waterfront	Developer	57	16 BT/11 TL/10 TL/8 P/12 SW
20 th Street at Waterfront	Developer	67	15 SW/8 P/12 TL/12 TL/ 20 BT
21 st Street	Developer	49	10 SW/11 TL/10 TL/8 P/10 SW
22 nd Street between Illinois Street and SUD Boundary	Developer	66	12 SW/5.5 B/11 TL/11 S/5.5 B/ 9 P/12 SW
22 nd Street between SUD Boundary and Louisiana Street	Developer	60	12 SW/7 B/11 TL/11 S/7 B/ 12 SW
22 st Street between Louisiana Street and Maryland Street	Developer	62	12 SW/8 P/11 S/11 S/8 P/12 SW
22 nd Street between Maryland Street and Waterfront	Developer	60	12 SW/8 P/10 S/10 S/8 P/12 SW
Louisiana Street between 20 th Street and 21 st Street*	Developer	30	20 TL/10 SW
Louisiana Street between 21 st and 22 nd Street	Developer	54	12 SW/11 TL/11 TL/ 8 P/12 SW
Maryland Street north of 22 nd Street	Developer	60	12 SW/8 P/10 S/10 S/8 P/12 SW
Maryland Street south of 22 nd Street	Developer	62	12 SW/8 P/11 TL/11 TL/8 P/ 12 SW
Michigan Street*	Other	54.5	10 SW/13 TL/ 13 TL/ 18.5 L

* May be Port-owned private street

Abbreviations			
ROW	Right-of-Way	BT	Bay Trail
TL	Travel Lane	S	Sharrow
SW	Sidewalk	L	Loading
B	Bicycle Lane	E	Easement
P	Parking		
L	Loading		

8.3 Bicycle Access

The project extends regional Bay Trail and Blue Greenway along the shoreline and adds additional designated Class 2 and sharrow (class three) bicycle routes for connectivity from Illinois Street through the site. See Figure 8.1 for proposed bicycle routes. Refer to Section 2.3.2 of the SSMP for additional information and detail regarding bicycle routes and circulation. SFMTA retains the right to modify facilities post-construction after street acceptance as demand requires.

8.4 Transit Access

The project will establish a Transit Management Agency (TMA) to coordinate and implement Transportation Demand Management (TDM) strategies and provide a shuttle service to connect the site to regional transit hubs including BART and Caltrain. A route for TMA shuttles has been designated as shown on Figure 8.2.

Additionally, SFMTA is currently analyzing potential MUNI routes for access to Pier 70 and has indicated the route as shown on Figure 8.2. There will be a bus stop in both the inbound and outbound direction to be constructed prior to commencement of the MUNI bus route. The project will provide bus bulbs at these locations for effective bus loading operations, per SFMTA request.

Refer to Section 2.8 of the SSMP and Pier 70 SUD Vehicle Turning Supplement for additional information regarding transit access and specific turning studies for vehicle turning through the transit routes indicated.

8.5 Streetscape Design Considerations

8.5.1 Raised Streets

Based on its location and historic industrial character, the Project proposes a series of Raised Streets – a curbless street variant of Shared Public Ways as defined in the

San Francisco Better Streets Plan (BSP) – on 20th at the Waterfront and Maryland Street between 21st and 22nd Streets, where pedestrian activity in the vicinity of retail, adjacent plazas and parks will be more intensive than other parts of the site. The design intent is to calm traffic moving through this area to create a safe environment for pedestrians that encourages public recreational use and socialization. In order to distinguish from the BSP Shared Public Way category, which is intended to apply to small streets and prioritizes pedestrian use of the entire right-of-way over vehicles and bicycles, the term “Raised Streets” is introduced to capture the concept as applied in the Project. Within the Raised Streets, specific crosswalk locations will be provided to designate where pedestrians have priority to cross and parking lanes help separate the pedestrian zone from travel lanes. Drainage of Raised Streets is addressed in Section 14.2.8,.

8.5.2 Traffic Calming

Roadways are designed as local streets with minimum lane widths with a strategic layout to avoid throughways, intended to reduce speeds and promote pedestrian and bicycle safety. In addition, raised streets and streetscape features such as bulbouts have been included to further the same purpose.

8.5.3 Fire Department Access

Fire trucks will utilize the entire travel way for turning movements at intersections. Intersections will be designed to provide 7-foot clear when fire trucks enter on-coming travel lanes. Fire truck turnaround locations will be coordinated with the SFFD and constructed consistent with the Fire Code at dead-end street locations.

The final street layouts and cross sections are detailed in the SSMP. The final configurations will be reviewed by the SFFD for conformance to the Fire Code.

Refer to Pier 70 SUD Vehicular Turning Supplement for detailed fire truck turning studies through proposed roadway network.

8.5.4 Street Pavement, Curb and Gutter, and Sidewalk Sections

The existing portions of 20th and 22nd Streets within the Developer Obligation Area will be reconstructed as a part of the Project. The City standard structural section for reconstructed existing and new on-grade roadways consists of eight inches of Portland Cement Concrete and two-inch asphalt concrete wearing surface. Alternative cross sections such as asphalt wearing surface over Class 2 aggregate base, cobblestones, decorative paving, and porous paving may be used if approved by the Acquiring Agency. City standard roadways will be maintained by the Acquiring Agency. Alternative materials have been proposed as a part of the SSMP and will be maintained by an Independent Maintenance Entity to be established by the project.

City standard curb and gutter will be maintained by the Acquiring Agency. Sidewalks and non-standard curb conditions such as flush curbs at raised streets, if approved by the Acquiring Agency and any affected City Department, will be maintained by an Independent Maintenance Entity to be established by the Project.

Based on Measure M-TR-10 of the Mitigation Monitoring and Reporting Program for the Pier 70 Mixed-Use District Project (MMRP) on Illinois Street, the Developer will replace curb ramps on east side at 20th Street intersection, construct new curb ramps on east side at newly constructed 21st Street intersection, and replace curb ramps on four corners at 22nd Street intersection. Replacement of the sidewalk on east side of Illinois Street between intersections with 20th, 21st, and 22nd Streets will be the responsibility of others, and will be a minimum of 10 feet in width, with

obstructions such fire hydrants and power poles relocated as feasible to ensure accessible path of travel to and from Project.

Paving in Illinois Street will be restored as needed based on utility trenching.

8.5.5 Street Lights

Streetlighting units - consisting of poles, foundations, and fixtures - will be designed and constructed for the proposed roadway network. Street lighting shall comply with City of San Francisco standards. The SSMP identifies a set of lamp fixtures and fixture types that will be specified, and surplus stock will be provided for repair and replacement of street lights by SFPUC. Project may submit street lighting units to the City for approval, and if not acceptable, the poles, foundations, and fixtures will be maintained by the project through an Independent Maintenance Entity through an MEP. The City, at its discretion, may choose to maintain approved fixtures and related electrical wiring on private poles through an agreement with the Independent Maintenance Entity.

8.6 Traffic Control and Signalization

The project will design and construct signalization to be implemented at the offsite intersections of Illinois Street at 20th Street and 22nd Street (based on MMRP Measure M-TR-10), as well as at the new intersection created at Illinois Street and 21st Street.

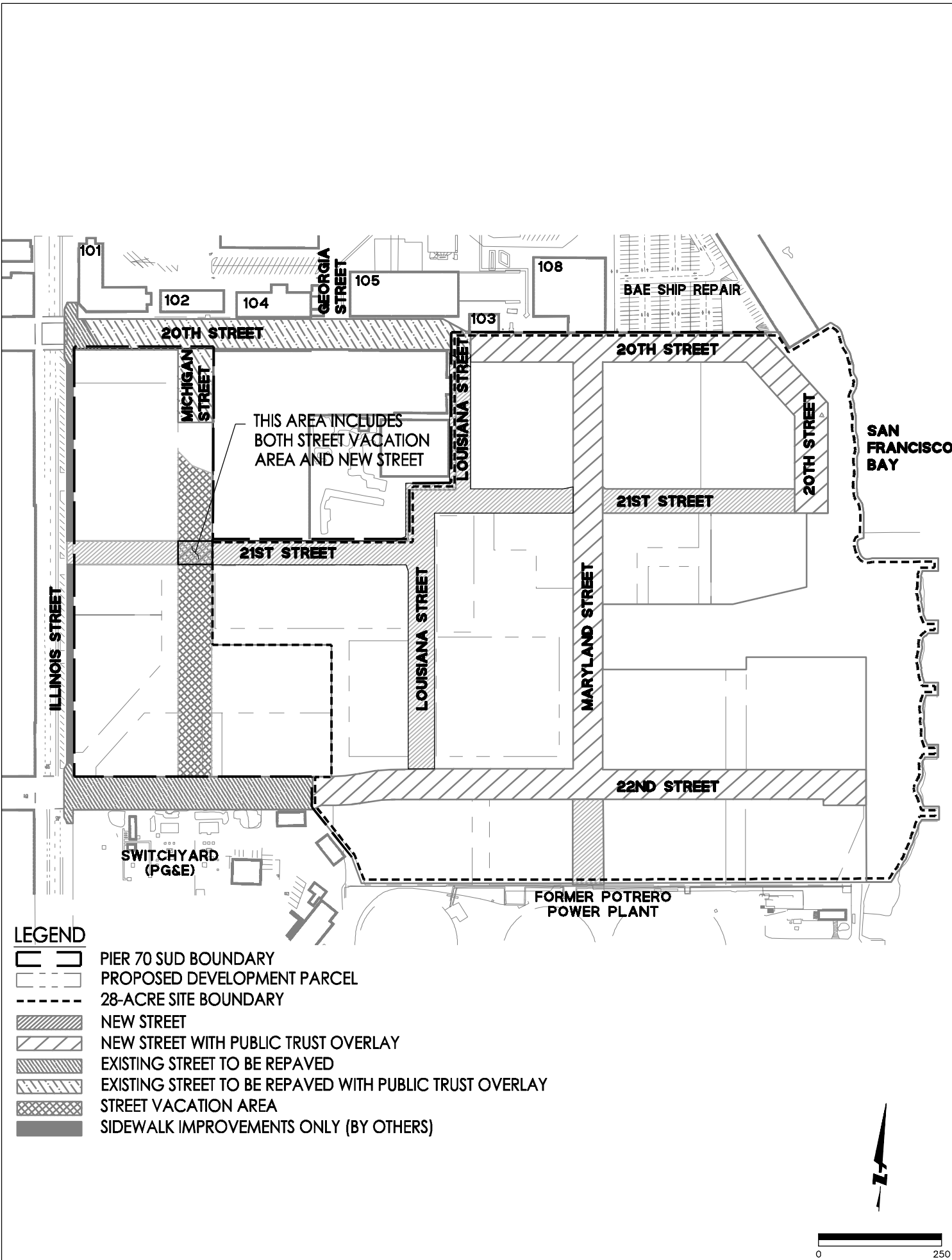
8.7 Maintenance and Street Acceptance

The Acquiring Agency will be responsible for maintenance and repair of the roadways under its ownership, except as otherwise agreed to and permitted through an MEP. The Developer will be responsible for maintenance of new and/or improved public streets within the Developer Obligation Area until such time as they are accepted by the Acquiring Agency for maintenance and liability purposes.

Upon acceptance of the new and/or improved public streets by the Acquiring Agency, responsibility for the operation and maintenance of the roadway and streetscape elements will be designated as defined in the various City of San Francisco Municipal Codes, except as otherwise agreed to and permitted through an MEP. An Independent Maintenance Entity, such as a Maintenance Community Facilities District (Maintenance CFD), will be established prior to occupancy and will provide a comprehensive management approach for those items that fall outside of the City's responsibility.

8.8 Phasing of Improvements

The new roadway system will be constructed in phases to match the Phases of the Project. The amount of the existing roadway repaired and/or replaced will be the minimum necessary to serve the Phase. The Phase will connect to the existing roadways as close to the edge of the Phase area as possible while maintaining safe access to the new development and the remainder of the Project site. The existing land uses will continue to utilize the existing roadways until replaced with new roadways. Bus stops will be added just prior to commencement of the MUNI bus route or with the last phase, whichever is earlier, and not necessarily with the phase in which they are located. Repairs and/or replacement of the existing facilities will be made as necessary to serve the Phase. Fire truck turnaround areas will be coordinated with the SFFD consistent with the Fire Code.

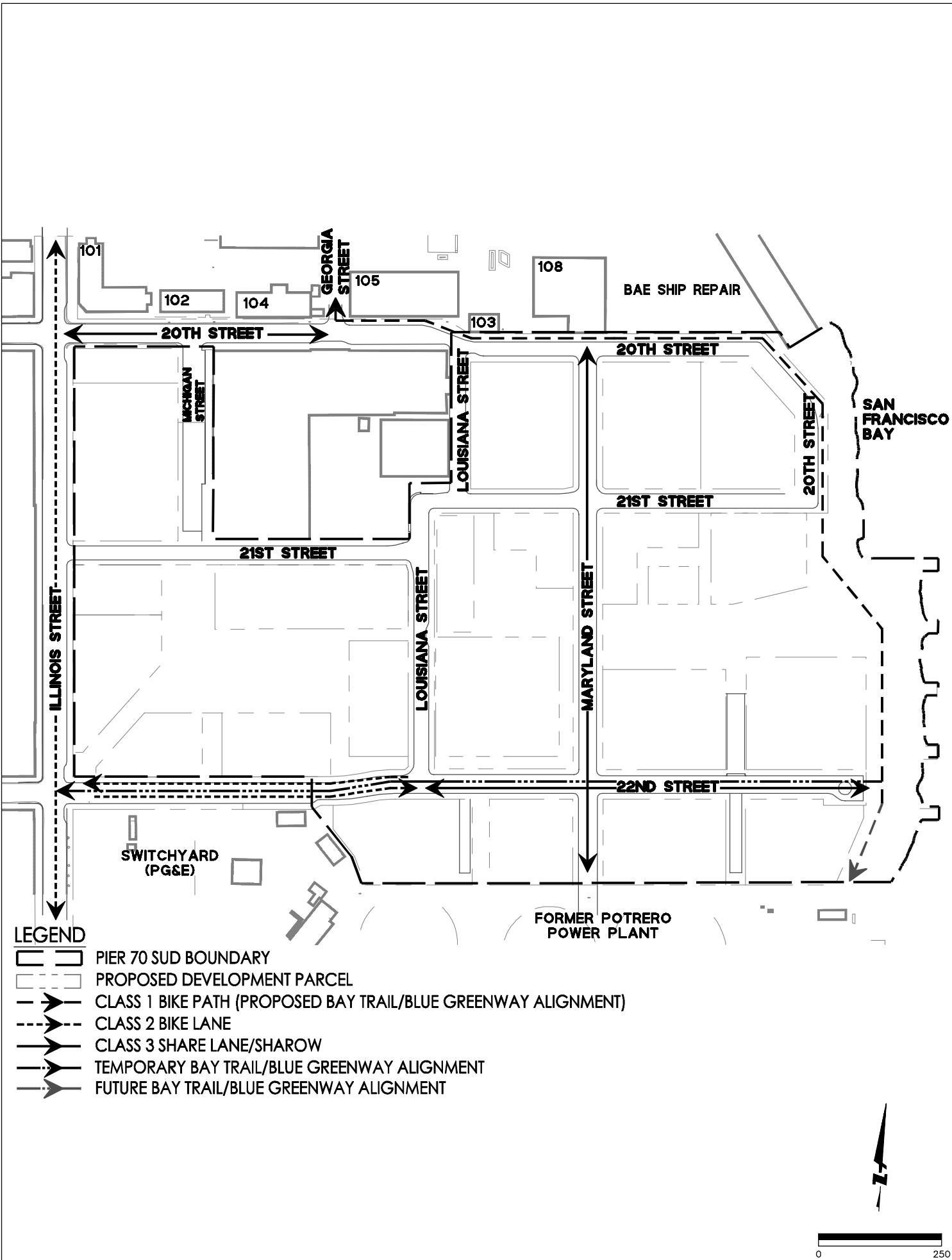


LEGEND

- PIER 70 SUD BOUNDARY
- PROPOSED DEVELOPMENT PARCEL
- 28-ACRE SITE BOUNDARY
- NEW STREET
- NEW STREET WITH PUBLIC TRUST OVERLAY
- EXISTING STREET TO BE REPAVED
- EXISTING STREET TO BE REPAVED WITH PUBLIC TRUST OVERLAY
- STREET VACATION AREA
- SIDEWALK IMPROVEMENTS ONLY (BY OTHERS)



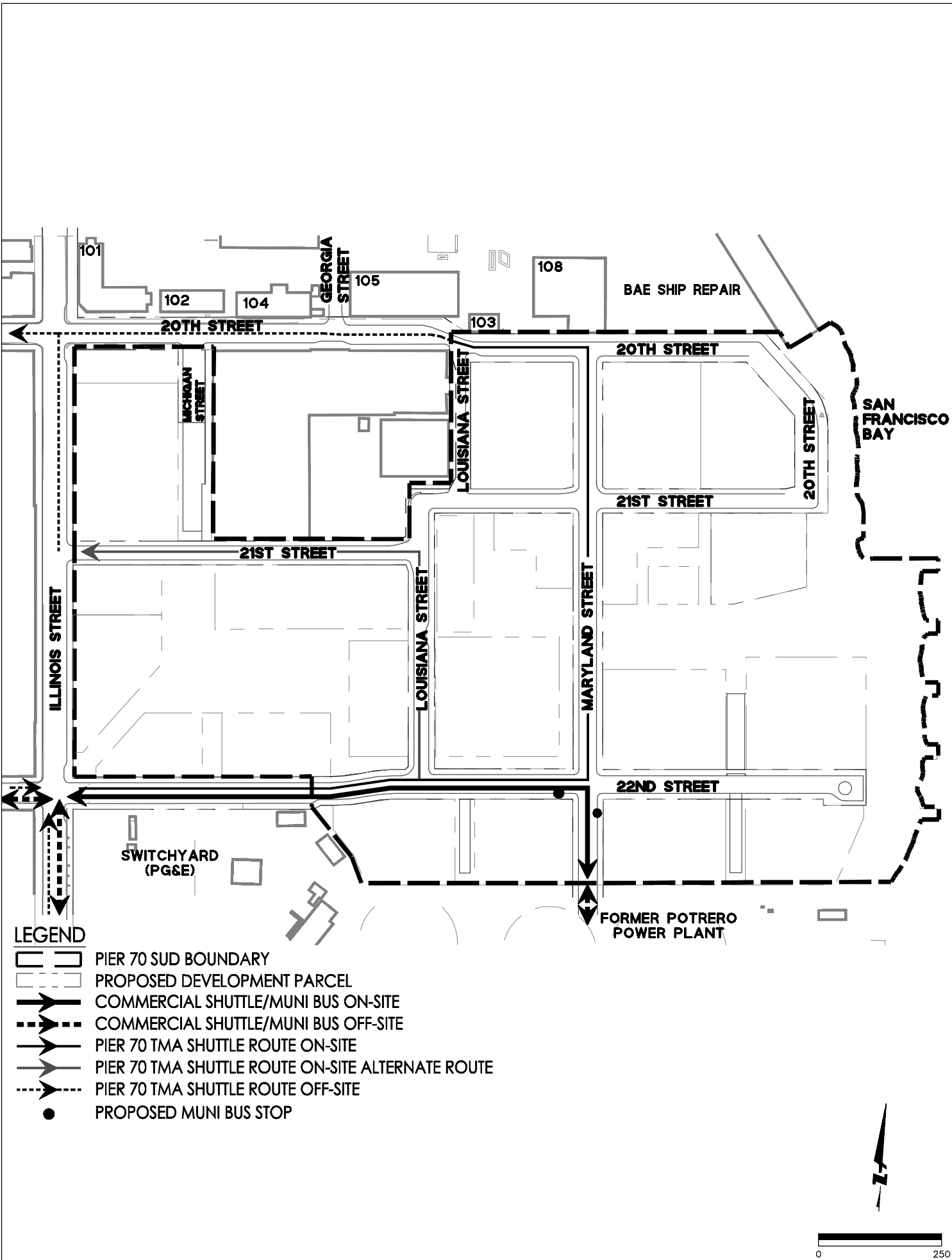
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 PLOTTED BY: rals



LEGEND

- PIER 70 SUD BOUNDARY
- PROPOSED DEVELOPMENT PARCEL
- CLASS 1 BIKE PATH (PROPOSED BAY TRAIL/BLUE GREENWAY ALIGNMENT)
- CLASS 2 BIKE LANE
- CLASS 3 SHARE LANE/SHAROW
- TEMPORARY BAY TRAIL/BLUE GREENWAY ALIGNMENT
- FUTURE BAY TRAIL/BLUE GREENWAY ALIGNMENT

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FIGURE 8.2: TRANSIT ROUTE

9. Open Space and Parks

9.1 Open Space and Parks Overview

New parks will include open plazas adjacent to historic buildings, linear commons lined with retail uses, a waterfront promenade, a waterfront terrace with multi-use lawn, the extension of the Bay Trail through the Project site, a playground nestled between several buildings and a hill, and mid-block passages connecting the public realm to streets.

The proposed open space and parks respond to several key objectives:

1. To connect the Dogpatch neighborhood to the waterfront
2. To create a variety of vibrant public spaces for social interaction and respite
3. To enhance the resiliency of the site against sea-level rise
4. To retain a defining feature of the Historic District open areas
5. To project an identity for the site that draws from the character of the adjacent neighborhood and the history of the Pier 70 industrial waterfront.

In total approximately nine acres of parks will be provided within the Project. The proposed open space would supplement recreational amenities in the vicinity of the project site, such as the new Crane Cove Park in the northwestern part of Pier 70, and would include extension of the Blue Greenway and Bay Trail through the southern half of Pier 70 within the Project area.

These open spaces are anticipated to accommodate everyday passive uses as well as public outdoor events, including art exhibitions, theater performances, cultural events, outdoor fairs, festivals and markets, outdoor film screenings, evening/night markets, food events, street fairs, and lecture services. Fewer than 100 events per year are anticipated, including approximately 25 mid-size events attracting attendance between 500-750 people, and four larger-size events attracting up to 5,000 people.

Improvements in the Park and Open Space parcels will be subject to a site specific storm water management plan, which may include the presence of storm water features as part of a comprehensive storm water management approach for the Project. Some parks and open spaces will be subject to utility easements that may impact proposed improvements.

In addition to these publicly accessible open space areas, the Project could potentially include private open space areas such as balconies, rooftops, and courtyards that would be accessible only to building occupants.

Since the Project will install or modify 500 square feet or more of landscape area, compliance with San Francisco's Water Efficient Irrigation Ordinance, adopted as Chapter 63 of the San Francisco Administrative Code and the SFPUC Rules & Regulations Regarding Water Service to Customers. Compliance will be documented with improvement plans to be reviewed and approved by SFPUC prior to construction.

9.2 Proposed Open Space and Parks to be Built by Developer – Developer Obligation Area

The Developer's Infrastructure obligations include the design and construction of the open space and park improvements within the Developer Obligation Area as summarized below in Table 4. A brief description of the new parks, open space facilities, and the Bay Trail is provided further below. Figure 9.0 illustrates the location of the proposed parks and open space.

Table 9.0: Proposed Parks and Open Space – Developer Obligation Area

Park	ID	Suggested Programming
Waterfront Promenade	WP-1	Multi-use Bay Trail, café dining terraces, furnished picnic and seating, shoreline pathway to craneway piers, viewing pavilions, large-scale public art and artifact pieces, public program uses
Waterfront Promenade	WP-2	
Waterfront Terrace	WTP	Multi-use Bay Trail, viewing pavilion, a social lawn, and eating/drinking area with picnicking, seating, and food and beverage operations.
Slipways Commons	SC-1	Connect interior to the waterfront, multipurpose uses including community gatherings, festivals, performances, art installations, nighttime and cultural events, café terrace, an event plaza and a viewing pavilion.
Slipways Commons	SC-2	
Market Square	OS-1	Outdoor market space, social centerpiece, pedestrian hub, informal and formal events, flexible space for open-air markets, market stalls, and small performances and gatherings
Building 12 Plaza	OS-2	Small plazas along edges of Building 12, display of artwork, seating, and ground-floor uses within building to extend outside, including café terrace, metal-frame remnant of Building 15
Parcel C2 Plaza	OS-3	Plaza located along the southern frontage of C2 with direct views of Building 12 at the core of the Project
Mid-Block Passages	-	Pedestrian amenities including seating, landscaping, pedestrian lighting, public art, retail displays, café access, temporary kiosks and/or food and retail trucks, as feasible

9.2.1 Waterfront Promenade (WP-1, WP-2)

The Waterfront Promenade would encompass a minimum 100-foot-wide portion of an approximately 5-acre waterfront park area (which includes the Waterfront Terrace and Slipways Commons open space areas, described below) located along

the central and southern shoreline of the project site. The Waterfront Promenade would include a north-south running pedestrian and bicycle promenade as part of the 20-foot-wide Blue Greenway and Bay Trail system that extends from Mission Creek to the southern San Francisco County line at Candlestick Point. Anticipated features include a café terrace outdoor dining terraces east of Parcel E3 and H2, and furnished picnic and seating terraces east of Parcels E3 and H2, which would provide park users with opportunities for waterfront viewing and passive recreation. A six-foot-wide informal shoreline pathway would run parallel to the rip-rap along the water's edge and would connect the various features at the Bay edge. The Pier 70 craneway piers along the water's edge would also be made accessible to the public and would offer opportunities for fishing and Bayfront viewing, as well as views back to the Pier 70 historic buildings. The Waterfront Promenade installation would include two of four possible viewing pavilions, large-scale public art and artifact pieces, within the project site, which would be designed to emphasize the view of the horizon as well as accommodate a variety of public program uses such as cultural events and gatherings.

9.2.2 Waterfront Terrace (WTP)

The Waterfront Terrace would be constructed along the northern half of the project site's shoreline, just to the north of the Waterfront Promenade, and orient views towards the active and historic shipbuilding activities north of the project site. The Waterfront Terrace includes three primary spaces: a third possible viewing pavilion to the north, a social lawn along the central portion, and an eating/drinking area along the southern portion, which would include picnicking, seating, and food and beverage operations. The Waterfront Terrace would also include the northern portion of the 20-foot-wide Blue Greenway and Bay Trail system within the project site.

There are no alterations planned for the existing dilapidated pier extending from the project site into San Francisco Bay which would remain in place under the Project. The Port through its historic resource consultant has determined that the existing building on the pier has lost its integrity as a contributing resource and the pier is collapsing into the Bay due to damage from winter storms. The dilapidated pier is not part of the Project.

9.2.3 Slipways Commons (SC-1, SC-2)

Slipways Commons open space would connect existing Buildings 2, 12, and 21 to the waterfront. This area would be designed as the most flexible, multipurpose of the open spaces, intended to accommodate community gatherings, festivals, performances, art installations, and nighttime and cultural events, as well as passive recreation during quieter times. Anticipated features include a café terrace and multifunction commons, an event plaza and a viewing pavilion. No streets are planned between Parcels E1, E2, E3 and E4 and Building 21 and the park, in order to maximize recreational use of the park and encourage pedestrian travel. As shown in Figure 2.6.1 of the SSMP, emergency vehicle access will be provided east of Maryland Street within a portion of SC-1 for access to Building 21.

9.2.4 Market Square (OS-1)

The Market Square is an outdoor market space framing the social centerpiece of Project. Market Square would be located directly north of historic Building 12 and east of Building 2 with four pedestrian access points. The approximately 1.5-acre plaza and square would provide the opportunity for informal and formal events, supporting flexible space for open-air markets, market stalls, and small performances and gatherings.

9.2.5 Building 12 Plaza (OS-2)

The Building 12 Plaza are small plazas along the east and southern edges of Building 12 (approximately 23 to 28 feet wide). The plazas will provide opportunities for display of artwork, seating, and ground-floor uses within building to extend outside. The southern plaza would also host a café terrace. The Project would potentially retain a metal-frame remnant of Building 15 above the new 22nd Street, directly south of Building 12.

9.2.6 Parcel C2 Plaza

The Parcel C2 open space includes a small park fronting 22nd Street that will feature enhanced landscaping and potentially limited seating.

9.2.7 Mid-Block Passages

Mid-block passages are publicly accessible pedestrian routes underneath a building or between two adjacent parcels. These paths are designed to connect between various amenities and pedestrian-oriented spaces. They include public staircases and narrow pedestrian paths, as well as alleys that connect between two streets. Some, but not all, mid-block passages are pedestrian-only private ROW that are closed to motorized vehicles. Mid-block passages will not be considered public open space on commercial blocks if building connector is constructed overhead.

9.3 Proposed Open Space and Parks to be Built by Other – Illinois Parcels

The Developer's Infrastructure obligations specifically exclude the design and construction of the open space and park improvements within the Illinois Parcels, as summarized herein.

9.3.1 Irish Hill Playground (IHP)

The Irish Hill Playground installation would be south and east of the existing remnant of Irish Hill. The Irish Hill Playground would include children's play areas (play slope and play pad) and other recreation opportunities, a picnic grove, a lounging terrace, and planted slopes and pathways. The non-native multi-trunk trees located on the remnant of Irish Hill would remain.

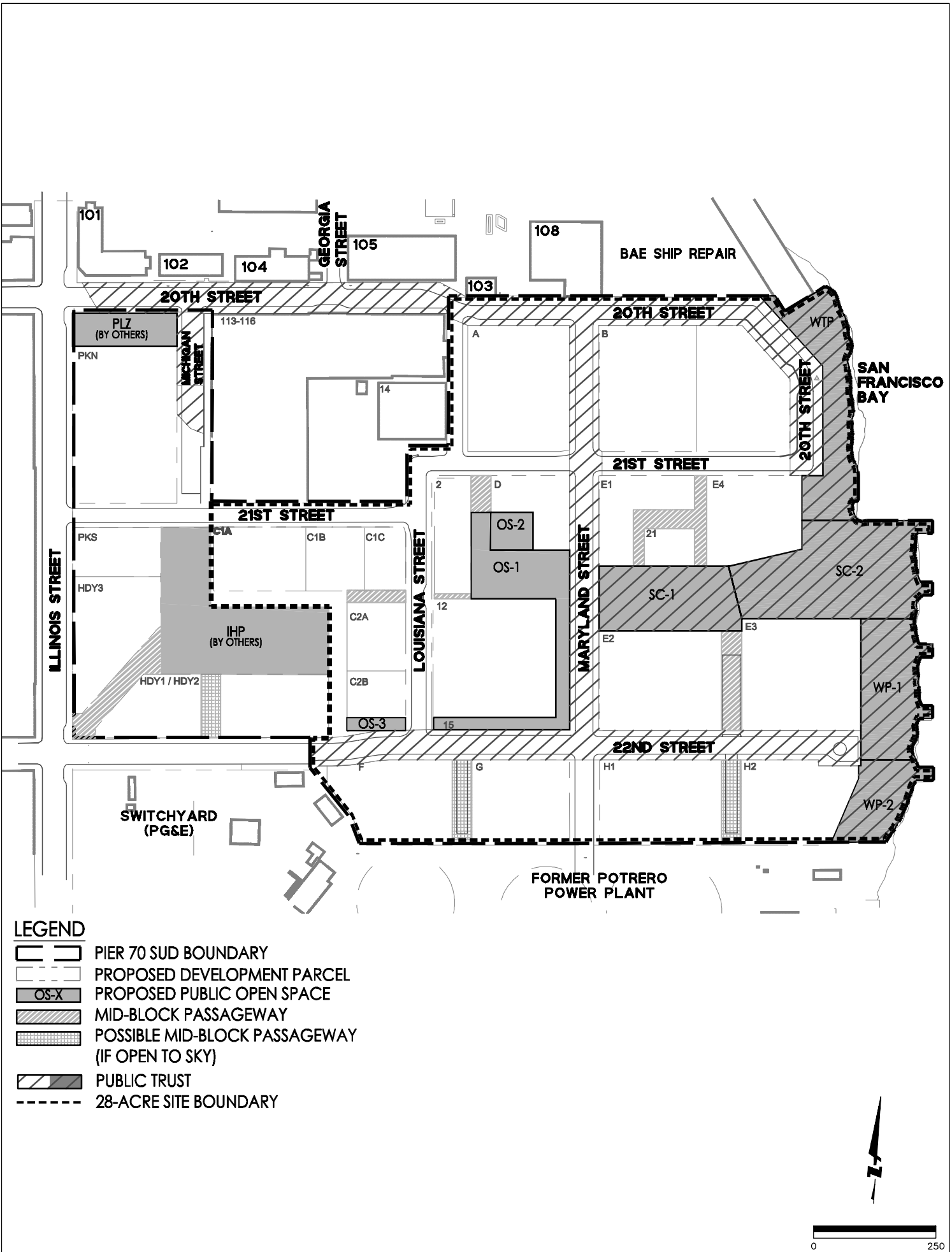
9.3.2 20th Street Plaza (PLZ)

The 20th Street Plaza open space area would be located at the southeast corner of the 20th Street and Illinois Street intersection, directly north of Parcel PKN. This gateway space would allow for direct views from Illinois Street and 20th Street to Building 113, on the Historic Core site. Potential features within the 20th Street Plaza include terraced seating areas, and stormwater management facilities.

9.4 Phasing, Operation and Maintenance

New open space and parks system will be constructed in phases to match the Phases of the Project. The Phase will connect to the existing open space and parks as close to the edge of the Phase area as possible where a logical transition line can be established within the open space improvement features.

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PIER 70 SUD INFRASTRUCTURE PLAN

FIGURE 9.0: OPEN SPACE EXHIBIT

10. Utility Layout and Separation

10.1 Utility Systems

The Project proposes to install public utility systems, including the combined sewer system, low pressure water (LPW) system, non-potable water (unless building by building graywater is implemented), auxiliary water supply system (AWSS), and dry utility systems. See Figure 10.0 Typical Utility Plan and Section.

10.2 Utility Layout and Separation Criteria

Utility main layout and separations will be designed in accordance with the City of San Francisco Subdivision Regulations (Subdivision Regulations) and SFPUC Utility Standards. Utility main separation requirements are presented in Table 10.0 Horizontal Utility Main Separation Matrix. Subdivision Regulations shall prevail unless a design modification is granted by SFPUC.

Table 10.0: Minimum Horizontal Utility Main Separation Matrix

Utility Separation	Combined Sewer	Combined Sewer Force Main	Potable Water (LPW)	Auxiliary Water Supply System (AWSS)	Non-Potable Water
Face of Curb	5' clear to OD (Ref 1, copied LPW)	5' clear to OD (Ref 1, copied LPW)	5' clear to OD (Ref 1)	5' clear to OD (Ref 1, copied LPW)	5' clear to OD (Ref 1, copied LPW)
Combined Sewer	---	3.5' min clear OD to OD (Ref 1)	10' clear OD to OD (Ref 2)	3.5' min clear OD to OD (Ref 1)	3.5' min clear OD to OD (Ref 1)
Combined Sewer Force Main	---	---	10' clear OD to OD (Ref 2)	3.5' min clear OD to OD (Ref 1)	3.5' min clear OD to OD (Ref 1)
Potable Water (LPW)	---	---	---	4' clear OD to OD (Ref 1 & 2)	4' clear OD to OD (Ref 1 & 2)
Auxiliary Water Supply System	---	---	---	---	3' clear to OD pipe (Ref 1)

Ref 1: San Francisco Subdivision Regulations, Diagram No. 1 Minimum Utilities Separation for Wastewater and Water – Combined Sewer System, dated October, 2014

Ref 2: CA Code of Regulations Title 22 Section 64572

10.3 Conceptual Utility Layout

The Project utility layout is designed to connect the proposed Project utility infrastructure to the existing adjacent public utility infrastructure facilities. Individual utility systems are further described and shown in Sections 11 through 16. Specific sections for each roadway are included in the Pier 70 SUD Roadway and Utility Section Supplement to be approved separately as part of the Master Utility Plans.

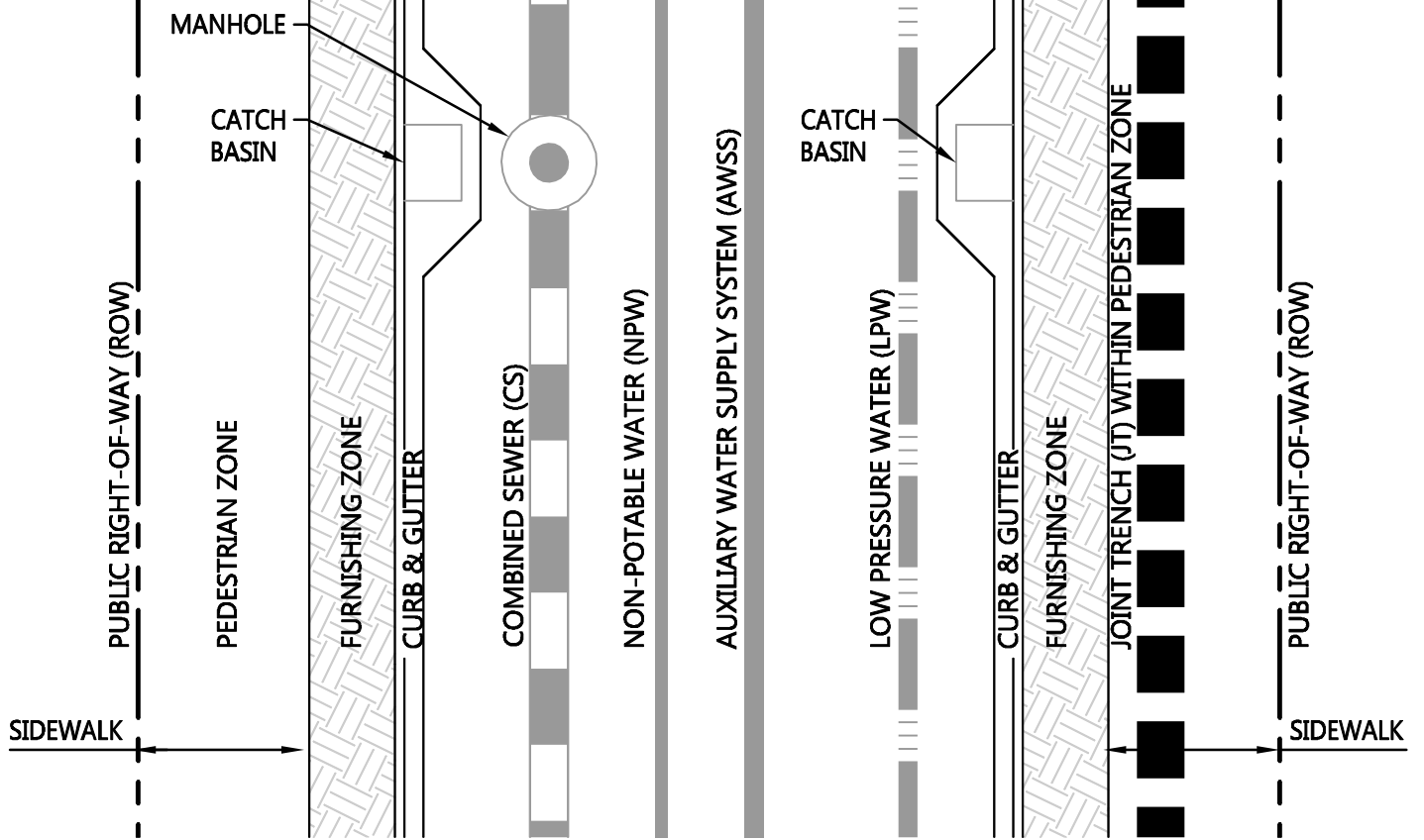
10.4 Utility Layout Requirements Exception or Design Modifications

Based on the utility sizing and roadway sections included in the Pier 70 SUD Roadway and Utility Section Supplement, proposed exceptions or design modifications may be required, subject to approval, for the following conditions

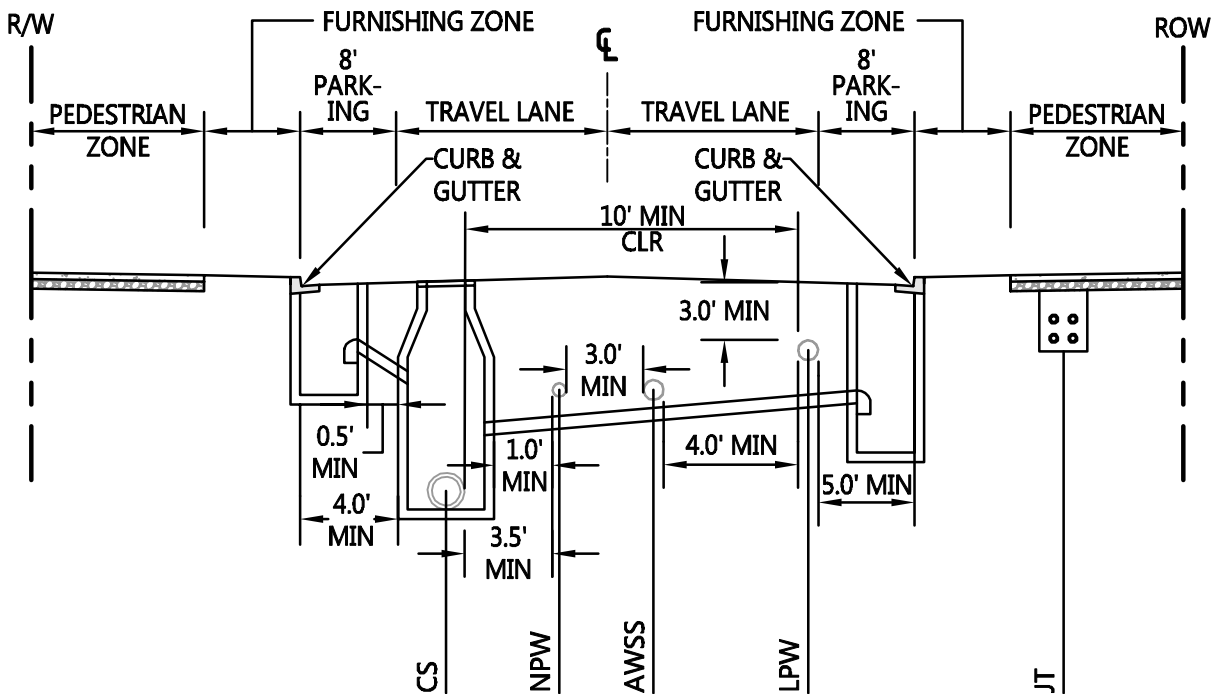
- Combined Sewer Force Main under multi-use path at 20th Street
- Low Pressure Water Main within 5.0 feet of face of curb at bulbout on 20th Street at Louisiana Street intersection

In accordance with the SSMP, an Independent Maintenance Entity will accept additional maintenance responsibilities caused by deviations from standards listed above, including restoration of the areas listed above where maintenance of utilities may impact improvements, subject to approval. SFPUC would be responsible only for temporary restoration with asphalt curbs or paving as is typical in standard roadways. The Independent Maintenance Entity would be responsible for final restoration as defined in a Maintenance Agreement to be executed with the Acquiring Agency for the street. A formal exception or design modification will be requested with the Project construction documents submittal, as needed.

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TYPICAL STREETS
 NTS



TYPICAL UTILITY CROSS SECTION
 NTS

NOTE: MANHOLE SHALL NOT BE LOCATED WITHIN THE PARKING SPACES.

11. Low Pressure Potable Water System

11.1 Existing Low Pressure Water System

Existing potable water service to the Project site is provided by a water supply, storage and distribution system owned and operated by SFPUC. The system provides domestic water supply and low pressure fire hydrants. The existing Low Pressure Water (LPW) system includes a 16-inch diameter transmission main on 3rd Street and local 8-inch and 12-inch distribution mains in the surrounding street network. The existing water mains in the vicinity of the Project are shown on Figure 11.0.

The Project site also includes a network of water service piping that will be removed or abandoned with Project development.

Hydrant flow tests were performed on the hydrants in the vicinity of the Project to establish pressure and flow of the existing system, and create a model for the Project. Results of the 6 hydrant flow tests are included in Table 11.1. For additional information on the flow tests performed by the SFFD, including a map of hydrant locations, see Appendix F of the Low Pressure Water Master Plan (LPWMP).

Table 11.1: Existing Fire Hydrant Flow Data

Hydrant	Observed Flow (gpm)	Static Pressure at Gauge (psi)	Observed Pressure During Flow Test (psi)	Pressure Drop During Flow Test (psi)
1	924	72	69	3
2	809	72	70	2
3	1,093	72	66	6
4	1,067	72	71	1
5	1,144	72	71	1
6	791	62	57	5

11.2 Proposed Low Pressure Water System

11.2.1 Proposed Water Demands

The Project water demands are identified in Table 11.2.

Table 11.2: Project Domestic Water Demands

Scenario	Maximum Residential Scenario Demand (gpm)	Maximum Commercial Scenario Demand (gpm)
Average Day Demand (ADD)	299	246
Max Day Demand (MDD) (Peaking Factor 1.2)	358	295
Peak Hour Demand (PHD) (Peaking Factor 2.6)	792	652
Required Fire Flow	2000	2000
Maximum Demand (MDD + Fire Flow)	2,358	2,295

For additional information on the Project's methods used for calculating domestic water demands, including specific unit water demands used, see the LPWMP.

11.2.2 Project Water Supply

As required by the California Water Code, SFPUC prepared and approved a Water Supply Assessment for the Project, dated May 4, 2016. SFPUC concluded that there are adequate water supplies to serve the Project and cumulative retail water demands during normal years, single dry years, and multiple dry years over a 20-year planning horizon.

11.2.3 Proposed Water Distribution System

The Developer's infrastructure obligation includes the design and construction of the proposed LPW distribution system within the Developer Obligation Area identified in Figure 1.0, except on 20th street between Illinois and Louisiana Street where there is an existing 12-inch main LPW line. The Developer will prepare a work plan to assess the condition of this LPW line to determine if it is suitable to support the project based on criteria provided by SFPUC and retain the LPW line as appropriate. Should the existing 12-inch main LPW line not meet the SFPUC criteria, the Developer will replace the line on 20th Street between Illinois and Louisiana Street. The proposed water distribution system is shown in Figure 11.0. The LPW system consists of the backbone improvements – such as 8-inch and 12-inch low pressure mains, fittings, valves, and hydrants, service laterals, meters and appurtenant installations.

Developer will strive to install laterals at the time the main is constructed in accordance with the Subdivision Regulations. However in cases where the adjacent vertical development lags too far behind the infrastructure construction to install the lateral with certainty, Developer may request to defer installation of laterals, subject to case by case approval as an exception to the Subdivision Regulations in accordance with Subdivision Code Section 1312. The deferral will be subject to certain pavement restoration requirements within the moratorium area to be identified as a condition to the exception. Connection details will be provided with the Improvement Plans for review and approval by SFPUC.

The LPW distribution system will connect to the existing low pressure water system at Louisiana Street and 20th Street, Illinois Street and 21st Street, and Illinois and 22nd Street. The LPW infrastructure will be located within the paved area of the street and provide a minimum clearance from the outside of the pipe of 5.0 feet to

face of curb, except for a small section of pipe on 20th Street at Louisiana Street (if exception/design modification is approved by SFPUC and SFDPW) due to a bulbout at this location.

Vertical and horizontal separation distances between adjacent combined sewer system, non-potable water and dry utilities will conform to the requirements outlined in Title 22 of the California Code of Regulations and the State of California Department of Health Services Guidance Memorandum 2003-02 and the Subdivision Regulations. Figure 10.0 shows typical utility alignment and roadway sections.

Required disinfection of new mains and connections to existing mains must be performed by SFPUC at Developer's cost.

11.2.4 Low Pressure Water Design Criteria

The proposed LPW system is required to maintain 20 psi minimum residual pressure and 14 fps maximum velocity during MDD plus Fire Flow. The system will also maintain 40 psi minimum residual pressure and 8 fps maximum velocity during PHD. The Project water system is modeled in the LPWMP to confirm the on-site LPW system will meet pressure and flow requirements.

11.3 Potable Water Fire Protection

The potable water system will be the primary fire water supply for the Project site. The potable water system will be designed to provide the maximum daily demand plus a design fire flow of 2,000 gpm. The 2,000 gpm fire flow will provide adequate fire protection for the new construction. The existing historical structures to remain will be retrofitted with appropriate fire protection systems when they are remodeled for commercial use and will be designed based on the 2,000 gpm flow available.

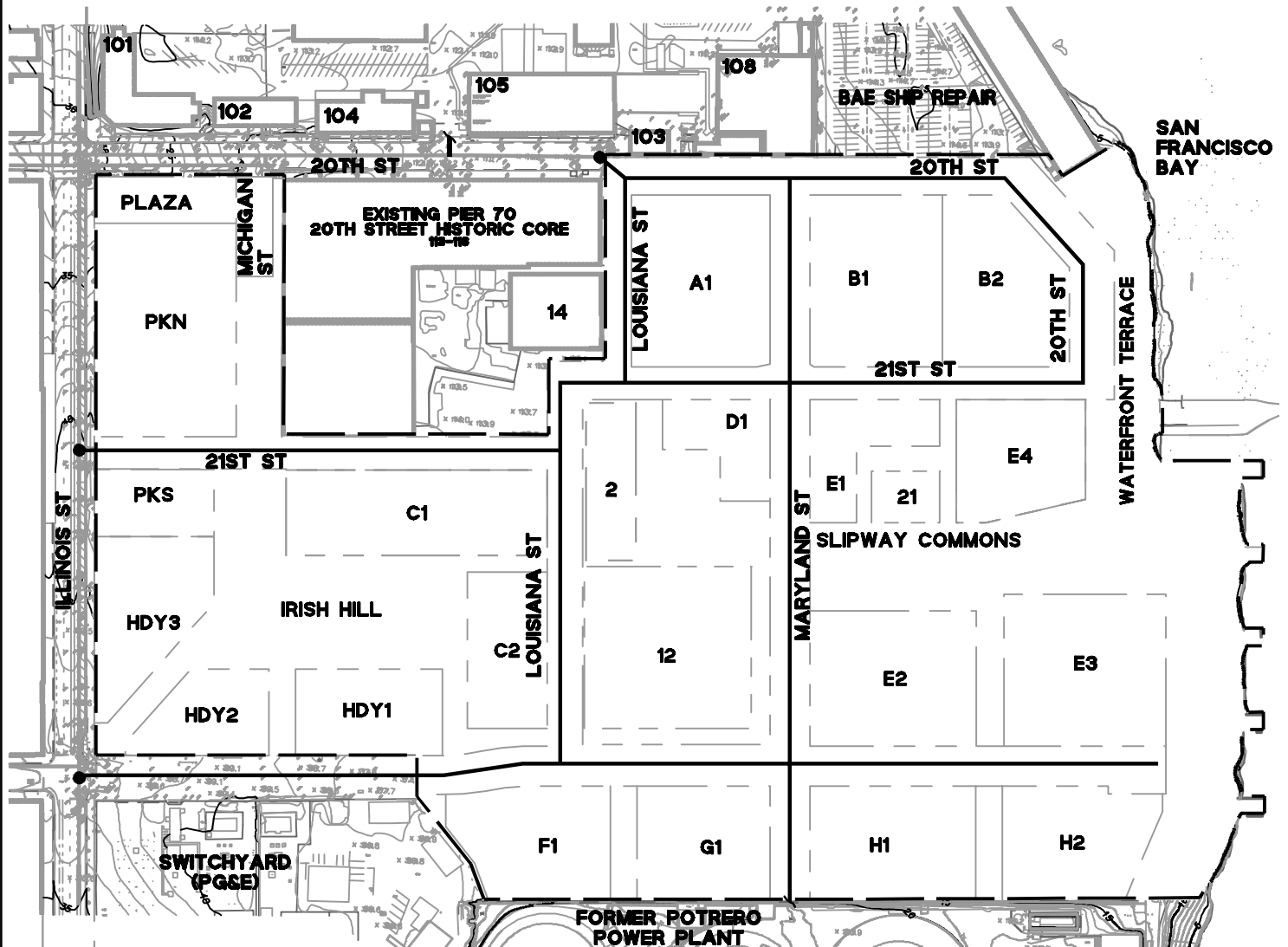
The project will coordinate with the SFFD for the final location of potable water fire hydrants around the Project.

11.4 Low Pressure Water System Phasing







The new LPW system will be installed based on the principle of adjacency, and as-needed to facilitate a specific proposed Development Phase consistent with the Project Phasing Plan to be approved with the Basis of Design. . The amount and location of the proposed LPW system installed will be the minimum necessary to support the Development Phase. The new Development Phase will connect to the existing systems as close to the edge of the Development Phase area as possible while maintaining the integrity of the existing system. Repairs and/or replacement of the existing facilities will be made as necessary to support the proposed Development Phase. Temporary LPW systems may be constructed by Developer and maintained by SFPUC at Developer's expense as necessary to support existing LPW facilities impacted by proposed Development Phases.

Impacts to improvements installed with previously constructed portions of the development due to the designs of subsequent phases will be the responsibility of the Developer and addressed prior to approval of the construction documents for the subsequent Phase.

For each Development Phase, the Developer will provide a Low Pressure Water Utility Report describing and depicting the existing LPW infrastructure and the proposed phased improvements and demonstrate that the Development Phase will provide the required pressure and flow.



LEGEND

-  PIER 70 SUD BOUNDARY
-  PROPOSED DEVELOPMENT PARCEL
-  EXISTING LOW PRESSURE WATER MAIN
-  PROPOSED LOW PRESSURE WATER MAIN IN PUBLIC RIGHT OF WAY
-  PROPOSED LOW PRESSURE WATER MAIN OUTSIDE OF PUBLIC RIGHT OF WAY
-  POINT OF CONNECTION

PIER 70 SUD INFRASTRUCTURE PLAN

FIGURE 11.0: LOW PRESSURE WATER LOCATION

12. Non-Potable Water System

In September 2012, the City and County of San Francisco adopted the Non-Potable Water Ordinance allowing the collection, treatment, and use of alternative water sources for non-potable applications. In October 2013, the ordinance was amended to allow district-scale water systems consisting of two or more building sharing a non-potable water system. The ordinance was further amended in July 2015 to mandate the installation of onsite non-potable water systems in new developments 250,000 sf or more (the "Non-Potable Water Ordinance", Ordinance 109-15 – Mandatory Use of Alternate Water Supplies in New Construction). The project will comply with local ordinances by either supplying non-potable water demands through a network of non-potable water pipes supplied from a district wide Water Treatment and Recycling System (WTRS) located just outside of the Developer Obligation Area in Building 108 or by implementing graywater reuse on a building by building basis through the site. Should the project proceed with the parcel by parcel graywater reuse systems, the project will apply for an exemption from requirements for recycled water in the proposed roadway network and if granted will not install NPW mains in roadways.

12.1 Existing Recycled Water System

The Project is located within the City's designated recycled water use area, however a City recycled water system is not currently available within or near the Project. The Project may be served by the City's recycled water supply in the future as a back-up in the event a district-wide WTRS is implementable.

12.2 Proposed Non-Potable Water System

The Project will either implement parcel-based graywater reuse systems or a district wide WTRS to comply with the City's Non-Potable Water Program. The Developer's Infrastructure obligations include the design and construction of either proposed Non-Potable Water (NPW) system variants within the Developer Obligation Area identified in Figure 1.0 and further described in 12.2.1 and 12.2.2. The decision between parcel-based or district-wide WTRS will be made prior to construction of Phase 1 based on market viability and the SFPUC Non Potable Water application procedures.

The project Non-Potable Water (NPW) demands are identified in Table 12.0 and in the Non-Potable Water Master Plan (NPWMP). The NPWMP outlines the Project's methods used for calculating non-potable water demands, including specific unit water demands used.

Table 12.0: Project Non-Potable Domestic Water Demands

Scenario	Maximum Residential Scenario Demand (gpm)	Maximum Commercial Scenario Demand (gpm)
Average Day Demand (ADD)	95	113
Max Day Demand (MDD) (Peaking Factor 1.4)	134	158
Peak Hour Demand (PHD) (Peaking Factor 3.0)	286	339

12.2.1 Parcel Based Graywater Variant

A City source of RW is not available at the site. Should the project proceed with Parcel based Graywater to address NPW demands, each parcel will implement graywater reuse to supply NPW demands within the building. In the event that irrigation of parks and open space can be provided with pipes from adjacent

buildings, the project would file an application for an exemption from requirements for RW in the proposed roadway network, and a RW distribution network would not be installed if the exemption is approved. In the event an exemption is not granted, a RW distribution system would be installed with cross-connections to the LPW system within the Developer Obligation Area, but not extending to off-site users.

12.2.2 District WTRS Variant

As described and shown in the Updated District-Scale Wastewater Treatment and Reuse Project Summary for the Pier 70 SUD Project, dated September 27, 2016 by AECOM, if implemented, the WTRS will be located north of 20th Street, in Building 108 or in the parking lot east of Building 108 adjacent to the BAE Ship Repair Facility. The WTRS may collect blackwater, graywater, and/or rainwater from the project, and will include the following in one centralized location: feed tank, trash trap, bioreactor, disinfection and storage tank, and possibly heat recovery. Wastewater flows in excess of the non-potable demand will be discharged to the municipal sewer. Liquid waste from the reactor is assumed to be discharged to municipal sewer or be hauled away by truck to a location permitted to accept liquid waste, in compliance with the Hazardous Materials Business Plans for Wastewater Treatment and Reuse Systems. Trash trap waste is assumed to be disposed of with other landfill waste. The WTRS will be enclosed and odor control unit(s) will be installed and vented to the atmosphere. The footprint of the facility will be approximately 10,000 to 20,000 square feet and will be sized for a total capacity up to 150,000 gallons per day (depending on final project demands) and designed to allow expansion of the treatment capacity by phase.

Should the project proceed with the District WTRS Variant, the following would apply:

12.2.2.1 Proposed Non-Potable Water Supply

Under the district wide WTRS scenario, NPW will be supplied by a WTRS that will divert flows from the combined sewer system, treat these flows, and generate NPW for use on site. Excess combined sewer flow would be pumped in the 20th Street force main to the combined sewer system to Illinois Street, which would require agreement with SFPUC.

12.2.2.2 Proposed Distribution System

Under the district wide WTRS scenario, the Developer's Infrastructure obligations include the design and construction of the proposed non-potable water distribution system within the Developer Obligation Area identified in Figure 1.0. A private entity may own and operate the NPW system once complete within a Major Encroachment Permit, or alternatively, the Developer may explore the possibility that the SFPUC would own and operate the NPW distribution system. The proposed NPW distribution system is shown in Figure 12.0 for the WTRS scenario. The NPW system consists of the backbone improvements - such as 8-inch low pressure mains, fittings, and valves, service laterals, meters and appurtenant installations. Developer may choose to request to defer installation of laterals in certain cases where the adjacent vertical development will lag the infrastructure construction, subject to case by case approval as an exception. See Section 11.2.3 for full explanation. If operated by a private entity, an encroachment permit will be required for the NPW system located in public rights of way.

12.3 Non-Potable Water System Phasing

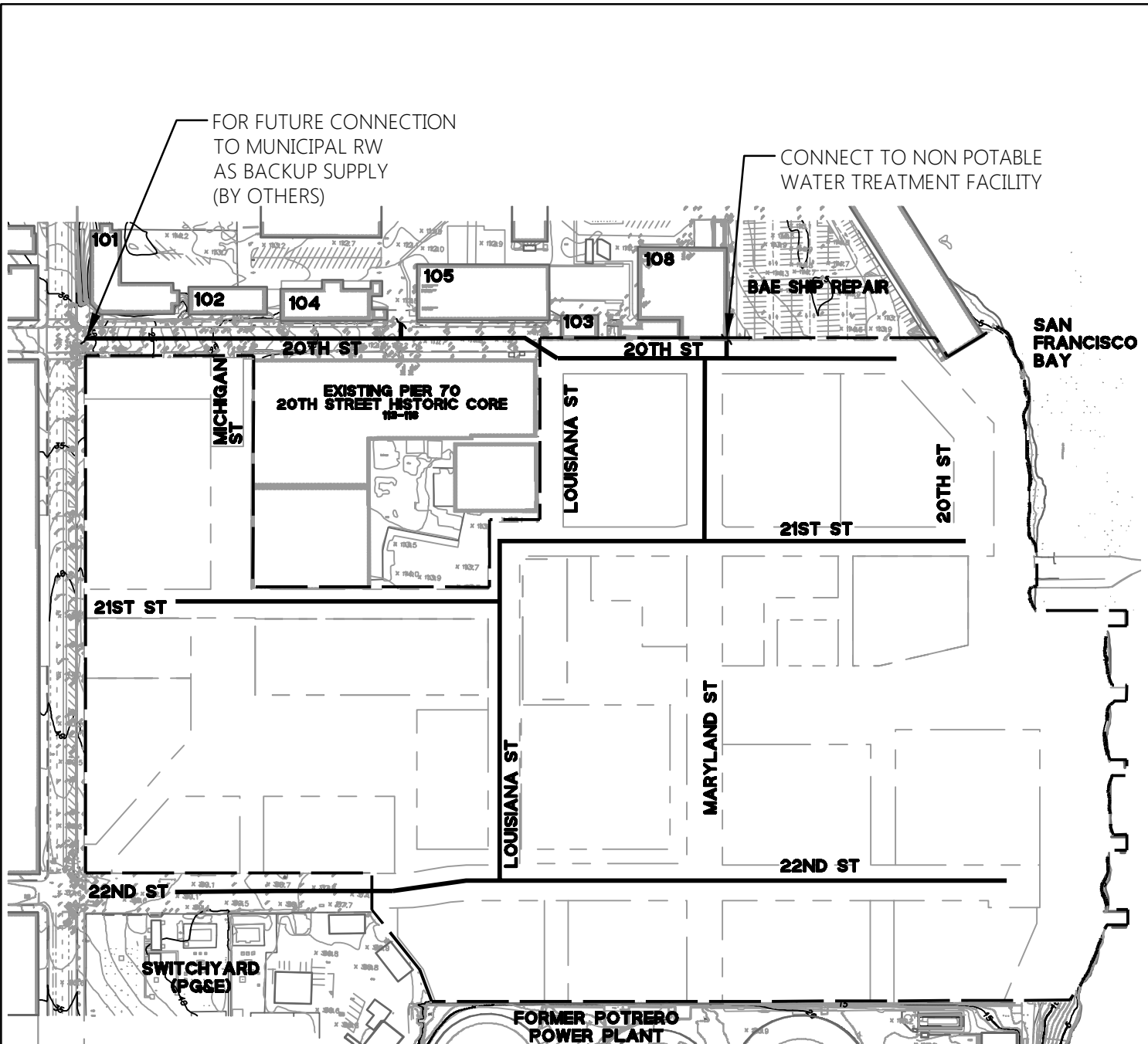
The new NPW system will be installed based on the principle of adjacency, and as-needed to facilitate a specific proposed Development Phase the Project Phasing Plan to be approved with the Basis of Design. . The amount and location of the proposed NPW

system installed will be the minimum necessary to support the Development Phase. The new Development Phase will connect to the existing systems as close to the edge of the Development Phase area as possible while maintaining the integrity of the existing system. Each phase will be operational prior to occupancy of proposed buildings to be constructed as a part of that phase.

The Operator of the NPW distribution system will be responsible for the new, phased NPW facilities once construction of the improvements is complete. In the event that the Operator is a private entity, a major encroachment will be needed for the NPW distribution system. Alternatively, the Developer may explore the possibility that the SFPUC would operate the NPW distribution system. Impacts to improvements installed with previously constructed portions of the development due to the designs of subsequent phases will be the responsibility of the Developer and addressed prior to approval of the construction documents for the subsequent Phase.

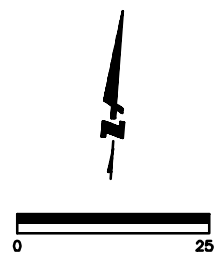
For each Development Phase, the Developer will provide the City a Non-Potable Water Utility Report describing and depicting the existing NPW infrastructure and the proposed phased improvements and demonstrate that the Development Phase will provide the required pressure and flow.

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LEGEND

-  PIER 70 SUD BOUNDARY
-  PROPOSED DEVELOPMENT PARCEL
-  PROPOSED NON-POTABLE WATER MAIN (8 INCH)



PIER 70 SUD INFRASTRUCTURE PLAN

FIGURE 12.0: NON-POTABLE WATER LOCATION

13.Auxiliary Water Supply System (AWSS)

13.1 Existing AWSS Infrastructure

The SFPUC, in cooperation with the San Francisco Fire Department (SFFD), owns and operates the Auxiliary Water Supply System (AWSS), a high-pressure, non-potable water distribution system dedicated to fire suppression that is particularly designed for reliability after a major seismic event. Currently, a 14-inch AWSS main exists in 3rd Street.

13.2 AWSS Regulations and Requirements

New developments within the City must meet the fire suppression objectives that were developed by SFPUC and SFFD. Developer will prepare a design study that is equivalent to a Master Utility Plan for AWSS and submit with the Basis of Design as part of each Phase. The SFPUC and SFFD will work with the Developer to determine post-seismic event fire suppression requirements during the planning phases of the Project. Requirements will be determined based on building density, fire flow, pressure requirements, City-side objectives for fire suppression following a seismic event, and proximity of new facilities to existing AWSS facilities. AWSS improvements will be located in public right-of-way, or on Port of San Francisco property within a public easement, as approved by SFPUC on a case-by-case basis.

13.3 Proposed AWSS Infrastructure

To meet the SFPUC and SFFD AWSS requirements, the Project will be required to incorporate new AWSS infrastructure. The Developer's Infrastructure obligations include the design and construction of the proposed AWSS within the Developer Obligation Area identified in Figure 1.0 as well as the offsite AWSS extension in 20th Street between 3rd Street and Illinois Street, including the tie-in to the existing AWSS in 3rd Street. In addition, the system includes an AWSS extension in 22nd Street between 3rd Street and Illinois

Street, including the tie-in to the existing AWSS in 3rd Street, to be designed and constructed by other Developers to serve the Hoedown Yard development.

The potable water system will be the primary fire water supply for the Project site. The AWSS is a redundant system that will be designed for enhanced post-seismic reliability achieved through geotechnical stabilization and use of more robust materials such as Earthquake Resistant Ductile Iron Pipe (ERDIP).

The AWSS consists of the backbone improvements - such as high pressure ERDIP mains, fittings, valves, and hydrants. Pipe diameter will be determined based on modeling of the system to be performed by SFPUC and their consultants and presented in the Basis of Design for each Phase. SFPUC shall work in good faith with Developer to provide reasonable criteria for the proposed interim condition prior to connection through PPP with the goal of not oversizing the piping beyond what will be required in the ultimate looped condition. The AWSS generally does not include service laterals that connect to buildings. The proposed AWSS layout consists of the following, as depicted on Figure 13.0, that would create a new reliable auxiliary system to complement the potable water fire protection system with multiple points of connection to the existing City AWSS.:

1. Developer Obligation: An L-shaped segment of high-pressure mains connecting to the existing AWSS distribution system in 3rd Street at 20th Street, extending through 20th Street and Maryland Street, and connecting through the future development area in former Potrero Power Plant. The Developers of former Potrero Power Plant will construct a mirror L-shaped segment that will connect back to the existing AWSS distribution system in 3rd Street at 23rd Street, creating a loop between the two sites. There will be new hydrants every 500 feet (or as approved by SFFD) within the Project as part of this L-shaped segment. In the event that the former Potrero Power Plant development project has not commenced construction of AWSS

infrastructure within their site prior to completion of Phase 3 at Pier 70, Developer will be required to install AWSS pipe in 22nd Street between Maryland Street and the existing City AWSS to complete a second point of connection as a condition of acceptance of Phase 3 streets. Developer must include this possible AWSS in the affected utility sections of 22nd Street for future planning purposes.

2. By Others: A straight extension of high-pressure main connecting to the existing AWSS distribution system in 3rd Street at 22nd Street to Illinois Street, where a fire hydrant will be located at the northeast corner.

A typical utility section identifying clearances to other infrastructure within the roadway network is identified in Figure 10. Final design of the AWSS for the project will be determined by the SFPUC and SFFD in consultation with the Developer.

13.4 Proposed System Wide Improvements

Based on a recent study commissioned by SFPUC, additional improvements are being considered to enhance AWSS service to the project vicinity, including Mission Bay. In addition to the Proposed AWSS Infrastructure listed in Section 13.3, Developer will provide a one-time capital contribution not to exceed \$1,500,000 current dollars to the City, subject to a 4.5% escalation calculated from the time of project approval, to pay for a share of the system-wide improvements proposed in the vicinity of the project. This payment amount will be provided based on an actual fair share calculation up to the specified amount and must be utilized to pay for improvements that benefit the project. Unless the parties mutually agree to a different payment trigger, payment will be due at the earlier of either SFPUC's Notice to Proceed for the system-wide improvements or acceptance of the final City street in Phase 3.

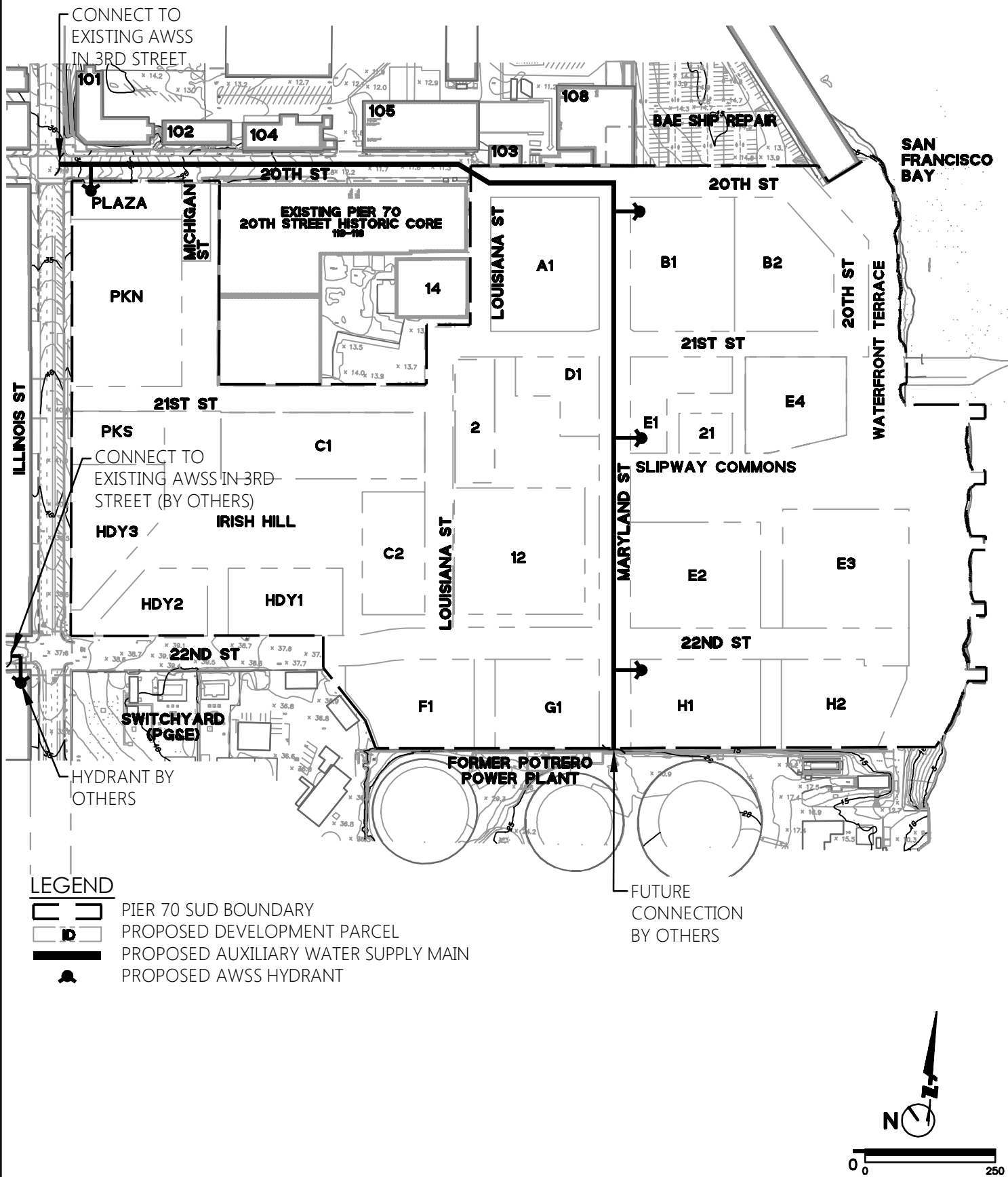
13.5 AWSS Phasing

The new AWSS will be installed based on the principle of adjacency and as-needed to facilitate a specific proposed Development Phase the Project Phasing Plan to be approved with the Basis of Design. . The amount and location of the proposed AWSS installed will be the minimum necessary to support the Development Phase. The new Development Phase will connect to the existing systems as close to the edge of the Development Phase area as possible while maintaining the integrity of the existing system.

The SFPUC will be responsible for maintenance of SFPUC-owned AWSS facilities. . Impacts to improvements installed with previously constructed portions of the development due to the designs of subsequent phases will be the responsibility of the Developer and addressed prior to approval of the construction documents for the subsequent Phase.

For each Development Phase, the SFPUC will provide flow and pressure capacity of the existing AWSS that project system is connecting to at the Developer's Expense. The developer, in conjunction with its consultants, will provide an AWSS Report describing the pressure and flow the AWSS provides with each phase. The construction documents will be completed by the Developer in conjunction with the SFPUC.

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 PLOT DATE: 09-01-17
 PLOTTED BY: rals



PIER 70 SUD INFRASTRUCTURE PLAN

FIGURE 13.0: AUXILIARY WATER SUPPLY LOCATION

14. Combined Sewer System

14.1 Existing Combined Sewer

The project is located in the City's Central Basin Combined Sewer System (CSS) district where sanitary sewer and storm water are collected and conveyed in the same system.

14.1.1 Existing Drainage Areas

The Project site is part of a larger 51.0 acre drainage area identified in the March 13, 2014 SFPUC memorandum, "Pier 70 Development – 20th Street Pump Station Hydraulic Assessment."

14.1.2 Existing Sewer Demands

Based on the March 13, 2014 SFPUC memorandum, "Pier 70 Development – 20th Street Pump Station Hydraulic Assessment," existing Average Dry Weather Flow (ADWF) is 100 gpm and the existing Peak Dry Weather Flow (PDWF) is 200 gpm.

14.1.3 Existing Combined Sewer System

The drainage basin is served by an existing CSS that includes a gravity collection system, pump station, force main, storage and CS control structures and CS outfall structures.

The CS gravity collection system includes 8-inch and 18-inch CS mains (to remain) in 20th Street between Illinois Street and the future Georgia Street at the BAE shipyard entrance. A 42-inch storage pipe then conveys flow along 20th Street from Georgia Street to the CS pump station near the Bay at the east end of 20th Street, is also known as the SFPUC 20th Street Pump Station. A 54-inch storage pipe extends approximately 950-feet south. The 42-inch storage pipe, 54-inch storage pipe, and 20th Street Pump Station will be replaced as part of the Project.

There are other Port owned sanitary sewer mains on the site that will be removed or abandoned as part of the Project.

The pump station pumps sanitary sewer and storm events consistent with the applicable NPDES Permit to the 27-inch gravity CS main in Illinois Street via a 10-inch diameter force main in 20th Street and a portion of Illinois Street. This pump station has the capacity to pump sanitary sewer flows and minor storm events. The pump station works in conjunction with 42-inch and 54-inch on site storage pipes and control structures for existing outfall structures 30 and 30A to manage stormwater and limit the number of CS outfall events as identified in the City's NPDES permit.

14.2 Proposed Combined Sewer

The project will continue to use a CSS for conveyance of sanitary sewer and storm water flows from the Project site. Because the project is over 250,000 gross square feet it will be subject to Article 12C of the San Francisco Health Code, Onsite Water Reuse Ordinance. To comply with this ordinance the Project will either implement gray water reuse on a parcel by parcel basis or implement a District Wide Water Treatment and Recycling System. The CSS is conservatively analyzed without assuming any reduction from wastewater treatment and reuse of non-potable water.

The Developer's infrastructure obligation includes the design and construction of the new combined sewer force main (CSFM) in 20th Street between Louisiana Street and the combined sewer pump station. The Developer will prepare a work plan to assess the condition and appropriate sizing of the remainder of the existing offsite CSFM that connects to the City CSS in Illinois Street to determine if it is suitable to support the project based on criteria provided by SFPUC and retain the CSFM appropriate. Should the existing 10-inch CSFM not meet the SFPUC review and criteria, the Developer will replace

the line on 20th Street between Illinois Street and Louisiana Street as well as the line in Illinois Street between 20th Street and the manhole near 21st Street. The replacement of this infrastructure is at the sole discretion of the SFPUC.

14.2.1 Drainage Area

A portion of the drainage area previously directed to the existing CS Pump Station will be connected directly to the gravity main located in Illinois Street, to which the pump station ultimately drains. This reduced area is the western and southern half of Buildings PKS, HDY2 and HDY3 and totals approximately 1.2 acres. Additionally, sewer contributions from these structures will also be directed to the gravity main in Illinois Street. The remainder of the drainage area previously draining to the pump station totals approximately 49.8 acres and will continue to follow this drainage pattern.

14.2.2 Proposed Sanitary Sewer Demands

Project sanitary sewer demands conservatively assume 95% return on potable water and 100% return on non-potable water (indicative of implementation of WTRS which results in higher CS conveyance demand than building by building graywater reuse) resulting in an ADWF of 365,955 gpd for the maximum residential scenario. Applying a peaking factor of 3.0 to the ADWF, the Project is anticipated to generate a PDWF of 1,097,865 gpd or 762 gpm. The project Grading and Combined Sewer System Master Plan (GCSMP) outlines the Project's method for calculating the sanitary sewer demand is being submitted concurrently with this Infrastructure Plan.

14.2.3 Proposed Combined Sewer Capacity and Design Criteria

Preliminary hydrology and hydraulic models for the site have been developed and are included in the Combined Sewer Master Plan. The proposed CSS will be

designed with tidal elevation of POCD 96.5 or SFVD13 7.9 and will generally provide 4 feet of freeboard in conformance with the Subdivision Regulations, and include allowance for SLR of 24 inches. The Reconstructed 20th Street Pump Station will be protected from 66 inches of SLR to elevation 103.5 POCD or 14.9 SFVD13. In addition, the rim elevation of the Pump Station will be designed to protect from flooding related to the potential for overland flows.

14.2.4 Proposed Combined Sewer System

The proposed CSS is shown schematically in Figure 14.0. The CSS consists of the backbone improvements - such as gravity mains, manholes, catch basins, culverts, pump station, force main, and storage pipe, service laterals and appurtenant installations. . Developer may choose to request to defer installation of laterals (e.g., where the adjacent vertical development will lag the infrastructure construction), subject to case by case approval by SFPUC as an exception to the San Francisco Subdivision Code..

The CSS will be designed and constructed by the Developer with review and approval by SFPUC. The proposed CSS includes the gravity collection system, pump station, force main, storage and CS control structures and CS outfall structures. The CS outfall will require a flap gate, which will be installed at the time of outfall repair. The offsite existing upstream gravity CSS in 20th street between Illinois Street and Louisiana Street will remain in place. The existing offsite force main between the point of connection at 20th Street and Louisiana Street to the connection to the gravity sewer system on Illinois Street in the vicinity of 21st Street, may be retained subject to SFPUC approval of pending condition and sizing assessment. The proposed CSS system will be owned and maintained by the City upon construction completion and improvement acceptance by the City.

The proposed gravity CSS within the Developer Obligation Area will include a system of 12-inch to 54-inch mains. In raised streets, (if approved by the City), manholes will be offset from the valley gutter to prevent inundation during flood events. The gravity mains will connect to a new, relocated CS pump station located in the BAE parking area just north of 20th Street in the vicinity of Building 108. The pump station will pump sanitary sewer flows and the design stormwater flow to the 27-inch CS main in Illinois Street. The pump station control panel is proposed to be located within or on the side of existing Building 108 with substructures such as the wet well located outside, directly adjacent to the building.

The pump station will work in conjunction with proposed on-site storage pipe and control structures for outfall structures 30 and 30A to manage stormwater and limit the number of CS outfall events as identified in the City's NPDES permit.

14.2.5 Water Treatment and Recycling System (WTRS)

The Project may choose to implement a WTRS instead of implementing a parcel based graywater system to comply with the City's Non-Potable Water Ordinance, subject to market viability and the SFPUC Non Potable Water application approval. With WTRS some of the flow from the CSS would be diverted to an on-site, modular wastewater treatment plant that would treat collected wastewater to meet the water quality criteria defined in Title 22, Division 4, Chapter 3: Water Recycling Criteria of the California Code of Regulations. The resulting, treated, non-potable water would then be distributed to development parcels for reuse in toilet flushing, irrigation, cooling towers and other allowable uses as discussed further in the Non-Potable Water section of this Infrastructure Plan. The WTRS would be modular and installed and expanded in increments to accommodate the Phase Development Plan. The first module would have to be operational prior to first occupancy in

accordance with the Non-Potable Water Ordinance, unless otherwise waived by the SFPUC.

14.2.6 Existing Condition on 20th Street

The vicinity of the Historic Core fronting 20th Street, Louisiana Street, and 21st Street is a low-lying area that cannot be raised as part of this project. There are a number of existing historic buildings fronting 20th Street and future grades must generally conform to existing due to this constraining factor. The new CSS will contain the hydraulic grade below the street elevation for the 5-year storm. While the new CSS must maintain or reduce the freeboard and will improve the existing condition, it potentially may not achieve the City's recommended 4 feet and required 2 feet of freeboard as identified in the 2015 San Francisco Subdivision Regulations; after review in detailed design, the Developer may submit a request an exception from the freeboard requirement in these site boundary-constrained areas. Additionally, in the event of SLR, flooding in this low-lying area will need to be addressed as part of the Port's adaptive management strategy for the BAE Shipyard to the north. As previously discussed, the Project will fund a Shoreline Adaptation CFD through special taxes.

14.2.7 SLR Adaptation

The CSS has been designed to accommodate the required tide elevation plus a 24-inch allowance for SLR. As part of the Project's Adaptive Management Strategy, SLR will be monitored to determine when the adaptation strategy needs to be implemented. Adaptation strategy may include raising shoreline grades and addition of SLR pump stations to reduce the CSS hydraulic grade. Ownership and operation of pump stations will be determined in the development of adaptive management strategy (see Section 5.2).

14.2.8 100-Year Storm Design and Overland Release

A storm drain system model for the site has been developed as part of the Combined Sewer Master Plan. The model confirms that the storm drain system, street sections and street grading are able to convey the 100-year storm event and overland release without overtopping the street curb or impacting buildings. Modeling will be reviewed by the SFPUC as part of the MUP review and approval process. For the raised streets, this street was modeled to confirm that a 4-foot wide accessible path is maintained within the pedestrian zone while overland release from the 100-year storm event occurs without flooding subgrade structures such as basements. A draft memorandum outlining performance of drainage for raised streets is included as Appendix F to the GCSMP. Grading must conform to the street and building finish floors of existing Port buildings to remain along 20th Street and Louisiana Street, which affects overland release. At a minimum, the new CSS must maintain the freeboard in these areas for the 100-year storm.

14.2.9 Combined Sewer Phasing

The new CSS will be installed based on the principle of adjacency and as-needed to facilitate a specific proposed Development Phase consistent with the Project Phasing Plan to be approved with the Basis of Design, while also maintaining existing combined sewer function and applicable NPDES permit compliance status. The amount and location of the proposed CSS installed will be the minimum necessary to support the Development Phase, while maintaining service to existing non-project users of the sewer system and system permit compliance. The new Development Phase will connect to the existing systems as close to the edge of the Development Phase area as possible while maintaining the integrity of the existing system for the remainder of the Project. Utilities in previously built phases shall be inspected before and after construction of new phase to monitor any damages

caused during construction. Repairs and/or replacement of the existing facilities will be made as necessary to support the proposed Development Phase.

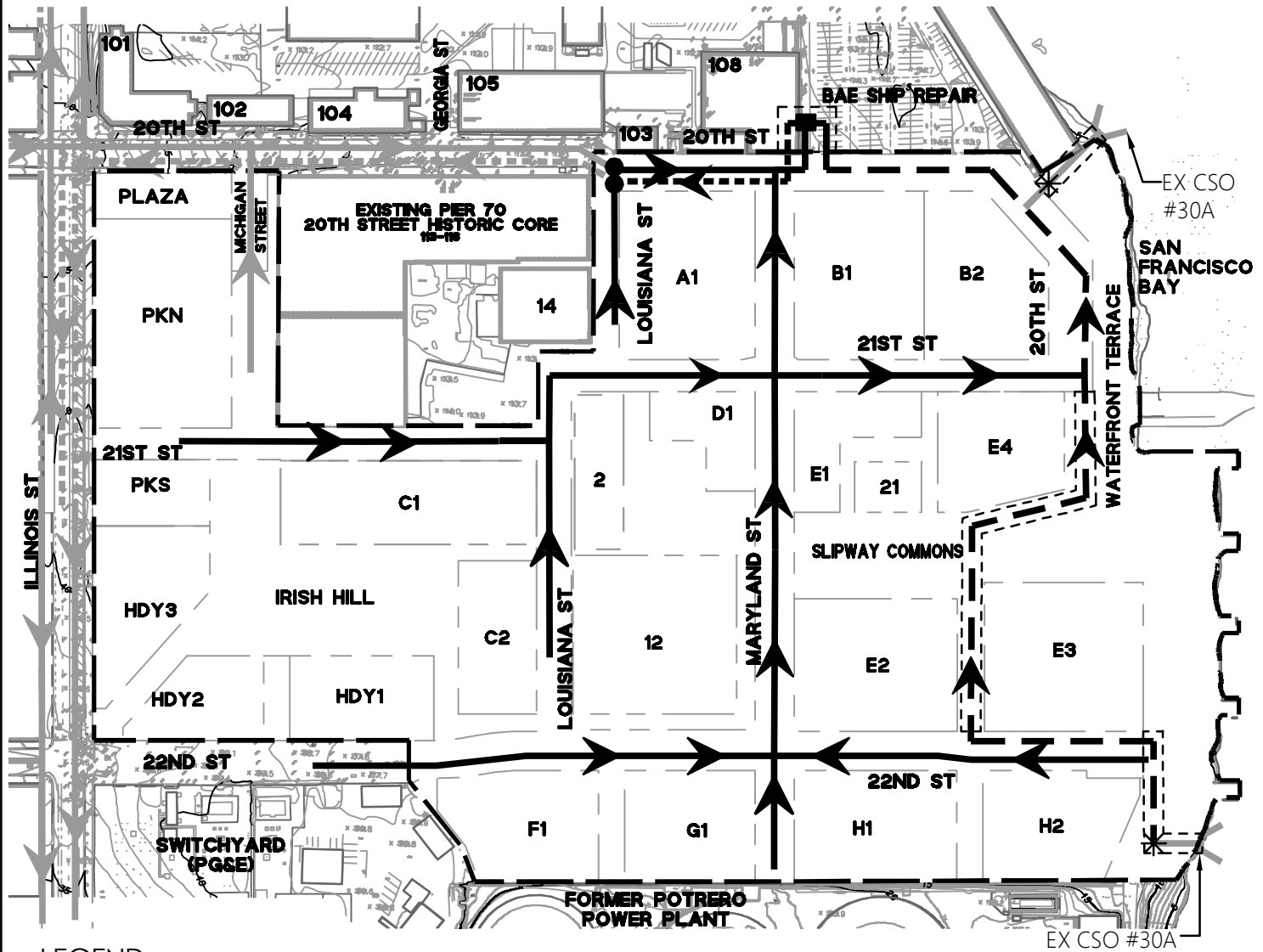
Temporary CS may be constructed by Developer and maintained by SFPUC at Developer's expense as necessary to support service to permanent infrastructure upstream. Temporary infrastructure will be avoided to the extent possible and are subject to SFPUC for approval.

A combined Alternatives Analysis/Conceptual Engineering Report (AA/CER) for the CS Pump Station, sewer storage facilities, and associated force main will be prepared by the Developer for SFPUC review and approval. The AA/CER will be scheduled in a manner so as to secure SFPUC approval prior to issuance of the Phase 1 Improvement Plan permit. The AA/CER will reference applicable design criteria (e.g., NPDES permit requirements, SLR performance objectives; construction phasing, etc.); identify applicable alternative designs (including capacities of sump, pumps, and storage); evaluate those alternatives, including applicable modeling, and secure SFPUC approval on the preferred alternative. The report will identify construction timing for the Developer's replacement of PS, sewer storage facilities, and outfall repair and flap gate installation. Any needed system-wide modeling will be conducted by the Developer team via access to the SFPUC system model or, at the Developer's request, by the SFPUC (subject to reimbursement).

The existing CS pump station and 54-inch storage pipe will remain until they either a) need to be upgraded because of capacity limitations that would result in Combined Sewer Discharges exceeding those allowed by SFPUC's NPDES Permit, or b) are impacted by the Phase development footprint. Additionally, a Basis of Design Report and supporting analysis will be submitted by the Developer at the

start of each subsequent project Phase in order to reconfirm sewer system performance, including Phase demands. The pump station shall be replaced as part of the Phase improvements if the estimated frequency of Combined Sewer Discharges exceeds the allowable limit by the time of Phase completion. As the existing pump station is in conflict with the development footprint in Phase 3, it must be replaced within Phase 3 at a minimum, if not earlier due to capacity limitations. The amount of storage will be managed to meet the Phase demands until all storage is replaced by Phase 3. Initial calculations of Combined Sewer Discharge frequency by phase have been provided in the Technical Memorandum included as Appendix E to the GCSMP.

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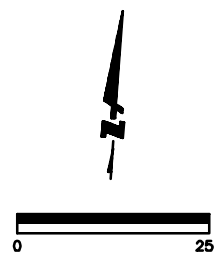


LEGEND

- PIER 70 SUD BOUNDARY
- PROPOSED DEVELOPMENT PARCEL
- PROPOSED COMBINED SEWER MAIN
- PROPOSED COMBINED SEWER FORCE MAIN
- PROPOSED COMBINED SEWER STORAGE
- EXISTING COMBINED SEWER FORCE MAIN
- EXISTING COMBINED SEWER GRAVITY MAIN
- PROPOSED PUMP STATION
- POINT OF CONNECTION
- WEIR STRUCTURE/FUTURE PUMP STATION
- OUTSIDE OF RIGHT OF WAY

NOTES

1. HALF OF PKS, HDY3, & HDY2 STORM DRAIN RUNOFF FLOWS DIRECTLY TO 27" GRAVITY MAIN IN ILLINOIS STREET.
2. PKS, HDY2, & HDY3 SEWER FLOWS TO 27" GRAVITY MAIN IN ILLINOIS STREET.



PIER 70 SUD INFRASTRUCTURE PLAN

FIGURE 14.0: COMBINED SEWER LOCATION

15. Stormwater Management

15.1 Existing Stormwater Management System

The site was developed prior to recent implementation of stormwater management systems and does not currently employ any best management practices to manage stormwater runoff. Currently, the site is 87% covered in impervious pavement.

15.2 Proposed Stormwater Management System

The Project is located in a combined sewer area and is subject to the Combined Sewer Area Performance Requirements of the San Francisco Stormwater Management Requirements (SMRs). A Stormwater Master Plan will be provided as part of the Basis of Design submitted with the Improvement Plans. This will be updated with each Phase.

Since the site was previously more than 50% impervious, the Project must reduce the runoff rate and volume of stormwater going into the combined system relative to the 2-year, 24-hour design storm. The Developer's Infrastructure obligations include the design and construction of the proposed stormwater management system within the Developer Obligation Area identified in Figure 1.0. Typically, the SMRs require projects reduce runoff rate and volume of stormwater by 25% each respectively. The SMRs acknowledge that some projects have more challenging site conditions than others, and with this in mind, SFPUC has developed the Modified Compliance Program to allow development projects with proven site challenges and limitations to modify the standard stormwater performance measures set by the SMR. The Modified Compliance Program:

- Applies only to projects in the Combine Sewer System
- Evaluates site limitation including: high groundwater, shallow depth to bedrock, poorly infiltrating soils, contamination, and zero lot line projects
- Assesses project potential for non-potable demand

- Modifies volume and peak runoff rate reduction requirements based on site-specific constraints. Modification allows for increase in peak runoff rate reduction while simultaneously decreasing volume reduction at a 1:1 ratio, to a maximum of 40% peak runoff rate and 10% volume reduction.

15.2.1 Roadways and Open Space

Three percolation tests have been performed at the site, with infiltration results between 0.3 inches per hour in bedrock areas and 2.4 inches per hour in existing fill areas. Additional testing will be performed in the future to confirm infiltration rates site wide in the vicinity of proposed features that will require infiltration for stormwater management. Provided that these tests yield similar results, the Roadways and Open Space will comply with SMRs through infiltration of stormwater runoff into underlying soils in landscape areas and pervious paving. The roadways and open space will achieve 25% peak rate and volume reductions in comparison to the existing condition for the 2 year, 24 hour event.

As discussed in Section 15.2.2 for Development Parcels, within the Developer Obligation Area, the project may increase perviousness in the Roadways and Open Space to provide additional rate and volume reductions for the Development Parcels. As approved by SFPUC based on proposed design, the project would still include equivalent reductions achieved by non-potable reuse as a part of this site wide compliance strategy, and provide the equivalence of 25% rate and volume reductions site wide.

Actual location of permeable paving to be approved during the City projects Street Improvement Permit (SIP) and Stormwater Control Plan (SCP) review and approvals process.

15.2.2 Development Parcels

The Development Parcels are generally zero lot line and directly adjacent to public parks and streets with limited options to reduce the volume of runoff. The Project intends to submit a master application for vertical parcels within the Developer Obligation Area requesting Modified Compliance Approval from SFPUC consisting of a 40 percent reduction in peak runoff rate and a 10 percent reduction in runoff volume for the Development Parcels. The Project's Modified Compliance Application will be submitted to the SMR Review Team prior to submittal of the Preliminary Stormwater Control Plan (SCP) for SFPUC Approval. Additionally, the project will be pursuing a master credit for stormwater volume reduction associated with non-potable reuse at the site through implementation of the district-wide WTRS. Alternatively, as approved by SFPUC, a stormwater volume reduction equivalency credit may be sought parcel by parcel based on graywater reuse within the buildings when subject to the NPO. Additional runoff volume and rate reductions, if required, may be addressed at each development parcel with implementation of Best Management Practices (BMPs), such as green roofs, flow through planters, or detention. Developer is not directly responsible for SMR compliance on Development Parcels.

Additionally, as discussed in 15.2.1 for Roadway and Open Space, the project may elect to increase perviousness within the streets and open space to further achieve a master-credit to be applied to Development Parcels; however, this would require the project to provide the equivalence of full compliance for Development Parcels.

15.2.3 Exempt Areas

Several Areas with the Developer Obligation Area are exempted from SMRs, including the existing portion of 20th Street and 22nd Street which are being

repaved in their current alignment, and Historic Buildings 2, 12 and 21, which are to remain.

15.2.4 SLR Adaptation

Stormwater Management features will be connected to the CSS. Initial design allows both CSS and Stormwater Management features to accommodate 24-inches SLR while maintaining freeboard within the respective systems. Modifications to the CSS required for SLR beyond 24-inches will also mitigate SLR impacts to the Stormwater Management features, future adaptation is not anticipated.

16. Dry Utility Systems

16.1 Existing Dry Utility Systems

16.1.1 Electric

Existing 12kV distribution systems within the project limits are served by Pacific Gas and Electric (PG&E) Company via Port electrical facilities managed and operated by the San Francisco Public Utilities Commission (SFPUC). The PG&E systems emanate from the adjacent PG&E Substation 'A' on Illinois and 22nd Street. PG&E 12kV systems occupy existing rights of way or franchised areas in 22nd Street and Illinois Street, and within the project limits. Port electrical facilities emanate from several PG&E wholesale distribution tariff WDT 12kV service locations within the project site and on the periphery. Specific WDT locations are as follows; Building 21, Building 102 and Michigan Street at 20th Street. These distribution points are wholesale energy transfer locations serving Port owned distribution facilities within the project site managed by the SFPUC PE. PG&E and Port facilities currently provide electric utility service at voltages of 12kV to below 600V with the project site.

16.1.2 Natural Gas

The site is currently served from an existing 16-inch PG&E gas main on Illinois Street through a 4-inch gas main on 20th Street.

16.1.3 Communications

Existing AT&T, Comcast, and other internet providers' facilities existing on Illinois street are in underground duct banks. Existing City of San Francisco Communication Department of Technology Information Services (DTIS) facilities consist of overhead lines and cables in underground conduits.

16.2 Proposed Dry Utility Systems

The Developer's Infrastructure obligations include the design and construction of the proposed dry utility systems per a utility service agreement to be executed during project implementation,

within the Developer Obligation Area identified in Figure 1.0. The proposed Joint Trench Layout is shown on Figure 16.0.

16.2.1 Electric

In accordance with Chapter 99 of the San Francisco Administrative Code, the SFPUC has performed a feasibility study and has determined that it will provide electric power to the project. SFPUC is the exclusive electric service provider for Pier 70 subject to the conditions of the DA. Based on the Draft June 15, 2015 Master Electric Infrastructure Plan (MEIP), the total cumulative electric load requirement for the project is about 22 MVA megavolt-amperes (MVA).

Developer will design and construct a joint trench with substructures including conduits, pull boxes, concrete pads and enclosures to complete a fully operational distribution system required by the SFPUC in accordance with their Rules and Regulations. The joint trench and associated substructures may be subject to refund. Distribution elements such as switches, transformers, and cables will be provided by the SFPUC and located underground.

SFPUC is responsible for planning, design and construction of all Wholesale Distribution Tariff (WDT) intervening facilities necessary to provide a source of SFPUC power to the project. Developer is responsible for all temporary and permanent distribution facilities starting at the load side of the WDT; including but not limited to the removal and relocation of any existing utility infrastructure, required for this project in accordance with SFPUC Rules and Regulations for Electric Service, local, state, and federal requirements.

SFPUC requires adequate space for the WDT interconnections to the PG&E power grid. Based on the required load of 22 MVA from the MEIP, SFPUC projects that there may be up to three 12kV circuits required to serve the load; that would consequently require additional space to install a switchgear with metering and necessary intervening facilities for respective WDT service location. While the WDT space can be indoor or outdoor, the project anticipates the WDT facilities to be installed indoors

located within specific buildings. SFPUC will be responsible for the design and coordination with the architect, electrical and civil/structural engineers of each building. Each WDT space will require a minimum area of 24 feet by 30 feet and at least 2 feet of unobstructed clearance from the top of the equipment to the bottom of a structural ceiling (if installed indoors). The walls and door around an indoor WDT space shall have a 3-hour fire rating. The door shall open outward and meet the same Uniform Building Code and NEC requirements for the installation and access of the building's electrical main service equipment. The switchgear shall be accessible 24 hours a day, 7 days a week. In the event that the WDT space is no longer needed in the future, SFPUC will remove all equipment including substructures, and restore the slab to a condition consistent with the adjacent building slab. The WDT spaces will not be on any of the development parcels except PKN, PKS, C1B or C1A, and C2A. Vertical Developer shall grant and SFPUC shall document and procure all necessary land rights for the WDT installation, and SFPUC provide a timely quitclaim of those land rights upon vacating the WDT facility.

16.2.2 Natural Gas

The gas distribution system is planned to be an element of a joint trench (JT) system which would include electric, phone, cable TV and streetlight facilities. The joint trench distribution system is shown on Figure 16.0. On some streets, in order to provide 10 feet between proposed building structures and gas piping systems, gas mains may be required to be separated from the joint trench into a gas only trench. The Developer will be responsible for construction of gas mains within the proposed roadway network.

16.2.3 Communications

The communications systems are planned to be an element of a JT which would include electric, gas and streetlight facilities.

Internet providers such as AT&T, Comcast or other third parties will provide new service for proposed improvements as participants in the JT system. Facilities will be placed in franchised areas. The Developer will be responsible for designs and construction of the JT

to accommodate AT&T, Comcast, or other third party facilities within Developer Obligation Area.

The Developer will be responsible for a DTIS substructure system within the Developer Obligation Area, including conduits, boxes and fire alarm pull stations; these will be provided as an element of the JT. Design and specification will be in accordance with DTIS standard requirements.

16.2.4 District Microgrid and Renewable Energy Variants

Solar photovoltaic arrays could be located on various project rooftops and interconnected with a proposed Project district scale microgrid system to serve as a site-side (demand side) distribution system capable of balancing captive supply and demand resources. The Project microgrid would reduce energy losses in transmission and distribution, increasing efficiency of the electric delivery system. The Project microgrid can be backed up by the project's electrical distribution system and would not necessarily supply all project demand.

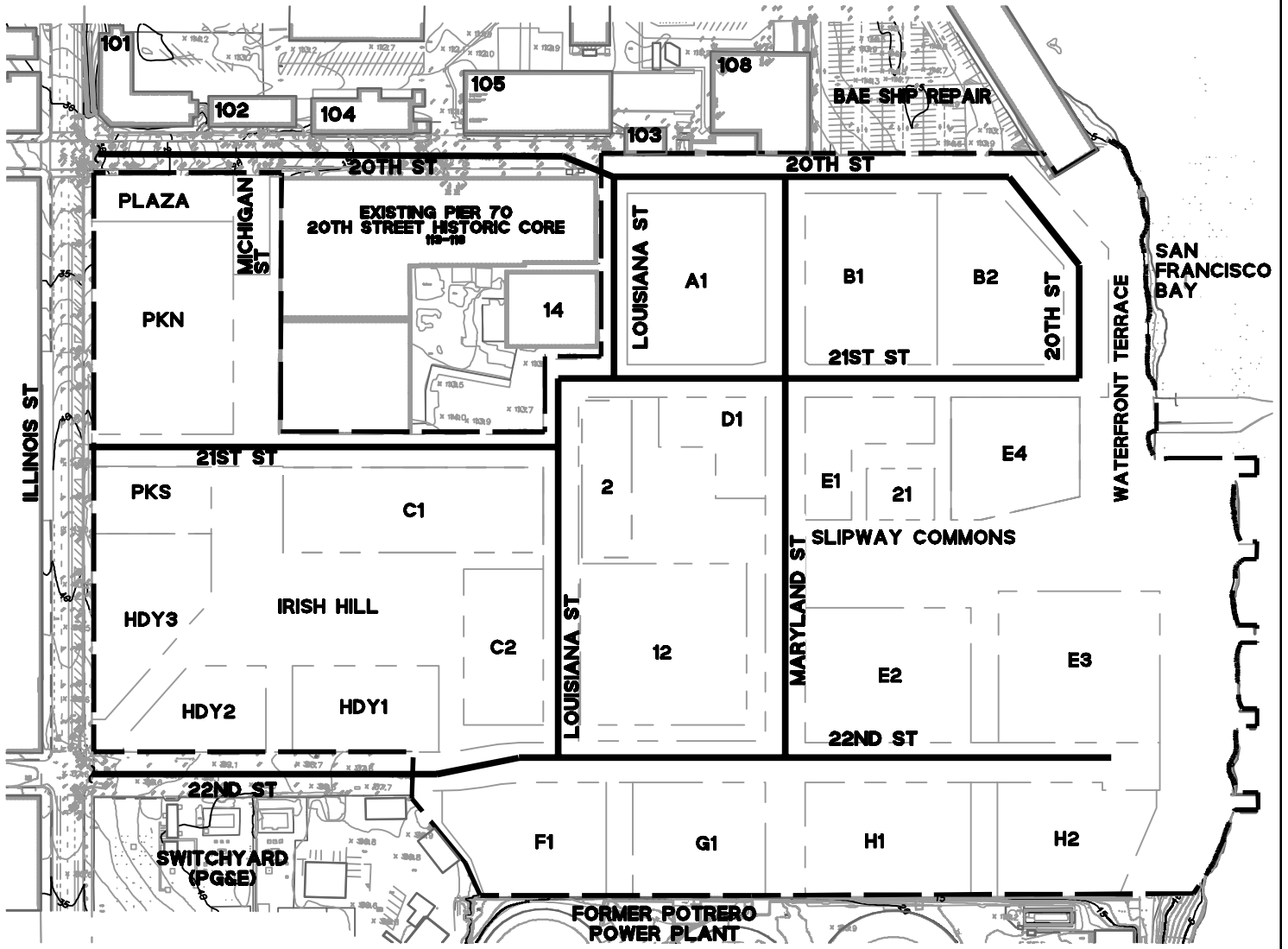
16.2.5 Streetlight Systems

Proposed public streetlighting systems will consist of conduits, boxes, conductors and streetlighting units (foundation, pole, and luminaire). Lighting unit locations, and spacing will be in compliance with San Francisco Public Utilities Commission Streetlighting Standard Requirements, and Subdivision Regulations. LED or light emitting diode technology will be employed in conformance with the latest industry standards, IES recommended practice and subject to SFPUC approval. Electric distribution systems will be in compliance with the National Electrical or California electrical Code, and all local requirements. Streetlighting units shall comply with City of San Francisco standards. The SSMP identifies a set of lamp fixtures and fixture types that will be specified, and surplus stock will be provided for repair and replacement of street lights by SFPUC. Project may submit street lights/poles to the City for approval, and if not acceptable, street lights/poles will be maintained by the project through an Independent Maintenance


Entity. The City, at its discretion, may choose to maintain approved fixtures and related electrical wiring on private poles through an agreement with the Independent Maintenance Entity.

16.3 Proposed Dry Utility System Phasing

The new JT system will be installed based on the principle of adjacency and as-needed to facilitate a specific proposed Development Phase the Project Phasing Plan to be approved with the Basis of Design. . The amount and location of the proposed JT installed will be the minimum necessary to support the Development Phase. The new Development Phase will connect to the existing systems as close to the edge of the Development Phase area as possible while maintaining the integrity of the existing system for the remainder of the Project. Repairs and/or replacement of the existing facilities will be made as necessary to support the proposed Development Phase. Temporary JT may be constructed by Developer and maintained by the Project Electrical Utility at Developer's expense as necessary to support service to existing buildings.



LEGEND

-  PIER 70 SUD BOUNDARY
-  PROPOSED DEVELOPMENT PARCEL
-  PROPOSED JOINT TRENCH

