San Francisco Public Utilities Commission

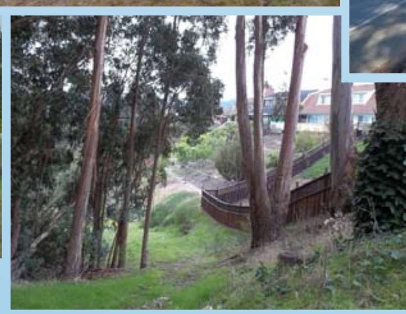
Peninsula Pipelines Seismic Upgrade Project

San Mateo County, California

Public Review Draft
Environmental Impact Report

Volume 2 of 2: Appendices

March 2013



Prepared for:

San Francisco Planning Department, Environmental Planning Division

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

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

San Francisco Public Utilities Commission

Peninsula Pipelines Seismic Upgrade Project

San Mateo County, California

Public Review Draft
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Notice of Preparation

1650 Mission St.
Suite 400
San Francisco,
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Reception:
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Planning
Information:
415.558.6377

Notice of Preparation of an Environmental Impact Report

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

PROJECT DESCRIPTION

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

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

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

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

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

FINDING

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

PUBLIC SCOPING PROCESS

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

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

November 3, 2011
Date

Bill Wycko
Environmental Review Officer

Peninsula Pipelines Seismic Upgrade Project

CASE NO. 2011.0123E

1.0 OVERVIEW AND BACKGROUND

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

1.1 San Francisco Regional Water System and the PPSU Project

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

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

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

1.2 Environmental Review Process

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

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

1.3 Public Scoping Meeting

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

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

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

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

2.0 PROJECT DESCRIPTION

2.1 Project Goals

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

2.2 Project Location and Existing Facilities

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

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

2.3 Proposed Facilities and Operation

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

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

<u>Construction Activities</u>

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

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

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

<u>Additional Activities</u>

Tree Removal

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

Pipeline Shutdown and Startup

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

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

Dewatering

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

Excavation

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

Staging Areas

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

Operations and Maintenance

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

<u>Access</u>

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

2.4 Schedule

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

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

3.0 ENVIRONMENTAL ANALYSIS

3.1 Environmental Issues to Be Addressed in the EIR

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

Land Use and Land Use Planning

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

Aesthetics

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

Population and Housing

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

Cultural and Paleontological Resources

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

Traffic, Transportation, and Circulation

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

Noise

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

Air Quality

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

Greenhouse Gas Emissions

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

Wind and Shadow

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

Recreation

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

Utilities and Service Systems

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

Public Services

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

Biological Resources

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

Geology, Soils, and Seismicity

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

Hydrology and Water Quality

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

Hazards and Hazardous Materials

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

Mineral/Energy Resources

Construction of the project would not likely affect the availability of mineral resources, if present in the project area, given that the project would be built within the SFPUC's existing ROW, which is land that is no longer available for mining. However, construction of the project would require the use of water and energy resources, and the potential for impacts on the availability of mineral resources will be examined further.

Agriculture and Forestry Resources

It is not likely that agricultural or forestry resources would be affected by project construction, given that the project would be built within the SFPUC's existing ROW, which is land that is no longer available for agriculture or forestry uses. Nevertheless, the potential for these types of impacts will be examined further.

Other Environmental Issues

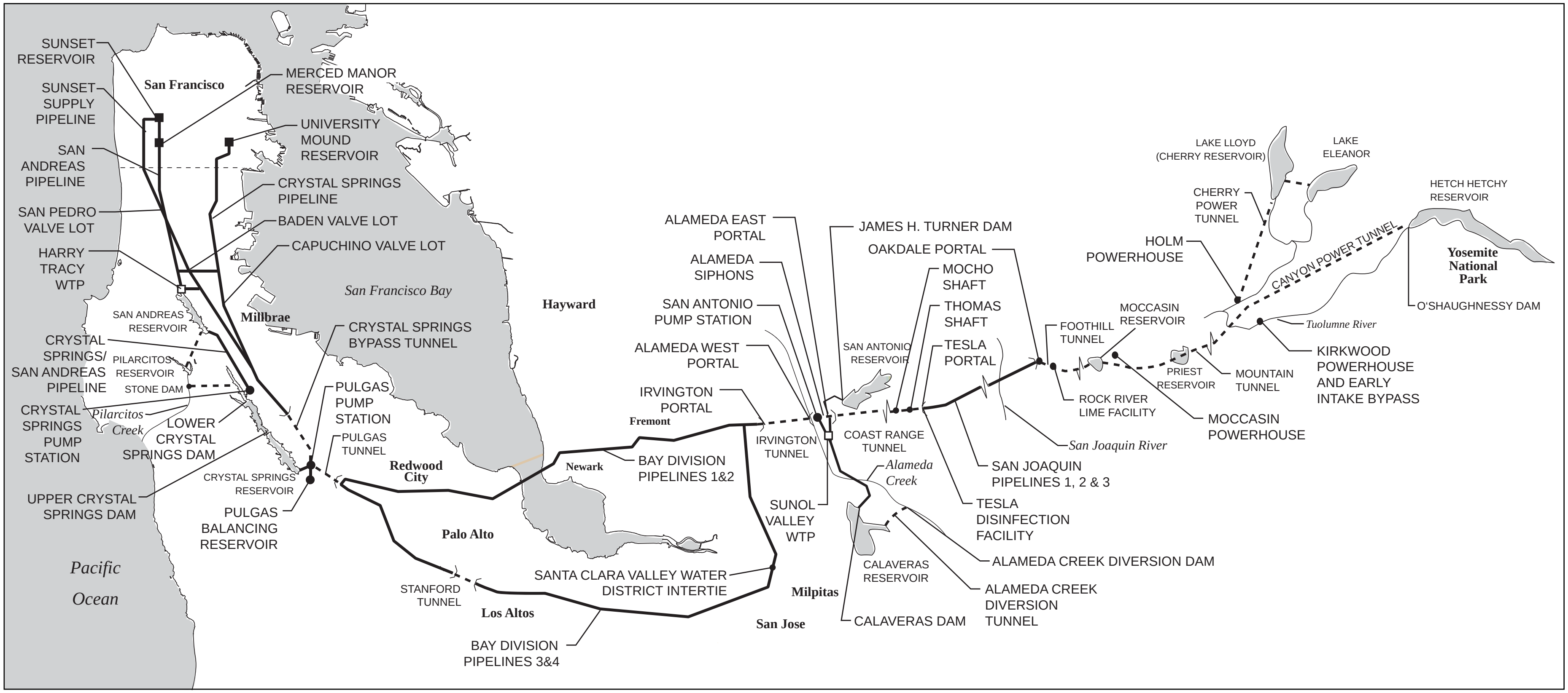
The proposed project would not expand the SFPUC service area nor increase the capacity to deliver water to meet the water purchase requests in the existing service area. Therefore, construction of the project would not likely result in growth-inducing impacts. Nevertheless, the potential for these types of impacts to result will be examined. In addition, the EIR will address whether the proposed project could result in impacts that are significant when combined with the impacts of other SFPUC projects or other non-SFPUC projects occurring in the area at the same time.

3.2 Alternatives

As required by CEQA, the EIR will describe and evaluate a reasonable range of alternatives to the proposed project. The alternatives would feasibly attain most of the proposed project's basic objectives while simultaneously avoiding or substantially lessening any significant effects of the proposed project. CEQA also requires evaluation of the "No Project" alternative.

4.0 ATTACHED FIGURES

Figure 1: SFPUC Regional Water System
Figure 2: Project Vicinity
Figure 3: Colma Site
Figure 4: South San Francisco Site
Figure 5: San Bruno North Site
Figure 6: San Bruno South Site
Figure 7: Millbrae Site



Pipeline

Tunnel

Water Treatment Plant (WTP)

Other Facilities

Segments of the system not shown

N

Not to Scale

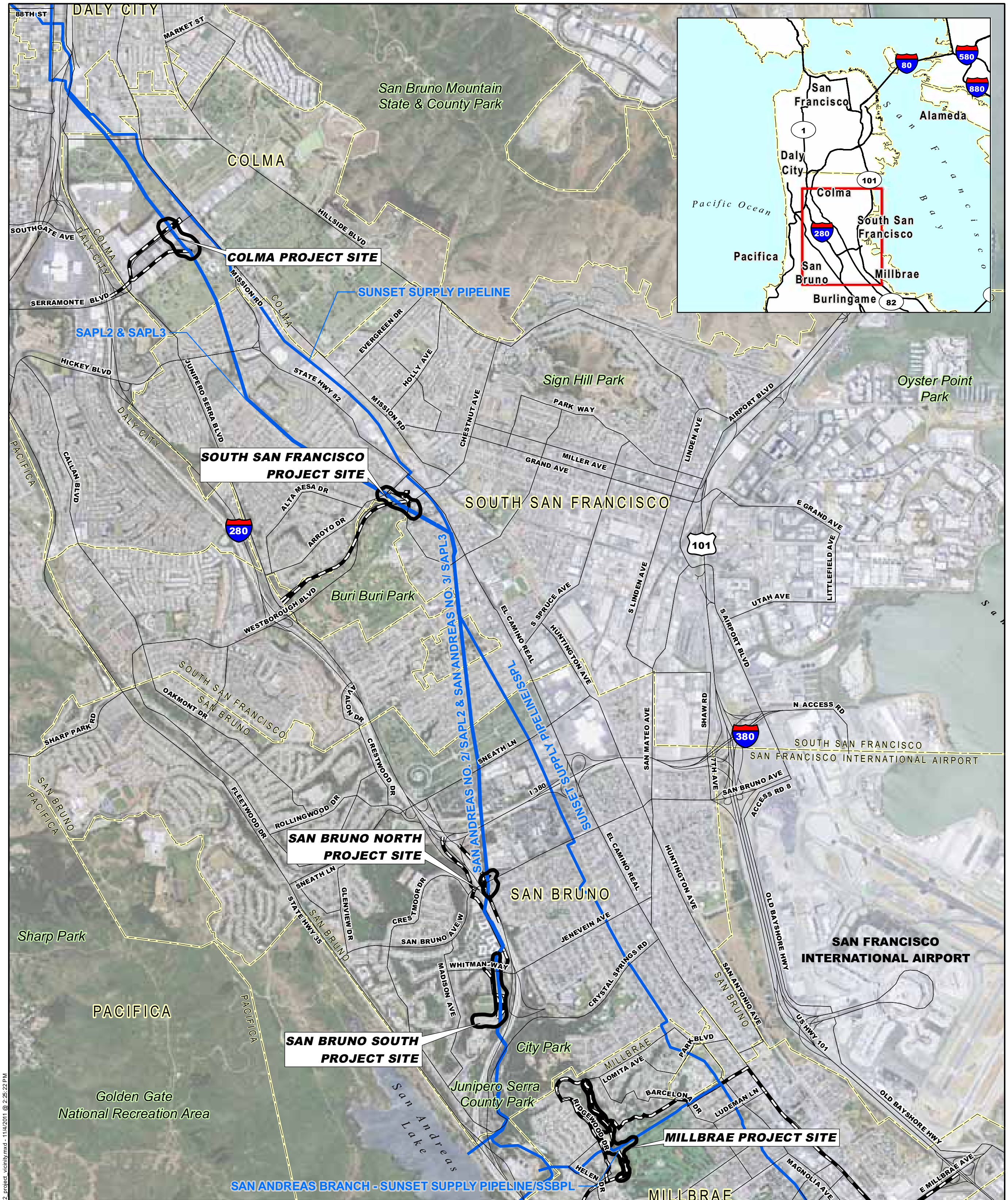
SFPUC REGIONAL WATER SYSTEM

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

November 2011

FIGURE 1

Source: San Francisco Planning Department (2008)



- Project Site
- Access Route to I-280
- SFPUC Water Transmission Line
- City Limits

N

0 4 8 Miles

PROJECT VICINITY

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

November 2011

FIGURE 2

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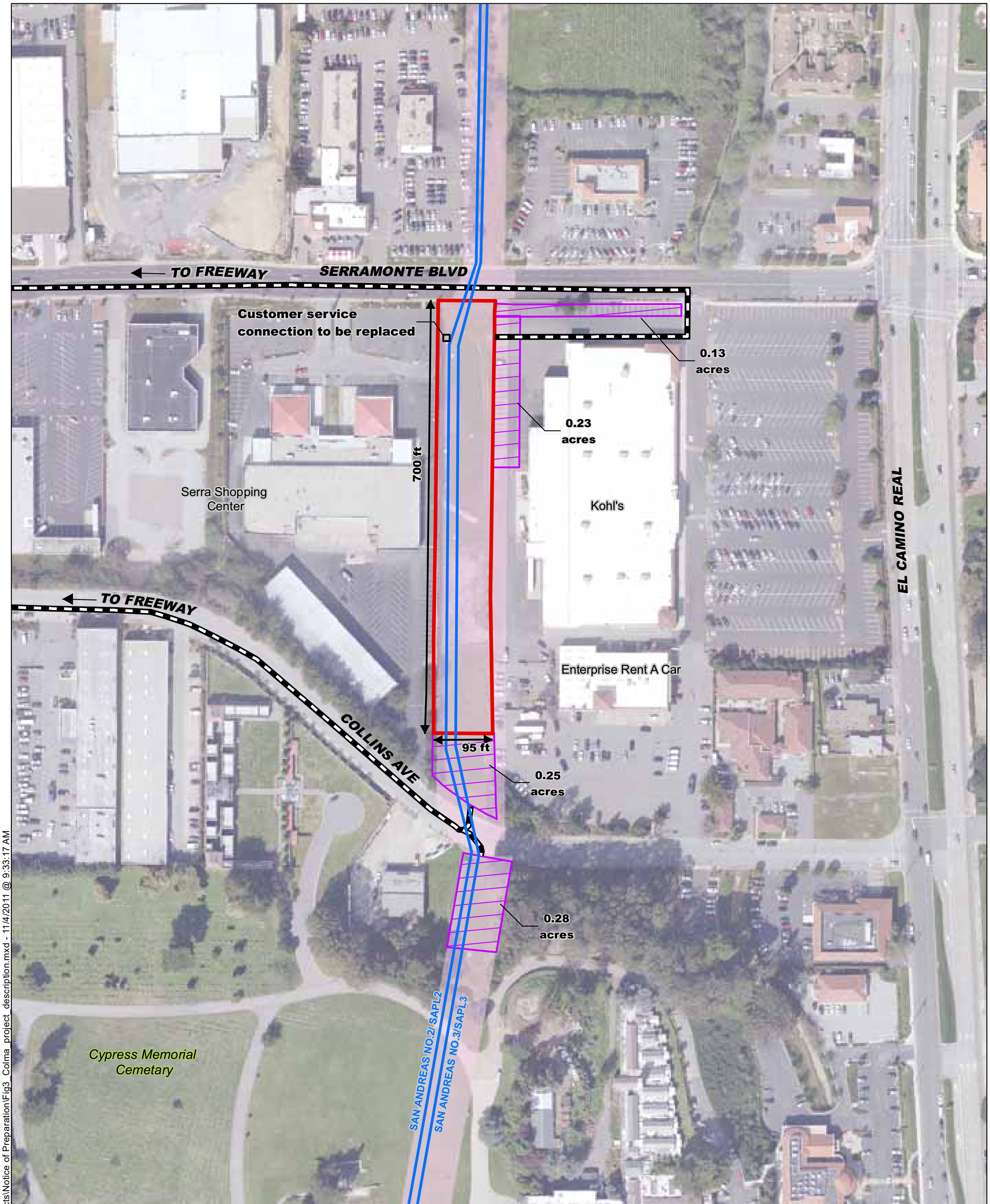
Source: SFPUC 2009/2011



Project Components

Construction Zone

Staging and Spoils Area

Access Route

SFPUC Water Transmission Line

SFPUC Parcels - Right of Way

N

0 100 200 Feet

COLMA SITE

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

November 2011

FIGURE 3

Source: SFPUC 2011

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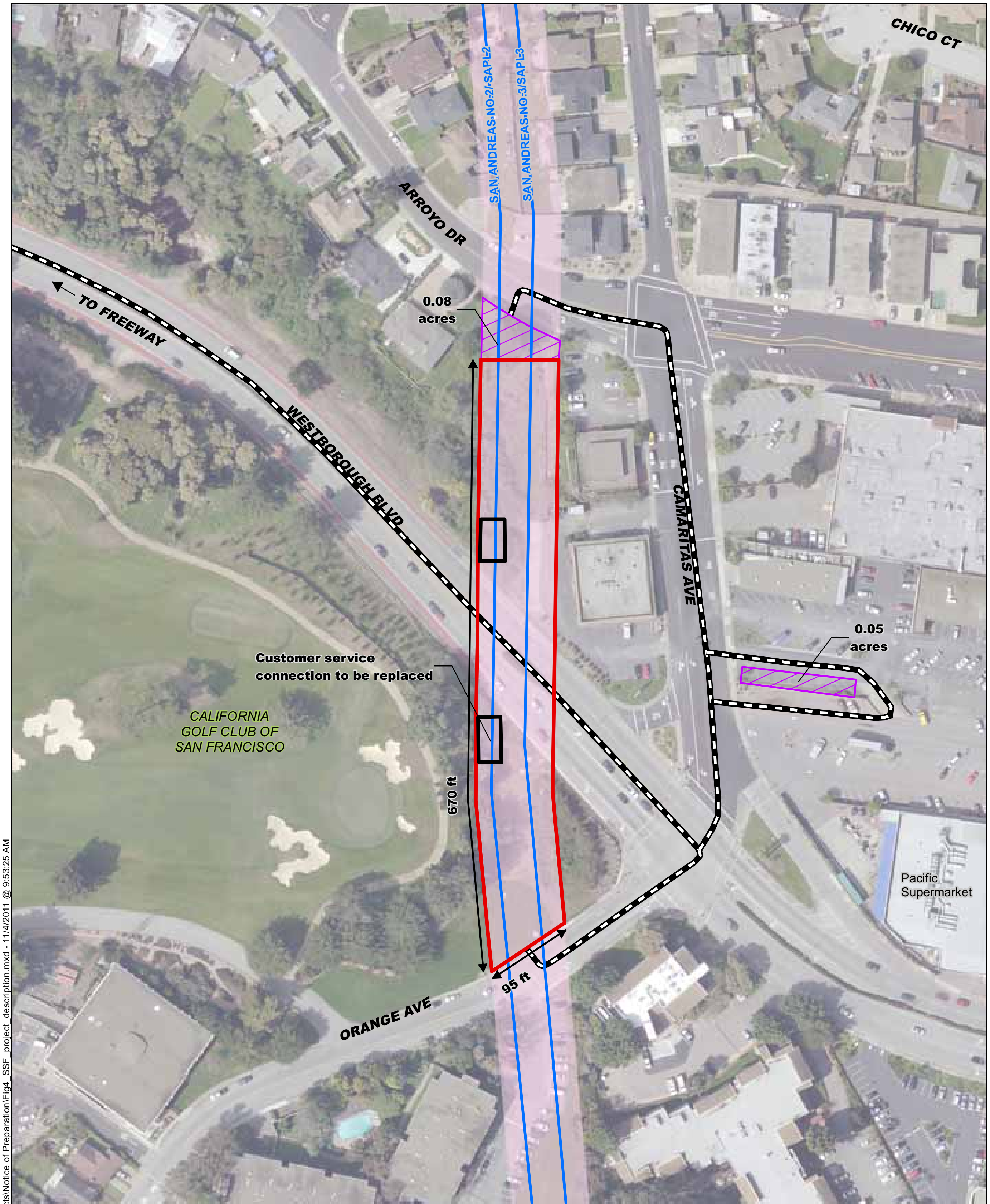

Project Components

Construction Zone

Boring Pit (~ 50' x 20')

Staging and Spoils Area

Access Route

SFPUC Water Transmission Line

SFPUC Parcels - Right of Way

N

0 75 150 Feet

SOUTH SAN FRANCISCO SITE

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

November 2011

FIGURE 4

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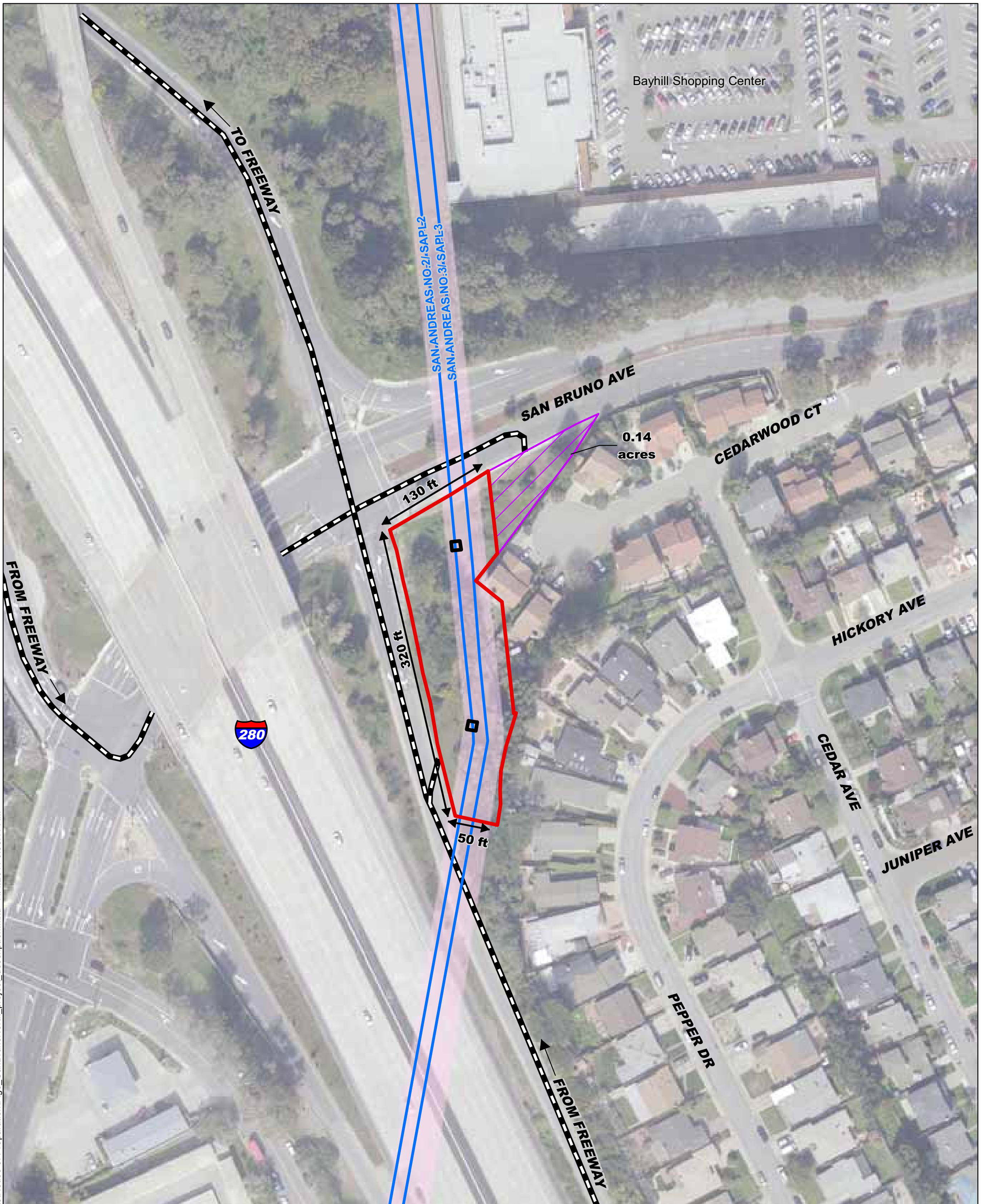
Source: SFPUC 2011



Project Components
Construction Zone
Pit (10' x 10')
Staging and Spoils Area
Access Route
SFPUC Water Transmission Line
SFPUC Parcels - Right of Way

N
0 75 150 Feet

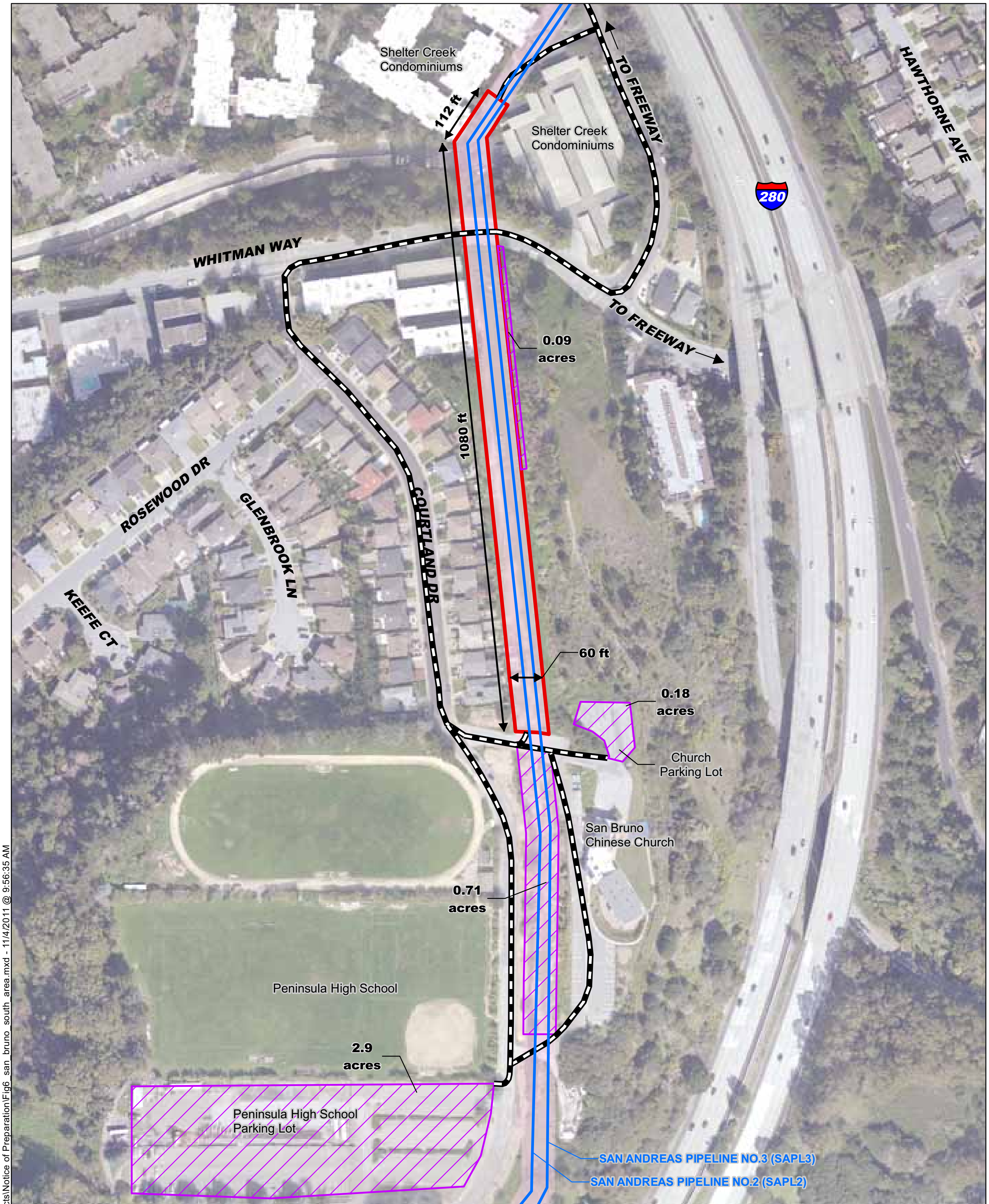
SAN BRUNO NORTH SITE

Peninsula Pipeline Seismic Upgrade
San Francisco Public Utilities Commission
November 2011 San Mateo County, California

FIGURE 5

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

Source: SFPUC 2011



Project Components

- Construction Zone
- Staging and Spoils Area
- Access Route
- SFPUC Water Transmission Line
- SFPUC Parcels - Right of Way

N

0 100 200 Feet

SAN BRUNO SOUTH SITE

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

November 2011

FIGURE 6

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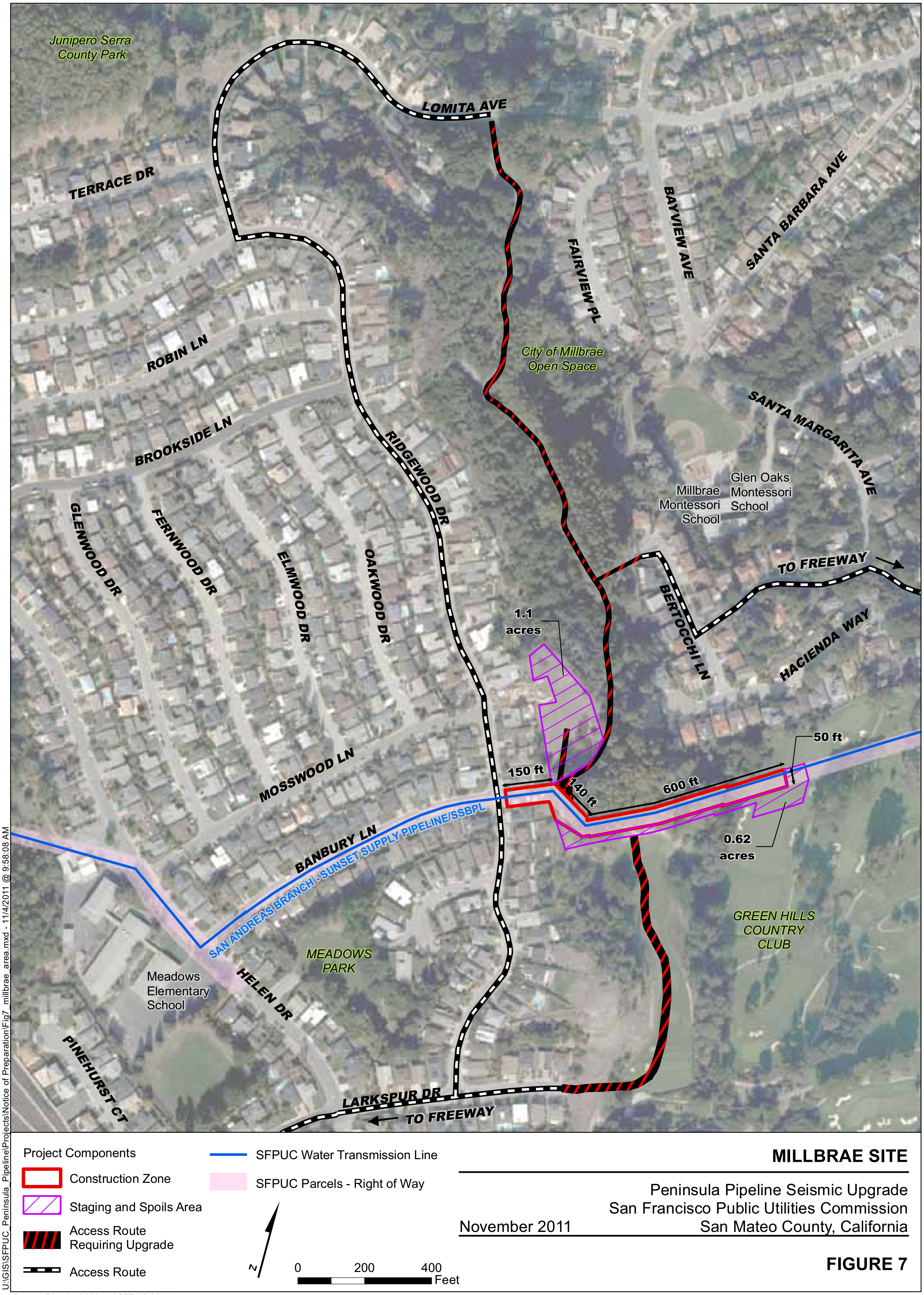
Source:SFPUC 2011



MILLBRAE SITE

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

November 2011

FIGURE 7

Source: Bing Aerial Maps/ SFPUC 2011

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Appendix B
Public Scoping Process Summary Report

PUBLIC SCOPING PROCESS
SUMMARY REPORT

PENINSULA PIPELINES SEISMIC UPGRADE PROJECT

SCH No. 2011112028

May 2012

Prepared for:
San Francisco Planning Department
Environmental Planning Division
and
San Francisco Public Utilities Commission
Bureau of Environmental Management

Prepared by:
URS Corporation *and*
Mara Feeney & Associates
San Francisco, California

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APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

CEQA	California Environmental Quality Act
EIR	Environmental Impact Report
Environmental Planning	San Francisco Planning Department’s Environmental Planning Division
HTWTP	Harry Tracy Water Treatment Plant
NOP	Notice of Preparation
PPSU	Peninsula Pipelines Seismic Upgrade
SAPL2	San Andreas Pipeline No. 2
SAPL3	San Andreas Pipeline No. 3
SFPUC	San Francisco Public Utilities Commission
SSBPL	Sunset Supply Branch Pipeline
WSIP	Water System Improvement Program

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1.0 PROJECT OVERVIEW

1.1 INTRODUCTION

The purpose of this report is to document the actions taken during the scoping process that was conducted to support the environmental analysis for the Peninsula Pipelines Seismic Upgrade (PPSU) project sponsored by the San Francisco Public Utilities Commission (SFPUC) as part of its Water System Improvement Program (WSIP). The San Francisco Planning Department's Environmental Planning Division (Environmental Planning) is the local lead agency for all projects sponsored by the City and County of San Francisco or conducted within the city. The agency determined that an Environmental Impact Report (EIR) would be prepared to meet the requirements of the California Environmental Quality Act (CEQA). The agency took a series of actions to inform interested parties and members of the public about the proposed project, and to encourage comments on the scope of the planned environmental analysis.

Scoping activities were conducted during the fall of 2011. Information and outreach activities for the project included publishing required notices through the California State Clearinghouse and in local newspapers; mailing a Notice of Preparation (NOP) to area residents and other interested parties on November 9, 2011; and conducting a public scoping meeting on November 30, 2011. The formal 30-day public scoping period extended from November 9, 2011, to December 9, 2011. This report describes these activities and summarizes the comments that were received during the scoping period.

1.2 PROJECT BACKGROUND

The SFPUC owns and operates a regional system that provides drinking water to 2.4 million customers in the San Francisco Bay Area through a complex network of facilities stretching from the Sierras to San Francisco. The SFPUC is implementing a $4.3-billion bond-funded WSIP to upgrade, replace, or repair facilities throughout the system, in order to improve delivery reliability and readiness to meet water demand during and after seismic events or prolonged droughts, as well as to meet new water quality regulations through the year 2030.

The PPSU project is part of this overall WSIP program. The proposed project would entail seismic upgrades to the SFPUC's San Andreas Pipeline No. 2 (SAPL2), San Andreas Pipeline No. 3 (SAPL3), and Sunset Supply Branch Pipeline (SSBPL), drinking water transmission pipelines that deliver water from the Harry Tracy Water Treatment Plant (HTWTP) to the SFPUC's regional water system. The overall project goal for the upgrades to SAPL2, SAPL3, and SSBPL is to increase the seismic reliability of water delivery from HTWTP to downstream customers after a major earthquake on the San Andreas Fault. Portions of these pipelines traverse the Serra Fault—a secondary fault along the San Francisco Peninsula in San Mateo County that may experience movement in the future, possibly coincident with a large earthquake along the San Andreas Fault. During recent geotechnical investigations performed for the HTWTP Long-Term Improvement Project, it was determined that fault offset on the Serra Fault during a San Andreas design event may cause pipeline failure at the fault crossings. Additionally, SAPL2, constructed circa 1928, uses lockbar joints for longitudinal joints and rivets for circumferential joints, which are highly vulnerable to seismically-induced joint failure. In addition to the fault crossings, there are other areas where the pipelines cross potential liquefaction and landslide zones. The proposed project would replace/stabilize segments of these pipes at five locations that are susceptible to failure during such events.

1.3 PROPOSED PROJECT

The proposed project consists of seismic upgrades to three SFPUC water transmission pipelines—SAPL2, SAPL3, and SSBPL—at five locations on the San Francisco Peninsula. The upgrades would improve segments of pipelines to increase reliability in the case of seismic events. The five sites are located in Colma, South San Francisco, San Bruno (two sites), and Millbrae in San Mateo County, as shown on Figure 1. A common staging area was proposed for the northern portion of the SFPUC's Baden Value Lot near the South San Francisco site subsequent to the close of the scoping period. The locations of the five project sites and the work that would be completed at each site are described below.

1.3.1 Colma Site

The proposed project component located in the Town of Colma would include the installation of a new 54-inch-diameter steel pipeline to replace the existing 54-inch-diameter steel pipeline for an approximately 700-foot segment of SAPL2 in the vicinity of Serramonte Boulevard and Collins Avenue.

1.3.2 South San Francisco Site

In South San Francisco, the proposed project would include the installation of a new 54-inch-diameter steel pipeline to replace the existing 54-inch-diameter steel pipeline for an approximately 650-foot segment of SAPL2 in the vicinity of Westborough Boulevard from Arroyo Drive to West Orange Avenue.

1.3.3 San Bruno North Site

The proposed project at the San Bruno North site would entail the stabilization of SAPL2 in the tunnel from San Bruno Avenue West to just before the San Bruno Avenue West northbound exit from Interstate 280, through which it currently extends. Project construction activities would include excavation of two access pits above the existing tunnel and installation of grouting or pipe stabilization structures within the tunnel.

1.3.4 San Bruno South Site

At the San Bruno South site, the proposed project would include the installation of a new 54-inch-diameter steel pipeline to replace the existing 54-inch-diameter steel pipeline for an approximately 1,170-foot segment of SAPL2; and installation of a new 66-inch-diameter steel pipeline to replace an approximately 1,050-foot segment of the existing 66-inch-diameter steel SAPL3. These activities would occur in the vicinity of Courtland Drive and Whitman Way.

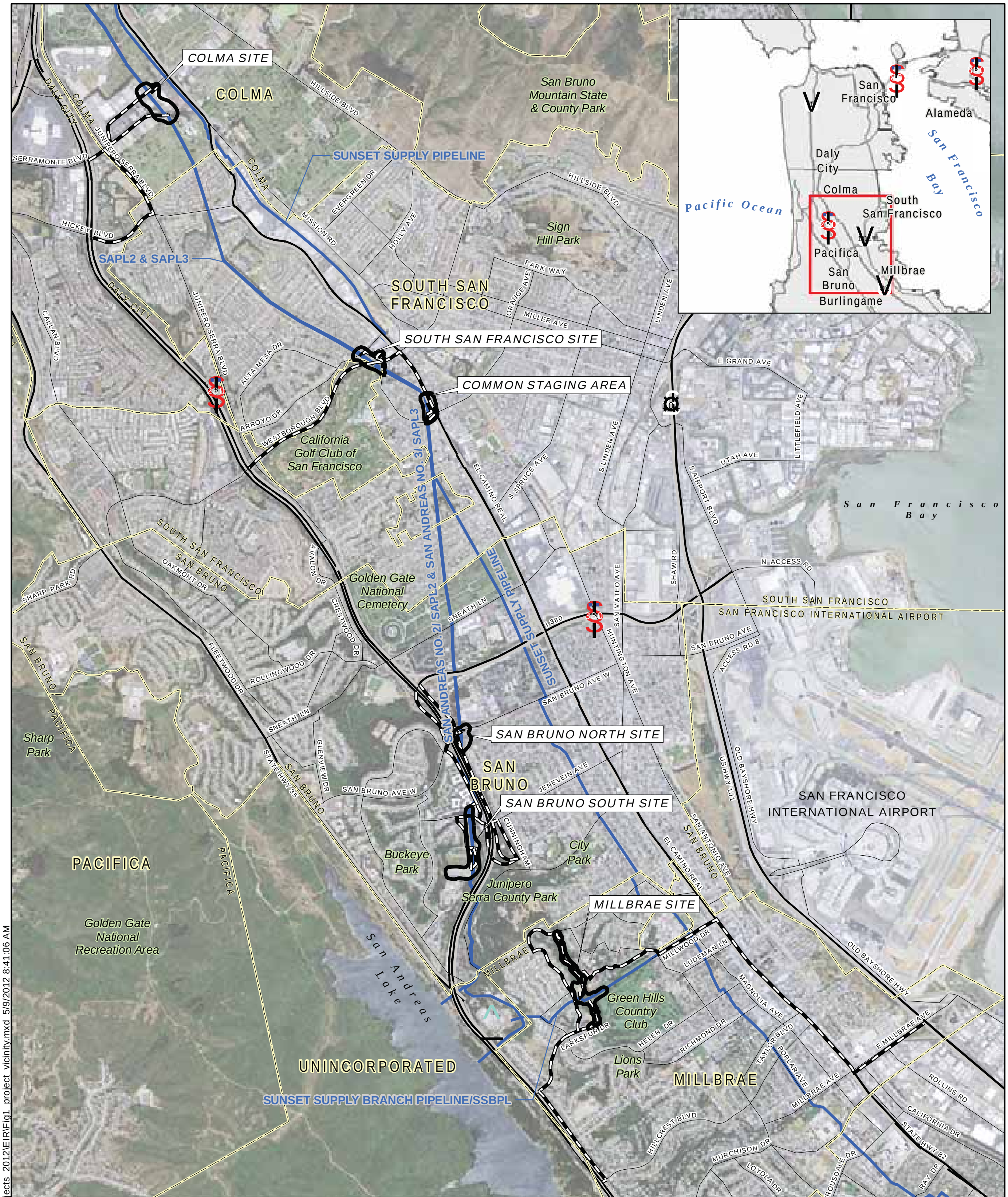
1.3.5 Millbrae Site

The Millbrae site generally extends east from the intersection of Banbury Lane and Ridgewood Drive, through two residential side yards, and through a portion of the Green Hills Country Club golf course. The proposed project would include installation of a new 61-inch-diameter steel pipeline to replace the existing 61-inch-diameter steel SSBPL pipeline, from the eastern curb of Ridgewood Drive and extending 890 feet to the east.

2.0 PURPOSE OF THE SCOPING PROCESS

The purpose of the scoping process is to inform the public and other agencies about the project and to solicit input on the appropriate scope, content, and focus of the EIR. Such input helps the lead agency (in this case, Environmental Planning) identify appropriate issues, methodologies, information sources, and level of detail for the EIR. Scoping comments also help develop the range of alternatives to be evaluated in the EIR. The scoping process is a means of engaging other interested agencies, the public, and other interested parties, in the environmental review process. All comments received during this process will be considered by the lead agency in guiding the development of the Draft EIR.

The Draft EIR will include a detailed description of the proposed project. It will identify existing environmental conditions and resources in the site vicinity, and will determine how construction, operation, and maintenance of the proposed project could potentially affect these environmental resources. The environmental consultants preparing the Draft EIR on behalf of the lead agency will consider comments on the scope of the environmental analysis that were raised during the public scoping process, and address them as appropriate in their analysis. When the Draft EIR is completed, it is released for public review and comment. The PPSU Draft EIR is expected to be released for public review and comment early in 2013, and certification of the Final EIR is anticipated in late summer 2013.



- Project Site
- Access Route to Project Site
- SFPUC Water Transmission Line
- Harry Tracy Water Treatment Plant
- City Limits

0 0.5 1 Mile

PROJECT VICINITY

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

May 2012

FIGURE 1

Source: SFPUC 2009/2011

ed U:\GIS\SFPUC_Peninsula_Pipeline\Projects_2012\EIR\Fig1_project_vicinity.mxd 5/9/2012 8:41:06 AM

3.0 SCOPING PROCESS FOR THE PPSU PROJECT

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

3.1 NOTICE OF PREPARATION

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

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

3.2 NOP MAILING LIST

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

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

3.3 ADDITIONAL NOTIFICATION

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

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

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

3.4 PUBLIC SCOPING MEETING

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

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

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

3.5 COMMENTS RECEIVED

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

Local Jurisdictions

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

Regional Agency

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

Homeowners/Residents/Individuals

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

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

3.6 SUMMARY OF SCOPING COMMENTS

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

General

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

Communications

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

Safety and Security

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

Aesthetics

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

Noise and Vibration

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

Land Use Conflicts

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

Transportation, Traffic, and Parking

- Describe impacts of construction on local roads (Balchior)

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

Biological Resources

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

Hydrology and Water Quality

- Identify stormwater impacts associated with project construction (Aknin)

Air Quality

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

Erosion Control

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

Utilities and Services

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

Other

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

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

APPENDIX A

NOTICE OF PREPARATION DOCUMENTS

November 9, 2011

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

Reception:
415.558.6378

Fax:
415.558.6409

Planning
Information:
415.558.6377

TO: Responsible Agencies, Trustee Agencies, and Interested Parties

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

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

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

PROJECT DESCRIPTION:

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

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

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

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

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

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

PUBLIC SCOPING MEETING LOCATION, DATE, AND TIME:

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

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

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

Reception:
415.558.6378

Fax:
415.558.6409

Planning
Information:
415.558.6377

Notice of Preparation of an Environmental Impact Report

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

PROJECT DESCRIPTION

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

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

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

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

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

FINDING

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

PUBLIC SCOPING PROCESS

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

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

November 3, 2011
Date

Bill Wycko
Environmental Review Officer

Peninsula Pipelines Seismic Upgrade Project

CASE NO. 2011.0123E

1.0 OVERVIEW AND BACKGROUND

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

1.1 San Francisco Regional Water System and the PPSU Project

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

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

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

1.2 Environmental Review Process

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

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

1.3 Public Scoping Meeting

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

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

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

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

2.0 PROJECT DESCRIPTION

2.1 Project Goals

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

2.2 Project Location and Existing Facilities

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

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

2.3 Proposed Facilities and Operation

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

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

<u>Construction Activities</u>

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

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

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

Additional Activities

Tree Removal

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

Pipeline Shutdown and Startup

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

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

Dewatering

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

Excavation

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

Staging Areas

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

Operations and Maintenance

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

<u>Access</u>

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

2.4 Schedule

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

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

3.0 ENVIRONMENTAL ANALYSIS

3.1 Environmental Issues to Be Addressed in the EIR

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

Land Use and Land Use Planning

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

Aesthetics

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

Population and Housing

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

Cultural and Paleontological Resources

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

Traffic, Transportation, and Circulation

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

Noise

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

Air Quality

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

Greenhouse Gas Emissions

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

Wind and Shadow

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

Recreation

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

Utilities and Service Systems

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

Public Services

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

Biological Resources

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

Geology, Soils, and Seismicity

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

Hydrology and Water Quality

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

Hazards and Hazardous Materials

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

Mineral/Energy Resources

Construction of the project would not likely affect the availability of mineral resources, if present in the project area, given that the project would be built within the SFPUC's existing ROW, which is land that is no longer available for mining. However, construction of the project would require the use of water and energy resources, and the potential for impacts on the availability of mineral resources will be examined further.

Agriculture and Forestry Resources

It is not likely that agricultural or forestry resources would be affected by project construction, given that the project would be built within the SFPUC's existing ROW, which is land that is no longer available for agriculture or forestry uses. Nevertheless, the potential for these types of impacts will be examined further.

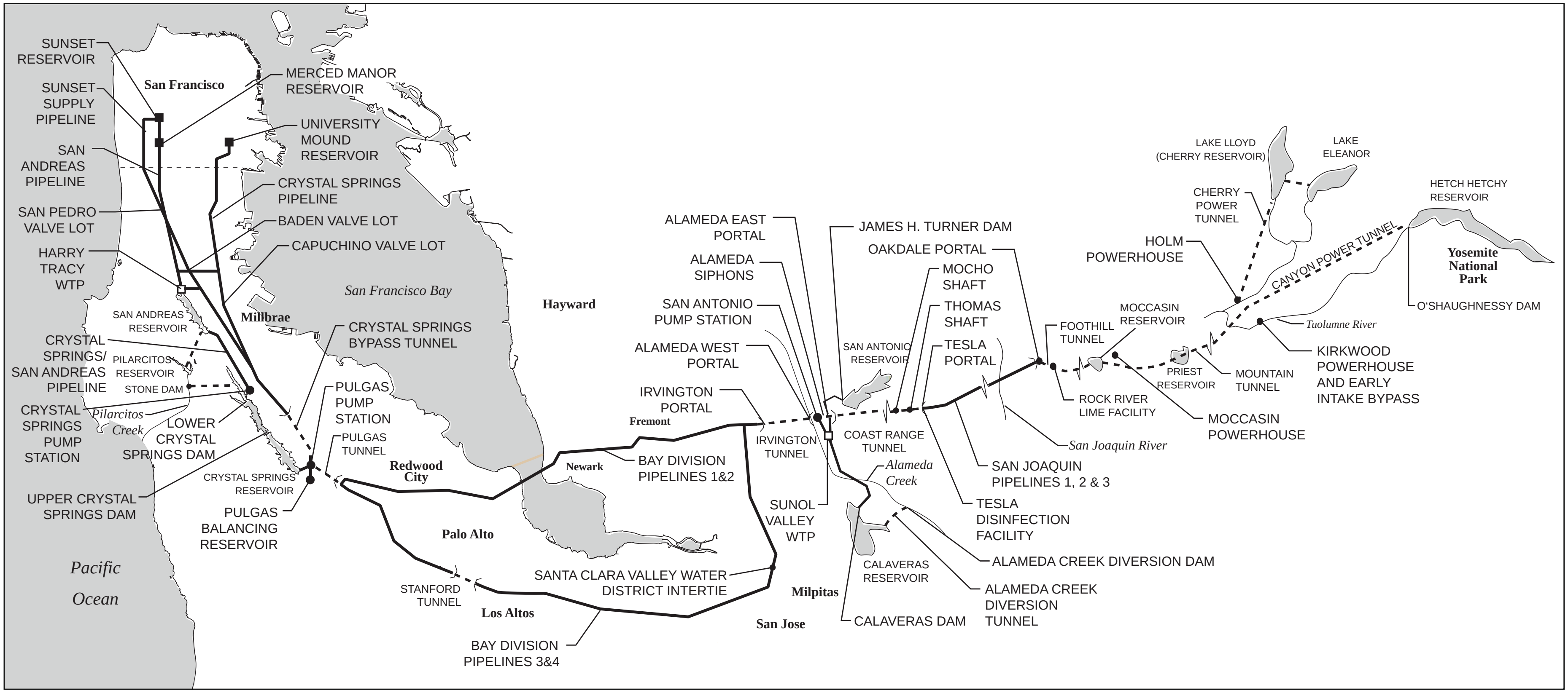
Other Environmental Issues

The proposed project would not expand the SFPUC service area nor increase the capacity to deliver water to meet the water purchase requests in the existing service area. Therefore, construction of the project would not likely result in growth-inducing impacts. Nevertheless, the potential for these types of impacts to result will be examined. In addition, the EIR will address whether the proposed project could result in impacts that are significant when combined with the impacts of other SFPUC projects or other non-SFPUC projects occurring in the area at the same time.

3.2 Alternatives

As required by CEQA, the EIR will describe and evaluate a reasonable range of alternatives to the proposed project. The alternatives would feasibly attain most of the proposed project's basic objectives while simultaneously avoiding or substantially lessening any significant effects of the proposed project. CEQA also requires evaluation of the “No Project” alternative.

4.0 ATTACHED FIGURES



Pipeline

Tunnel

Water Treatment Plant (WTP)

Other Facilities

Segments of the system not shown

Not to Scale

SFPUC REGIONAL WATER SYSTEM

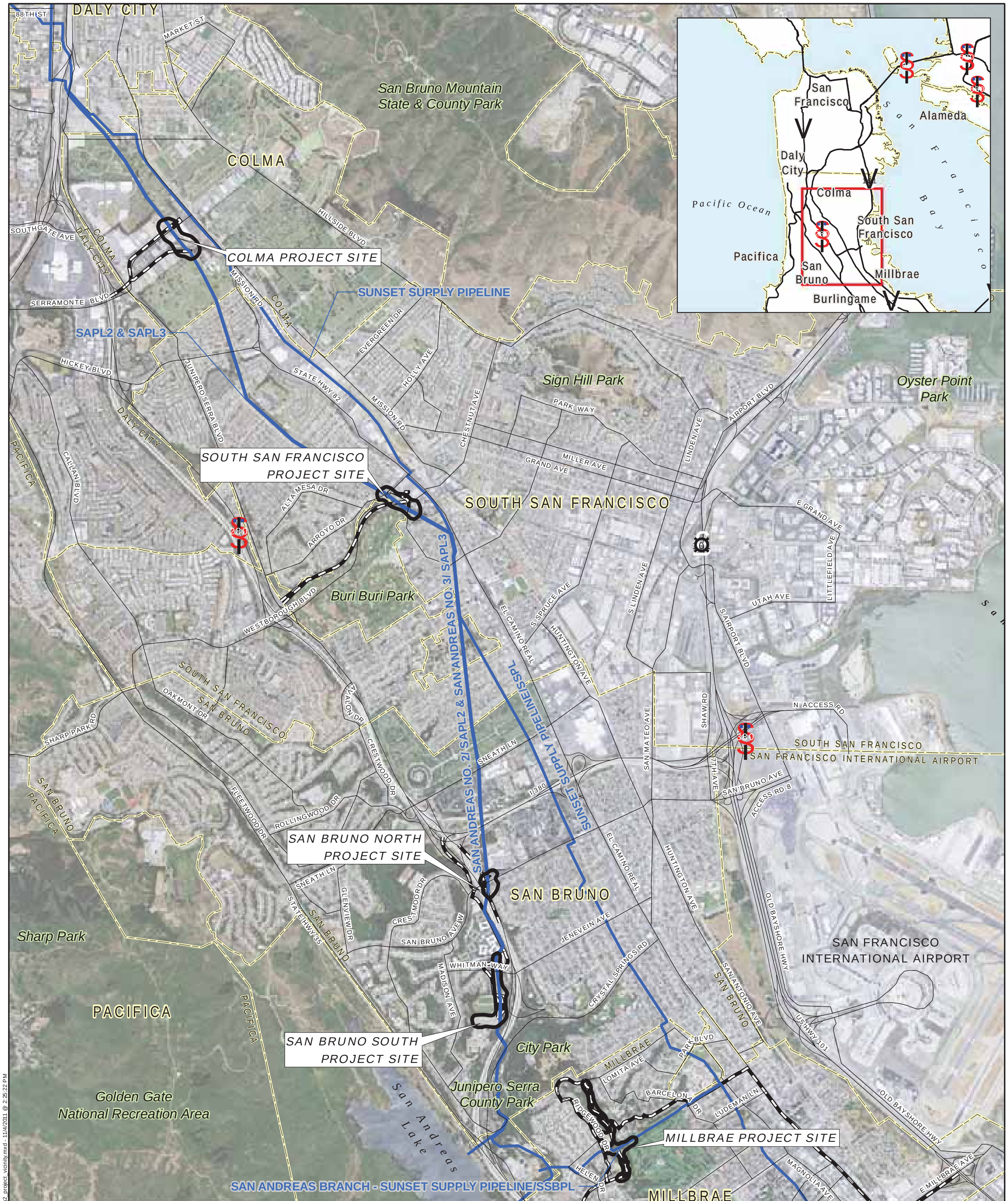
Peninsula Pipeline Seismic Upgrade
San Francisco Public Utilities Commission
San Mateo County, California

November 2011

FIGURE 1

11/4/11 vsa... T:\SFPUC CS-116 Peninsula Pipelines\Fig1_sfpuc_reg_water_syS.ai

Source: San Francisco Planning Department (2008)



Project Site
Access Route to I-280
SFPUC Water Transmission Line
City Limits

0 0.5 1 Mile

PROJECT VICINITY

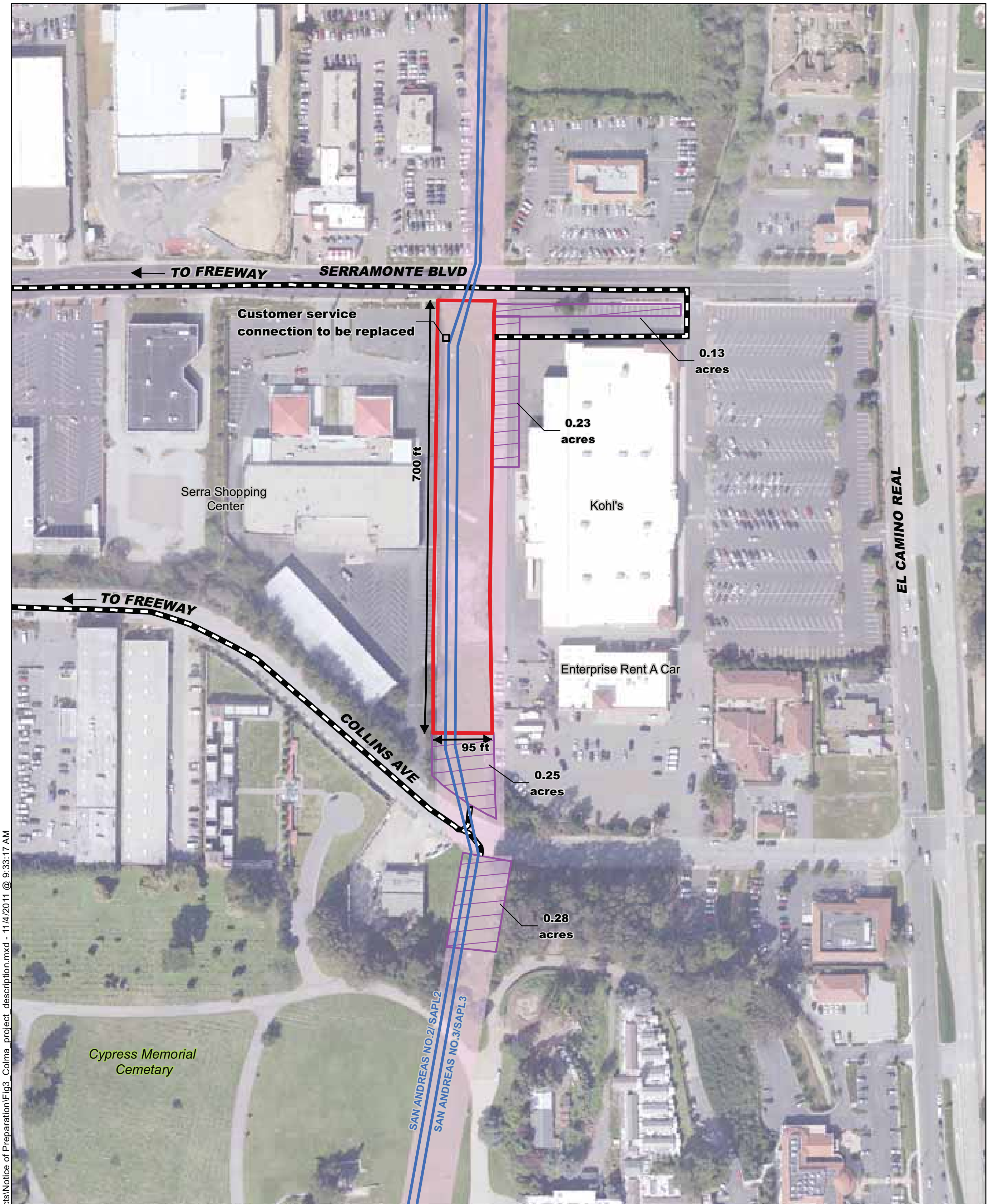
Peninsula Pipeline Seismic Upgrade
San Francisco Public Utilities Commission
San Mateo County, California

November 2011

FIGURE 2

U:\GIS\SFPUC_Peninsula_Pipeline\Projects\Notice of Preparation\Fig2_project_vicinity.mxd - 11/4/2011 @ 2:25:22 PM

Source: SFPUC 2009/2011



Project Components

Construction Zone

Staging and Spoils Area

Access Route

SFPUC Water Transmission Line

SFPUC Parcels - Right of Way

N

0 100 200 Feet

COLMA SITE

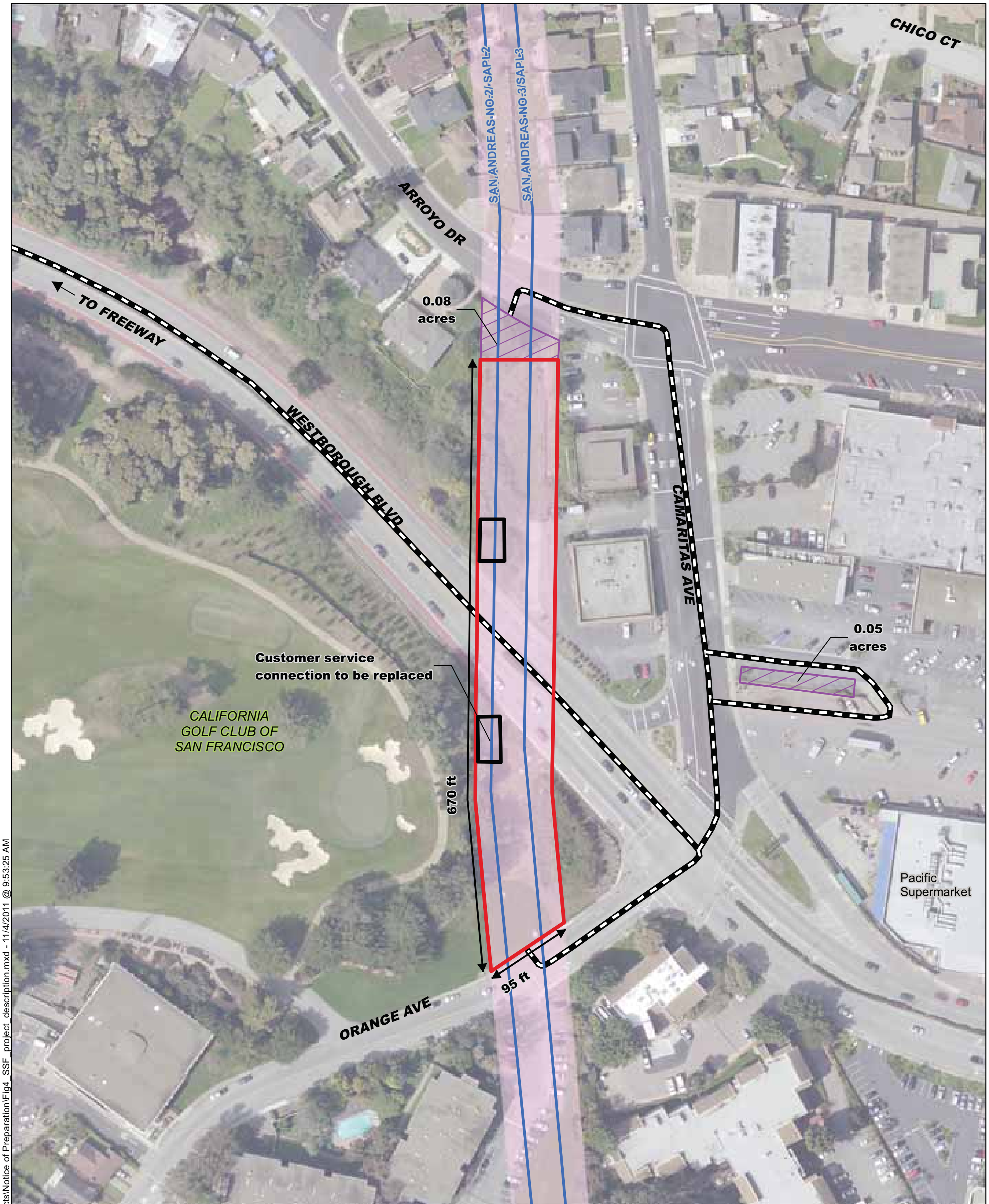
Peninsula Pipeline Seismic Upgrade
San Francisco Public Utilities Commission
San Mateo County, California

November 2011

FIGURE 3

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

Source: SFPUC 2011



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

Project Components

- Construction Zone
- Boring Pit (~ 50' x 20')
- Staging and Spoils Area
- Access Route
- SFPUC Water Transmission Line
- SFPUC Parcels - Right of Way

N

0 75 150 Feet

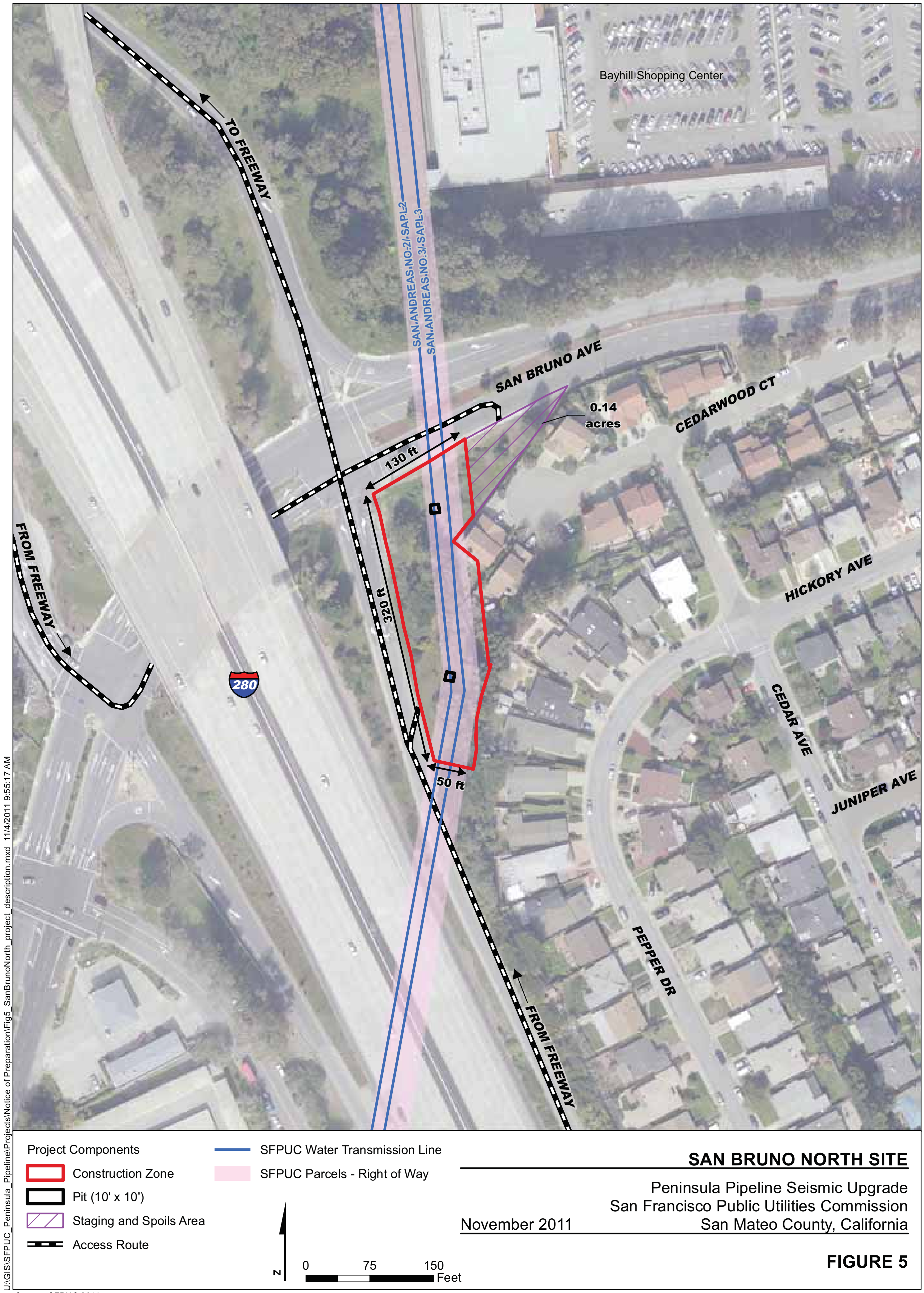
SOUTH SAN FRANCISCO SITE

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

November 2011

FIGURE 4

Source: SFPUC 2011



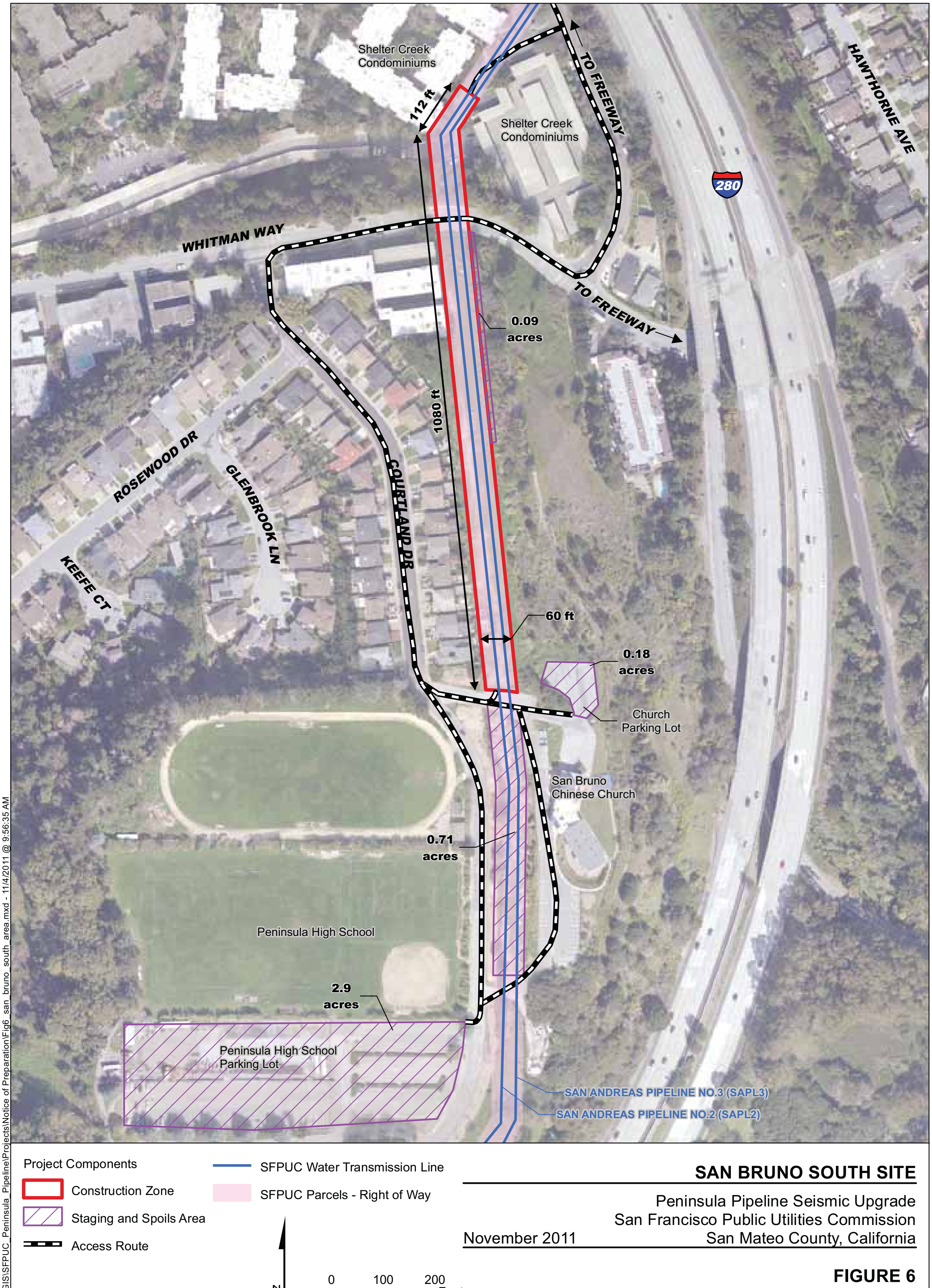
SAN BRUNO NORTH SITE

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

November 2011

FIGURE 5

Source: SFPUC 2011



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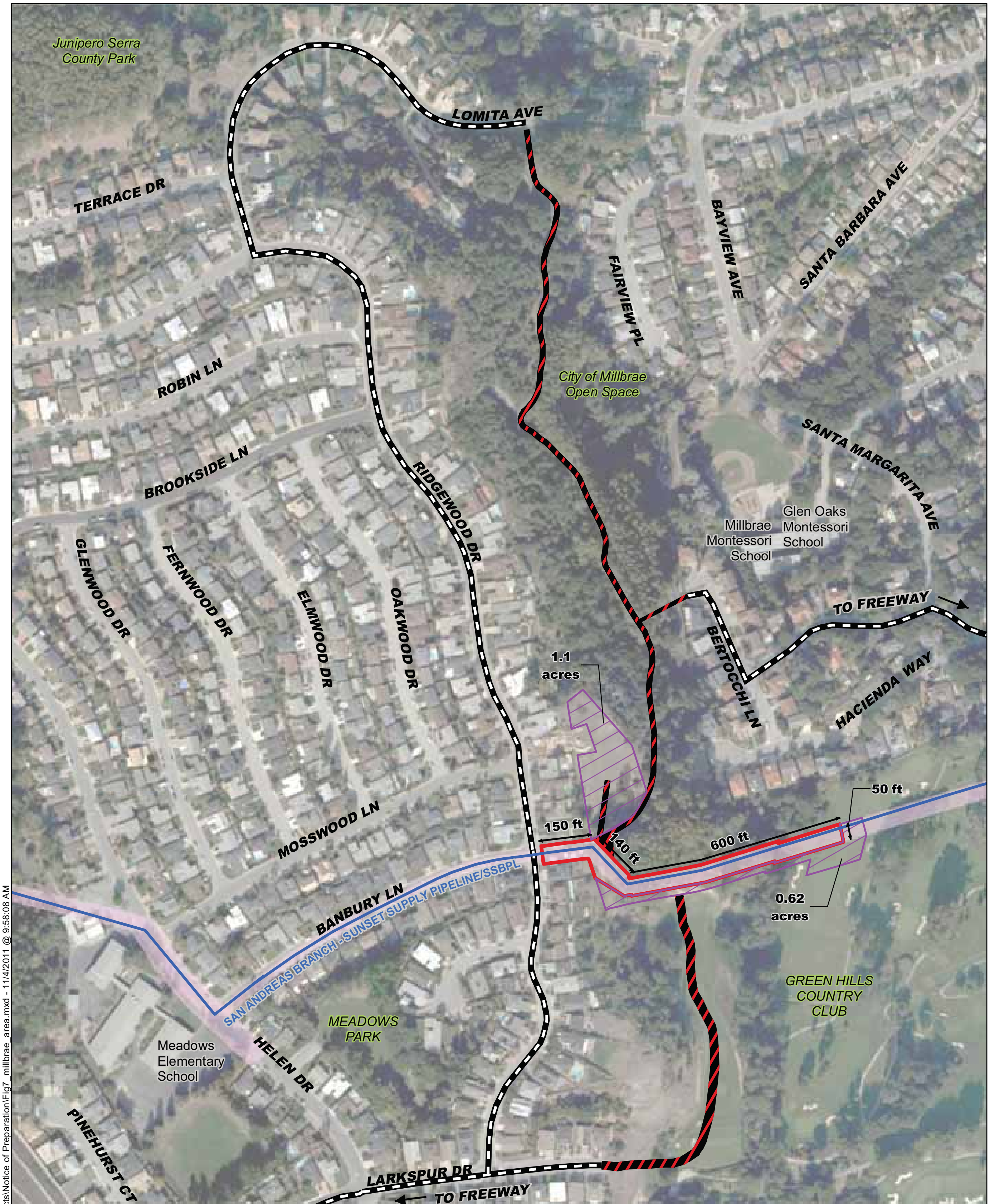
SAN BRUNO SOUTH SITE

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

November 2011

FIGURE 6

Source:SFPUC 2011



Project Components

Construction Zone

Staging and Spoils Area

Access Route Requiring Upgrade

Access Route

SFPUC Water Transmission Line

SFPUC Parcels - Right of Way

N

0 200 400 Feet

MILLBRAE SITE

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

November 2011

FIGURE 7

Source: Bing Aerial Maps/ SFPUC 2011

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APPENDIX B

NEWSPAPER ADVERTISEMENTS

FUTURE INNOVATORS

Modern trailblazer moves country in right direction

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

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

MARGARET LAVIN

ELEMENTARY, MY DEARS

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

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

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

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

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

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

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

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

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

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

Contact Margaret Lavin at elementarydays@gmail.com.

SAN FRANCISCO PLANNING DEPARTMENT
ENVIRONMENTAL REVIEW NOTICE

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

NOTICE OF PREPARATION OF AN EIR

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

Case No. 2011.0123E: Peninsula Pipelines Seismic Upgrade Project

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

Notice is hereby given to the general public as follows:

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

SAN FRANCISCO EXAMINER

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

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

EXM#: 2204407

PROOF OF PUBLICATION

(2015.5 C.C.P.)

State of California)
County of SAN FRANCISCO) ss

Notice Type: GPN - GOVT PUBLIC NOTICE

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

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

11/09/2011

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

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

Liliana Moreno

Signature

PLANNING DEPARTMENT ENVIRONMENTAL REVIEW NOTICE

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

PRELIMINARY MITIGATED NEGATIVE DECLARATION

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

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

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

NOTICE OF PREPARATION OF AN EIR

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

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

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

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

!A000002418041!

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

NOTICE OF PREPARATION OF EIR

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

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

Notice is hereby given to the general public as follows:

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

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

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

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APPENDIX C

SCOPING MEETING MATERIALS

WSIP Peninsula Pipelines Seismic Upgrade Project

San Francisco Planning Department Scoping Meeting

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

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

Agenda

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

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

Deadline for Submitting Scoping Comments

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

Comment letters may be submitted:

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

For More Information

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

Public Scoping Meeting

San Francisco Planning Department
Environmental Planning Division

SCOPING MEETING

Peninsula Pipelines Seismic Upgrade Project
Environmental Impact Report

November 30, 2011

Peninsula Pipelines Seismic Upgrade Project – EIR Scoping Meeting

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

Meeting Agenda

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

Project Team Introductions

San Francisco Planning Department
- *Timothy Johnston, Environmental Review Coordinator*
- *Denise Heick, Environmental Consultant Lead, URS*

San Francisco Public Utilities Commission (SFPUC)
- *Susan Hou, PE, Project Manager*
- *Sam Young, PE, Regional Project Engineer*
- *Anna Roche, Environmental Project Manager*
- *Alison Kastama, Communications*

ENVIRONMENTAL REVIEW PROCESS

California Environmental Quality Act

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

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

CEQA Objectives

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

Environmental Impact Report

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

Proposed Environmental Review Schedule

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

Tentative EIR schedule

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

Meeting Purpose

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

Peninsula Pipelines Seismic Upgrade Project

Overview

Hetch Hetchy Regional Water System

Water System Improvement Program

Alison Kastama, Communications

Project Overview

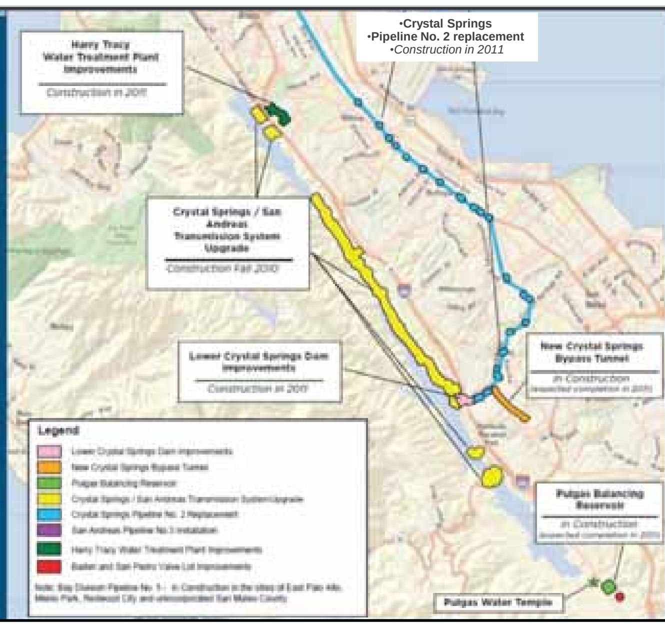
Project Objectives, Components, Site Details

Susan Hou, Project Manager

Hetch Hetchy Regional Water System

Projects in the Vicinity

Projects in the Vicinity



Peninsula Pipelines Seismic Upgrade Project Goals

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

Ensuring water delivery for your community after a major earthquake.

Project Area Overview

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

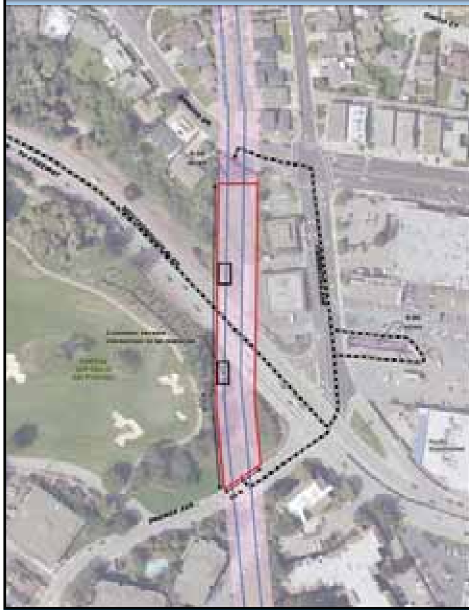
Proposed Project Components

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

Project Work: Colma

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

Project Work: South San Francisco



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

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

Project Work: San Bruno North

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

Project Work: San Bruno South

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

Project Work: Millbrae

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

Estimated Project Schedule

Environmental Review & Permitting:

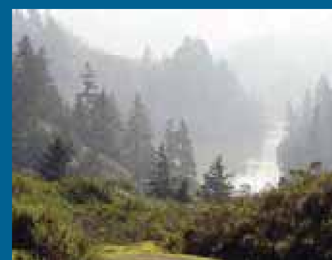
Summer 2011 – Fall 2013

Project Design:

Spring 2011 – Summer 2013

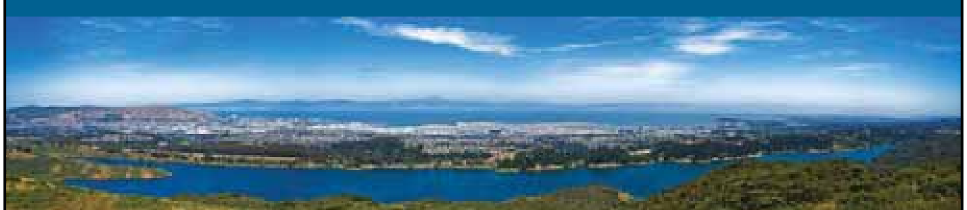
Project Construction:

Winter of 2014 – Fall of 2015



Project Goal

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



PUBLIC COMMENTS

Comment Session Ground Rules

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

Where to send comments

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

Send Comment Letter :

- By U.S. mail to:

  San Francisco Planning Department
  Attn: Bill Wycko, Environmental Review Officer
  PPSU EIR Scoping Comment
  1650 Mission Street, Suite 400
  San Francisco, CA 94103
- By fax to (415) 558-6409
- By email to: Timothy.Johnston@sfgov.org

For More Information

About the Environmental Review Process:

Tim Johnston, SF Planning Dept.
Environmental Planning Division
(415) 575-9035, timothy.johnston@sfgov.org
The Notice of Preparation (NOP) is available online at *http://www.sf-planning.org/index.aspx?page=1829*

About the Proposed Project:

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

WSIP Peninsula Pipelines
Seismic Upgrade Project

ENVIRONMENTAL IMPACT REPORT / CEQA SCOPING MEETING

November 30, 2011

COMMENT CARD

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

Name Title

Organization or business (if applicable)

Address

City, State, Zip

Phone Fax

E-Mail

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

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

WSIP Peninsula Pipelines Seismic Upgrade Project

ENVIRONMENTAL IMPACT REPORT / CEQA SCOPING MEETING

November 30, 2011

SPEAKER CARD

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

Name Title

Organization or business (if applicable)

Address

City, State, Zip

Phone Fax

E-Mail

WSIP Peninsula Pipelines Seismic Upgrade Project

ENVIRONMENTAL IMPACT REPORT / CEQA SCOPING MEETING

November 30, 2011

SPEAKER CARD

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

Name Title

Organization or business (if applicable)

Address

City, State, Zip

Phone Fax

E-Mail

WSIP Peninsula Pipelines Seismic Upgrades Project

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

SIGN-IN SHEET

Name Lais + Henry Cash Title Organization

Address (City, State, Zip) 1094 RIDGEWOOD DR. Millbrae, CA

Phone 588-3180 Fax 588-3184 E-Mail Hcashproperties@Gmail.com

Name EVA TONG Title Organization

Address (City, State, Zip) 1086 Ridgewood DR, Millbrae, CA 94030

Phone (415) 867-4606 Fax E-Mail evamtong@yahoo.com

Name ERNEST TRESSITTE Title Mill Brae CA 94030 Organization

Address (City, State, Zip) 1100 Ridgewood DR.

Phone Fax E-Mail

Name Mary K Baird Title Organization

Address (City, State, Zip) 1104 Shelter Creek lane San Bruno CA 94066-3833

Phone 650 873 4569 Fax E-Mail

Name [illegible] Title [illegible] SB Chinese Church Organization

Address (City, State, Zip) 250 Courtland DR. San Bruno

Phone Fax E-Mail

WSIP Peninsula Pipelines Seismic Upgrades Project

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

SIGN-IN SHEET

Name Michael Laughlin Title Acting City Planner Organization Town of Colma

Address (City, State, Zip)

Phone Fax E-Mail michaellaughlin@colma.ca.gov

Name Andrew Wu Title Senior Pastor Organization San Bruno Chinese Church

Address (City, State, Zip) 250 Courtland Drive, San Bruno, CA 94066.

Phone 650. 589. 9760 Fax 650. 589. 9231 E-Mail pastor.andrewu@sanbrunochinesechurch.org

Name Title Organization

Address (City, State, Zip)

Phone Fax E-Mail

Name Title Organization

Address (City, State, Zip)

Phone Fax E-Mail

Name Title Organization

Address (City, State, Zip)

Phone Fax E-Mail

WSIP Peninsula Pipelines Seismic Upgrades Project

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

SIGN-IN SHEET

Name Silvia Pratt Title Organization

Address (City, State, Zip) 417 Maple Ave 94066

Phone Fax E-Mail

Name Tracy Harcourt & Ed Chejlava Title Organization

Address (City, State, Zip) 336 Courtland Drive

Phone ~~650~~ 589-8351 Fax E-Mail

Name Novella Jefferson Title Organization

Address (City, State, Zip) 360 Courtland DR.

Phone (650) 952-9584 Fax E-Mail

Name STEVE BALCHIOS Title Organization

Address (City, State, Zip) 120 GLENBROOK

Phone 589-3690 Fax E-Mail

Name JOHNSON WONG Title Organization

Address (City, State, Zip)

Phone Fax E-Mail

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APPENDIX D

SCOPING MEETING TRANSCRIPT

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STATE OF CALIFORNIA

CITY AND COUNTY OF SAN FRANCISCO

SAN FRANCISCO PUBLIC UTILITIES COMMISSION

PENINSULA PIPELINES SEISMIC UPGRADE PROJECT

PUBLIC ENVIRONMENTAL SCOPING MEETING

WEDNESDAY, NOVEMBER 30, 2011

San Bruno Chinese Church
250 Courtland Drive
San Bruno, California

6:30 P.M.

JOB NO. 16037

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

A REGISTERED PROFESSIONAL REPORTER

--ooo--

A P P E A R A N C E S

MODERATOR: Timothy Johnston
Environmental Review Coordinator

PROJECT LEADERS:

Alison Kastama, Communications

Susan Hou, PE, Project Manager

COMMENTORS:

Steve Balchior

Eva Tong

Silvia Pratt

Alan Wong

Mara Feeney, Community Relations & Socioeconomic Analyst

Rev. Andrew Wu, Senior Pastor

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P R O C E E D I N G S

WEDNESDAY, NOVEMBER 30, 2011

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

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

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

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

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

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

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

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

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

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

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

Let's see. I went through the introductions.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

MR. JOHNSTON: All right. Thanks, Susan.

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

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

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

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

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

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

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

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

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

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

Do we have Steve Balchior?

MR. BALCHIOR: Was that "Steve"?

MR. JOHNSTON: Steve.

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

MR. JOHNSON: Okay.

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

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

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

MS. TONG: Yes.

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

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

MS. TONG: I think I'm okay.

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

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

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

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

MS. TONG: Yeah.

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

MS. PRATT: Okay.

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

MR. JOHNSTON: Okay.

MS. PRATT: -- in those condominiums.

MR. JOHNSTON: Uh-huh.

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

MR. JOHNSTON: Yeah, right.

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

MR. JOHNSTON: Okay.

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

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

MS. PRATT: Yes.

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

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

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

MS. PRATT: Thank you.

MR. JOHNSTON: Alan Wong?

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

MR. JOHNSTON: Okay.

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

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

MR. JOHNSTON: Yeah. Okay, so --

MR. WONG: Main concern.

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

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

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

MR. JOHNSTON: Yes.

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

MR. JOHNSTON: Okay.

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

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

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

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

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

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

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

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

Thank you very much for coming.

(CONCLUDED AT 7:10 P.M.)

--ooo--

REPORTER'S CERTIFICATE

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

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

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

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

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

Dated: FRIDAY, DECEMBER 16, 2011.

____

Easteller Bruihl, RPR, CSR No. 3077

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APPENDIX E

WRITTEN COMMENTS RECEIVED DURING THE SCOPING PERIOD

STATE OF CALIFORNIA

Governor's Office of Planning and Research

State Clearinghouse and Planning Unit

Edmund G. Brown Jr.
Governor

Ken Alex
Director

RECEIVED

NOV 21 2011

CITY & COUNTY OF S.F.
PLANNING DEPARTMENT
MEA

Notice of Preparation

November 8, 2011

To: Reviewing Agencies

Re: Peninsula Pipelines Seismic Upgrade Project
SCH# 2011112028

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

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

Please direct your comments to:

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

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

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

Sincerely,

Scott Morgan

Scott Morgan
Director, State Clearinghouse

Attachments
cc: Lead Agency

Document Details Report
State Clearinghouse Data Base

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

Type **NOP** Notice of Preparation

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

Lead Agency Contact

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

Project Location

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

Proximity to:

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

---

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

---

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

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

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

Print Form

Appendix C

Notice of Completion & Environmental Document Transmittal

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

SCH # 2011112028

Project Title: Peninsula Pipelines Seismic Upgrade Project

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

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

Document Type:

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

NEPA: ☐ NOI ☐ EA ☐ Draft EIS ☐ FONSI

Other: ☐ Joint Document ☐ Final Document ☐ Other: ______

RECEIVED
NOV 08 2011
STATE CLEARING HOUSE

Local Action Type:

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

Development Type:

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

Project Issues Discussed in Document:

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

---

Present Land Use/Zoning/General Plan Designation:

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

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

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

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

Revised 2010

NOP Distribution List

County: San Mateu

SCH# 2011112028

Resources Agency

- [x] **Resources Agency**
  Nadell Gayou
- [ ] **Dept. of Boating & Waterways**
  Nicole Wong
- [ ] **California Coastal Commission**
  Elizabeth A. Fuchs
- [ ] **Colorado River Board**
  Gerald R. Zimmerman
- [ ] **Dept. of Conservation**
  Elizabeth Carpenter
- [ ] **California Energy Commission**
  Eric Knight
- [ ] **Cal Fire**
  Allen Robertson
- [ ] **Central Valley Flood Protection Board**
  James Herota
- [ ] **Office of Historic Preservation**
  Ron Parsons
- [x] **Dept of Parks & Recreation**
  Environmental Stewardship Section
- [ ] **California Department of Resources, Recycling & Recovery**
  Sue O'Leary
- [x] **S.F. Bay Conservation & Dev't. Comm.**
  Steve McAdam
- [ ] **Dept. of Water Resources** Resources Agency
  Nadell Gayou

Fish and Game

- [ ] **Depart. of Fish & Game**
  Scott Flint
  Environmental Services Division
- [ ] **Fish & Game Region 1**
  Donald Koch
- [ ] **Fish & Game Region 1E**
  Laurie Harnsberger
- [ ] **Fish & Game Region 2**
  Jeff Drongesen
- [x] **Fish & Game Region 3**
  Charles Armor
- [ ] **Fish & Game Region 4**
  Julie Vance
- [ ] **Fish & Game Region 5**
  Leslie Newton-Reed
  Habitat Conservation Program
- [ ] **Fish & Game Region 6**
  Gabrina Gatchel
  Habitat Conservation Program
- [ ] **Fish & Game Region 6 I/M**
  Brad Henderson
  Inyo/Mono, Habitat Conservation Program
- [ ] **Dept. of Fish & Game M**
  George Isaac
  Marine Region

Other Departments

- [ ] **Food & Agriculture**
  Sandra Schubert
  Dept. of Food and Agriculture
- [ ] **Depart. of General Services**
  Public School Construction
- [ ] **Dept. of General Services**
  Anna Garbeff
  Environmental Services Section
- [ ] **Dept. of Public Health**
  Bridgette Binning
  Dept. of Health/Drinking Water
- [ ] **Delta Stewardship Council**
  Terry Macaulay

Independent Commissions,Boards

- [ ] **Delta Protection Commission**
  Linda Flack
- [x] **Cal EMA (Emergency Management Agency)**
  Dennis Castrillo
- [x] **Native American Heritage Comm.**
  Debbie Treadway
- [x] **Public Utilities Commission**
  Leo Wong
- [ ] **Santa Monica Bay Restoration**
  Guangyu Wang
- [ ] **State Lands Commission**
  Jennifer Deleong
- [ ] **Tahoe Regional Planning Agency (TRPA)**
  Cherry Jacques

Business, Trans & Housing

- [x] **Caltrans - Division of Aeronautics**
  Philip Crimmins
- [ ] **Caltrans - Planning**
  Terri Pencovic
- [x] **California Highway Patrol**
  Suzann Ikeuchi
  Office of Special Projects
- [ ] **Housing & Community Development**
  CEQA Coordinator
  Housing Policy Division

Dept. of Transportation

- [ ] **Caltrans, District 1**
  Rex Jackman
- [ ] **Caltrans, District 2**
  Marcelino Gonzalez
- [ ] **Caltrans, District 3**
  Bruce de Terra
- [x] **Caltrans, District 4**
  Lisa Carboni
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  Michael Navarro
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  Elmer Alvarez
- [ ] **Caltrans, District 8**
  Dan Kopulsky
- [ ] **Caltrans, District 9**
  Gayle Rosander
- [ ] **Caltrans, District 10**
  Tom Dumas
- [ ] **Caltrans, District 11**
  Jacob Armstrong
- [ ] **Caltrans, District 12**
  Marlon Regisford

Cal EPA

Air Resources Board

- [ ] Airport/Energy Projects
  Jim Lerner
- [ ] Transportation Projects
  Douglas Ito
- [ ] Industrial Projects
  Mike Tollstrup
- [ ] **State Water Resources Control Board**
  Regional Programs Unit
  Division of Financial Assistance
- [ ] **State Water Resources Control Board**
  Student Intern, 401 Water Quality Certification Unit
  Division of Water Quality
- [ ] **State Water Resouces Control Board**
  Phil Crader
  Division of Water Rights
- [ ] **Dept. of Toxic Substances Control**
  CEQA Tracking Center
- [ ] **Department of Pesticide Regulation**
  CEQA Coordinator

Regional Water Quality Control Board (RWQCB)

- [ ] **RWQCB 1**
  Cathleen Hudson
  North Coast Region (1)
- [x] **RWQCB 2**
  Environmental Document Coordinator
  San Francisco Bay Region (2)
- [ ] **RWQCB 3**
  Central Coast Region (3)
- [ ] **RWQCB 4**
  Teresa Rodgers
  Los Angeles Region (4)
- [ ] **RWQCB 5S**
  Central Valley Region (5)
- [ ] **RWQCB 5F**
  Central Valley Region (5)
  Fresno Branch Office
- [ ] **RWQCB 5R**
  Central Valley Region (5)
  Redding Branch Office
- [ ] **RWQCB 6**
  Lahontan Region (6)
- [ ] **RWQCB 6V**
  Lahontan Region (6)
  Victorville Branch Office
- [ ] **RWQCB 7**
  Colorado River Basin Region (7)
- [ ] **RWQCB 8**
  Santa Ana Region (8)
- [ ] **RWQCB 9**
  San Diego Region (9)

- [ ] **Other** ____________

- [ ] ____________
  Conservancy

Last Updated 9/29/11

BAWSCA
Bay Area Water Supply & Conservation Agency

December 8, 2011

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

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

Dear Mr. Wycko,

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

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

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

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

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

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

Sincerely,

Nicole M. Sandkulla

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

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

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

To <timothy.johnston@sfgov.org>

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

bcc

Subject
Peninsula Pipeline Seismic Upgrade Project - NOP Comments

Hi Mr. Johnston:

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

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

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

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

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

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

Aaron

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

Aaron J. Aknin, AICP
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TOWN OF COLMA
PLANNING DEPARTMENT

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

December 9, 2011

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

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

Dear Mr. Johnston,

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

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

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

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

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

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

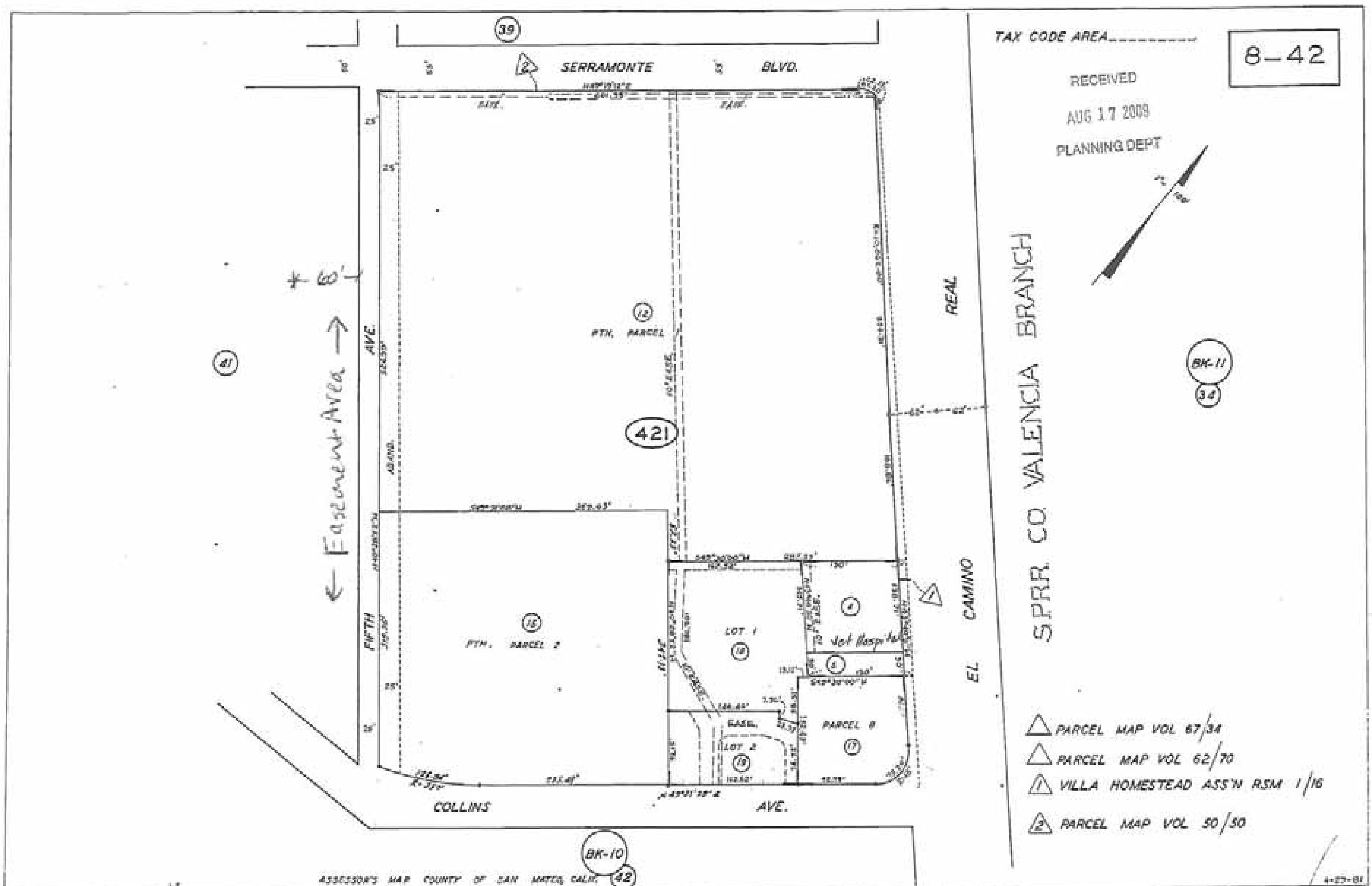
Landscaping and Maintenance: We would appreciate a discussion of any plans that the SFPUC has to provide landscaping after the project is completed and the schedule for maintenance. Currently, the easement contains weeds and grass which is mowed periodically. We would like the project to include provisions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

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

Sincerely,

Michael P. Laughlin, AICP
Acting City Planner

Attachment: Assessor Parcel Map


TAX CODE AREA
8-42
RECEIVED
AUG 17 2009
PLANNING DEPT
SPRR CO VALENCIA BRANCH
BK-11
34
39
SERRAMONTE BLVD.
EL CAMINO REAL
FIFTH AVE.
COLLINS AVE.
421
12
PTN. PARCEL
15
PTN. PARCEL 2
LOT 1
18
LOT 2
19
PARCEL 8
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4
5
Jot Hospital
41
Easement Area
± 60'
BK-10
42
PARCEL MAP VOL 67/34
PARCEL MAP VOL 62/70
1 VILLA HOMESTEAD ASS'N RSM 1/16
2 PARCEL MAP VOL 50/50
ASSESSOR'S MAP COUNTY OF SAN MATEO, CALIF.
4-25-81

FROM : EVA/JANET PHONE NO. : 415 6921529 DEC. 08 2011 03:31PM P1

Page 1 of 2

RECEIVED

DEC 0 8 2011

CITY & COUNTY OF S.F.
PLANNING DEPARTMENT
MEA

WSIP Peninsula Pipelines Seismic Upgrade Project

ENVIRONMENTAL IMPACT REPORT / CEQA SCOPING MEETING

November 30, 2011

COMMENT CARD

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

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

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

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

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

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

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

(5) Dust or operation of big machine will pollute the environ[ment]

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

Page 2 of 2

WSIP Peninsula Pipelines
Seismic Upgrade Project

Seismic Upgrade Project

ENVIRONMENTAL IMPACT REPORT / CEQA SCOPING MEETING

November 30, 2011

COMMENT CARD

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

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

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

6 Privacy intruded – workers working on the site can see interior of my house.
7 Big construction project and duration of 3 – 6 months or longer period will impact the value of my property
8 I am concerned about the security of my property due to open space created by construction.
9 Portable restroom and construction debris should be restricted to the staging room.
10 Once project starts an aggressive vector control must be in place and active.

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

H & L Cash

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

FAX COVER SHEET

To: Timothy Johnston
(415) 558-6409

Number of pages including this one 8

Comment: PPSU Project EIR Scoping Comments

December 5, 2011

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

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

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

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

Dear Mr. Wycko:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Sincerely,

Henry L. Cash
Lais Henderson-Cash

Henry L. Cash
Lais Henderson-Cash

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Appendix C
Transportation

SFPUC PPSU

Construction Vehicles - Daily and Peak Hour

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

Notes:

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

Source: URS and LCW Consulting, October 2012

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Common Staging Area

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

SFPUC PPSU						
On-Street Parking Supply and Occupancy Surveys						
SITE	**Supply**		**Midday Occupancy**			
COLMA	north	south	north		south	
Collins Avenue						
El Camino to SFPUC ROW	18	12	9	51%	5	41%
SOUTH SAN FRANCISCO						
West Orange Avenue	north	south	north		south	
Westborough to Golf Course Driveway	13	17	9	71%	7	41%
Arroyo Avenue	north	south	north		south	
Camaritas to Del Monte Avenue	15	15	5	33%	4	27%
Camaritas Avenue	east	west	east		west	
Westborough to Arroyo	0	9	0	--	3	33%
COMMON STAGING AREA						
West Orange Avenue	north	south	north		south	
El Camino Real to Fairway Drive	10	10	6	60%	4	40%
SAN BRUNO SOUTH						
Whitman Way	north	south	north		south	
Shelter Creek to Courtland	20	10	5	25%	5	50%
Shelter Creek Lane	east	west	east		west	
Whitman Way to SB Avenue West	80	79	60	75%	52	66%
Courtland Drive	east	west	east		west	
Whitman Way to Church Driveway	21	23	10	48%	7	30%
MILLBRAE						
Banbury Lane	north	south	north		south	
Rridewood Drive to Helen Drive	29	30	11	38%	13	43%
Occupancy surveys conducted by LCW Consulting on October 4, 2012						

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

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

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

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

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #3 Crestmoor/San Bruno Ave/Shelter Creek Way

Cycle (sec):	130	Critical Vol./Cap.(X):	0.570
Loss Time (sec):	8	Average Delay (sec/veh):	39.4
Optimal Cycle:	130	Level Of Service:	D

Street Name:	Crestmoor/Shelter Creek Way						San Bruno Ave					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	0 1 0 0 1			0 1 0 1 0			1 0 2 0 1			1 0 1 1 0		
Volume Module:												
Base Vol:	27	5	272	99	21	9	10	440	23	98	191	63
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	27	5	272	99	21	9	10	440	23	98	191	63
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	27	5	272	99	21	9	10	440	23	98	191	63
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
PHF Volume:	31	6	316	115	24	10	12	512	27	114	222	73
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	31	6	316	115	24	10	12	512	27	114	222	73
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	31	6	316	115	24	10	12	512	27	114	222	73
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.94	0.94	0.67	0.80	0.80	0.80	0.93	0.93	0.67	0.93	0.81	0.81
Lanes:	0.84	0.16	1.00	1.00	0.70	0.30	1.00	2.00	1.00	1.00	1.50	0.50
Final Sat.:	1508	279	1266	1518	1062	455	1769	3538	1266	1769	2306	761
Capacity Analysis Module:												
Vol/Sat:	0.02	0.02	0.25	0.08	0.02	0.02	0.01	0.14	0.02	0.06	0.10	0.10
Crit Moves:			****	****				****		****		
Green/Cycle:	0.27	0.44	0.44	0.13	0.30	0.30	0.02	0.25	0.25	0.11	0.34	0.34
Volume/Cap:	0.08	0.05	0.57	0.57	0.08	0.08	0.28	0.57	0.08	0.57	0.28	0.28
Delay/Veh:	35.3	21.0	28.7	55.8	32.6	32.6	66.1	43.2	37.1	58.5	31.2	31.2
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	35.3	21.0	28.7	55.8	32.6	32.6	66.1	43.2	37.1	58.5	31.2	31.2
LOS by Move:	D	C	C	E	C	C	E	D	D	E	C	C
HCM2kAvgQ:	1	1	10	5	1	1	1	10	1	5	4	4

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

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

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

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

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

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

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

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

                     Level Of Service Computation Report
         2000 HCM Unsignalized Method (Future Volume Alternative)
******************************************************************************
Intersection #8 Santa Margarita/Cappuchino
******************************************************************************
Average Delay (sec/veh):       5.1       Worst Case Level Of Service: A[  8.7]
******************************************************************************
Street Name:           Santa Margarita                        Cappuchino
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:          Include          Include          Include          Include
Lanes:        0  0  0  0  0    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0    23    0     2     4    6     0     0    3    11
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0    0     0    23    0     2     4    6     0     0    3    11
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0    0     0    23    0     2     4    6     0     0    3    11
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.77 0.77  0.77  0.77 0.77  0.77  0.77 0.77  0.77  0.77 0.77  0.77
PHF Volume:     0    0     0    30    0     3     5    8     0     0    4    14
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0    0     0    30    0     3     5    8     0     0    4    14
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   6.4  6.5   6.2   4.1 xxxx xxxxx xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx   3.5  4.0   3.3   2.2 xxxx xxxxx xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    29   29    11    18 xxxx xxxxx  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx   990  868  1076  1612 xxxx xxxxx  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx   988  865  1076  1612 xxxx xxxxx  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  0.03 0.00  0.00  0.00 xxxx  xxxx  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.2 xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     A    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx  994 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx  0.1 xxxxx   0.0 xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx  8.7 xxxxx   7.2 xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    A     *     A    *     *     *    *     *
ApproachDel:     xxxxxx              8.7             xxxxxx           xxxxxx
ApproachLOS:        *                 A                 *                *
******************************************************************************
Note: Queue reported is the number of cars per lane.
******************************************************************************
```

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

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #9 Shelter Creek Lane/Condo Driveway

Average Delay (sec/veh): 2.3 Worst Case Level Of Service: B[10.5]

Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Uncontrolled	Uncontrolled	Stop Sign	Stop Sign
Rights:	Include	Include	Include	Include
Lanes:	0 1 0 0 0	0 0 0 1 0	0 0 1! 0 0	0 0 0 0 0

	NB L	NB T	NB R	SB L	SB T	SB R	EB L	EB T	EB R	WB L	WB T	WB R
Volume Module:												
Base Vol:	7	175	0	0	90	11	48	0	25	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	7	175	0	0	90	11	48	0	25	0	0	0
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	7	175	0	0	90	11	48	0	25	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
PHF Volume:	8	206	0	0	106	13	56	0	29	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	8	206	0	0	106	13	56	0	29	0	0	0
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	6.4	6.5	6.2	xxxxx	xxxx	xxxxx
FollowUpTim:	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3.5	4.0	3.3	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	119	xxxx	xxxxx	xxxx	xxxx	xxxxx	335	335	112	xxxx	xxxx	xxxxx
Potent Cap.:	1482	xxxx	xxxxx	xxxx	xxxx	xxxxx	665	589	946	xxxx	xxxx	xxxxx
Move Cap.:	1482	xxxx	xxxxx	xxxx	xxxx	xxxxx	662	586	946	xxxx	xxxx	xxxxx
Volume/Cap:	0.01	xxxx	xxxx	xxxx	xxxx	xxxx	0.09	0.00	0.03	xxxx	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	0.0	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	7.4	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	A	*	*	*	*	*	*	*	*	*	*	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	738	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	0.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	0.4	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	7.4	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	10.5	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	A	*	*	*	*	*	*	B	*	*	*	*
ApproachDel:		xxxxxx			xxxxxx			10.5			xxxxxx	
ApproachLOS:		*			*			B			*	

Note: Queue reported is the number of cars per lane.

```
-------------------------------------------------------------------------------
               SFPUC - Peninsula Pipelines Seismic Upgrade Project
                              Existing Conditions
                                 AM Peak Hour
-------------------------------------------------------------------------------
                      Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #10 Whitman/Shelter Creek Condo Driveway/Eastburn
********************************************************************************
Average Delay (sec/veh):       2.7     Worst Case Level Of Service: B[ 10.7]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:          Include          Include          Include          Include
Lanes:        0  0  1! 0  0   0  0  1! 0  0   0  0  1! 0  0   0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       7    0    11    35    0    16     3  108     4     4   87     8
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    7    0    11    35    0    16     3  108     4     4   87     8
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    7    0    11    35    0    16     3  108     4     4   87     8
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.71 0.71  0.71  0.71 0.71  0.71  0.71 0.71  0.71  0.71 0.71  0.71
PHF Volume:    10    0    15    49    0    23     4  152     6     6  123    11
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:   10    0    15    49    0    23     4  152     6     6  123    11
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  7.1  6.5   6.2   7.1  6.5   6.2   4.1 xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3   3.5  4.0   3.3   2.2 xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  314  308   155   311  306   128   134 xxxx xxxxx   158 xxxx xxxxx
Potent Cap.:  642  609   896   646  611   927  1463 xxxx xxxxx  1434 xxxx xxxxx
Move Cap.:    624  605   896   631  607   927  1463 xxxx xxxxx  1434 xxxx xxxxx
Volume/Cap:  0.02 0.00  0.02  0.08 0.00  0.02  0.00 xxxx  xxxx  0.00 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2WayQ95thQ:  xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx   0.0 xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.5 xxxx xxxxx   7.5 xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     A    *     *     A    *     *
Movement:     LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.: xxxx  766 xxxxx  xxxx  702 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx  0.1 xxxxx xxxxx  0.3 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx  9.9 xxxxx xxxxx 10.7 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    A     *     *    B     *     *    *     *     *    *     *
ApproachDel:         9.9              10.7            xxxxxx           xxxxxx
ApproachLOS:          A                 B                *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

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

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

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #1 West Orange/Westborough/Camaritas

Cycle (sec):	130	Critical Vol./Cap.(X):	1.213
Loss Time (sec):	8	Average Delay (sec/veh):	32.7
Optimal Cycle:	130	Level Of Service:	C

Street Name:	West Orange Ave/Camaritas Ave						Westborough Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Prot+Permit			Prot+Permit		
Rights:	Include			Include			Include			Include		
Min. Green:	33	33	33	33	33	33	36	65	65	21	50	50
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	1 0	0 1	0	1 1	0 0	1	1 0	2 0	1	1 0	2 0	1
Volume Module:												
Base Vol:	40	15	35	93	60	230	113	788	156	67	1071	303
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	40	15	35	93	60	230	113	788	156	67	1071	303
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	40	15	35	93	60	230	113	788	156	67	1071	303
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	42	16	37	98	63	242	119	829	164	71	1127	319
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	42	16	37	98	63	242	119	829	164	71	1127	319
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	42	16	37	98	63	242	119	829	164	71	1127	319
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.68	0.70	0.69	0.60	0.60	0.64	0.93	0.93	0.64	0.93	0.93	0.64
Lanes:	1.00	0.30	0.70	1.22	0.78	1.00	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	1288	394	918	1385	894	1225	1769	3538	1220	1767	3538	1214
Capacity Analysis Module:												
Vol/Sat:	0.03	0.04	0.04	0.07	0.07	0.20	0.07	0.23	0.13	0.04	0.32	0.26
Crit Moves:						****	****				****	
Green/Cycle:	0.25	0.25	0.25	0.25	0.25	0.25	0.70	0.52	0.52	0.57	0.41	0.41
Volume/Cap:	0.13	0.16	0.16	0.28	0.28	0.78	0.21	0.45	0.26	0.13	0.78	0.64
Delay/Veh:	38.2	38.7	38.7	40.1	40.1	62.4	14.3	20.6	18.5	12.8	37.7	37.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	38.2	38.7	38.7	40.1	40.1	62.4	14.3	20.6	18.5	12.8	37.7	37.3
LOS by Move:	D	D	D	D	D	E	B	C	B	B	D	D
HCM2kAvgQ:	1	2	2	3	3	11	2	11	4	1	22	11

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

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #2 I-280 Northbound Ramps/San Bruno Ave

Cycle (sec):	130	Critical Vol./Cap.(X):	0.764
Loss Time (sec):	8	Average Delay (sec/veh):	28.9
Optimal Cycle:	130	Level Of Service:	C

Street Name:	I-280 Ramps						San Bruno Ave					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	1 0 1! 0 1			0 0 0 0 0			2 0 2 0 0			0 0 2 0 1		
Volume Module:												
Base Vol:	153	207	240	0	0	0	169	508	0	0	793	441
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	153	207	240	0	0	0	169	508	0	0	793	441
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	153	207	240	0	0	0	169	508	0	0	793	441
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	161	218	253	0	0	0	178	535	0	0	835	464
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	161	218	253	0	0	0	178	535	0	0	835	464
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	161	218	253	0	0	0	178	535	0	0	835	464
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.80	0.71	0.80	1.00	1.00	1.00	0.90	0.84	1.00	1.00	0.93	0.67
Lanes:	1.18	0.54	1.28	0.00	0.00	0.00	2.00	2.00	0.00	0.00	2.00	1.00
Final Sat.:	1785	731	1939	0	0	0	3432	3184	0	0	3538	1266
Capacity Analysis Module:												
Vol/Sat:	0.09	0.30	0.13	0.00	0.00	0.00	0.05	0.17	0.00	0.00	0.24	0.37
Crit Moves:		****					****					****
Green/Cycle:	0.39	0.39	0.39	0.00	0.00	0.00	0.07	0.55	0.00	0.00	0.48	0.48
Volume/Cap:	0.23	0.76	0.33	0.00	0.00	0.00	0.76	0.31	0.00	0.00	0.49	0.76
Delay/Veh:	26.6	38.7	27.9	0.0	0.0	0.0	73.5	16.1	0.0	0.0	23.2	33.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	26.6	38.7	27.9	0.0	0.0	0.0	73.5	16.1	0.0	0.0	23.2	33.5
LOS by Move:	C	D	C	A	A	A	E	B	A	A	C	C
HCM2kAvgQ:	4	15	5	0	0	0	5	6	0	0	12	17

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

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #3 Crestmoor/San Bruno Ave/Shelter Creek Way

Cycle (sec):	130	Critical Vol./Cap.(X):	0.426
Loss Time (sec):	8	Average Delay (sec/veh):	33.6
Optimal Cycle:	130	Level Of Service:	C

Street Name:	Crestmoor/Shelter Creek Way						San Bruno Ave					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	0 1 0 0 1			0 1 0 1 0			1 0 2 0 1			1 0 1 1 0		
Volume Module:												
Base Vol:	27	12	140	89	14	13	13	301	28	221	461	112
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	27	12	140	89	14	13	13	301	28	221	461	112
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	27	12	140	89	14	13	13	301	28	221	461	112
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	28	13	147	94	15	14	14	317	29	233	485	118
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	28	13	147	94	15	14	14	317	29	233	485	118
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	28	13	147	94	15	14	14	317	29	233	485	118
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	0.95	0.67	0.79	0.79	0.79	0.93	0.93	0.67	0.93	0.81	0.81
Lanes:	0.69	0.31	1.00	1.00	0.52	0.48	1.00	2.00	1.00	1.00	1.61	0.39
Final Sat.:	1247	554	1266	1507	781	726	1769	3538	1266	1769	2487	604
Capacity Analysis Module:												
Vol/Sat:	0.02	0.02	0.12	0.06	0.02	0.02	0.01	0.09	0.02	0.13	0.20	0.20
Crit Moves:			****	****				****		****		
Green/Cycle:	0.23	0.27	0.27	0.15	0.19	0.19	0.02	0.21	0.21	0.31	0.50	0.50
Volume/Cap:	0.10	0.08	0.43	0.43	0.10	0.10	0.39	0.43	0.11	0.43	0.39	0.39
Delay/Veh:	39.6	35.2	39.7	51.6	43.5	43.5	70.0	44.9	41.7	36.3	20.4	20.4
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	39.6	35.2	39.7	51.6	43.5	43.5	70.0	44.9	41.7	36.3	20.4	20.4
LOS by Move:	D	D	D	D	D	D	E	D	D	D	C	C
HCM2kAvgQ:	1	1	5	4	1	1	1	6	1	7	8	8

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

                        Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #5 Courtland Dr/Whitman
********************************************************************************
Average Delay (sec/veh):        4.0       Worst Case Level Of Service: A[  9.0]
********************************************************************************
Street Name:                 Courtland Dr                        Whitman
Approach:        North Bound       South Bound        East Bound        West Bound
Movement:       L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:          Stop Sign         Stop Sign        Uncontrolled      Uncontrolled
Rights:            Include           Include           Include           Include
Lanes:          0  0  1! 0  0    0  0  0  0  0    0  0  0  1  0    0  1  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:         5     0    61     0     0     0     0    57     2    86   100     0
Growth Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Initial Bse:      5     0    61     0     0     0     0    57     2    86   100     0
Added Vol:        0     0     0     0     0     0     0     0     0     0     0     0
PasserByVol:      0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:      5     0    61     0     0     0     0    57     2    86   100     0
User Adj:      1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:       0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93
PHF Volume:       5     0    66     0     0     0     0    61     2    92   108     0
Reduct Vol:       0     0     0     0     0     0     0     0     0     0     0     0
FinalVolume:      5     0    66     0     0     0     0    61     2    92   108     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:   6.4   6.5   6.2 xxxxx xxxx xxxxx xxxxx xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:   3.5   4.0   3.3 xxxxx xxxx xxxxx xxxxx xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:   355   355    62  xxxx xxxx xxxxx  xxxx xxxx xxxxx    63 xxxx xxxxx
Potent Cap.:   647   574  1008  xxxx xxxx xxxxx  xxxx xxxx xxxxx  1552 xxxx xxxxx
Move Cap.:     616   538  1008  xxxx xxxx xxxxx  xxxx xxxx xxxxx  1552 xxxx xxxxx
Volume/Cap:   0.01  0.00  0.07  xxxx xxxx  xxxx  xxxx xxxx  xxxx  0.06 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.2 xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.5 xxxx xxxxx
LOS by Move:     *     *     *     *     *     *     *     *     *     A     *     *
Movement:       LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.:  xxxx   962 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx   0.2 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   0.2 xxxx xxxxx
Shrd ConDel:xxxxx   9.0 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.5 xxxx xxxxx
Shared LOS:      *     A     *     *     *     *     *     *     *     A     *     *
ApproachDel:          9.0           xxxxxx            xxxxxx            xxxxxx
ApproachLOS:           A               *                 *                 *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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-------------------------------------------------------------------------------
              SFPUC - Peninsula Pipelines Seismic Upgrade Project
                              Existing Conditions
                                 PM Peak Hour
-------------------------------------------------------------------------------
                       Level Of Service Computation Report
          2000 HCM 4-Way Stop Method (Future Volume Alternative)
*******************************************************************************
Intersection #6 Helen/Larkspur
*******************************************************************************
Cycle (sec):          100               Critical Vol./Cap.(X):          0.461
Loss Time (sec):        0               Average Delay (sec/veh):         10.4
Optimal Cycle:          0               Level Of Service:                   B
*******************************************************************************
Street Name:                  Helen                           Larkspur
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign        Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Min. Green:    0     0     0    0     0     0    0     0     0    0     0     0
Lanes:       0  0  1! 0  0    0  1  0  0  0    0  0  1! 0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------
Volume Module:
Base Vol:     81    47   189   15    28     0    2    42    34  121    66    32
Growth Adj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:  81    47   189   15    28     0    2    42    34  121    66    32
Added Vol:     0     0     0    0     0     0    0     0     0    0     0     0
PasserByVol:   0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:  81    47   189   15    28     0    2    42    34  121    66    32
User Adj:   1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:    0.89 0.89  0.89 0.89 0.89  0.89 0.89 0.89  0.89 0.89 0.89  0.89
PHF Volume:   91    53   212   17    31     0    2    47    38  136    74    36
Reduct Vol:    0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:  91    53   212   17    31     0    2    47    38  136    74    36
PCE Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume:  91    53   212   17    31     0    2    47    38  136    74    36
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Adjustment: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:      0.25 0.15  0.60 0.35 0.65  0.00 0.02 0.54  0.44 0.55 0.30  0.15
Final Sat.:  197  114   460  222  413     0   17  363   294  379  207   100
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.46 0.46  0.46 0.08 0.08  xxxx 0.13 0.13  0.13 0.36 0.36  0.36
Crit Moves:            ****      ****             ****             ****
Delay/Veh:  11.0 11.0  11.0  8.6  8.6   0.0  8.6  8.6   8.6 10.5 10.5  10.5
Delay Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh: 11.0 11.0  11.0  8.6  8.6   0.0  8.6  8.6   8.6 10.5 10.5  10.5
LOS by Move:   B     B     B    A     A     *    A     A     A    B     B     B
ApproachDel:      11.0              8.6              8.6             10.5
Delay Adj:        1.00             1.00             1.00             1.00
ApprAdjDel:       11.0              8.6              8.6             10.5
LOS by Appr:         B                A                A                B
AllWayAvgQ:   0.8  0.8   0.8  0.1  0.1   0.1  0.1  0.1   0.1  0.5  0.5   0.5
*******************************************************************************
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--------------------------------------------------------------------------------
             SFPUC - Peninsula Pipelines Seismic Upgrade Project
                          Existing Conditions
                             PM Peak Hour
--------------------------------------------------------------------------------
                    Level Of Service Computation Report
         2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #7 Ridgewood/Banbury
********************************************************************************
Average Delay (sec/veh):       0.6      Worst Case Level Of Service: A[  8.7]
********************************************************************************
Street Name:             Ridgewood                           Banbury
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:          Include          Include          Include          Include
Lanes:        0  0  1  0  0    0  0  1  0  0    0  0  1! 0  0    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0   53     0     0   33     0     2    0     4     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0   53     0     0   33     0     2    0     4     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0   53     0     0   33     0     2    0     4     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.85 0.85  0.85  0.85 0.85  0.85  0.85 0.85  0.85  0.85 0.85  0.85
PHF Volume:     0   62     0     0   39     0     2    0     5     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0   62     0     0   39     0     2    0     5     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   6.4  6.5   6.2 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx   101  101    39  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx   902  793  1039  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   902  793  1039  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  0.00 0.00  0.00  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  989 xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.0 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  8.7 xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    A     *     *    *     *
ApproachDel:     xxxxxx           xxxxxx              8.7            xxxxxx
ApproachLOS:        *                *                 A                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

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-------------------------------------------------------------------------------
             SFPUC - Peninsula Pipelines Seismic Upgrade Project
                            Existing Conditions
                               PM Peak Hour
-------------------------------------------------------------------------------
                      Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
*******************************************************************************
Intersection #8 Santa Margarita/Cappuchino
*******************************************************************************
Average Delay (sec/veh):       3.2      Worst Case Level Of Service: A[  8.6]
*******************************************************************************
Street Name:            Santa Margarita                     Cappuchino
Approach:         North Bound      South Bound      East Bound       West Bound
Movement:        L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:            Include          Include          Include          Include
Lanes:           0  0  0  0  0    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        0     0     0    10     0     6     2     6     0     0    11    12
Growth Adj:   1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Initial Bse:     0     0     0    10     0     6     2     6     0     0    11    12
Added Vol:       0     0     0     0     0     0     0     0     0     0     0     0
PasserByVol:     0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:     0     0     0    10     0     6     2     6     0     0    11    12
User Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:      0.77  0.77  0.77  0.77  0.77  0.77  0.77  0.77  0.77  0.77  0.77  0.77
PHF Volume:      0     0     0    13     0     8     3     8     0     0    14    16
Reduct Vol:      0     0     0     0     0     0     0     0     0     0     0     0
FinalVolume:     0     0     0    13     0     8     3     8     0     0    14    16
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx  xxxx xxxxx   6.4   6.5   6.2   4.1  xxxx xxxxx xxxxx  xxxx xxxxx
FollowUpTim:xxxxx  xxxx xxxxx   3.5   4.0   3.3   2.2  xxxx xxxxx xxxxx  xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx  xxxx xxxxx    35    35    22    30  xxxx xxxxx  xxxx  xxxx xxxxx
Potent Cap.: xxxx  xxxx xxxxx   983   861  1061  1596  xxxx xxxxx  xxxx  xxxx xxxxx
Move Cap.:   xxxx  xxxx xxxxx   982   860  1061  1596  xxxx xxxxx  xxxx  xxxx xxxxx
Volume/Cap:  xxxx  xxxx  xxxx  0.01  0.00  0.01  0.00  xxxx  xxxx  xxxx  xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2WayQ5thQ:   xxxx  xxxx xxxxx  xxxx  xxxx xxxxx   0.0  xxxx xxxxx  xxxx  xxxx xxxxx
Control Del:xxxxx  xxxx xxxxx xxxxx  xxxx xxxxx   7.3  xxxx xxxxx xxxxx  xxxx xxxxx
LOS by Move:     *     *     *     *     *     *     A     *     *     *     *     *
Movement:        LT - LTR - RT     LT - LTR - RT    LT - LTR - RT     LT - LTR - RT
Shared Cap.: xxxx  xxxx xxxxx  xxxx  1010 xxxxx  xxxx  xxxx xxxxx  xxxx  xxxx xxxxx
SharedQueue:xxxxx  xxxx xxxxx xxxxx   0.1 xxxxx   0.0  xxxx xxxxx xxxxx  xxxx xxxxx
Shrd ConDel:xxxxx  xxxx xxxxx xxxxx   8.6 xxxxx   7.3  xxxx xxxxx xxxxx  xxxx xxxxx
Shared LOS:      *     *     *     *     A     *     A     *     *     *     *     *
ApproachDel:      xxxxxx              8.6             xxxxxx            xxxxxx
ApproachLOS:         *                 A                 *                 *
*******************************************************************************
Note: Queue reported is the number of cars per lane.
*******************************************************************************
```

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

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

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #11 Serramonte/Junipero Serra Blvd

Cycle (sec):	120	Critical Vol./Cap.(X):	0.635
Loss Time (sec):	8	Average Delay (sec/veh):	36.6
Optimal Cycle:	42	Level Of Service:	D

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Split Phase			Split Phase			Prot+Permit			Prot+Permit		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	2 0	1	1 0	1 1	0	2 0	2 0	1	1 0	1 1	1
Volume Module:												
Base Vol:	435	486	123	107	333	116	383	553	281	205	329	504
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	435	486	123	107	333	116	383	553	281	205	329	504
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	435	486	123	107	333	116	383	553	281	205	329	504
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
PHF Volume:	453	506	128	111	347	121	399	576	293	214	343	525
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	453	506	128	111	347	121	399	576	293	214	343	525
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	453	506	128	111	347	121	399	576	293	214	343	525
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.90	0.93	0.80	0.93	0.89	0.89	0.90	0.93	0.81	0.93	0.85	0.82
Lanes:	2.00	2.00	1.00	1.00	1.48	0.52	2.00	2.00	1.00	1.00	1.16	1.84
Final Sat.:	3432	3538	1528	1769	2516	876	3426	3538	1536	1768	1871	2866
Capacity Analysis Module:												
Vol/Sat:	0.13	0.14	0.08	0.06	0.14	0.14	0.12	0.16	0.19	0.12	0.18	0.18
Crit Moves:		****			****				****	****		
Green/Cycle:	0.23	0.23	0.23	0.22	0.22	0.22	0.51	0.30	0.30	0.49	0.30	0.30
Volume/Cap:	0.59	0.63	0.37	0.29	0.63	0.63	0.44	0.54	0.63	0.45	0.61	0.61
Delay/Veh:	42.6	43.7	40.0	39.7	44.5	44.5	17.7	35.7	39.2	20.0	36.8	36.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	42.6	43.7	40.0	39.7	44.5	44.5	17.7	35.7	39.2	20.0	36.8	36.8
LOS by Move:	D	D	D	D	D	D	B	D	D	B	D	D
HCM2kAvgQ:	8	10	4	4	9	9	5	10	10	5	10	10

Note: Queue reported is the number of cars per lane.

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

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

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

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #2 I-280 Northbound Ramps/San Bruno Ave

Cycle (sec):	130	Critical Vol./Cap.(X):	0.594
Loss Time (sec):	8	Average Delay (sec/veh):	32.4
Optimal Cycle:	130	Level Of Service:	C

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

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

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #2 I-280 Northbound Ramps/San Bruno Ave

Cycle (sec):	130	Critical Vol./Cap.(X):	0.747
Loss Time (sec):	8	Average Delay (sec/veh):	40.1
Optimal Cycle:	130	Level Of Service:	D

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

SFPUC - Peninsula Pipelines Seismic Upgrade Project
Existing Plus Project - SB Ave West eastbound lane closure
AM Peak Hour

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #2 I-280 Northbound Ramps/San Bruno Ave

Cycle (sec):	130	Critical Vol./Cap.(X):	0.873
Loss Time (sec):	8	Average Delay (sec/veh):	33.8
Optimal Cycle:	130	Level Of Service:	C

Street Name:	I-280 Ramps						San Bruno Ave					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	1 0	1! 0	1	0 0	0 0	0	2 0	1 0	0	0 0	2 0	1
Volume Module:												
Base Vol:	109	127	284	0	0	0	304	685	0	0	498	192
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	109	127	284	0	0	0	304	685	0	0	498	192
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PPSU:	22	0	10	0	0	0	1	11	0	0	0	1
Initial Fut:	131	127	294	0	0	0	305	696	0	0	498	193
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
PHF Volume:	151	146	338	0	0	0	351	800	0	0	572	222
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	151	146	338	0	0	0	351	800	0	0	572	222
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	151	146	338	0	0	0	351	800	0	0	572	222
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.78	0.69	0.78	1.00	1.00	1.00	0.89	0.78	1.00	1.00	0.92	0.66
Lanes:	1.18	0.40	1.42	0.00	0.00	0.00	2.00	1.00	0.00	0.00	2.00	1.00
Final Sat.:	1744	526	2082	0	0	0	3400	1476	0	0	3505	1255
Capacity Analysis Module:												
Vol/Sat:	0.09	0.28	0.16	0.00	0.00	0.00	0.10	0.54	0.00	0.00	0.16	0.18
Crit Moves:		****						****		****		
Green/Cycle:	0.32	0.32	0.32	0.00	0.00	0.00	0.23	0.62	0.00	0.00	0.39	0.39
Volume/Cap:	0.27	0.87	0.51	0.00	0.00	0.00	0.45	0.87	0.00	0.00	0.42	0.45
Delay/Veh:	33.2	53.2	36.5	0.0	0.0	0.0	43.5	29.7	0.0	0.0	28.9	29.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	33.2	53.2	36.5	0.0	0.0	0.0	43.5	29.7	0.0	0.0	28.9	29.8
LOS by Move:	C	D	D	A	A	A	D	C	A	A	C	C
HCM2kAvgQ:	4	17	8	0	0	0	6	29	0	0	9	7

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

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

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

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #3 Crestmoor/San Bruno Ave/Shelter Creek Way

Cycle (sec):	130	Critical Vol./Cap.(X):	0.604
Loss Time (sec):	8	Average Delay (sec/veh):	40.5
Optimal Cycle:	130	Level Of Service:	D

Street Name:	Crestmoor/Shelter Creek Way						San Bruno Ave					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	0 1	0	0 1	0 1	0	1 0	1 0	2	0 1	1 0	1	1 0
Volume Module:												
Base Vol:	27	5	272	99	21	9	10	440	23	98	191	63
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	27	5	272	99	21	9	10	440	23	98	191	63
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PPSU:	0	0	13	0	0	0	0	0	0	23	0	0
Initial Fut:	27	5	285	99	21	9	10	440	23	121	191	63
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
PHF Volume:	31	6	331	115	24	10	12	512	27	141	222	73
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	31	6	331	115	24	10	12	512	27	141	222	73
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	31	6	331	115	24	10	12	512	27	141	222	73
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.93	0.93	0.66	0.79	0.79	0.79	0.92	0.92	0.66	0.92	0.80	0.80
Lanes:	0.84	0.16	1.00	1.00	0.70	0.30	1.00	2.00	1.00	1.00	1.50	0.50
Final Sat.:	1494	277	1255	1504	1053	451	1753	3505	1255	1753	2285	754
Capacity Analysis Module:												
Vol/Sat:	0.02	0.02	0.26	0.08	0.02	0.02	0.01	0.15	0.02	0.08	0.10	0.10
Crit Moves:			****	****				****		****		
Green/Cycle:	0.27	0.44	0.44	0.13	0.30	0.30	0.02	0.24	0.24	0.13	0.35	0.35
Volume/Cap:	0.08	0.05	0.60	0.60	0.08	0.08	0.28	0.60	0.09	0.60	0.28	0.28
Delay/Veh:	35.6	21.1	29.9	57.9	33.0	33.0	65.9	45.0	38.3	57.6	30.5	30.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	35.6	21.1	29.9	57.9	33.0	33.0	65.9	45.0	38.3	57.6	30.5	30.5
LOS by Move:	D	C	C	E	C	C	E	D	D	E	C	C
HCM2kAvgQ:	1	1	11	5	1	1	1	10	1	6	4	4

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

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

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--------------------------------------------------------------------------------
              SFPUC - Peninsula Pipelines Seismic Upgrade Project
                            Existing Plus Project
                                 AM Peak Hour
--------------------------------------------------------------------------------
                        Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #5 Courtland Dr/Whitman
********************************************************************************
Average Delay (sec/veh):       5.0      Worst Case Level Of Service: A[ 10.0]
********************************************************************************
Street Name:             Courtland Dr                       Whitman
Approach:        North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:          Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:            Include          Include          Include          Include
Lanes:         0  0  1! 0  0    0  0  0  0  0    0  0  1  0  0    0  1  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:         5    0   101     0    0     0     0  138     0    66   37     0
Growth Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:      5    0   101     0    0     0     0  138     0    66   37     0
Added Vol:        0    0     0     0    0     0     0    0     0     0    0     0
PPSU:             0    0    12     0    0     0     0    0     0    32    0     0
Initial Fut:      5    0   113     0    0     0     0  138     0    98   37     0
User Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:       0.86 0.86  0.86  0.86 0.86  0.86  0.86 0.86  0.86  0.86 0.86  0.86
PHF Volume:       6    0   131     0    0     0     0  160     0   114   43     0
Reduct Vol:       0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:      6    0   131     0    0     0     0  160     0   114   43     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:   6.4  6.5   6.2 xxxxx xxxx xxxxx xxxxx xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:   3.5  4.0   3.3 xxxxx xxxx xxxxx xxxxx xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:   431  431   160  xxxx xxxx xxxxx  xxxx xxxx xxxxx   160 xxxx xxxxx
Potent Cap.:   581  517   885  xxxx xxxx xxxxx  xxxx xxxx xxxxx  1419 xxxx xxxxx
Move Cap.:     543  473   885  xxxx xxxx xxxxx  xxxx xxxx xxxxx  1419 xxxx xxxxx
Volume/Cap:   0.01 0.00  0.15  xxxx xxxx  xxxx  xxxx xxxx  xxxx  0.08 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.3 xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.8 xxxx xxxxx
LOS by Move:     *    *     *     *    *     *     *    *     *     A    *     *
Movement:      LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx  862 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx  0.6 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   0.3 xxxx xxxxx
Shrd ConDel:xxxxx 10.0 xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.8 xxxx xxxxx
Shared LOS:      *    A     *     *    *     *     *    *     *     A    *     *
ApproachDel:        10.0            xxxxxx           xxxxxx           xxxxxx
ApproachLOS:          A                *                *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

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

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #6 Helen/Larkspur

Cycle (sec):	100	Critical Vol./Cap.(X):	0.727
Loss Time (sec):	0	Average Delay (sec/veh):	19.4
Optimal Cycle:	0	Level Of Service:	C

Street Name:		Helen						Larkspur				
Approach:		North Bound			South Bound			East Bound			West Bound	
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Stop Sign			Stop Sign			Stop Sign			Stop Sign	
Rights:		Include			Include			Include			Include	
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:		0 0 1! 0 0			0 0 0 1 0			0 0 1! 0 0			0 0 1! 0 0	
Volume Module:												
Base Vol:	179	112	41	0	134	122	78	56	182	69	84	1
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	179	112	41	0	134	122	78	56	182	69	84	1
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PPSU:	0	0	0	0	0	0	0	25	0	0	7	0
Initial Fut:	179	112	41	0	134	122	78	81	182	69	91	1
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
PHF Volume:	211	132	48	0	158	144	92	95	214	81	107	1
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	211	132	48	0	158	144	92	95	214	81	107	1
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	211	132	48	0	158	144	92	95	214	81	107	1
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.54	0.34	0.12	0.00	0.52	0.48	0.23	0.24	0.53	0.43	0.56	0.01
Final Sat.:	290	181	66	0	275	250	127	132	296	191	252	3
Capacity Analysis Module:												
Vol/Sat:	0.73	0.73	0.73	xxxx	0.57	0.57	0.72	0.72	0.72	0.42	0.42	0.42
Crit Moves:		****			****			****			****	
Delay/Veh:	22.6	22.6	22.6	0.0	16.1	16.1	21.5	21.5	21.5	14.0	14.0	14.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	22.6	22.6	22.6	0.0	16.1	16.1	21.5	21.5	21.5	14.0	14.0	14.0
LOS by Move:	C	C	C	*	C	C	C	C	C	B	B	B
ApproachDel:		22.6			16.1			21.5			14.0	
Delay Adj:		1.00			1.00			1.00			1.00	
ApprAdjDel:		22.6			16.1			21.5			14.0	
LOS by Appr:		C			C			C			B	
AllWayAvgQ:	2.0	2.0	2.0	1.0	1.0	1.0	1.9	1.9	1.9	0.5	0.5	0.5

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

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

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

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

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

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

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--------------------------------------------------------------------------------
            SFPUC - Peninsula Pipelines Seismic Upgrade Project
                         Existing plus Project
                             PM Peak Hour
--------------------------------------------------------------------------------
                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #1 West Orange/Westborough/Camaritas
********************************************************************************
Cycle (sec):          130              Critical Vol./Cap.(X):          1.213
Loss Time (sec):        8              Average Delay (sec/veh):         33.7
Optimal Cycle:        130              Level Of Service:                   C
********************************************************************************
Street Name:  West Orange Ave/Camaritas Ave           Westborough Blvd
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Permitted        Permitted       Prot+Permit      Prot+Permit
Rights:          Include          Include          Include          Include
Min. Green:   33    33    33   33    33    33   36    65    65   21    50    50
Y+R:         4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0
Lanes:        1  0  0  1  0    1  1  0  0  1    1  0  2  0  1    1  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     40    15    35   93    60   230  113   788   156   67  1071   303
Growth Adj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Initial Bse:  40    15    35   93    60   230  113   788   156   67  1071   303
Added Vol:     0     0     0    0     0     0    0     0     0    0     0     0
PPSU:         13     0     0    0     0    13    3     0     3    0     0     0
Initial Fut:  53    15    35   93    60   243  116   788   159   67  1071   303
User Adj:   1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:    0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95  0.95
PHF Volume:   56    16    37   98    63   256  122   829   167   71  1127   319
Reduct Vol:    0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:  56    16    37   98    63   256  122   829   167   71  1127   319
PCE Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
FinalVolume:  56    16    37   98    63   256  122   829   167   71  1127   319
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment: 0.68  0.70  0.69 0.60  0.60  0.65 0.93  0.93  0.64 0.93  0.93  0.64
Lanes:      1.00  0.30  0.70 1.22  0.78  1.00 1.00  2.00  1.00 1.00  2.00  1.00
Final Sat.: 1290   394   919 1387   895  1226 1769  3538  1220 1767  3538  1214
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.04  0.04  0.04 0.07  0.07  0.21 0.07  0.23  0.14 0.04  0.32  0.26
Crit Moves:                               ****  ****                    ****
Green/Cycle: 0.26 0.26  0.26 0.26  0.26  0.26 0.69  0.51  0.51 0.57  0.40  0.40
Volume/Cap: 0.17  0.15  0.15 0.27  0.27  0.80 0.22  0.46  0.27 0.13  0.80  0.66
Delay/Veh:  38.1  37.9  37.9 39.2  39.2  63.1 15.0  21.1  19.0 13.4  39.1  38.6
User DelAdj: 1.00 1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh: 38.1  37.9  37.9 39.2  39.2  63.1 15.0  21.1  19.0 13.4  39.1  38.6
LOS by Move:   D     D     D    D     D     E    B     C     B    B     D     D
HCM2kAvgQ:     2     2     2    3     3    12    2    11     4    1    22    11
********************************************************************************
```

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

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--------------------------------------------------------------------------------
          SFPUC - Peninsula Pipelines Seismic Upgrade Project
              Existing plus Project - ramp lane closure
                           PM Peak Hour
--------------------------------------------------------------------------------

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

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

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

SFPUC - Peninsula Pipelines Seismic Upgrade Project
Existing plus Project - SB Ave West and ramp closure
PM Peak Hour

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #2 I-280 Northbound Ramps/San Bruno Ave

Cycle (sec):	130	Critical Vol./Cap.(X):	0.897
Loss Time (sec):	8	Average Delay (sec/veh):	41.0
Optimal Cycle:	130	Level Of Service:	D

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

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

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #3 Crestmoor/San Bruno Ave/Shelter Creek Way

Cycle (sec):	130	Critical Vol./Cap.(X):	0.459
Loss Time (sec):	8	Average Delay (sec/veh):	34.6
Optimal Cycle:	130	Level Of Service:	C

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

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

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

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

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

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

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

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

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

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

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

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

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

Appendix D
Noise

Appendix D-1
Noise and Vibration Fundamentals

NOISE AND VIBRATION FUNDAMENTALS

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

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

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

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

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

- The Equivalent Level (LEQ) is the level of constant noise energy that is equivalent to the time-varying sound energy over a specified time period; an hourly LEQ refers to the energy equivalent level of sound for each one-hour period.

- The Day-Night Level (LDN) is the A-weighted LEQ noise level over a 24-hour period with a 10 dB penalty applied to sound levels between 10pm~7am to account for the higher potential for disturbance to human activities in the nighttime. Because of the 10 dB penalty during nighttime hours, the LDN is very sensitive to late night noise events.

- The Community Noise Equivalent Level (CNEL) is similar to the LDN with an additional 5 dB penalty applied to sound levels between 7pm~10pm. Typically, in environments where transportation sources are the primary noise source, the difference between the CNEL and the LDN is trivial (1 dB or less). Based on this assumption, all data presented in this report are LDN rather than CNEL.

Sound Propagation

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

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

NOISE AND VIBRATION TERMINOLOGY DEFINITIONS

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

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

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

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

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

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

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

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

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

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

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

Groundborne Vibration: Vibration propagated through soil and building structures.

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

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

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

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

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

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

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

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

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

TYPICAL SOUND LEVELS

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

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

HEALTH EFFECTS OF NOISE AND VIBRATION

Noise

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

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

Vibration

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

REFERENCES

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

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

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

Long, Marshall, 2006. *Architectural Acoustics*, Elsevier Academic Press, London.

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Appendix D-2
Existing Noise Environment

EXISTING NOISE ENVIRONMENT

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

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

Colma Site

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

South San Francisco Site

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

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

San Bruno North Site

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

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

San Bruno South Site

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

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

Millbrae Site

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

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

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

Common Staging Area

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

LONG-TERM MEASUREMENT DATA TIME HISTORY PLOTS

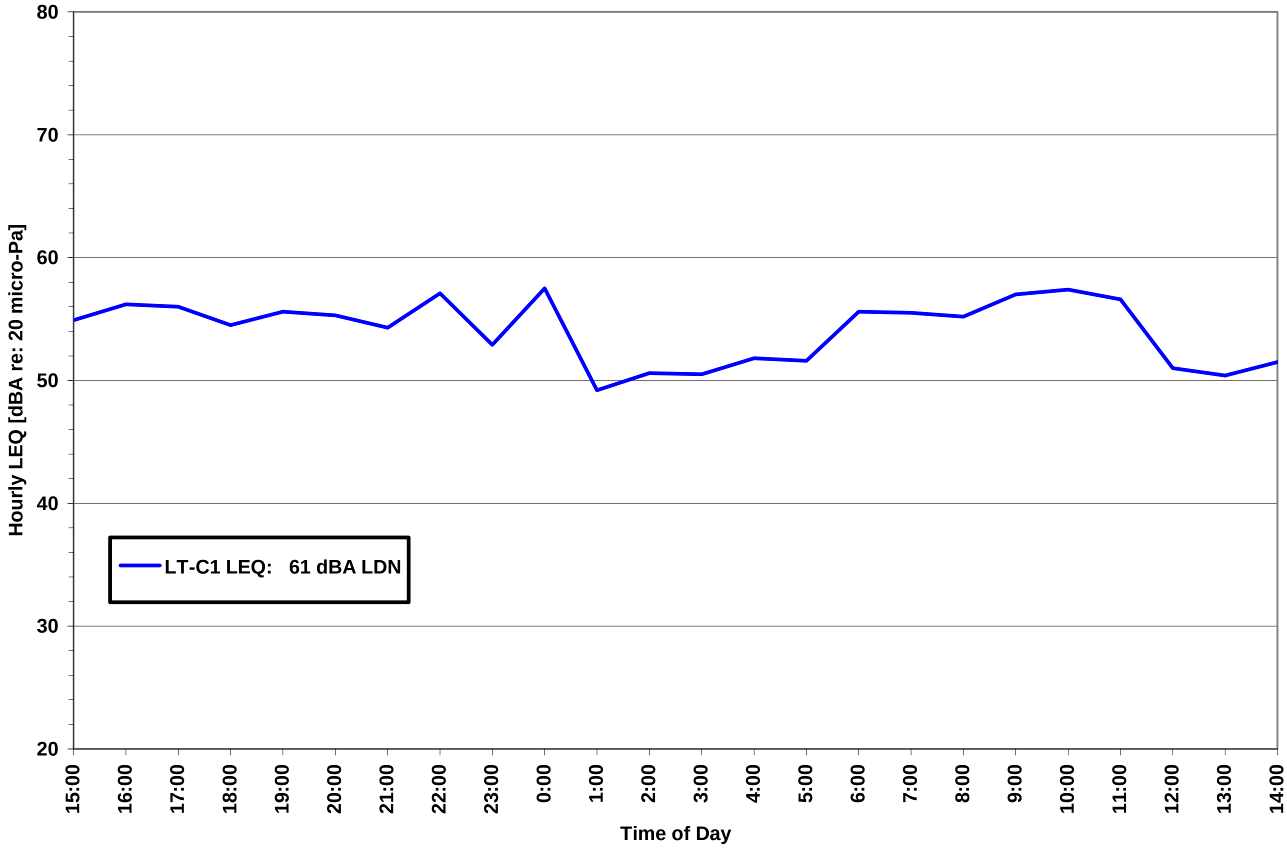

Figure 1: Colma Site Time History of Noise Levels

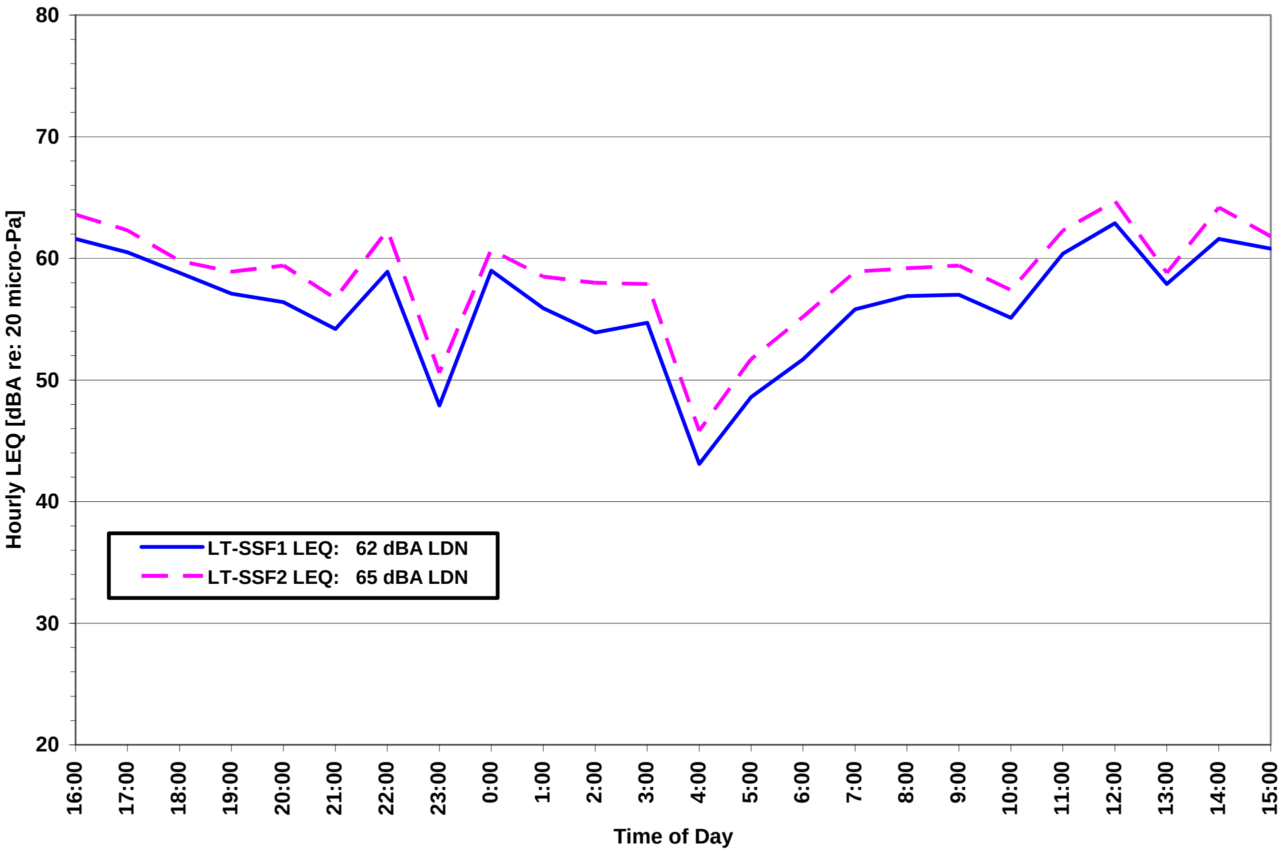

Figure 2: South San Francisco Site Time History of Noise Levels

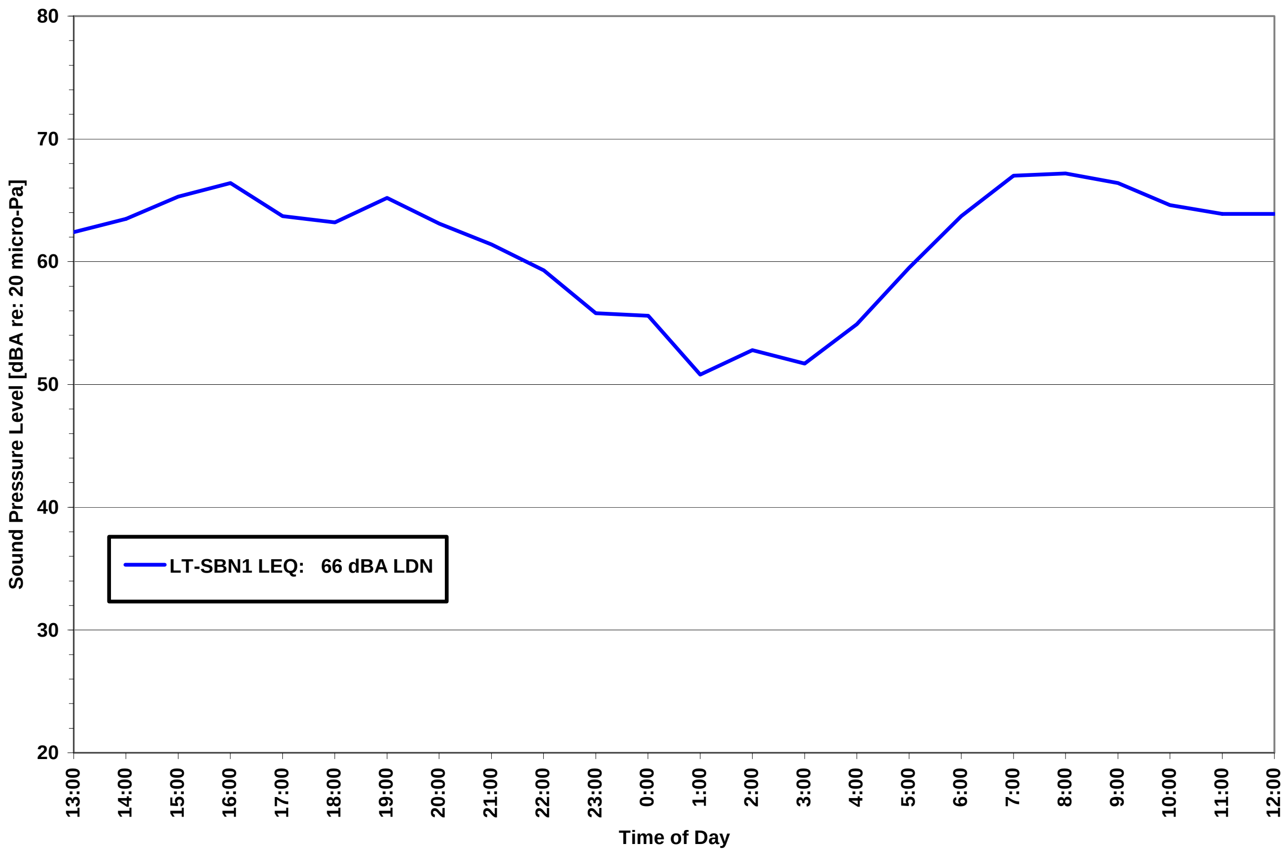

Figure 3: San Bruno North Site Time History of Noise Levels

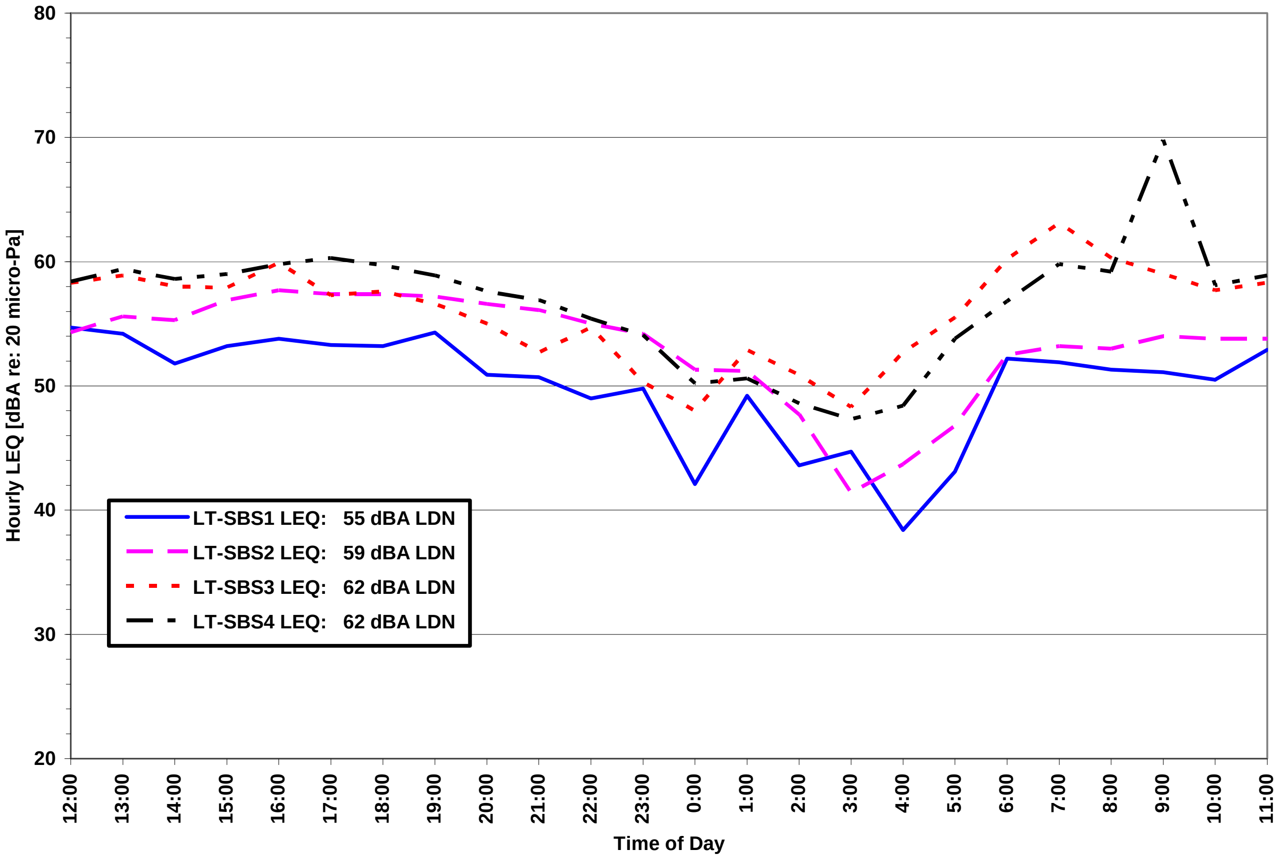

Figure 4: San Bruno South Site Time History of Noise Levels

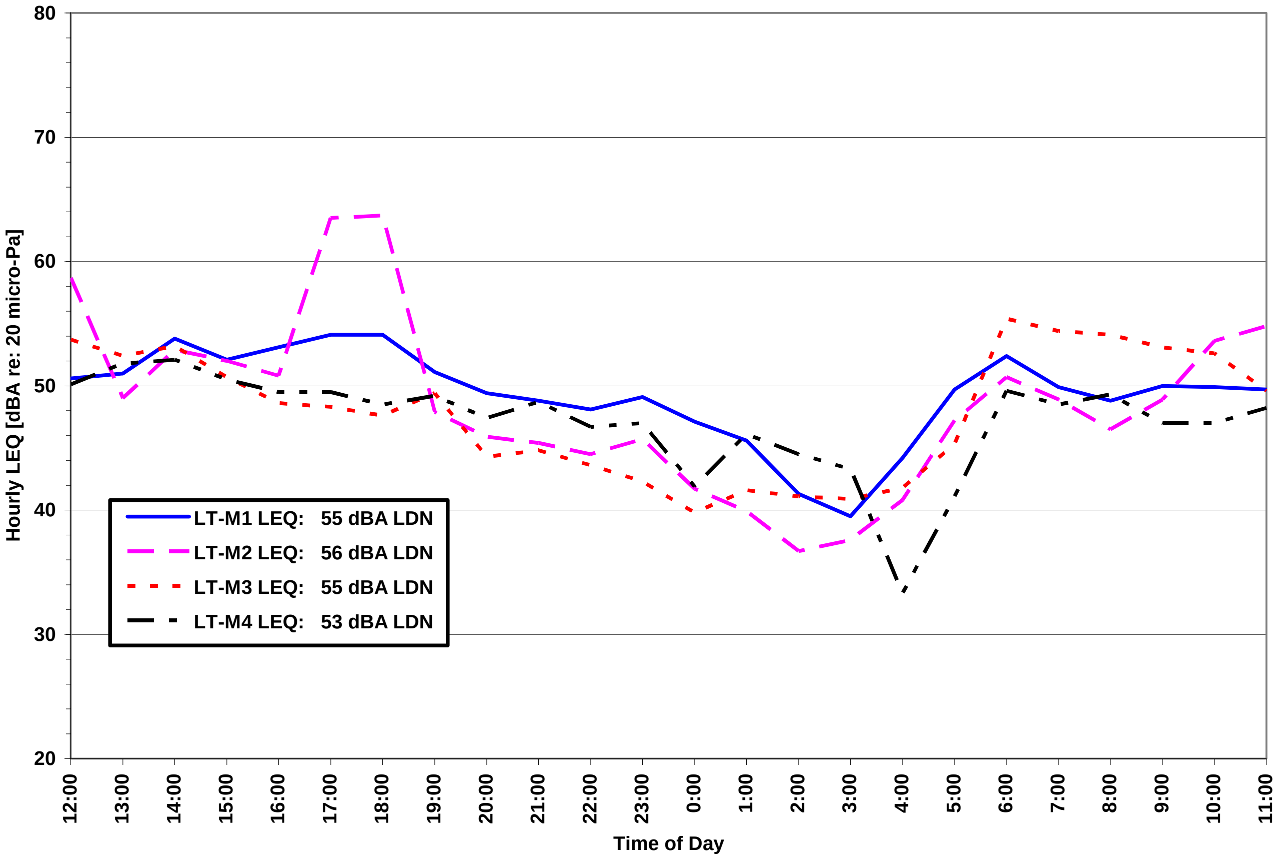

Figure 5: Millbrae Site Time History of Noise Levels

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

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

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

NOTES: Construction noise would not exceed the 70 dBA speech interference criterion (Impact NO-1) at the identified receptor.
NA = Not Applicable
[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.
[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).
[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.
[d] The Town of Colma Noise Ordinance exempts work on utilities.

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

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

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

NA = Not Applicable

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

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

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

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

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

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

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

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

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

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

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

Table D-3.4
Estimated Daytime Construction Noise Levels (dBA) at the South San Francisco Site – Clubview Apartments

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Speech Interference Criterion[c]	Daytime Ambient Noise Level	Daytime Noise Ordinance Limit[d]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Tree Removal	Brush Chipper	76	550	-21	55	70	60	90	0	0	55
	Chain Saw	82	550	-21	61	70	60	90	0	0	61
	Flatbed Truck	70	550	-21	49	70	60	90	0	0	49
	Haul Truck	72	550	-21	51	70	60	90	-1	0	50
	Skid Loader	75	550	-21	54	70	60	90	-4	0	50
	Track Loader	81	550	-21	60	70	60	90	-5	0	55
	Whole Tree Chipper	83	550	-21	62	70	60	90	-4	0	58
Mobilization	Flatbed Truck	70	125	-8	62	70	60	90	0	0	62
	Haul Truck	72	125	-8	64	70	60	90	-1	0	63
	Pickup Truck	70	125	-8	62	70	60	90	0	0	62
Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration	Backhoe	74	125	-8	66	70	60	90	-3	0	63
	Cement Drum Mixer	77	125	-8	69	70	60	90	-8	0	61
	Cement Mixer Truck	75	125	-8	67	70	60	90	0	0	67
	Compactor	76	125	-8	68	70	60	90	-4	0	64
	Crane	73	125	-8	65	70	60	90	-6	0	59
	Dozer	78	125	-8	70	70	60	90	-7	0	63
	Dump Truck	72	125	-8	64	70	60	90	-1	0	63
	Flatbed Truck	70	125	-8	62	70	60	90	0	0	62
	Forklift	62	125	-8	54	70	60	90	0	0	54
	Grader	81	125	-8	**73**	70	60	90	-10	0	63
	Generator, >25kVA	81	125	-8	**73**	70	60	90	-6	0	67
	Loader	75	125	-8	67	70	60	90	-4	0	63
	Pickup Truck	70	125	-8	62	70	60	90	0	0	62
	Pump, Water	78	125	-8	70	70	60	90	-6	0	64
	Vacuum Street Sweeper	72	530	-21	51	70	60	90	0	0	51
	Vibratory Pile Driver	88	125	-8	**80**	70	60	90	-10	0	70
	Water Truck	70	125	-8	62	70	60	90	0	0	62
	Welder, Diesel	70	125	-8	62	70	60	90	0	0	62

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

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

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

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

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

Table D-3.5
Estimated Daytime Construction Noise Levels (dBA) at the South San Francisco Site – Golf Club of San Francisco

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Speech Interference Criterion[c]	Daytime Ambient Noise Level	Daytime Noise Ordinance Limit[d]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Tree Removal	Brush Chipper	76	180	-11	65	66	59	90	0	-5	65
	Chain Saw	82	180	-11	**71**	66	59	90	0	-5	**71**
	Flatbed Truck	70	180	-11	59	66	59	90	0	-5	59
	Haul Truck	72	180	-11	61	66	59	90	-1	-5	60
	Skid Loader	75	180	-11	64	66	59	90	-4	-5	60
	Track Loader	81	180	-11	**70**	66	59	90	-5	-5	65
	Whole Tree Chipper	83	180	-11	**72**	66	59	90	-4	-5	68
Mobilization	Flatbed Truck	70	30	4	**74**	66	59	90	0	-5	69
	Haul Truck	72	30	4	**76**	66	59	90	-1	-5	70
	Pickup Truck	70	30	4	**74**	66	59	90	0	-5	69
Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration	Backhoe	74	30	4	**78**	66	59	90	-3	-5	70
	Cement Drum Mixer	77	30	4	**81**	66	59	90	-8	-10	63
	Cement Mixer Truck	75	30	4	**79**	66	59	90	0	-5	**74**
	Compactor	76	30	4	**80**	66	59	90	-4	-5	**71**
	Crane	73	30	4	**77**	66	59	90	-6	-5	66
	Dozer	78	30	4	**82**	66	59	90	-7	-5	70
	Dump Truck	72	30	4	**76**	66	59	90	-1	-5	70
	Flatbed Truck	70	30	4	**74**	66	59	90	0	-5	69
	Forklift	62	30	4	66	66	59	90	0	-5	61
	Grader	81	30	4	**85**	66	59	90	-10	-5	70
	Generator, >25kVA	81	30	4	**85**	66	59	90	-6	-10	69
	Loader	75	30	4	**79**	66	59	90	-4	-5	70
	Pickup Truck	70	30	4	**74**	66	59	90	0	-5	69
	Pump, Water	78	30	4	**82**	66	59	90	-6	-10	66
	Vacuum Street Sweeper	72	30	4	**76**	66	59	90	0	-5	**71**
	Vibratory Pile Driver	88	30	4	**92**	66	59	90	-10	-5	**77**
	Water Truck	70	30	4	**74**	66	59	90	0	-5	69
	Welder, Diesel	70	30	4	**74**	66	59	90	0	-10	64

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

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

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

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

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

Table D-3.6
Estimated Daytime Construction Noise Levels (dBA) at the San Bruno North Site – 1840 Cedarwood Court

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Speech Interference Criterion[c]	Daytime Ambient Noise Level	Daytime Noise Ordinance Limit[d]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Mobilization	Flatbed Truck	70	15	10	**80**	70	61	101	0	-5	**75**
	Haul Truck	72	15	10	**82**	70	61	101	-1	-5	**76**
	Pickup Truck	70	15	10	**80**	70	61	101	0	-5	**75**
Shoring and Excavation, Pipeline Stabilization, Intermittent Dewatering, Backfill and Restoration	Backhoe	74	15	10	**84**	70	61	101	-3	-5	**76**
	Cement Drum Mixer	77	15	10	**87**	70	61	101	-8	-10	69
	Cement Mixer Truck	75	15	10	**85**	70	61	101	0	-5	**80**
	Compactor	76	15	10	**86**	70	61	101	-4	-5	**77**
	Crane	73	15	10	**83**	70	61	101	-6	-5	**72**
	Dump Truck	72	15	10	**82**	70	61	101	-1	-5	**76**
	Flatbed Truck	70	15	10	**80**	70	61	101	0	-5	**75**
	Forklift	62	15	10	**72**	70	61	101	0	-5	67
	Generator, >25kVA	81	15	10	**91**	70	61	101	-6	-10	**75**
	Loader	75	15	10	**85**	70	61	101	-4	-5	**76**
	Pickup Truck	70	15	10	**80**	70	61	101	0	-5	**75**
	Pump, Water	78	15	10	**88**	70	61	101	-6	-10	**72**
	Vacuum Street Sweeper	72	15	10	**82**	70	61	101	0	-5	**77**
	Vibratory Pile Driver	88	15	10	**98**	70	61	101	-10	-5	**83**
	Water Truck	70	15	10	**80**	70	61	101	0	-5	**75**
	Welder, Diesel	70	15	10	**80**	70	61	101	0	-10	70

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

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

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

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

[d] The City of San Bruno Noise Ordinance states that construction noise is limited to 85 dBA at 100 feet, the values shown are the equivalent at the typical distance from the closest receptor.

Table D-3.7

Estimated Daytime Construction Noise Levels (dBA) at the San Bruno South Site – Park Plaza Apartments and Shelter Creek Condominiums

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Speech Interference Criterion[c]	Daytime Ambient Noise Level	Daytime Noise Ordinance Limit[d]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Dewatering (Shutdown, Hydrostatic Testing, Disinfection)	Dewatering Pump	65	55	-1	64	70	59	87	0	0	64
Mobilization	Flatbed Truck	70	10	14	**84**	70	59	105	0	0	**84**
	Haul Truck	72	10	14	**86**	70	59	105	-1	0	**85**
	Pickup Truck	70	10	14	**84**	70	59	105	0	0	**84**
Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration	Backhoe	74	10	14	**88**	70	59	105	-3	0	**85**
	Cement Drum Mixer	77	10	14	**91**	70	59	105	-8	0	**83**
	Cement Mixer Truck	75	10	14	**89**	70	59	105	0	0	**89**
	Compactor	76	10	14	**90**	70	59	105	-4	0	**86**
	Crane	73	10	14	**87**	70	59	105	-6	0	**81**
	Dozer	78	10	14	**92**	70	59	105	-7	0	**85**
	Dump Truck	72	10	14	**86**	70	59	105	-1	0	**85**
	Flatbed Truck	70	10	14	**84**	70	59	105	0	0	**84**
	Forklift	62	10	14	**76**	70	59	105	0	0	**76**
	Grader	81	10	14	**95**	70	59	105	-10	0	**85**
	Generator, >25kVA	81	10	14	**95**	70	59	105	-6	0	**89**
	Loader	75	10	14	**89**	70	59	105	-4	0	**85**
	Pickup Truck	70	10	14	**84**	70	59	105	0	0	**84**
	Pump, Water	78	10	14	**92**	70	59	105	-6	0	**86**
	Vacuum Street Sweeper	72	690	-23	49	70	59	68	0	0	49
	Vibratory Pile Driver	88	10	14	**102**	70	59	105	-10	0	**92**
	Water Truck	70	10	14	**84**	70	59	105	0	0	**84**
	Welder, Diesel	70	10	14	**84**	70	59	105	0	0	**84**

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

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

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

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

[d] The City of San Bruno Noise Ordinance states that construction noise is limited to 85 dBA at 100 feet, the values shown are the equivalent at the typical distance from the closest receptor.

Table D-3.8
Estimated Daytime Construction Noise Levels (dBA) at the San Bruno South Site – Residences along Courtland Drive

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Speech Interference Criterion[c]	Daytime Ambient Noise Level	Daytime Noise Ordinance Limit[d]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Dewatering (Shutdown, Hydrostatic Testing, Disinfection)	Dewatering Pump	65	315	-16	49	70	59	75	0	0	49
Mobilization	Flatbed Truck	70	10	14	**84**	70	59	105	0	-5	**79**
	Haul Truck	72	10	14	**86**	70	59	105	-1	-5	**80**
	Pickup Truck	70	10	14	**84**	70	59	105	0	-5	**79**
Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration	Backhoe	74	10	14	**88**	70	59	105	-3	-5	**80**
	Cement Drum Mixer	77	10	14	**91**	70	59	105	-8	-10	**73**
	Cement Mixer Truck	75	10	14	**89**	70	59	105	0	-5	**84**
	Compactor	76	10	14	**90**	70	59	105	-4	-5	**81**
	Crane	73	10	14	**87**	70	59	105	-6	-5	**76**
	Dozer	78	10	14	**92**	70	59	105	-7	-5	**80**
	Dump Truck	72	10	14	**86**	70	59	105	-1	-5	**80**
	Flatbed Truck	70	10	14	**84**	70	59	105	0	-5	**79**
	Forklift	62	10	14	**76**	70	59	105	0	-5	**71**
	Grader	81	10	14	**95**	70	59	105	-10	-5	**80**
	Generator, >25kVA	81	10	14	**95**	70	59	105	-6	-10	**79**
	Loader	75	10	14	**89**	70	59	105	-4	-5	**80**
	Pickup Truck	70	10	14	**84**	70	59	105	0	-5	**79**
	Pump, Water	78	10	14	**92**	70	59	105	-6	-10	**76**
	Vacuum Street Sweeper	72	55	-1	**71**	70	59	90	0	-5	66
	Vibratory Pile Driver	88	10	14	**102**	70	59	105	-10	-5	**87**
	Water Truck	70	10	14	**84**	70	59	105	0	-5	**79**
	Welder, Diesel	70	10	14	**84**	70	59	105	0	-10	**74**

NOTES: **Bolded** values indicate construction noise levels that would exceed the 70 dBA speech interference criterion (Impact NO-1) at the identified receptor.
[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.
[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).
[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.
[d] The City of San Bruno Noise Ordinance states that construction noise is limited to 85 dBA at 100 feet, the values shown are the equivalent at the typical distance from the closest receptor.

Table D-3.9
Estimated Daytime Construction Noise Levels (dBA) at the San Bruno South Site – Peninsula High School

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Speech Interference Criterion[c]	Daytime Ambient Noise Level	Daytime Noise Ordinance Limit[d]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Dewatering (Shutdown, Hydrostatic Testing, Disinfection)	Dewatering Pump	65	1830	-31	34	70	53	60	0	0	34
Mobilization	Flatbed Truck	70	150	-10	60	70	53	85	0	-5	55
	Haul Truck	72	150	-10	62	70	53	85	-1	-5	56
	Pickup Truck	70	150	-10	60	70	53	85	0	-5	55
Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration	Backhoe	74	150	-10	64	70	53	85	-3	-5	56
	Cement Drum Mixer	77	1000	-26	51	70	53	65	-8	-10	33
	Cement Mixer Truck	75	1000	-26	49	70	53	65	0	-5	44
	Compactor	76	1000	-26	50	70	53	65	-4	-5	41
	Crane	73	1000	-26	47	70	53	65	-6	-5	36
	Dozer	78	1000	-26	52	70	53	65	-7	-5	40
	Dump Truck	72	150	-10	62	70	53	85	-1	-5	56
	Flatbed Truck	70	150	-10	60	70	53	85	0	-5	55
	Forklift	62	150	-10	52	70	53	85	0	-5	47
	Grader	81	1000	-26	55	70	53	65	-10	-5	40
	Generator, >25kVA	81	150	-10	**71**	70	53	85	-6	-10	55
	Loader	75	1000	-26	49	70	53	65	-4	-5	40
	Pickup Truck	70	150	-10	60	70	53	85	0	-5	55
	Pump, Water	78	150	-10	68	70	53	85	-6	-10	52
	Vacuum Street Sweeper	72	150	-10	62	70	53	85	0	-5	57
	Vibratory Pile Driver	88	1000	-26	62	70	53	65	-10	-5	47
	Water Truck	70	150	-10	60	70	53	85	0	-5	55
	Welder, Diesel	70	150	-10	60	70	53	85	0	-10	50

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

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

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

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

[d] The City of San Bruno Noise Ordinance states that construction noise is limited to 85 dBA at 100 feet, the values shown are the equivalent at the typical distance from the closest receptor.

Table D-3.10
Estimated Daytime Construction Noise Levels (dBA) at the San Bruno South Site – Peninsula High School Athletic Fields

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Speech Interference Criterion[c]	Daytime Ambient Noise Level	Daytime Noise Ordinance Limit[d]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Dewatering (Shutdown, Hydrostatic Testing, Disinfection)	Dewatering Pump	65	950	-26	39	66	54	65	0	0	39
Mobilization	Flatbed Truck	70	40	2	**72**	66	54	93	0	-5	67
	Haul Truck	72	40	2	**74**	66	54	93	-1	-5	68
	Pickup Truck	70	40	2	**72**	66	54	93	0	-5	67
Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration	Backhoe	74	40	2	**76**	66	54	93	-3	-5	68
	Cement Drum Mixer	77	140	-9	68	66	54	82	-8	-10	50
	Cement Mixer Truck	75	140	-9	66	66	54	82	0	-5	61
	Compactor	76	140	-9	67	66	54	82	-4	-5	58
	Crane	73	140	-9	64	66	54	82	-6	-5	53
	Dozer	78	140	-9	69	66	54	82	-7	-5	57
	Dump Truck	72	40	2	**74**	66	54	93	-1	-5	68
	Flatbed Truck	70	40	2	**72**	66	54	93	0	-5	67
	Forklift	62	40	2	64	66	54	93	0	-5	59
	Grader	81	140	-9	**72**	66	54	82	-10	-5	57
	Generator, >25kVA	81	40	2	**83**	66	54	93	-6	-10	67
	Loader	75	140	-9	66	66	54	82	-4	-5	57
	Pickup Truck	70	40	2	**72**	66	54	93	0	-5	67
	Pump, Water	78	40	2	**80**	66	54	93	-6	-10	64
	Vacuum Street Sweeper	72	40	2	**74**	66	54	93	0	-5	69
	Vibratory Pile Driver	88	140	-9	**79**	66	54	82	-10	-5	64
	Water Truck	70	40	2	**72**	66	54	93	0	-5	67
	Welder, Diesel	70	40	2	**72**	66	54	93	0	-10	62

NOTES: **Bolded** values indicate construction noise levels that would exceed the 70 dBA speech interference criterion (Impact NO-1) at the identified receptor.
[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.
[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).
[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.
[d] The City of San Bruno Noise Ordinance states that construction noise is limited to 85 dBA at 100 feet, the values shown are the equivalent at the typical distance from the closest receptor.

Table D-3.11
Estimated Daytime Construction Noise Levels (dBA) at the South San Bruno Site – San Bruno Chinese Church

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Speech Interference Criterion[c]	Daytime Ambient Noise Level	Daytime Noise Ordinance Limit[d]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Dewatering (Shutdown, Hydrostatic Testing, Disinfection)	Dewatering Pump	65	1050	-26	39	70	59	65	0	0	39
Mobilization	Flatbed Truck	70	30	4	**74**	70	59	93	0	-5	69
	Haul Truck	72	30	4	**76**	70	59	93	-1	-5	70
	Pickup Truck	70	30	4	**74**	70	59	93	0	-5	69
Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration	Backhoe	74	30	4	**78**	70	59	93	-3	-5	70
	Cement Drum Mixer	77	190	-12	65	70	59	82	-8	-10	47
	Cement Mixer Truck	75	190	-12	63	70	59	82	0	-5	58
	Compactor	76	190	-12	64	70	59	82	-4	-5	55
	Crane	73	190	-12	61	70	59	82	-6	-5	50
	Dozer	78	190	-12	66	70	59	82	-7	-5	54
	Dump Truck	72	30	4	**76**	70	59	93	-1	-5	70
	Flatbed Truck	70	30	4	**74**	70	59	93	0	-5	69
	Forklift	62	30	4	66	70	59	93	0	-5	61
	Grader	81	190	-12	69	70	59	82	-10	-5	54
	Generator, >25kVA	81	30	4	**85**	70	59	93	-6	-10	69
	Loader	75	190	-12	63	70	59	82	-4	-5	54
	Pickup Truck	70	30	4	**74**	70	59	93	0	-5	69
	Pump, Water	78	30	4	**82**	70	59	93	-6	-10	66
	Vacuum Street Sweeper	72	120	-8	64	70	59	93	0	-5	59
	Vibratory Pile Driver	88	190	-12	**76**	70	59	82	-10	-5	61
	Water Truck	70	30	4	**74**	70	59	93	0	-5	69
	Welder, Diesel	70	30	4	**74**	70	59	93	0	-10	64

NOTES: **Bolded** values indicate construction noise levels that would exceed the 70 dBA speech interference criterion (Impact NO-1) at the identified receptor.
[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.
[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).
[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.
[d] The City of San Bruno Noise Ordinance states that construction noise is limited to 85 dBA at 100 feet, the values shown are the equivalent at the typical distance from the closest receptor.

Table D-3.12
Estimated Daytime Construction Noise Levels (dBA) at the Millbrae Site – Residences at Ridgewood Drive

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Speech Interference Criterion[c]	Daytime Ambient Noise Level	Daytime Noise Ordinance Limit[d]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Tree Removal	Brush Chipper	76	50	0	**76**	70	52	NA	0	-5	**71**
	Chain Saw	82	70	-3	**79**	70	52	NA	0	-5	**74**
	Flatbed Truck	70	10	14	**84**	70	52	NA	0	-5	**79**
	Haul Truck	72	10	14	**86**	70	52	NA	-1	-5	**80**
	Skid Loader	75	10	14	**89**	70	52	NA	-4	-5	**80**
	Track Loader	81	10	14	**95**	70	52	NA	-5	-5	**85**
	Whole Tree Chipper	83	50	0	**83**	70	52	NA	-4	-5	**74**
Dewatering (Shutdown, Hydrostatic Testing, Disinfection)	Dewatering Pump	65	625	-22	43	70	52	NA	0	0	43
Mobilization	Flatbed Truck	70	10	14	**84**	70	52	NA	0	-5	**79**
	Haul Truck	72	10	14	**86**	70	52	NA	-1	-5	**80**
	Pickup Truck	70	10	14	**84**	70	52	NA	0	-5	**79**
Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration	Backhoe	74	10	14	**88**	70	52	NA	-3	-5	**80**
	Cement Drum Mixer	77	10	14	**91**	70	52	NA	-8	-10	**73**
	Cement Mixer Truck	75	10	14	**89**	70	52	NA	0	-5	**84**
	Compactor	76	10	14	**90**	70	52	NA	-4	-5	**81**
	Crane	73	10	14	**87**	70	52	NA	-6	-5	**76**
	Dozer	78	10	14	**92**	70	52	NA	-7	-5	**80**
	Dump Truck	72	10	14	**86**	70	52	NA	-1	-5	**80**
	Flatbed Truck	70	10	14	**84**	70	52	NA	0	-5	**79**
	Forklift	62	10	14	**76**	70	52	NA	0	-5	**71**
	Grader	81	10	14	**95**	70	52	NA	-10	-5	**80**
	Generator, >25kVA	81	10	14	**95**	70	52	NA	-6	-10	**79**
	Loader	75	10	14	**89**	70	52	NA	-4	-5	**80**
	Pickup Truck	70	10	14	**84**	70	52	NA	0	-5	**79**
	Pump, Water	78	10	14	**92**	70	52	NA	-6	-10	**76**
	Vacuum Street Sweeper	72	10	14	**86**	70	52	NA	0	-5	**81**
	Vibratory Pile Driver	88	10	14	**102**	70	52	NA	-10	-5	**87**
	Water Truck	70	10	14	**84**	70	52	NA	0	-5	**79**
	Welder, Diesel	70	10	14	**84**	70	52	NA	0	-10	**74**

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

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

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

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

[d] The City of Millbrae Noise Ordinance does not limit construction noise within the approved hours.

Table D-3.13
Estimated Daytime Construction Noise Levels (dBA) at the Millbrae Site – Green Hills Country Club

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Speech Interference Criterion[c]	Daytime Ambient Noise Level	Daytime Noise Ordinance Limit[d]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Tree Removal	Brush Chipper	76	10	14	**90**	66	48	NA	0	-5	**85**
	Chain Saw	82	10	14	**96**	66	48	NA	0	-5	**91**
	Flatbed Truck	70	10	14	**84**	66	48	NA	0	-5	**79**
	Haul Truck	72	10	14	**86**	66	48	NA	-1	-5	**80**
	Skid Loader	75	10	14	**89**	66	48	NA	-4	-5	**80**
	Track Loader	81	10	14	**95**	66	48	NA	-5	-5	**85**
	Whole Tree Chipper	83	10	14	**97**	66	48	NA	-4	-5	**88**
Dewatering (Shutdown, Hydrostatic Testing, Disinfection)	Dewatering Pump	65	10	14	**79**	66	48	NA	0	-10	**69**
Mobilization	Flatbed Truck	70	10	14	84	66	48	NA	0	-5	**79**
	Haul Truck	72	10	14	86	66	48	NA	-1	-5	**80**
	Pickup Truck	70	10	14	84	66	48	NA	0	-5	**79**
Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration	Backhoe	74	10	14	**88**	66	48	NA	-3	-5	**80**
	Cement Drum Mixer	77	10	14	**91**	66	48	NA	-8	-10	**73**
	Cement Mixer Truck	75	10	14	**89**	66	48	NA	0	-5	**84**
	Compactor	76	10	14	**90**	66	48	NA	-4	-5	**81**
	Crane	73	10	14	**87**	66	48	NA	-6	-5	**76**
	Dozer	78	10	14	**92**	66	48	NA	-7	-5	**80**
	Dump Truck	72	10	14	**86**	66	48	NA	-1	-5	**80**
	Flatbed Truck	70	10	14	**84**	66	48	NA	0	-5	**79**
	Forklift	62	10	14	**76**	66	48	NA	0	-5	**71**
	Grader	81	10	14	**95**	66	48	NA	-10	-5	**80**
	Generator, >25kVA	81	10	14	**95**	66	48	NA	-6	-10	**79**
	Loader	75	10	14	**89**	66	48	NA	-4	-5	**80**
	Pickup Truck	70	10	14	**84**	66	48	NA	0	-5	**79**
	Pump, Water	78	10	14	**92**	66	48	NA	-6	-10	**76**
	Vacuum Street Sweeper	72	10	14	**86**	66	48	NA	0	-5	**81**
	Vibratory Pile Driver	88	10	14	**102**	66	48	NA	-10	-5	**87**
	Water Truck	70	10	14	**84**	66	48	NA	0	-5	**79**
	Welder, Diesel	70	10	14	**84**	66	48	NA	0	-10	**74**

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

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

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

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

[d] The City of Millbrae Noise Ordinance does not limit construction noise within the approved hours.

Table D-3.14
Estimated Daytime Construction Noise Levels (dBA) at the Millbrae Site – Residences along Hacienda Way

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Speech Interference Criterion[c]	Daytime Ambient Noise Level	Daytime Noise Ordinance Limit[d]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Tree Removal	Brush Chipper	76	115	-7	69	70	52	NA	0	0	69
	Chain Saw	82	115	-7	**75**	70	52	NA	0	0	**75**
	Flatbed Truck	70	115	-7	63	70	52	NA	0	0	63
	Haul Truck	72	115	-7	65	70	52	NA	-1	0	64
	Skid Loader	75	115	-7	68	70	52	NA	-4	0	64
	Track Loader	81	115	-7	**74**	70	52	NA	-5	0	69
	Whole Tree Chipper	83	115	-7	**76**	70	52	NA	-4	0	**72**
Dewatering (Shutdown, Hydrostatic Testing, Disinfection)	Dewatering Pump	65	250	-14	51	70	52	NA	0	0	51
Mobilization	Flatbed Truck	70	115	-7	63	70	52	NA	0	0	63
	Haul Truck	72	115	-7	65	70	52	NA	-1	0	64
	Pickup Truck	70	115	-7	63	70	52	NA	0	0	63
Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration	Backhoe	74	115	-7	67	70	52	NA	-3	0	64
	Cement Drum Mixer	77	115	-7	70	70	52	NA	-8	0	62
	Cement Mixer Truck	75	115	-7	68	70	52	NA	0	0	68
	Compactor	76	115	-7	69	70	52	NA	-4	0	65
	Crane	73	115	-7	66	70	52	NA	-6	0	60
	Dozer	78	115	-7	**71**	70	52	NA	-7	0	64
	Dump Truck	72	115	-7	65	70	52	NA	-1	0	64
	Flatbed Truck	70	115	-7	63	70	52	NA	0	0	63
	Forklift	62	115	-7	55	70	52	NA	0	0	55
	Grader	81	115	-7	**74**	70	52	NA	-10	0	64
	Generator, >25kVA	81	115	-7	**74**	70	52	NA	-6	0	68
	Loader	75	115	-7	68	70	52	NA	-4	0	64
	Pickup Truck	70	115	-7	63	70	52	NA	0	0	63
	Pump, Water	78	115	-7	**71**	70	52	NA	-6	0	65
	Vacuum Street Sweeper	72	115	-7	65	70	52	NA	0	0	65
	Vibratory Pile Driver	88	115	-7	**81**	70	52	NA	-10	0	**71**
	Water Truck	70	115	-7	63	70	52	NA	0	0	63
	Welder, Diesel	70	115	-7	63	70	52	NA	0	0	63

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

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

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

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

[d] The City of Millbrae Noise Ordinance does not limit construction noise within the approved hours.

Table D-3.15
Estimated Daytime Construction Noise Levels (dBA) at the Millbrae Site – Meadows Elementary School

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Speech Interference Criterion[c]	Daytime Ambient Noise Level	Daytime Noise Ordinance Limit[d]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Tree Removal	Brush Chipper	76	1250	-28	48	70/66	52	NA	0	0	48
	Chain Saw	82	1250	-28	54	70/66	52	NA	0	0	54
	Flatbed Truck	70	1250	-28	42	70/66	52	NA	0	0	42
	Haul Truck	72	1250	-28	44	70/66	52	NA	-1	0	43
	Skid Loader	75	1250	-28	47	70/66	52	NA	-4	0	43
	Track Loader	81	1250	-28	53	70/66	52	NA	-5	0	48
	Whole Tree Chipper	83	1250	-28	55	70/66	52	NA	-4	0	51
Dewatering (Shutdown, Hydrostatic Testing, Disinfection)	Dewatering Pump	65	45	1	66	70/66	52	NA	0	0	66
Mobilization	Flatbed Truck	70	1275	-28	42	70/66	52	NA	0	0	42
	Haul Truck	72	1275	-28	44	70/66	52	NA	-1	0	43
	Pickup Truck	70	1275	-28	42	70/66	52	NA	0	0	42
Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration	Backhoe	74	1130	-27	47	70/66	52	NA	-3	0	44
	Cement Drum Mixer	77	1130	-27	50	70/66	52	NA	-8	0	42
	Cement Mixer Truck	75	1130	-27	48	70/66	52	NA	0	0	48
	Compactor	76	1130	-27	49	70/66	52	NA	-4	0	45
	Crane	73	1130	-27	46	70/66	52	NA	-6	0	40
	Dozer	78	1130	-27	51	70/66	52	NA	-7	0	44
	Dump Truck	72	1130	-27	45	70/66	52	NA	-1	0	44
	Flatbed Truck	70	1130	-27	43	70/66	52	NA	0	0	43
	Forklift	62	1130	-27	35	70/66	52	NA	0	0	35
	Grader	81	1130	-27	54	70/66	52	NA	-10	0	44
	Generator, >25kVA	81	1130	-27	54	70/66	52	NA	-6	0	48
	Loader	75	1130	-27	48	70/66	52	NA	-4	0	44
	Pickup Truck	70	1130	-27	43	70/66	52	NA	0	0	43
	Pump, Water	78	1130	-27	51	70/66	52	NA	-6	0	45
	Vacuum Street Sweeper	72	1130	-27	45	70/66	52	NA	0	0	45
	Vibratory Pile Driver	88	1130	-27	61	70/66	52	NA	-10	0	51
	Water Truck	70	1130	-27	43	70/66	52	NA	0	0	43
	Welder, Diesel	70	1130	-27	43	70/66	52	NA	0	0	43

NOTES: Construction noise would not exceed the 70 dBA or 66 dBA speech interference criteria (Impact NO-1) at the identified receptor.
[a] Reference noise levels represent noise levels for similar equipment types without noise controls at 50 feet. These estimates assume that the equipment would operate at the standard usage factors published by the FHWA.
[b] This distance is the minimum distance from the receptor to each piece of equipment based on where the equipment could operate (e.g. construction zone or staging/spoils area).
[c] The speech interference criterion for indoor receptors is 70 dBA; the criterion for outdoor receptors is 66 dBA.
[d] The City of Millbrae Noise Ordinance does not limit construction noise within the approved hours.

Table D-3.16
Estimated Daytime Construction Noise Levels (dBA) at the Millbrae Site – Glen Oaks and Millbrae Montessori Schools

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Speech Interference Criterion[c]	Daytime Ambient Noise Level	Daytime Noise Ordinance Limit[d]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Tree Removal	Brush Chipper	76	750	-24	52	70/66	52	NA	0	0	52
	Chain Saw	82	750	-24	58	70/66	52	NA	0	0	58
	Flatbed Truck	70	750	-24	46	70/66	52	NA	0	0	46
	Haul Truck	72	750	-24	48	70/66	52	NA	-1	0	47
	Skid Loader	75	750	-24	51	70/66	52	NA	-4	0	47
	Track Loader	81	750	-24	57	70/66	52	NA	-5	0	52
	Whole Tree Chipper	83	750	-24	59	70/66	52	NA	-4	0	55
Dewatering (Shutdown, Hydrostatic Testing, Disinfection)	Dewatering Pump	65	825	-24	41	70/66	52	NA	0	0	41
Mobilization	Flatbed Truck	70	615	-22	48	70/66	52	NA	0	0	48
	Haul Truck	72	615	-22	50	70/66	52	NA	-1	0	49
	Pickup Truck	70	615	-22	48	70/66	52	NA	0	0	48
Shoring and Excavation, Pipeline Removal and Installation, Intermittent Dewatering, Backfill and Restoration	Backhoe	74	750	-24	50	70/66	52	NA	-3	0	47
	Cement Drum Mixer	77	750	-24	53	70/66	52	NA	-8	0	45
	Cement Mixer Truck	75	750	-24	51	70/66	52	NA	0	0	51
	Compactor	76	750	-24	52	70/66	52	NA	-4	0	48
	Crane	73	750	-24	50	70/66	52	NA	-6	0	44
	Dozer	78	750	-24	54	70/66	52	NA	-7	0	47
	Dump Truck	72	750	-24	48	70/66	52	NA	-1	0	47
	Flatbed Truck	70	750	-24	46	70/66	52	NA	0	0	46
	Forklift	62	750	-24	38	70/66	52	NA	0	0	38
	Grader	81	750	-24	57	70/66	52	NA	-10	0	47
	Generator, >25kVA	81	750	-24	57	70/66	52	NA	-6	0	51
	Loader	75	750	-24	51	70/66	52	NA	-4	0	47
	Pickup Truck	70	750	-24	46	70/66	52	NA	0	0	46
	Pump, Water	78	750	-24	54	70/66	52	NA	-6	0	48
	Vacuum Street Sweeper	72	750	-24	48	70/66	52	NA	0	0	48
	Vibratory Pile Driver	88	750	-24	64	70/66	52	NA	-10	0	54
	Water Truck	70	750	-24	46	70/66	52	NA	0	0	46
	Welder, Diesel	70	750	-24	46	70/66	52	NA	0	0	46

NOTES: Construction noise would not exceed the 70 dBA or 66 dBA speech interference criteria (Impact NO-1) at the identified receptor.

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

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

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

[d] The City of Millbrae Noise Ordinance does not limit construction noise within the approved hours.

Table D-3.17
Estimated Daytime Construction Noise Levels (dBA) at the Common Staging Area – Residences along Fairway Drive

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Speech Interference Criterion[c]	Daytime Ambient Noise Level	Daytime Noise Ordinance Limit[d]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Mobilization	Flatbed Truck	70	30	4	**74**	70	58	90	0	-5	69
	Haul Truck	72	30	4	**76**	70	58	90	-1	-5	70
	Pickup Truck	70	30	4	**74**	70	58	90	0	-5	69

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

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

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

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

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

Table D-3.18
Estimated Nighttime Dewatering Noise Levels (dBA) at SAPL2-1 Whitman Way

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Sleep Interference Criterion[c]	Nighttime Ambient Noise Level[d]	Nighttime Noise Ordinance Limit[e]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Dewatering (Shutdown, Hydrostatic Testing, Disinfection)	Dewatering Pump	65	55	-1	**64**	60	53	66	0	-5	59

NOTES: **Bolded** values indicate construction noise levels that would exceed the 60 dBA sleep interference criterion (Impact NO-2) at the identified receptor.

NA = Not Applicable

See Table D-3.7 for information pertaining to daytime dewatering activities.

[a] Reference noise levels represent noise levels for Godwin NC150 pump used by the SFPUC for dewatering. The usage factor is considered to be 100%. Level based on manufacturer noise data for 30 feet.

[b] This distance is the minimum distance from the receptor to the dewatering pump located on the street at the curb.

[c] The sleep interference criterion for sensitive receptors is 60 dBA.

[d] The nighttime ambient noise level is based on the noise data recorded at Location LT-SBS4.

[e] The City of San Bruno Noise Ordinance states that nighttime construction noise is limited to 60 dBA at 100 feet, the value shown is the equivalent at the typical distance from the closest receptor.

Table D-3.19
Estimated Nighttime Dewatering Noise Levels (dBA) at SAPL3-1 Shelter Creek Lane

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Sleep Interference Criterion[c]	Nighttime Ambient Noise Level[d]	Nighttime Noise Ordinance Limit[e]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Dewatering (Shutdown, Hydrostatic Testing, Disinfection)	Dewatering Pump	65	75	-4	**61**	60	53	66	0	-1	60

NOTES: **Bolded** values indicate construction noise levels that would exceed the 60 dBA sleep interference criterion (Impact NO-2) at the identified receptor.

NA = Not Applicable

See Table D-3.7 for information pertaining to daytime dewatering activities.

[a] Reference noise levels represent noise levels for Godwin NC150 pump used by the SFPUC for dewatering. The usage factor is considered to be 100%. Level based on manufacturer noise data for 30 feet.

[b] This distance is the minimum distance from the receptor to the dewatering pump located on the street at the curb.

[c] The sleep interference criterion for sensitive receptors is 60 dBA.

[d] The nighttime ambient noise level is based on the noise data recorded at Location LT-SBS4.

[e] The City of San Bruno Noise Ordinance states that nighttime construction noise is limited to 60 dBA at 100 feet, the value shown is the equivalent at the typical distance from the closest receptor.

Table D-3.20
Estimated Nighttime Dewatering Noise Levels (dBA) at SAPL3-2 Shelter Creek Lane

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Sleep Interference Criterion[c]	Nighttime Ambient Noise Level[d]	Nighttime Noise Ordinance Limit[e]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Dewatering (Shutdown, Hydrostatic Testing, Disinfection)	Dewatering Pump	65	120	-8	57	60	53	66	0	0	57

NOTES: Construction noise would not exceed the 60 dBA sleep interference criterion (Impact NO-2) at the identified receptor.
NA = Not Applicable
See Table D-3.7 for information pertaining to daytime dewatering activities.
[a] Reference noise levels represent noise levels for Godwin NC150 pump used by the SFPUC for dewatering. The usage factor is considered to be 100%. Level based on manufacturer noise data for 30 feet.
[b] This distance is the minimum distance from the receptor to the dewatering pump located on the street at the curb.
[c] The sleep interference criterion for sensitive receptors is 60 dBA.
[d] The nighttime ambient noise level is based on the noise data recorded at Location LT-SBS4.
[e] The City of San Bruno Noise Ordinance states that nighttime construction noise is limited to 60 dBA at 100 feet, the value shown is the equivalent at the typical distance from the closest receptor.

Table D-3.21
Estimated Daytime and Nighttime Dewatering Noise Levels (dBA) at SSBPL-1 Helen Drive

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Speech/Sleep Interference Criterion[c]	Ambient Noise Level	Noise Ordinance Limit[d]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Daytime Dewatering (Shutdown, Hydrostatic Testing, Disinfection)	Dewatering Pump	65	36	3	67	70	59[e]	NA	0	0	67
Nighttime Dewatering (Shutdown, Hydrostatic Testing, Disinfection)	Dewatering Pump	65	36	3	**67**	60	50[f]	NA	0	-10	57

NOTES: **Bolded** values indicate construction noise levels that would exceed the 60 dBA sleep interference criterion (Impact NO-2) at the identified receptor.

NA = Not Applicable

[a] Reference noise levels represent noise levels for Godwin NC150 pump used by the SFPUC for dewatering. The usage factor is considered to be 100%. Level based on manufacturer noise data for 30 feet.

[b] This distance is the minimum distance from the receptor to the dewatering pump located on the street at the curb.

[c] The speech inteference criterion for sensitive receptors is 70 dBA; the sleep interference criterion for sensitive receptors is 60 dBA.

[d] The City of Millbrae Noise Ordinance does not limit construction noise levels during daytime hours and does not address permissible construction noise levels during nighttime hours.

[e] The daytime ambient noise level is based on the noise data recorded at Location ST-M8.

[f] The nighttime ambient noise level is based on the average of noise data recorded at Locations LT-M1 and LT-M2.

Table D-3.22
Estimated Nighttime Dewatering Noise Levels (dBA) at SSBPL-2 Residences along Hacienda Drive

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Sleep Interference Criterion[c]	Nighttime Ambient Noise Level[d]	Nighttime Noise Ordinance Limit[e]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Dewatering (Shutdown, Hydrostatic Testing, Disinfection)	Dewatering Pump	65	250	-14	51	60	45	NA	0	0	51

NOTES: Construction noise would not exceed the 60 dBA sleep interference criterion (Impact NO-2) at the identified receptor.
NA = Not Applicable
See Table D-3.14 for information pertaining to daytime dewatering activities.
[a] Reference noise levels represent noise levels for Godwin NC150 pump used by the SFPUC for dewatering. The usage factor is considered to be 100%. Level based on manufacturer noise data for 30 feet.
[b] This distance is the minimum distance from the receptor to the dewatering pump located near bunker on Hole 5, just south of the staging/spoils area.
[c] The sleep interference criterion for sensitive receptors is 60 dBA.
[d] The nighttime ambient noise level is based on the noise data recorded at Location LT-M3.
[e] The City of Millbrae Noise Ordinance does not address permissible construction noise levels during nighttime hours.

Table D-3-23
Estimated Daytime and Nighttime Dewatering Noise Levels (dBA) at SSBPL-3 Millwood Drive and Barcelona Drive

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Speech/Sleep Interference Criterion[c]	Ambient Noise Level	Noise Ordinance Limit[d]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Daytime Dewatering (Shutdown, Hydrostatic Testing, Disinfection)	Dewatering Pump	65	40	2	67	70	60[e]	NA	0	0	67
Nighttime Dewatering (Shutdown, Hydrostatic Testing, Disinfection)	Dewatering Pump	65	40	2	**67**	60	45[f]	NA	0	-10	57

NOTES: **Bolded** values indicate construction noise levels that would exceed the 60 dBA sleep interference criterion (Impact NO-2) at the identified receptor.

NA = Not Applicable

[a] Reference noise levels represent noise levels for Godwin NC150 pump used by the SFPUC for dewatering. The usage factor is considered to be 100%. Level based on manufacturer noise data for 30 feet.

[b] This distance is the minimum distance from the receptor to the dewatering pump located on the street at the curb.

[c] The speech inteference criterion for sensitive receptors is 70 dBA; the sleep interference criterion for sensitive receptors is 60 dBA.

[d] The City of Millbrae Noise Ordinance does not limit construction noise levels during daytime hours and does not address permissible construction noise levels during nighttime hours.

[e] The daytime ambient noise level is based on the average of noise data recorded at Locations ST-3 and ST-M5 through ST-M8.

[f] The nighttime ambient noise level is based on the average of noise data recorded at Locations LT-M3 and LT-M4.

Table D-3.24
Estimated Daytime and Nighttime Dewatering Noise Levels (dBA) at SSBPL-4 Millwood Drive and Magnolia Avenue

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Speech/Sleep Interference Criterion[c]	Ambient Noise Level	Noise Ordinance Limit[d]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Daytime Dewatering (Shutdown, Hydrostatic Testing, Disinfection)	Dewatering Pump	65	88	-5	60	70	60[e]	NA	0	0	60
Nighttime Dewatering (Shutdown, Hydrostatic Testing, Disinfection)	Dewatering Pump	65	88	-5	60	60	45[f]	NA	0	0	60

NOTES: Construction noise would not exceed the 70 dBA speech interference or 60 dBA sleep interference criteria (Impacts NO-1 and NO-2) at the identified receptor.
NA = Not Applicable
[a] Reference noise levels represent noise levels for Godwin NC150 pump used by the SFPUC for dewatering. The usage factor is considered to be 100%. Level based on manufacturer noise data for 30 feet.
[b] This distance is the minimum distance from the receptor to the dewatering pump located on the street at the curb.
[c] The speech inteference criterion for sensitive receptors is 70 dBA; the sleep interference criterion for sensitive receptors is 60 dBA.
[d] The City of Millbrae Noise Ordinance does not limit construction noise levels during daytime hours and does not address permissible construction noise levels during nighttime hours.
[e] The daytime ambient noise level is based on the average of noise data recorded at Locations ST-3 and ST-M5 through ST-M8.
[f] The nighttime ambient noise level is based on the average of noise data recorded at Locations LT-M3 and LT-M4.

Table D-3.25
Estimated Nighttime Construction Noise Levels (dBA) at San Bruno North - 1840 Cedarwood Court

Project Component	Noise Source	Reference Hourly Leq in dBA at 50 feet[a]	Minimum Distance Between Closest Receptor and Source[b]	Distance Adjustment	Adjusted Hourly Leq	Exterior Sleep Interference Criterion[c]	Nighttime Ambient Noise Level[d]	Nighttime Noise Ordinance Limit[e]	With Mitigation Measure M-NO-1	With Noise Barrier Walls	Mitigated Hourly Leq
Mobilization	Flatbed Truck	70	15	10	**80**	60	58	76	0	-5	**75**
	Haul Truck	72	15	10	**82**	60	58	76	-1	-5	**76**
	Pickup Truck	70	15	10	**80**	60	58	76	0	-5	**75**
Shoring and Excavation, Pipeline Stabilization, Intermittent Dewatering, Backfill and Restoration	Backhoe	74	15	10	**84**	60	58	76	-3	-5	**76**
	Cement Drum Mixer	77	15	10	**87**	60	58	76	-8	-10	**69**
	Cement Mixer Truck	75	15	10	**85**	60	58	76	0	-5	**80**
	Crane	73	15	10	**83**	60	58	76	-6	-5	**72**
	Dump Truck	72	15	10	**82**	60	58	76	-1	-5	**76**
	Flatbed Truck	70	15	10	**80**	60	58	76	0	-5	**75**
	Forklift	62	15	10	**72**	60	58	76	0	-5	**67**
	Generator, >25kVA	81	15	10	**91**	60	58	76	-6	-10	**75**
	Loader	75	15	10	**85**	60	58	76	-4	-5	**76**
	Pickup Truck	70	15	10	**80**	60	58	76	0	-5	**75**
	Pump, Water	78	15	10	**88**	60	58	76	-6	-10	**72**
	Vacuum Street Sweeper	72	15	10	**82**	60	58	76	0	-5	**77**
	Water Truck	70	15	10	**80**	60	58	76	0	-5	**75**
	Welder, Diesel	70	15	10	**80**	60	58	76	0	-10	**70**

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

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

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

[c] The sleep interference criterion for indoor receptors is 60 dBA.

[d] The nighttime ambient noise level is based on the noise data recorded at Location LT-SBN1.

[e] The City of San Bruno Noise Ordinance states that nighttime construction noise is limited to 85 dBA at 100 feet, the values shown are the equivalent at the typical distance from the closest receptor.

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Appendix E
Air Quality Technical Report

San Francisco Public Utilities Commission

Peninsula Pipelines Seismic Upgrade Project

Air Quality Technical Report
Final

June 2012

San Francisco Public Utilities Commission

Peninsula Pipelines Seismic Upgrade Project

Air Quality Technical Report
Final

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June 2012

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ACRONYMS

AADT	annual average daily traffic
ABAG	Association of Bay Area Governments
AQTR	air quality technical report
ASF	age sensitivity factor
BAAQMD	Bay Area Air Quality Management District
BMP	best management practice
CARB	California Air Resources Board
CEHTP	California Environmental Health Tracking Program
CEQA	California Environmental Quality Act
CO	carbon monoxide
CRAF	cancer risk adjustment factor
DPM	diesel particulate matter
Environmental Planning	San Francisco Planning Department, Environmental Planning Division
g/s	gram per second
GSR	Groundwater Storage and Recovery
HI	hazard index
HQ	hazard quotient
HRA	health risk assessment
HTWTP	Harry Tracy Water Treatment Plant
I-280	Interstate 280
ISCST3	Industrial Source Complex Short Term
KSFO	San Francisco International Airport
lbs/day	pounds per day
mg/kg/day	milligram per kilogram of body weight per day
mg/kg/day^{-1}	milligram per kilogram of body weight-day, expressed in units of inverse dose
$\mu g/m^3$	micrograms per cubic meter
mph	miles per hour
NO_X	oxides of nitrogen
OEHHA	California Office of Environmental Health Hazard Assessment
PM_{10}	particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
POM	polycyclic organic matter
ppm	parts per million
PPSU	Peninsula Pipelines Seismic Upgrade
REL	Reference Exposure Level
ROG	reactive organic gases
ROW	right-of-way
SAPL2	San Andreas Pipeline No. 2
SAPL3	San Andreas Pipeline No. 3
SFBAAB	San Francisco Bay Area Air Basin
SFPUC	San Francisco Public Utilities Commission
SO_2	sulfur dioxide
SOW	scope of work
SSBPL	Sunset Supply Branch Pipeline
TAC	toxic air contaminants
TOG	total organic gases
URS	URS Corporation
U.S. EPA	U.S. Environmental Protection Agency

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1.0 INTRODUCTION

At the request of the San Francisco Public Utilities Commission (SFPUC), URS Corporation (URS) prepared this air quality technical report (AQTR), which describes the air quality analysis and impacts for the Peninsula Pipelines Seismic Upgrade (PPSU) project.

The document is consistent with the guidelines prepared by the San Francisco Planning Department, Environmental Planning Division (Environmental Planning) to comply with the California Environmental Quality Act (CEQA) and the latest Bay Area Air Quality Management District (BAAQMD) CEQA guidance (BAAQMD, 2011a). This report will provide the background documentation for the air quality section in the CEQA document and be included in the administrative record supporting any impact determinations for the proposed project.

The report is based on the AQTR scope of work (SOW), approved by Environmental Planning on November 22, 2011 (see Appendix 1). Any deviation from the approved SOW, based on the consultations with the BAAQMD staff, is documented in this report.

The report is divided into seven sections as follows:

Section 1.0, Introduction, describes the purpose and scope of this AQTR.

Section 2.0, Project Description, describes the proposed project and the existing land uses, identifies all emissions sources and air pollutants emitted, and discusses the introduction of any sources from the proposed project to nearby sensitive receptors.

Section 3.0, Project Setting, identifies the closest sensitive receptor and all existing or reasonably foreseeable future emissions sources (stationary, mobile, and/or construction) and air pollutants within the project's zone of influence.

Section 4.0, Criteria Air Pollutants, identifies the methodology used for the analysis, including assumptions regarding the project baseline and the models use to estimate project emissions; presents the average daily criteria pollutants emission rate results for the proposed project; and compares those emission rates to significance thresholds.

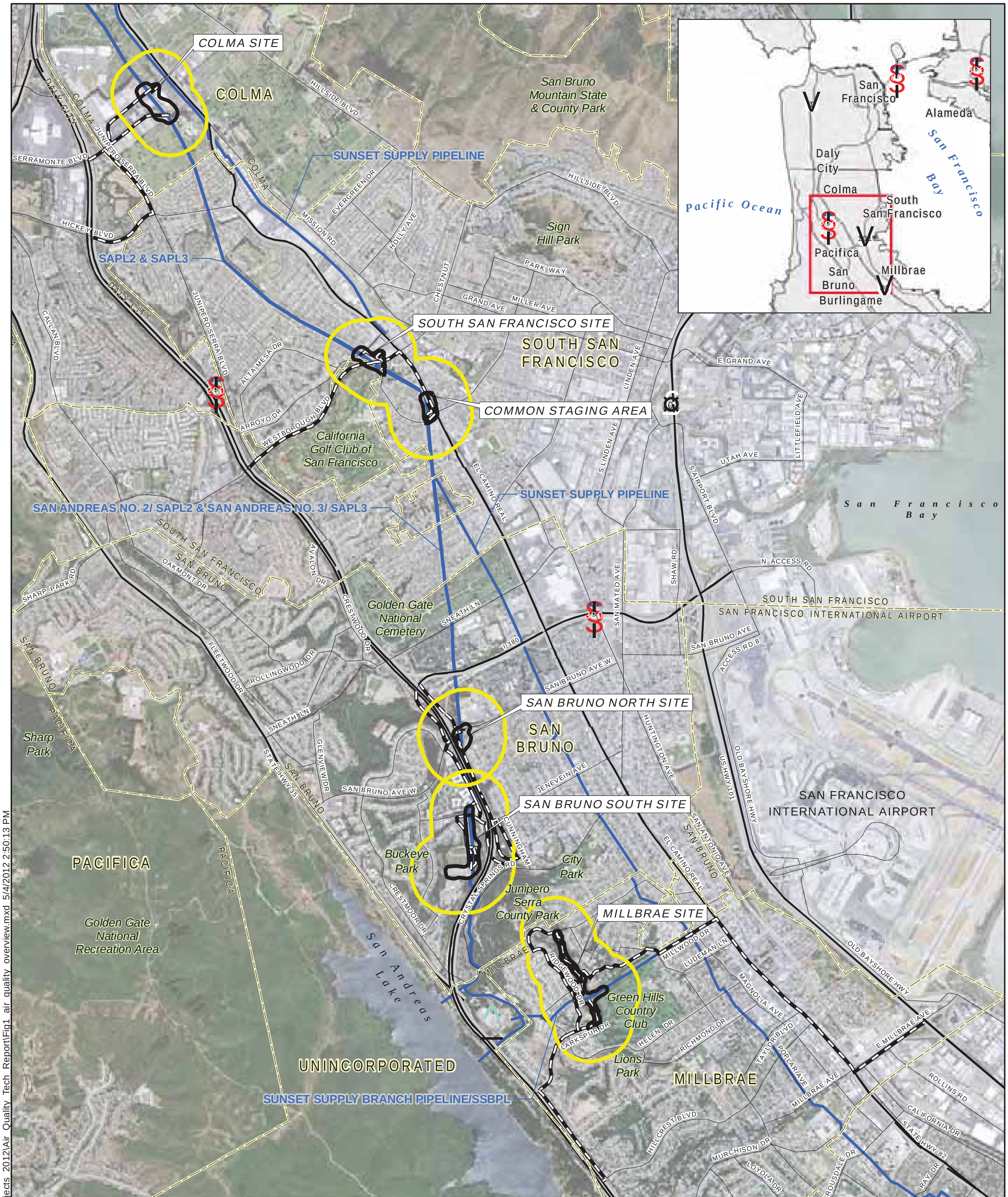
Section 5.0, Health Risk Analysis, discusses the modeling approach, assumptions, and all input parameters for individual and cumulative impacts of emissions from construction activities on nearby sensitive receptors; presents the estimated excess lifetime cancer risks, chronic and acute noncancer hazard index (HI), and concentrations of particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$) for the project; and compares these individual and cumulative health risks to their respective significance thresholds.

Section 6.0, Conclusion, summarizes the approach used and impacts of the criteria air pollutant emission rates and health risks for the proposed project.

Section 7.0, References, includes a listing of all references cited in this report.

2.0 PROJECT DESCRIPTION

The proposed project would entail upgrades of six components at five different locations or sites along the regional water system pipelines in the town of Colma and the cities of South San Francisco, San Bruno, and Millbrae, in San Mateo County on the San Francisco Peninsula, as shown in Figure 1.



Harry Tracy Water Treatment Plant

Project Site

Access Route to Project Site

SFPUC Water Transmission Line

1,000-foot Buffer of Project Site

City Limits

0 0.5 1 Mile

AIR QUALITY OVERVIEW

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

June 2012

FIGURE 1

Source: SFPUC, 2009/ 2011.

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The proposed project would result in seismic upgrades to three drinking water transmission pipelines: the San Andreas Pipeline No. 2 (SAPL2), San Andreas Pipeline No. 3 (SAPL3), and Sunset Supply Branch Pipeline (SSBPL). These transmission pipelines deliver potable water from the Harry Tracy Water Treatment Plant (HTWTP) to the SFPUC's regional water distribution system. Portions of these pipelines traverse the Serra Fault—a secondary fault along the peninsula in San Mateo County that may experience movement in the future, possibly coincident with a large earthquake along the San Andreas Fault (G&E/GTC Joint Venture, 2011b). As a result of recent geotechnical investigations performed on behalf of the SFPUC for its HTWTP Long-Term Improvement Project, the SFPUC determined that fault offset on the Serra fault during a San Andreas design event may cause pipeline failure at the fault crossings (G&E/GTC Joint Venture, 2011b). SAPL2, constructed circa 1928, uses lockbar joints for longitudinal joints and rivets for circumferential joints, which are highly seismically vulnerable to joint failure (G&E/GTC Joint Venture, 2011a). In addition to the fault crossings, there are other areas where the pipelines are susceptible to liquefaction, ground shaking, and landslides (G&E/GTC Joint Venture, 2011b). The proposed project would upgrade six segments of these pipes at five locations that are susceptible to failure during such events.

The proposed PPSU project would entail upgrades of six pipeline components at five different locations or sites, as summarized below and shown on Figures 2 through 6:

- Colma site (SAPL2)
  - Replace approximately 700 feet[1] of pipe between Serramonte Boulevard and Collins Avenue.
  - Construction would entail open-trench techniques.
  - Replace a customer service connection.

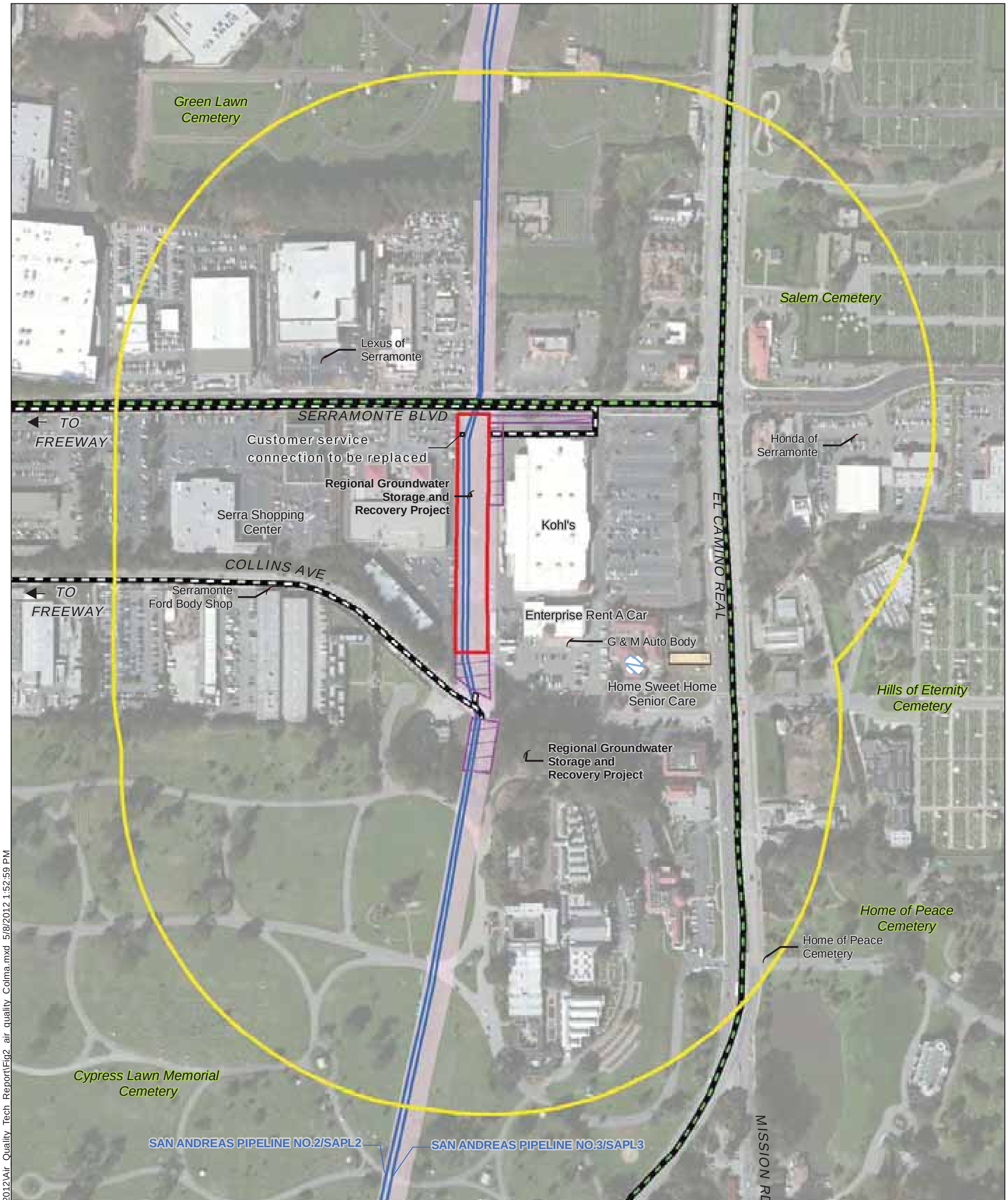
- South San Francisco site (SAPL2)
  - Remove a dense stand of trees within the SFPUC project right-of-way (ROW).
  - Replace approximately 720 feet of pipe between Arroyo Drive and West Orange Avenue.
  - Construction would entail open-trench and jack-and-bore techniques.
  - Replace a customer service connection.

- San Bruno North site (SAPL2)
  - Structural support of SAPL2 within an existing tunnel to stabilize existing pipe in an existing tunnel between San Bruno Avenue West and the Interstate 280 (I-280) off-ramp.
  - Construction would entail excavation of access pits to the top of the tunnel and stabilization activities within the tunnel.

- San Bruno South site (SAPL2 and SAPL3)
  - Replace an approximately 1,170-foot segment of SAPL2 and an approximately 1,050-foot segment of SAPL3 at Whitman Way.
  - Construction would entail open-trench techniques.

- Millbrae site (SSBPL)
  - Remove approximately 300 trees within the SFPUC project ROW.
  - Develop access routes to the site through the adjacent park and golf course.
  - Replace approximately 900 feet of pipe east of Banbury Lane.
  - Construction would entail open-trench techniques.

[1] Throughout this report, approximate pipe replacement lengths are provided as horizontal distances. The total length of pipe to be replaced may be longer, due to the vertical changes along the pipeline.



Regional Groundwater Storage and Recovery Project Construction Emission Source
Stationary Emission Source
Health Care Facility
Average Annual Daily Traffic >10,000 Cars per Day
1,000-foot Buffer of Project Site
Residential Sensitive Receptor

Project Components
Construction Zone
Staging and Spoils Area
Access Route
SFPUC Water Transmission Line
SFPUC Parcels - Right-of-Way

0 200 400 Feet

AIR QUALITY COLMA SITE

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

June 2012

FIGURE 2

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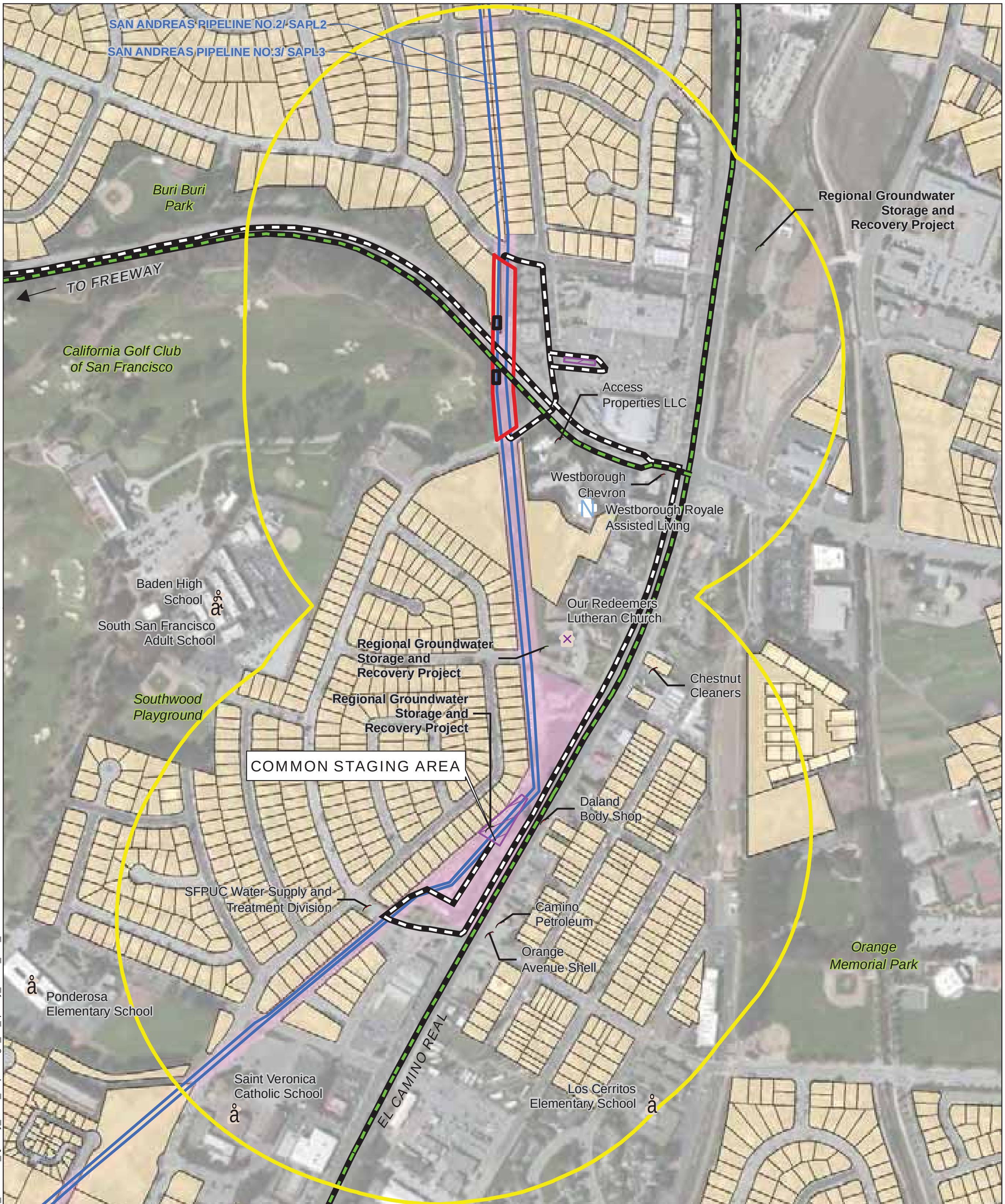
Source: SFPUC, 2011.



Regional Groundwater Storage and Recovery Project Construction Emission Source
Stationary Emission Source
Church
School
Health Care Facility
Average Annual Daily Traffic >10,000 Cars per Day
1,000-foot Buffer of Project Site

0 200 400 Feet

Residential Sensitive Receptor

Project Components
Construction Zone
Staging and Spoils Area
Boring Pit
Access Route
SFPUC Water Transmission Line
SFPUC Parcels - Right-of-Way

AIR QUALITY
SOUTH SAN FRANCISCO SITE

Peninsula Pipelines Seismic Upgrade
San Francisco Public Utilities Commission
June 2012 San Mateo County, California

FIGURE 3

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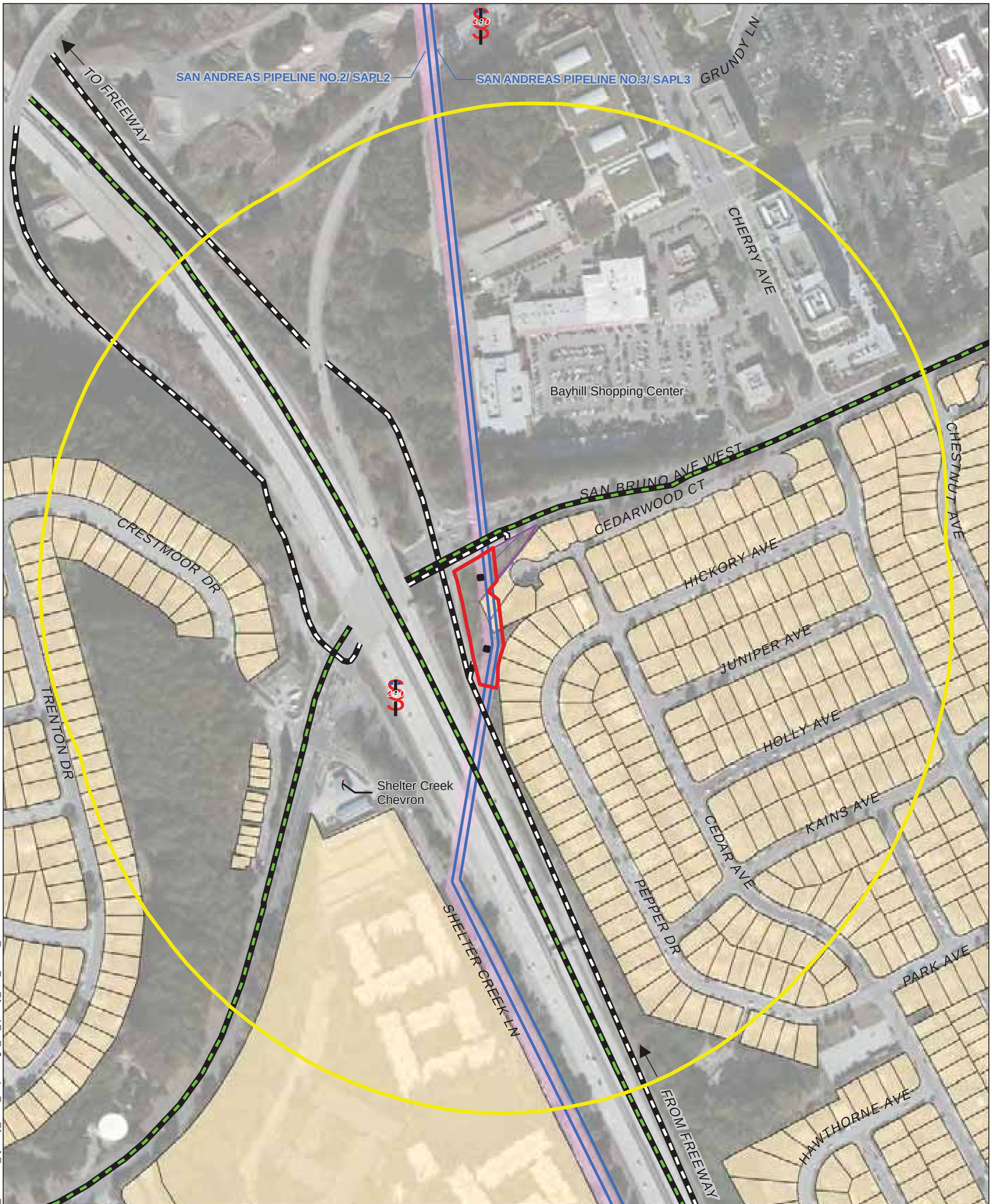
Source: SFPUC, 2011.



Stationary Emission Source
Average Annual Daily Traffic >10,000 Cars per Day
1,000-foot Buffer of Project Site
Residential Sensitive Receptor

Project Components
Construction Zone
Staging and Spoils Area
Access Portal
Access Route
SFPUC Water Transmission Line
SFPUC Parcels - Right-of-Way

0 100 200 Feet

AIR QUALITY
SAN BRUNO NORTH SITE

Peninsula Pipelines Seismic Upgrade
San Francisco Public Utilities Commission
June 2012 San Mateo County, California

FIGURE 4

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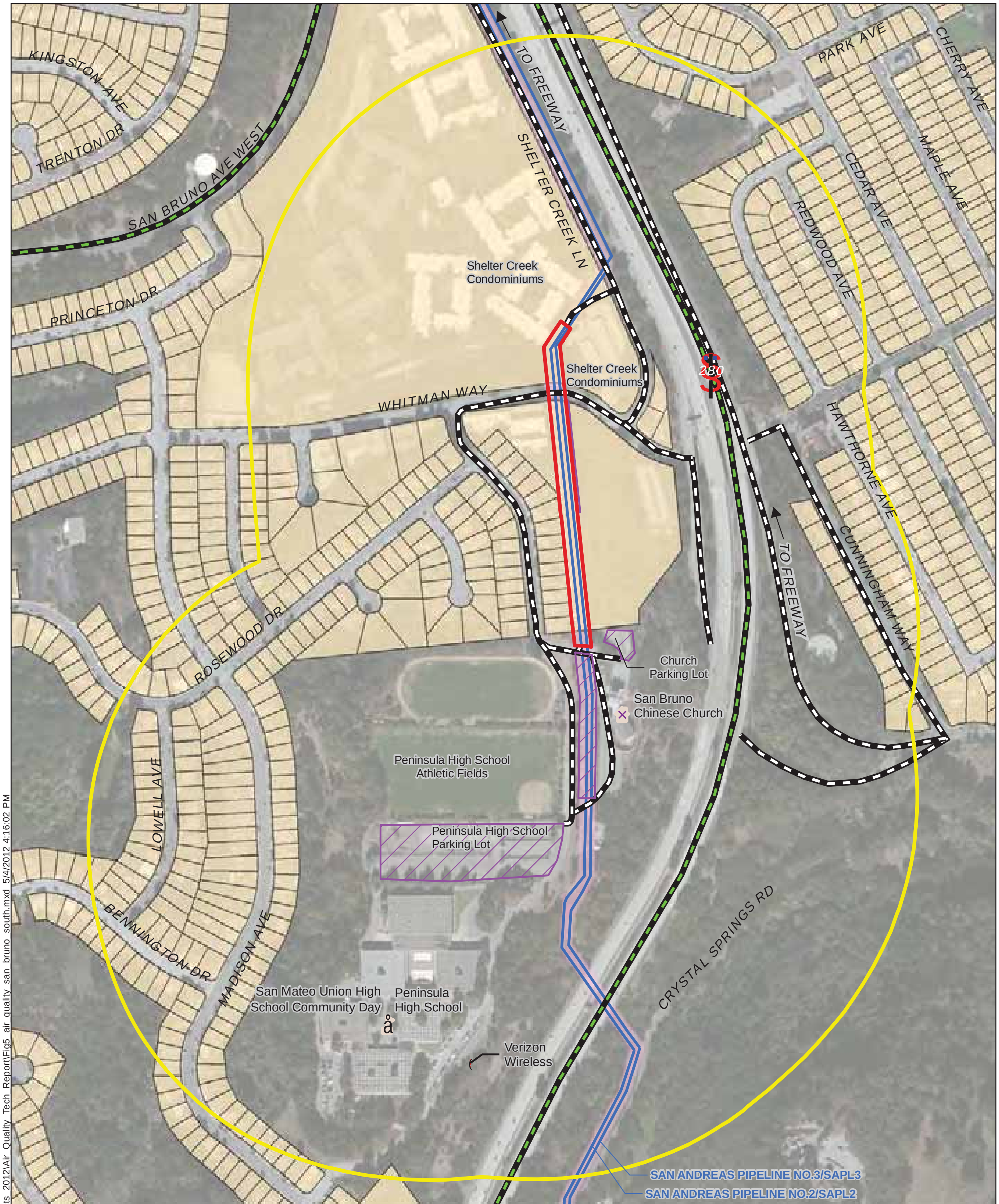
Source: SFPUC, 2011.



Stationary Emission Source
Church
School
Average Annual Daily Traffic >10,000 Cars per Day
1,000-foot Buffer of Project Site
Residential Sensitive Receptor

Project Components
Construction Zone
Staging and Spoils Area
Access Route
SFPUC Water Transmission Line
SFPUC Parcels - Right-of-Way

0 200 400 Feet

AIR QUALITY
SAN BRUNO SOUTH SITE

Peninsula Pipelines Seismic Upgrade
San Francisco Public Utilities Commission
June 2012 San Mateo County, California

FIGURE 5

Source:SFPUC 2011

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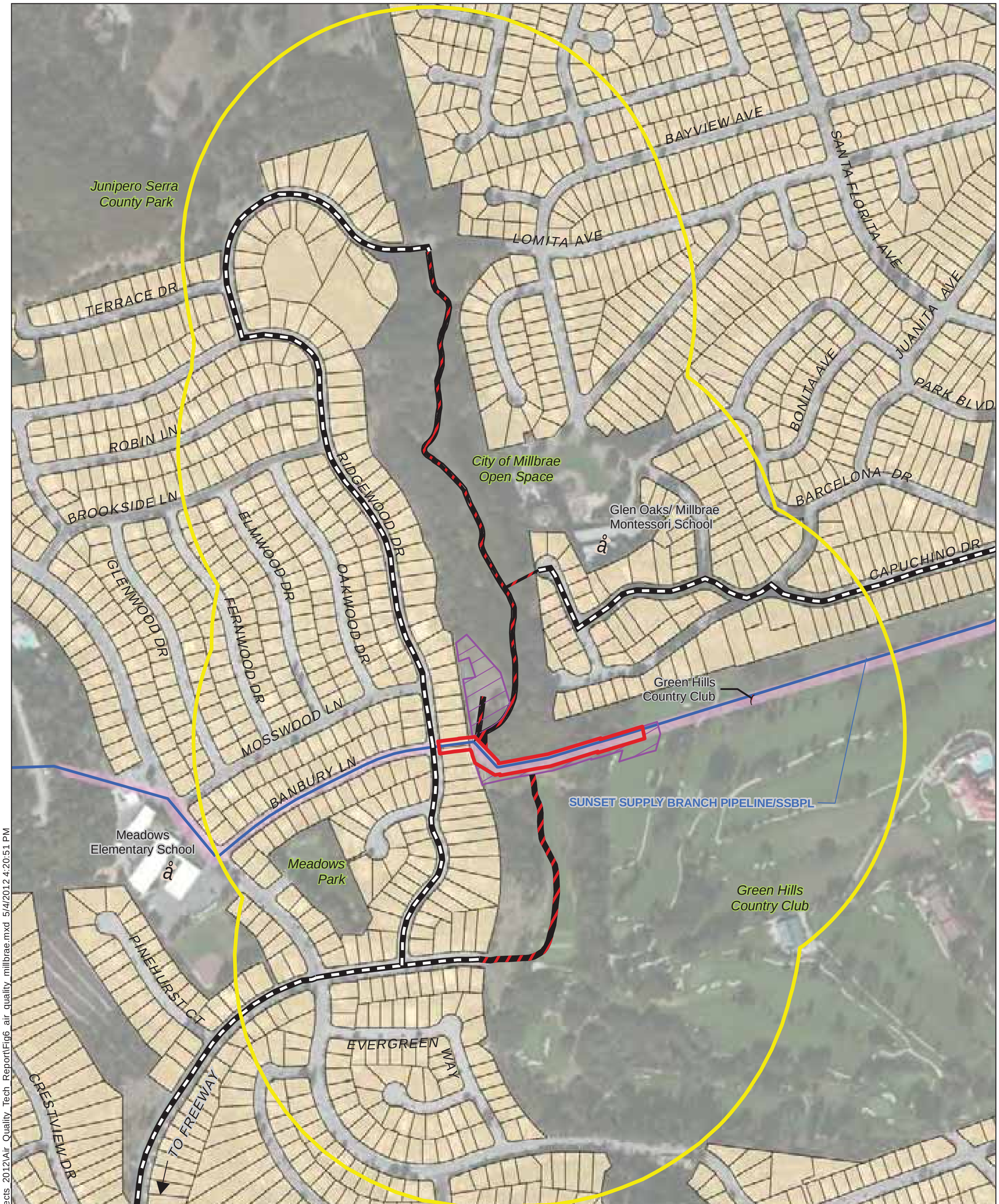

Stationary Emission Source

School

1,000-foot Buffer of Project Site

Residential Sensitive Receptor

Project Components

Construction Zone

Staging and Spoils Area

Access Route Requiring Upgrade

Access Route

SFPUC Water Transmission Line

SFPUC Parcels - Right-of-Way

0 200 400 Feet

AIR QUALITY MILLBRAE SITE

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

June 2012

FIGURE 6

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Source: Bing Aerial Maps/ SFPUC 2011

In addition to the staging areas at or near each site, a common staging area on the northern portion of the SFPUC's Baden Value Lot (near the South San Francisco site) would be used for the duration of the project construction at all of the PPSU sites. This staging area would be used for temporary construction offices (trailers) and worker parking. Trailers would be installed on the site and gravel would be placed in areas used for worker parking.

2.1 PROJECT ASSUMPTIONS

Construction of the proposed project would result in direct emissions of criteria air pollutants that include carbon monoxide (CO), ozone precursors (oxides of nitrogen [NO_X] and reactive organic gases [ROG]), particulate matter less than or equal to 10 microns in diameter (PM_{10}), $PM_{2.5}$, and sulfur dioxide (SO_2). Construction equipment would also emit the seven priority toxic air contaminants (TACs) identified by the U.S. Environmental Protection Agency, which include acrolein, benzene, 1,3-butadiene, diesel particulate matter (DPM), formaldehyde, naphthalene, and polycyclic organic matter (POM) (U.S. EPA, 2007). In addition, the BAAQMD modeling guidance lists the individual toxicity of speciated total organic gases (TOG) from tailpipe emissions, such as acetaldehyde and ethylbenzene (BAAQMD, 2011d).

Subsequent to approval of the AQTR SOW, URS has had conversations with the BAAQMD about the inclusion of acrolein in the health risk analysis. Because the California Air Resources Board (CARB) does not have certified emission factors or an analytical test method for acrolein, the appropriate tools needed to implement and enforce acrolein emission limits are not available. Therefore the BAAQMD does not require a health risk analysis for acrolein (BAAQMD, 2011c); however, because the BAAQMD includes acrolein in the on-road emission profile, it was included in the health risk assessment (HRA) for on-road sources. Additionally, California Office of Environmental Health Hazard Assessment (OEHHA) states that there are inadequate epidemiological studies regarding the carcinogenicity of benzo[a]pyrene[2] to humans, and data from animal bioassays must be extrapolated to estimate the human cancer risk (OEHHA, 1994). Therefore, POMs were not evaluated in this HRA.

During project construction, a small number of gasoline-powered engines would be used, but toxic emissions from these engines are expected to be minimal. There will not be any stationary sources at the project sites. Additionally, the proposed project will not introduce any new sensitive receptors to the site. The mobile and construction sources, and their associated pollutant emissions, are listed below.

- Mobile Sources:
  - On-Road Haul Trucks (Criteria pollutants: CO, NO_X, ROG, PM_{10} [combustion and fugitive dust], $PM_{2.5}$ [combustion and fugitive dust], SO_2; TACs: acrolein, acetaldehyde, benzene, 1,3-butadiene, DPM, ethylbenzene, formaldehyde, and naphthalene[3]).
  - On-Road Worker Vehicles (Criteria pollutants: CO, NO_X, ROG, PM_{10} [combustion and fugitive dust], $PM_{2.5}$ [combustion and fugitive dust], $SO_{2;}$ TACs: acrolein, acetaldehyde, benzene, 1,3-butadiene, DPM, ethylbenzene, formaldehyde, and naphthalene[3]).

[2] The most common category of POM is the polycyclic aromatic hydrocarbons, also known as polynuclear aromatics, which include benzo[a]pyrene.

[3] Acetaldehyde, benzene, 1,3-butadiene, ethylbenzene, formaldehyde, and naphthalene are TACs emitted from gasoline tailpipe emissions, while DPM is a TAC emitted from diesel exhaust emissions. On-road haul trucks are gasoline and diesel powered, while the Off-road Construction Equipment is only diesel powered. Therefore, acetaldehyde, benzene, 1,3-butadiene, ethylbenzene, formaldehyde, DPM and naphthalene are the TACs evaluated in the HRA for on-road haul trucks, while DPM is the TAC evaluated in the HRA for off-road construction equipment.

- Construction Sources:
  - Off-road Construction Equipment (Criteria pollutants: CO, NO_X, ROG, PM_{10} [combustion and fugitive dust], $PM_{2.5}$ [combustion and fugitive dust], SO_2; TACs: DPM[2]).
  - Earth Moving (Criteria pollutants: PM_{10} [fugitive dust], $PM_{2.5}$ [fugitive dust])
  - Dirt Piling and Material Handling (PM_{10} [fugitive dust], $PM_{2.5}$ [fugitive dust])

Discussions with BAAQMD staff confirmed that projects that employ Best Management Practices (BMPs) do not have to quantify their fugitive dust emissions (BAAQMD, 2011b; BAAQMD, 2012a). The project will employ BMPs during construction; therefore, this report only assesses impacts from exhaust PM_{10} and $PM_{2.5}$ emissions.

The operation of the proposed project would not increase emissions of criteria pollutants, precursors, or TACs, because it would not result in changes to the operation of the existing pipelines.

2.2 CONSTRUCTION SCHEDULE

Construction is estimated to begin in 2014 and end in 2015, as shown in Figure 7. The duration of construction activities at each project site would range from approximately 2 weeks to 9.5 months, as shown in Table 1. The total duration of construction is estimated to be 12 months.

There would be three phases of construction activities, with initial tree removal activities at a few project sites, as shown in Table 2. Initial tree removal would be completed at the South San Francisco and Millbrae project sites, where dense trees grow in the SFPUC ROW. The first construction phase would entail shutdown and dewatering of the pipeline, and mobilization at the project site (such as installation of fencing, grubbing, and preparation of laydown areas). This phase would last up to 10 days (1 to 2 weeks). The second phase would include excavation; pipeline removal and installation; hydrostatic testing; and backfill, landscaping, and site restoration, and would last for 24 to 81 days (2 to 4 months), depending on the project site. The third phase would include disinfection of the pipelines and would last 10 days (2 weeks).

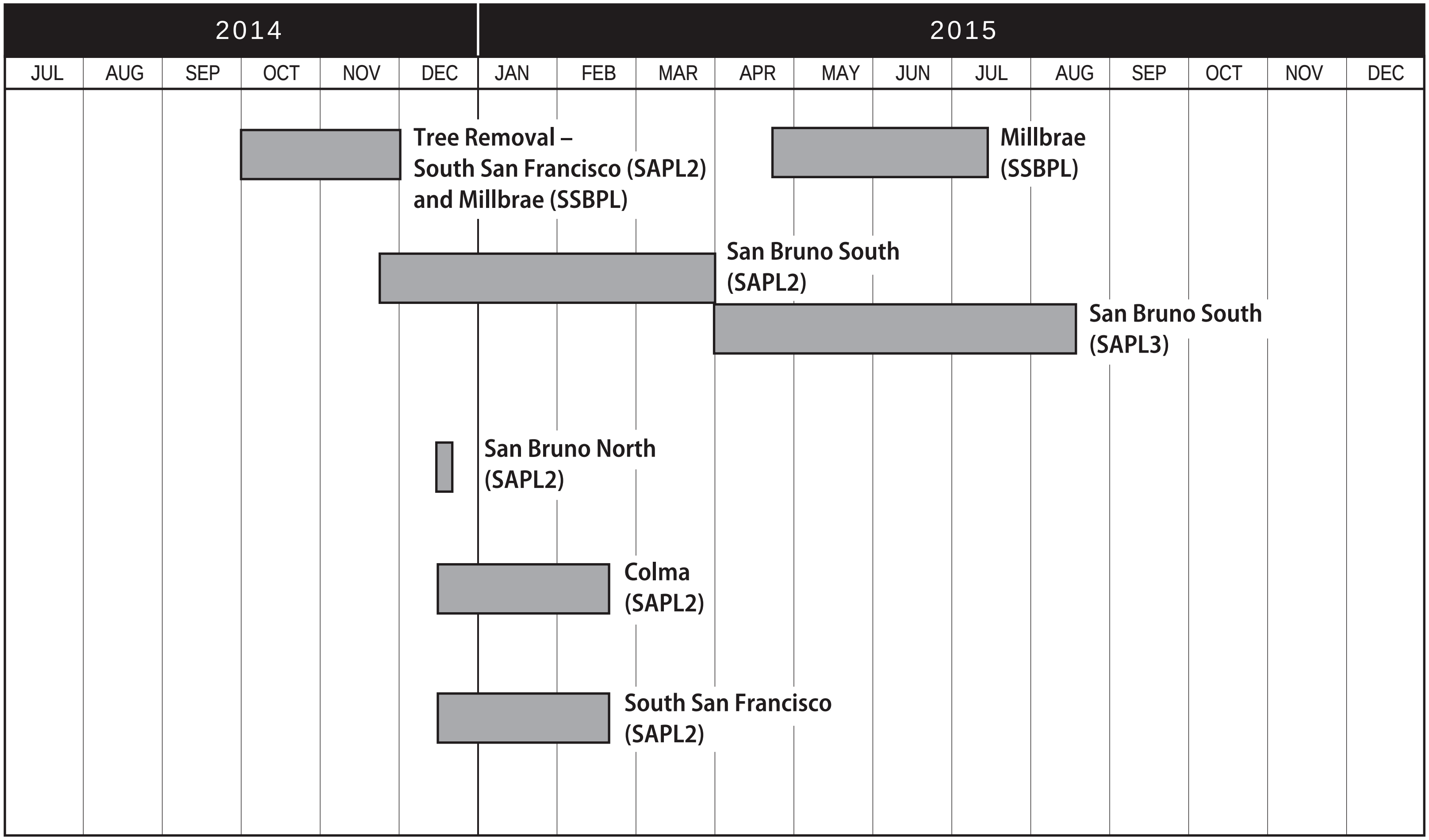
The workforce for each project site is anticipated to consist of one or three crews, with up to 20 personnel per crew. Tree removal at the Millbrae project site would require one crew. Construction employee parking is anticipated to be on paved parking lots or streets adjacent to the project sites.

3.0 PROJECT SETTING

This section summarizes the sensitive receptors in the project study area, as well as emissions sources. Figures 2 through 6 show the locations of the project sites and pipelines, and the various project components, including construction zones, site access, and staging and spoils areas.

The figures also show the locations of sensitive receptors, permitted stationary sources, and all major roadways within 1,000 feet of the project sites. There will be a number of receptors that could be exposed to project emissions at each of the project sites. The proposed project sites are located in predominantly residential areas that also include schools, churches, and parks. These sensitive receptors are evaluated for potential air quality impacts from the proposed project activities.

The proposed project would result in new sources of construction-related emissions; however, it would not introduce new sensitive receptors. Therefore, this section reviews the closest sensitive receptors and



Note: The pipeline shutdown and disinfection activities for the San Bruno North site (SAPL2) are the same as those activities for the San Bruno South site (SAPL2) and are included in the San Bruno South site duration only.

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CONSTRUCTION PHASING

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

June 2012

FIGURE 7

Table 1
Construction Duration at Each Project Site

Project Site	Construction Duration
Colma Project Site (SAPL2)	2.5 months
South San Francisco Project Site (SAPL2)	3 months[1]
San Bruno North Project Site (SAPL2)	2 weeks[2]
San Bruno South Project Site (SAPL2 and SAPL3)	9.5 months
Millbrae Project Site (SSBPL)	4.5 months[3]

Notes:

1 The 3-month duration of construction at South San Francisco includes approximately 2 weeks required for tree removal, which will be completed separately and in advance of the 2.5-month construction at the site.
2 The shutdown, dewatering, and disinfection activities for the San Bruno North Project Site (SAPL2) are the same as those activities for the San Bruno South Project Site (SAPL2) and are, therefore, not included in the construction duration.
3 The 4.5-month duration of construction at Millbrae includes the 1.5 months required for tree removal, which will be completed separately and in advance of the 3-month construction at the site.

SAPL2 = San Andreas Pipeline No. 2
SAPL3 = San Andreas Pipeline No. 3
SSBPL = Sunset Supply Branch Pipeline

Table 2
Typical Construction Activities

Construction Activities	Estimated Duration
Tree Removal (South San Francisco and Millbrae sites only; at other sites, only a few tree removals may be required)	Approximately 2 months[1]
Shutdown and dewatering	Approximately 1 week
Mobilization[2]	Approximately 2 weeks
Shoring and excavation, pipeline removal and installation, intermittent dewatering, hydrostatic testing, backfill and restoration	Approximately 2 to 3 months, depending on site
Disinfection	Approximately 2 weeks

Notes:

1 Tree removal activities would occur at the South San Francisco and Millbrae project sites. Estimated duration for tree removal activities would be 2 months, inclusive of both the South San Francisco and Millbrae project sites.
2 Mobilization would occur concurrently with shutdown and dewatering.

existing sources within the project's zone of influence.[4] The population in San Mateo County is expected to increase by 17.7 percent between 2010 and 2030 (ABAG, 2009), and there could be reasonably foreseeable future projects in the vicinity. Reasonably foreseeable future projects are evaluated as part of the cumulative impacts analysis in Section 4.0.

The figures also show the location of permitted stationary sources and the location of all major roadways within 1,000 feet of the project sites that have annual average daily traffic (AADT) greater than 10,000, which is used for the cumulative health risk analysis (see Section 5.0).

Table 3 presents the stationary sources permitted by the BAAQMD, and major roadway sources (greater than 10,000 AADT) that are within 1,000 feet of project facility sites.[5] These identified permitted sources and roadways are used in the cumulative health risk analysis (see Section 5.4 for methodology). No major nonpermitted sources (e.g., train yards, distribution facilities, and high-volume fueling stations) are located within 1,000 feet of project sites.

4.0 CRITERIA AIR POLLUTANT ANALYSIS

These pollutants are called "criteria" air pollutants because standards have been established for each of them to meet specific public health and welfare criteria set forth in the Federal Clean Air Act. California has adopted more stringent ambient air quality standards for the criteria air pollutants (referred to as State Ambient Air Quality Standards, or state standards), and has adopted air quality standards for some pollutants for which there is no corresponding federal standard. Table 4 shows current federal and state ambient air quality standards, as well as the Bay Area attainment status and common sources for each pollutant. The pollutants of particular concern for which the Bay Area is nonattainment of federal and state standards—ozone and particulate matter—are described in greater detail below.

4.1 OZONE

Ozone is not emitted directly into the atmosphere, but is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving ROG and NO_X. ROG and NO_X are known as precursor compounds for ozone. Significant ozone production generally requires ozone precursors to be present in a stable atmosphere with strong sunlight for approximately 3 hours. Ozone is a regional air pollutant because it is not emitted directly by sources, but is formed downwind of sources of ROG and NO_X under the influence of wind and sunlight.

The main sources of NO_X and ROG are combustion processes (including motor vehicle engines); the evaporation of solvents, paints, and fuels; and biogenic sources. Automobiles are the single largest source of ozone precursors in the San Francisco Bay Area Air Basin (SFBAAB). Tailpipe emissions of ROG are highest during cold starts, hard acceleration, stop-and-go conditions, and slow speeds. They decline as speeds increase up to about 50 miles per hour (mph), then increase again at high speeds and high engine loads. ROG emissions associated with evaporation of unburned fuel depend on vehicle and ambient temperature cycles. Nitrogen oxide emissions exhibit a different curve; emissions decrease as the vehicle approaches 30 mph and then begin to increase with increasing speeds (BAAQMD, 2011a).

[4] Zone of influence is defined as the area within a 1,000-foot radius of the proposed project.

[5] Please note that additional stationary sources and major roadway sources (greater than 10,000 AADT) within 1,000 feet of the common staging area of the South San Francisco site are included in Table 3. These additional sources were not included in the AQTR SOW because the common staging area was added to the project subsequent to the approval of the Final AQTR SOW in November 2011.

Table 3
Preliminary Identification of Existing Stationary Sources and Roadways

Project Site	Facility Name	Street Address/Location	City
Stationary Sources (within 1,000-foot buffer)			
Colma Site (SAPL2)	Lexus of Serramonte	700 Serramonte Boulevard	Colma
	Serramonte Ford Body Shop	500 Collins Avenue	Colma
	G & M Auto Body	245 Collins Avenue	Colma
	Honda of Serramonte	485 Serramonte Boulevard	Colma
	Home of Peace Cemetery	1299 El Camino Real	Colma
South San Francisco Site (SAPL2)	Westborough Chevron	1 Westborough Boulevard	South San Francisco
	Access Properties LLC	91 Westborough Boulevard	South San Francisco
	Daland Body Shop[1]	890 El Camino Real	South San Francisco
	SFPUC Water Supply and Treatment Division[1]	609 West Orange Avenue	South San Francisco
	Chestnut Cleaners[1]	26 Chestnut Avenue	South San Francisco
	Camino Petroleum[1]	698 El Camino Real	South San Francisco
	Orange Avenue Shell[1]	710 El Camino Real	South San Francisco
San Bruno North Site (SAPL2)	Shelter Creek Chevron	2101 San Bruno Avenue West	San Bruno
San Bruno South Site (SAPL2/SAPL3)	Verizon Wireless	250 Courtland Drive	San Bruno
Millbrae Site (SSBPL)	Green Hills Country Club	End of Ludeman Lane	Millbrae
Roadway Sources (roadways within the 1,000-foot buffer with > 10,000 vehicles per day)			
Colma Site (SAPL2)	El Camino Real	Between Villa Avenue and Mission Road	Colma
	Serramonte Boulevard	Between Junipero Serra Boulevard and El Camino Real	Colma
South San Francisco Site (SAPL2)	El Camino Real	Between El Paseo Drive and Ponderosa Drive	South San Francisco
	Westborough Boulevard	Between Junipero Serra Boulevard and El Camino Real	South San Francisco
San Bruno North Site (SAPL2), San Bruno South Site (SAPL2 and SAPL3)	Interstate 280 South	Between San Bruno Avenue West and Crestmoor Drive	San Bruno

Notes:

[1] These stationary sources are found within 1,000 feet of the common staging area on the SFPUC's Baden Valve Lot near the South San Francisco site.

Source: BAAQMD, 2012e

SAPL2 = San Andreas Pipeline No. 2
SAPL3 = San Andreas Pipeline No. 3
SFPUC = San Francisco Public Utilities Commission
SSBPL = Sunset Supply Branch Pipeline

Table 4
Ambient Air Quality Standards and Bay Area Attainment Status

Pollutant	Averaging Time	State Standard	Bay Area Attainment Status for California Standard	Federal Primary Standard	Bay Area Attainment Status for Federal Standard	Major Pollutant Sources
Ozone	8 hour	0.070 ppm	Nonattainment	0.075 ppm	Nonattainment	Formed when ROG and NO_X react in the presence of sunlight. Major sources include on-road motor vehicles, solvent evaporation, and commercial/industrial mobile equipment.
	1 hour	0.090 ppm	Nonattainment	—[1]	—	
Carbon Monoxide	8 hour	9.0 ppm	Attainment	9.0 ppm	Attainment	Internal combustion engines, primarily gasoline-powered motor vehicles
	1 hour	20 ppm	Attainment	35 ppm	Attainment	
Nitrogen Dioxide	Annual Average	0.030 ppm	—	0.053 ppm	Attainment	Motor vehicles, petroleum refining operations, industrial sources, aircraft, ships, and railroads
	1 hour	0.180 ppm	Attainment	0.100 ppm	Unclassified	
Sulfur Dioxide	Annual Average	—	—	0.03 ppm	Attainment	Fuel combustion, chemical plants, sulfur recovery plants, and metal processing
	24 hour	0.04 ppm	Attainment	0.14 ppm	Attainment	
	3 hour	—	—	0.5 ppm[2]	Attainment	
	1 hour	0.25 ppm	Attainment	0.075 ppm	Attainment	
Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 $\mu g/m^3$	Nonattainment	—	—	Dust- and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays)
	24 hour	50 $\mu g/m^3$	Nonattainment	150 $\mu g/m^3$	Unclassified	
Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12 $\mu g/m^3$	Nonattainment	15 $\mu g/m^3$	Attainment	Fuel combustion in motor vehicles, equipment, and industrial sources; residential and agricultural burning; also, formed from photochemical reactions of other pollutants, including NO_X, sulfur oxides, and organics.
	24 hour	—	—	35 $\mu g/m^3$	Nonattainment	
Lead	Calendar Quarter	—	—	1.5 $\mu g/m^3$	Attainment	Present source: lead smelters, battery manufacturing and recycling facilities. Past source: combustion of leaded gasoline.
	Rolling 3-Month Average	—	—	0.15 $\mu g/m^3$	—[3]	
	30-Day Average	1.5 $\mu g/m^3$	Attainment	—	—	
Hydrogen Sulfide	1 hour	0.03 ppm	Unclassified	No federal standard	—	Geothermal power plants, petroleum production, and refining
Visibility Reducing Particles	8 hour	Extinction of 0.23/km; visibility of 10 miles or more	Unclassified	No federal standard	—	See $PM_{2.5}$.

Notes:

1 The national 1-hour ozone standard was revoked by the U.S. Environmental Protection Agency on June 15, 2005.

2 There is no primary federal standard for 3-hour standard for SO_2; this value represents the secondary standard. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

3 National lead standard, rolling 3-month average: final rule signed October 15, 2008. Final designations expected October 2011.

km = kilometer
$\mu g/m^3$ = micrograms per cubic meter
NO_X = oxides of nitrogen
ppm = parts per million
ROG = reactive organic gases
SO_2 = sulfur dioxide

Source: CARB, 2012; BAAQMD, 2012b

Ozone concentrations tend to be higher in the late spring, summer, and fall, when the long sunny days combine with regional subsidence inversions to create conditions conducive to the formation and accumulation of secondary photochemical compounds, like ozone. Short-term exposure to ozone can irritate the eyes and cause constriction of the airways. Besides causing shortness of breath, ozone can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema.

4.2 PARTICULATE MATTER

PM_{10} and $PM_{2.5}$ consist of particulate matter that is 10 microns or less in diameter and 2.5 microns or less in diameter, respectively. (A micron is one-millionth of a meter.) PM_{10} and $PM_{2.5}$ represent fractions of particulate matter that can be inhaled into the air passages and the lungs and can cause adverse health effects. Very small particles of certain substances (e.g., sulfates and nitrates) can cause lung damage directly, or can contain adsorbed gases (e.g., chlorides or ammonium) that may be injurious to health. Particulates also can damage materials and reduce visibility. Large dust particles (diameter greater than 10 microns) settle out rapidly and are easily filtered by human breathing passages. This large dust is of more concern as a soiling nuisance rather than a health hazard. The remaining fraction, PM_{10} and $PM_{2.5}$, are a health concern particularly at levels above the federal and state ambient air quality standards. $PM_{2.5}$ (including diesel exhaust particles) is thought to have greater effects on health, because these particles are so small that they are able to penetrate to the deepest parts of the lungs.

In the SFBAAB, most particulate matter is caused by combustion, factories, construction, grading, demolition, agricultural activities, and motor vehicles. Motor vehicles are currently responsible for about half of the particulates in the SFBAAB. Wood burning in fireplaces and stoves is another large source of fine particulates (BAAQMD, 2011a).

Scientific studies have suggested links between fine particulate matter and numerous health problems including asthma, bronchitis, and acute and chronic respiratory symptoms such as shortness of breath and painful breathing. Recent studies have shown an association between morbidity and mortality, and daily concentrations of particulate matter in the air. Children are more susceptible to the health risks of PM_{10} and $PM_{2.5}$ because their immune and respiratory systems are still developing.

Mortality studies since the 1990s have shown a statistically significant direct association between mortality (premature deaths) and daily concentrations of particulate matter in the air. Despite important gaps in scientific knowledge, a comprehensive evaluation of the research findings provides persuasive evidence that exposure to fine particulate air pollution has adverse effects on cardiopulmonary health (Dockery and Pope, 2006; Bhatia and Rivard, 2008).

4.3 TOXIC AIR CONTAMINANTS

In addition to the criteria air pollutants listed above, TACs or hazardous air pollutants may lead to serious illness or increased mortality, even when present in relatively low concentrations. There are hundreds of different types of TACs with varying degrees of toxicity. Many TACs are confirmed or suspected carcinogens, or are known or suspected to cause birth defects or neurological damage. Additionally, many TACs can be toxic at very low concentrations. For some chemicals, such as carcinogens, there are no thresholds below which exposure can be considered risk-free.

Industrial facilities and mobile sources are significant sources of TACs. Automobile exhaust also contains TACs such as benzene and 1,3-butadiene. Most recently, DPM was identified as a TAC by CARB. DPM differs from other TACs in that it is not a single substance but rather a complex mixture of hundreds of substances. BAAQMD research indicates that mobile-source emissions of DPM, benzene, and 1,3-butadiene represent a substantial portion of the ambient background risk from TACs in the SFBAAB.

For the proposed project, the TAC of greatest concern is DPM, which would be emitted by heavy construction equipment. Additional TACs emitted by the proposed project would be acrolein (for on-road sources only), acetaldehyde, benzene, 1,3-butadiene, ethylbenzene, formaldehyde, and naphthalene.

4.4 CRITERIA AIR POLLUTANT METHODOLOGY

BAAQMD adopted and then revised CEQA Air Quality Guidelines, including new thresholds of significance, in May 2011 (BAAQMD, 2011a). Based on a writ mandated by the Alameda Superior Court, these thresholds have currently been set aside and the BAAQMD has to cease dissemination of them until the BAAQMD complies with CEQA for the adoption of the thresholds. As a result, the BAAQMD is no longer recommending the 2011 thresholds be used to measure a project's significant air quality impacts. Instead, the BAAQMD suggests that lead agencies use the 1999 CEQA thresholds to make determinations regarding the significance of an individual project's air quality impacts. However, Environmental Planning has decided that the 2011 thresholds are more conservative than the 1999 thresholds, and recommends their use for impact determinations (Environmental Planning 2012b).

This analysis uses the methodologies from the BAAQMD CEQA Air Quality Guidelines to determine the potential impacts of the proposed project.

4.4.1 Thresholds of Significance

Average project emissions were calculated without considering the implementation of mitigation measures using the methodology described below, and compared to the 2011 CEQA construction thresholds of significance, shown in Table 5.

Table 5
Construction Emission Significance Thresholds

Pollutant/Precursor	Daily Average Emissions (lbs/day)
ROG	54
NO_X	54
PM_{10}	82
$PM_{2.5}$	54

Notes:

lbs/day = pounds per day
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
ROG = reactive organic gases

Source: BAAQMD, 2011a.

Project-related air quality impacts fall into two categories: short-term impacts due to construction and long-term impacts due to project operation. During construction (short-term), the project would affect local particulate concentrations primarily due to fugitive dust sources, as well as the generation of exhaust emissions of both criteria pollutants and TACs from off-road construction equipment, on-road haul trucks, and on-road worker vehicles. Criteria air pollutant emissions were calculated as average construction emissions, which are calculated as total construction emissions divided by number of construction days.

Operation of the proposed project will not generate air emissions.

4.4.2 Off-Road Construction Equipment (Exhaust Emissions)

URS estimated construction equipment exhaust emissions using emission factors from CARB's OFFROAD2011 model.[6] URS selected inputs for the OFFROAD model for emission factors for the year 2014.[7]

URS calculated off-road exhaust emissions by combining the OFFROAD emission factors and project-specific construction information (such as construction equipment type, number of pieces of equipment, engine horsepower rating, engine duty load, hours of operation per day, and days of operation per week). Project-specific information for each construction phase is listed in Appendix 2.

Construction phase equipment lists were provided for each activity, except for the soil excavation and installation of concrete pipe support at the San Bruno North site. Because these data were not available and these emissions cannot be considered negligible, the equipment list for shoring and excavation, pipeline removal and installation, intermittent dewatering, hydrostatic testing, backfill and restoration was conservatively assumed to be similar and was used as a proxy for emission calculations for soil excavation and installation of concrete pipe support.

4.4.3 On-Road Haul Trucks

URS calculated haul truck exhaust and idling emissions using the EMFAC2011 model. URS selected inputs required by EMFAC, including analysis years, location, vehicle class (heavy duty trucks), and vehicle speeds. As described above, URS selected inputs for the OFFROAD model for emission factors for the year 2014.[6]

URS used EMFAC to generate running emissions (in units of grams of pollutant per mile) and idling emissions (in units of grams of pollutant per minute). Haul distances were estimated from the highway to the project area based on project maps. The daily number of trucks trips was provided by the SFPUC project engineers. It was assumed that trucks would not idle along the access routes, and that the trucks would only idle during material loading and unloading at the staging and spoils areas. Idling time at the staging and spoils areas were assumed to be 5 minutes, which is the maximum idling time allowed by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations.

4.4.4 On-Road Vehicles Used for Construction Worker Commuting

URS calculated worker commute exhaust emissions using the EMFAC2011 model. We selected inputs required by EMFAC, including analysis years, location, vehicle class, and vehicle speeds. As described above, URS selected inputs for the OFFROAD model for emission factors for the year 2014.[6]

EMFAC generates emissions in units of grams of pollutant per mile. Project-specific information about the number of construction workers commuting and worker schedules was used to estimate the total number of vehicle miles traveled.

[6] Based on URS experience with OFFROAD2011 and conversations with CARB, the OFFROAD2011 model only provides emission factors for NO_X, ROG, and particulate matter, and does not provide emission factors for CO and oxides of sulfur. Therefore, URS used the OFFROAD2007 emission factors along with updated OFROAD2011 activity data for those pollutants. Although CARB has indicated that an update to the OFFROAD2011 model would provide emission factors for CO and oxides of sulfur, this updated model is not available at this time (CARB, 2011).

[7] While URS proposed the use of off-road emission factors for years 2014 and 2015 in the AQTR SOW, use of off-road emission factors for year 2014 only provided a more conservative estimate.

4.5 CRITERIA AIR POLLUTANT RESULTS

Emissions of criteria air pollutants would occur during construction activities at the sites. These construction activities include off-road construction equipment, on-road haul trucks, and on-road worker vehicles, as described above. In cases where emission factors were only provided for PM_{10}, a ratio is used to estimate emissions for $PM_{2.5}$.

Criteria pollutant construction emissions presented below in Table 6 were estimated for the proposed project using the methodology described in Section 4.4.2 through 4.4.4. Detailed model outputs and emission worksheet calculations are included in Appendix 2.

Table 6
Total Construction Criteria Air Pollutant Emissions

Emission Source	ROG	CO	NO_X	Exhaust PM_{10}[1]	Exhaust $PM_{2.5}$[1]	SO_2
Construction Equipment (total tons)[2]	<1	3	4	<1	<1	<1
Haul Trucks (total tons)	<1	<1	<1	<1	<1	<1
Worker Commute (total tons)	1	2	<1	<1	<1	<1
Total construction emissions (tons)	**1**	**5**	**4**	**<1**	**<1**	**<1**
Average daily construction emissions (lbs/day)	**5**	**42**	**36**	**2**	**2**	**<1**
Construction Threshold	***54***	***N/A***	***54***	***82***	***54***	***N/A***
Significant Impact?	No	No	No	No	No	No

Notes:

[1] BAAQMD's proposed construction-related significance thresholds for PM_{10} and $PM_{2.5}$ apply to exhaust emissions only and not to fugitive dust.

[2] $PM_{2.5}$ emission factors are not available using OFFROAD2011, so the emissions for $PM_{2.5}$ were based on the CEIDARS 0.92 $PM_{10}/PM_{2.5}$ conversion ratio (SCAQMD, 2006).

CO = carbon monoxide
lbs/day = pounds per day
N/A = not applicable
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter
ROG = reactive organic gases
SO_2 = sulfur dioxide

As shown in Table 6, average construction criteria air pollutant emissions would not exceed the construction thresholds of significance. Therefore, air quality impacts from the proposed project would be less than significant.

For all proposed construction projects, BAAQMD recommends implementing all the Basic Construction Mitigation Measures, listed in Table 8-1 of the 20011 BAAQMD CEQA Guidance (BAAQMD, 2011a), to meet the BMP threshold for fugitive dust, regardless of significance determination. SFPUC shall require construction contractors to implement the following BMPs:

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.

2. All haul trucks transporting soil, sand, or other loose material off site shall be covered.

3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.

4. All vehicle speeds on unpaved roads shall be limited to 15 mph.

5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.

6. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations). Clear signage shall be provided for construction workers at all access points.

7. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified visible emissions evaluator.

8. A publicly visible sign shall be posted with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

Based on guidance from the BAAQMD staff, fugitive dust emissions were not quantified because compliance with the BAAQMD-recommended BMPs would ensure that construction-related fugitive dust impacts of the proposed project would be less than significant (BAAQMD, 2011b).

4.6 SUMMARY OF PROPOSED PROJECT CRITERIA AIR POLLUTANT IMPACTS

Construction exhaust emissions from off-road construction equipment, on-road haul trucks, and on-road commute worker vehicles would be less than the thresholds of significance (see Table 6). Therefore, construction exhaust emission impacts would be less than significant.

By implementing the BAAQMD BMPs during the construction period, fugitive dust emissions from construction activities would be less than significant.

5.0 HEALTH RISK ANALYSIS

As described in Section 4.0, Criteria Air Pollutants, site preparation activities and other construction work would affect localized air quality. Emissions from construction equipment would include particulate matter (PM_{10} and $PM_{2.5}$) as well as TACs such as DPM, which represents a portion of the overall particulate emissions. As shown in Table 6, emissions of PM_{10} and $PM_{2.5}$ in equipment exhaust would not exceed the significance criteria for regional emissions of criteria pollutants. However, localized $PM_{2.5}$ and TAC emissions could expose sensitive receptors to substantial concentrations, resulting in health risks. Acetaldehyde, benzene, 1,3-butadiene, DPM, ethylbenzene, formaldehyde, and naphthalene are the only TACs identified for inclusion in the cancer risk as well as acute and chronic noncancer hazard evaluation. In addition, acrolein was included for acute and chronic noncancer risk for on-road sources.[8]

[8] Cancer potency factors were not available for acrolein, so cancer risk for acrolein was not estimated.

The construction health risk analysis evaluated the potential risk to existing sensitive receptors in the vicinity of the proposed construction areas. Emission estimates, modeled emissions, risk characterization, and model results are discussed in this section. Detailed modeling files are provided on the electronic CD that accompanies this report (in Appendix 2).

The thresholds for individual project risks and hazards are:

- An excess lifetime cancer risk level of more than 10 in one million;
- A noncancer (both chronic or acute) HI greater than 1.0; and
- An incremental increase in the annual average $PM_{2.5}$ concentration greater than 0.3 micrograms per cubic meter ($\mu g/m^3$).

5.1 HEALTH RISK METHODOLOGY

5.1.1 Emission Estimates

Construction-related emissions of DPM (using exhaust PM_{10} as a surrogate), TOG (for the gasoline-related TACs), and $PM_{2.5}$ were calculated using the OFFROAD2011 and EMFAC2011 models, as described in Section 4.1, Criteria Air Pollutant Methodology. This is a conservative assumption, and consistent with regulatory guidance, because DPM represents a portion of total particulate emissions from exhaust. Exhaust and evaporative TOGs from gasoline-fueled vehicles were evaluated based on the speciation profiles presented in the BAAQMD Recommended Method for Screening and Modeling Local Risk and Hazards (BAAQMD, 2011d) and used in the cancer risk, as well as the acute and chronic noncancer analyses.

Health risks were estimated based on the projected annual construction-related exhaust emissions at each site, of $PM_{2.5}$, DPM, and TACs (such as acrolein [for on-road sources only], acetaldehyde, benzene, 1,3-butadiene, ethylbenzene, formaldehyde, and naphthalene) from gasoline engines. It was conservatively assumed that the maximum emissions would be uniform over the duration of construction. In reality, emissions would vary by day and phase. Emissions were modeled using the χ/Q method, such that the entire construction scenario had unit emission rates (i.e., 1 gram per second [g/s]), and the model estimates dispersion factors (with units of [$\mu g/m^3$]/[g/s]). The schedule (see Figure 7) and hours of operation[9] for each site were used to convert annual emissions to the unit emission rates. The annual and unit (g/s) emission rates for each project site are presented in Table 7 below.

5.1.2 Dispersion Modeling

The approved AQTR SOW recommended using a Tier 1 SCREEN3 modeling approach to evaluate worst-case project health risks. SCREEN3 is a single source Gaussian plume model that provides maximum ground-level concentrations for point, area, flare, and volume sources.

However, in subsequent conversations with the BAAQMD staff, it was determined that the SCREEN3 model was unable to estimate short-term to annual average concentrations, given that SCREEN3 only provided short-term concentrations (maximum 1-hour concentrations). Therefore, BAAQMD recommended modeling $PM_{2.5}$ and TAC concentrations using a Tier 2 model, such as the Industrial Source Complex Short Term (ISCST3) model, instead (BAAQMD, 2012c). Typically, AERMOD is the preferred regulatory dispersion model because it uses a refined meteorology and topography input. However, AERMOD-ready

[9] The maximum daily hours of operation provided by SFPUC engineers was 8 hours per day.

Table 7
Site-Specific Construction Criteria Air Pollutant Emissions

Project Site	$PM_{2.5}$	DPM	TOG
Colma			
Annual Emissions (tons/year)	0.037	0.040	4.15E-04
Unit Emissions (grams/second)	0.017	0.018	1.89E-04
South San Francisco (including common staging area)			
Annual Emissions (tons/year)	0.038	0.042	4.15E-04
Unit Emissions (grams/second)	0.015	0.017	1.65E-04
San Bruno North			
Annual Emissions (tons/year)	8.62E-03	7.93E-03	0.00
Unit Emissions (grams/second)	0.012	0.014	0.00
San Bruno South			
Annual Emissions (tons/year)	0.11	0.12	8.29E-04
Unit Emissions (grams/second)	0.022	0.024	1.66E-04
Millbrae			
Annual Emissions (tons/year)	0.050	0.055	4.15E-04
Unit Emissions (grams/second)	0.014	0.016	1.19E-04

meteorological data are not available for the stations in proximity to the sites; therefore, the ISCST3 model was recommended by the BAAQMD staff. Air dispersion models such as ISCST3 require a variety of inputs such as source parameters, meteorological parameters, topography information, and receptor parameters. The modeling parameters used in ISCST3 are described below.

Meteorological Data

Meteorological data representing the conditions for the project site were obtained from the closest meteorological reporting site: San Francisco International Airport (KSFO) (Site ID: 23234, 300-meter mixing height). BAAQMD staff stated that the only ISCST3-model ready data for the KSFO station was the 5-year period from 1991 through 1995 (BAAQMD, 2012d). The 1992 meteorological data were found to be invalid; therefore, only 4 years of meteorological data were used in the health risk analysis.

Terrain

Surface conditions and topographic features generate turbulence, modify vertical and horizontal winds, and change the temperature and humidity distributions in the boundary layer of the atmosphere. These in turn affect pollutant dispersion, and various models differ in their needs to adjust for these variables. Terrain elevation is defined as the elevation relative to the facility base elevation. For the purposes of this model, it was assumed that the sites will have simple flat terrain, because the terrain heights do not exceed stack base elevation (BAAQMD, 2011d). Additionally, the terrain surrounding the sites was modeled as an urban area.

Source Characterization

Emission rates used in the health risk analysis are described in Section 4.1, Criteria Air Pollutant Methodology. Construction and staging areas at the well sites were represented by a series of adjacent area sources. In addition, segments of I-280 adjacent to the pipeline construction area were included in the modeling analysis and also were represented as a series of adjacent area sources. Each area source was modeled with a release height of 2 meters. Area sources representing the pipeline alignment were 16 meters in width,[10] representing the maximum trench construction corridor. Area sources representing I-280 varied in width from 48 to 72 meters, based on the number of lanes, median width, and on- and off-ramps associated with each segment. The location of the area sources, along with discrete receptor locations and the Cartesian receptor grid, are shown in Figure 8. The Cartesian receptor grid allows for the setup of a receptor grid with uniform north-south and east-west spacing. The Cartesian grid was used whenever possible to represent receptors. Discrete receptors were used in locations where it was difficult to set up a Cartesian grid, such as certain residences located northeast of Interstate 210, where the interstate runs northwest to southeast. All staging area emissions were assumed to originate from the Peninsula High School Parking Lot staging area and the SFPUC ROW in front of the San Bruno Chinese Church, because they are located adjacent to sensitive receptors and represent a conservative scenario. Because this scenario did not show significant concentrations within the high school parking lot, SFPUC ROW, or at nearby receptors, modeling of the church parking lot staging area was determined to be unnecessary.

Daily emissions from construction equipment and truck trips were accounted for in the pipeline construction area sources. Daily emissions from I-280 were based on estimates of the average annual daily trips related to project construction activities, for this road segment. Ten percent of the maximum daily emissions modeled for the construction areas were assumed to occur in the staging areas, and 90 percent in the construction areas. This 90 percent of total construction emissions was uniformly distributed across each of the active construction area sources. Because construction activities are anticipated to occur 5 days a week for 8 hours, variable emissions profiles were applied to each area source to accurately reflect construction activity. Emissions from I-280 were assumed to occur 7 days a week for 24 hours per day.

Receptors

According to the BAAQMD Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 2.0, sensitive receptors are defined as residential dwellings, including apartments, houses, and condominiums; schools, colleges, and universities; daycares; hospitals; and senior-care facilities.

All sites, with the exception of the Colma site, are located within residential areas. Figures 2 through 5 identify the sensitive receptors within 1,000 feet of the sites.

As shown on Figure 2, sensitive receptors at the Colma site include Home Sweet Home Senior Care center and the adjacent residence along El Camino Real, east of the construction zone.

As shown on Figure 3, sensitive receptors within the 1,000-foot buffer at the South San Francisco site are residences along West Orange Avenue, Fairway Drive, and Southwood Drive to the south of the project construction zone and east of the staging and spoils area; and residences along Arroyo Drive, Alta Mesa

[10] The 16-meter (48-foot) corridor represents the average area from which emissions would be generated, including the trench and areas adjacent to it.

+ Discrete Receptors

Cartesian Grid Receptor

Area Sources

Note:
The Cartesian receptor grid includes the Peninsula High School. Discrete receptors were used to denote other receptors where it was not possible to use the Cartesian receptor grid.

AREA SOURCE, RECEPTOR LOCATIONS AND RECEPTOR GRID

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

June 2012

FIGURE 8

Drive, Indio Drive, Del Monte Drive, Camaritas Avenue, Del Paso Drive, Hermosa Lane, and Chico Court to the north of the project construction zone and the staging and spoils area. There are also residences along A Street, B Street, and C Street to the south of the project construction area and west of the staging and spoils area. Other sensitive receptors identified on Figure 3 within the 1,000-foot buffer zone include the Westborough Royale Assisted Living Center and Our Redeemers Lutheran Church. Baden High School, South San Francisco Adult School, and Los Cerritos Elementary School are located just outside the 1,000-foot buffer zone.

As shown on Figure 4, sensitive receptors within a 1,000-foot buffer zone at the San Bruno North site include residences along Crestwood Drive, Cunningham Highway, and Hawthorne Avenue to the east of the project construction zone and the staging and spoils area; residences along Cedarwood Court, Hickory Avenue, Juniper Avenue, Holly Avenue, and Pepper Drive to the east of the project construction zone and the staging and spoils area; and the Shelter Creek condominiums to the southwest of the project construction zone.

As shown on Figure 5, the San Bruno South site includes sensitive receptors within a 1,000-foot buffer zone, such as residences along Rosewood Drive, Madison Avenue, and Glenbrook Lane to the west of the project construction zone and the staging and spoils area; the San Mateo Union Community Daycare and Peninsula High School to the south of the project construction zone and the staging and spoils area; and the San Bruno Chinese Church to the east of the project staging and spoil area.

As shown on Figure 6, sensitive receptors near the construction area and the staging and spoils areas at the Millbrae site include the residences along Lomita Avenue, Terrance Drive, Ridgewood Drive, Robin Lane, Brookside Lane, Glenwood Drive, Fernwood Drive, Elmwood Drive, Oakwood Lane, and Banbury Lane to the west of the project construction zone and the staging and spoils area; residences along Parkview Drive, Bayview Avenue, Santa Barbara Avenue, Guadalupe Avenue, and Santa Margarita Avenue to the east of the project staging and spoils area; and residences along Ridgewood Drive, Helen Drive, and Evergreen Way to the south of the project construction zone and the staging and spoils area. Other notable sensitive receptors within the 1,000-foot area of the emission sources at the Millbrae site include the Glen Oaks Montessori School and Millbrae Montessori School north of the construction zone. Meadows Elementary School is identified as a sensitive receptor on Figure 6 even though it is outside of the 1,000-foot buffer zone because of potential impacts, given the proximity to the project.

5.2 HEALTH RISK ASSESSMENT RESULTS

The following section describes the various components of the HRA.

5.2.1 Exposure Assumptions

The exposure assessment estimates human exposure to substances that can increase cancer risk or cause acute and chronic noncancer health risks. The TACs evaluated in this HRA are emitted into the air, so the primary exposure pathway is through inhalation.

Dose-response assessment is the process of characterizing the relationship between exposure to an agent and incidence of an adverse health effect in exposed populations. In quantitative carcinogenic risk assessments, the dose-response relationship is expressed in terms of a potency slope that is used to calculate the probability or risk of cancer associated with an estimated exposure. Cancer potency factor is expressed as the 95^{th} percent upper confidence limit of the slope of the dose response curve, and assumes continuous lifetime exposure to a substance at a dose of 1 milligram per kilogram of body weight per day (mg/kg/day), commonly expressed in units of inverse dose (i.e., $mg/kg/day^{-1}$). It is assumed in cancer risk assessments that risk is directly proportional to dose, and that there is no threshold for carcinogenesis. OEHHA has compiled cancer potency factors, which should be used in risk assessments (OEHHA, 2011).

For noncarcinogenic effects, dose-response data developed from animal or human studies are used to develop acute and chronic noncancer Reference Exposure Levels (RELs). The acute and chronic RELs are defined as the concentration at which no adverse noncancer health effects are anticipated. The most sensitive health effect is chosen to determine the REL if the chemical affects multiple organ systems. Unlike cancer health effects, noncancer acute and chronic health effects are generally assumed to have thresholds for adverse effects. In other words, acute or chronic injury from a pollutant will not occur until exposure to that pollutant has reached or exceeded a certain concentration (i.e., threshold). The acute and chronic RELs are intended to be below the threshold for health effects in the general population.

Risk characterization is the final step of risk assessment. Modeled concentrations and public exposure information, which are determined through exposure assessment, are combined with potency factors and RELs that are developed through dose-response assessment.

5.2.2 Cancer Risk

The maximum incremental cancer risk from exposure to TACs was calculated by estimating exposure to carcinogenic chemicals and multiplying the dose times the cancer potency factor. The following equation was used to determine cancer risk:

Cancer Risk = (Dose * CRAF * Cancer Potency Factor), where:

Cancer Risk = risk (potential chances per million)
Dose = dose through inhalation (mg/kg/day)
CRAF = Cancer risk adjustment factor (10 for infant receptors over a period of 2 years)[11]
Cancer Potency Factor = toxicity factor (mg/kg/day^{-1})

Dose is estimated using the following equation:

Dose = (Cair * DBR * EF * ED * CF)/AT, where:

Dose = dose through inhalation (mg/kg/day)
Cair = annual air concentration (μg/m^3) from air dispersion model
DBR = daily breathing rate (302 liters per kilogram body weight-day for adults and 581 liters per kilogram per day for children)
EF = exposure frequency (350 days/year)
ED = exposure duration (9 months)
CF = conversion factor (10-^{6} ([milligrams per microgram] * [cubic meters per liter])
AT = averaging time (25,550 days or 70 years)

For the construction HRA, the BAAQMD-recommended 581 liters per kilogram per day was used for child receptors at identified schools and daycare centers (BAAQMD, 2011c). The exposure frequency was assumed to be 350 days per year for residents (adults and children), 180 days for child receptors in school, and 245 days for child receptors at daycare. Exposure duration for each project site was based on the construction schedule presented in Figure 7. To determine incremental cancer risk, the estimated dose

[11] Based on conversations with the BAAQMD staff, because the construction period for the project is less than 70 years, a CRAF of 10 was suggested for exposures that occur at construction sites to child receptors (BAAQMD, 2012c).

through inhalation was multiplied by the OEHHA-established cancer potency slope factor of 1.1 $(mg/kg/day)^{-1}$ for DPM.

To estimate the cancer risk from TOG, the different compounds that make up the toxic portions of TOG are speciated using the BAAQMD breakdown tables (BAAQMD, 2011d). A weighted toxicity value was then developed that incorporates the individual toxicity of each speciated compound that makes up TOG. The weighted toxicity values are then developed for each emission source by multiplying the TOG speciated percentage of each individual compound by its corresponding toxicity value.

Analyses conducted by the OEHHA indicate that both the prenatal and postnatal life stages can be, but are not always, much more susceptible to developing cancer than the adult life stage. The analyses also indicated that the age sensitivity factors (ASFs) for these age windows vary by chemical, gender, and species. ASFs for prenatal, postnatal, and juvenile exposures is complicated by the limited database of chemicals and studies available for analysis, and the broad distribution of results for different chemicals. U.S. Environmental Protection Agency and OEHHA have proposed to apply a default ASF of 10 for the third trimester to age 2 years, and a factor of 3 for ages 2 through 15 years to account for potential increased sensitivity to carcinogens during childhood and applied to all carcinogens, regardless of the theorized mode of action. For estimating cancer risk for residential receptors, the incorporation of the ASFs results in a cancer risk adjustment factor (CRAF) of 1.7. For estimating cancer risk for child receptors at school, a CRAF of 3 should be applied (BAAQMD, 2011d). The CRAF for child receptors near construction would sites would be 10, because the construction period is less than 70 years (BAAQMD, 2012c)

Existing receptors in the vicinity of the project site would be exposed to TAC emissions generated during construction of the project. It should be noted that this is a conservative assumption because it assumes that the maximally exposed individual would be exposed to the annual average concentration throughout the construction period, when during the actual construction process equipment location would vary within the project area (and TAC concentrations around the sites would change). The receptor grids, in combination with discrete receptors described above, allows the examination of TAC concentrations throughout the area surrounding the construction sites.

Results for cancer risk impacts were modeled for the San Bruno South site, because this site had the longest construction period. If the health risk for the San Bruno South site was above the significance thresholds, the site with the second-longest construction period would have been modeled. Because the health risks for the San Bruno South project site were below the significance thresholds, the health risks for other project sites were based on the modeling results for the San Bruno South site.

Based on the assessment described above, it was determined that the maximally exposed individual would be exposed to an incremental cancer risk of 6.9 in one million at the San Bruno South site, which is below the threshold of 10 in one million. Thus, incremental cancer risks at the various project sites would be below the cancer risk threshold (as presented in Table 8). The impact would be less than significant. Detailed modeling results are presented on the accompanying CD (in Appendix 2).

5.2.3 Chronic Noncancer Hazard Index

The potential for exposure to result in chronic noncancer effects is evaluated by comparing the estimated annual average air concentration (which is equivalent to the average daily air concentration) to the chemical-specific noncancer chronic RELs. The chronic REL is the inhalation exposure concentration at which no adverse chronic health effects would be anticipated following exposure. When calculated for a

Table 8
Construction Period Health Risk Assessment Results

Site	Project Impact (Unmitigated)			
	Annual Average $PM_{2.5}$ (μg/m^3)	**Cancer Risk (per million)[3]**	**Chronic Hazard Quotient[4]**	**Acute Hazard Quotient[5]**
Colma[1]	0.024	2.3	0.005	2.280E-07
South SF[1]	0.025	2.4	0.006	2.280E-07
San Bruno North[1,2]	0.005	0.5	0.001	0.000E+00
San Bruno South	0.072	6.9	0.016	4.561E-07
Millbrae[1]	0.033	3.2	0.007	2.280E-08
Thresholds[3]	**0.3**	**10**	**1**	**1**

Notes:

1 Only the San Bruno South site was modeled using ISCST3. $PM_{2.5}$ and DPM concentrations for the other sites were calculated by using the ratio of each site's total emissions to the San Bruno South site's total emissions. The nearest sensitive receptor to the San Bruno South site was adjacent to the construction area; therefore, these results present a worst case scenario at each of the other sites. Meteorological conditions are similar at all sites.

2 The San Bruno North site Acute Hazard is zero because no gasoline operated equipment would be used during construction at the site. DPM does not cause acute health effects.

3 The cancer risk was estimated for DPM and TOG at the Colma, South San Francisco, San Bruno South, and Millbrae sites. The cancer risk was estimated for DPM only at the San Bruno North site because there would be no gasoline-operated equipment at that site. The cancer risk for speciated TOG, such as acetaldehyde, benzene, 1,3-butadiene, ethylbenzene, formaldehyde, and naphthalene, was estimated based on the TOG dose multiplied by the individual speciated TOG cancer potency factor (BAAQMD, 2011d). There is no cancer potency factor available for acrolein, so cancer risks from acrolein were not estimated.

4 The chronic hazard quotient was estimated for DPM at all sites by dividing the modeled DPM concentration at each site by the DPM chronic inhalation REL. The chronic hazard quotient for speciated TOG, such as acrolein (for on-road sources only), acetaldehyde, benzene, 1,3-butadiene, ethylbenzene, formaldehyde, and naphthalene, was estimated at all sites except San Bruno North, because the San Bruno North site would not have any gasoline equipment onsite. The chronic hazard quotient for speciated TOG was estimated by multiplying the modeled TOG concentration by the EMFAC speciated TOG percent, and dividing it by the speciated TOG chronic inhalation REL.

5 There is no acute inhalation REL for DPM, 1,3-butadiene, ethylbenzene, and naphthalene, so an acute hazard quotient for those pollutants was not estimated. An acute hazard quotient was estimated for speciated TOGs, such as acrolein (for on-road sources only), acetaldehyde, benzene, and formaldehyde, at all sites except San Bruno North, because the San Bruno North site does not operate any gasoline equipment onsite. An acute hazard quotient for speciated TOG was estimated by multiplying the modeled TOG concentration by the EMFAC speciated TOG percent, and dividing it by the speciated TOG acute inhalation REL.

μg/m^3 = micrograms per cubic meter
$PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter

single chemical, the comparison yields a ratio termed a hazard quotient (HQ). To evaluate the potential for adverse chronic noncancer health effects from simultaneous exposure to multiple chemicals, the HQs for all chemicals are summed, yielding a HI.

The chronic risk level is calculated as follows:

Inhalation chronic risk = Cair / cREL, where:

Cair = annual concentration ($\mu g/m^3$)
cREL = Chronic noncancer REL ($\mu g/m^3$)

The results are presented in Table 8. As shown in the table, TAC exposure from the project's construction emissions would result in a maximum chronic HI of 0.016 at the San Bruno South site, which is well below the threshold of 1.0; therefore, chronic noncancer health impacts at existing receptors would be less than significant.

5.2.4 Acute Noncancer Hazard Index

The potential exposure to emissions of pollutants resulting in acute noncancer effects is evaluated by comparing the estimated 1-hour maximum air concentration to the chemical-specific noncancer acute RELs. The acute REL is the inhalation exposure concentration at which no adverse acute health effects would be anticipated following exposure. When calculated for a single chemical, the comparison yields a ratio termed a HQ. To evaluate the potential for adverse acute noncancer health effects from simultaneous exposure to multiple chemicals, the HQs for all chemicals are summed, yielding an HI.

The acute risk level is calculated as follows:

Inhalation chronic risk = Cair / aREL, where:

Cair = 1-hour concentration ($\mu g/m^3$)
aREL = Acute Noncancer REL ($\mu g/m^3$)

There is currently no acute noncancer toxicity value available for DPM. TAC exposure from the project's construction emissions would result in an acute HI of 4.6E-7 at the San Bruno South site (see Table 8), which is well below the threshold of 1.0; therefore, acute noncancer health impacts at existing receptors would be less than significant.

5.2.5 Ambient $PM_{2.5}$ Increase

The $PM_{2.5}$ increase was modeled in ISCST3, based on the unit concentration of $PM_{2.5}$. Results of the analysis also indicate that the incremental increase in annual average $PM_{2.5}$ concentration would be 0.072 $\mu g/m^3$ near the construction site, which is below the significance threshold of 0.3 $\mu g/m^3$ (see Table 8). Therefore, $PM_{2.5}$ concentrations from construction-related emissions would be less than significant. No mitigation would be required.

5.3 CUMULATIVE HEALTH RISK

A cumulative health risk analysis is conducted for each site, and results are compared to the thresholds for cumulative effects:

- An excess lifetime cancer risk level of more than 100 in one million;
- A chronic noncancer HI greater than 10; and
- An incremental increase in the annual average $PM_{2.5}$ of greater than 0.8 μg/m^3.

The incremental increase in $PM_{2.5}$ concentrations, incremental cancer risk, and chronic HI from all past, present, and foreseeable future sources (including stationary sources, roadways with greater than 10,000 AADT, and construction projects) within a 1,000-foot radius from the project fenceline of the sources, plus the contribution from the project, are analyzed for the cumulative HRA. Stationary sources, interstates, and surface roadways with traffic greater than 10,000 AADT within the 1,000-foot buffer zone of each project site are presented in Table 3.

There is only one construction project within the project’s 1,000-foot buffer zone: the Regional Groundwater Storage and Recovery (GSR) Project, which will be constructed from February 2013 through November 2015 and coincide with the project’s construction period.

Stationary Sources. The screening $PM_{2.5}$ concentration, cancer risks, and hazards values for permitted stationary sources were obtained from the BAAQMD county-specific files for Google Earth™ (BAAQMD, 2012e). The BAAQMD gas station cancer risk and chronic hazard distance multipliers were used for gas stations, such as the Westborough Chevron, Comino Petroleum, Orange Avenue Shell, and the Shelter Creek Chevron. The multiplier is based on the distance between the gas station and the nearest sensitive receptor. There was one diesel generator for which BAAQMD did not provide screening values. The $PM_{2.5}$ concentrations, cancer risks, and hazards values for that source was included in the cumulative analysis by modeling permitted emission rates, provided by the BAAQMD, in ISCST3.

Major Roadways. The screening $PM_{2.5}$ concentration, cancer risks, and hazards values for highways and major roadways greater than 10,000 AADT were obtained from the BAAQMD county-specific files for Google Earth™ (BAAQMD, 2012e), based on distance from the nearest sensitive receptor. Traffic data for major surface roadways were obtained from the California Environmental Health Tracking Program traffic tool (CEHTP, 2012).

Other Construction Projects. As mentioned above, the only construction project within the 1,000-foot buffer zone that is anticipated to be constructed during the PPSU construction period is the Regional GSR Project. The construction emission estimates for GSR were not available for use in the PPSU cumulative HRA. However, Environmental Planning recommended inference of GSR emissions based on Groundwater Supply Project construction emissions (Environmental Planning, 2012a). Using the emissions and average well flow rate for the Groundwater Supply Project, emission rates per well for the GSR were estimated. These emissions rates were modeled in the ISCST3 model to estimate $PM_{2.5}$ concentrations, cancer risks, and HIs per well. Two GSR wells are proposed to be constructed within the Colma site’s 1,000-foot buffer zone, and three GSR wells are proposed to be constructed within the South San Francisco site’s 1,000-foot buffer zone. The health risk values per well were multiplied by the number of wells surrounding the project sites to obtain construction cumulative health risk values.

Table 9 shows the cumulative cancer risk, $PM_{2.5}$ concentrations, and chronic hazard indices from all sources within the 1,000-foot buffer zone. As shown in the table, the maximum cumulative health risk impacts at the San Francisco South site would result in a $PM_{2.5}$ concentration of 0.421 μg/m^3, a cancer risk of 83 in one million, and a chronic HI of 0.154. Therefore, the project’s construction would not result in a substantial health risk, nor would it make a considerable contribution to cumulative health risk impacts. Therefore, cumulative risks, including the project’s incremental contribution, would not be considerable.

Table 9
Construction Period Cumulative Health Risk Assessment Results

	Nearby Sources[8]				Nearby Construction Projects[1]				Cumulative Analysis		
Project Site	**Plant Number/Roadway/Interstate**	**Annual Average $PM_{2.5}$ ($\mu g/m^3$)**	**Cancer Risk (per million)**	**Chronic Hazard**	**Project Name**	**Annual Average $PM_{2.5}$ ($\mu g/m^3$)[5]**	**Cancer Risk (per million)**	**Chronic Hazard**	**Annual Average $PM_{2.5}$ ($\mu g/m^3$)**	**Cancer Risk (per million)**	**Chronic Hazard**
Colma Site[4]	G11198: Lexus of Serramonte	N/A	8.722	0.012	Regional Groundwater Storage and Recovery Project	0.046	4.3	0.01	0.199	19	0.087
	8758: Serramonte Ford Body Shop	0.018	0.000	0.000							
	12251: G & M Auto Body	0.000	0.040	0.000							
	12368: Honda of Serramonte	0.000	0.000	0.000							
	G8650: Home of Peace Cemetery	N/A	0.222	0.000							
	El Camino Real[2]	0.077	2.571	0.030							
	Serramonte Boulevard[2]	0.034	1.161	0.030							
South San Francisco Site (including common staging area)[4]	G11428[10]: Westborough Chevron	N/A	0.331	0.001	Regional Groundwater Storage and Recovery Project	0.068	6.5	0.015	0.421	83	0.154
	19316[6] : Access Properties LLC	0.000	0.008	0.000							
	El Camino Real[2]	0.020	0.804	0.030							
	Westborough Boulevard[2]	0.204	5.903	0.030							
	5611: Daland Body Shop	0.000	0.000	0.000							
	14240: SFPUC Water Supply and Treatment Division	0.104	58.80	0.021							
	19842: Chestnut Cleaners	0.000	7.490	0.020							
	G11391[10]: Camino Petroleum	N/A	0.214	0.019							
	G12394[10]: Orange Avenue Shell	N/A	0.149	0.013							
San Bruno North Site[4,7]	G3134[10]: Shelter Creek Chevron	N/A	0.618	0.001	N/A	N/A	N/A	N/A	0.123	8	0.011
	I-280[3]	0.118	6.843	0.009							
San Bruno South Site	16280: Verizon Wireless Highway 35/280	0.003	11.140	0.004	N/A	N/A	N/A	N/A	0.109	20	0.022
	I-280[3]	0.034	2.008	0.002							
Millbrae Site[4]	G7549: Green Hills Country Club	N/A	0.635	0.001	N/A	N/A	N/A	N/A	0.033	4	0.008
Thresholds[9]									**0.8**	**100**	**10**

Notes:

1 All nearby construction projects (within 1,000 feet of the construction area) were assumed to comply with the BAAQMD thresholds for project construction.

2 Roadway annual average $PM_{2.5}$ and cancer risk for surface streets >10,000 AADT were estimated from screening tables provided by BAAQMD (BAAQMD, 2012e) and traffic data from the California Environmental Health Tracking Program traffic tool (CEHTP, 2012). The maximum acute and chronic HI for roadways will be less than 0.03.

Interstate annual average $PM_{2.5}$, cancer risk, and chronic hazard values were estimated from the BAAQMD highway screening analysis tool for San Mateo County (BAAQMD, 2012e).

4 $PM_{2.5}$ and DPM concentrations were modeled using ISCST3 only for the San Bruno South site. The remaining sites' $PM_{2.5}$ and DPM concentrations were calculated by using the ratio of each site's total emissions to the San Bruno South site's total emissions. The nearest sensitive receptor to the San Bruno South site was adjacent to the construction area; therefore, these results present a worst case scenario at each of the other sites. Meteorological conditions are similar at all sites.

5 While the BAAQMD threshold for project construction $PM_{2.5}$ concentrations is 0.3 $\mu g/m^3$, in order to meet a cancer risk value of 10 in a million, $PM_{2.5}$ concentrations from diesel exhaust cannot exceed 0.101 $\mu g/m^3$. Therefore, the worst possible impact from $PM_{2.5}$ concentrations at any receptor must be equal to or less than 0.101 $\mu g/m^3$ to comply with BAAQMD new source thresholds.

6 For Source #19316, URS was provided average daily emissions, and not annual average $PM_{2.5}$, cancer risk, or chronic hazard. Consequently, the annual $PM_{2.5}$ concentration, cancer risk, and chronic hazard were estimated by assuming this source was located at the construction site, and the same ratio methodology described in footnote 4 was used to calculate a worst case impact.

7 Acute hazard for the San Bruno North site is zero because no gasoline-operated equipment would be used during construction. DPM does not impact acute hazard.

8 Some nearby sources emit $PM_{2.5}$, but in quantities below the significant figures reported to the BAAQMD. These are represented by zero. Sources that do not emit $PM_{2.5}$ (e.g., gas stations) have N/A for $PM_{2.5}$ concentrations. In addition, for cancer risk and chronic hazard, some sites register values below the significant figures used by the BAAQMD.

9 The BAAQMD has acute hazard significance thresholds for individual projects, but not for cumulative impacts. Consequently, cumulative acute hazards were not estimated.

10 The BAAQMD gas station cancer risk and chronic hazard distance multipliers were used where appropriate using the distance between the gas station and the nearest sensitive receptor.

AADT = annual average daily traffic
BAAQMD = Bay Area Air Quality Management District
DPM = diesel particulate matter
I-280 = Interstate 280
$\mu g/m^3$ = micrograms per cubic meter
$PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter
SFPUC = San Francisco Public Utilities Commission

6.0 CONCLUSION

Project-related construction emissions were estimated using the CARB OFFROAD 2011 and EMFAC 2011 models, and then compared to the thresholds of significance. The proposed project would not result in significant construction criteria air pollutant emissions, nor would it make a considerable contribution to a cumulative criteria pollutant air quality impact.

Individual and cumulative health risk impacts were analyzed by modeling site unit emissions in the ISCST3 dispersion model. Individual site $PM_{2.5}$, cancer and noncancer risks for DPM and gasoline-related TACs, such as acetaldehyde, benzene, 1,3-butadiene, ethylbenzene, formaldehyde, and naphthalene, were compared to the significance thresholds. $PM_{2.5}$, cancer, and noncancer health risks from project construction would be below the applicable thresholds. Therefore, the project's individual health risk impacts would be less than significant.

Cumulative health risk impacts from stationary sources and roadways with greater than 10,000 AADT within 1,000 feet of the site were analyzed using the BAAQMD screening values. For stationary sources without screening values, and construction projects within 1,000 feet of the site, the $PM_{2.5}$, cancer and noncancer risks were modeled using the ISCST3 dispersion model. The $PM_{2.5}$, cancer, and noncancer health risks from cumulative projects within the 1,000-foot buffer zone, including the proposed project, were compared to and found to be below the applicable thresholds. Therefore, cumulative health risks impacts would be less than significant.

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APPENDIX 1
APPROVED AIR QUALITY
TECHNICAL REPORT SCOPE OF WORK

SAN FRANCISCO PUBLIC UTILITIES COMMISSION
PENINSULA PIPELINES SEISMIC UPGRADE
ENVIRONMENTAL ANALYSIS SERVICES
AGREEMENT NO. CS-116A

FINAL AIR QUALITY TECHNICAL REPORT
SCOPE OF WORK

Prepared for:

San Francisco Public Utilities Commission
San Francisco Planning Department, Major Environmental Analysis Division

Prepared by:

URS Corporation
One Montgomery Street, Suite 900
San Francisco, CA 94104

November 22, 2011

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ACRONYMS

AADT	annual average daily traffic
ABAG	Association of Bay Area Governments
BAAQMD	Bay Area Air Quality Management District
CEQA	California Environmental Quality Act
CO	carbon monoxide
DPM	diesel particulate matter
HRA	health risk assessment
HTWTP	Harry Tracy Water Treatment Plant
lbs/day	pounds per day
$\mu g/m^3$	microgram per cubic meter
MEI	maximally exposed individual
NO_X	oxides of nitrogen
OEHHA	Office of Environmental Health Hazard Assessment
PM_{10}	particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
POM	polycyclic organic matter
PPSU	Peninsula Pipelines Seismic Upgrade
ROG	reactive organic gases
SAPL2	San Andreas Pipeline No. 2
SAPL3	San Andreas Pipeline No. 3
SFEP	San Francisco Planning Department, Environmental Planning Division
SFPUC	San Francisco Public Utilities Commission
SO_2	sulfur dioxide
SOW	scope of work
SSBPL	Sunset Supply Branch Pipeline
TAC	toxic air contaminants
URS	URS Corporation
U.S. EPA	U.S. Environmental Protection Agency

1.0 INTRODUCTION

This document describes URS Corporation's (URS) proposed scope of work (SOW) for preparing the Air Quality Technical Report for the San Francisco Public Utilities Commission's (SFPUC's) Peninsula Pipelines Seismic Upgrade (PPSU) project. This document is required per guidelines from the San Francisco Planning Department, Environmental Planning Division (SFEP) to comply with the California Environmental Quality Act (CEQA) and the latest Bay Area Air Quality Management District (BAAQMD) CEQA guidance (BAAQMD, 2011a).

This SOW contains the following sections:

1. Project Description Assumptions
2. Project Setting Assumptions (including project area map showing sensitive receptors and existing major emissions sources in the project area)
3. Criteria Air Pollutant Methodology
4. Health Risk and Hazards Methodology
5. Potential Mitigation Measures
6. Contents of the Air Quality Technical Report
7. Assumptions for Reviewing and Finalizing the Technical Report

2.0 PROJECT DESCRIPTION ASSUMPTIONS

The proposed project is the seismic upgrade of SFPUC water pipelines at five locations within the cities of Colma, South San Francisco, San Bruno, and Millbrae in San Mateo County on the San Francisco Peninsula, as shown in Figure 1.

The proposed project would result in seismic upgrades to three water transmission pipelines: the San Andreas Pipeline No. 2 (SAPL2) and San Andreas Pipeline No. 3 (SAPL3) and the Sunset Supply Branch Pipeline (SSBPL). These transmission pipelines deliver potable water from the Harry Tracy Water Treatment Plant (HTWTP) to the SFPUC's regional water distribution system. Portions of these pipelines traverse the Serra Fault—a secondary fault along the peninsula in San Mateo County that may experience movement in the future, possibly coincident with a large earthquake along the San Andreas Fault. During recent geotechnical investigations performed for the HTWTP Long-Term Improvement Project, it was determined that fault offset on the Serra fault during a San Andreas design event may cause pipeline failure at the fault crossings. Additionally, SAPL2, constructed circa 1928, uses lockbar joints for longitudinal joints and rivets for circumferential joints, which are highly seismically vulnerable to joint failure. In addition to the fault crossings, there are other areas where the pipelines cross potential liquefaction and landslide zones. The proposed project would replace/stabilize segments of these pipes at five locations that are susceptible to failure during such events. The overall project goal for the upgrades to SAPL2, SAPL3, and SSBPL is to increase the seismic reliability of water delivery from HTWTP to downstream customers after a major earthquake on the San Andreas Fault.

Construction activities of the proposed project would be anticipated to result in direct emissions of criteria air pollutants such as carbon monoxide (CO), oxides of nitrogen (NO_X), reactive organic gases (ROG), particulate matter less than or equal to 10 microns in diameter (PM_{10}), particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), and sulfur dioxide (SO_2). These activities will also result in emissions of the seven priority toxic air contaminant (TAC) identified by the U.S. Environmental Protection Agency (U.S. EPA), which include acrolein, benzene, 1,3-butadiene, diesel particulate matter (DPM), formaldehyde, naphthalene, and polycyclic organic matter (POM) from the operation of diesel construction equipment (U.S. EPA, 2007). There will be a small number of gasoline powered engines, but toxic emissions from these engines are expected to be minimal. There will not be any stationary sources at the project site.

Additionally, the proposed project will not introduce any new sensitive receptors to the site. The mobile and construction sources, and their associated pollutant emissions, are listed below.

- Mobile Sources:
  - On-Road Haul Trucks (Criteria pollutants: CO, NO_X, ROG, PM_{10} [combustion and fugitive dust], $PM_{2.5}$ [combustion and fugitive dust], SO_2; Toxic air contaminants: acrolein, benzene, 1,3-butadiene, DPM, formaldehyde, naphthalene, and POM).
  - On-Road Worker Vehicles (Criteria pollutants: CO, NO_X, ROG, PM_{10} [combustion and fugitive dust], $PM_{2.5}$ [combustion and fugitive dust], SO_2; Toxic air contaminants: acrolein, benzene, 1,3-butadiene, DPM, formaldehyde, naphthalene, and POM).

- Construction Sources:
  - Off-road Construction Equipment (Criteria pollutants: CO, NO_X, ROG, PM_{10} [combustion and fugitive], $PM_{2.5}$ [combustion and fugitive dust], SO_2; Toxic air contaminants: acrolein, benzene, 1,3-butadiene, DPM, formaldehyde, naphthalene, and POM).
  - Earth Moving (Criteria pollutants: PM_{10} [fugitive dust], $PM_{2.5}$ [fugitive dust])
  - Dirt Piling and Material Handling (Criteria pollutants: , PM_{10} [fugitive dust], $PM_{2.5}$ [fugitive dust])

However, operation of the proposed project would not be expected to increase emissions of criteria pollutants, precursors, or TACs, because it would not result in changes to the operations of the existing pipelines.

Proposed construction activities are summarized below for each project site, from north to south:

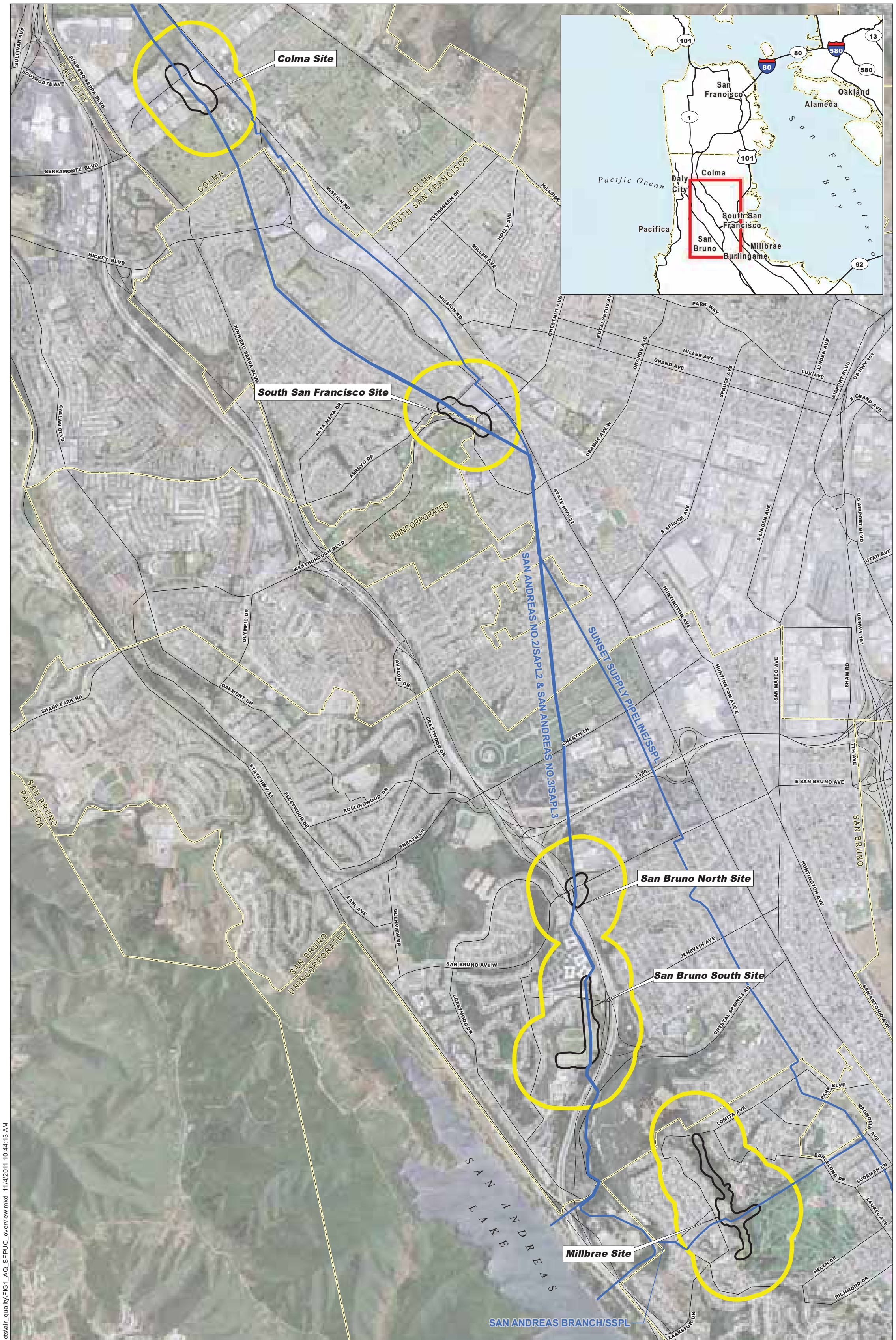
- **Colma Project Site (SAPL2):** The proposed pipe upgrade would entail replacement of 700 feet of pipe south of Serramonte Boulevard, extending to approximately 150 feet north of Collins Avenue in the City of Colma. The existing 54-inch-diameter pipeline would be replaced with a new double lap welded 54-inch-diameter steel pipe. The construction method would be open trench.

- **South San Francisco Project Site (SAPL2):** The proposed pipe upgrade would entail replacement of 650 feet of pipe at Westborough Boulevard between Arroyo Drive and Orange Avenue in South San Francisco. The existing 54-inch-diameter pipeline would be replaced with a new double lap welded 54-inch-diameter steel pipe. The construction methods would include open trench for the portion of the pipe that is located north and south of Westborough Boulevard, and may entail either open trench, sliplining, or jack and bore, for the pipe section that is under Westborough Boulevard.

- **San Bruno North Project Site (SAPL2):** The proposed project would include excavating two access portals (10 feet by 10 feet) to the top of the tunnel in which the pipeline is located; removing a portion of the tunnel to gain access inside the tunnel; and installing pipe support (likely concrete) or grouting. The construction would take place between San Bruno Avenue and the Interstate 280 offramp.

- **San Bruno South Project Site (SAPL2 and SAPL3):** The proposed project would involve removing existing pipes sections and replacing them with thick-walled welded steel pipes. For SAPL2, a new 54-inch-diameter welded steel pipeline would be installed to replace the existing 54-inch-diameter lockbar riveted steel pipeline for an approximately 1,170-foot segment of the pipeline. For SAPL3, a new 66-inch-diameter steel pipeline segment would be installed to replace an approximately 1,050-foot portion of the existing 66-inch-diameter steel pipe. The construction method would be open trench.

- **Millbrae Project Site (SSBPL):** The proposed project would include the replacement of an 890-foot segment of the 61-inch-diameter steel SSBPL, east from the curb of Ridgewood Drive. The construction method would be open trench. Prior to pipe replacement, access routes to the project construction zone would require minor improvements. Four potential access routes to the construction area are under consideration, and include: (1) the SFPUC easement through the side yards of residences at 1100 and 1080 Ridgewood Drive; (2) from Larkspur Drive through the Green



General Study Area
1,000-foot Buffer of Project Sites
SFPUC Water Transmission Line
City Limits

N

0 1,000 2,000 Feet

AIR QUALITY- OVERVIEW

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

November 2011

FIGURE 1

U:\GIS\SFPUC_Peninsula_Pipeline\Projects\air_quality\FIG1_AQ_SFPUC_overview.mxd 11/4/2011 10:44:13 AM

Source: Aerial Imagery, NAIP 2009

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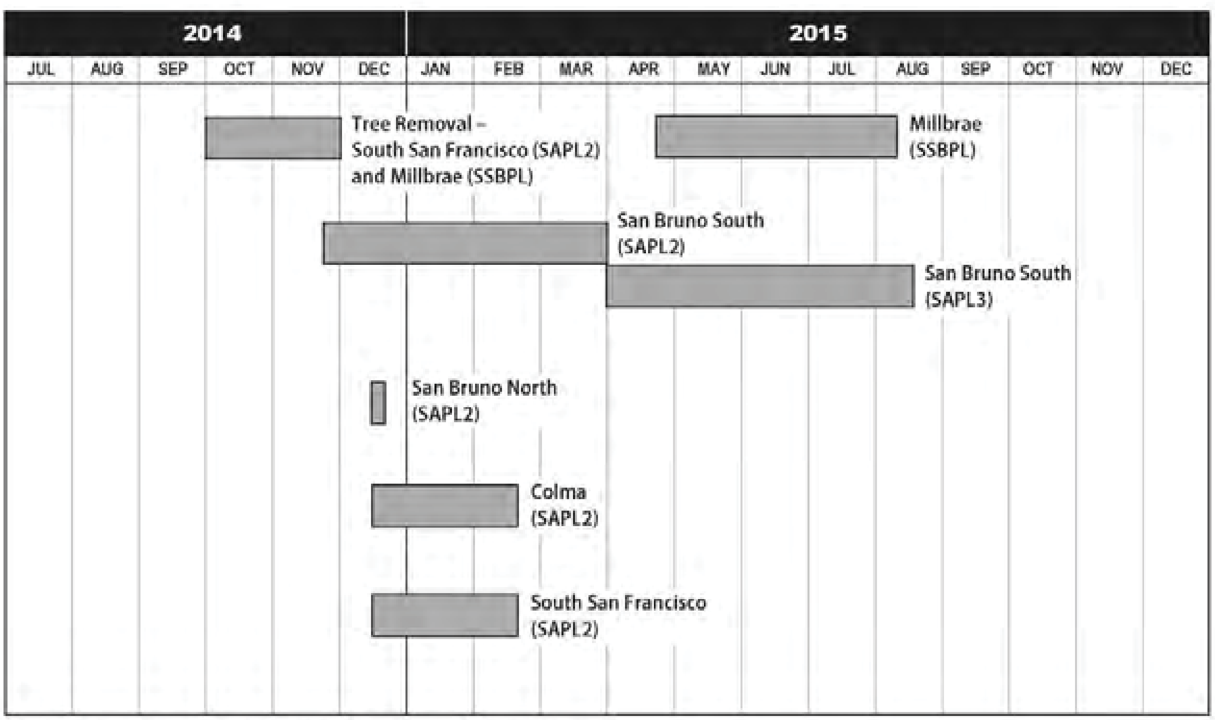
Hills Country Club golf course driving range; (3) from Lomita Avenue along an unpaved trail through City of Millbrae open space; and (4) an alternative route from Bertocchi Lane through the open space. In addition, the proposed project would entail removal of a portion of a grove of eucalyptus trees within the SFPUC right-of-way to allow access to the underlying pipeline.

Construction is estimated to begin in 2014 and end in 2015, as shown in Table 1. The duration of construction activities at each project site would range from approximately 2 weeks to 9.5 months, as shown in Table 2. The total duration of construction is estimated to be 12 months.

There would be three phases of construction activities, with initial tree removal activities at a few project sites, as shown in Table 3. Initial tree removal would be completed at the South San Francisco and Millbrae project sites where dense trees grow in the SFPUC ROW. The first construction phase would entail shutdown and dewatering of the pipeline and mobilization at the project site, such as installation of fencing, grubbing, and preparation of laydown areas. This phase would last up to 10 days (1 to 2 weeks). The second phase would include excavation, pipeline removal and installation, hydrostatic testing, and backfill, landscaping and site restoration, and would last for 24 to 81 days (2 to 4 months), depending on the project site. The third phase would include disinfection of the pipelines and would last 10 days (2 weeks).

The workforce for each project site is anticipated to consist of one or three crews, with up to 20 personnel per crew. Tree removal at the Millbrae project site would require one crew. Construction employee parking is anticipated to be on paved parking lots or streets adjacent to the project sites.

Table 1
Construction Phasing



Note: The pipeline shutdown and disinfection activities for the San Bruno North project site (SAPL2) are the same as those activities for the San Bruno South project site (SAPL2) and are included in the San Bruno South project site duration only.

Table 2
Construction Duration at Each Project Site

Project Site	Construction Duration
Colma Project Site (SAPL2)	2.5 months
South San Francisco Project Site (SAPL2)	3 months[1]
San Bruno North Project Site (SAPL2)	2 weeks[2]
San Bruno South Project Site (SAPL2 and SAPL3)	9.5 months
Millbrae Project Site (SSBPL)	4.5 months[3]

Notes:

[1] The 3-month duration of construction at South San Francisco includes approximately 2 weeks required for tree removal, which will be completed separately and in advance of the 2.5-month construction at the site.

[2] The shutdown, dewatering, and disinfection activities for the San Bruno North Project Site (SAPL2) are the same as those activities for the San Bruno South Project Site (SAPL2) and are, therefore, not included in the construction duration.

[3] The 4.5-month duration of construction at Millbrae includes the 1.5 months required for tree removal, which will be completed separately and in advance of the 3-month construction at the site.

SAPL2 = San Andreas Pipeline No. 2

SAPL3 = San Andreas Pipeline No. 3

SSBPL = Sunset Supply Branch Pipeline

Table 3
Typical Construction Activities

Construction Activities	Estimated Duration
Tree Removal (South San Francisco and Millbrae project sites only)	Approximately 2 months[1]
Shutdown and dewatering	Approximately 1 week
Mobilization[2]	Approximately 2 weeks
Shoring and excavation, pipeline removal and installation, intermittent dewatering, hydrostatic testing, backfill and restoration	Approximately 2 to 3 months depending on site
Disinfection	Approximately 2 weeks

Notes:

[1] Tree removal activities would occur at the South San Francisco and Millbrae project sites. Estimated duration for tree removal activities would be 2 months, inclusive of both the South San Francisco and Millbrae project sites.

[2] Mobilization would occur concurrently with shutdown and dewatering.

3.0 PROJECT SETTING ASSUMPTIONS

Implementation of the proposed project would result in new sources of construction-related emissions; however, it would not introduce new sensitive receptors. Therefore, this section reviews the closest sensitive receptors and existing sources within the project's zone of influence.[1] The population in San Mateo county is expected to increase by 17.7 percent between 2010 and 2030 (ABAG, 2009), and there could be reasonably foreseeable future projects in the vicinity. Reasonably foreseeable future projects will be evaluated as part of the cumulative impacts analysis in Section 4.0.

There will be a number of receptors that could be exposed to project emissions at each of the project sites. The proposed project areas are located in predominantly residential areas that also include schools, churches, and parks. These sensitive receptors will be evaluated for potential air quality impacts from the proposed project activities. Figures 2 through 5 show the locations of the project sites and pipelines, along with sensitive receptors within 1,000 feet of the sites.

These figures show the locations of the project components, including construction zones, site access, and staging and spoils areas; and the location of the sensitive receptors. The figures also show the location of permitted stationary sources; and the location of all major roadways within 1,000 feet of the project sites that have annual average daily traffic (AADT) greater than 10,000, which will be used for the cumulative health risk analysis.

Table 4 presents the preliminary identification of stationary sources permitted by the BAAQMD, and major roadway sources (>10,000 AADT) that are within 1,000 feet of project facility sites. These identified permitted sources and roadways will be used in the cumulative health risk analysis (see Section 5.1.2 for methodology). No major non-permitted sources (e.g., train yards, distribution facilities, and high-volume fueling stations) are located within 1,000 feet of project sites.

4.0 CRITERIA AIR POLLUTANT METHODOLOGY

This SOW assumes that all air emissions generated by the PPSU project will be temporary and associated with construction activities. In addition, this scope assumes that there will be no new operational air emission sources (mobile or stationary) associated with the proposed project. Therefore, the construction-related criteria air pollutants will be evaluated for the proposed project, as outlined below.

The PPSU project would generate several criteria air pollutants: CO, SO_2, PM_{10}, $PM_{2.5}$, and ozone precursors, which include ROG and NO_X. The project would also generate greenhouse gas emissions, to be evaluated in a separate greenhouse gas memorandum.

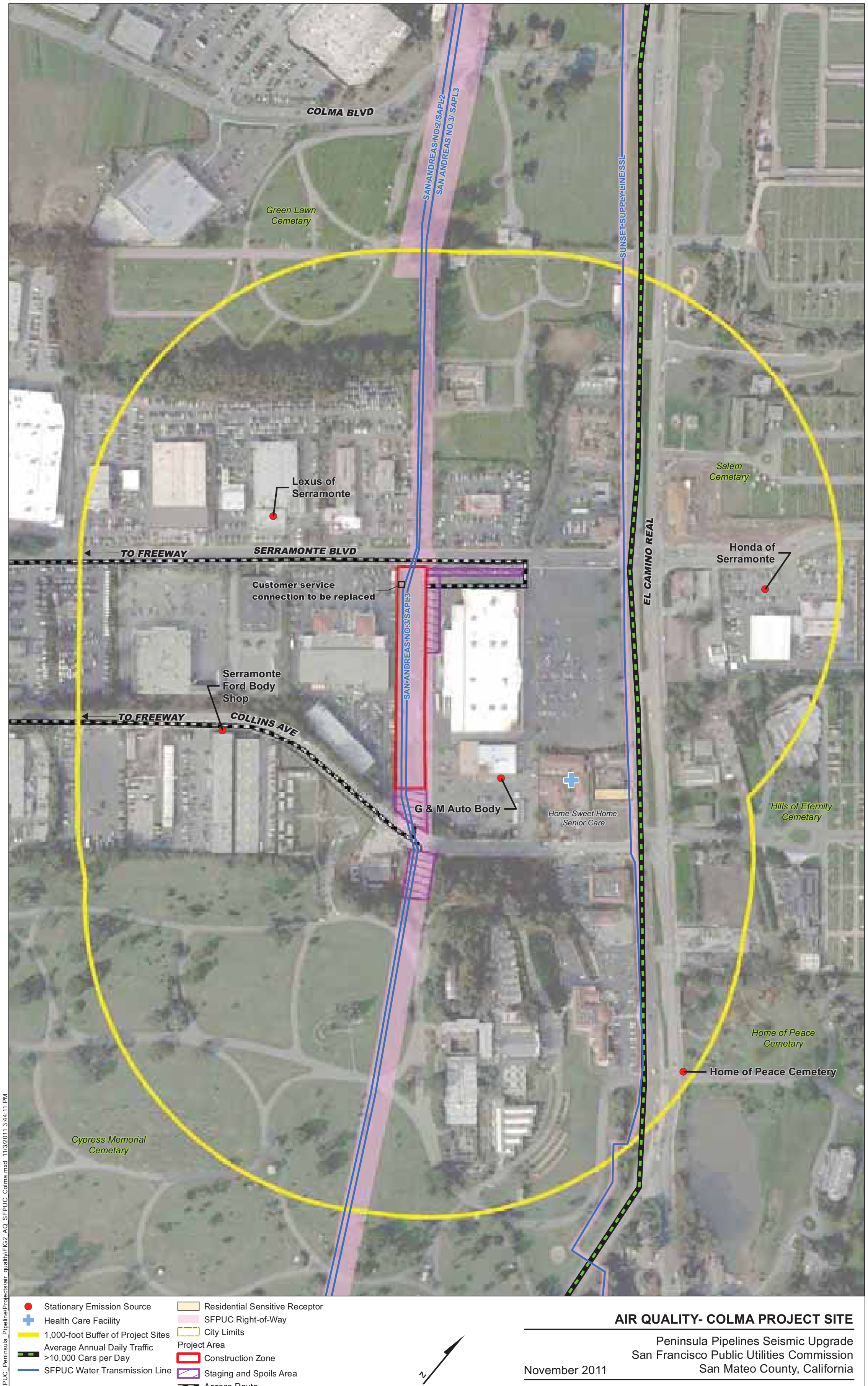
PPSU project activities will occur at the project sites described above, all of which are located in San Mateo County. The project falls under the jurisdiction of the BAAQMD. The air basin is considered nonattainment for the federal and state 8-hour ozone standard, the state annual and 24-hour PM_{10} standard, the federal 24-hour $PM_{2.5}$, and the state annual $PM_{2.5}$ standard.

[1] Zone of influence is defined as the area within a 1,000-foot radius of the proposed project.

Table 4
Preliminary Identification of Existing Stationary Sources and Roadways

Project Site	Facility Name	Street Address	City
Stationary Sources			
Colma Project Site (SAPL2)	Lexus of Serramonte	700 Serramonte Boulevard	Colma
	Serramonte Ford Body Shop	500 Collins Avenue	Colma
	G & M Auto Body	245 Collins Avenue	Colma
	Honda of Serramonte	485 Serramonte Boulevard	Colma
	Home of Peace Cemetery	1299 El Camino Real	Colma
South San Francisco Project Site (SAPL2)	Westborough Chevron	1 Westborough Boulevard	South San Francisco
	Access Properties LLC	91 Westborough Boulevard	South San Francisco
San Bruno North Project Site (SAPL2)	Shelter Creek Chevron	2101 San Bruno Avenue West	San Bruno
San Bruno South Project Site (SAPL2/SAPL3)	Verizon Wireless	250 Courtland Drive	San Bruno
Millbrae Project Site (SSBPL)	Green Hills Country Club	End of Ludeman Lane	Millbrae
Roadway Sources (roadways within the 1,000-foot buffer with > 10,000 vehicles per day)			
Colma Project Site (SAPL2)	El Camino Real between Villa Avenue and Mission Road		Colma
South San Francisco Project Site (SAPL2)	El Camino Real between Kaiser Foundation Hospital Drive and Southwood Drive		South San Francisco
San Bruno North Project Site (SAPL2), San Bruno South Project Site (SAPL2 and SAPL3)	Interstate 280 South between San Bruno Avenue and Crestmoor Drive		San Bruno

Notes:
SAPL2 = San Andreas Pipeline No. 2
SAPL3 = San Andreas Pipeline No. 3
SSBPL = Sunset Supply Branch Pipeline



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AIR QUALITY- COLMA PROJECT SITE

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

November 2011

FIGURE 2

Source: SF PUC Water Transmission line, November 2010
Aerial Imagery, Bing Imagery 2009
Emission sources: BAAQMD

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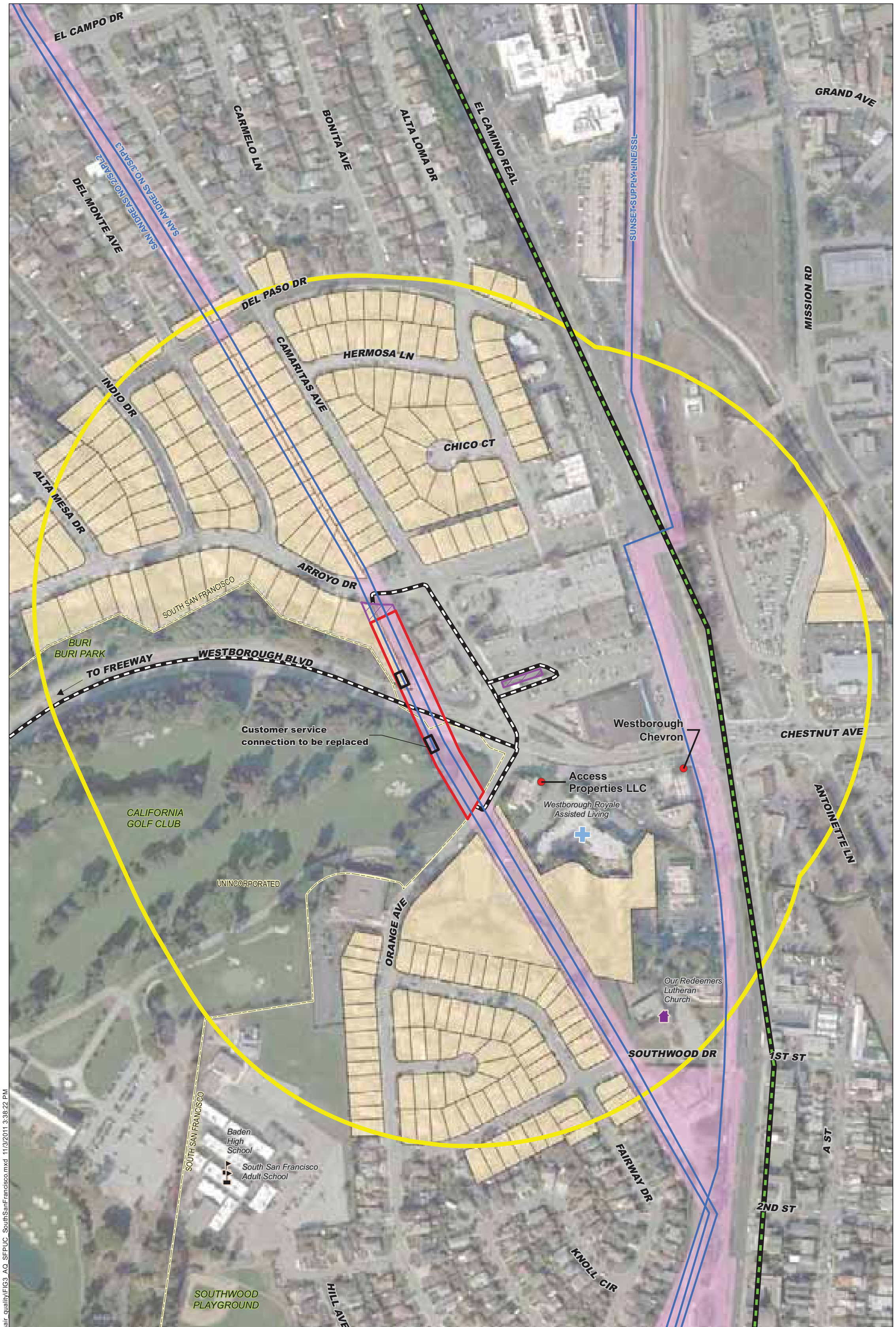

- Stationary Emission Source
- Church
- School
- Health Care Facility
- 1,000-foot Buffer of Project Sites
- Average Annual Daily Traffic >10,000 Cars per Day
- SFPUC Water Transmission Line
- Residential Sensitive Receptor
- SFPUC Right-of-Way
- City Limits

Project Area
- Construction Zone
- Staging and Spoils Area
- Boring Pit (~ 50' x 20')
- Access Route

N

0 150 300 Feet

AIR QUALITY-
SOUTH SAN FRANCISCO PROJECT SITE

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

November 2011

FIGURE 3

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Source: SF PUC Water Transmission line, November 2010
Aerial Imagery, Bing Imagery 2009
Emission sources: BAAQMD

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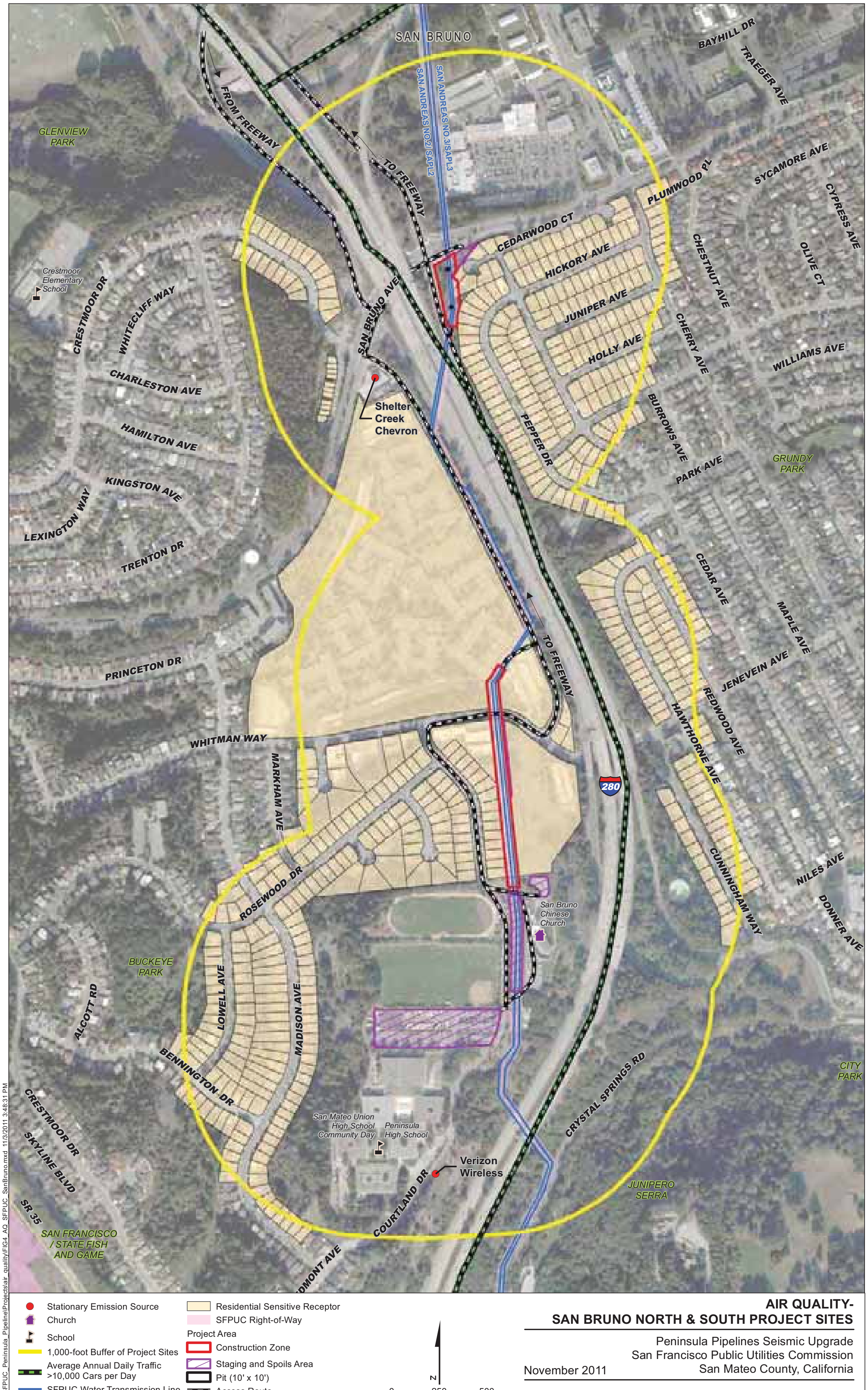

AIR QUALITY-
SAN BRUNO NORTH & SOUTH PROJECT SITES

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

November 2011

FIGURE 4

Source: SF PUC Water Transmission line, November 2010
Aerial Imagery, Bing Imagery 2009
Emission sources: BAAQMD

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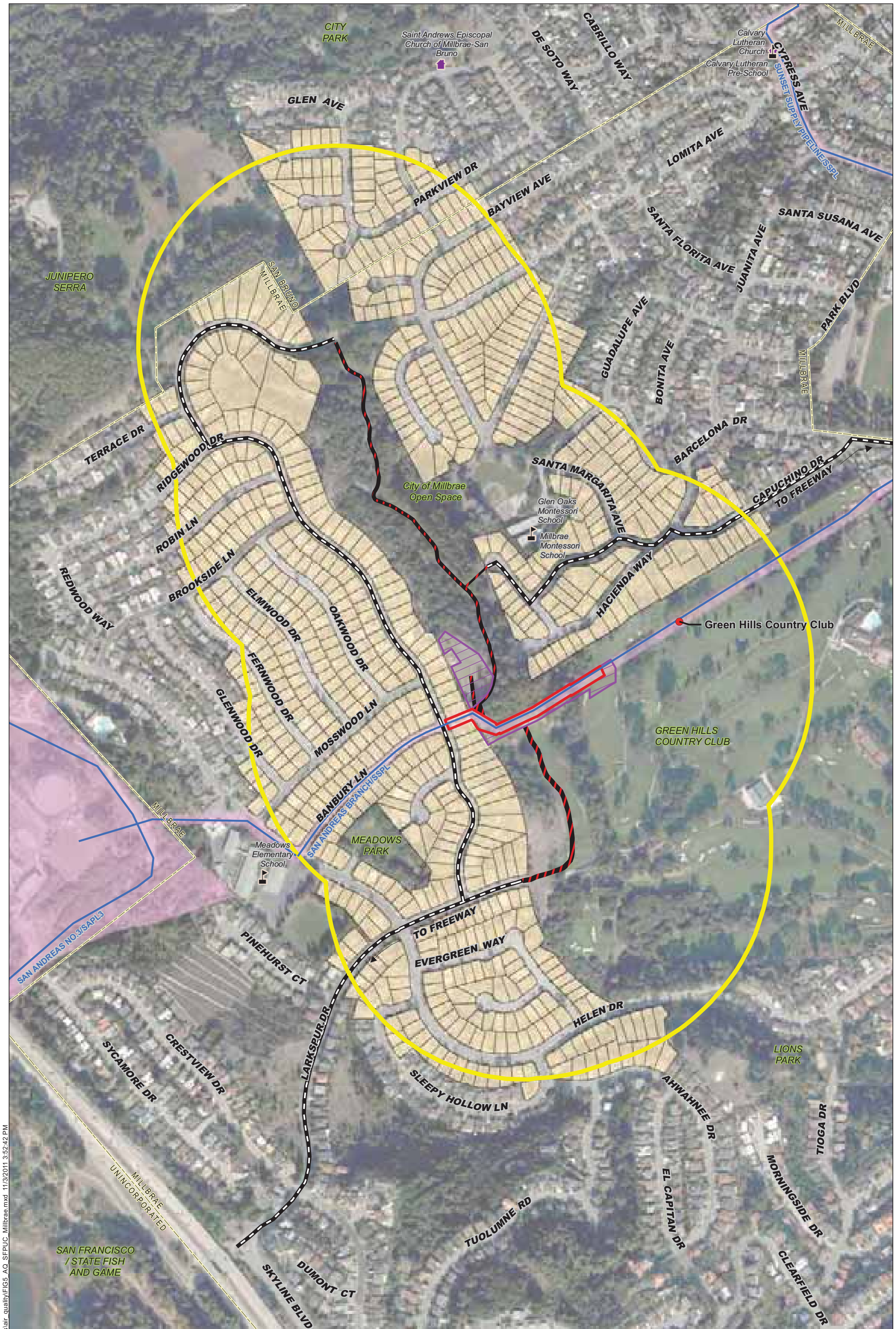

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- Stationary Emission Source
- Church
- School
- 1,000-foot Buffer of Project Sites
- Average Annual Daily Traffic >10,000 Cars per Day
- SFPUC Water Transmission Line
- Residential Sensitive Receptor
- SFPUC Right-of-Way
- City Limits

Project Area
- Construction Zone
- Staging and Spoils Area
- Access Route
- Access Route Requiring Upgrade

N

0 250 500 Feet

AIR QUALITY- MILLBRAE PROJECT SITE

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

November 2011

FIGURE 5

Source: SF PUC Water Transmission line, November 2010
Aerial Imagery, Bing Imagery 2009
Emission sources: BAAQMD

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URS will calculate PPSU project emissions for the following emissions categories:

- Off-road construction equipment;
- On-road haul trucks; and
- On-road vehicles used for construction worker commuting.

For each category of emissions, the methodology and assumptions used to calculate emissions are discussed below.

Because the project will employ Best Management Practices, the fugitive dust emissions do not need to be quantified (BAAQMD, 2011b).

4.1.1 Off-Road Construction Equipment (Exhaust Emissions)

URS will estimate construction equipment exhaust emissions using emission factors from the California Air Resources Board's OFFROAD2011 model[2]. URS will select inputs for the OFFROAD model that will produce emission factors for the years 2014 and 2015. URS will calculate off-road exhaust emissions by combining the OFFROAD emission factors and project-specific construction information (such as construction equipment type, number of pieces of equipment, engine horsepower rating, engine duty load, hours of operation per day, and days of operation per week). If project-specific information is not available, a typical construction equipment list will be created for certain construction activities (like earth moving, vegetation removal, site grading, and pipeline excavation).

4.1.2 On-Road Haul Trucks

URS will calculate haul truck exhaust and idling emissions using the EMFAC2011 model. URS will select inputs required by EMFAC, including analysis years (2014 and 2015), location, vehicle class (heavy duty trucks), and vehicle speeds. URS will also identify average temperature and relative humidity for the project area based on weather station data from the Western Regional Climate Center. URS will use EMFAC to generate running emissions (in units of grams of pollutant per mile) and idling emissions (in units of grams of pollutant per minute). Haul distance will be estimated from the highway to the project area based on project maps. The daily number of trucks trips will be provided by the SFPUC project engineers, or will be estimated based on the amount of spoil material and capacity of the trucks. It is assumed that trucks would not idle along the access routes, and that the trucks would only idle during material loading and unloading at the staging and spoils area. Idling time at the staging and spoils area will be assumed to be 5 minutes, which is the maximum idling time allowed by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations.

4.1.3 On-Road Vehicles Used for Construction Worker Commuting

URS will calculate worker commute exhaust emissions using the EMFAC2011 model. We will select inputs required by EMFAC, including analysis years (2014 and 2015), location, vehicle class, and vehicle speeds. We will also identify average temperature and relative humidity for the project area based on weather station data from the Western Regional Climate Center. EMFAC generates emissions in units of grams of pollutant per mile. Project-specific information about the number of construction workers commuting and worker schedules will be used to estimate the total number of vehicle miles traveled.

[2] Based on URS experience with OFFROAD2011 and conversations with the California Air Resources Board (CARB), the OFFROAD2011 model only provides emission factors for NO_X, ROG, and PM, and does not provide emission factors for CO and SO_X. Therefore, URS proposes to use OFFROAD2007 emission factors along with updated OFROAD2011 activity data for those pollutants. Although CARB has indicated that an update to the OFFROAD2011 model would provide emission factors for CO and SO_X, this model is not anticipated to be available at the time that the analysis for the PPSU project is undertaken (CARB, 2011).

4.1.4 Thresholds of Significance

Average project emissions (total construction emissions divided by number of construction days) will be calculated (without considering the implementation of mitigation measures) using the methodology described above, and compared to the BAAQMD construction thresholds of significance, shown in Table 5.

Table 5
BAAQMD Construction Emission Significance Thresholds

Pollutant/Precursor	Daily Average Emissions (lbs/day)
ROG	54
NO_X	54
PM_{10}	82
$PM_{2.5}$	54

Source: BAAQMD, 2011.

Notes:

BAAQMD = Bay Area Air Quality Management District
lbs/day = pounds per day
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
ROG = reactive organic gases

5.0 HEALTH RISK AND HAZARDS METHODOLOGY

5.1.1 Individual Health Risk Analysis

This SOW assumes that all air emissions generated by the PPSU project will be temporary and associated with construction activities. In addition, this scope assumes that there will be no new operational air emission sources (mobile or stationary) associated with the proposed project. Therefore, the TACs and their related health-risk impacts will be evaluated for the proposed project, as outlined below.

Pipeline construction will generate exhaust emissions that include TACs and $PM_{2.5}$ (see emission methodology described in Section 4.0). TACs and $PM_{2.5}$ pose potential health risks to nearby sensitive receptors. BAAQMD recommends that projects be evaluated for their potential health risk impacts to sensitive receptors located within 1,000 feet of an emission source.

According to the BAAQMD Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 2.0, sensitive receptors are defined as residential dwellings, including apartments, houses, and condominiums; schools, colleges, and universities; daycares; hospitals; and senior-care facilities.

All project sites, with the exception of the Colma project site, are located within residential areas. Figures 2 through 5 identify the sensitive receptors within 1,000 feet of the project area.

As shown on Figure 2, sensitive receptors at the Colma project site include Home Sweet Home Senior Care center and the adjacent residence along El Camino Real, east of the construction zone.

As shown on Figure 3, sensitive receptors within the 1,000-foot buffer at the South San Francisco project site are residences along Orange Avenue, Fairway Drive, and Southwood Drive to the south of the project construction zone and the staging and spoils area; and residences along Arroyo Drive, Alta Mesa Drive, Indio Drive, Del Monte Drive, Camaritas Avenue, Del Paso Drive, Hermosa Lane, and Chico Court to the north of the project construction zone and the staging and spoils area. Other sensitive receptors identified on Figure 3 within the 1,000-foot buffer include the Westborough Royale Assisted Living Center, Our Redeemers Lutheran Church, Baden High School, and South San Francisco Adult School.

As shown on Figure 4, sensitive receptors within a 1,000-foot buffer at the San Bruno North project site include residences along Crestwood Drive and San Bruno Avenue to the west of the project construction zone and the staging and spoils area; residences along Cedarwood Court, Hickory Avenue, Juniper Avenue, Holly Avenue, and Pepper Drive to the east of the project construction zone and the staging and spoils area; and the Shelter Creek condominiums to the southwest of the project construction zone.

As shown on Figure 4, the San Bruno South project site includes sensitive receptors within a 1,000-foot buffer, such as residences along Rosewood Drive, Madison Avenue, and Glenbrook Lane to the west of the project construction zone and the staging and spoils area; the San Mateo Union Community Daycare and Peninsula High School to the south of the project construction zone and the staging and spoils area; and the San Bruno Chinese Church to the east of the project staging and spoil area.

As shown on Figure 5, sensitive receptors near the construction area and the staging and spoils areas at the Millbrae project site include the residences along Lomita Avenue, Terrance Drive, Ridgewood Drive, Robin Lane, Brookside Lane, Glenwood Drive, Fernwood Drive, Elmwood Drive, Oakwood Lane, and Banbury Lane to the west of the project construction zone and the staging and spoils area; residences along Parkview Drive, Bayview Avenue, Santa Barbara Avenue, Guadalupe Avenue, and Santa Margarita Avenue to the east of the project staging and spoils area; and residences along Ridgewood Drive, Helen Drive, and Evergreen Way to the south of the project construction zone and the staging and spoils area. Other notable sensitive receptors within the 1,000-foot area of the emission sources at the Millbrae project site include the Glen Oaks Montessori School and Millbrae Montessori School north of the construction zone. Meadows Elementary School is identified as a sensitive receptor on Figure 5 even though it is outside of the 1,000-foot buffer because of potential impacts, given the proximity to the project.

URS will base the health risk assessment (HRA) on BAAQMD's Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 2.0. BAAQMD considers a significant health risk to be any of the following:

- Noncompliance with a qualified risk reduction plan; or
- An excess cancer risk level of more than 10 in one million, or a noncancer (i.e., chronic or acute) hazard index greater than 1.0 (which would be a cumulatively considerable contribution); or
- An incremental increase of greater than 0.3 microgram per cubic meter ($\mu g/m^3$) annual average $PM_{2.5}$ (which would be a cumulatively considerable contribution).

To evaluate the significance of the project's TAC and $PM_{2.5}$ emissions, URS will use the BAAQMD's tiered modeling approach. Based on consultation with BAAQMD staff (BAAQMD, 2010), URS recommends a modeling approach instead of using the BAAQMD screening tables, which were created for development projects and are not appropriate to evaluate potential health risks for linear infrastructure projects.

URS will first perform a Tier 1 analysis using BAAQMD's Tier 1 SCREEN3 modeling approach to evaluate project health risks. URS will estimate the construction project's maximum grams per second emissions for each pollutant: TACs and $PM_{2.5}$, emitted from off-road construction equipment and truck idling. TACs such as such as acrolein, benzene, 1,3-butadiene, DPM, formaldehyde, naphthalene, and POM will be analyzed because U.S. EPA has listed these compounds as priority toxics (U.S. EPA, 2007). URS does not expect a large number of gasoline-powered engines to be used during construction, and speciated total organic gas emissions from gasoline-powered engines are expected to be minimal. These emissions will only be included in the health risk analysis if the analysis using diesel engine emissions is close to or at the BAAQMD health risk threshold.

It will be assumed that truck emissions along access routes where upgrades to the routes are not required (e.g., paved roads) would not expose sensitive receptors to toxic emissions, given the short exposure time as the truck passes along the access route. However, in areas where access routes require upgrades (e.g., unpaved roads), heavy construction equipment and trucks used for upgrade activities could potentially expose sensitive receptors to toxic emissions. Because the duration and intensity of the upgrade activity is unknown at this time, the access routes that require upgrades will be included in the health risk analysis. In addition, it is possible that truck idling at the staging and spoils area could expose sensitive receptors to TACs over a longer exposure period, and therefore these areas will also be included in the health risk analysis.

URS will then run the SCREEN3 model using project emissions described above as an input to estimate maximum hourly concentrations. We will convert SCREEN3's hourly concentrations to annual values using BAAQMD's standard conversion factors. Assuming the maximum estimated concentrations, we will estimate acute, chronic, and carcinogenic health risks using the methodology described in the California Office of Environmental Health Hazard Assessment's (OEHHA) HRA guidelines. For $PM_{2.5}$, we will compare estimated concentrations to the BAAQMD's threshold of 0.3 $\mu g/m^3$. If the analysis finds no health risks, then we will document the results. Tier 1 modeling uses a nondirectional model; therefore, URS will not prepare a receptor map for this analysis. If the Tier 1 analysis finds potential health risks, then URS will schedule a meeting with SFEP to discuss the Tier 1 results and which Tier 2 model would be the most appropriate for refined health risk modeling.

Under the Tier 2 analysis, we will model the project's ambient concentration emissions using models that are more complex. Based on the discussion with SFEP, URS will use either the ISCST3 or AERMOD model to estimate the project's ambient concentrations at all sensitive receptors within a 1,000-foot radius of the project. URS will identify and submit a draft receptor grid for all project locations requiring a refined health risk analysis. URS will also provide receptor heights. If appropriate meteorological data are available to run AERMOD, then we will use AERMOD. Otherwise, we will use ISCST3 to estimate maximum hourly and annual concentrations. We will use CAL3QHC to estimate maximum hourly and annual concentrations from the on-road haul trucks on the access roads. Once we have estimated total concentrations at all sensitive receptors, we will convert them to health risks using OEHHA's guidelines. If the results of the Tier 2 analysis show that the project would not create significant health risks, then we will document the results. However, if the Tier 2 analysis finds significant health risks, we will conduct a Tier 3 analysis.

The Tier 3 analysis consists of using the same models as in the Tier 2 analysis, but refining the modeling assumptions to better represent on-the-ground conditions, and local factors such as topography. If, using the Tier 3 analysis, we identify significant health risks, then we will examine whether mitigation measures can reduce those risks. This could include using newer, cleaner equipment, or limiting construction hours. We will then rerun the analysis to determine whether mitigation would eliminate health risks.

5.1.2 Cumulative Health Risk Analysis

The individual project-level construction health-risk analysis will then be used as a basis for the cumulative impact analysis to determine the project's contribution to significant cumulative impacts associated with TAC emissions from project construction, and from other past, present, and reasonably foreseeable future projects in the vicinity.

The cumulative impact analysis will consider all existing permitted stationary sources, roadway emissions sources with more than 10,000 vehicles per day, and foreseeable construction projects located within 1,000 feet of the project site. Screening levels for permitted stationary sources, presented in Table 4, were obtained from the BAAQMD and have been provided in Appendix A. Screening levels for roadways, presented in Table 4, will be provided to SFEP when the maximally exposed individual (MEI) has been identified through the individual health risk analysis. The distance between each roadway and the MEI is needed to determine the appropriate screening levels from the BAAQMD screening tables. URS will prepare a list of foreseeable construction projects in the vicinity, and will consult SFEP to identify which projects would be included in the cumulative health risk analysis. Once the list has been determined, screening levels for the construction projects will be determined from BAAQMD *Screening Tables for Air Toxics Evaluation during Construction, Table 2*. If the sum of the screening levels for the permitted stationary sources, roadways with more than 10,000 vehicles per day and foreseeable construction projects within 1,000 feet of the project site exceed the cumulative impact thresholds, then a refined cumulative health risk analysis will be prepared. URS will discuss project-level modeling results and how to address cumulative impacts with SFEP by looking at the MEI at one project location.

If a refined cumulative health risk analysis is required, URS will consult with SFEP on the appropriate methodologies for analysis and, if required, will recommend appropriate mitigation measures for significant cumulative impacts. URS will provide SFPUC with a list of these mitigation measures to be reviewed for feasibility.

6.0 POTENTIAL MITIGATION MEASURES

Should any of the daily average criteria pollutant emissions exceed the thresholds shown in Table 5, mitigation measures will be identified that could reduce the emissions below the threshold.

Mitigation Measures may include those listed in the BAAQMD CEQA Air Quality Guidelines, Tables 8-2 and 8-3.

Appendix B of the BAAQMD CEQA Air Quality Guidelines states that Mitigation Measures 1 through 8 in Table 8-3 would provide a total reduction of 75 percent for fugitive dust emissions when implemented. Mitigation Measure 10 in Table 8-3 would provide a reduction of 20 percent for NO_X emissions and 45 percent for PM emissions, when controls are installed such as late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, or add-on devices such as particulate filters. Mitigation measures will be developed in consultation with SFEP, and the mitigation effectiveness will be used to determine the mitigation emissions and health risks, if warranted.

7.0 CONTENTS OF THE AIR QUALITY TECHNICAL REPORT

The technical report will include the following sections, consistent with SFEP and BAAQMD CEQA 2011 Guidelines (BAAQMD, 2011):

- Project Description

- Project Setting
- Criteria Air Pollutants
  - Criteria Air Pollutant Methodology
  - Criteria Air Pollutant Results
  - Mitigation Measures
  - Summary
- Health Risk Analysis
  - Health Risk Methodology
  - Health Risk Results
  - Mitigation Measures
  - Summary
- Conclusion
- Approved Scope of Work: The approved SOW will be included as an appendix to the technical report.
- Technical Appendices: Copies of model outputs including emissions information, if provided, and any permits obtained from BAAQMD or other regulatory entity (if applicable) will be included as technical appendices.

8.0 ASSUMPTIONS FOR REVIEWING AND FINALIZING THE TECHNICAL REPORT

Prior to preparation of the air quality technical report, the SFPUC, as the project sponsor, will confirm that the project description and associated assumptions for construction are correct. It is assumed that there will be no further changes in the project description. During preparation of the first draft technical report, URS will work with the SFPUC as needed to ensure that proposed mitigation measures are feasible.

URS will prepare two rounds of the Draft Air Quality Technical Report for the proposed project sites in San Mateo County, with the contents as described above, for review by SFEP. URS will respond to comments and incorporate edits by the reviewers in each subsequent submittal. It is assumed that SFEP will provide one set of non-conflicting comments on each draft submittal, and that resolution of any outstanding issues will be conducted through conference calls or meetings, as needed. URS will then prepare a Final Air Quality Technical Report that will serve as the basis for the CEQA air quality analysis, in the form of either a reference document or an appendix included as part of the CEQA document.

9.0 REFERENCES

ABAG (Association of Bay Area Governments), 2009. Projections 2009, December, 2009.

BAAQMD (Bay Area Air Quality Management District), 2010. Personal communication via phone between Tim Rimpo (URS Corporation, Senior Air Quality Scientist) and Sigalle Michael (BAAQMD, Senior Environmental Planner). December 2010.

BAAQMD (Bay Area Air Quality Management District), 2011a. California Environmental Quality Act Air Quality Guidelines. Updated May 2011.

BAAQMD (Bay Area Air Quality Management District), 2011b. Personal communication via phone between Avanti Tamhane (URS Corporation, Air Quality Engineer) and Alison Kirk (BAAQMD, Senior Environmental Planner). October 2011.

CARB (California Air Resources Board), 2011. Personal communication via phone between Jon Tamimi (URS Corporation, Air Quality Specialist) and Nicole Doney (CARB, Manager – Off-road Diesel Analysis Section). November.

U.S. EPA (U.S. Environmental Protection Agency), 2007. Federal Registry, Vol. 72, No. 37, page 8430, February 2007.

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APPENDIX A

Appendix A

Project Locations	Plant Number	Plant Name	Plant Address	City	County	UTM East	UTM North	Plant Cancer Risk (millions)	Plant Chronic Hazard	Plant PM2.5 Concentration (ug/m3)
	G11198	Lexus of Serramonte - Attn: Ray Chin	700 Serramonte Blvd	Colma	San Mateo	547609	4169820	8.722	0.012	na
	8758	Serramonte Ford Body Shop	500 COLLINS AVE	Colma	San Mateo	547670	4169453	0.00	0.000	0.018
	12251	G & M Auto Body	245 COLLINS AVE	Colma	San Mateo	547931	4169803	0.04	0.000	0.000
	12368	Honda of Serramonte	485 SERRAMONTE BLVD	Colma	San Mateo	547994	4169994	0.00	0.000	0.000
Colma Project Site (SAPL2)	G8650	Home of Peace Cemetery	1299 El Camino Real	Colma	San Mateo	548070	4169774	0.222	0.000	na
	G11428	Westborough Chevron	1 Westborough Boulevard	South San Francisco	San Mateo	549896	4167671	22.056	0.037	na
South San Francisco Project Site (SAPL2)	19316	Access Properties LLC	91 WESTBOROUGH BOULEVARD	South San Francisco	San Mateo	549800	4167600	No data	No data	No data
San Bruno North Project Site (SAPL2)	G3134	Shelter Creek Chevron	2101 W San Bruno Ave	San Bruno	San Mateo	550301	4163667	15.446	0.026	na
San Bruno South Project Site (SAPL2/SAPL3)	16280	Verizon Wireless- HWY 35/280	250 COURTLAND DRIVE	San Bruno	San Mateo	550538	4162877	11.14	0.004	0.003
Millbrae Project Site (SSBPL)	G7549	Green Hills Country Club	End of Ludeman Lane	Millbrae	San Mateo	551952	4162183	0.635	0.001	na

APPENDIX 2
DETAILED CONSTRUCTION INFORMATION AND CALCULATIONS

SFPUC Peninsula Pipelines Air Quality Health Risk Analysis															
	Project Scenario				Cumulative Scenario										
	Project Impact (Unmitigated)				Nearby Sources[8]				Nearby Construction Projects[1]				Cumulative Analysis		
Site	Annual Average $PM_{2.5}$ ($\mu g/m^3$)	Cancer Risk (per million)	Chronic Hazard	Acute Hazard	Plant Number/ Roadway/ Interstate	Annual Average $PM_{2.5}$ ($\mu g/m^3$)	Cancer Risk (per million)	Chronic Hazard	Project Name	Annual Average $PM_{2.5}$ ($\mu g/m^3$)[5]	Cancer Risk (per million)	Chronic Hazard	Annual Average $PM_{2.5}$ ($\mu g/m^3$)	Cancer Risk (per million)	Chronic Hazard
Colma[4]	0.024	2.3	0.005	2.280E-07	G11198	N/A	8.722	0.012	Regional Groundwater Storage and Recovery Project	0.046	4.3	0.01	0.199	19	0.087
					8758	0.018	0.000	0.000							
					12251	0.000	0.040	0.000							
					12368	0.000	0.000	0.000							
					G8650	N/A	0.222	0.000							
					El Camino Real[2]	0.077	2.571	0.030							
					Serramonte Blvd[2]	0.034	1.161	0.030							
South SF[4]	0.025	2.4	0.006	2.280E-07	G11428[10]	N/A	0.331	0.001	Regional Groundwater Storage and Recovery Project	0.068	6.5	0.015	0.421	83	0.154
					19316[6]	0.000	0.008	0.000							
					El Camino Real[2]	0.020	0.804	0.030							
					Westborough Blvd[2]	0.204	5.903	0.030							
					5611	0.000	0.000	0.000							
					14240	0.104	58.80	0.021							
					19842	0.000	7.490	0.020							
					G11391[10]	N/A	0.214	0.019							
					G12394[10]	N/A	0.149	0.013							
San Bruno North[4,7]	0.005	0.5	0.001	0.000E+00	G3134[10]	N/A	0.618	0.001	N/A	N/A	N/A	N/A	0.123	8	0.011
					I-280[3]	0.118	6.843	0.009							
San Bruno South	0.072	6.9	0.016	4.561E-07	16280	0.003	11.140	0.004	N/A	N/A	N/A	N/A	0.109	20	0.022
					I-280[3]	0.034	2.008	0.002							
Millbrae[4]	0.033	3.2	0.007	2.280E-07	G7549	N/A	0.635	0.001	N/A	N/A	N/A	N/A	0.033	4	0.008
Thresholds[9]	**0.3**	**10**	**1**	**1**									**0.8**	**100**	**10**

Notes:

[1]Only the Regional Groundwater Storage and Recovery Project was considered. Emissions were estimated by comparing a similar project and scaling the emission rates per well. For health risk, the emissions were treated as if they occurred at the construction site to estimate worst case impact.

[2]Roadway Annual Average PM2.5 and Cancer Risk, for surface streets >10,000 AADT, estimated from screening tables provided by BAAQMD (http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/County%20Surface%20Street%20Screening%20Tables%20Dec%202011.ashx?la=en) and traffic data from the California Environmental Health Tracking Program (CEHTP) Traffic Tool (http://www.ehib.org/traffic_tool.jsp). The maximum acute and chronic hazard index for roadways will be less than 0.03.

[3]Interstate Annual Average PM2.5, Cancer Risk, and Chronic Hazard values estimated from BAAQMD Highway Screening Analysis Tool for San Mateo County (http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/SanMateo-6ft.ashx?la=en).

[4]Only the San Bruno South Site was modeled using ISC. The remaining sites' PM2.5 and DPM concentrations were calculated by ratioing each sites total emissions to the San Bruno South Site's total emissions. The nearest sensitve receptor to the San Bruno South Site was adjacent to the construction area, therefore these results present a worst case scenario at each of the other sites. Meteorological conditions are similar at all sites.

[5]While the BAAQMD threshold for project construction PM2.5 concentrations is 0.3 (μg/m3), in order to meet a cancer risk value of 10 in a million, PM2.5 concentrations from Diesel exhaust cannot exceed 0.101 (μg/m3). Therefore, the worst possible impact from PM2.5 concentrations at any receptor must be equal to or less than 0.101 (μg/m3) to comply with BAAQMD new source thresholds.

[6]For Source #19316, we were provided average daily emissions, and not Annual Average PM2.5, Cancer Risk, or Chronic Hazard. These values were estimated by assuming this source was located at the construction site, and the same methodology using modeling results was used to calculate a worst case impact.

[7]San Bruno North Site Acute Hazard is zero because no gasoline operated equipment operates at the construction site during construction. DPM does not impact Acute Hazard.

[8]Some nearby sources emit PM2.5, but in quantities below the signifcant figures reported to the BAAQMD, these are represented by zero. Sources that do not emit PM2.5 (e.g., gas stations) have N/A for PM2.5 concentrations. Again, for cancer risk and chronic hazard, some sites register values below the significant figures used by the BAAQMD.

[9]The BAAQMD has acute hazard significance thresholds for individual projects, but not for cumulative impacts. Consequently, acute hazards have not been estimated for nearby sources and nearby construction projects.

[10]The BAAQMD gas station cancer risk and chronic hazard distance multipliers were used where appropriate using the distance between the gas station and the nearest sensitive receptor.

SFPUC Peninsula Pipelines - Health Risk Summary

SFPUC Peninsula Pipeline Upgrade	Annual Average $PM_{2.5}$ Concentration at Nearest Receptor	Diesel Particulate Matter Cancer Risk	Gasoline TOG Emissions Cancer Risk
Site	$\mu g/m^3$	Increase Per Million	Increase Per Million
Colma	0.02	2	1.37E-04
South SF	0.03	2	1.37E-04
San Bruno South	0.07	7	2.74E-04
San Bruno North	0.01	0	0.00E+00
Millbrae	0.03	3	1.37E-04
Threshold	0.3	10	10

SFPUC Peninsula Pipeline Upgrade	Acute Hazard Index	Chronic Hazard Index
Site		
Colma	2.28E-06	5.30E-03
South SF	2.28E-06	5.53E-03
San Bruno South	4.56E-06	1.57E-02
San Bruno North	0.00E+00	1.14E-03
Millbrae	2.28E-06	7.24E-03
Threshold	1	1

SFPUC Peninsula Pipeline Upgrade	Concentration at Nearest Receptor - Colma Site	Cancer Risk - Colma Site
Compound	$\mu g/m^3$	Increase Per Million
Acetaldehyde	7.67E-07	6.11E-07
Acrolein	3.56E-07	-
Benzene	6.77E-06	5.39E-05
1,3-Butadiene	1.51E-06	7.20E-05
Ethylbenzene	2.88E-06	1.99E-06
Formaldehyde	4.33E-06	7.24E-06
Naphthalene	1.37E-07	1.31E-06
Total TOG Tailpipe Cancer Rick Increase		**1.37E-04**

SFPUC Peninsula Pipelines - Health Risk Summary

SFPUC Peninsula Pipeline Upgrade	Concentration at Nearest Receptor - South SF Site	Cancer Risk - South SF Site
Compound	μg/m^3	Increase Per Million
Acetaldehyde	7.67E-07	6.11E-07
Acrolein	3.56E-07	-
Benzene	6.77E-06	5.39E-05
1,3-Butadiene	1.51E-06	7.20E-05
Ethylbenzene	2.88E-06	1.99E-06
Formaldehyde	4.33E-06	7.24E-06
Naphthalene	1.37E-07	1.31E-06
Total Gasoline TOG Cancer Rick Increase		**1.37E-04**

SFPUC Peninsula Pipeline Upgrade	Concentration at Nearest Receptor - South San Bruno	Cancer Risk - South San Bruno Site
Compound	μg/m^3	Increase Per Million
Acetaldehyde	1.53E-06	1.22E-06
Acrolein	7.12E-07	-
Benzene	1.35E-05	1.08E-04
1,3-Butadiene	3.01E-06	1.44E-04
Ethylbenzene	5.75E-06	3.98E-06
Formaldehyde	8.66E-06	1.45E-05
Naphthalene	2.74E-07	2.62E-06
Total Gasoline TOG Cancer Rick Increase		**2.74E-04**

SFPUC Peninsula Pipeline Upgrade	Concentration at Nearest Receptor - San Bruno North Site	Cancer Risk - San Bruno North Site
Compound	μg/m^3	Increase Per Million
Acetaldehyde	0.00E+00	0.00E+00
Acrolein	0.00E+00	-
Benzene	0.00E+00	0.00E+00
1,3-Butadiene	0.00E+00	0.00E+00
Ethylbenzene	0.00E+00	0.00E+00
Formaldehyde	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00
Total Gasoline TOG Cancer Rick Increase		**0.00E+00**

SFPUC Peninsula Pipelines - Health Risk Summary

SFPUC Peninsula Pipeline Upgrade	Concentration at Nearest Receptor - Millbrae Site	Cancer Risk - Millbrae Site
Compound	$\mu g/m^3$	Increase Per Million
Acetaldehyde	7.67E-07	6.11E-07
Acrolein	3.56E-07	-
Benzene	6.77E-06	5.39E-05
1,3-Butadiene	1.51E-06	7.20E-05
Ethylbenzene	2.88E-06	1.99E-06
Formaldehyde	4.33E-06	7.24E-06
Naphthalene	1.37E-07	1.31E-06
Total Gasoline TOG Cancer Rick Increase		**1.37E-04**

SFPUC Peninsula Pipelines - Health Risk Data

Cancer Risk

Site	DPM AA Conc µg/m3	Dose	DPM Cancer Risk
Colma	0.026	1.48E-05	2.32E-06
South SF	0.028	1.54E-05	2.42E-06
San Bruno South	0.078	4.36E-05	6.86E-06
San Bruno North	0.006	3.17E-06	4.99E-07
Millbrae	0.036	2.02E-05	3.17E-06

Site	TOG AA Conc µg/m3	Dose	TOG Cancer Risk
Colma	0.0003	1.53E-07	1.37E-10
South SF	0.0003	1.53E-07	1.37E-10
San Bruno South	0.0005	3.05E-07	2.74E-10
San Bruno North	0.0000	0.00E+00	0.00E+00
Millbrae	0.0003	1.53E-07	1.37E-10

Constants		
DBR	302	L/kg-day Adult
	581	L/kg-day Child
EF	350	days/year
ED	70	years
CF	0.000001	
AT	25550	days
ASF	10	

Colma Site Speciated TOG Speciated Cancer Risk

Compound	TOG AA Conc µg/m3	Dose	Cancer Risk
Acetaldehyde	0.026491873	4.2742E-10	6.11E-07
Acrolein	0.000000767	1.98445E-10	-
Benzene	0.000000356	3.77045E-09	5.39E-05
1,3-Butadiene	0.000006768	8.39575E-10	7.20E-05
Ethylbenzene	0.000001507	1.60282E-09	1.99E-06
Formaldehyde	0.000002877	2.41187E-09	7.24E-06
Naphthalene	0.000004329	7.6325E-11	1.31E-06
Total			1.37E-04

SFPUC Peninsula Pipelines - Health Risk Data

Chronic and Acute Inhalation Hazard

Colma Site

Compound	Chronic Inhalation REL	Colma Concentration	Hazard Quotient
DPM	5	0.026491873	0.005298375
Acetaldehyde	1.40E+02	7.67191E-07	5.48E-09
Acrolein	3.50E-01	3.56196E-07	1.02E-06
Benzene	6.00E+01	6.76772E-06	1.13E-07
1,3-Butadiene	2.00E+01	1.50698E-06	7.53491E-08
Ethylbenzene	2.00E+03	2.87697E-06	1.43848E-09
Formaldehyde	9.00E+00	4.32915E-06	4.81E-07
Naphthalene	9.00E+00	1.36998E-07	1.5222E-08
Total			0.005300084

Compound	Acute Inhalation REL	Colma Concentration	Hazard Quotient
DPM	-	0.026491873	-
Acetaldehyde	4.70E+02	7.67191E-07	1.63E-09
Acrolein	2.50E+00	3.56196E-07	1.42478E-07
Benzene	1.30E+03	6.76772E-06	5.21E-09
1,3-Butadiene	-	1.50698E-06	-
Ethylbenzene	-	2.87697E-06	-
Formaldehyde	5.50E+01	4.32915E-06	7.87118E-08
Naphthalene	-	1.36998E-07	-
Total			2.28028E-07

South San Francisco Site

Compound	Chronic Inhalation REL	SSF Concentration	Hazard Quotient
DPM	5	0.027621286	0.005524257
Acetaldehyde	1.40E+02	7.67191E-07	5.47993E-09
Acrolein	3.50E-01	3.56196E-07	1.0177E-06
Benzene	6.00E+01	6.76772E-06	1.13E-07
1,3-Butadiene	2.00E+01	1.50698E-06	7.53491E-08
Ethylbenzene	2.00E+03	2.87697E-06	1.43848E-09
Formaldehyde	9.00E+00	4.32915E-06	4.81016E-07
Naphthalene	9.00E+00	1.36998E-07	1.5222E-08
Total			0.005525966

SFPUC Peninsula Pipelines - Health Risk Data

Compound	Acute Inhalation REL	SSF Concentration	Hazard Quotient
DPM	-	0.027621286	-
Acetaldehyde	4.70E+02	7.67191E-07	1.63232E-09
Acrolein	2.50E+00	3.56196E-07	1.42478E-07
Benzene	1.30E+03	6.76772E-06	5.21E-09
1,3-Butadiene	-	1.50698E-06	-
Ethylbenzene	-	2.87697E-06	-
Formaldehyde	5.50E+01	4.32915E-06	7.87118E-08
Naphthalene	-	1.36998E-07	-
Total			2.28028E-07

San Bruno South Site

Compound	Chronic Inhalation REL	SBS Concentration	Hazard Quotient
DPM	5	0.078300000	0.01566
Acetaldehyde	1.40E+02	1.53438E-06	1.09599E-08
Acrolein	3.50E-01	7.12392E-07	2.0354E-06
Benzene	6.00E+01	1.35354E-05	2.26E-07
1,3-Butadiene	2.00E+01	3.01396E-06	1.50698E-07
Ethylbenzene	2.00E+03	5.75393E-06	2.87697E-09
Formaldehyde	9.00E+00	8.6583E-06	9.62033E-07
Naphthalene	9.00E+00	2.73997E-07	3.04441E-08
Total			0.015663418

Compound	Acute Inhalation REL	SBS Concentration	Hazard Quotient
DPM	-	0.078300000	-
Acetaldehyde	4.70E+02	1.53438E-06	3.26464E-09
Acrolein	2.50E+00	7.12392E-07	2.84957E-07
Benzene	1.30E+03	1.35354E-05	1.04E-08
1,3-Butadiene	-	3.01396E-06	-
Ethylbenzene	-	5.75393E-06	-
Formaldehyde	5.50E+01	8.6583E-06	1.57424E-07
Naphthalene	-	2.73997E-07	-
Total			4.56057E-07

SFPUC Peninsula Pipelines - Health Risk Data

San Bruno North Site

	Chronic Inhalation REL	SBN Concentration	Hazard Quotient
DPM	5	0.005696157	0.001139231
Acetaldehyde	1.40E+02	0	0
Acrolein	3.50E-01	0	0
Benzene	6.00E+01	0	0.00E+00
1,3-Butadiene	2.00E+01	0	0
Ethylbenzene	2.00E+03	0	0
Formaldehyde	9.00E+00	0	0
Naphthalene	9.00E+00	0	0
Total			0.001139231

	Acute Inhalation REL	SBN Concentration	Hazard Quotient
DPM		0.005696157	-
Acetaldehyde	4.70E+02	0	0
Acrolein	2.50E+00	0	0
Benzene	1.30E+03	0	0.00E+00
1,3-Butadiene	-	0	-
Ethylbenzene	-	0	-
Formaldehyde	5.50E+01	0	0
Naphthalene	-	0	-
Total			0

Millbrae Site

	Chronic Inhalation REL	Millbrae Concentration	Hazard Quotient
DPM	5	0.036209174	0.007241835
Acetaldehyde	1.40E+02	7.67191E-07	5.47993E-09
Acrolein	3.50E-01	3.56196E-07	1.0177E-06
Benzene	6.00E+01	6.76772E-06	1.13E-07
1,3-Butadiene	2.00E+01	1.50698E-06	7.53491E-08
Ethylbenzene	2.00E+03	2.87697E-06	1.43848E-09
Formaldehyde	9.00E+00	4.32915E-06	4.81016E-07
Naphthalene	9.00E+00	1.36998E-07	1.5222E-08
Total			0.007243544

SFPUC Peninsula Pipelines - Health Risk Data

	Acute Inhalation REL	Millbrae Concentration	Hazard Quotient
DPM		0.036209174	-
Acetaldehyde	4.70E+02	7.67191E-07	1.63232E-09
Acrolein	2.50E+00	3.56196E-07	1.42478E-07
Benzene	1.30E+03	6.76772E-06	5.21E-09
1,3-Butadiene	-	1.50698E-06	-
Ethylbenzene	-	2.87697E-06	-
Formaldehyde	5.50E+01	4.32915E-06	7.87118E-08
Naphthalene	-	1.36998E-07	-
Total			2.28028E-07

SFPUC Peninsula Pipelines - Construction GHG Summary

	Emissions (Tons)		
Construction Equipment	CH_4	N_2O	CO_2
2014-2015	0.080	0.036	524.2

	Emissions (Tons)		
Haul Trucks	CH_4	N_2O	CO_2
2014-2015	0.00012	0.00011	64.5

	Emissions (Tons)		
Worker Commute	CH_4	N_2O	CO_2
2014-2015	0.017	0.030	204.6

	Total Emissions (Tons)		
	CH_4	N_2O	CO_2
Total	0.098	0.066	793.3
GWP	21	310	1
Total CO_2e	2	20	793

Total CO_2e (Metric Tons)	**740.0**

SFPUC Peninsula Pipelines - Construction Emissions Summary

	Emissions (Tons)								
Construction Equipment	ROG	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_X	CH_4	N_2O	CO_2
2014-2015	0.425	3.032	3.578	0.263	0.242	0.006	0.080	0.036	524.2

Note: PM2.5 Emissions 92% of PM10 emissions per SCAQMD Appendix A CEIDARS Table with PM2.5 Fraction

	Emissions (Tons)								
Haul Trucks	ROG	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_X	CH_4	N_2O	CO_2
2014-2015	0.032	0.089	0.396	0.011	0.010	0.000	0.00012	0.00011	64.5

	Emissions (Tons)								
Worker Commute	ROG	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_X	CH_4	N_2O	CO_2
2014-2015	0.052	1.678	0.163	0.002	0.002	0.000	0.017	0.030	204.642

	Total Emissions (Tons)								
	ROG	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_X	CH_4	N_2O	CO_2
Total (Tons)	0.508	4.799	4.136	0.277	0.255	0.006	0.098	0.066	793
Total (lbs/day)	4.5	42.3	36.4	2.4	2.2	0.1	0.9	0.6	6984.9
BAAQMD CEQA Threshold	54	-	54	82	54	-	-	-	-
Exceeds Threshold?	**No**	-	**No**	**No**	**No**	-	-	-	-

Project Start	10/1/2014
Project End	8/15/2015
Project Life	318
Construction Days	227

SFPUC Peninsula Pipelines - Construction Emissions Summary by Site

Diesel Fuel Construction Emissions

Millbrae	ROG	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_X	CH_4	N_2O	CO_2
Emissions (Tons/Year)	0.09	0.63	0.78	0.05	0.05	0.00	0.02	0.01	114.48
Emissions (grams/second)	0.0253	0.1810	0.2229	0.0157	0.0144	0.0004	0.0047	0.0021	32.7814

San Bruno North	ROG	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_X	CH_4	N_2O	CO_2
Emissions (Tons/Year)	0.01	0.10	0.12	0.01	0.01	0.00	0.00	0.00	16.49
Emissions (grams/second)	0.0217	0.1533	0.1818	0.0136	0.0125	0.0003	0.0040	0.0018	25.9679

San Bruno South	ROG	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_X	CH_4	N_2O	CO_2
Emissions (Tons/Year)	0.19	1.35	1.58	0.12	0.11	0.00	0.04	0.02	226.38
Emissions (grams/second)	0.0381	0.2699	0.3170	0.0238	0.0219	0.0005	0.0070	0.0031	45.4194

Colma	ROG	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_X	CH_4	N_2O	CO_2
Emissions (Tons/Year)	0.06	0.46	0.53	0.04	0.04	0.00	0.01	0.01	76.55
Emissions (grams/second)	0.0294	0.2083	0.2435	0.0183	0.0168	0.0004	0.0054	0.0024	34.9464

South San Francisco	ROG	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_X	CH_4	N_2O	CO_2
Emissions (Tons/Year)	0.07	0.48	0.57	0.04	0.04	0.00	0.01	0.01	83.09
Emissions (grams/second)	0.0268	0.1909	0.2282	0.0167	0.0153	0.0004	0.0050	0.0022	33.1286

SFPUC Peninsula Pipelines - Construction Emissions Summary by Site

Gasoline Vehicle Construction Emissions

Millbrae

	ROG	TOG	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2
Emissions (Tons/Year)	0.0003	0.000415	0.0053	0.0006	0.0000	0.0000	0.0004	0.0002	1.5827
Emissions (grams/second)	0.0001	0.0001	0.0015	0.0002	0.0000	0.0000	0.0001	0.0000	0.4532

San Bruno North

	ROG	TOG	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2
Emissions (Tons/Year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Emissions (grams/second)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

San Bruno South

	ROG	TOG	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2
Emissions (Tons/Year)	0.0006	0.000829	0.0105	0.0012	0.0000	0.0000	0.0007	0.0003	3.1654
Emissions (grams/second)	0.0001	0.0002	0.0021	0.0002	0.0000	0.0000	0.0001	0.0001	0.6351

Colma

	ROG	TOG	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2
Emissions (Tons/Year)	0.0003	0.000415	0.0053	0.0006	0.0000	0.0000	0.0004	0.0002	1.5827
Emissions (grams/second)	0.0001	0.0002	0.0024	0.0003	0.0000	0.0000	0.0002	0.0001	0.7225

South San Francisco

	ROG	TOG	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2
Emissions (Tons/Year)	0.000279	0.000415	0.005272	0.000618	1.3E-05	0	0.000361	0.000159	1.582699
Emissions (grams/second)	0.0001	0.0002	0.0021	0.0002	0.0000	0.0000	0.0001	0.0001	0.6311

SFPUC Peninsula Pipelines - Construction Equipment Emissions

Equipment List Provided in "Comprehensive Equipment List November 2011" Spreadsheet	Project Start	10/1/2014	318
Phase scheduling and duration from "Air Quality Technical Report Scope of Work"	Project End	8/15/2015	227

PPSU Equipment List

Phase/Equipment	Engine HP (1)	Load Factor (2)	OFFROAD LF	Operating Factor	Amount	Hours/Day	Days/Week	Fuel Type	Days	Sites	Hours
Tree Removal	**Tree Removal Occurs at the SSF and Millbrae Sites only From Oct.-Nov. 2014**										
Chain saw	4	43%			2	4	5	Gasoline	30	1.33	319
Brush chipper	49	43%	42%		1	4	5	Diesel	30	1.33	160
Whole tree chippers	490	43%	42%		1	4	5	Diesel	30	1.33	160
Rubber tire skidder and track skid-steer loader	125	54%	37%	75%	1	2	5	DIesel	30	1.33	80
Flatbed truck	300	57%	38%	25%	1	1	5	Diesel	30	1.33	40
Shutdown and dewatering	**Shutdown and Dewatering Occurs at Each Site (5 Sites-San Bruno North and South are Same Site, but two pipelines at San Bruno) Over a 1 Week Period in Dec. 2014**										
Pumps and Hoses	7	43%	40%		2	4	5	Diesel	5	3	120
Generator	108	43%	34%		2	4	5	Diesel	5	3	120
Pickup Truck	175	80%	100%		4	4	5	Gasoline	5	3	240
Baker Tanks	NA	NA	-	NA		NA	NA	NA	-	-	-
Mobilization	**Mobilization Occurs at Each Site Over a 1 Week Period in Dec. 2014**										
Flatbed trucks	300	57%	38%	25%	1	1	5	Diesel	10	5	50
Pickup trucks	175	80%	100%		2	4	5	Gasoline	10	5	400
Shoring/excavation, pipeline removal/installation, dewatering, hydrostatic testing, backfill/restoration	**Phase Occurs at Millbrae, San Bruno South (Two Pipelines, SAPL2 and SAPL3), Colma, and South San Francisco Sites. Phase would take place in 2 months for South San Francisco site**										
Backhoe-Loader	70	38%	37%	85%	1	6	5	Diesel	66	4.31	1707
Cement/Mixer	11	56%	42%	90%	1	4	5	Diesel	66	4.31	1138
Compactor	75	59%	42%	85%	1	2	5	Diesel	66	4.31	569
Concrete Truck with Pump	74	43%	38%	75%	2	1	5	Diesel	66	4.31	569
Crane (with hydraulic or diesel impact hammer attachments)	150	43%	29%	75%	1	6	5	Diesel	66	4.31	1707
Excavator	150	43%	43%	75%	1	6	5	Diesel	66	4.31	1707
Dozer	150	59%	40%	85%	1	2	5	I se	66	4.31	569
Forklift	70	35%	20%	65%	1	1	5	Diesel	66	4.31	284
Grader	70	54%	41%	85%	1	2	5	Diesel	66	4.31	569
Generator	108	43%	34%		1	8	5	Diesel	66	4.31	2276
Loader	125	54%	36%	75%	1	2	5	Diesel	66	4.31	569
Pump	7	43%	40%		2	4	5	Diesel	66	4.31	2276
Street Sweeper	65	68%	46%	35%	1	5	5	Diesel	66	4.31	1422
Tractor	70	38%	37%	85%	1	2	5	Diesel	66	4.31	569
Truck (water, dump, pickup, various off-road)	300	57%	38%	25%	1	5	5	Diesel	66	4.31	1422
Welding Set	20	45%	42%	75%	1	2	5	Diesel	66	4.31	569
Winch	5	43%	42%		1	2	5		66	4.31	569
Disinfection	**Phase takes place at 5 sites (SAPL2 and SAPL3 at San Bruno South, San Bruno North is covered by this, Millbrae, Colma, and South San Francisco) for two weeks**										
Pumps and Hoses	7	74%	40%		2	4	5	Diesel	10	3	240
Generator	108	43%	34%		1	4	5	Diesel	10	3	120
Pickup Truck	175	80%	100%		2	4	5	Gasoline	10	3	240
Baker Tanks	NA	NA	-	NA		NA	NA	NA	-	-	-

Notes:

(1) If the specific horsepower is not known, the AQ consultant can use ARB's OFFROAD state average horsepower for the given equipment types.

(2) The engine load factor is the % the engine is operated compared to the engine capacity (ie, fraction of available power)

SFPUC Peninsula Pipelines - Construction Equipment Emissions

	Emission Factors (lb/hr)							
Phase/Equipment	ROG	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2
Tree Removal								
Chain saw	-	-	-	-	-	-	-	-
Brush chipper	0.04	0.24	0.19	0.02	0.00	0.58	0.26	27.99
Whole tree chippers	0.09	0.65	1.48	0.05	0.00	0.58	0.26	250.21
Rubber tire skidder and track skid-steer loader	0.02	0.34	0.26	0.01	0.00	0.58	0.26	45.99
Flatbed truck	0.08	0.41	1.07	0.04	0.00	0.58	0.26	187.70
Shutdown and dewatering								
Pumps and Hoses	0.03	0.23	0.15	0.01	0.00	0.58	0.26	21.74
Generator	0.04	0.33	0.33	0.03	0.00	0.58	0.26	55.13
Pickup Truck	0.00	0.07	0.01	0.00	0.00	0.50	0.22	22.48
Baker Tanks	-	-	-	-	-	-	-	-
Mobilization								
Flatbed trucks	0.08	0.41	1.07	0.04	0.00	0.58	0.26	187.70
Pickup trucks	0.00	0.07	0.01	0.00	0.00	0.50	0.22	22.48
Shoring/excavation, pipeline removal/installation, dewatering, hydrostatic testing, backfill/restoration								
Backhoe-Loader	0.03	0.28	0.23	0.02	0.00	0.58	0.26	36.46
Cement/Mixer	0.04	0.24	0.19	0.02	0.00	0.58	0.26	27.99
Compactor	0.04	0.30	0.30	0.03	0.00	0.58	0.26	46.87
Concrete Truck with Pump	0.04	0.34	0.24	0.02	0.00	0.58	0.26	52.53
Crane (with hydraulic or diesel impact hammer attachments)	0.06	0.33	0.70	0.04	0.00	0.58	0.26	66.62
Excavator	0.03	0.43	0.47	0.03	0.00	0.58	0.26	94.68
Dozer	0.09	0.55	1.01	0.07	0.00	0.58	0.26	112.92
Forklift	0.03	0.13	0.15	0.01	0.00	0.58	0.26	19.40
Grader	0.09	0.36	0.40	0.04	0.00	0.58	0.26	41.09
Generator	0.04	0.33	0.33	0.03	0.00	0.58	0.26	55.13
Loader	0.05	0.41	0.51	0.04	0.00	0.58	0.26	63.22
Pump	0.03	0.23	0.15	0.01	0.00	0.58	0.26	21.74
Street Sweeper	0.05	0.29	0.28	0.03	0.00	0.58	0.26	40.87
Tractor	0.05	0.41	0.27	0.02	0.00	0.58	0.26	51.38
Truck (water, dump, pickup, various off-road)	0.08	0.41	1.07	0.04	0.00	0.58	0.26	187.70
Welding Set	0.04	0.24	0.19	0.02	0.00	0.58	0.26	27.99
Winch	0.04	0.24	0.19	0.02	0.00	0.58	0.26	27.99
Disinfection								
Pumps and Hoses	0.03	0.23	0.15	0.01	0.00	0.58	0.26	21.74
Generator	0.04	0.33	0.33	0.03	0.00	0.58	0.26	55.13
Pickup Truck	0.00	0.07	0.01	0.00	0.00	0.50	0.22	22.48
Baker Tanks	-	-	-	-	-			-

SFPUC Peninsula Pipelines - Construction Equipment Emissions

	Total Emissions per day (Lbs/Day)								Total Emissions by Activity (Tons/Activity)							
Phase/Equipment	ROG	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2	ROG	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2
Tree Removal																
Chain saw	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brush chipper	0.15	0.98	0.79	0.07	0.00	0.04	0.02	114.62	0.003	0.019	0.016	0.001	0.000	0.001	0.000	2.287
Whole tree chippers	0.36	2.64	6.05	0.22	0.01	0.06	0.03	1024.68	0.007	0.053	0.121	0.004	0.000	0.001	0.001	20.442
Rubber tire skidder and track skid-steer loader	0.03	0.75	0.56	0.03	0.00	0.01	0.00	100.67	0.001	0.015	0.011	0.001	0.000	0.000	0.000	2.008
Flatbed truck	0.03	0.15	0.40	0.02	0.00	0.01	0.01	70.39	0.001	0.003	0.008	0.000	0.000	0.000	0.000	1.404
Shutdown and dewatering																
Pumps and Hoses	0.29	1.97	1.27	0.12	0.00	0.01	0.00	187.00	0.002	0.015	0.010	0.001	0.000	0.000	0.000	1.403
Generator	0.36	3.31	3.36	0.29	0.01	0.10	0.05	557.77	0.003	0.025	0.025	0.002	0.000	0.002	0.001	4.183
Pickup Truck	0.05	0.96	0.11	0.00	0.00	0.02	0.01	287.76	0.000	0.007	0.001	0.000	0.000	0.000	0.000	2.158
Baker Tanks	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mobilization																
Flatbed trucks	0.08	0.41	1.07	0.04	0.00	0.01	0.01	187.70	0.001	0.004	0.010	0.000	0.000	0.000	0.000	1.760
Pickup trucks	0.03	0.48	0.06	0.00	0.00	0.02	0.01	143.88	0.001	0.012	0.001	0.000	0.000	0.001	0.000	3.597
Shoring/excavation, pipeline removal/installation, dewatering, hydrostatic testing, backfill/restoration																
Backhoe-Loader	0.20	1.70	1.36	0.12	0.00	0.01	0.01	218.74	0.025	0.211	0.169	0.014	0.000	0.002	0.001	27.159
Cement/Mixer	0.15	0.95	0.77	0.07	0.00	0.00	0.00	111.96	0.026	0.163	0.132	0.012	0.000	0.000	0.000	19.109
Compactor	0.08	0.60	0.60	0.05	0.00	0.00	0.00	93.74	0.014	0.101	0.102	0.009	0.000	0.000	0.000	15.920
Concrete Truck with Pump	0.07	0.68	0.47	0.04	0.00	0.00	0.00	105.06	0.009	0.081	0.057	0.005	0.000	0.001	0.001	12.681
Crane (with hydraulic or diesel impact hammer attachments)	0.36	1.95	4.19	0.26	0.00	0.08	0.03	399.71	0.057	0.308	0.663	0.041	0.001	0.011	0.005	63.222
Excavator	0.21	2.57	2.84	0.16	0.01	0.08	0.03	568.06	0.022	0.274	0.303	0.017	0.001	0.011	0.005	60.596
Dozer	0.18	1.09	2.02	0.14	0.00	0.01	0.01	225.85	0.032	0.195	0.360	0.024	0.000	0.002	0.001	40.274
Forklift	0.03	0.13	0.15	0.01	0.00	0.00	0.00	19.40	0.005	0.021	0.025	0.002	0.000	0.000	0.000	3.139
Grader	0.18	0.73	0.80	0.08	0.00	0.01	0.00	82.18	0.028	0.116	0.127	0.013	0.000	0.001	0.000	13.085
Generator	0.28	2.62	2.66	0.23	0.01	0.20	0.09	441.03	0.051	0.471	0.478	0.041	0.001	0.029	0.013	79.332
Loader	0.10	0.82	1.03	0.08	0.00	0.01	0.00	126.45	0.016	0.131	0.164	0.014	0.000	0.001	0.001	20.232
Pump	0.27	1.83	1.18	0.12	0.00	0.01	0.00	173.96	0.041	0.280	0.181	0.018	0.000	0.002	0.001	26.597
Street Sweeper	0.26	1.47	1.39	0.14	0.00	0.02	0.01	204.35	0.019	0.108	0.102	0.010	0.000	0.002	0.001	15.038
Tractor	0.09	0.82	0.55	0.05	0.00	0.00	0.00	102.76	0.012	0.102	0.068	0.006	0.000	0.001	0.000	12.758
Truck (water, dump, pickup, various off-road)	0.39	2.05	5.34	0.22	0.01	0.06	0.03	938.52	0.021	0.109	0.285	0.012	0.001	0.008	0.004	50.057
Welding Set	0.07	0.48	0.39	0.03	0.00	0.00	0.00	55.98	0.009	0.054	0.044	0.004	0.000	0.000	0.000	6.398
Winch	0.07	0.48	0.39	0.03	0.00	0.00	0.00	55.98	0.011	0.069	0.056	0.005	0.000	0.000	0.000	8.151
Disinfection																
Pumps and Hoses	0.27	1.83	1.18	0.12	0.00	0.01	0.00	173.96	0.007	0.051	0.033	0.003	0.000	0.000	0.000	4.827
Generator	0.14	1.31	1.33	0.11	0.00	0.10	0.05	220.52	0.003	0.025	0.025	0.002	0.000	0.002	0.001	4.183
Pickup Truck	0.03	0.48	0.06	0.00	0.00	0.02	0.01	143.88	0.000	0.007	0.001	0.000	0.000	0.000	0.000	2.158
Baker Tanks	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Totals (Tons)								0.42	3.03	3.58	0.26	0.01	0.08	0.04	524.16
	Total lbs/day over project duration								3.74	26.69	31.50	2.32	0.05	0.71	0.32	4615.26

Emission Factors (lb/hr) (OFFROAD2011)	HP Bin	ROG	CO	NO_X	PM	SOX	CO_2
Bore/Drill Rigs	50	0.029988915	0.210703504	0.232001972	0.016612176	0.000401229	31.03681551
	120	0.024035366	0.441994991	0.38262669	0.022718873	0.000904678	77.12179156
	175	0.041867199	0.556592722	0.669014727	0.030608054	0.001587351	141.0764132
	250	0.041332965	0.282264052	0.811184119	0.024141949	0.002116469	188.1018818
	500	0.064516733	0.54555961	1.232514548	0.03904963	0.003055597	311.3087928
	750	0.087912023	0.824818073	1.608925001	0.054554502	0.006184592	615.093183
	1000	0.088347477	1.23683307	3.038339143	0.059349515	0.009333628	928.2828483
	9999	0.417798829	12.36709386	12.54139129	0.304281802	0.015469437	1538.524257
Cranes	50	0.045100218	0.180512091	0.157237817	0.015671217	0.000299746	23.18669033
	120	0.058120113	0.290843774	0.581981748	0.04321262	0.000588261	50.14795258
	175	0.061586794	0.353488445	0.795629119	0.042928154	0.000904015	80.34458438
	250	0.075261985	0.254888338	1.083363744	0.049654986	0.00126198	112.1588823
	500	0.085192357	0.597686012	1.337264846	0.055415675	0.001767752	180.1012347
	750	0.083332107	0.912483214	1.558943162	0.054300843	0.003047032	303.0446518
	1000	0.512805559	1.598316948	6.91862576	0.342914548	0.004315315	429.1825446
	9999	0.065101154	15.98157116	1.492080051	0.035572826	0.009759177	970.6062945
Crawler Tractors	50	0.083731164	0.334230567	0.257023822	0.029874401	0.000321631	24.87961487
	120	0.059963156	0.487378889	0.617821071	0.051602031	0.000771992	65.81059833
	175	0.073463064	0.596435747	0.971979511	0.052908323	0.001363571	121.1877854
	250	0.071956023	0.553120655	1.196096868	0.046225751	0.001869265	166.131601
	500	0.109696767	1.754687926	1.808754239	0.069953081	0.002544422	259.2294735
	750	0.154458371	2.653510757	2.638004533	0.096239124	0.004672298	464.6867796
	1000	0.30751652	4.22441392	5.813632206	0.170824226	0.006617073	658.105838
	9999	0.4019931	42.23991479	8.700953946	0.228618827	0.010967053	1090.736296
Excavators	50	0.020517344	0.242551308	0.149395432	0.011440439	0.000323415	25.01756254
	120	0.029190546	0.382976242	0.353303756	0.026326268	0.000863637	73.62308108
	175	0.039634184	0.466825743	0.572615692	0.028145212	0.001262685	112.2215532
	250	0.044725535	0.310089786	0.804530923	0.025524874	0.001785453	158.6827379
	500	0.053206189	0.678720636	0.927726604	0.029896261	0.002294189	233.7354288
	750	0.095990366	1.038327466	1.722973089	0.055618111	0.003895348	387.4146042
	1000	0.18128899	1.843542682	3.919709985	0.104370523	0.005516729	548.6702525
	9999	0.220485115	18.43358328	4.748250695	0.122546405	0.009143357	909.3591397
Graders	50	0.090218016	0.325582723	0.231108085	0.030599467	0.000355999	27.53811547
	120	0.086003073	0.455999976	0.818734278	0.068216072	0.000879376	74.96485037
	175	0.093301672	0.553281717	1.160023659	0.065103648	0.00139433	123.9215568
	250	0.059313252	0.451757268	1.056892157	0.034125547	0.001936569	172.1132158
	500	0.068565743	1.209889361	0.980995925	0.037692565	0.002252463	229.4843588
	1000	0.420554444	3.185262333	6.66461399	0.231942982	0.006916894	687.9245249
	9999	0.648754707	31.84943807	11.7702487	0.354983174	0.011463973	1140.15741

Emission Factors (lb/hr) (OFFROAD2011)	HP Bin	ROG	CO	NO_X	PM	SOX	CO_2
Off-Highway Tractors	50	0.048485333	0.368501131	0.20376866	0.020109039	0.00040393	34.43416935
	120	0.041284284	0.516695372	0.449425686	0.036732414	0.001099588	93.7374366
	175	0.053202545	0.633769083	0.762688226	0.039116723	0.001467419	130.4173375
	250	0.068659788	0.604997752	1.16225817	0.041704374	0.001467419	130.4172686
	500	0.074331322	2.002321824	1.265410018	0.044627292	0.001956559	173.8897453
	750	0.121295255	3.025457719	2.206216938	0.073214186	0.005712399	568.13074
	1000	0.067118202	4.793616936	2.188466854	0.052108588	0.008187493	814.2933746
	9999	0.539303996	47.93137574	9.631363739	0.308378569	0.013569847	1349.599544
Off-Highway Trucks	50	0.033567359	0.29680272	0.142620817	0.014839953	0.00037161	33.02701006
	120	0.040616176	0.415712818	0.414076131	0.03356964	0.001011606	89.90683729
	175	0.05668703	0.506931575	0.698204671	0.039078704	0.001407452	125.0878066
	250	0.070908372	0.332615339	0.966684619	0.041836034	0.001873923	166.5454324
	500	0.101951949	0.715343701	1.469242838	0.056294881	0.002673047	272.3338478
	750	0.221275578	1.094283045	3.080522253	0.127420131	0.004441561	441.7386497
	1000	0.258786788	1.964863462	4.808496491	0.141449959	0.006281426	624.7240418
	9999	0.513438855	19.64666976	8.725828062	0.272991528	0.010410755	1035.409729
Other Construction Equipment	50	0.03741384	0.238165779	0.193714601	0.017482822	0.000361835	27.98955786
	120	0.044969021	0.406285299	0.495436289	0.038667233	0.000948514	80.85871251
	175	0.065387175	0.496774856	0.889831813	0.046532108	0.001198486	106.5158387
	250	0.066574797	0.315246021	1.146393209	0.042163727	0.001507814	153.6183391
	500	0.089014035	0.659379675	1.490536643	0.054915181	0.002495434	254.238497
	750	0.110885162	1.009135786	2.11725649	0.067751052	0.004112958	419.0342873
	1000	0.138209527	1.765307551	3.374592221	0.08856136	0.005824916	593.4511651
	9999	0.240682859	17.6513102	5.068868383	0.139105963	0.009654143	983.5784581
Pavers	50	0.055487743	0.278262664	0.202219936	0.021032164	0.000361835	27.98957047
	120	0.041147118	0.443857429	0.451776752	0.035180426	0.00081171	69.19642095
	175	0.060131453	0.541213346	0.830730067	0.041542811	0.001443433	128.2855354
	250	0.033545657	0.473532583	0.808436584	0.020516787	0.002187018	194.3719737
	500	0.044626896	1.321572026	0.913641401	0.030339945	0.002289388	233.2464465
	750	0.094548636	2.003420773	1.670804037	0.071566353	0.003773356	384.435322
Paving Equipment	50	0.023727661	0.244709057	0.141297946	0.01190735	0.000160224	12.62790615
	120	0.038795815	0.380005786	0.441796234	0.033694466	0.000309311	23.92655659
	175	0.039859719	0.462137603	0.605963541	0.028908044	0.000639306	54.49936854
	250	0.043268294	0.388502939	0.807433198	0.026738365	0.001136686	101.0232984
	500	0.068773298	1.066769861	1.224348107	0.043607673	0.001515581	134.6977729
	750	0.085342807	1.619110901	1.866497041	0.042953446	0.002497971	222.0080198
	1000	0.118986542	2.693123708	3.014066286	0.072910907	0.003537715	314.4156028
Rollers	50	0.031903879	0.215096536	0.159163394	0.01427149	0.000335897	25.98313297
	120	0.041267373	0.371143801	0.459146341	0.034191781	0.000691968	58.98874329
	175	0.036156482	0.451106094	0.561797373	0.026056972	0.001216828	108.1460341
	250	0.055569574	0.334148352	0.953140355	0.033767576	0.001722523	153.0898359
	500	0.086488712	0.76245741	1.435751668	0.055824203	0.002150548	219.1011349
	750	0.218826465	1.163859172	3.703076393	0.137907069	0.00354452	361.1211087

Emission Factors (lb/hr) (OFFROAD2011)	HP Bin	ROG	CO	NO_X	PM	SOX	CO_2
Rough Terrain Forklifts	50	0.040937481	0.191451728	0.219016471	0.018266333	0.000437704	33.85834624
	120	0.024744855	0.367289655	0.381376168	0.0222782	0.000732568	62.44984678
	175	0.021014268	0.449590057	0.412823555	0.016016718	0.001405335	124.8996497
	250	0.028412223	0.283521106	0.550831565	0.016079034	0.001921754	170.7965158
	500	0.046589829	0.574822267	1.159676827	0.025231819	0.002518328	256.5710083
	750	0.035978202	0.88028138	0.724296682	0.004914795	0.004150693	422.8787178
Rubber Tired Dozers	50	0.088712637	0.35860866	0.241104992	0.031770056	0.000384649	34.18584395
	120	0.072404844	0.485129998	0.680747655	0.060929121	0.001047101	93.06143983
	175	0.103577291	0.595741438	1.282812198	0.073406668	0.001456836	129.47682
	250	0.109604856	0.570133897	1.465813294	0.072162945	0.002064545	183.4871497
	500	0.180350297	1.903973564	2.486367961	0.115927131	0.00259981	264.8723608
	750	0.215861417	2.876157158	3.638106321	0.131152831	0.00400971	398.7885022
Rubber Tired Loaders	50	0.058119808	0.29319432	0.202981924	0.022474988	0.000402687	31.14966698
	120	0.049281126	0.402520986	0.489883337	0.04252833	0.000691086	58.91350868
	175	0.059833316	0.488263019	0.75039378	0.041912381	0.001196228	106.3152085
	250	0.055187449	0.372807208	0.902545614	0.030680857	0.001676244	148.9766598
	500	0.088744896	0.92407523	1.32453883	0.049914082	0.002326314	237.0083678
	750	0.160734677	1.407481987	2.304024989	0.091047687	0.004881859	485.5286567
	1000	0.22818113	2.494032461	4.467025899	0.130155096	0.005971252	593.8751718
	9999	0.416194511	24.93783058	7.719196666	0.222738449	0.009896677	984.2812014
Scrapers	50	0.101263756	0.362095092	0.258221936	0.034428914	0.000404633	34.49406131
	120	0.053286105	0.530723795	0.63364134	0.047192455	0.001101501	93.90047577
	175	0.104893207	0.646526613	1.397335322	0.074006221	0.001666085	148.0737973
	250	0.146694815	0.56890906	2.1090713	0.096414458	0.0023569	209.4702603
	500	0.160464052	1.685573712	2.527906048	0.101967828	0.003154925	321.4284902
	750	0.183150806	2.55356326	3.011652051	0.113873261	0.005583152	555.2768033
	1000	0.980008256	4.199428693	13.53039902	0.630836668	0.007907057	786.4026307
	9999	0.861050477	41.9900875	14.96088386	0.561018049	0.013105056	1303.373778
Skid Steer Loaders	50	0.019392152	0.168233718	0.160353612	0.010087433	0.000329899	25.51915711
	120	0.014400341	0.333896172	0.229974894	0.013438785	0.000501618	42.76182448
	175	0.031123883	0.413177631	0.516097878	0.023526938	0.000917594	78.22283037
	250	0.034030193	0.230332916	0.599186383	0.021567164	0.001073321	95.39174781
	500	0.042055704	0.44786022	0.690330552	0.024286427	0.001431095	127.1890364
	750	0.05071406	0.681604493	1.033065663	0.042752973	0.002358721	209.6321677
	1000	0.147657954	1.128676344	3.112225144	0.097481934	0.003340504	296.8884837
Surfacing Equipment	50	0.022358079	0.163830769	0.128618609	0.010294097	0.000182377	14.10763896
	120	0.027232072	0.292442946	0.32539375	0.023035543	0.000748014	63.76655124
	175	0.039155267	0.355500791	0.573161908	0.027361951	0.00096511	85.77446386
	250	0.036323958	0.278912415	0.732703821	0.02144167	0.001517508	134.8690496
	500	0.047184278	0.636622841	0.938180194	0.030225927	0.002171228	221.2079029
	750	0.058700861	0.970291342	1.342764731	0.042182938	0.003489472	347.0479412
	1000	0.133110853	1.623969126	3.104490832	0.075798311	0.004941914	491.501558
	9999	0.101830148	16.23806729	2.904234794	0.065386882	0.008190666	814.6084682

Emission Factors (lb/hr) (OFFROAD2011)	HP Bin	ROG	CO	NO_X	PM	SOX	CO_2
Tractors/Loaders/Backhoes	50	0.03435074	0.244625835	0.167069991	0.015192351	0.000392312	30.34710008
	120	0.032305074	0.378434381	0.374726912	0.029437038	0.000606796	51.72804132
	175	0.040869515	0.460430396	0.577399938	0.029039667	0.001140777	101.3869799
	250	0.044824471	0.317792112	0.816554735	0.026336972	0.001932336	171.7369962
	500	0.067108406	0.711275287	1.167301218	0.039484846	0.003880192	344.8534574
	750	0.117548129	1.087502067	1.980928333	0.071709253	0.005820288	517.2800517
	1000	0.098908473	1.931133558	2.686850431	0.059602075	0.008242897	732.5902884
	9999	0.455672463	19.30940445	8.988905527	0.27679098	0.013661673	1214.185882
Trenchers	50	0.046175667	0.335072078	0.240398243	0.022055796	0.000425546	32.9178402
	120	0.061463232	0.535464327	0.656071441	0.051170068	0.000761253	64.89516582
	175	0.091242895	0.654791984	1.227122933	0.062979783	0.001619099	143.8979218
	250	0.099342651	0.594033023	1.569015647	0.062397347	0.002508016	222.9006508
	500	0.100402892	1.713394201	1.735722484	0.063986055	0.003055596	311.3087057
	750	0.066705276	2.594287842	1.251982463	0.042037408	0.005900894	586.8776746
	1000	0.889742609	4.119088678	12.49054333	0.565674487	0.008357054	831.1569013
Sweepers/Scrubbers	50	0.052210079	0.254578214	0.205580398	0.021546169	0.000407875	31.55095076
	120	0.053584631	0.439692512	0.539934925	0.047527788	0.000880259	75.04011146
	175	0.115889975	0.542885561	1.458883883	0.080611056	0.001563929	138.9947762
	250	0.085625019	0.306729504	1.376421437	0.054471626	0.001822985	162.0184156
	500	0.114815093	0.601926187	1.829759176	0.07904971	0.002430647	216.024621
	1000	0.111614522	1.590456689	3.434816864	0.087358734	0.00567369	504.2511835
Aerial Lifts	50	0.006744062	0.153267999	0.128317866	0.0049404	0.000253544	19.61275253
	120	0.008409682	0.287513613	0.16962825	0.008087334	0.000446602	38.071823
	175	0.014242371	0.351209128	0.285917012	0.011747	0.000816955	69.64356149
	250	0.129224652	0.227984526	1.685691444	0.087593211	0.001262387	128.6138718
	500	0.050400631	0.475424897	1.18829982	0.026127831	0.002089252	212.8560798
Forklifts	50	0.032825863	0.1061752	0.112872822	0.012334582	0.000189672	14.67194704
	120	0.023965262	0.188785823	0.249962367	0.020940764	0.000366284	31.22492091
	175	0.029916618	0.234649143	0.397683975	0.021605166	0.000630708	56.0543495
	250	0.046854489	0.127592487	0.671140728	0.030444365	0.000867753	77.12182278
	500	0.068141196	0.244562341	0.967570691	0.044031504	0.001089306	110.9801454
	1000	0.50167381	0.621909372	6.09118519	0.340176846	0.001542713	157.1740036
Other General Industrial Equipment	50	0.033239678	0.229001472	0.147647254	0.014381476	0.000281103	21.74457718
	120	0.035937219	0.348002063	0.37067456	0.031645216	0.000727714	62.03600068
	175	0.048524165	0.423851807	0.650752149	0.035033104	0.001079399	95.93198455
	250	0.063467839	0.278120929	0.968966276	0.040088775	0.001525551	135.583839
	500	0.078352102	0.603539686	1.219803936	0.04608038	0.002605102	265.4117198
	750	0.094188097	0.925994562	1.614015965	0.051402032	0.004398438	437.4499226
	1000	0.190794578	1.668243046	4.252685162	0.11117068	0.005626654	559.6030204
	9999	0.267488398	16.68076222	6.572480341	0.170016095	0.009325545	927.478971

Emission Factors (lb/hr) (OFFROAD2011)	HP Bin	ROG	CO	NO_X	PM	SOX	CO_2
Other Material Handling Equipment	50	0.043645101	0.263502851	0.179164486	0.017914474	0.00039215	30.33456104
	120	0.037436442	0.406097701	0.436154179	0.033463832	0.00071168	60.66911279
	175	0.055009923	0.494691101	0.730434665	0.039403548	0.001373588	122.0780974
	250	0.074698414	0.32498669	1.174221581	0.046056531	0.001631656	145.0140361
	500	0.079092755	0.707081099	1.25810373	0.048768636	0.001880869	191.6257044
	750	0.093536916	1.084723819	1.698346455	0.057613756	0.003100037	315.8362774
	1000	0.033760058	1.953139905	1.815842363	0.014192383	0.004390382	447.2984968
	9999	0.106784854	19.52944591	3.144428575	0.060848947	0.007276565	741.3468734

SFPUC Peninsula Pipelines - Haul Truck Emissions

PPSU Equipment List			Total Trips for Haul Trucks (1)					One-Way Distance (miles) (5)					Vehicle Miles Traveled				
Phase/Equipment	**Days/Week**	**Fuel Type**	Colma	SSF	SBN	SBS	Millbrae	Colma	SSF	SBN	SBS	Millbrae	Colma	SSF	SBN	SBS	Millbrae
Tree Removal																	
Haul truck(2)	5	Diesel	0	5	0	0	21	1.4	1.85	0.3	1.3	1.5	0	19	0	0	63
Mobilization																	
Haul trucks (2,3)	5	Diesel	80	80	80	80	80	1.4	1.85	0.3	1.3	1.5	224	296	48	208	240
Shoring/excavation, pipeline removal/installation, dewatering, hydrostatic testing, backfill/restoration																	
Haul Trucks (2,4)	5	Diesel	558	1354	17	4086	1026	1.4	1.85	0.3	1.3	1.5	1562	5010	10	10624	3078

Notes:

(1) Total trips associated with on-site or off-site hauling for haul trucks

(2) Assume haul truck capcity is 10 cubic yards; for pipe delivery and shoring materials delivery assume a 40-foot long flat bed truck

(3) Assuming 8 trips per day for 2 week period

(4) See Project Description Table 3-2 for a break-down of total trips associated with soil excavation/off-haul; backfill material on-haul; off-haul of existing pipe; on-haul of new pipe and shoring; and off-haul of shoring post-construction

Assume truck trips are one-way (i.e. don't carry material on and material off in same trip)

(5) Distances are one way from the freeway to project site

Haul Truck Emission Factors									
Grams/Mile									
Vehicle/Yea	ROG	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_X	CH_4	N_2O	CO_2
T7-2014	1.34	3.79	16.80	0.47	0.43	0.00	0.01	0.00	2736
Pounds/Mile									
Vehicle/Yea	ROG	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_X	CH_4	N_2O	CO_2
T7-2014	0.00	0.01	0.04	0.00	0.00	0.00	0.00	0.00	6.03

Project Start	10/1/2014
Project End	8/15/2015
Project Life	318
Construction Days	227

Notes:

EMFAC 2011 Emission factors for T7-Single Construction Trucks at 15 mph in the Bay Area

CH4 and N2O Emission factors from California Climate Action Registry General Reporting Protocol Version 3.1

SFPUC Peninsula Pipelines - Haul Truck Emissions

PPSU Equipment List	Emission Factors (lb/mile)									Emissions (Tons)								
Phase/Equipment	ROG	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_X	CH_4	N_2O	CO_2	ROG	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_X	CH_4	N_2O	CO_2
Tree Removal																		
Haul truck(2)	0.0030	0.0083	0.0370	0.0010	0.0010	0.0000	0.0000	0.0000	6.0316	1.21E-04	3.40E-04	1.51E-03	4.25E-05	3.91E-05	0.00E+00	4.58E-07	4.31E-07	2.46E-01
Mobilization																		
Haul trucks (2,3)	0.00296	0.00835	0.03703	0.00104	0.00096	0.00000	0.00001	0.00001	6.03159	0.002	0.004	0.019	0.001	0.000	0.000	0.000	0.000	3.064
Shoring/excavation, pipeline removal/installation, dewatering, hydrostatic testing, backfill/restoration																		
Haul Trucks (2,4)	0.00296	0.00835	0.03703	0.00104	0.00096	0.00000	0.00001	0.00001	6.03159	0.03	0.08	0.38	0.01	0.01	0.00	0.00	0.00	61.17
	Totals (Tons)									**0.03**	**0.09**	**0.40**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**64.48**
	Total lbs/day over project duration									**0.28**	**0.79**	**3.49**	**0.10**	**0.09**	**0.00**	**0.00**	**0.00**	**567.77**

SFPUC Peninsula Pipelines - Worker Commute Emissions

PPSU Equipment List								
Phase/Equipment	**Workers/Crew**	**Crews/Site**	**Workers/Site**	**Number of Sites**	**Days/Site**	**Commute Distance (Miles) One-Way)**	**Daily Distance**	**Total Distance**
Tree Removal	**Tree Removal Occurs at the SSF and Millbrae Sites only From Oct.-Nov. 2014**							
Worker Commute	20	2	40	1.33	30	16.8	1787.52	53625.6
Shutdown and dewatering	**Shutdown and Dewatering Occurs at 3 Sites (One for each pipeline) Over a 1 Week Period in Dec. 2014**							
Worker Commute	20	2	40	3.00	5	16.8	4032	20160
Mobilization	**Mobilization Shutdown and Dewatering Occurs at Each Site (4 Sites-San Bruno North and South are Same Site) Over a 1 Week Period in Dec. 2014**							
Worker Commute	20	2	40	5.00	10	16.8	6720	67200
Shoring and excavation, pipeline removal and installation, intermittent dewatering, hydrostatic testing, backfill and restoration	**Phase Occurs at Millbrae, San Bruno South (Two Pipelines, SAPL2 and SAPL3), Colma, and South San Francisco Sites. Phase would take place in 2 months for South San Francisco site**							
Worker Commute	20	2	40	3.875	81	16.8	5208	421848
Disinfection	**Phase takes place at 3 sites (one for each pipeline) for two weeks**							
Worker Commute	20	2	40	3.00	10	16.8	4032	40320

Worker Commute Emission Factors									
Grams/Mile									
Vehicle/Year	ROG	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_X	CH_4	N_2O	CO_2
LDA-2014	0.0428	1.4454	0.1347	0.0021	0.0019	0.0000	0.0178	0.0273	281.1868
LDT-2014	0.1133	3.6032	0.3548	0.0047	0.0043	0.0000	0.0346	0.0621	334.4060
Pounds/Mile									
Vehicle/Year	ROG	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_X	CH_4	N_2O	CO_2
LDA-2014	9.44E-05	3.19E-03	2.97E-04	4.59E-06	4.17E-06	0.00E+00	3.92E-05	6.02E-05	6.20E-01
LDT-2014	2.50E-04	7.94E-03	7.82E-04	1.04E-05	9.49E-06	0.00E+00	7.63E-05	1.37E-04	7.37E-01
Combined	1.72E-04	5.57E-03	5.40E-04	7.50E-06	6.83E-06	0.00E+00	5.78E-05	9.85E-05	6.79E-01

Notes:
EMFAC 2011 Emission factors for LDA and LDT at 35 mph in the Bay Area
CH4 and N2O Emission factors from California Climate Action Registry General Reporting Protocol Version 3.1 Table C.4
Assumed a 50-50 split of LDA and LDT for worker vehicles, assumption from URBEMIS

Project Start	10/1/2014
Project End	8/15/2015
Project Life	318
Construction Days	227

SFPUC Peninsula Pipelines - Worker Commute Emissions

PPSU Equipment List	Emission Factors (lb/mile)								
Phase/Equipment	ROG	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_X	CH_4	N_2O	CO_2
Tree Removal									
Worker Commute	0.000172	0.005565	0.000540	0.000007	0.000007	0.000000	0.000058	0.000099	0.678575
Shutdown and dewatering									
Worker Commute	0.000172	0.005565	0.000540	0.000007	0.000007	0.000000	0.000058	0.000099	0.678575
Mobilization									
Worker Commute	0.000172	0.005565	0.000540	0.000007	0.000007	0.000000	0.000058	0.000099	0.678575
Shoring and excavation, pipeline removal and installation, intermittent dewatering, hydrostatic testing, backfill and restoration									
Worker Commute	0.000172	0.005565	0.000540	0.000007	0.000007	0.000000	0.000058	0.000099	0.678575
Disinfection									
Worker Commute	0.000172	0.005565	0.000540	0.000007	0.000007	0.000000	0.000058	0.000099	0.678575

SFPUC Peninsula Pipelines - Worker Commute Emissions

PPSU Equipment List	Total Emissions per Day (Lbs/Day)									Total Emissions by Activity (Tons/Activity)								
Phase/Equipment	ROG	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_X	CH_4	N_2O	CO_2	ROG	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_X	CH_4	N_2O	CO_2
Tree Removal																		
Worker Commute	0.31	9.95	0.96	0.01	0.01	0.00	0.10	0.18	1213	0.0046	0.1492	0.0145	0.0002	0.0002	0.0000	0.0015	0.0026	18.1945
Shutdown and dewatering																		
Worker Commute	0.69	22.44	2.18	0.03	0.03	0.00	0.23	0.40	2736	0.0017	0.0561	0.0054	0.0001	0.0001	0.0000	0.0006	0.0010	6.8400
Mobilization																		
Worker Commute	1.16	37.40	3.63	0.05	0.05	0.00	0.39	0.66	4560	0.0058	0.1870	0.0181	0.0003	0.0002	0.0000	0.0019	0.0033	22.8001
Shoring and excavation, pipeline removal and installation, intermittent dewatering, hydrostatic testing, backfill and restoration																		
Worker Commute	0.90	28.98	2.81	0.04	0.04	0.00	0.30	0.51	3534	0.0363	1.1738	0.1138	0.0016	0.0014	0.0000	0.0122	0.0208	143.1277
Disinfection																		
Worker Commute	0.69	22.44	2.18	0.03	0.03	0.00	0.23	0.40	2736	0.0035	0.1122	0.0109	0.0002	0.0001	0.0000	0.0012	0.0020	13.6801
	Totals (Tons)									**0.05**	**1.68**	**0.16**	**0.00**	**0.00**	**0.00**	**0.02**	**0.03**	**204.64**
	Total lbs/day over project duration									**0.46**	**14.78**	**1.43**	**0.02**	**0.02**	**0.00**	**0.15**	**0.26**	**1801.88**

SFPUC Peninsula Pipelines - Cancer Potency Factors

Cancer Potency Factors										
Toxic Compounds	EMFAC Gasoline TOG Speciation	Unit Factor	(HARP) Residential Cancer Risk Factors	Unit Cancer Risk Weighted Factor	Cancer Potency Factor	Cancer Potency Factor Weighted	Chronic Noncancer Reference Dose	Unit Chronic Noncancer Risk Weighted Factor	Acute Noncancer Reference Dose	Unit ACUTE Noncancer Risk Weighted Factor
	(%TOG)		(ug/m3)-1	(ug/m3)-1	(mg/kg-d)-1	(mg/kg-d)-2	(ug/m3)	(ug/m3)	(ug/m3)	(ug/m3)
Acetaldehyde	0.28%	0.0028	0.0000027	7.54E-09	1.00E-02	2.80E-05	140	0.39	470	1.31
Acrolein	0.13%	0.0013	0	0	7.00E-02	-	0.35	0.00046	2.5	0.0033
Benzene	2.47%	0.0247	0.000029	7.17E-07	1.00E-01	2.47E-03	60	1.48	1300	32.14
1,3-Butadiene	0.55%	0.0055	0.000174	9.49E-07	6.00E-01	3.30E-03	20	0.11	0	0
Ethylbenzene	1.05%	0.0105	2.52E-06	2.64E-08	8.70E-03	9.14E-05	2000	20.97	0	0
Formaldehyde	1.58%	0.0158	6.08E-06	9.60E-08	2.10E-02	3.32E-04	9	0.14	55	0.87
Hexane	1.60%	0.016	0	0	-	-	7000	111.92	0	0
Methanol	0.12%	0.0012	0	0	-	-	4000	4.89	28000	34.22
MEK	0.02%	0.0002	0	0	-	-	0	0	13000	2.37
Naphthalene	0.05%	0.0005	0.000035	1.64E-08	1.20E-01	6.00E-05	9	0.0042	0	0
Propylene	3.06%	0.0306	0	0	-	-	3000	91.86	0	0
Styrene	0.12%	0.0012	0	0	-	-	900	1.11	21000	25.79
Toluene	5.76%	0.0576	0	0	-	-	300	17.27	37000	2129.65
Xylenes	4.80%	0.048	0	0	-	-	700	33.61	22000	1056.22
Toxicity Weighted Factor				1.81E-06		6.28E-03		283.77		3282.58
	5.06%			1.81E-06						

Table from OEHHA "Air Toxis Hot Spots Program Guidance Manual for Preparation fo Health Risk Assessments"

SFPUC Peninsula Pipelines - BAAQMD Source # P-19316

BAY AREA AIR QUALITY MANAGEMENT DISTRICT Printed: NOV 29, 2011
DETAIL POLLUTANTS - ABATED
MOST RECENT P/0 APPROVED (2011)

Access Properties LLC (P# 19316)

S# SOURCE NAME
MATERIAL SOURCE CODE
THROUGHPUT DATE
Standby Diesel Generator
C22AG098

POLLUTANT	CODE	LBS/DAY
Benzene	41	7.66E-05
Formaldehyde	124	6.34E-06
Organics (part not spec el	990	0.000662
Arsenic (all)	1030	6.67E-08
Beryllium (all) pollutant	1040	3.91E-08
Cadmium	1070	1.67E-07
Chromium (hexavalent)	1095	3.45E-09
Lead (all) pollutant	1140	1.42E-07
Manganese	1160	2.22E-07
Nickel pollutant	1180	2.7E-06
Mercury (all) pollutant	1190	4.72E-08
Diesel Engine Exhaust Particulates	1350	0.000763
PAH's (non-speciated)	1840	3.52E-07
Nitrous Oxide (N2O)	2030	2.05E-05
Nitrogen (Oxides (part not	2990	0.0141
Sulfur Dioxide (SO2)	3990	0.000025
Carbon Monoxide (CO)	4990	0.00617
Carbon Dioxide, non-biogen	6960	2.57
Methane (CH4)	6970	0.000103

Note: Data provide by BAAQMD on November 29, 2011

SFPUC Peninsula Pipelines - Regional Groundwater Storage and Recovery Project Emissions Estimation

SFPUC Regional Groundwater Storage and Recovery Project - Estimated Construction Emissions and DPM Cancer Risk

Project	Number of Wells	Flow (MGD)	Flow/Well (MGD)	Well size ratio (RGSRP/GWSP)	Construction Emissions (PM_{10}) Total (lbs)	Construction Emissions (PM_{10}) Per Well (lbs)	Cancer Risk/Well (Per million)	Number of Wells Colma	Number of Wells South SF	Total Cancer Risk Colma	Total Cancer Risk South SF
SFPUC GWSP	4	2.5	0.63		410	103					
SFPUC RGSRP	16	7.3	0.46	73%		75	2.2	2	3	4.3	6.5

SFPUC Peninsula Pipelines - Nearby Roadway and Highway Health Screening Information by Site

Surface Streets

Site	Roadway	AADT	Direction	Distance (ft)	$PM_{2.5}$	Cancer Risk
Colma	Serramonte	35,290	E-W	607	0.03	1.16
	El Camino Real	17,000	N-S	165	0.077	2.571
South SF	El Camino Real	25,435	N-S	847	0.02	0.80
	Westborough	40,672	E-W	131	0.20	5.90

Highways

Site	Highway	Direction	Distance (ft)	$PM_{2.5}$	Cancer Risk	Chronic	Acute
San Bruno North	I-280	E	205	0.118	6.843	0.009	0.012
San Bruno South	I-280	W	531	0.034	2.008	0.002	0.004

SFPUC Peninsula Pipelines - ISC Modeling Information Summary

San Bruno South ISC Modeling Results		
Met Data Year	Annual PM10 (ug/m3)	Annual PM2.5 (ug/m3)
1991	0.0704	0.0647
1992	Invalid met data	Invalid met data
1993	0.0829	0.0763
1994	0.0863	0.0794
1995	0.0737	0.0678
Four year average	0.0783	0.0721
Significance Threshold	N/A	**0.3**
Meteorological data provided by Jim Cordova, BAAQMD.		

SFPUC Peninsula Pipelines - EMFAC2011 HHDD Truck 2014 Emission Factors

EMFAC 2011
2014 Estimated Annual Emission Rates
EMFAC 2011 Vehicle Categories
San Mateo COUNTY
San Francisco Bay Area AIR BASIN
Bay Area AQMD
Area
San Mateo (SF)

CalYr	Season	Veh	Fuel	MdlYr	Speed	ROG_RUNEX	CO_RUNEX	NOX_RUNEX	CO2_RUNEX(	PM10_RUNEX	PM2_5_RUNEX	SOX_RUNEX
					(Miles/hr)	(gms/mile)	(gms/mile)	(gms/mile)	(gms/mile)	(gms/mile)	(gms/mile)	(gms/mile)
2014	Annual	T7 sir	DSL	AllMYr	15	1.344	3.787	16.797	2694.845	0.473	0.435	0

SFPUC Peninsula Pipelines - EMFAC2011 Light Duty Automobile 2014 Emission Factors

EMFAC 2011
2014 Estimated Annual Emission Rates
EMFAC 2011 Vehicle Categories
San Mateo COUNTY
San Francisco Bay Area AIR BASIN
Bay Area AQMD
Area
San Mateo (SF)

CalYr	Season	Veh	Fuel	MdlYr	Speed	ROG_RUNEX	CO_RUNEX	NOX_RUNEX	CO2_RUNEX(Pa	PM10_RUNEX	PM2_5_RUNEX	SOX_RUNEX
					(Miles/hr)	(gms/mile)	(gms/mile)	(gms/mile)	(gms/mile)	(gms/mile)	(gms/mile)	(gms/mile)
2014	Annual	LDA	GAS	AllMYr	35	0.04275	1.45033	0.13318	281.23682	0.00192	0.00174	0.00000
2014	Annual	LDA	DSL	AllMYr	35	0.05498	0.25373	0.50897	268.97861	0.04118	0.03789	0.00000
						0.04280	1.44545	0.13471	281.18681	0.00208	0.00189	0.00000

SFPUC Peninsula Pipelines - EMFAC2011 Light Duty-1 Truck 2014 Emission Factors

EMFAC 2011
2014 Estimated Annual Emission Rates
EMFAC 2011 Vehicle Categories
San Mateo COUNTY
San Francisco Bay Area AIR BASIN
Bay Area AQMD
Area
San Mateo (SF)

CalYr	Season	Veh	Fuel	MdlYr	Speed	ROG_RUNEX	CO_RUNEX	NOX_RUNEX	CO2_RUNEX(P	PM10_RUNEX	PM2_5_RUNEX	SOX_RUNEX
					(Miles/hr)	(gms/mile)	(gms/mile)	(gms/mile)	(gms/mile)	(gms/mile)	(gms/mile)	(gms/mile)
2014	Annual	LDT1	GAS	AllMYr	35	0.113	3.608	0.354	334.458	0.005	0.004	0.000
2014	Annual	LDT1	DSL	AllMYr	35	0.104	0.421	0.703	298.295	0.087	0.080	0.000
						0.113	3.603	0.355	334.406	0.005	0.004	0.000

SFPUC Peninsula Pipelines - EMFAC2011 Light Duty-2 Truck 2014 Emission Factors

EMFAC 2011
2014 Estimated Annual Emission Rates
EMFAC 2011 Vehicle Categories
San Mateo COUNTY
San Francisco Bay Area AIR BASIN
Bay Area AQMD
Area
San Mateo (SF)

CalYr	Season	Veh	Fuel	MdlYr	Speed	ROG_RUNEX	CO_RUNEX	NOX_RUNEX	CO2_RUNEX	PM10_RUNEX	PM2_5_RUNEX	SOX_RUNEX
					(Miles/hr)	(gms/mile)	(gms/mile)	(gms/mile)	(gms/mile)	(gms/mile)	(gms/mile)	(gms/mile)
2014	Annual	LDT2	GAS	AllMYr	10	0.179565982	3.39648321	0.398237512	1093.8994	0.008383213	0.007706097	0

SFPUC Peninsula Pipelines - OFFROAD2011 2014 Emission Factors						
CalendarYear	AirBasin	Equipment Type	HorsepowerBin	Nox (lb/hr)	PM (lb/hr)	HC (lb/hr)
2014	SF	Bore/Drill Rigs	50	0.232	0.017	0.030
2014	SF	Bore/Drill Rigs	120	0.383	0.023	0.024
2014	SF	Bore/Drill Rigs	175	0.669	0.031	0.042
2014	SF	Bore/Drill Rigs	250	0.811	0.024	0.041
2014	SF	Bore/Drill Rigs	500	1.233	0.039	0.065
2014	SF	Bore/Drill Rigs	750	1.609	0.055	0.088
2014	SF	Bore/Drill Rigs	1000	3.038	0.059	0.088
2014	SF	Bore/Drill Rigs	9999	12.541	0.304	0.418
2014	SF	Cranes	50	0.157	0.016	0.045
2014	SF	Cranes	120	0.582	0.043	0.058
2014	SF	Cranes	175	0.796	0.043	0.062
2014	SF	Cranes	250	1.083	0.050	0.075
2014	SF	Cranes	500	1.337	0.055	0.085
2014	SF	Cranes	750	1.559	0.054	0.083
2014	SF	Cranes	1000	6.919	0.343	0.513
2014	SF	Cranes	9999	1.492	0.036	0.065
2014	SF	Crawler Tractors	50	0.257	0.030	0.084
2014	SF	Crawler Tractors	120	0.618	0.052	0.060
2014	SF	Crawler Tractors	175	0.972	0.053	0.073
2014	SF	Crawler Tractors	250	1.196	0.046	0.072
2014	SF	Crawler Tractors	500	1.809	0.070	0.110
2014	SF	Crawler Tractors	750	2.638	0.096	0.154
2014	SF	Crawler Tractors	1000	5.814	0.171	0.308
2014	SF	Crawler Tractors	9999	8.701	0.229	0.402
2014	SF	Excavators	50	0.149	0.011	0.021
2014	SF	Excavators	120	0.353	0.026	0.029
2014	SF	Excavators	175	0.573	0.028	0.040
2014	SF	Excavators	250	0.805	0.026	0.045
2014	SF	Excavators	500	0.928	0.030	0.053
2014	SF	Excavators	750	1.723	0.056	0.096
2014	SF	Excavators	1000	3.920	0.104	0.181
2014	SF	Excavators	9999	4.748	0.123	0.220

SFPUC Peninsula Pipelines - OFFROAD2011 2014 Emission Factors						
CalendarYear	AirBasin	Equipment Type	HorsepowerBin	Nox (lb/hr)	PM (lb/hr)	HC (lb/hr)
2014	SF	Graders	50	0.231	0.031	0.090
2014	SF	Graders	120	0.819	0.068	0.086
2014	SF	Graders	175	1.160	0.065	0.093
2014	SF	Graders	250	1.057	0.034	0.059
2014	SF	Graders	500	0.981	0.038	0.069
2014	SF	Graders	1000	6.665	0.232	0.421
2014	SF	Graders	9999	11.770	0.355	0.649
2014	SF	Off-Highway Tractors	50	0.204	0.020	0.048
2014	SF	Off-Highway Tractors	120	0.449	0.037	0.041
2014	SF	Off-Highway Tractors	175	0.763	0.039	0.053
2014	SF	Off-Highway Tractors	250	1.162	0.042	0.069
2014	SF	Off-Highway Tractors	500	1.265	0.045	0.074
2014	SF	Off-Highway Tractors	750	2.206	0.073	0.121
2014	SF	Off-Highway Tractors	1000	2.188	0.052	0.067
2014	SF	Off-Highway Tractors	9999	9.631	0.308	0.539
2014	SF	Off-Highway Trucks	50	0.143	0.015	0.034
2014	SF	Off-Highway Trucks	120	0.414	0.034	0.041
2014	SF	Off-Highway Trucks	175	0.698	0.039	0.057
2014	SF	Off-Highway Trucks	250	0.967	0.042	0.071
2014	SF	Off-Highway Trucks	500	1.469	0.056	0.102
2014	SF	Off-Highway Trucks	750	3.081	0.127	0.221
2014	SF	Off-Highway Trucks	1000	4.808	0.141	0.259
2014	SF	Off-Highway Trucks	9999	8.726	0.273	0.513
2014	SF	Other Construction Equipment	50	0.194	0.017	0.037
2014	SF	Other Construction Equipment	120	0.495	0.039	0.045
2014	SF	Other Construction Equipment	175	0.890	0.047	0.065
2014	SF	Other Construction Equipment	250	1.146	0.042	0.067
2014	SF	Other Construction Equipment	500	1.491	0.055	0.089
2014	SF	Other Construction Equipment	750	2.117	0.068	0.111
2014	SF	Other Construction Equipment	1000	3.375	0.089	0.138
2014	SF	Other Construction Equipment	9999	5.069	0.139	0.241
2014	SF	Pavers	50	0.202	0.021	0.055

SFPUC Peninsula Pipelines - OFFROAD2011 2014 Emission Factors						
CalendarYear	AirBasin	Equipment Type	HorsepowerBin	Nox (lb/hr)	PM (lb/hr)	HC (lb/hr)
2014	SF	Pavers	120	0.452	0.035	0.041
2014	SF	Pavers	175	0.831	0.042	0.060
2014	SF	Pavers	250	0.808	0.021	0.034
2014	SF	Pavers	500	0.914	0.030	0.045
2014	SF	Pavers	750	1.671	0.072	0.095
2014	SF	Paving Equipment	50	0.141	0.012	0.024
2014	SF	Paving Equipment	120	0.442	0.034	0.039
2014	SF	Paving Equipment	175	0.606	0.029	0.040
2014	SF	Paving Equipment	250	0.807	0.027	0.043
2014	SF	Paving Equipment	500	1.224	0.044	0.069
2014	SF	Paving Equipment	750	1.866	0.043	0.085
2014	SF	Paving Equipment	1000	3.014	0.073	0.119
2014	SF	Rollers	50	0.159	0.014	0.032
2014	SF	Rollers	120	0.459	0.034	0.041
2014	SF	Rollers	175	0.562	0.026	0.036
2014	SF	Rollers	250	0.953	0.034	0.056
2014	SF	Rollers	500	1.436	0.056	0.086
2014	SF	Rollers	750	3.703	0.138	0.219
2014	SF	Rough Terrain Forklifts	50	0.219	0.018	0.041
2014	SF	Rough Terrain Forklifts	120	0.381	0.022	0.025
2014	SF	Rough Terrain Forklifts	175	0.413	0.016	0.021
2014	SF	Rough Terrain Forklifts	250	0.551	0.016	0.028
2014	SF	Rough Terrain Forklifts	500	1.160	0.025	0.047
2014	SF	Rough Terrain Forklifts	750	0.724	0.005	0.036
2014	SF	Rubber Tired Dozers	50	0.241	0.032	0.089
2014	SF	Rubber Tired Dozers	120	0.681	0.061	0.072
2014	SF	Rubber Tired Dozers	175	1.283	0.073	0.104
2014	SF	Rubber Tired Dozers	250	1.466	0.072	0.110
2014	SF	Rubber Tired Dozers	500	2.486	0.116	0.180
2014	SF	Rubber Tired Dozers	750	3.638	0.131	0.216
2014	SF	Rubber Tired Loaders	50	0.203	0.022	0.058
2014	SF	Rubber Tired Loaders	120	0.490	0.043	0.049

SFPUC Peninsula Pipelines - OFFROAD2011 2014 Emission Factors						
CalendarYear	AirBasin	Equipment Type	HorsepowerBin	Nox (lb/hr)	PM (lb/hr)	HC (lb/hr)
2014	SF	Rubber Tired Loaders	175	0.750	0.042	0.060
2014	SF	Rubber Tired Loaders	250	0.903	0.031	0.055
2014	SF	Rubber Tired Loaders	500	1.325	0.050	0.089
2014	SF	Rubber Tired Loaders	750	2.304	0.091	0.161
2014	SF	Rubber Tired Loaders	1000	4.467	0.130	0.228
2014	SF	Rubber Tired Loaders	9999	7.719	0.223	0.416
2014	SF	Scrapers	50	0.258	0.034	0.101
2014	SF	Scrapers	120	0.634	0.047	0.053
2014	SF	Scrapers	175	1.397	0.074	0.105
2014	SF	Scrapers	250	2.109	0.096	0.147
2014	SF	Scrapers	500	2.528	0.102	0.160
2014	SF	Scrapers	750	3.012	0.114	0.183
2014	SF	Scrapers	1000	13.530	0.631	0.980
2014	SF	Scrapers	9999	14.961	0.561	0.861
2014	SF	Skid Steer Loaders	50	0.160	0.010	0.019
2014	SF	Skid Steer Loaders	120	0.230	0.013	0.014
2014	SF	Skid Steer Loaders	175	0.516	0.024	0.031
2014	SF	Skid Steer Loaders	250	0.599	0.022	0.034
2014	SF	Skid Steer Loaders	500	0.690	0.024	0.042
2014	SF	Skid Steer Loaders	750	1.033	0.043	0.051
2014	SF	Skid Steer Loaders	1000	3.112	0.097	0.148
2014	SF	Surfacing Equipment	50	0.129	0.010	0.022
2014	SF	Surfacing Equipment	120	0.325	0.023	0.027
2014	SF	Surfacing Equipment	175	0.573	0.027	0.039
2014	SF	Surfacing Equipment	250	0.733	0.021	0.036
2014	SF	Surfacing Equipment	500	0.938	0.030	0.047
2014	SF	Surfacing Equipment	750	1.343	0.042	0.059
2014	SF	Surfacing Equipment	1000	3.104	0.076	0.133
2014	SF	Surfacing Equipment	9999	2.904	0.065	0.102
2014	SF	Tractors/Loaders/Backhoes	50	0.167	0.015	0.034
2014	SF	Tractors/Loaders/Backhoes	120	0.375	0.029	0.032
2014	SF	Tractors/Loaders/Backhoes	175	0.577	0.029	0.041

SFPUC Peninsula Pipelines - OFFROAD2011 2014 Emission Factors						
CalendarYear	AirBasin	Equipment Type	HorsepowerBin	Nox (lb/hr)	PM (lb/hr)	HC (lb/hr)
2014	SF	Tractors/Loaders/Backhoes	250	0.817	0.026	0.045
2014	SF	Tractors/Loaders/Backhoes	500	1.167	0.039	0.067
2014	SF	Tractors/Loaders/Backhoes	750	1.981	0.072	0.118
2014	SF	Tractors/Loaders/Backhoes	1000	2.687	0.060	0.099
2014	SF	Tractors/Loaders/Backhoes	9999	8.989	0.277	0.456
2014	SF	Trenchers	50	0.240	0.022	0.046
2014	SF	Trenchers	120	0.656	0.051	0.061
2014	SF	Trenchers	175	1.227	0.063	0.091
2014	SF	Trenchers	250	1.569	0.062	0.099
2014	SF	Trenchers	500	1.736	0.064	0.100
2014	SF	Trenchers	750	1.252	0.042	0.067
2014	SF	Trenchers	1000	12.491	0.566	0.890
2014	SF	Sweepers/Scrubbers	50	0.206	0.022	0.052
2014	SF	Sweepers/Scrubbers	120	0.540	0.048	0.054
2014	SF	Sweepers/Scrubbers	175	1.459	0.081	0.116
2014	SF	Sweepers/Scrubbers	250	1.376	0.054	0.086
2014	SF	Sweepers/Scrubbers	500	1.830	0.079	0.115
2014	SF	Sweepers/Scrubbers	1000	3.435	0.087	0.112
2014	SF	Aerial Lifts	50	0.128	0.005	0.007
2014	SF	Aerial Lifts	120	0.170	0.008	0.008
2014	SF	Aerial Lifts	175	0.286	0.012	0.014
2014	SF	Aerial Lifts	250	1.686	0.088	0.129
2014	SF	Aerial Lifts	500	1.188	0.026	0.050
2014	SF	Forklifts	50	0.113	0.012	0.033
2014	SF	Forklifts	120	0.250	0.021	0.024
2014	SF	Forklifts	175	0.398	0.022	0.030
2014	SF	Forklifts	250	0.671	0.030	0.047
2014	SF	Forklifts	500	0.968	0.044	0.068
2014	SF	Forklifts	1000	6.091	0.340	0.502
2014	SF	Other General Industrial Equipment	50	0.148	0.014	0.033
2014	SF	Other General Industrial Equipment	120	0.371	0.032	0.036
2014	SF	Other General Industrial Equipment	175	0.651	0.035	0.049

SFPUC Peninsula Pipelines - OFFROAD2011 2014 Emission Factors						
CalendarYear	AirBasin	Equipment Type	HorsepowerBin	Nox (lb/hr)	PM (lb/hr)	HC (lb/hr)
2014	SF	Other General Industrial Equipment	250	0.969	0.040	0.063
2014	SF	Other General Industrial Equipment	500	1.220	0.046	0.078
2014	SF	Other General Industrial Equipment	750	1.614	0.051	0.094
2014	SF	Other General Industrial Equipment	1000	4.253	0.111	0.191
2014	SF	Other General Industrial Equipment	9999	6.572	0.170	0.267
2014	SF	Other Material Handling Equipment	50	0.179	0.018	0.044
2014	SF	Other Material Handling Equipment	120	0.436	0.033	0.037
2014	SF	Other Material Handling Equipment	175	0.730	0.039	0.055
2014	SF	Other Material Handling Equipment	250	1.174	0.046	0.075
2014	SF	Other Material Handling Equipment	500	1.258	0.049	0.079
2014	SF	Other Material Handling Equipment	750	1.698	0.058	0.094
2014	SF	Other Material Handling Equipment	1000	1.816	0.014	0.034
2014	SF	Other Material Handling Equipment	9999	3.144	0.061	0.107

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SFPUC Peninsula Pipelines - OFFROAD2011 2014 CO Emission Factors

		HP Bin	CO EF (g/hp/hr)
2014	Aerial Lift	50	1.3904239
		120	1.086783178
		175	0.910318748
		250	0.413648166
		500	0.431298212
2014	Bore/Drill Rig	50	1.911470038
		120	1.670712961
		175	1.442664067
		250	0.512131282
		500	0.494923353
		750	0.49884158
		1000	0.561018043
		9999	0.561018043
2014	Cranes	50	1.637578144
		120	1.099370972
		175	0.916226637
		250	0.462461622
		500	0.542211629
		750	0.551860565
		1000	0.724984373
		9999	0.724984373
2014	Crawlers	50	3.032088704
		120	1.84226121
		175	1.545935452
		250	1.003565235
		500	1.59182611
		750	1.604816311
		1000	1.916161922
		9999	1.916161922
2014	Excavators	50	2.200388454
		120	1.447625842
		175	1.209991972
		250	0.562617444
		500	0.615725004
		750	0.627969888
		1000	0.836216894
		9999	0.836216894
2014	Forklifts	50	0.963205208
		120	0.713598408
		175	0.608200348
		250	0.231499914
		500	0.221863224
		1000	0.282093346
2014	Graders	50	2.95363678
		120	1.723650916
		175	1.434082087
		250	0.8196546
		500	1.097593165
		750	1.111888556
		1000	1.444810691
		9999	1.444810691

SFPUC Peninsula Pipelines - OFFROAD2011 2014 CO Emission Factors

		HP Bin	CO EF (g/hp/hr)
2014	Off Highway Tractors	50	3.342986023
		120	1.953075653
		175	1.64270183
		250	1.097689456
		500	1.816475803
		750	1.829766049
		1000	2.174348067
		9999	2.174348067
2014	Off Highway Trucks	50	2.692548982
		120	1.571368018
		175	1.31394454
		250	0.60348712
		500	0.648948889
		750	0.661811253
		1000	0.891247074
		9999	0.891247074
2014	Other Construction Equipment	50	2.160603607
		120	1.535732596
		175	1.287618766
		250	0.57197276
		500	0.598179179
		750	0.610315057
		1000	0.800730036
		9999	0.800730036
2014	Other General Industrial Equipment	50	2.077466406
		120	1.315425671
		175	1.098605404
		250	0.504614125
		500	0.547521993
		750	0.560032091
		1000	0.756702317
		9999	0.756702317
2014	Other Material Handling Equipment	50	2.390457652
		120	1.535023489
		175	1.282217765
		250	0.589645931
		500	0.641453183
		750	0.656029931
		1000	0.885929358
		9999	0.885929358
2014	Pavers	50	2.524356422
		120	1.677752861
		175	1.402801397
		250	0.859163067
		500	1.198909975
		750	1.211648502

SFPUC Peninsula Pipelines - OFFROAD2011 2014 CO Emission Factors

		HP Bin	CO EF (g/hp/hr)
2014	Paving Equipment	50	2.219963225
		120	1.436397708
		175	1.197840517
		250	0.704887875
		500	0.967757339
		750	0.979221801
		1000	1.221580365
2014	Rollers	50	1.95132295
		120	1.402899968
		175	1.169247326
		250	0.606268571
		500	0.691689727
		750	0.703890187
2014	Rough Terrain Forklifts	50	1.736820859
		120	1.388331543
		175	1.165317825
		250	0.514412041
		500	0.521469989
		750	0.532385223
2014	Rubber Tired Dozers	50	3.253243036
		120	1.833760547
		175	1.544135832
		250	1.034433542
		500	1.727255763
		750	1.739470589
2014	Rubber Tired Loaders	50	2.659814134
		120	1.521503735
		175	1.265556457
		250	0.67641002
		500	0.838306947
		750	0.851230787
		1000	1.131274095
		9999	1.131274095
2014	Scrapers	50	3.284871418
		120	2.006102199
		175	1.675768792
		250	1.032211236
		500	1.52912675
		750	1.544369081
		1000	1.904828814
		9999	1.904828814
2014	Skid Steer Loaders	50	1.526190615
		120	1.2621063
		175	1.070938405
		250	0.417909014
		500	0.406291957
		750	0.412227463
		1000	0.511958978

SFPUC Peninsula Pipelines - OFFROAD2011 2014 CO Emission Factors

		HP Bin	CO EF (g/hp/hr)
2014	Surfacing Equipment	50	1.486247739
		120	1.105415741
		175	0.921442551
		250	0.506050172
		500	0.577534527
		750	0.586822332
		1000	0.736620005
		9999	0.736620005
2014	Sweepers/Scrubbers	50	2.309494708
		120	1.66200974
		175	1.407135705
		250	0.55652065
		500	0.546058251
		750	0.553728189
		1000	0.721419019
2014	Tractors/Loaders/Backhoes	50	2.219208242
		120	1.430457897
		175	1.193415512
		250	0.57659231
		500	0.645258086
		750	0.657710187
		1000	0.875947447
		9999	0.875947447
2014	Trenchers	50	3.03972276
		120	2.024021109
		175	1.697192273
		250	1.077795387
		500	1.554365073
		750	1.568998894
		1000	1.868387196

Appendix F
Biological Resources

Appendix F
Biological Resources

Table 1.1
Special-Status Plant Species
Potentially Occurring in Study Area

Table 1.1
Special-Status Plant Species Potentially Occurring in Study Area

Scientific Name	Common Name	Status			Life Form and Habitat	Blooming Period	Potential for Occurrence in Study Area
		Federal	State	CNPS			
Acanthomintha duttonii	San Mateo thorn-mint	FE	SE	1B.1	Annual herb. Chaparral, valley and foothill grassland/serpentinite.	April-June	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Allium peninsulare var. *franciscanum*	Franciscan onion	–	–	1B.2	Perennial bulbiferous herb. Cismontane woodland, valley and foothill grassland/clay, volcanic, often serpentinite.	May-June	None. Marginally suitable habitat present. Not observed during appropriately timed field surveys.
Amsinckia lunaris	bent-flowered fiddleneck	–	–	1B.2	Annual herb. Coastal bluff scrub, cismontane woodland, valley and foothill grassland.	March-June	None. Marginally suitable habitat present. Not observed during appropriately timed field surveys.
Arctostaphylos andersonii	Santa Cruz manzanita	–	–	1B.2	Perennial evergreen shrub. Broadleaved upland forest, chaparral, North Coast coniferous forest/openings, edges.	November-April	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Arctostaphylos franciscana	Franciscan manzanita	–	–	1B.1	Perennial evergreen shrub. Coastal scrub, serpentinite.	February-April	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Arctostaphylos imbricate	San Bruno Mountain manzanita	–	SE	1B.1	Perennial evergreen shrub. Chaparral, coastal scrub, rocky.	February-May	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Arctostaphyllos Montana ssp. *ravenii*	Presidio manzanita	FE	SE	1B.1	Perennial evergreen shrub. Chaparral, coastal prairie, coastal scrub, serpentine outcrop.	February-March	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Arctostaphylos montaraensis	Montara manzanita	–	–	1B.2	Perennial evergreen shrub. Chaparral (maritime), coastal scrub.	January-March	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Arctostaphylos pacifica	Pacific manzanita	–	SE	1B.2	Perennial evergreen shrub. Chaparral, and coastal scrub.	February-April	None. No suitable habitat present. Not observed during appropriately timed field surveys.

Table 1.1
Special-Status Plant Species Potentially Occurring in Study Area (Continued)

Scientific Name	Common Name	Status			Life Form and Habitat	Blooming Period	Potential for Occurrence in Study Area
		Federal	State	CNPS			
Arctostaphylos regismontana	Kings Mountain manzanita	–	–	1B.2	Perennial evergreen shrub. Broadleaved upland forest, chaparral, North Coast coniferous forest/openings, edges.	January-April	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Arenaria paludicola	marsh sandwort	FE	SE	1B.1	Perennial stoloniferous herb. Sandy openings, marshes and swamps.	May-August	None. No suitable habitat present.
Astragalus pycnostachyus var. *pycnostachyus*	coastal marsh milk-vetch	–	–	1B.2	Perennial herb. Coastal dunes (mesic), coastal scrub, Marshes and swamps (coastal salt, streamsides).	April-October	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Astragalus tener var. *tener*	alkali milk-vetch	–	–	1B.2	Annual herb. Playas, valley and foothill grassland (adobe clay), alkaline vernal pools.	March-June	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Atriplex joaquiniana	San Joaquin spearscale	–	–	1B.2	Annual herb. Alkaline; chenopod scrub, meadows and seeps, playas, valley and foothill grassland.	April-October	None. No suitable alkaline habitat present. Not observed during appropriately timed field surveys.
California macrophylla	round-leaved fillaree	–	–	1B.1	Annual herb. Cismontane woodland, valley and foothill grassland.	March-May	None. Marginally suitable habitat present. Not observed during appropriately timed field surveys.
Carex comosa	bristly sedge	–	–	2.1	Perennial rhizomatous herb. Coastal prairie, marshes and swamps (lake margins), valley and foothill grasslands.	May-September	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Centromadia parryi ssp. *parryi*	papoose tarplant	–	–	2.1	Annual herb. Chaparral and coastal prairie.	May-November	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Chloropyron maritimum ssp. *palustre (formerly Cordylanthus)*	Point Reyes bird's-beak	–	–	1B.2	Annual herb (hemiparasitic). Coastal salt marshes and swamps.	June-October	None. No suitable habitat present.
Chorizanthe cuspidata var. *cuspidate*	San Francisco Bay spineflower	–	–	1B.2	Annual herb. Coastal bluff scrub, coastal dunes, coastal prairie, coastal scrub/sandy.	April-July	None. No suitable habitat present. Not observed during appropriately timed field surveys.

Table 1.1
Special-Status Plant Species Potentially Occurring in Study Area (Continued)

Scientific Name	Common Name	Status			Life Form and Habitat	Blooming Period	Potential for Occurrence in Study Area
		Federal	State	CNPS			
Chorizanthe robusta var. *robusta*	robust spineflower	FE	–	1B.1	Annual herb. Chaparral (maritime), cismontane woodland (openings), coastal dunes, coastal scrub/sandy or gravelly.	April-September	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Cirsium andrewsii	Franciscan thistle	–	–	1B.2	Perennial herb. Broadleaved upland forest, ravines, seeps.	March-July	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Cirsium fontinale var. *fontinale*	fountain thistle	FE	SE	1B.1	Perennial herb. Chaparral (openings), cismontane woodland, valley and foothill grassland and seeps (serpentinite).	June-October	None. No suitable habitat present.
Cirsium occidentale var. *compactum*	compact cobwebby thistle	–	–	1B.2	Perennial herb. Chaparral, coastal dunes, coastal scrub, coastal prairie.	April-June	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Clarkia franciscana	Presidio clarkia	FE	SE	1B.1	Annual herb. Coastal scrub and valley, and foothill grassland on serpentinite.	May-July	None. No suitable serpentinite habitat present.
Collinsia corymbosa	round-headed Chinese houses	–	–	1B.2	Annual herb. Coastal dunes.	April-June	None. No suitable habitat present.
Collinsia multicolor	San Francisco collinsia	–	–	1B.2	Annual herb. Closed-cone coniferous forest, coastal scrub/ sometimes serpentinite.	March-May	None. Marginally suitable habitat present. Not observed during appropriately timed field surveys.
Dirca occidentalis	western leatherwood	–	–	1B.2	Broadleaved upland forest, Closed-cone coniferous forest, chaparral, cismontane woodland, North Coast coniferous forest, riparian forest, riparian woodland/mesic.	January-March (April)	None. Marginally suitable habitat present. Not observed during appropriately timed field surveys.
Equisetum palustre	Marsh horsetail	–	–	3	Perennial rhizomatous herb. Marshes and swamps.	unknown	None. No suitable habitat present.
Eriophyllum latilobum	San Mateo woolly sunflower	FE	SE	1B.1	Perennial herb. Cismontane woodland (often serpentinite, roadcuts).	May-June	None. Marginally suitable habitat present. Not observed during appropriately timed field surveys.

Table 1.1
Special-Status Plant Species Potentially Occurring in Study Area (Continued)

Scientific Name	Common Name	Status			Life Form and Habitat	Blooming Period	Potential for Occurrence in Study Area
		Federal	State	CNPS			
Fritillaria biflora var. *ineziana*	Hillsborough chocolate lily	–	–	1B.1	Perennial bulbiferous herb. Cismontane woodland, valley and foothill grassland/serpentinite.	March-April	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Fritillaria liliacea	fragrant fritillary	–	–	1B.2	Perennial bulbiferous herb. Cismontane woodland, coastal prairie, coastal scrub, valley and foothill grassland/often serpentinite.	February-April	None. Marginally suitable habitat present. Not observed during appropriately timed field surveys.
Gilia capitata ssp. *chamissonis*	dune gilia	–	–	1B.1	Coastal dunes, coastal scrub.	April-July	None. No suitable habitat present.
Gilia millefoliata	dark-eyed gilia	–	–	1B.2	Annual herb. Coastal dunes.	April-July	None. No suitable habitat present.
Grindelia hirsutula var. *maritima*	San Francisco gumplant	–	–	1B.2	Perennial herb. Coastal bluff scrub, coastal scrub, valley and foothill grassland (sandy or serpentinite).	June-September	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Helianthella castanea	Diablo helianthella	–	–	1B.2	Perennial herb. Broadleaved upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill grassland.	March-June	None. Marginally suitable habitat present. Not observed during appropriately timed field surveys.
Hemizonia congesta ssp. *congesta*	Seaside tarplant	–	–	1B.2	Annual herb. Valley and foothill grasslands/sometimes roadsides.	April-November	None. Marginally suitable habitat present. Not observed during appropriately timed field surveys.
Hesperolinon congestum	Marin western flax	FT	ST	1B.1	Chaparral, valley and foothill grassland/serpentinite.	April-July	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Hesperevax sparsiflora var. *brevifolia*	short-leaved evax	–	–	2.2	Annual herb. Coastal bluff scrub (sandy), coastal dunes.	March-June	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Holocarpha macradenia	Santa Cruz tarplant	FT	SE	1B.1	Annual herb. Often clay, sandy. Coastal prairie, coastal scrub, valley and foothill grassland.	June-October	Not expected. No suitable coastal prairie or scrub present. Minimal grassland present, which had been mowed or sprayed by June 2011.

Table 1.1
Special-Status Plant Species Potentially Occurring in Study Area (Continued)

Scientific Name	Common Name	Status			Life Form and Habitat	Blooming Period	Potential for Occurrence in Study Area
		Federal	State	CNPS			
Horkelia cuneata ssp. *sericea*	Kellogg's horkelia	–	–	1B.1	Perennial herb. Closed-cone coniferous forest, chaparral (maritime), coastal dunes, coastal scrub/sandy or gravelly, openings.	April-September	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Horkelia marinensis	Point Reyes horkelia	–	–	1B.2	Perennial herb. Coastal dunes, coastal prairie and scrub.	May-September	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Layia carnosa	beach layia	FE	SE	1B.1	Annual herb. Coastal dunes and sandy coastal scrub.	March-July	None. No suitable habitat present.
Leptosiphon croceus	coast yellow leptosiphon	–	–	1B.1	Annual herb. Coastal bluff scrub and coastal prairie.	April-May	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Leptosiphon rosaceus	rose leptosiphon	–	–	1B.1	Annual herb. Coastal bluff scrub.	April-July	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Lessingia arachnoidea	Crystal Springs lessingia	–	–	1B.2	Annual herb. Cismontane woodland, coastal scrub, valley and foothill grassland/serpentinite, often roadsides.	July-October	None. No suitable habitat present.
Lessingia germanorum	San Francisco lessingia	FE	SE	1B.1	Annual herb. Remnant dunes, coastal scrub.	June-November	None. No suitable habitat present.
Lessingia hololeuca	Wooly-headed lessingia	–	–	3	Annual herb. Broadleaved upland forest, coastal scrub, lower montane coniferous forest, valley and foothill grassland, on serpentinite.	June-October	None. No suitable habitat present.
Lilium maritimum	coast lily	–	–	1B.1	Perennial bulbiferous herb. Broadleaved upland forest, closed-cone coniferous forest, coastal prairie, coastal scrub, marshes and swamps (freshwater).	May-August	None. No suitable habitat present. Not observed during appropriately timed field surveys.

Table 1.1
Special-Status Plant Species Potentially Occurring in Study Area (Continued)

Scientific Name	Common Name	Status			Life Form and Habitat	Blooming Period	Potential for Occurrence in Study Area
		Federal	State	CNPS			
Lupinus eximius	San Mateo tree lupine	–	–	3.2	Perennial shrub. Chaparral, coastal scrub.	April-July	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Malacothamnus aboriginum	Indian Valley bush mallow	–	–	1B.2	Perennial deciduous shrub. Chaparral, cismontane woodland, rocky, granitic, often on burns.	April-October	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Malacothamnus arcuatus	arcuate bush mallow	–	–	1B.2	Perennial evergreen shrub. Chaparral, cismontane woodland.	April-September	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Malacothamnus davidsonii	Davidson's bush mallow	–	–	1B.2	Perennial deciduous shrub. Chaparral, cismontane woodland, coastal scrub, riparian woodland.	June-January	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Malacothamnus hallii	Hall's bush mallow	–	–	1B.2	Perennial evergreen shrub. Chaparral, coastal scrub.	May-September (October)	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Microseris paludosa	marsh microseris	–	–	1B.2	Perennial herb. Closed-cone coniferous forest, cismontane woodland, coastal scrub, and valley and foothill grassland.	April-July	None. Marginally suitable habitat present. Not observed during appropriately timed field surveys.
Monolopia gracilens	woodland woolly-threads	–	–	1B.2	Annual herb. Openings in forests, chaparral, valley and foothill grassland (serpentinite).	March-July	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Pedicularis dudleyi	Dudley’s lousewort	–	Rare	1B.2	Perennial herb. Maritime chaparral, North Coast coniferous forest, cismontane woodland, valley and foothill grassland.	April-June	None. Marginally suitable habitat present. Not observed during appropriately timed field surveys.
Pentachaeta bellidiflora	white-rayed pentachaeta	FE	SE	1B.1	Annual herb. Cismontane woodland, valley and foothill grassland (often serpentinite).	March-May	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Plagiobothrys chorisianus var. *chorisianus*	Choris' popcorn-flower	–	–	1B.2	Annual herb. Chaparral, coastal prairie, coastal scrub/mesic.	March-June	None. Marginally suitable habitat present. Not observed during appropriately timed field surveys.

Table 1.1
Special-Status Plant Species Potentially Occurring in Study Area (Continued)

Scientific Name	Common Name	Status			Life Form and Habitat	Blooming Period	Potential for Occurrence in Study Area
		Federal	State	CNPS			
Plagiobothrys diffuses	San Francisco popcorn-flower	–	SE	1B.1	Annual herb. Coastal prairie, valley and foothill grassland.	March-June	None. Marginally suitable habitat present. Not observed during appropriately timed field surveys.
Plagiobothrys glaber	hairless popcorn-flower	–	–	1A	Annual herb. Meadows and seeps (alkaline), marshes and swamps (coastal salt).	March-May	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Polemonium carneum	Oregon polemonium	–	–	2.2	Perennial herb. Coastal prairie and scrub, lower montane coniferous forest.	April-September	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Potentilla hickmanii	Hickman's cinquefoil	FE	SE	1B.1	Perennial herb. Coastal bluff scrub, closed-cone coniferous forest, vernally mesic meadows and seeps, freshwater marshes and swamps.	April-August	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Sanicula maritime	adobe sanicle	–	Rare	1B.1	Perennial herb. Clay, serpentinite; chaparral, coastal prairie, meadows and seeps, valley and foothill grassland.	February-May	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Silene verecunda ssp. *verecunda*	San Francisco campion	–	–	1B.2	Perennial herb. Coastal bluff scrub, chaparral, coastal prairie, valley and foothill grassland (sandy).	March-June	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Stebbinsoseris decipiens	Santa Cruz microseris	–	–	1B.2	Annual herb. Open areas often on serpentinite. Broad-leaved upland forest, closed-cone coniferous forest, chaparral, coastal prairie, coastal scrub, and valley and foothill grassland.	April-May	None. Marginally suitable habitat present. Not observed during appropriately timed field surveys.
Streptanthus albidus ssp. *peramoenus*	most beautiful jewel-flower	–	–	1B.2	Annual herb. Chaparral, cismontane woodland, valley and foothill grassland/serpentinite.	(March) April-September (October)	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Suaeda californica	California seablight	FE	–	1B.1	Perennial evergreen shrub. Marshes and swamps (coastal salt marsh).	July-October	None. No suitable habitat present.

Table 1.1
Special-Status Plant Species Potentially Occurring in Study Area (Continued)

Scientific Name	Common Name	Status			Life Form and Habitat	Blooming Period	Potential for Occurrence in Study Area
		Federal	State	CNPS			
Trifolium hydrophilum	saline clover	–	–	1B.2	Annual herb. Marshes and swamps, valley and foothill grassland (mesic, alkaline), vernal pools.	April-June	None. No suitable habitat present. Not observed during appropriately timed field surveys.
Triphysaria floribunda	San Francisco owl's-clover	–	–	1B.2	Annual herb. Coastal prairie, coastal scrub, valley and foothill grassland/usually serpentinite.	April-June	None. Marginally suitable habitat present. Not observed during appropriately timed field surveys.
Triquetrella californica	coastal triquetrella	–	–	1B.2	Moss. On soil in coastal bluff scrub, coastal scrub.	–	Not expected. No suitable coastal bluff habitat.

Status Key:

Federal Status
FE = Federally listed as endangered under FESA
FT = Federally listed as threatened under FESA

State Status
SE = State listed as endangered under CESA
ST = State listed as threatened under CESA
Rare = Although not presently threatened with extinction, it may become endangered if its present environment worsens

Notes:
– = Not Applicable
CESA = California Endangered Species Act
CNPS = California Native Plant Society
FESA = Federal Endangered Species Act

CNPS Status
1A Plants presumed extinct in California.
1B.1 Indicates that a plant is rare, threatened, or endangered in California and elsewhere, and that it is considered seriously threatened to a high degree or immediacy.
1B.2 Indicates that a plant is rare, threatened, or endangered in California and elsewhere and that it is fairly threatened but to a lesser degree or immediacy than the 1B.1 listing.
2 Indicates plants that are rare, threatened, or endangered in California, but more common elsewhere
2.2 As 2 above, but indicating that it is fairly threatened in California.
3 Indicates plants about which more information is needed – a review list.

Appendix F
Biological Resources

Table 1.2
Vascular Plant Species Observed in Study Area

Table 1.2
Vascular Plant Species Observed in Study Area

CLASS **Family** ***Scientific Name***	**Common Name**
EQUISETAE	
Equisetaceae – Horsetail Family	
Equisetum arvense	common horsetail
FILICINAE	
Dennstaedtiaceae – Bracken Family	
Pteridium aquilinum var. *pubescens*	western brackenfern
Polypodiaceae – Polypody Family	
Polypodium californicum	California polypody
CONIFERAE	
Cupressaceae – Cypress Family	
*Cupressus macrocarpa***	Monterey cypress
Pinaceae – Pine Family	
*Pinus radiata***	Monterey pine
Taxodiaceae – Redwood Family	
*Sequoia sempervirens***	coast redwood
DICOTYLEDONAE	
Aizoaceae – Carpetweed Family	
*Carpobrotus edulis**	Hottentot fig
Anacardiaceae – Sumac Family	
Toxicodendron diversilobum	poison oak
Apiaceae – Parsley Family	
*Conium maculatum**	poison hemlock
*Foeniculum vulgare**	sweet fennel
Sanicula crassicaulis	Pacific sanicle
*Torilis arvensis**	hedge-parsley
Apocynaceae – Dogbane Family	
*Vinca major**	periwinkle
Aquifoliaceae – Holly Family	
*Ilex aquifolium**	English holly
Araliaceae – Aralia Family	
*Hedera helix**	English ivy

Table 1.2
Vascular Plant Species Observed in Study Area (Continued)

CLASS **Family** ***Scientific Name***	**Common Name**
Asteraceae – Sunflower Family	
*Arctotheca calendula**	capeweed
Aster chilensis	common California aster
Baccharis pilularis	coyote brush
*Bellis perennis**	English daisy
*Carduus pycnocephalus**	Italian thistle
*Cirsium vulgare**	bull thistle
*Conyza canadensis**	horseweed
Conyza sp.*	horseweed
*Filago gallica**	narrow-leaf filago
Gnaphalium californicum	California everlasting
*Gnaphalium luteo-album**	cudweed
*Hypochaeris glabra**	smooth cat's-ear
*Hypochaeris radicata**	rough cat's-ear
*Lactuca serriola**	prickly lettuce
Madia sativa	coast tarweed
*Picris echioides**	bristly ox-tongue
*Soliva sessilis**	common soliva
*Sonchus asper**	prickly sow-thistle
*Sonchus oleraceus**	common sow-thistle
*Taraxacum officinale**	common dandelion
*Tragopogon porrifolius**	salsify
Brassicaceae – Mustard Family	
*Brassica nigra**	black mustard
Cardamine oligosperma	bitter cress
*Hirschfeldia incana**	hoary mustard
*Raphanus raphanistrum**	jointed charlock
*Raphanus sativus**	wild radish
Caprifoliaceae – Honeysuckle Family	
Lonicera hispidula var. *vacillans*	California honeysuckle
Symphoricarpos albus var. *laevigatus*	snowberry
Caryophyllaceae – Pink Family	
*Cerastium glomeratum**	mouse-ear chickweed
*Polycarpon tetraphyllum**	four-leaved allseed

Table 1.2
Vascular Plant Species Observed in Study Area (Continued)

CLASS **Family** ***Scientific Name***	**Common Name**
*Silene gallica**	common catchfly
Spergula arvensis ssp. *arvensis**	starwort
*Stellaria media**	common chickweed
Convolvulaceae – Morning-Glory Family	
*Convolvulus arvensis**	field bindweed
Cucurbitaceae – Gourd Family	
Marah fabaceus	California man-root
Dipsacaceae – Teasel Family	
*Dipsacus fullonum**	wild teasel
Euphorbiaceae – Spurge Family	
*Chamaesyce maculata**	spotted spurge
*Euphorbia peplus**	petty spurge
Fabaceae – Pea Family	
*Acacia decurrens**	green wattle
*Acacia longifolia**	golden wattle
*Acacia melanonxylon**	blackwood acacia
*Genista monspessulana**	French broom
*Lathyrus latifolius**	perennial sweet pea
*Lotus corniculatus**	bird’s-foot trefoil
Lotus purshianus var. *purshianus*	Spanish clover
Lupinus bicolor	dove lupine
Lupinus formosus var. *formosus*	summer lupine
Lupinus microcarpus var. *densiflorus*	white annual lupine
Lupinus nanus	sky lupine
Lupinus succulentus	succulent annual lupine
*Medicago polymorpha**	bur-clover
*Trifolium campestre**	hop clover
*Trifolium dubium**	little hop clover
*Trifolium hirtum**	rose clover
*Trifolium incarnatum**	crimson clover
*Trifolium repens**	white clover
*Trifolium subterraneum**	subterranean clover
Vicia sativa ssp. *nigra**	common vetch
Vicia sativa ssp. *sativa**	common vetch

Table 1.2
Vascular Plant Species Observed in Study Area (Continued)

CLASS **Family** ***Scientific Name***	**Common Name**
Vicia villosa ssp. *villosa**	hairy vetch
Fagaceae – Oak Family	
Quercus agrifolia	coast live oak
Geraniaceae – Geranium Family	
*Erodium botrys**	long-beaked storkbill
*Geranium dissectum**	cranesbill
*Geranium molle**	dovesfoot geranium
*Geranium purpureum**	little robin
Hippocastanaceae – Buckeye Family	
Aesculus californica	California buckeye
Linaceae – Flax Family	
*Linum bienne**	narrow-leaved flax
Lythraceae – Loosestrife Family	
*Lythrum hyssopifolium**	loosestrife
Malvaceae – Mallow Family	
*Malva nicaeensis**	bull mallow
*Malva parviflora**	cheeseweed
Myrtaceae – Myrtle Family	
*Eucalyptus globulus**	blue gum
Oleaceae – Olive Family	
*Ligustrum lucidum**	glossy privet
*Olea europea**	olive
Onagraceae – Evening Primrose Family	
Camissonia ovata	sun cups
Clarkia unguiculata	elegant clarkia
Clarkia purpurea ssp. *quadrivulnera*	clarkia
Clarkia rubicunda	farewell-to-spring
Epilobium brachycarpum	fireweed
Epilobium ciliatum ssp. *ciliatum*	northern willow herb
Oenothera elata ssp. *hookeri*	Hooker's evening primrose
Oxalidaceae – Oxalis Family	
*Oxalis corniculata**	creeping wood sorrel
*Oxalis pes-caprae**	Bermuda buttercup
Papaveraceae – Poppy Family	

Table 1.2
Vascular Plant Species Observed in Study Area (Continued)

CLASS **Family** ***Scientific Name***	**Common Name**
Eschscholzia californica	California poppy
*Fumaria parviflora**	small-flowered fumitory
Plantaginaceae – Plantain Family	
*Plantago coronopus**	cut-leaved plantain
*Plantago lanceolata **	English plantain
*Plantago major**	broadleaf plantain
Polygonaceae – Buckwheat Family	
*Polygonum arenastrum**	common knotweed
*Rumex acetosella**	sheep sorrel
*Rumex crispus**	curly dock
Rumex pulcher*	fiddle dock
Portulacaceae – Purslane Family	
Claytonia perfoliata	miner's lettuce
Primulaceae – Primrose Family	
*Anagallis arvensis**	scarlet pimpernel
Ranunculaceae – Buttercup Family	
Ranunculus californicus	California buttercup
Rhamnaceae – Buckthorn Family	
Rhamnus californica ssp. *californica*	California coffeeberry
Rosaceae – Rose Family	
*Cotoneaster pannosa**	cotoneaster
Cretaegus sp.*	hawthorn
Fragaria vesca	wood strawberry
Heteromeles arbutifolia	toyon
Horkelia cuneata ssp. *cuneata*	wedge-leaved horkelia
*Prunus cerasifera**	cherry plum
*Pyracantha angustifolia**	common firethorn
*Rubus discolor**	Himalayan blackberry
Rubus ursinus	California blackberry
Rubiaceae – Madder Family	
Galium aparine	bedstraw
*Galium murale**	tiny bedstraw
*Sherardia arvensis**	field madder
Salicaceae – Willow Family	

Table 1.2
Vascular Plant Species Observed in Study Area (Continued)

CLASS **Family** ***Scientific Name***	**Common Name**
*Populus nigra**	Lombardy poplar
Salix lasiolepis	arroyo willow
Scrophulariaceae – Figwort Family	
*Bellardia trixago**	bellardia
Castilleja exerta ssp. *exerta*	purple owl's-clover
Collinsia heterophylla	Chinese houses
Solanaceae – Nightshade Family	
*Solanum americanum**	white nightshade
Vitaceae – Grape Family	
*Vitis vinifera**	wine grape
MONOCOTYLEDONAE	
Iridaceae – Iris Family	
*Chasmanthe floribunda**	African cornflag
Sisyrinchium bellum	California blue-eyed grass
*Sparaxis tricolor**	harlequin flower
Juncaceae – Rush Family	
Juncus bufonius var. *bufonius*	toad rush
Luzula comosa	wood rush
Liliaceae – Lily Family	
Calochortus luteus	yellow mariposa-lily
Chlorogalum pomeridianum var. *pomeridianum*	wavy-leaf soap plant
Triteleia laxa	Ithuriel's spear
Orchidaceae – Orchid Family	
*Epipactis helleborine**	broad-leaf helleborine
Poaceae – Grass Family	
*Aira caryophyllea**	silver European hairgrass
*Avena barbata**	slender wild oat
*Avena fatua**	wild oat
*Briza maxima**	big quaking grass
*Briza minor**	little quaking grass
Bromus carinatus var. *carinatus*	California brome
*Bromus diandrus**	ripgut brome
Bromus madritensis ssp. *rubens**	red brome
*Cortaderia jubata**	pampas grass

Table 1.2
Vascular Plant Species Observed in Study Area (Continued)

CLASS **Family** ***Scientific Name***	**Common Name**
*Cynodon dactylon**	Bermuda grass
*Cynosorus echinatus**	hedgehog dogtail
*Dactylis glomerata**	orchard grass
Danthonia californica	California oatgrass
*Ehrharta erecta**	ehrharta grass
*Festuca pratensis**	meadow fescue
Festuca rubra	red fescue
*Holcus lanatus**	velvet grass
*Lolium multiflorum**	Italian ryegrass
*Phalaris aquatica**	Harding grass
*Poa annua**	annual bluegrass
*Vulpia bromoides**	six-weeks fescue
*Vulpia myuros**	zorro grass
Notes: * Indicates nonnative species or species not naturally occurring on site. ** Indicates species native to California but not naturally occurring on site.	

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Appendix F
Biological Resources

Table 2.1
Special-Status Wildlife Species
Potentially Occurring in Study Area

Table 2.1
Special-Status Wildlife Species Potentially Occurring in Study Area

Wildlife Species ***Scientific Name*** **Common Name**	**Status**		**Habitat**	**Potential for Occurrence**
	Federal	**State**		
Invertebrates				
Callophrys mossii bayensis San Bruno elfin butterfly	FE	–	Coastal, mountainous areas with grassy ground cover, mainly in the vicinity of San Bruno Mountain. Colonies are located on steep, north-facing slopes within the fog belt. Larval host plant is *Sedum spathulifolium.*	No suitable habitat present. Host plant not found during 2010-2011 plant surveys.
Plebejus icarioides missionensis Mission blue butterfly	FE	–	Inhabits grasslands of the San Francisco Peninsula. Three larval host plants: *Lupinus albifrons, L. variicolor, and L. formosus,* of which *L. albifrons* is favored.	Not likely to occur. Three *L. formosus* plants were found at Millbrae site but had been sprayed with herbicide. The nearest CNDDB record (occurrence 11) is for butterflies observed in 1985 by the San Andreas Lake Dam, approximately 1.9 miles south of the Millbrae site.
Speyeria callippe callippe Callippe silverspot butterfly	FE	–	Restricted to the Northern Coastal Scrub of the San Francisco Peninsula. Host plant is *Viola pedunculata*.	No suitable habitat present at project sites. Host plant not found during 2010-2011 plant surveys.
Speyeria zerene myrtleae Myrtle's silverspot	FE	–	Restricted to the foggy, coastal dunes/ hills of the Pt. Reyes Peninsula.	Extirpated from San Mateo County.
Euphydryas editha bayensis Bay checkerspot butterfly	FT	–	Restricted to native grasslands on outcrops of serpentine soil in the vicinity of San Francisco Bay.	No suitable habitat present.
Danaus plexippus monarch butterfly	–	S3	Winter roost sites extend along the coast from northern Mendocino to Baja California, Mexico. Roosts located in wind-protected tree groves (Eucalyptus, Monterey pine, Cypress), with nectar and water sources nearby.	No monarch butterflies were observed roosting in the Eucalyptus grove at the Millbrae project site during the December 2, 2010 survey.

Table 2.1
Special-Status Wildlife Species Potentially Occurring in Study Area (Continued)

Wildlife Species ***Scientific Name*** **Common Name**	**Status**		**Habitat**	**Potential for Occurrence**
	Federal	**State**		
Fish				
Oncorhynchus mykiss irideus Central California Coast DPS	FT	–	Requires loose, silt-free, well-oxygenated gravel for spawning. Stream must have either perennial flow or cool intermittent pools.	No suitable habitat present.
Mylopharodon conocephalus hardhead	–	SC	Low- to mid-elevation streams in the Sacramento-San Joaquin drainage. Also present in Russian River.	No suitable habitat present.
Eucyclogobius newberryi tidewater goby	FE	SC	Brackish water habitats along the California Coast from Agua Hedionda Lagoon, San Diego County to the mouth of Smith River.	No suitable habitat present.
Amphibians				
Ambystoma californiense California tiger salamander	FT	FT	Need underground refuges, especially ground squirrel burrows and vernal pools, or other seasonal water sources for breeding.	No suitable habitat present.
Rana draytonii California red-legged frog	FT	SC	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby, or emergent riparian vegetation.	Not likely to occur. No suitable breeding habitat present. Suitable dispersal habitat is present in a natural drainage west of the South San Francisco site.
Reptiles				
Emys marmorata western pond turtle	–	SC	Thoroughly aquatic–ponds, marshes, rivers, streams, and irrigation ditches, usually with aquatic vegetation.	No suitable habitat present.
Thamnophis sirtalis tetrataenia San Francisco garter snake	FE	SE	Vicinity of freshwater marshes, ponds, and slow-moving streams in San Mateo County and extreme northern Santa Cruz County	No suitable habitat present.

Table 2.1
Special-Status Wildlife Species Potentially Occurring in Study Area (Continued)

Wildlife Species *Scientific Name* Common Name	Status		Habitat	Potential for Occurrence
	Federal	State		
Birds				
Phalacrocorax auritus double-crested cormorant	—	–	Colonial nester on coastal cliffs, offshore islands, and along lake margins in the interior of the state.	No suitable habitat present.
Ardea Herodias great blue heron	–	–	Colonial nester in tall trees, cliff sides, and sequestered spots on marshes.	No suitable habitat present.
Nycticorax nycticorax black-crowned night heron	–	–	Colonial nester, usually in trees, occasionally in tule patches adjacent to lake margins, mud-bordered bays, marshy spots.	No suitable habitat present.
Circus cyaneus northern harrier	–	SC	Coast salt and fresh-water marsh, nest and forage in grasslands, from salt grass in desert sink to mountain cienagas.	No suitable habitat present.
Elanus leucurus white-tailed kite	–	FP	Rolling foothills and valley margins with scattered oaks and river bottomlands or marshes nest to deciduous woodland.	Suitable nesting habitat present.
Rallus longirostris obsoletus California clapper rail	FE	SE	Saltwater and brackish marshes traversed by tidal sloughs in the vicinity of San Francisco Bay.	No suitable habitat present.
Laterallus jamaicensis coturniculus California black rail	–	ST	Inhabits freshwater marshes, wet meadows, and shallow margins of saltwater marshes bordering larger bays.	No suitable habitat present.
Charadrius alexandrinus nivosus western snowy plover	FT	SC	Sandy beaches, salt pond levees, and shores of large alkali lakes.	No suitable habitat present.
Sternula antillarum browni California least tern	FE	SE	Nests along the coast on bare or sparsely vegetated substrates: sand beaches, alkali flats, land fills, or paved areas.	No suitable habitat present.
Asio flammeus short-eared owl	–	SC	Found in swamp lands, both fresh and salt; lowland meadows, irrigated alfalfa fields.	No suitable habitat present.

Table 2.1
Special-Status Wildlife Species Potentially Occurring in Study Area (Continued)

Wildlife Species ***Scientific Name*** **Common Name**	**Status**		**Habitat**	**Potential for Occurrence**
	Federal	**State**		
Athene cunicularia burrowing owl	–	SC	Open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably the California ground squirrel.	No suitable habitat present. No suitable burrows observed.
Riparia riparia bank swallow	–	ST	Colonial nester in riparian and other lowland habitats west of the desert. Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, or ocean to dig nesting holes.	No suitable habitat present.
Geothlypis trichas sinuosa saltmarsh common yellowthroat	–	SC	Resident of the San Francisco Bay region, in fresh and salt water marshes.	No suitable habitat present.
Melospiza melodia pusillula Alameda song sparrow	–	SC	Resident of salt marshes bordering the southern arm of San Francisco Bay.	No suitable habitat present.
Melospiza melodia samuelis San Pablo song sparrow	–	SC	Resident of salt marshes along the north side of San Francisco and San Pablo bays.	No suitable habitat present.
Mammals				
Sorex vagrans salt marsh wandering shrew	–	SC	Salt marshes of the southern arm of the San Francisco Bay.	No suitable habitat present.
Lasiurus blossevillii western red bat	–	SC	Roosts primarily in trees, 2 to 40 feet above ground, from sea level up through mixed conifer forests. Prefers habitat edges and mosaics, with trees that are protected from above and open below, with open areas for foraging.	Suitable habitat present at the Millbrae site.
Corynorhinus townsendii Townsend's big-eared bat	–	SC	Throughout California in a wide variety of habitats. Maternity roosts are found in caves, tunnels, mines, and buildings.	No suitable habitat present.

Table 2.1
Special-Status Wildlife Species Potentially Occurring in Study Area (Continued)

Wildlife Species ***Scientific Name*** **Common Name**	**Status**		**Habitat**	**Potential for Occurrence**
	Federal	**State**		
Antrozous pallidus Pallid bat	–	SC	Deserts, grasslands, shrub lands, woodlands, and forests. Most common in open, dry habitats.	Suitable habitat present in the form of hollow trees in woodlands at the Millbrae site.
Nyctinomops macrotis big free-tailed bat	–	SC	Low-lying arid areas in Southern California.	No suitable habitat present.
Enhydra lutris nereis southern sea otter	FT	–	Nearshore marine environments from about Año Nuevo, San Mateo County to Point Sal, Santa Barbara County.	No suitable habitat present.
Taxidea taxus American badger	–	SC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats with friable soils.	No suitable habitat present.
Reithrodontomys raviventris salt-marsh harvest mouse	FE	SE	Occurs only in the saline emergent wetlands of San Francisco Bay and its tributaries.	No suitable habitat present.
Neotoma fuscipes annectens San Francisco dusky-footed woodrat	—	SC	Forest habitats of moderate canopy and moderate to dense understory.	Suitable habitat present at the South San Francisco and Millbrae sites.
Zapus trinotatus orarius Point Reyes jumping mouse	–	SC	Primarily bunchgrass marshes on the uplands of Point Reyes. Also present in coastal scrub, grassland, and meadows.	No suitable habitat present.

Status Key:
Federal Status:
FE = Listed as endangered under FESA
FT = Listed as threatened under FESA
–**State Status:**
SE = Listed as endangered under CESA
ST = Listed as threatened under CESA
SC = Species of special concern under CESA
FP = Fully Protected under CESA
Notes:
CESA = California Endangered Species Act
FESA = Federal Endangered Species Act

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Appendix F
Biological Resources

Table 2.2
Wildlife Species Observed in Study Area

Table 2.2
Wildlife Species Observed in Study Area

Birds	
Scientific Name	**Common Name**
Cathartes aura	turkey vulture
Buteo jamaicensis	red-tailed hawk
Colaptes auratus	northern flicker
Sayornis nigricans	black phoebe
Petrochelidon pyrrhonota	cliff swallow
Aphelocoma coerulescens	western scrub-jay
Corvus brachyrhynchos	American crow
Corvus corax	common raven
Baeolophus inornatus	oak titmouse
Psaltriparus minimus	bushtit
Sitta carolinensis	white-breasted nuthatch
Thryomanes bewickii	Bewick's wren
Mimus polyglottos	northern mockingbird
Sturnus vulgaris	European starling
Pipilo maculates	spotted towhee
Pipilo crissalis	California towhee
Euphagus cyanocephalus	Brewer's blackbird
Carpodacus mexicanus	house finch
Other Mammals	
Sciurus niger	fox squirrel
Vulpes vulpes	red fox
Thomomys bottae	Botta's pocket gopher
Microtus californicus	California meadow vole
Note: No special-status species were observed during the survey.	

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Appendix G
Historical Site Data - Sanborn Map Reports, Historical Map Reports, and Aerial Photographs

Colma Project Site
Serramonte Blvd and El Camino Real
Daly City, CA 94014

Inquiry Number: 3190911.16
October 24, 2011

The EDR Aerial Photo Decade Package

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Date EDR Searched Historical Sources:
Aerial Photography October 24, 2011

Target Property:
Serramonte Blvd and El Camino Real
Daly City, CA 94014

Year	***Scale***	***Details***	***Source***
1943	Aerial Photograph. Scale: 1"=555'	Flight Year: 1943	Aero
1956	Aerial Photograph. Scale: 1"=655'	Flight Year: 1956	Clyde Sunderland
1965	Aerial Photograph. Scale: 1"=333'	Flight Year: 1965	Cartwright
1977	Aerial Photograph. Scale: 1"=601'	Flight Year: 1977	NASA
1982	Aerial Photograph. Scale: 1"=690'	Flight Year: 1982	USGS
1993	Aerial Photograph. Scale: 1"=500'	/Composite DOQQ - acquisition dates: 1993	EDR
1998	Aerial Photograph. Scale: 1"=666'	Flight Year: 1998	USGS
2005	Aerial Photograph. Scale: 1"=500'	Flight Year: 2005	EDR
2006	Aerial Photograph. Scale: 1"=500'	Flight Year: 2006	EDR


INQUIRY #: 3190911.16
YEAR: 1943
= 555'
N


INQUIRY #: 3190911.16
YEAR: 1956
= 655'
N


INQUIRY #: 3190911.16
YEAR: 1965
= 333'
N


INQUIRY #: 3190911.16
YEAR: 1977
= 601'
N


INQUIRY #: 3190911.16
YEAR: 1982
= 690'
N


INQUIRY #: 3190911.16
YEAR: 1993
= 500'
N

INQUIRY #: 3190911.16

YEAR: 1998

= 666'

N

EDR Environmental Data Resources Inc

INQUIRY #: 3190911.16

YEAR: 2005

= 500'

N

INQUIRY #: 3190911.16

YEAR: 2006

= 500'

N

EDR Environmental Data Resources Inc

Colma Project Site
Serramonte Blvd and El Camino Real
Daly City, CA 94014

Inquiry Number: 3190911.15
October 20, 2011

EDR Historical Topographic Map Report

EDR® Environmental Data Resources Inc

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800.352.0050
www.edrnet.com

EDR Historical Topographic Map Report

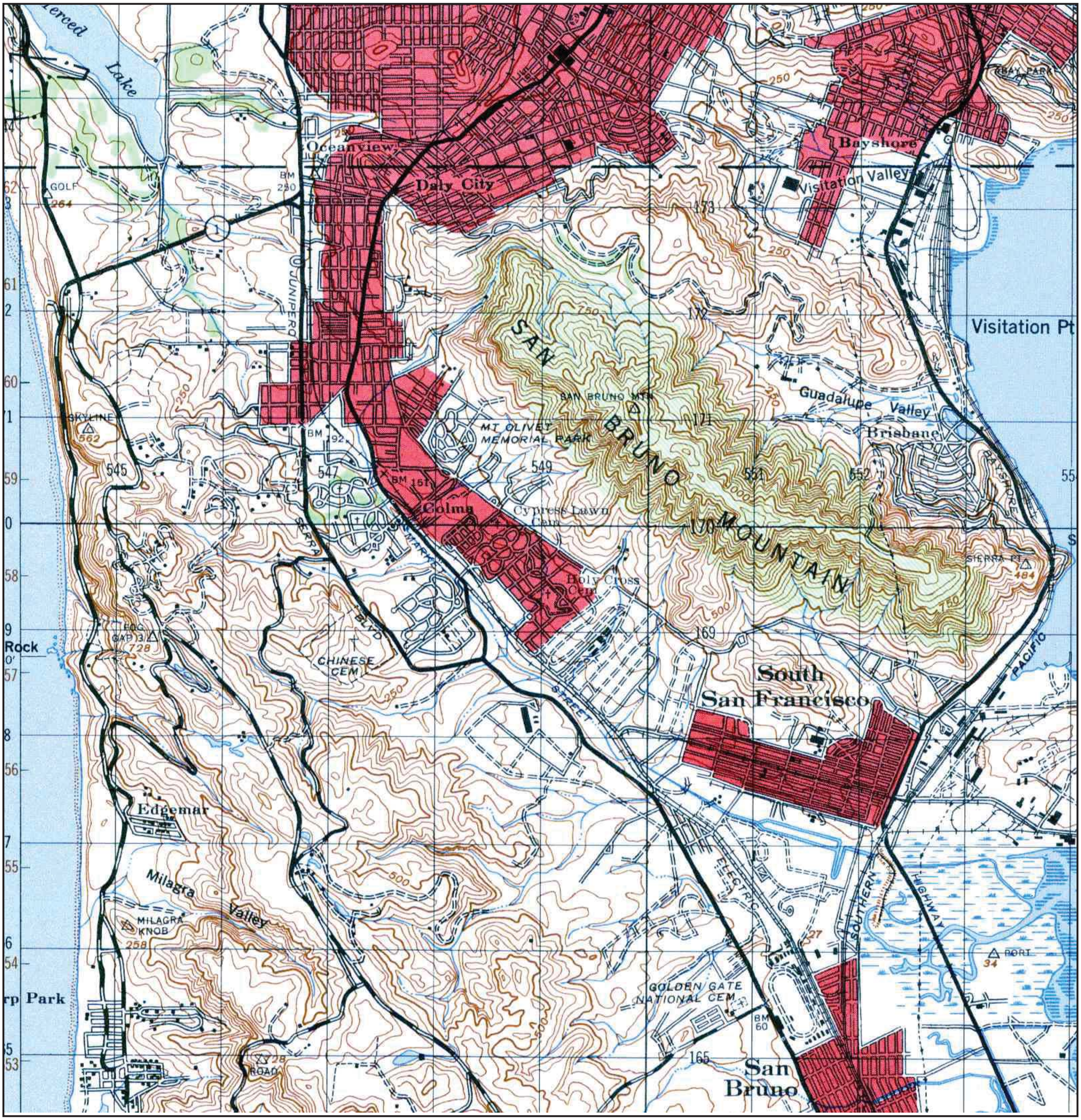
Environmental Data Resources, Inc.s (EDR) Historical Topographic Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topographic Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the early 1900s.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Historical Topographic Map

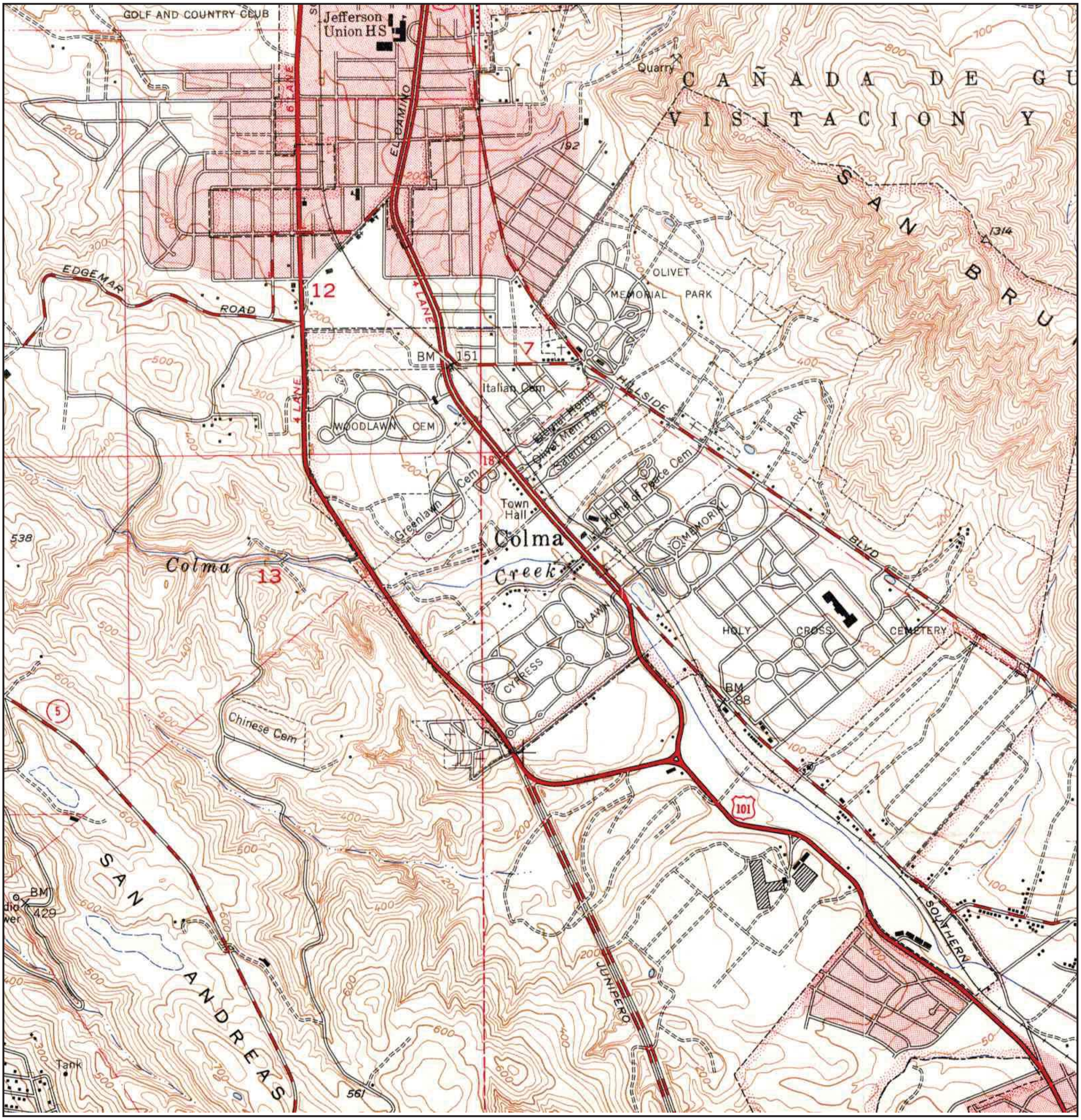
N ↑	TARGET QUAD NAME: SAN MATEO MAP YEAR: 1899 SERIES: 15 SCALE: 1:62500	SITE NAME: Colma Project Site ADDRESS: Serramonte Blvd and El Camino Real Daly City, CA 94014 LAT/LONG: 37.6745 / -122.4593	CLIENT: AEW Engineering , Inc. CONTACT: Lindsay Furuyama INQUIRY#: 3190911.15 RESEARCH DATE: 10/20/2011

Historical Topographic Map



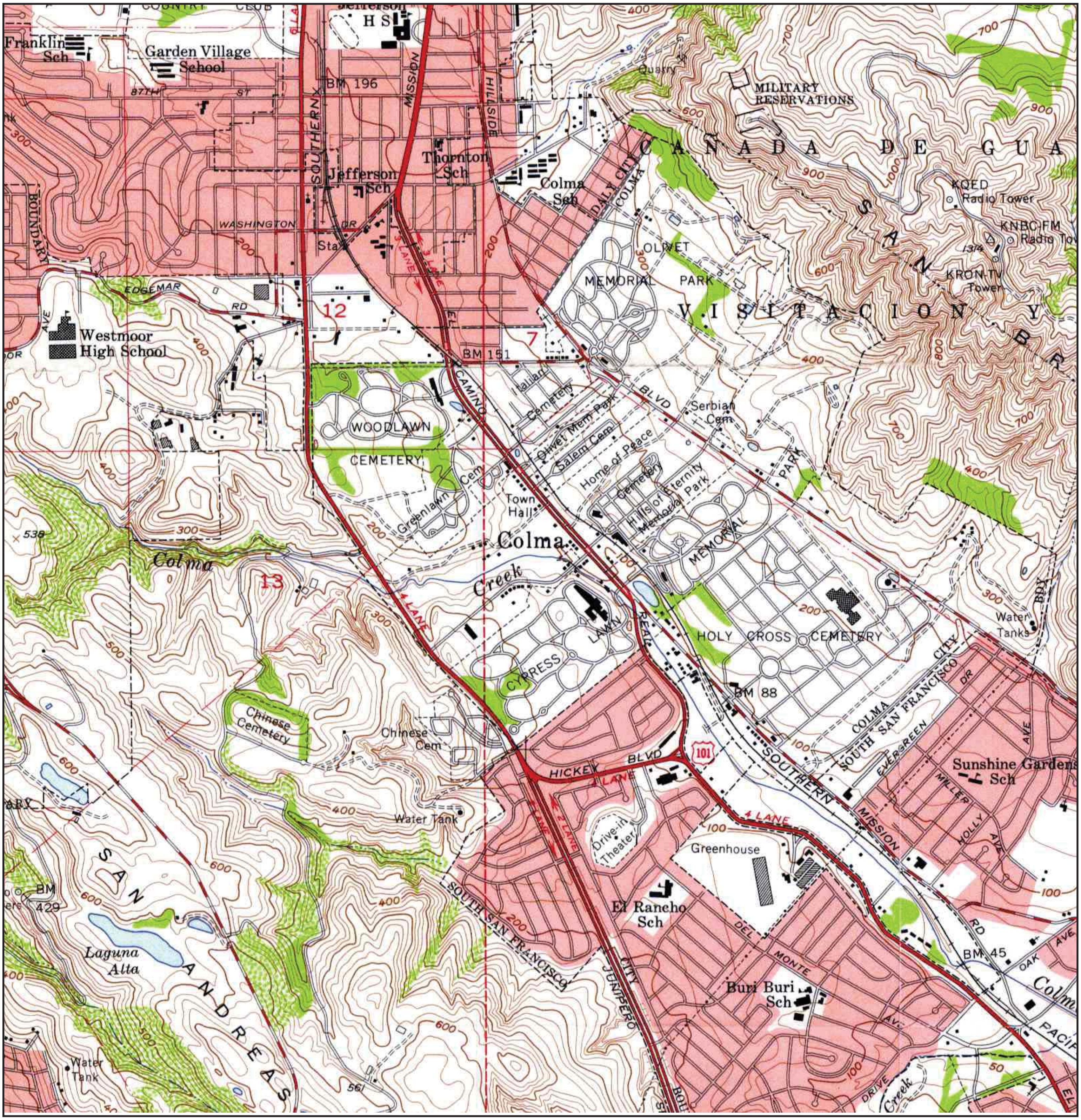
N ↑	TARGET QUAD NAME: SAN MATEO MAP YEAR: 1947 SERIES: 15 SCALE: 1:50000	SITE NAME: Colma Project Site ADDRESS: Serramonte Blvd and El Camino Real Daly City, CA 94014 LAT/LONG: 37.6745 / -122.4593		CLIENT: AEW Engineering , Inc. CONTACT: Lindsay Furuyama INQUIRY#: 3190911.15 RESEARCH DATE: 10/20/2011	

Historical Topographic Map



N ↑	TARGET QUAD NAME: SAN FRANCISCO SOUTH MAP YEAR: 1950 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Colma Project Site ADDRESS: Serramonte Blvd and El Camino Real Daly City, CA 94014 LAT/LONG: 37.6745 / -122.4593	CLIENT: AEW Engineering , Inc. CONTACT: Lindsay Furuyama INQUIRY#: 3190911.15 RESEARCH DATE: 10/20/2011

Historical Topographic Map



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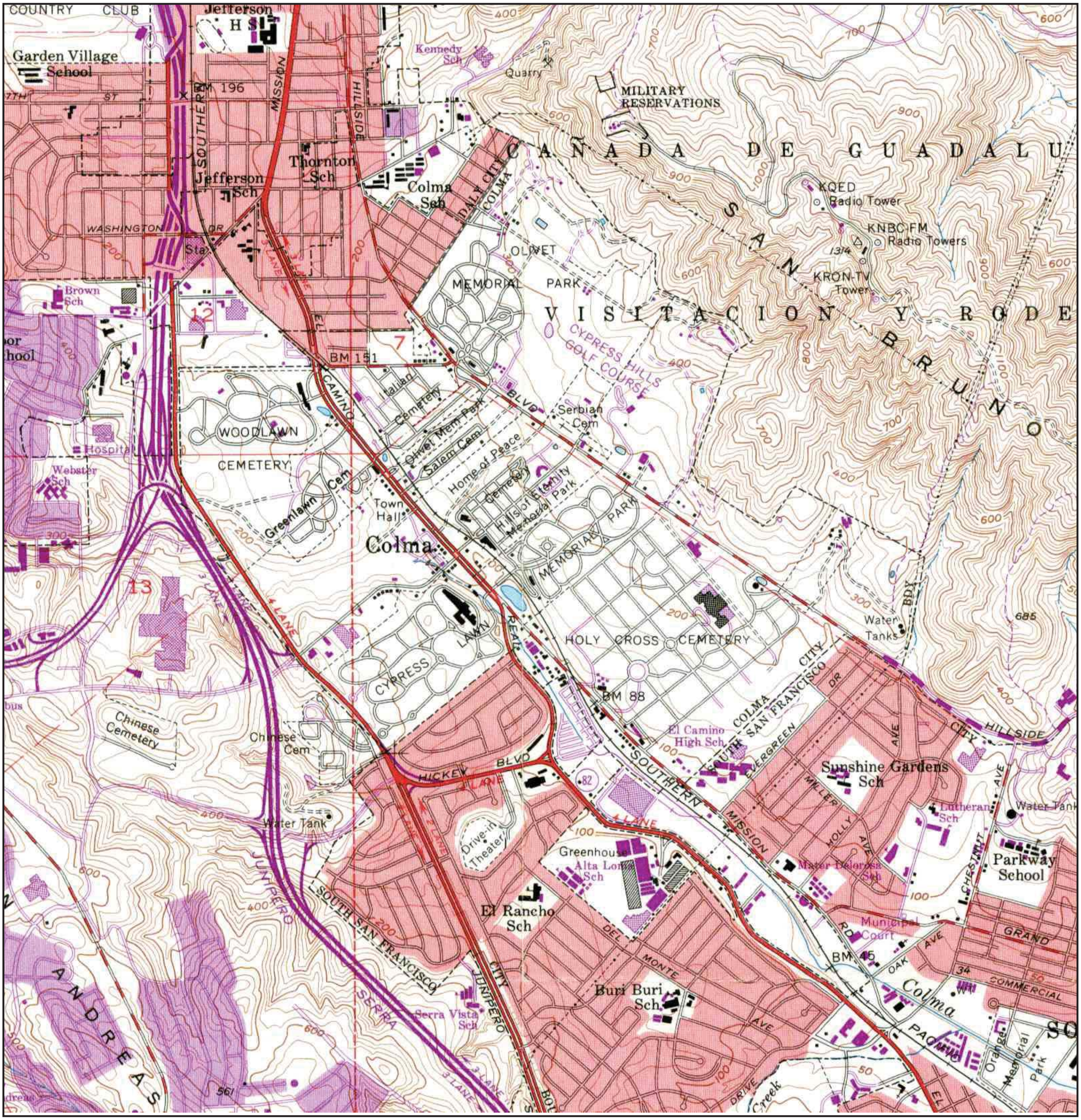
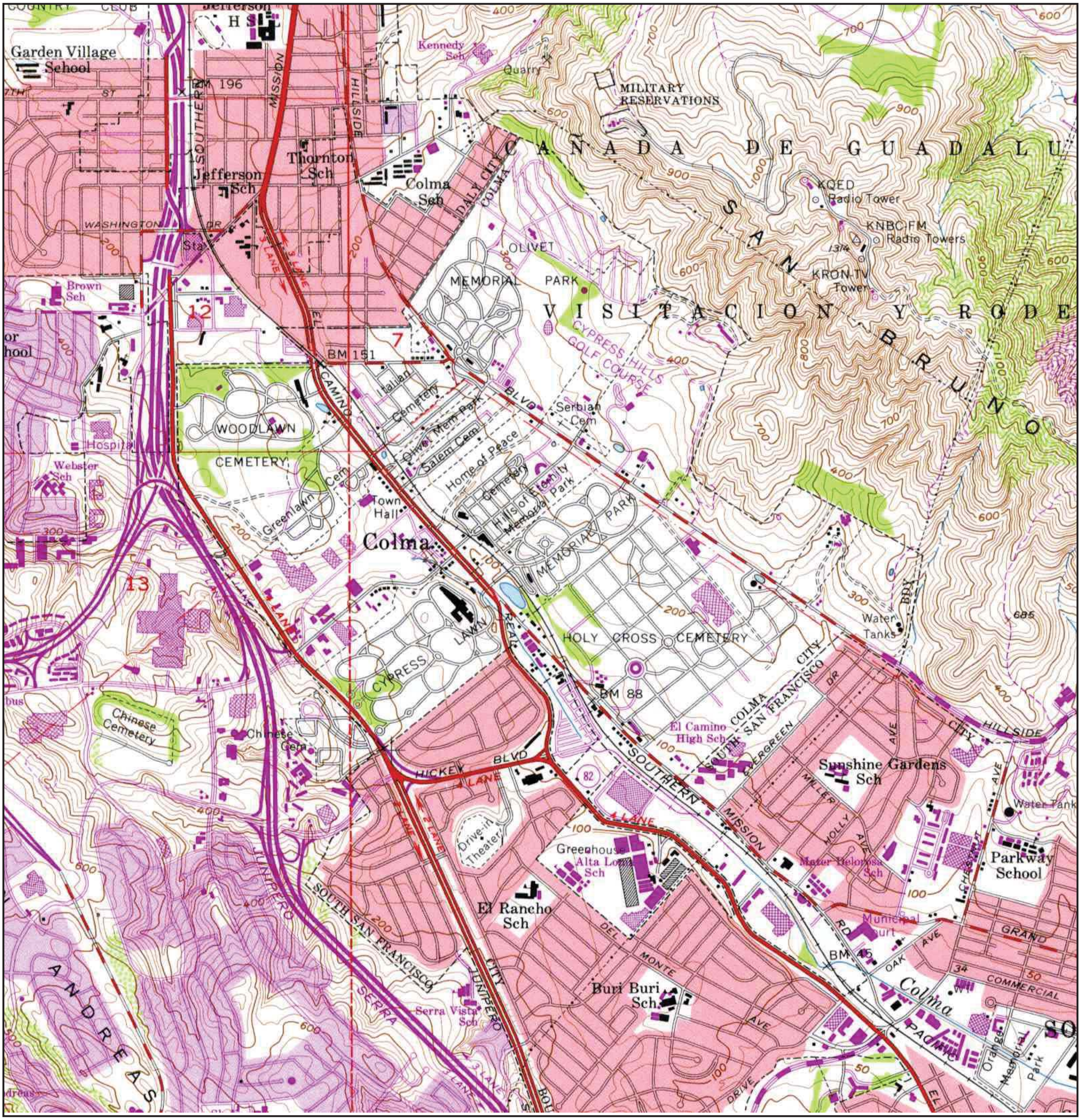


N ↑	TARGET QUAD NAME: SAN FRANCISCO SOUTH MAP YEAR: 1968 PHOTOREVISED: 1956 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Colma Project Site ADDRESS: Serramonte Blvd and El Camino Real Daly City, CA 94014 LAT/LONG: 37.6745 / -122.4593	CLIENT: AEW Engineering , Inc. CONTACT: Lindsay Furuyama INQUIRY#: 3190911.15 RESEARCH DATE: 10/20/2011

Historical Topographic Map



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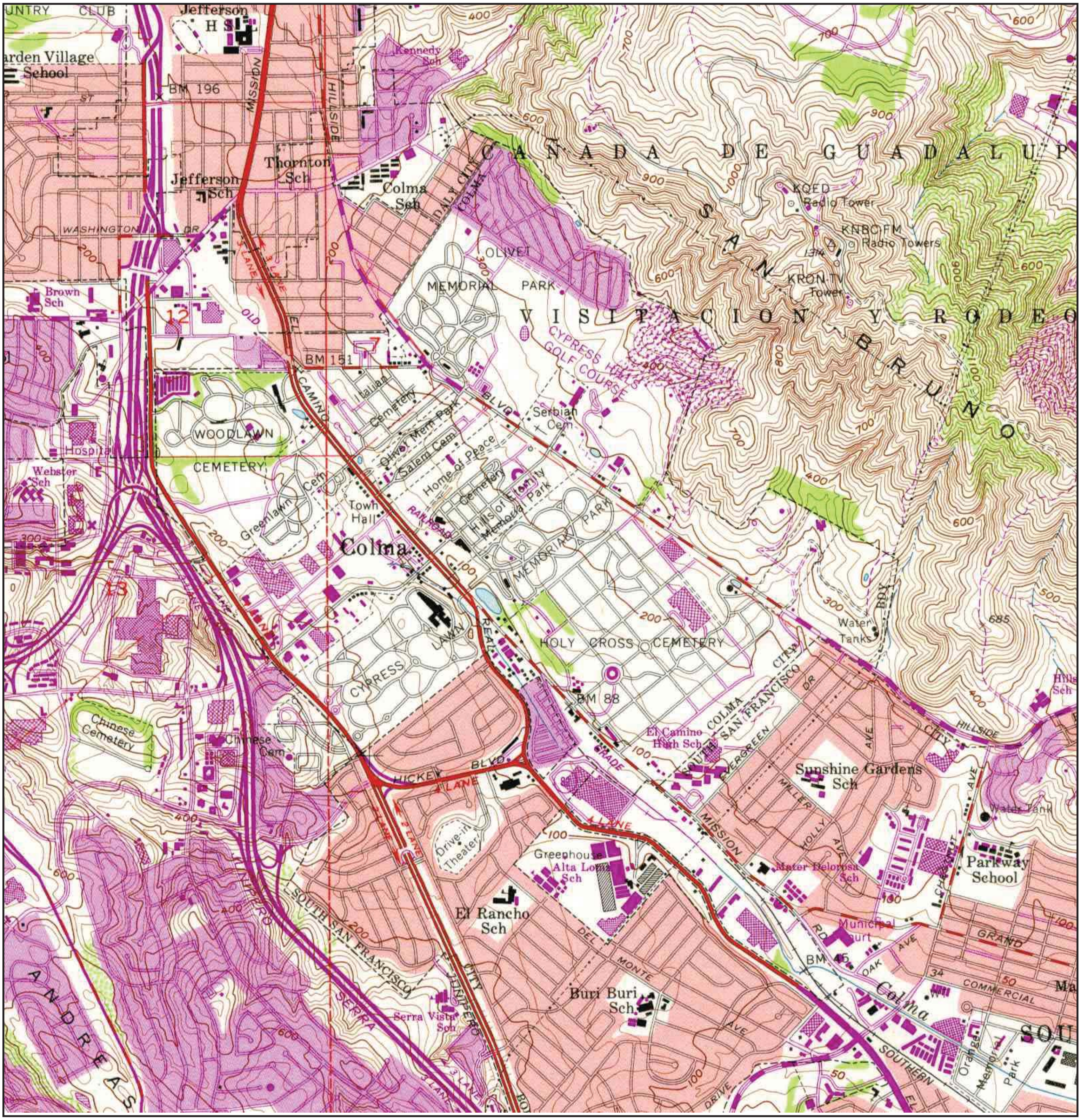
	NAME: SAN FRANCISCO SOUTH	ADDRESS: Serramonte Blvd and El Camino Real	CONTACT: Lindsay Furuyama
	MAP YEAR: 1973	Daly City, CA 94014	INQUIRY#: 3190911.15
	PHOTOREVISED:1956	LAT/LONG: 37.6745 / -122.4593	RESEARCH DATE: 10/20/2011
	SERIES: 7.5		
	SCALE: 1:24000		

Historical Topographic Map



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NAME:	SAN FRANCISCO SOUTH	ADDRESS:	Serramonte Blvd and El Camino Real	CONTACT:	Lindsay Furuyama
MAP YEAR:	1980		Daly City, CA 94014	INQUIRY#:	3190911.15
PHOTOREVISED:	1956	LAT/LONG:	37.6745 / -122.4593	RESEARCH DATE:	10/20/2011
SERIES:	7.5				
SCALE:	1:24000				

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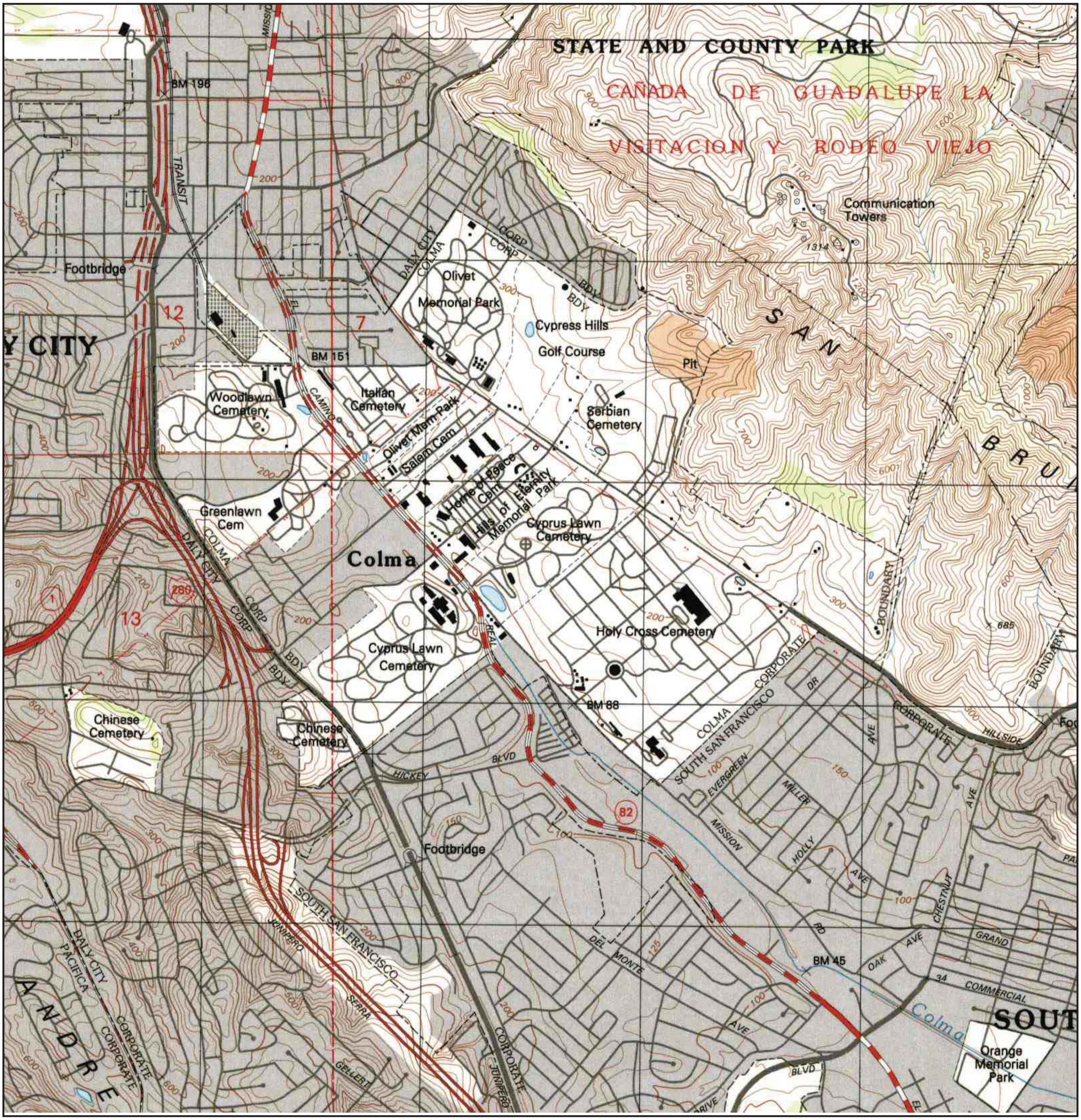
Historical Topographic Map



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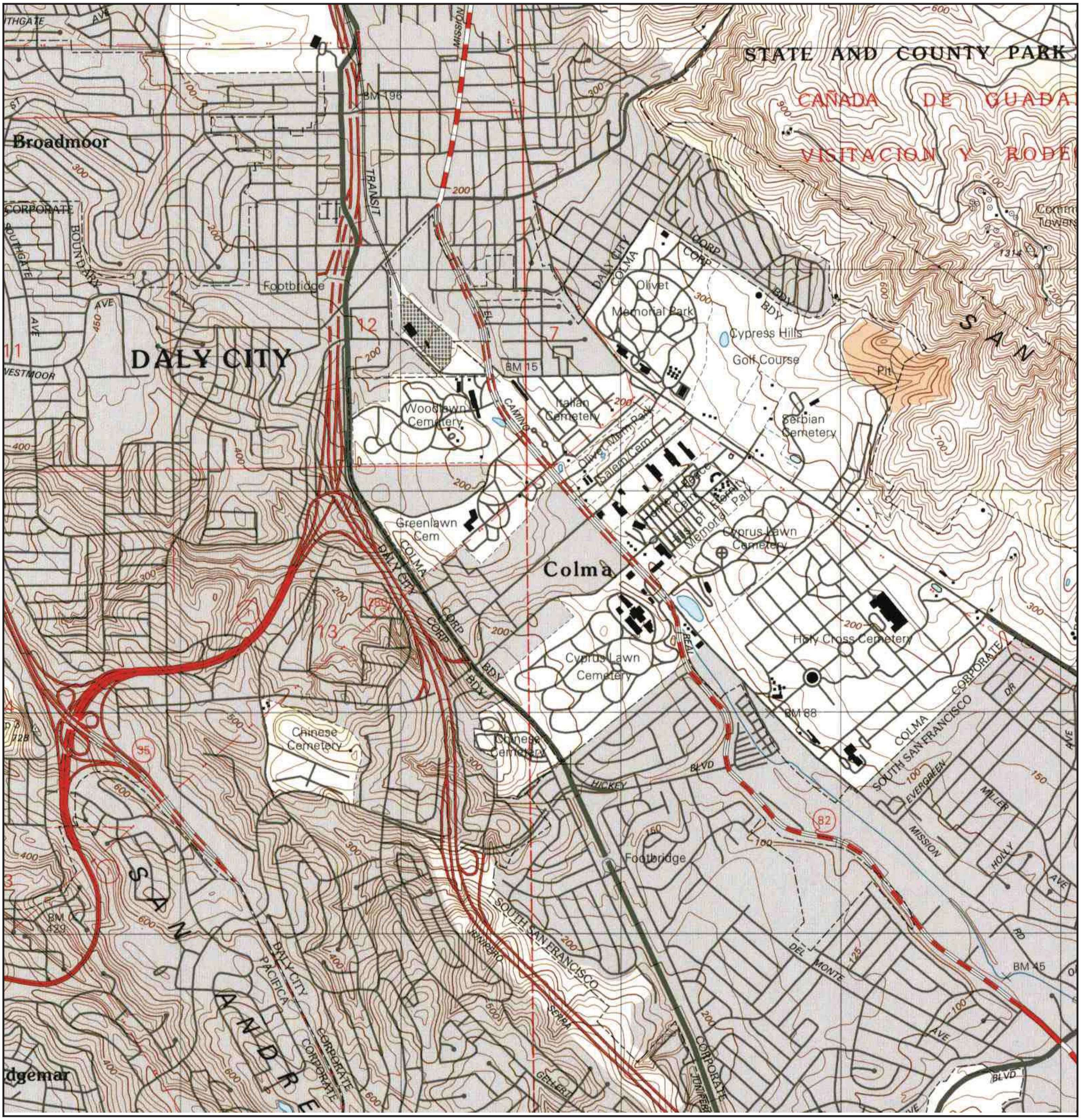
Historical Topographic Map



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	TARGET QUAD NAME: SAN FRANCISCO SOUTH MAP YEAR: 1995 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Colma Project Site ADDRESS: Serramonte Blvd and El Camino Real Daly City, CA 94014 LAT/LONG: 37.6745 / -122.4593	CLIENT: AEW Engineering , Inc. CONTACT: Lindsay Furuyama INQUIRY#: 3190911.15 RESEARCH DATE: 10/20/2011

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Colma Project Site
Serramonte Blvd and El Camino Real
Daly City, CA 94014

Inquiry Number: 3190911.14
October 20, 2011

Certified Sanborn® Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

10/20/11

Site Name:	Client Name:
Colma Project Site	AEW Engineering , Inc.
Serramonte Blvd and El	55 New Montgomery Street
Daly City, CA 94014	San Francisco, CA 94105
EDR Inquiry # 3190911.14	Contact: Lindsay Furuyama

EDR® Environmental Data Resources Inc

The complete Sanborn Library collection has been searched by EDR, and fire insurance maps covering the target property location provided by AEW Engineering , Inc. were identified for the years listed below. The certified Sanborn Library search results in this report can be authenticated by visiting www.edrnet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by Sanborn Library LLC, the copyright holder for the collection.

Certified Sanborn Results:

Site Name: Colma Project Site
Address: Serramonte Blvd and El Camino Real
City, State, Zip: Daly City, CA 94014
Cross Street:
P.O. # 2010-024
Project: URS Peninsula Pipeline
Certification # B290-4582-8171

Sanborn® Library search results
Certification # B290-4582-8171

UNMAPPED PROPERTY

This report certifies that the complete holdings of the Sanborn Library, LLC collection have been searched based on client supplied target property information, and fire insurance maps covering the target property were not found.

The Sanborn Library includes more than 1.2 million Sanborn fire insurance maps, which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ✔ Library of Congress
- ✔ University Publications of America
- ✔ EDR Private Collection

The Sanborn Library LLC Since 1866™

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South San Francisco Project Site
Westborough Blvd and Orange Ave
South San Francisco, CA 94080

Inquiry Number: 3190911.5
October 24, 2011

The EDR Aerial Photo Decade Package

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Date EDR Searched Historical Sources:
Aerial Photography October 24, 2011

Target Property:
Westborough Blvd and Orange Ave
South San Francisco, CA 94080

Year	***Scale***	***Details***	***Source***
1943	Aerial Photograph. Scale: 1"=555'	Flight Year: 1943	Aero
1956	Aerial Photograph. Scale: 1"=655'	Flight Year: 1956	Clyde Sunderland
1965	Aerial Photograph. Scale: 1"=333'	Flight Year: 1965	Cartwright
1973	Aerial Photograph. Scale: 1"=601'	Flight Year: 1973 Best Copy Available from original source	NASA
1982	Aerial Photograph. Scale: 1"=690'	Flight Year: 1982	USGS
1993	Aerial Photograph. Scale: 1"=500'	/Composite DOQQ - acquisition dates: 1993	EDR
1998	Aerial Photograph. Scale: 1"=666'	Flight Year: 1998	USGS
2005	Aerial Photograph. Scale: 1"=500'	Flight Year: 2005	EDR
2006	Aerial Photograph. Scale: 1"=500'	Flight Year: 2006	EDR


INQUIRY #: 3190911.5
YEAR: 1943
= 555'
N


INQUIRY #: 3190911.5
YEAR: 1956
= 655'
N

INQUIRY #: 3190911.5

YEAR: 1965

= 333'

N

INQUIRY #: 3190911.5

YEAR: 1973

= 601'

N

INQUIRY #: 3190911.5

YEAR: 1982

= 690'

N

INQUIRY #: 3190911.5

YEAR: 1993

= 500'

N


INQUIRY #: 3190911.5
YEAR: 1998
= 666'
N


INQUIRY #: 3190911.5

YEAR: 2005

= 500'

N

INQUIRY #: 3190911.5

YEAR: 2006

= 500'

N

South San Francisco Project Site
Westborough Blvd and Orange Ave
South San Francisco, CA 94080

Inquiry Number: 3190911.4
October 20, 2011

EDR Historical Topographic Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR Historical Topographic Map Report

Environmental Data Resources, Inc.s (EDR) Historical Topographic Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topographic Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the early 1900s.

Thank you for your business.
Please contact EDR at 1-800-352-0050
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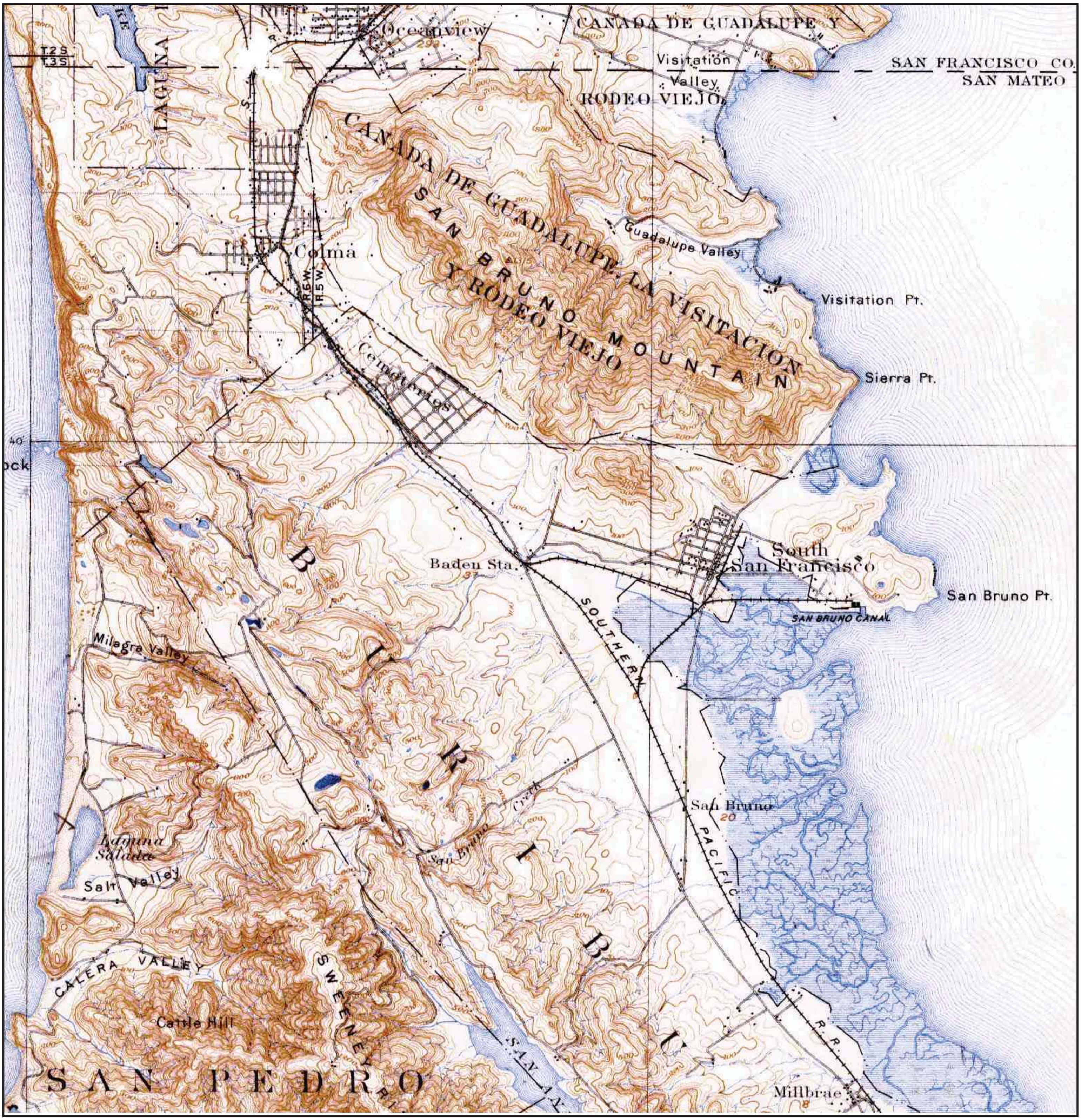
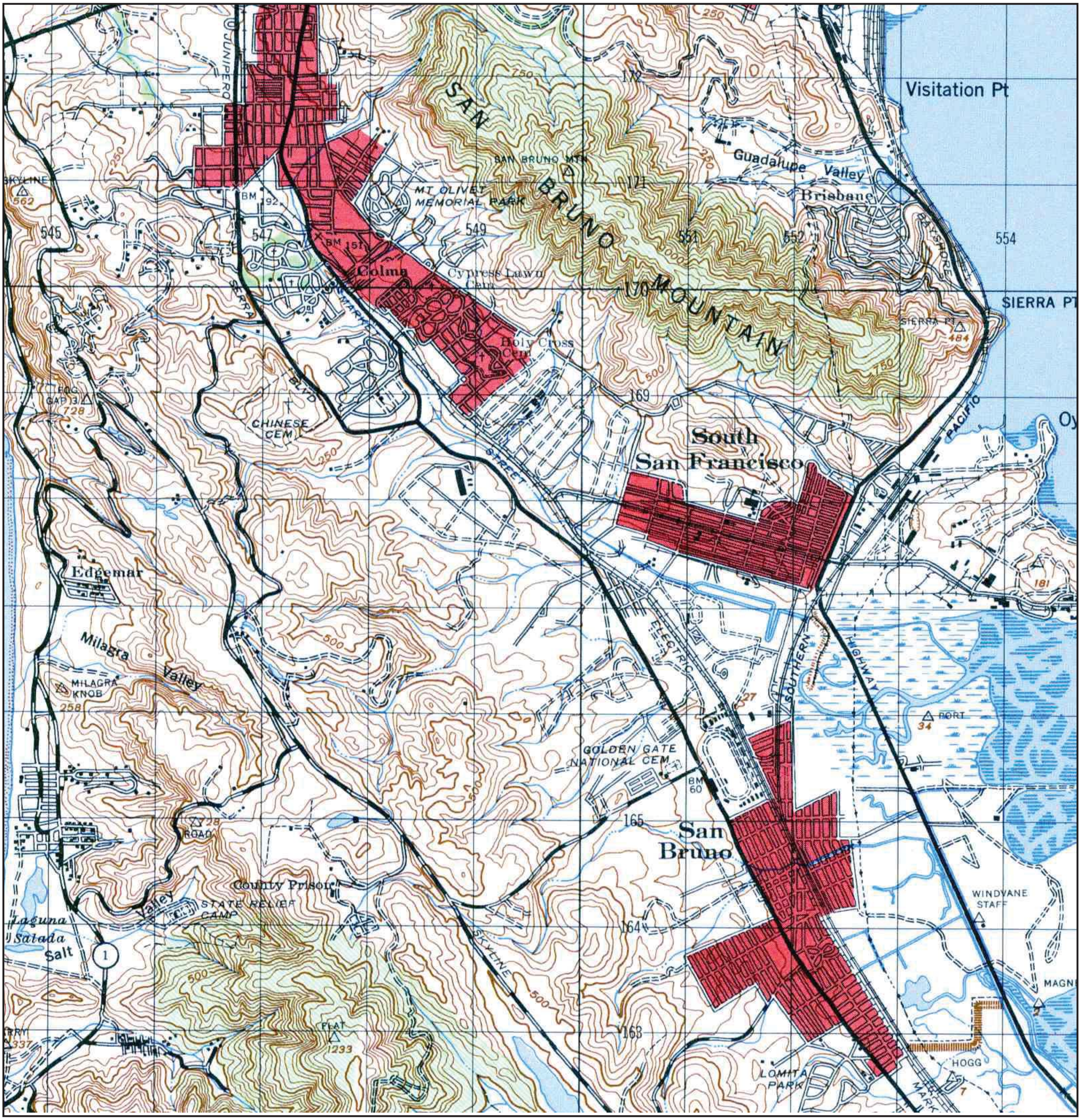
Historical Topographic Map



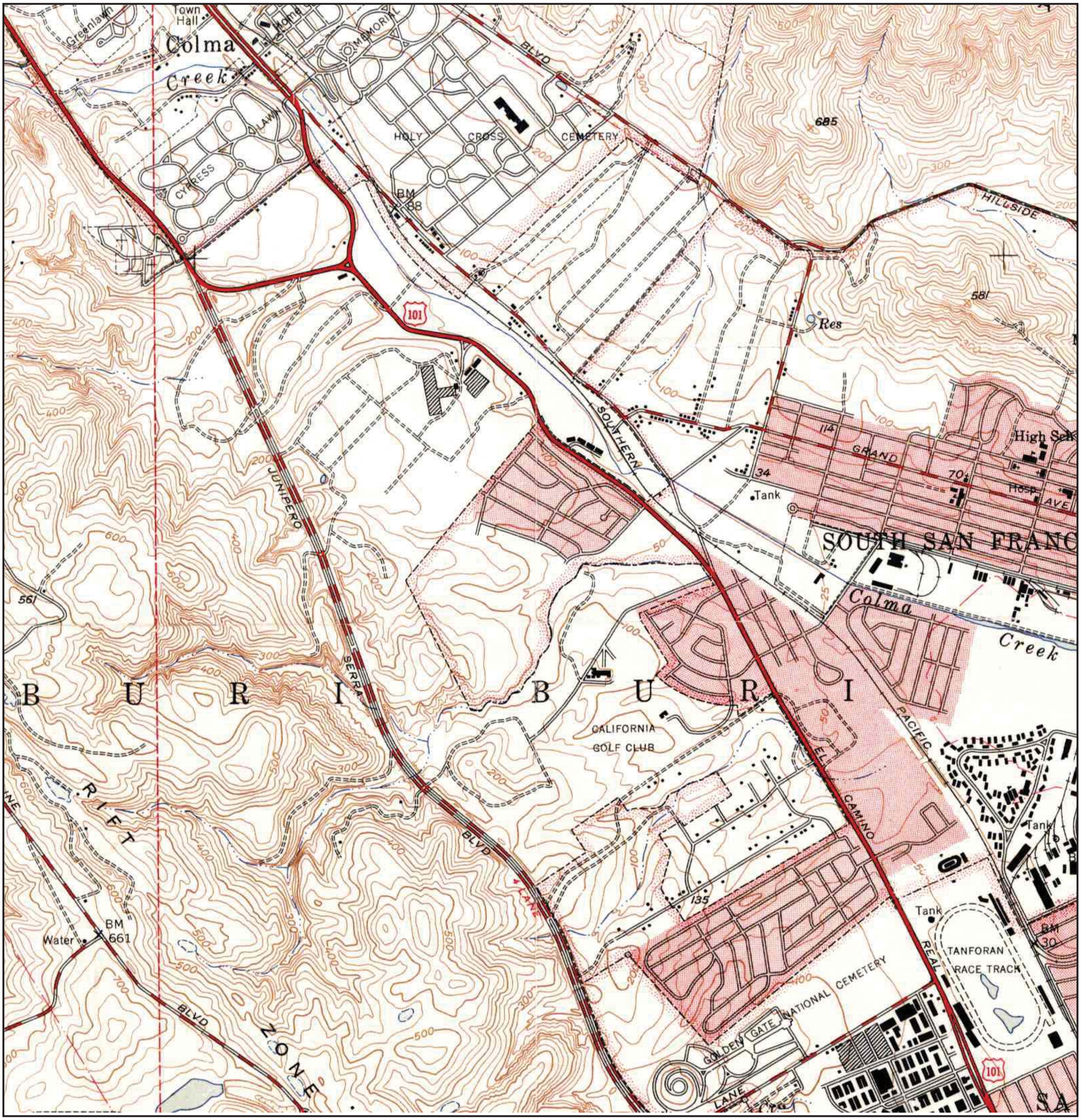
N ↑	TARGET QUAD NAME: SAN MATEO MAP YEAR: 1899 SERIES: 15 SCALE: 1:62500	SITE NAME: South San Francisco Project Site ADDRESS: Westborough Blvd and Orange Ave South San Francisco, CA LAT/LONG: 37.6544 / -122.4374	CLIENT: AEW Engineering , Inc. CONTACT: Lindsay Furuyama INQUIRY#: 3190911.4 RESEARCH DATE: 10/20/2011

Historical Topographic Map



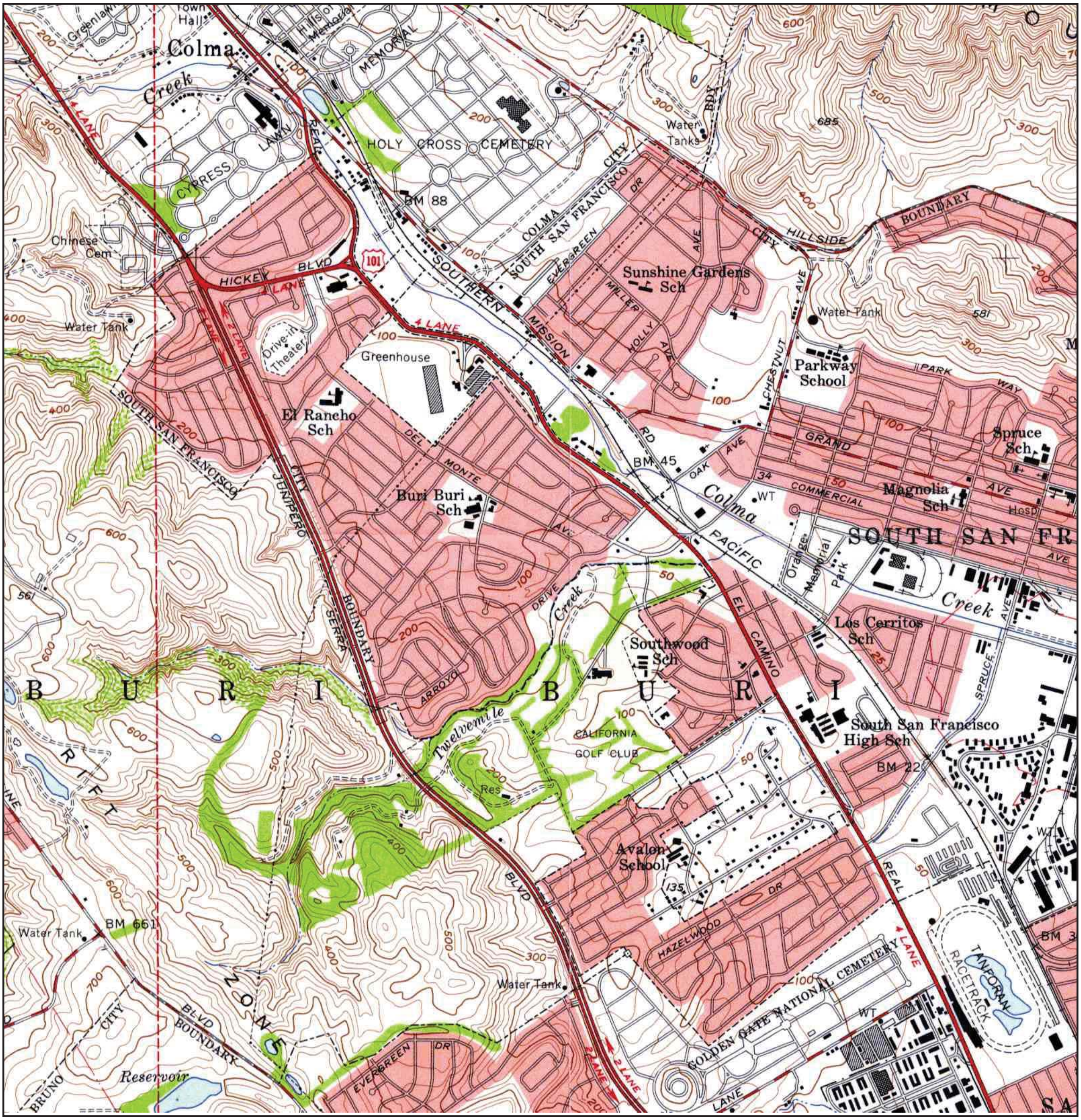
N ↑	TARGET QUAD		SITE NAME:	South San Francisco Project Site	CLIENT:	AEW Engineering , Inc.
	NAME:	SAN MATEO			CONTACT:	Lindsay Furuyama
	MAP YEAR:	1947	ADDRESS:	Westborough Blvd and Orange Ave	INQUIRY#:	3190911.4
					RESEARCH DATE:	10/20/2011
	SERIES:	15		South San Francisco, CA		
	SCALE:	1:50000	LAT/LONG:	37.6544 / -122.4374		

Historical Topographic Map



N ↑	TARGET QUAD NAME: SAN FRANCISCO SOUTH MAP YEAR: 1950 SERIES: 7.5 SCALE: 1:24000	SITE NAME: South San Francisco Project Site ADDRESS: Westborough Blvd and Orange Ave South San Francisco, CA LAT/LONG: 37.6544 / -122.4374	CLIENT: AEW Engineering , Inc. CONTACT: Lindsay Furuyama INQUIRY#: 3190911.4 RESEARCH DATE: 10/20/2011

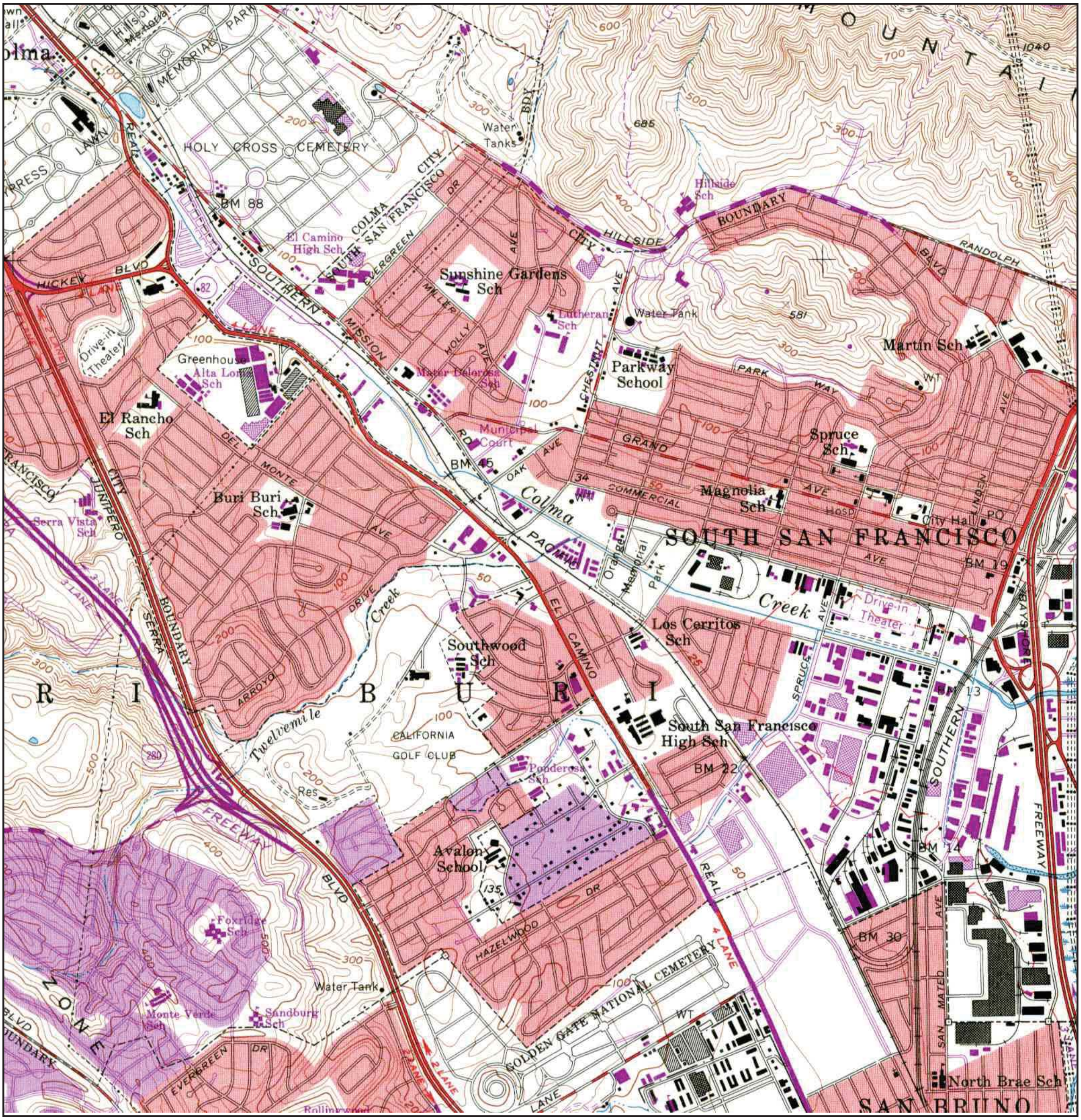
Historical Topographic Map



N	TARGET QUAD NAME: SAN FRANCISCO SOUTH MAP YEAR: 1956 SERIES: 7.5 SCALE: 1:24000	SITE NAME: South San Francisco Project Site ADDRESS: Westborough Blvd and Orange Ave South San Francisco, CA LAT/LONG: 37.6544 / -122.4374

CLIENT: AEW Engineering , Inc.
CONTACT: Lindsay Furuyama
INQUIRY#: 3190911.4
RESEARCH DATE: 10/20/2011

Historical Topographic Map



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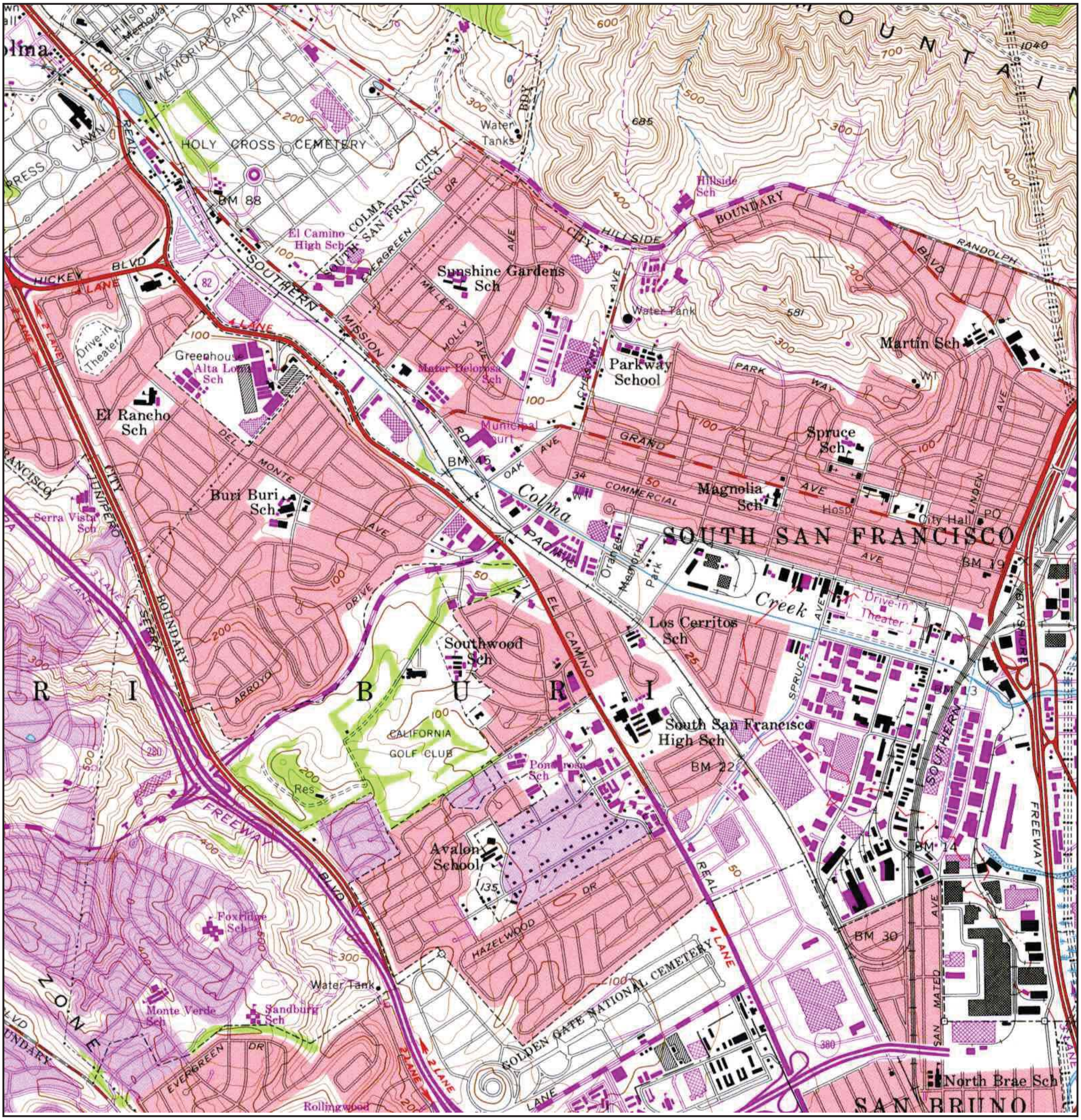
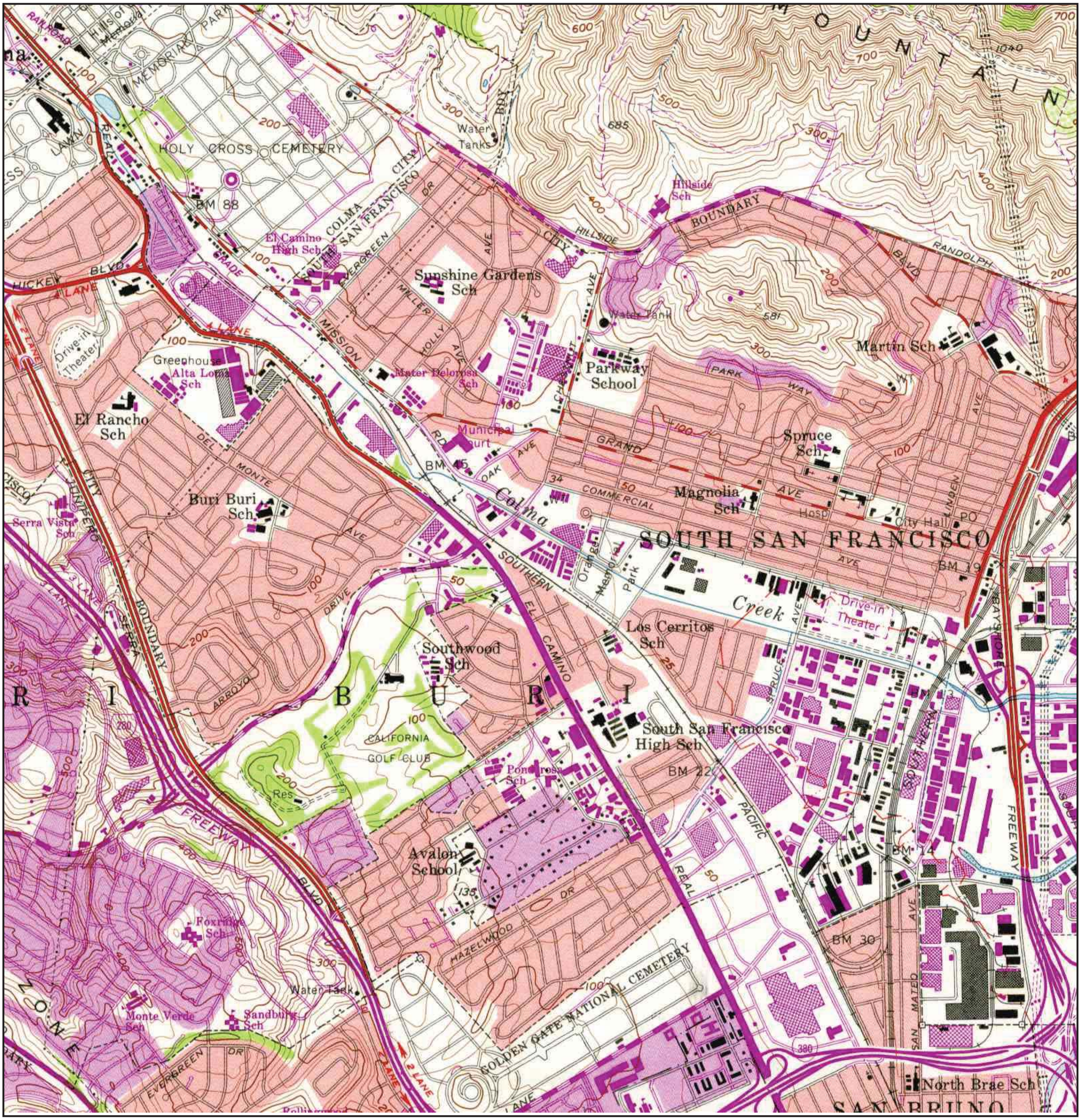
Historical Topographic Map



N ↑	TARGET QUAD	SITE NAME: South San Francisco Project Site	CLIENT: AEW Engineering , Inc.
	NAME: SAN FRANCISCO SOUTH	ADDRESS: Westborough Blvd and Orange Ave	CONTACT: Lindsay Furuyama
	MAP YEAR: 1973	South San Francisco, CA	INQUIRY#: 3190911.4
	PHOTOREVISED:1956	LAT/LONG: 37.6544 / -122.4374	RESEARCH DATE: 10/20/2011
	SERIES: 7.5		
	SCALE: 1:24000		

Historical Topographic Map



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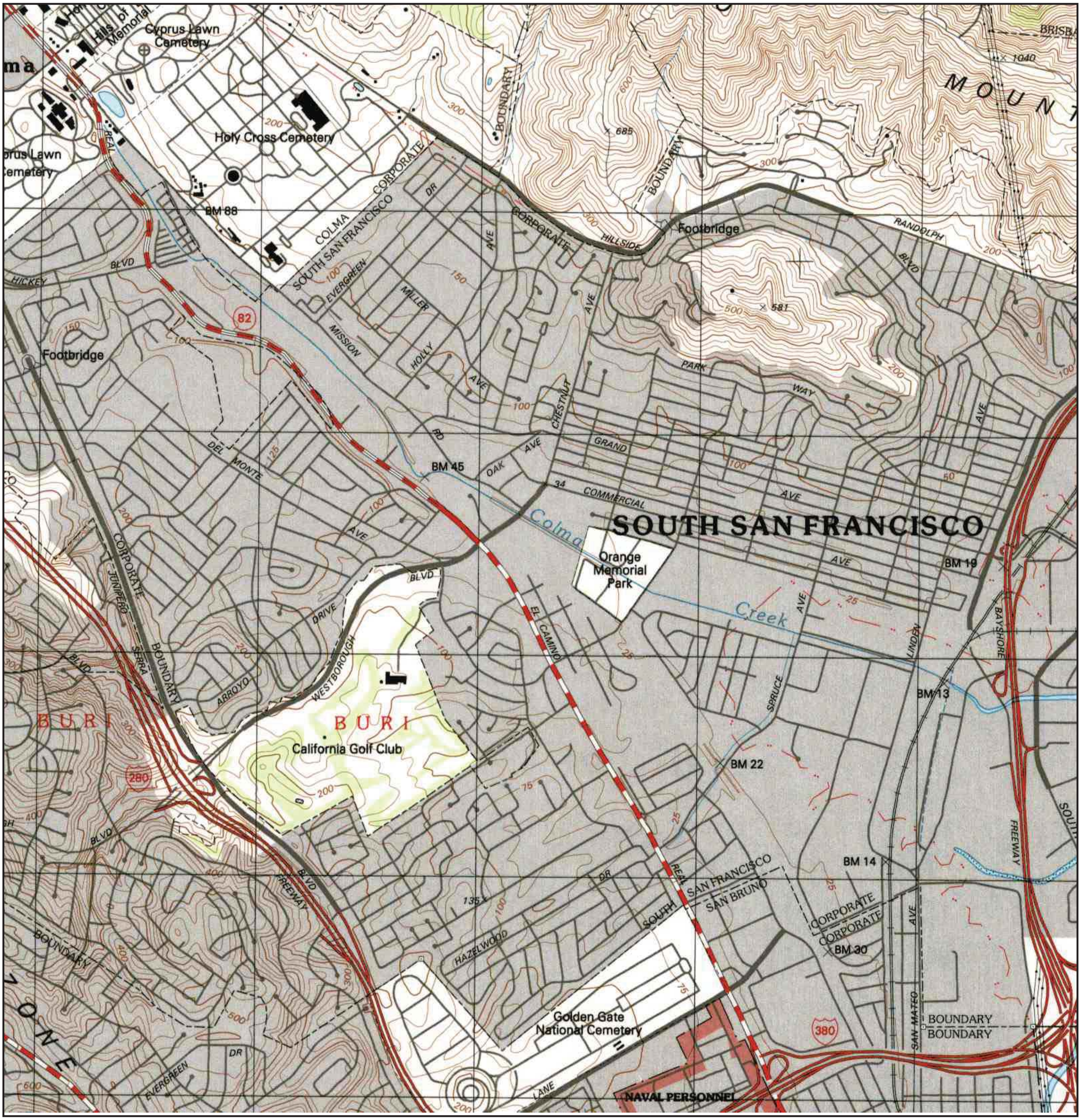
TARGET QUAD
NAME: SAN FRANCISCO SOUTH
MAP YEAR: 1980
PHOTOREVISED: 1956
SERIES: 7.5
SCALE: 1:24000

SITE NAME: South San Francisco Project Site
ADDRESS: Westborough Blvd and Orange Ave
South San Francisco, CA
LAT/LONG: 37.6544 / -122.4374

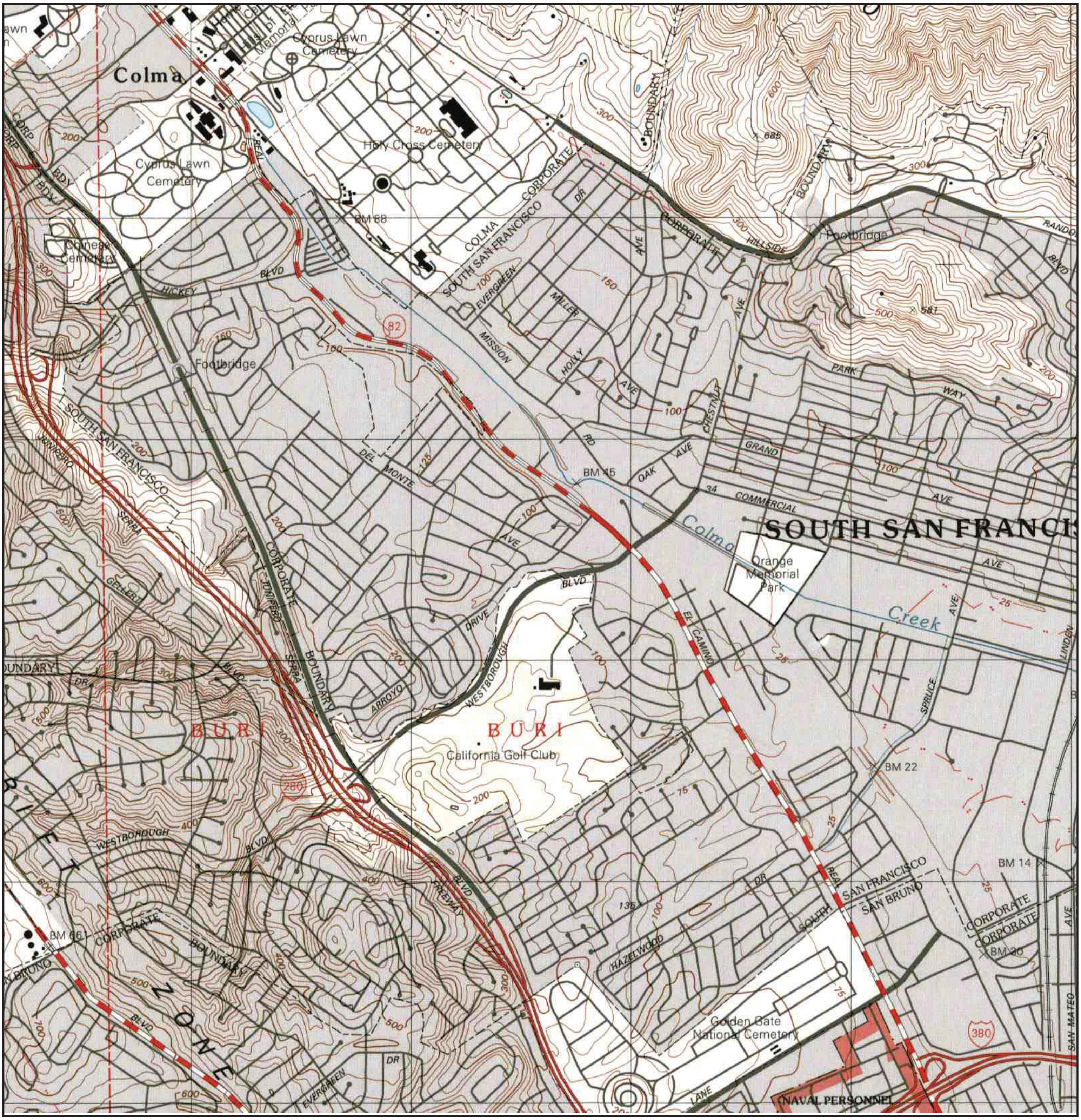
CLIENT: AEW Engineering , Inc.
CONTACT: Lindsay Furuyama
INQUIRY#: 3190911.4
RESEARCH DATE: 10/20/2011

Historical Topographic Map



N ↑	TARGET QUAD NAME: SAN FRANCISCO SOUTH MAP YEAR: 1993 SERIES: 7.5 SCALE: 1:24000	SITE NAME: South San Francisco Project Site ADDRESS: Westborough Blvd and Orange Ave South San Francisco, CA LAT/LONG: 37.6544 / -122.4374	CLIENT: AEW Engineering , Inc. CONTACT: Lindsay Furuyama INQUIRY#: 3190911.4 RESEARCH DATE: 10/20/2011

Historical Topographic Map



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South San Francisco Project Site
Westborough Blvd and Orange Ave
South San Francisco, CA 94080

Inquiry Number: 3190911.3
October 21, 2011

Certified Sanborn® Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

10/21/11

Site Name:	Client Name:
South San Francisco Project	AEW Engineering , Inc.
Westborough Blvd and Orange	55 New Montgomery Street
South San Francisco, CA	San Francisco, CA 94105
EDR Inquiry # 3190911.3	Contact: Lindsay Furuyama

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Certified Sanborn Results:

Site Name: South San Francisco Project Site
Address: Westborough Blvd and Orange Ave
City, State, Zip: South San Francisco, CA 94080
Cross Street:
P.O. # 2010-024
Project: URS Peninsula Pipeline
Certification # F046-42ED-846A

Sanborn® Library search results
Certification # F046-42ED-846A

Maps Provided:

1970

1956

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- ✔ Library of Congress
- ✔ University Publications of America
- ✔ EDR Private Collection

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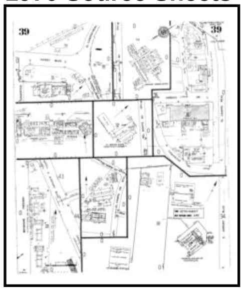
Sanborn Sheet Thumbnails

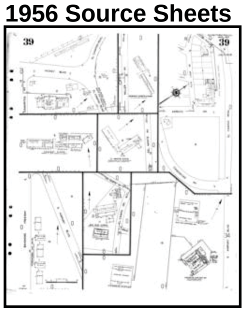
This Certified Sanborn Map Report is based upon the following Sanborn Fire Insurance map sheets.

1970 Source Sheets



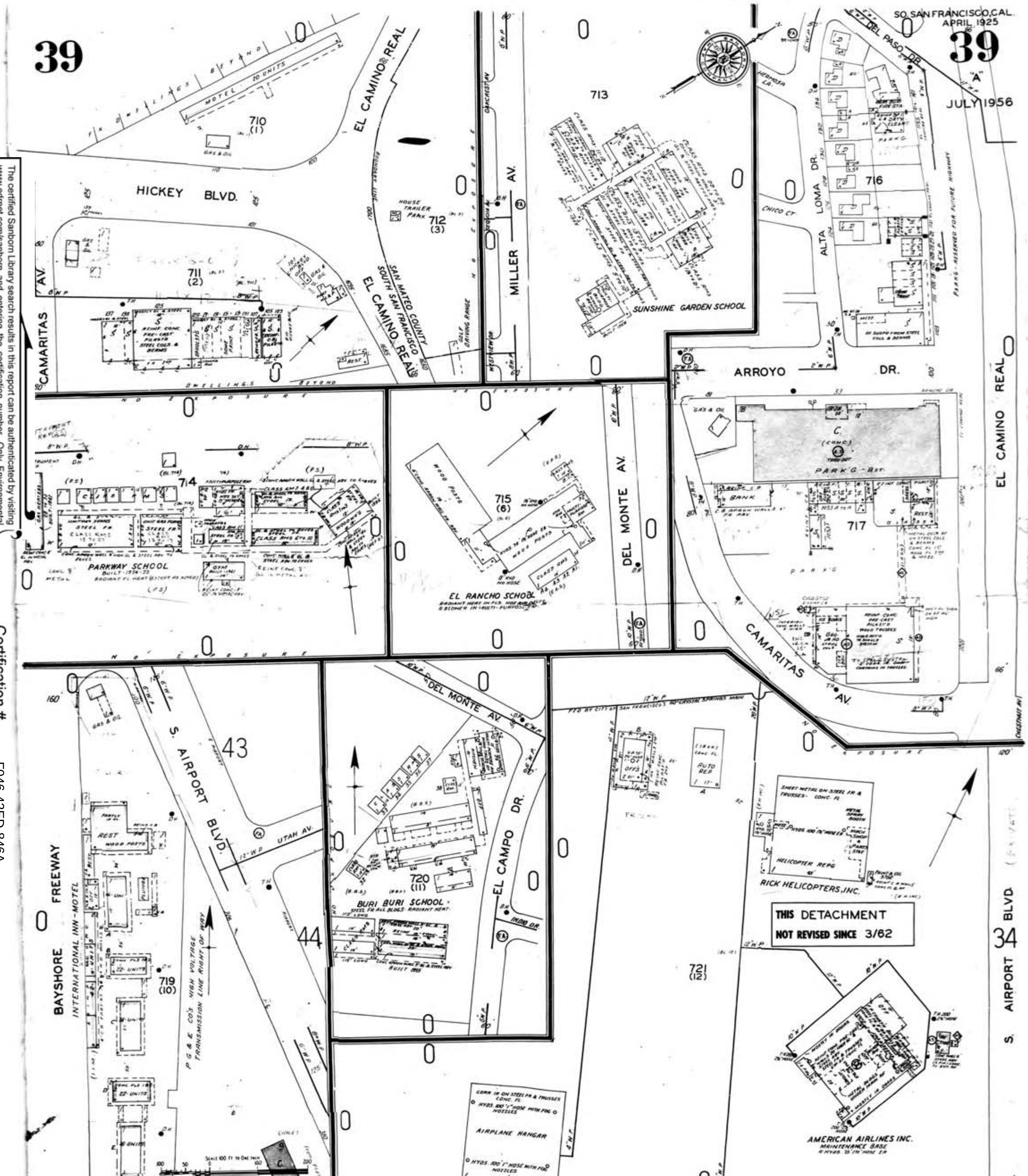
Volume 1, Sheet 39

1956 Source Sheets



Volume 1, Sheet 39

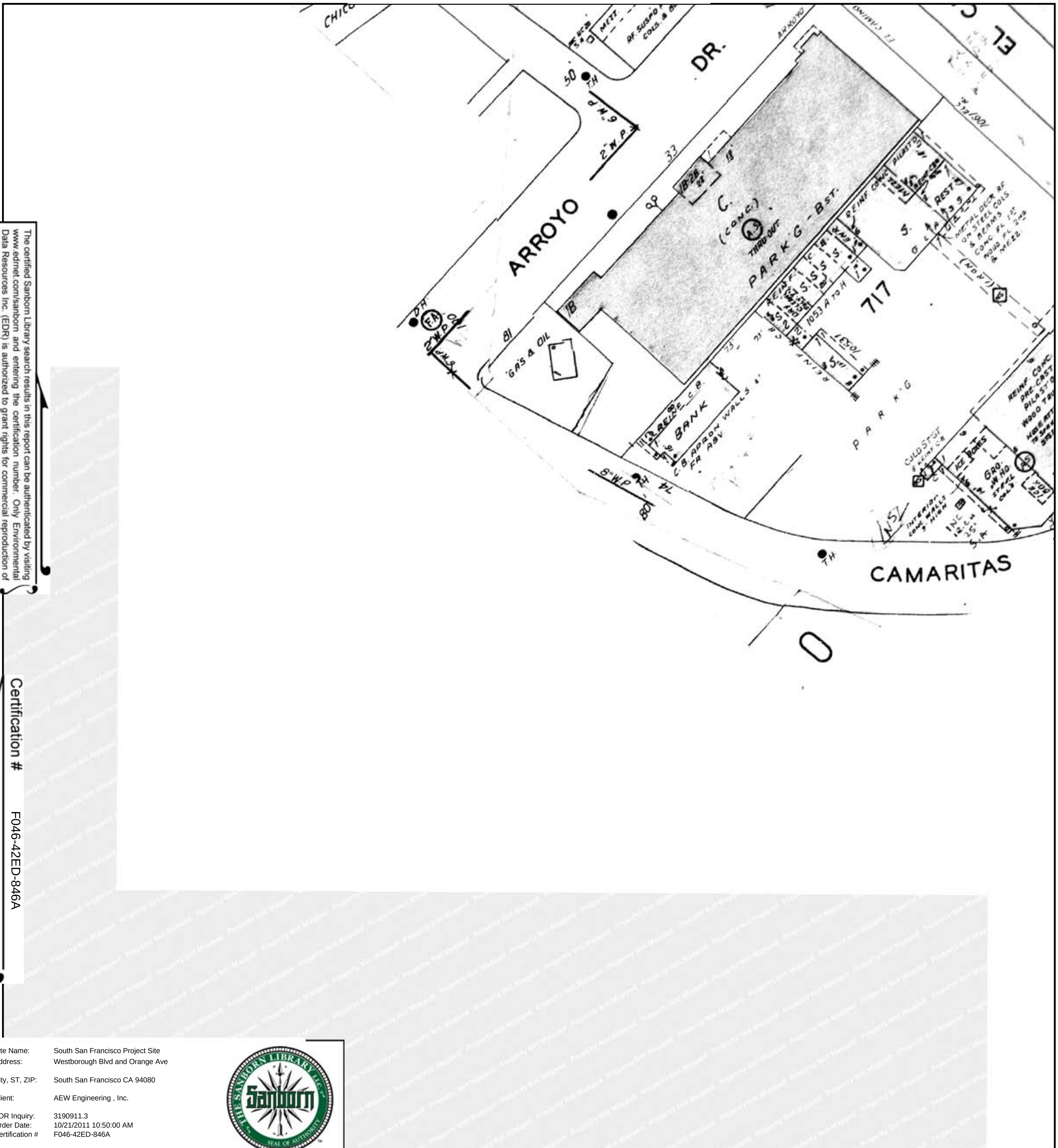
1970 Certified Sanborn Map



Certification # F046-42ED-846A

Site Name:	South San Francisco Project Site
Address:	Westborough Blvd and Orange Ave
City, ST, ZIP:	South San Francisco CA 94080
Client:	AEW Engineering , Inc.
EDR Inquiry:	3190911.3
Order Date:	10/21/2011 10:50:00 AM
Certification #	F046-42ED-846A
Copyright:	1970

1970 Certified Sanborn Map

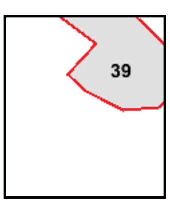


Certification # F046-42ED-846A

Site Name:	South San Francisco Project Site
Address:	Westborough Blvd and Orange Ave
City, ST, ZIP:	South San Francisco CA 94080
Client:	AEW Engineering , Inc.
EDR Inquiry:	3190911.3
Order Date:	10/21/2011 10:50:00 AM
Certification #	F046-42ED-846A
Copyright:	1970

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

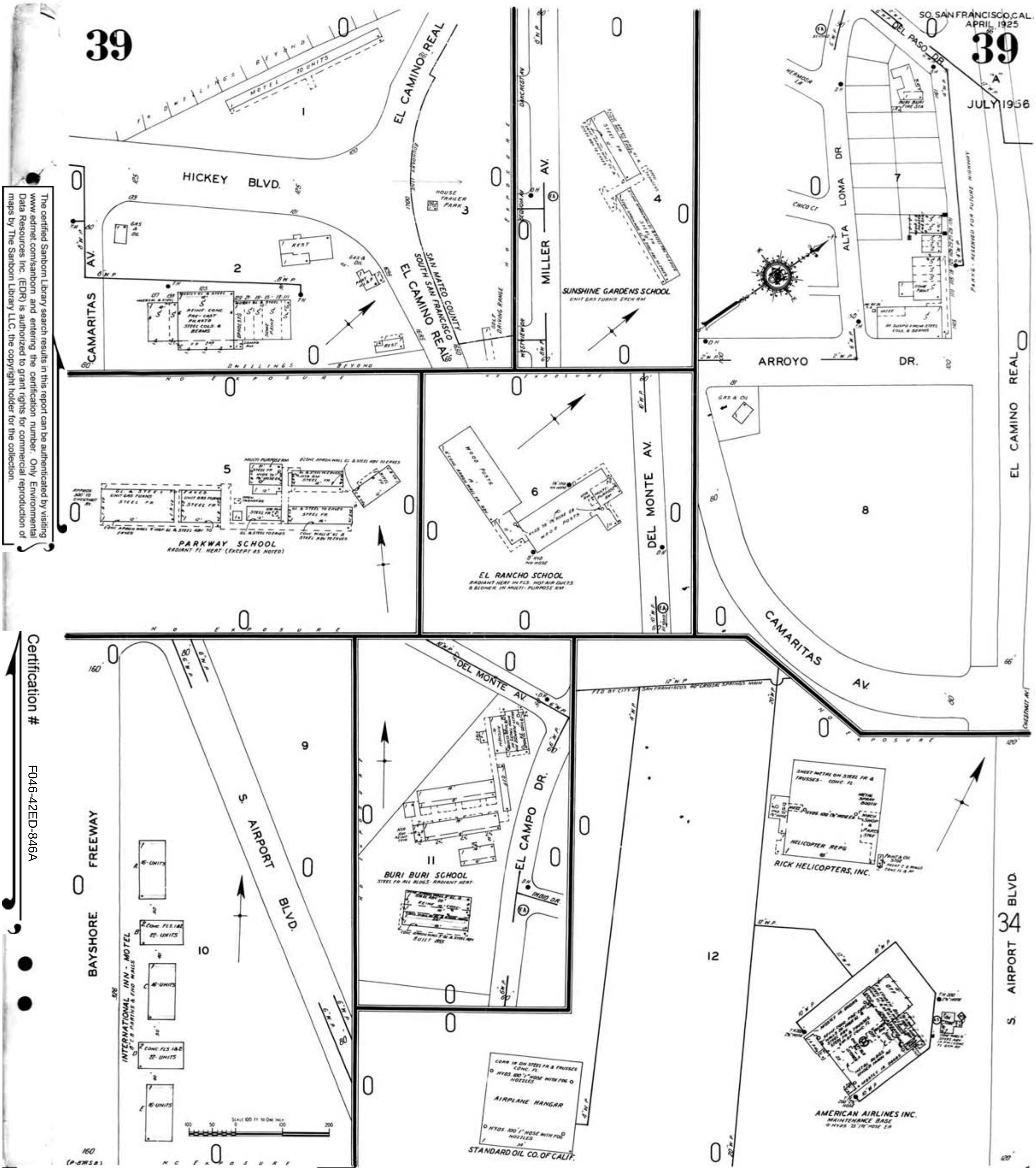
0 Feet 150 300 600



Volume 1, Sheet 39

N

1956 Certified Sanborn Map



Certification # F046-42ED-846A

Site Name:	South San Francisco Project Site
Address:	Westborough Blvd and Orange Ave
City, ST, ZIP:	South San Francisco CA 94080
Client:	AEW Engineering , Inc.
EDR Inquiry:	3190911.3
Order Date:	10/21/2011 10:50:00 AM
Certification #	F046-42ED-846A
Copyright:	1956