FOR CONTRACT NO.: 04-153204

INFORMATION HANDOUT

MATERIALS INFORMATION

FOUNDATION REPORT FOR RETAINING WALLS

GEOTECHNICAL DESIGN REPORT FOR CMS

PORTIONS OF PRELIMINARY SITE INVESTIGATION REPORT

ROUTE: 680-SCL-M0.0/M9.4

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. BRIAN MORI
District Branch Chief
Structure Design
Division of Engineering Services

Date: October 24, 2011

Attention: K. Nakaoka

File: 04-SCL-680 PM 0.0/9.94
04-153200
Ramp Metering & TOS

MH

From: for S. AWAD/M. HUNG
Transportation Engineers
Office of Geotechnical Design-West
Geotechnical Services
Division of Engineering Services

H. Nikoui
HOOSHMAND NIKOUI
Chief, Branch A
Office of Geotechnical Design-West
Geotechnical Services
Division of Engineering Services

Subject: Foundation Report for Retaining Walls

1. INTRODUCTION

This memo provides foundation recommendations for three retaining walls, namely, Retaining Wall No. 1 (Alum Rock NB 680), Retaining Wall No. 2 (Alum Rock SB 680), and Retaining Wall No. 3 (Capitol Expressway SB 680). These retaining walls are part of the Highway 680 Ramp Metering System and Traffic Operation System (TOS) elements along Route 680 in Santa Clara County, on both northbound and southbound sides. The proposed project limits are from 101/680 connector to Scott Creek Road, a stretch of approximately 10 miles along 680 corridor (Figure 1).

Recommendations contained in this report are based on the submitted layout and cross section plans, field mapping of the site, subsurface exploration, laboratory test results and foundation analysis. This foundation report addresses our foundation recommendation for the above retaining walls. Refer to Table 1 for general information regarding these retaining walls.

Table 1- Retaining Wall Limits

Wall No.	Direction	Beign	End	Wall Height(ft)
No. 1	NB	"ARN" 15+3.77	"ARN" 19+00	6 to 12
No. 2	SB	"ARS" 17+03.14	ARS" 21+50.00	6 to 10
No. 3	SB	"CES" 14+10.00	"CES" 16+20.00	6

2. PROJECT PURPOSE AND NEED

The need for this project is to relieve congestion and reduce accidents. The purpose is to install ramp metering systems to improve highway operations. These retaining walls are required for the proposed widening of the ramps (approximately 20 feet).

3. SCOPE OF WORK

The following tasks were performed for the preparation of this Foundation Report:

- Review of as-built plans;
- Field geotechnical exploration, including drilling 12 borings at or near the retaining walls alignments;
- Laboratory testing result on selected samples;
- Foundation design analysis; and
- Preparation of this Foundation Report.

4. SITE GEOLOGY AND SEISMICITY

4.1 Topography

The project site is located in Santa Clara County in east portion of the Santa Clara Valley. Highway 680 starts from highway 101 runs northeast, turns to the north where it parallels the Los Buells Hills to the east and the alluvial flats of the San Francisco Bay to the west. The highest point in the area is Mount Hamilton, southeast of the freeway, with an elevation exceeding at 4,213 feet. The 10 mile stretch of roadway starts at Highway 101 and 680, at an elevation of approximately 100 feet above sea level, Highway 680 turns to the north and gently climbs to an elevation of 140 feet at Berryessa Road Overcrossing. From this point the freeway gently drops down in elevation to 25 feet, at Jacklin Road, before rising up to an elevation of 110 feet at Scott Creek Road.

4.2 Climate

The climate of the job site is considered Mediterranean Climate. Santa Clara County has warm, dry summers and mild, wet winters. Temperatures are highest in July and coldest in January, with an average temperature of 61.3°. The average high temperature in San Jose is 84°, in July and August, and average low temperature is 41° in December. The average amount of rainfall is approximately 15.08 inches. In the summer, little rainfall occurs. The rainy season begins in

October, about 0.87 inches and ends in April about 1.02 inches, with the most rain falling in January (3.03 inches). (Data taken from http://www.weather.com)

4.3 Soils

Surficial soils in the project are all urban land soils with landforms of alluvial fan, flood plain and basin floor. The one soil that is not urban land is Elder fine sandy loam and has a landform of stream soils (See Attachment A: NRCS Custom Soil Resource Reports). The alluvial fan soils are the Elpaloalto, Stevenscreek complex, Flaskan complex, Campbell complex, Elder complex, Landelspark complex, Newpark complex and Cropley complex. The Still complex is alluvial fan and flood plain. Hangerone, and the Embarcadero and Clear Lake complexes are all derived from basin floor.

According to the NRCS, all the soils listed above are listed in Hydrologic Soil Group D, with the exception of the Elder fine sandy loam and the Clear Lake complex, which is Hydrologic Soil Group A and Group C, respectfully. The NRCS list soils in group D as "...Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission. Group A soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission. Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission."

The properties listed in County Soil Surveys are general and listed for information only. Soil strength tests should be performed over the area before considering the use of soils from the site for embankments.

4.4 Site Geology

The project site is located within the California Coast Ranges geomorphic province within the eastern portion of the Santa Clara Valley. Interstate 680 is located on the land between the Los Buellis Hills and the San Francisco Bay, which is comprised of Holocene natural levee, alluvial fan and basin deposits, and Pleistocene alluvial fan deposits. (Figure 2: USGS Open –File Report 98-795 Part 7, Preliminary Geologic Map of the San Jose 30x60 Quadrangle, CA. Compile by Wentworth, Carl, et. al. 1999). Map attached (Figure 2).

In a search of Caltrans Log of Test Borings (LOTBs) numerous logs were found that fall within the jobsite. Below are the LOTBs locations:

- Route 280/680/101 separation.
- Capitol Expressway Undercrossing
- Alum Rock Avenue On-ramp Overcrossing and Retaining Walls/Separation
- Madden Avenue Pedestrian Overcrossing
- McKee Road Overcrossing
- Upper Penitencia Creek Bridge
- Berryessa Road Overcrossing
- Hostetter Road Undercrossing
- Capitol Avenue Undercrossing
- Berryessa Creek Bridge
- Trimble Road Pedestrian Overcrossing
- Landess Avenue Overcrossing
- Calaveras Road Undercrossing
- Tularcitos Creek Reinforced Concrete Box
- Jacklin Road Undercrossing
- Scott Creek Road Undercrossing

These borings show the site is underlained by interbedded layers of silt, clay and sand and gravel, with occasional cobbles near stream channels. These findings are consistent with the natural levee, alluvial fan and basin deposits of the geologic map.

4.5 Seismicity

The project site starts at highway 101 and ends at Scott Creek Road which is a distance of approximately 10 miles. The two ends of the projects have different controlling faults as shown on Caltrans ARS online website (See Attachment B). For the southern portion of the job, from 101/680 split Berryessa Undercrossing, the controlling fault is the Silver Creek fault. North of Berryessa Undercrossing through the northern end of the project the controlling fault is Hayward Fault Zone (SE Extension Section). Table 2 presents the faults within the project area.

The site is not in the vicinity of any Alquist Priolo earthquake fault zones; therefore surface rupture should not be an issue. But the area immediately north of Scott Creek Road is defined as Special Study Zone, as defined by the Alquist Priolo Milpitas Quadrangle Map. Map is attached (Figure 3).

Table 2- Faults within the Project Site

Location	Fault	Minimum distance to project kilometers (miles)	MCE	PGA (g)
Southern Portion				
101/280/680	Silver Creek	1.14 (0.71)	7.1	0.58
Middle Portion				
Berryessa Road/680	Silver Creek	3.87 (2.40)	7.1	0.45
Berryessa Road/680	Hayward Fault Zone (SE Extension Section)	3.09 (1.92)	6.8	0.44
Berryessa Road/680	Calaveras Fault Zone (Central Calaveras section)	7.06 (4.39)	6.8	0.35
Northern Portion				
237/680	Silver Creek	3.44 (2.14)	7.1	0.47
237/680	Hayward Fault Zone (SE Extension Section)	1.52 (0.94)	6.8	0.49
237/680	Hayward Fault Zone (Southern Hayward Section)	4.86 (3.02)	7.3	0.40
Jacklin/680	Hayward Fault Zone (SE Extension Section)	0.78 (0.48)	6.8	0.52
Jacklin/680	Hayward Fault Zone (Southern Hayward Section)	2.37 (1.47)	7.3	0.48

4.6 Liquefaction

Liquefaction varies over the length of the project. From the 101/680 to Capitol Expressway Undercrossing and from the Hostetter Road Undercrossing to just north of the Jacklin Road Undercrossing liquefaction has had historical occurrences. However, there is no significant liquefaction problem at the retaining wall site (RW2), since the footing elevation will be below the potential liquefaction layer. The remainder of the project (between Alum Rock to just south of the Hostetter Road Undercrossing and north of Jacklin Road) is not within liquefaction zones. The Association of Bay Area Government (ABAG) map for Liquefaction is attached (Figure 4).

4.7 Flooding

According to the ABAG map, flooding the entire project lies within the 500 year flood zone, which has a "...0.2% annual chance flooding," and the area directly adjacent to creeks and arroyos are located within the 100 year flood zones which is defined by "...1% annual chance flooding." The 101/680 split is not located within a mapped flood zone. The ABAG map for Flood Hazard Areas is attached (Figure 5).

4.8 Landslides

The flat area of flood plain and fan deposits are typically not prone to landslides. The ABAG map for Landslides is attached (Figure 6).

5. SUBSURFACE INVESTIGATION

The subsurface exploration was performed by the Office of Geotechnical Design West (OGDW) for RW #1, 2, and 3 between June and August 2011. It consists of a total of 12 mud-rotary borings with Standard Penetration Tests (SPT) and Pocket Penetrometer (PP) Tests. Soil samples were taken every 5 feet from the Standard Penetration Test (SPT) sampling. Laboratory tests were used to update the soil information. All foundation soil classifications were based on Caltrans "Soil and Rock Logging, Classification, and Presentation Manual". Refer to the LOTBs in the Structure Plans. The LOTB sheets will be submitted when they are ready.

5.1 Retaining Wall No. 1 (RW1)

General information of borings located near the RW1 site is listed in Table 3.

Table 3- Summary of Field Borings for RW1

Boring ID	Total Length (ft)	Date of completion	Hammer Efficiency
A-11-001	71.5	6/7/11	88%
A-11-001	66.5	6/8/11	88%

In general, the SPT blow counts for all borings in this area ranged from 16 to as high as of 50 blows per foot. For all borings, Pocket Penetrometer (PP) tests were conducted on soil samples showing apparent cohesion. The unconfined compressive strength of the clayey soil was estimated varying from 0.50 tsf to 3.75 tsf.

According to samples extracted from the borings, in general, the borings describe the foundation soils as approximately 13 feet of medium stiff to stiff sandy silt with gravel. The remainder of the boring is very stiff sandy lean clay.

Groundwater was encountered approximately 26 feet below the ground surface at the time of drilling. However, groundwater elevations fluctuate seasonally and may be encountered at higher elevations.

5.2 Retaining Wall No. 2 (RW2)

General information of borings located near the RW2 site is listed in Table 4.

Table 4- Summary of Field Borings for RW2

Boring ID	Total Length (ft)	Date of completion	Hammer Efficiency
A-11-005	31.5	7/19/11	84%
A-11-006	26.5	7/20/11	84%
RC-11-002	46.5	8/3/11	80%

The SPT blow count values range from a low of 6 blows per foot to as high as 50 blows per foot. The unconfined compressive strength of the clayey soil was estimated to vary from 2.50 tsf to 4.5 tsf.

The subsoil profile at RW2 consists of approximately 15 feet of medium dense clayey sand with gravel. The remainder of the boring is dense well- graded sand with silt and gravel

Groundwater was encountered at 22.0 feet below the ground surface at the time of drilling. However, groundwater elevations fluctuate seasonally and may be encountered at higher elevations.

5.3 Retaining Wall No. 3 (RW3)

General information of borings located near the RW3 site is listed in Table 5.

Table 5- Summary of Field Borings for RW3

Boring ID	Total Length (ft)	Date of completion	Hammer Efficiency
A-11-008	46.6	7/21/11	57%
RC-11-003	41.5	7/28/11	57%
RC-11-004	41.5	8/2/11	80%
RC-11-005	41.5	8/2/11	80%

The SPT blow count values ranged from a low of 5 blows per foot to a high of 50 blows per foot. The unconfined compressive strength of the clayey soil was estimated to vary from 1.00 tsf to 4.50 tsf.

The borings describe the foundation soils as approximately 15 feet of medium dense to very dense well-graded gravel with silt and sand. This is underlain by 6 feet loose silty sand. The remainder of the boring is stiff lean clay.

Groundwater was encountered between 12.5 feet and 42 feet below the ground surface at the time of drilling. However, groundwater elevations fluctuate seasonally and may be encountered at higher elevations.

6. GEOTECHNICAL TESTING

6.1 In Situ Testing

In all borings, Standard Penetration Test (SPT) was performed at 5-feet interval in soil strata. Pocket Penetrometer (PP) tests were conducted on soil samples showing apparent cohesion. Visual soil classifications were made in the field in accordance with the Unified Soil Classification System. Soil samples were collected at various depths for laboratory testing.

6.2 Laboratory Testing

The laboratory testing program included unit weight tests, moisture content tests, gradation analyses, Atterberg limits tests, corrosion tests. Refer to Attachment C for the laboratory test results.

7. CORROSION EVALUATION

Corrosion studies were conducted in accordance with the requirements of California Test Method No. 643. The Department considers the site to be corrosive to foundation elements if one or more of the following conditions exist for the representative soil samples taken at the site:

> Chloride concentration is greater than or equal to 500 ppm, sulfate concentration is greater than or equal to 2000 ppm, or the pH is 5.5 or less.

7.1 Retaining Wall No. 1 (RW1)

The following table provides our corrosion test summary:

Table 6- Summary of Corrosion Test for RW1

Boring	*SIC Number*	*Sample Depth*	*Resistivity (Ohm-Cm)*	*pH*	*Chloride Content (ppm)*	*Sulfate Content (ppm)*
A-11-002	CSA-680-01	40-43	2256	7.7	N/A	N/A

7.2 Retaining Wall No. 1 (RW2)

The following table provides our corrosion test summary:

Table 7- Summary of Corrosion Test for RW2

Boring	*SIC Number*	*Sample Depth*	*Resistivity (Ohm-Cm)*	*pH*	*Chloride Content (ppm)*	*Sulfate Content (ppm)*
A-11-005	CSAwad-5	4-6	1072	7.6	N/A	N/A

7.3 Retaining Wall No. 1 (RW3)

The following table provides our Summary of Corrosion Tests for RW3:

Table 8- Summary of Corrosion Test for RW3

Boring	*SIC Number*	*Sample Depth*	*Resistivity (Ohm-Cm)*	*pH*	*Chloride Content (ppm)*	*Sulfate Content (ppm)*
A-11-008	CSAwad-7	41-43	6440	7.86	N/A	N/A
RC-11-005	CSAwad-6	5-7	1860	9.2	N/A	N/A

Based on the test results from the Materials Engineering Testing Services (METS) of Caltrans, the foundation soils for all the proposed retaining walls are considered non-corrosive. Refer to Attachment C for the laboratory test results.

8. FOUNDATION RECOMMENDATION

8.1 Retaining Wall No. 1

The proposed RW1 is about 386.23 feet long and varies in height from 7 feet to 12 feet.
Based on the information obtained from the borings drilled for RW1, plans and cross sections, and estimated soil parameters, it is estimated that the allowable bearing capacity of the foundation soils (using safety factor of 3) is greater than 2.7 ksf toe pressure required for Standard Plan Type 1 retaining wall, based on H= 12 ft with Case II wall design.

Thus, Standard Plan Type 1 retaining wall can be adopted for RW1 (Table 9).

Table 9 - Foundation Recommendations for Retaining Wall No.1

Wall Location	Wall Height, H (ft)	Foundation Type	Groundline	Friction Angle
"ARN" 15+3.77 to "ARN" 19+00	6 to 12	Type 1	Case II	40°

8.2 Retaining Wall No. 2

The proposed RW2 is about 446.86 feet long and 10 feet high.

Based on the above-mentioned investigation for RW2 and estimated soil parameters, it is estimated that the allowable bearing capacity of the foundation soils (using safety factor of 3) is less than 2.3 ksf toe pressure required for Standard Plan Type 1 retaining wall, based on H= 10 ft with Case II wall design. However, Standard Plan Type 1 retaining wall can be used (Table 10) if the following foundation treatment is implemented in order to have adequate bearing capacity:

We recommend sub-excavating the foundation soil to a depth of 2 feet below the retaining wall footing and extending the sub-excavation 2 feet beyond the toe side of the footing. The sub-excavated area should be backfilled with Class 3 Aggregate Base (AB3) at 95% relative compaction (Refer to Attachments D-1 and D-2).

Table 10- Foundation Recommendations for Retaining Wall No.2

Wall Location	Wall Height, H (ft)	Foundation Type	Groundline	Friction Angle
"ARS" 17+03.14 to ARS" 21+50.00	6 to 10	Type 1	Case II	30°

8.3 Retaining Wall No. 3

RW3 is about 210 feet long and 6 feet high. Based on the above-mentioned investigation for RW3 and estimated soil parameters, it is estimated that the allowable bearing capacity of the foundation soils (using safety factor of 3) is greater than 2.2 ksf toe pressure required for Standard Plan Type 5 retaining wall, based on H= 6 ft with Case I wall design.

Thus, Standard Plan Type 5 retaining wall can be adopted for RW3 (Table 11).

Table 11- Foundation Recommendations for Retaining Wall No.3

Wall Location	Wall Height, H (ft)	Foundation Type	Groundline	Friction Angle
"CES" 14+10.00 to "CES" 16+20.00	6	Type 5	Case II	40°

8.4 Settlement

Based on our consolidation analysis, no significant consolidation settlement is anticipated at these three retaining walls.

9. CONSTRUCTION CONSIDERATIONS

- Excavation and water control for retaining walls shall conform to the provisions in Section 19-3, "Structure Excavation and Backfill," of the Standard Specifications.
- There is likely that groundwater will encounter during excavation for the construction of both Retaining Wall No.1 (Alum Rock NB 680), and Retaining Wall No. 2 (Alum Rock SB 680). The Contractor should be prepared to lower the groundwater level during construction as necessary to maintain a dry and stable condition during construction.

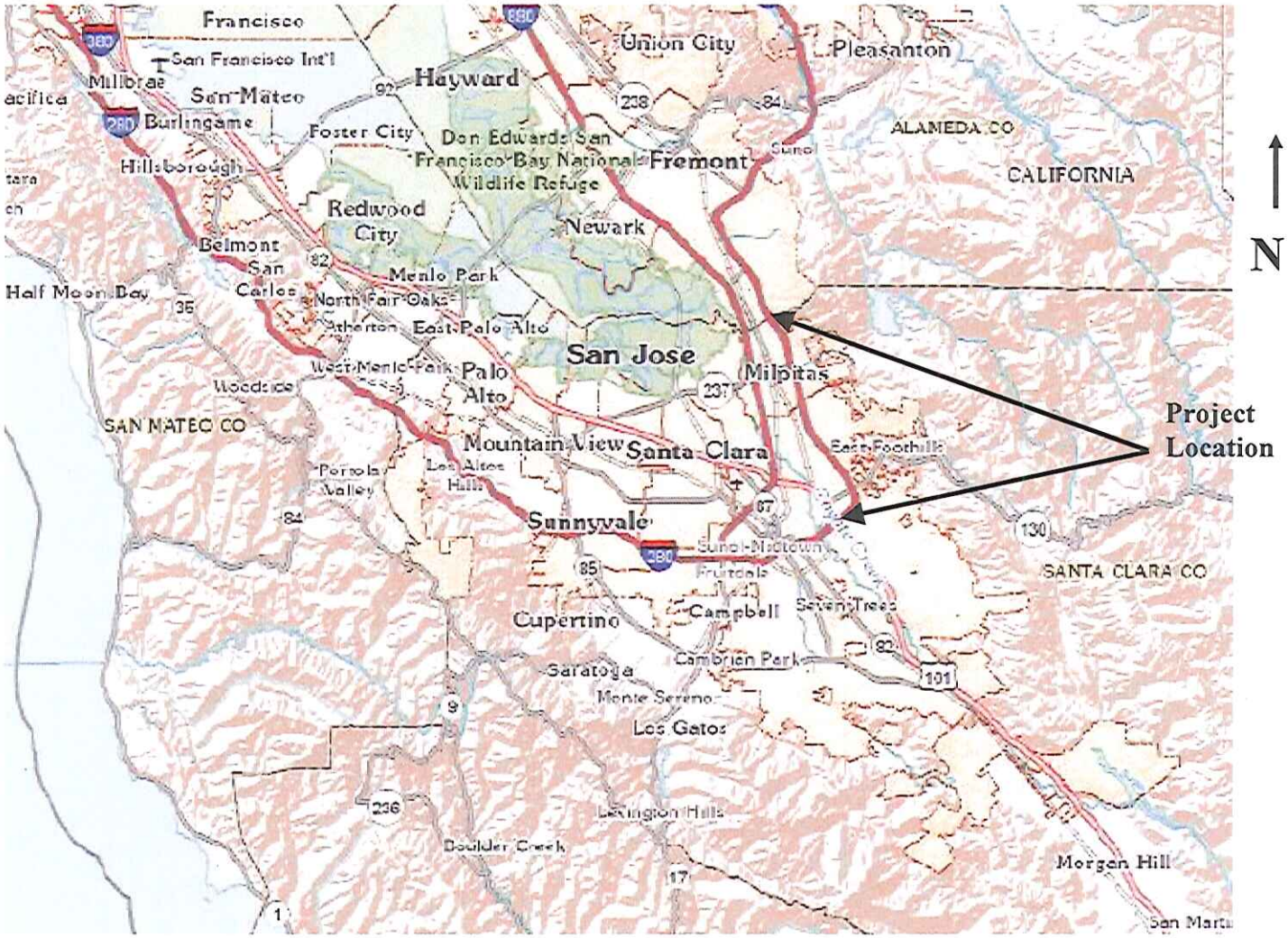
If you have any questions or need additional information, please call Samuel Awad at (510) 622-5443, or Hooshmand Nikoui, Branch Chief at (510) 286-4811.

c: TPokrywka, HNikoui, SAwad, Daily File, Project File

SAwad /mm/153200

REGISTERED PROFESSIONAL ENGINEER
SAMUEL AWAD
No. 64569
Exp. 6/30/13
CIVIL
STATE OF CALIFORNIA

Figures



MAP TAKEN FROM:
USGS MARE ISLAND QUADRANGLE, 1980

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GEOTECHNICAL DESIGN BRANCH (WEST) – BRANCH B

LOCATION MAP

04-SCL-680/	EFIS 0400000426
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FIGURE 1

Map taken from: Preliminary Geologic Map of the San Jose 30x60 Quadrangle, CA. Compile by Wentworth, Carl, et. Al. 1999

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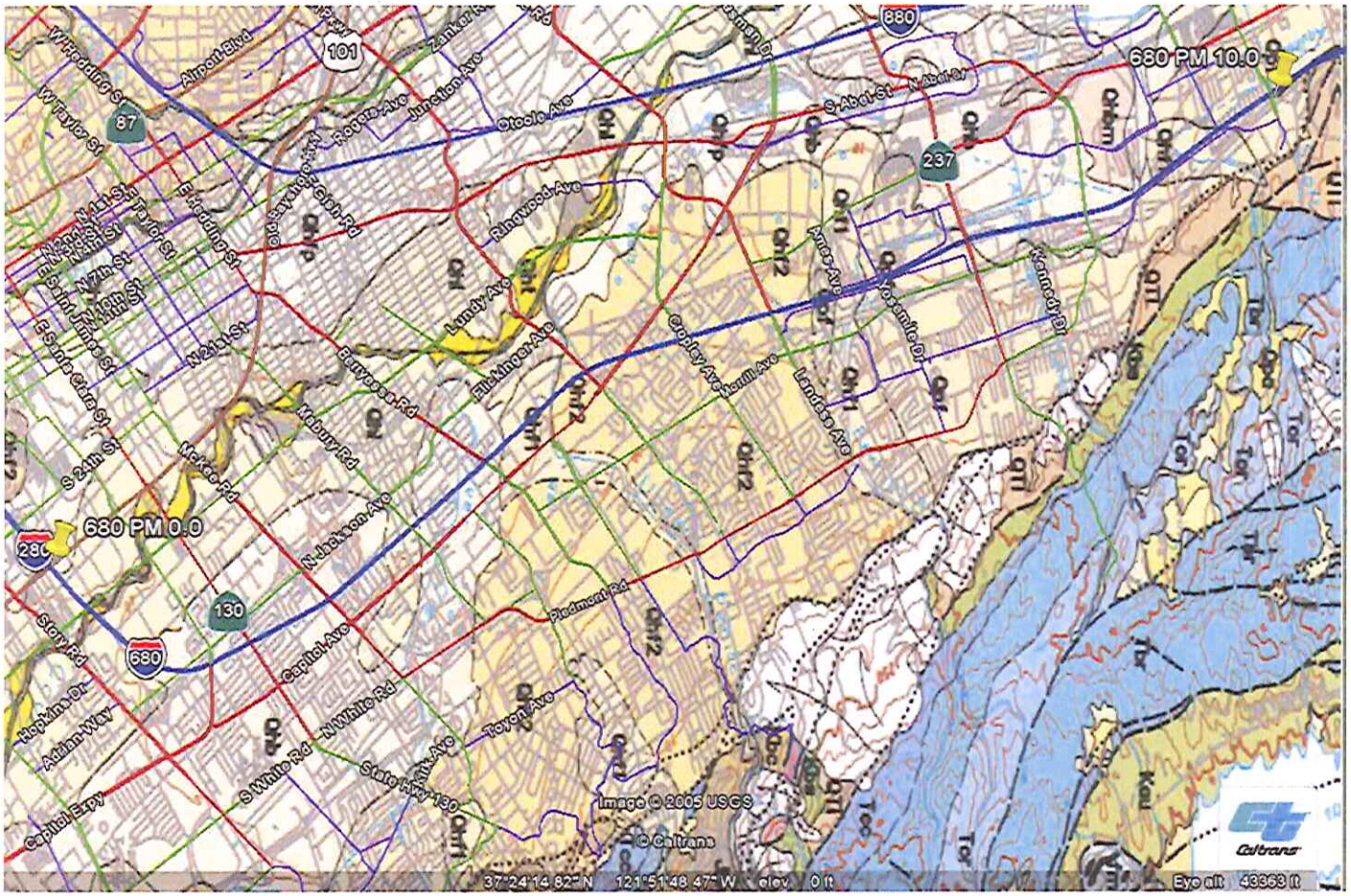

KEY

- Qhf2 Older Alluvial fan deposits (HOLOCENE)
- Qhb Basin deposits (HOLOCENE)
- Qhl Levee deposits (HOLOCENE)
- Qpf Alluvial fan deposits (UPPER PLEISTOCENE)

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GEOTECHNICAL DESIGN BRANCH (WEST) – BRANCH B

GEOLOGIC MAP

04-SCL-680	EFIS 0400000426
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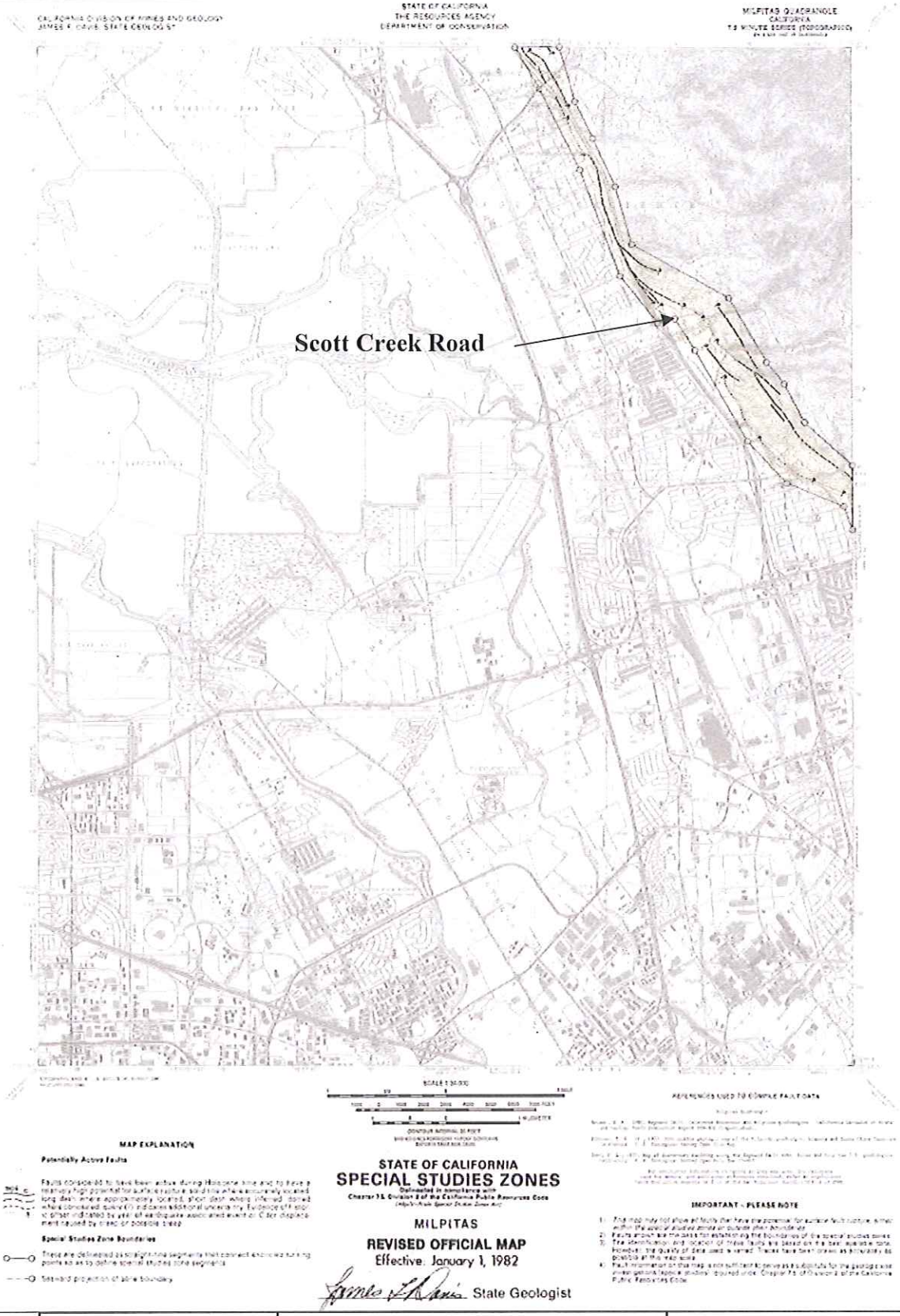
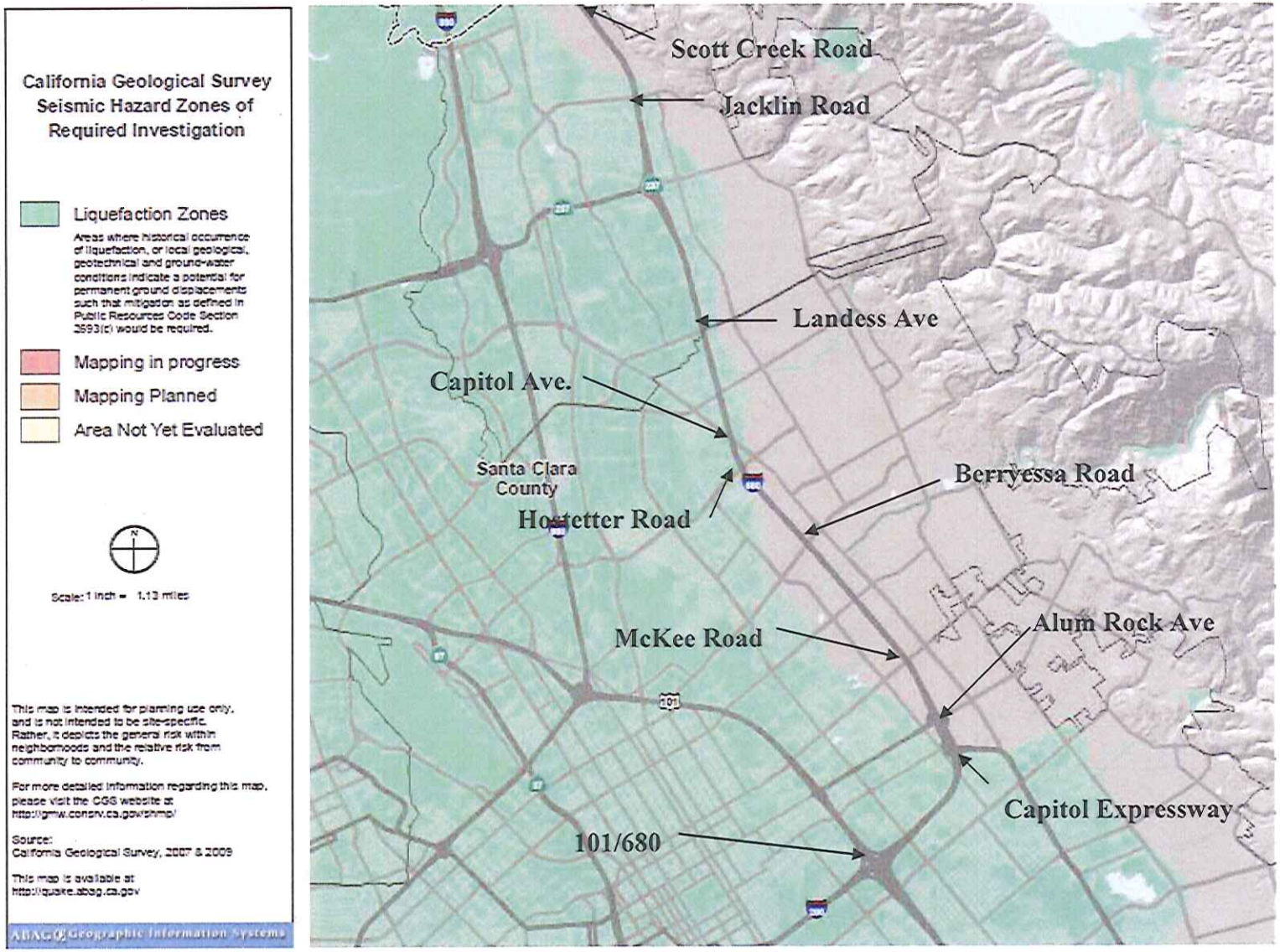
FIGURE 2



SCALE Not to Scale	Caltrans®	**Engineering Service Center** DIVISION OF ENGINEERING SERVICES OFFICE OF GEOTECHNICAL SERVICES GEOTECHNICAL DESIGN BRANCH (WEST) BRANCH B	ALQUIST PRIOLO MAP 04-SCL-680 EFIS 0400000426 PM 0.0-9.94 OCTOBER 2011 FIGURE 3



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LIQUIFACTION MAP

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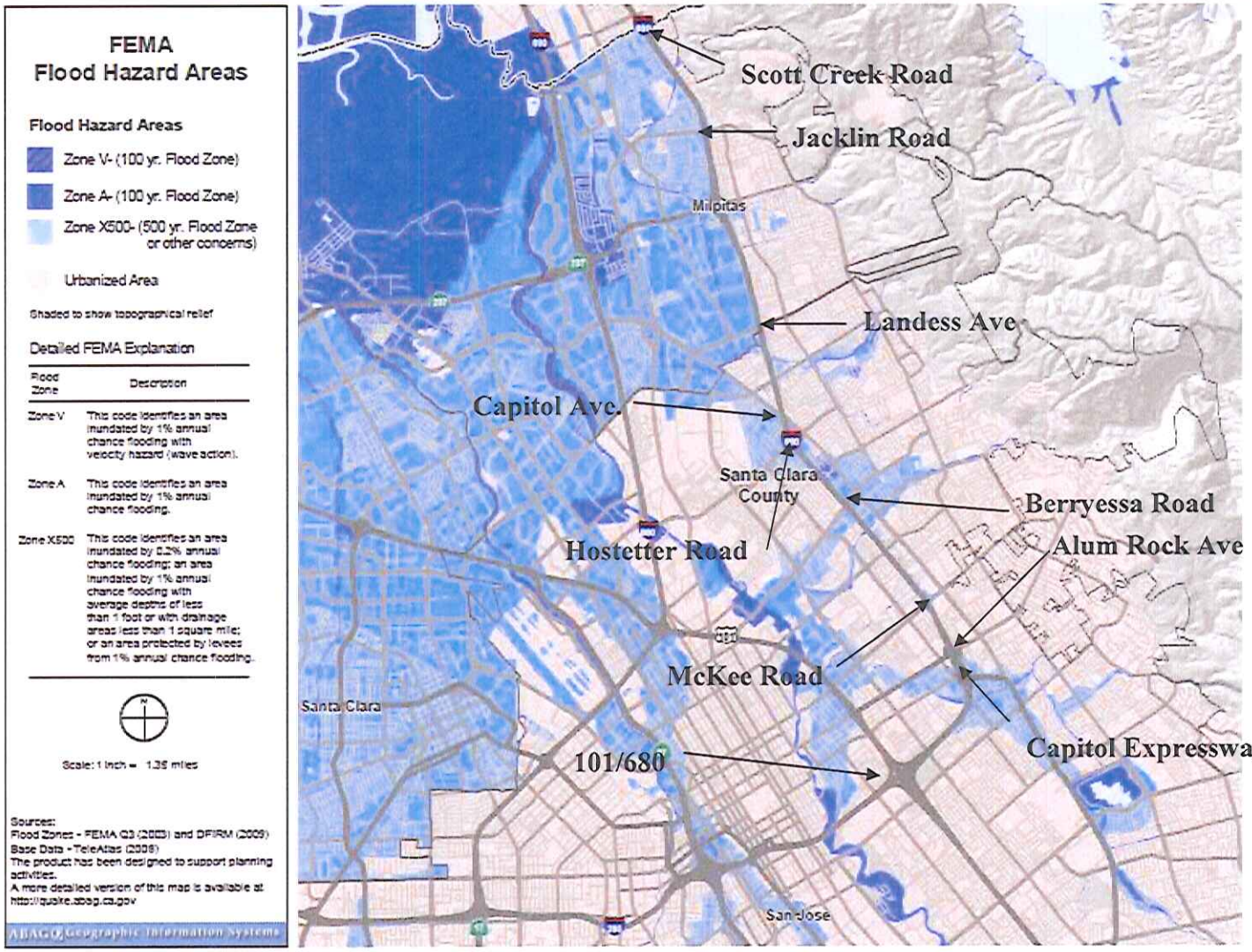
FIGURE 4



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GEOTECHNICAL DESIGN BRANCH (WEST) – BRANCH B

FLOOD ZONE MAP	
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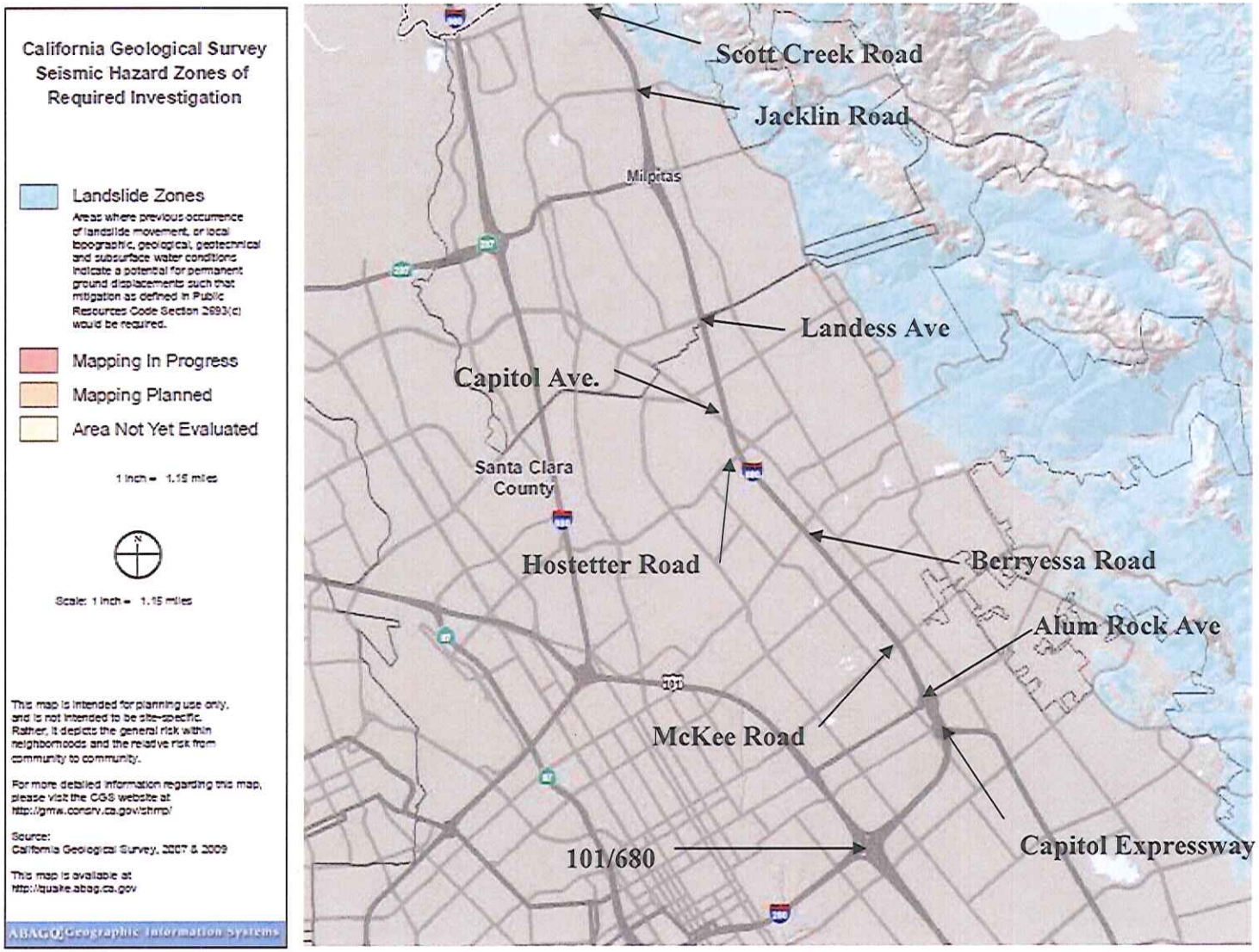
FIGURE 5	



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USGS MARE ISLAND QUADRANGLE, 1980

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GEOTECHNICAL DESIGN BRANCH (WEST) – BRANCH B

LANDSLIDE MAP

04-SCL-680	EFIS 0400000426
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FIGURE 6

Attachment A

Custom Soil Resource Report
Soil Map

Map Scale: 1:67,300 if printed on A size (8.5" x 11") sheet.

N

Meters: 0 500 1,000 2,000 3,000

Feet: 0 2,500 5,000 10,000 15,000

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Gully
- Short Steep Slope
- Other

Political Features

- Urban Areas
- Cities

Water Features

- Oceans
- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads

MAP INFORMATION

Map Scale: 1:67,300 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 10N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Santa Clara Area, California, Western Part
Survey Area Data: Version 1, Jul 27, 2010

Date(s) aerial images were photographed: 6/13/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Santa Clara Area, California, Western Part (CA641)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
130	Urban land-Still complex, 0 to 2 percent slopes	59.8	3.9%
131	Urban land-Elpaloalto complex, 0 to 2 percent slopes	407.3	26.8%
135	Urban land-Stevenscreek complex, 0 to 2 percent slopes	236.9	15.6%
140	Urban land-Flaskan complex, 0 to 2 percent slopes	30.4	2.0%
145	Urbanland-Hangerone complex, 0 to 2 percent slopes, drained	194.0	12.7%
150	Urbanland-Embarcadero complex, 0 to 2 percent slopes, drained	2.0	0.1%
160	Urbanland-Clear Lake complex, 0 to 2 percent slopes	131.4	8.6%
165	Urbanland-Campbell complex, 0 to 2 percent slopes, protected	36.2	2.4%
169	Urbanland-Elder complex, 0 to 2 percent slopes, protected	26.5	1.7%
170	Urbanland-Landelspark complex, 0 to 2 percent slopes	18.7	1.2%
171	Elder fine sandy loam, 0 to 2 percent slopes, rarely flooded	13.2	0.9%
180	Urbanland-Newpark complex, 0 to 2 percent slopes	61.3	4.0%
317	Urbanland-Cropley complex, 0 to 2 percent slopes	304.6	20.0%
Totals for Area of Interest		**1,522.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas

Custom Soil Resource Report
Map—Hydrologic Soil Group

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Political Features

- Urban Areas
- Cities

Water Features

- Oceans
- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads

MAP INFORMATION

Map Scale: 1:67,300 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 10N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Santa Clara Area, California, Western Part
Survey Area Data: Version 1, Jul 27, 2010

Date(s) aerial images were photographed: 6/13/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Santa Clara Area, California, Western Part				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
130	Urban land-Still complex, 0 to 2 percent slopes	D	59.8	3.9%
131	Urban land-Elpaloalto complex, 0 to 2 percent slopes	D	407.3	26.8%
135	Urban land-Stevenscreek complex, 0 to 2 percent slopes	D	236.9	15.6%
140	Urban land-Flaskan complex, 0 to 2 percent slopes	D	30.4	2.0%
145	Urbanland-Hangerone complex, 0 to 2 percent slopes, drained	D	194.0	12.7%
150	Urbanland-Embarcadero complex, 0 to 2 percent slopes, drained	D	2.0	0.1%
160	Urbanland-Clear Lake complex, 0 to 2 percent slopes	C	131.4	8.6%
165	Urbanland-Campbell complex, 0 to 2 percent slopes, protected	D	36.2	2.4%
169	Urbanland-Elder complex, 0 to 2 percent slopes, protected	D	26.5	1.7%
170	Urbanland-Landelspark complex, 0 to 2 percent slopes	D	18.7	1.2%
171	Elder fine sandy loam, 0 to 2 percent slopes, rarely flooded	A	13.2	0.9%
180	Urbanland-Newpark complex, 0 to 2 percent slopes	D	61.3	4.0%
317	Urbanland-Cropley complex, 0 to 2 percent slopes	D	304.6	20.0%
Totals for Area of Interest			**1,522.1**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

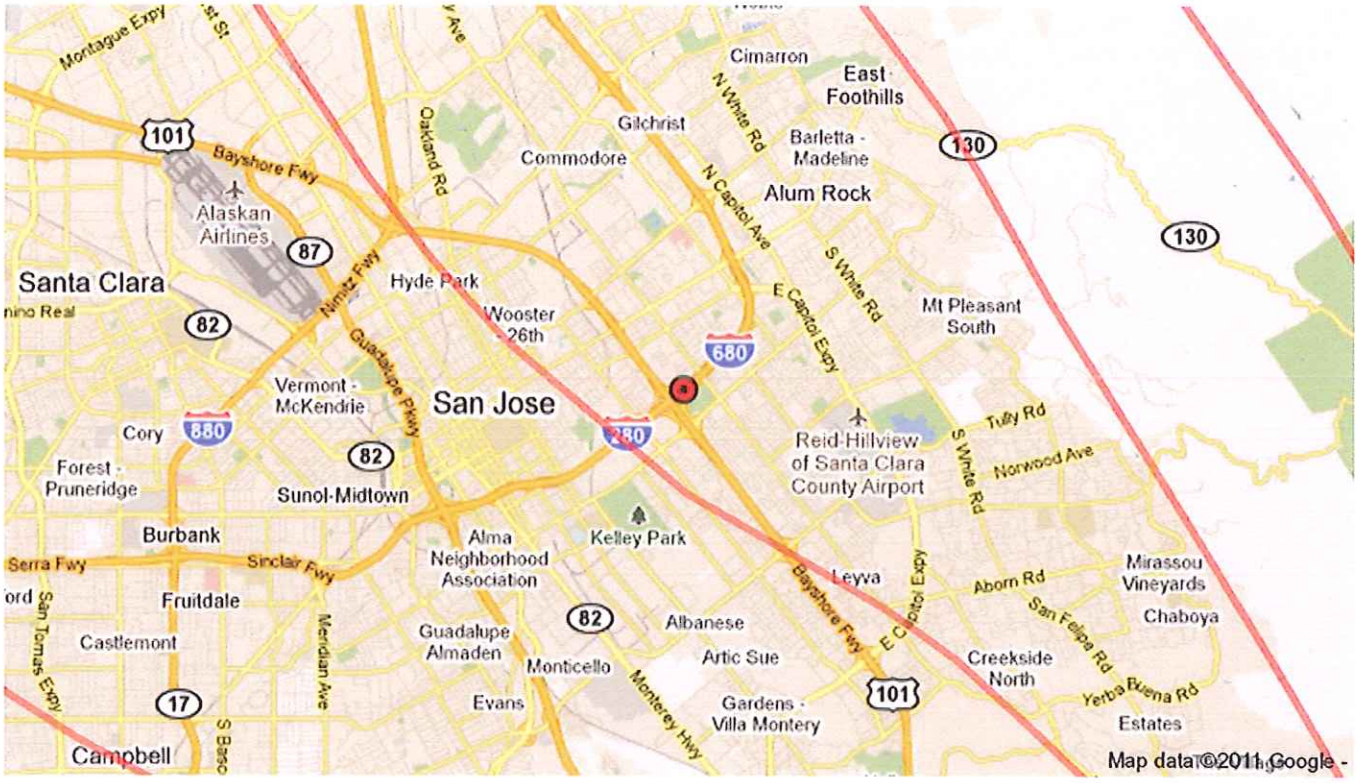
Tie-break Rule: Higher

Water Features

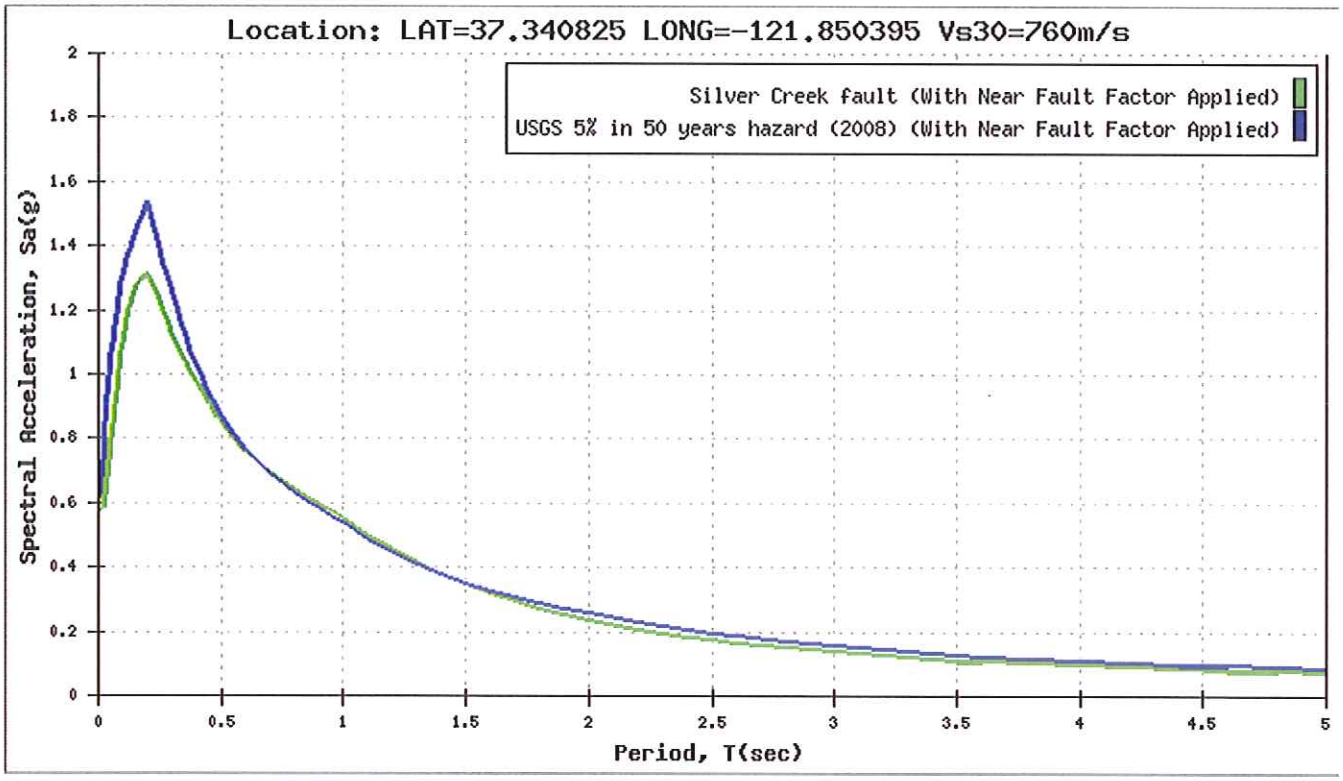
Water Features include ponding frequency, flooding frequency, and depth to water table.

Attachment B

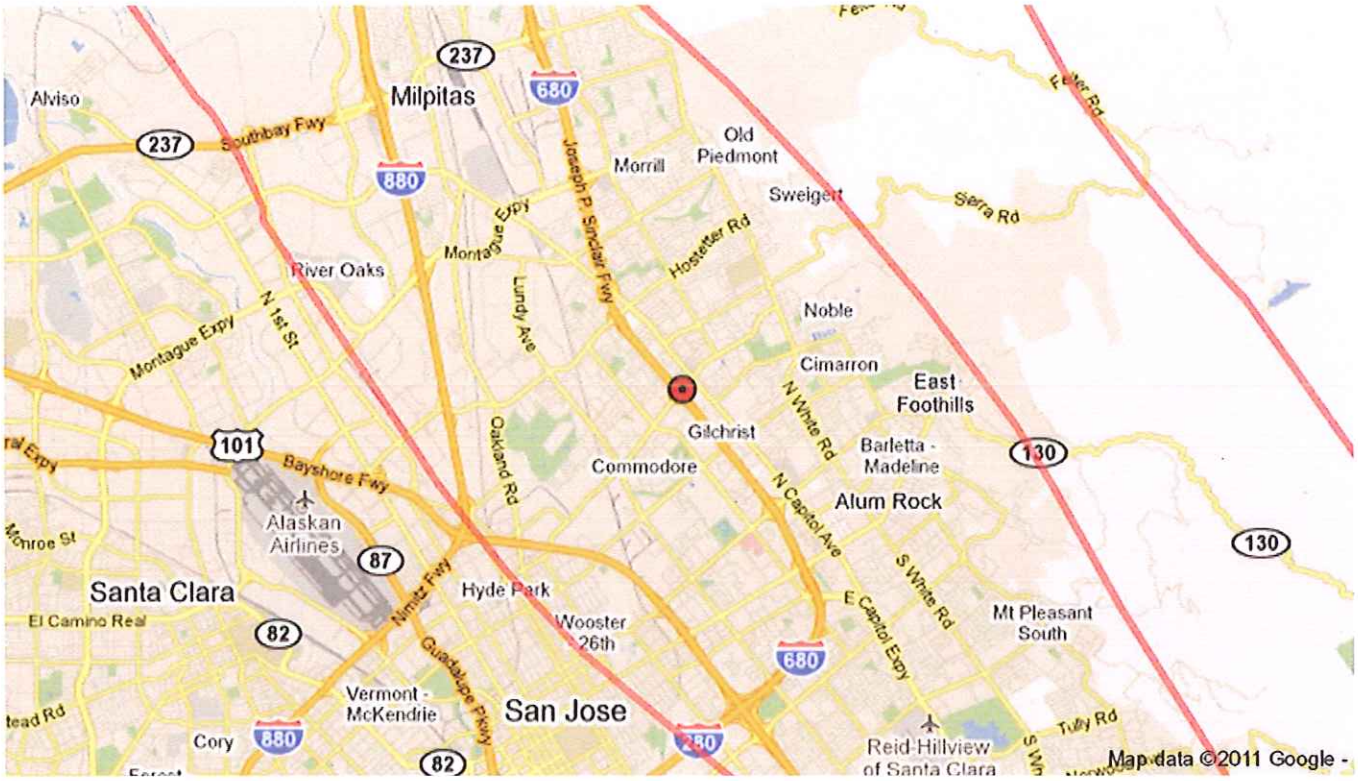
SELECT SITE LOCATION



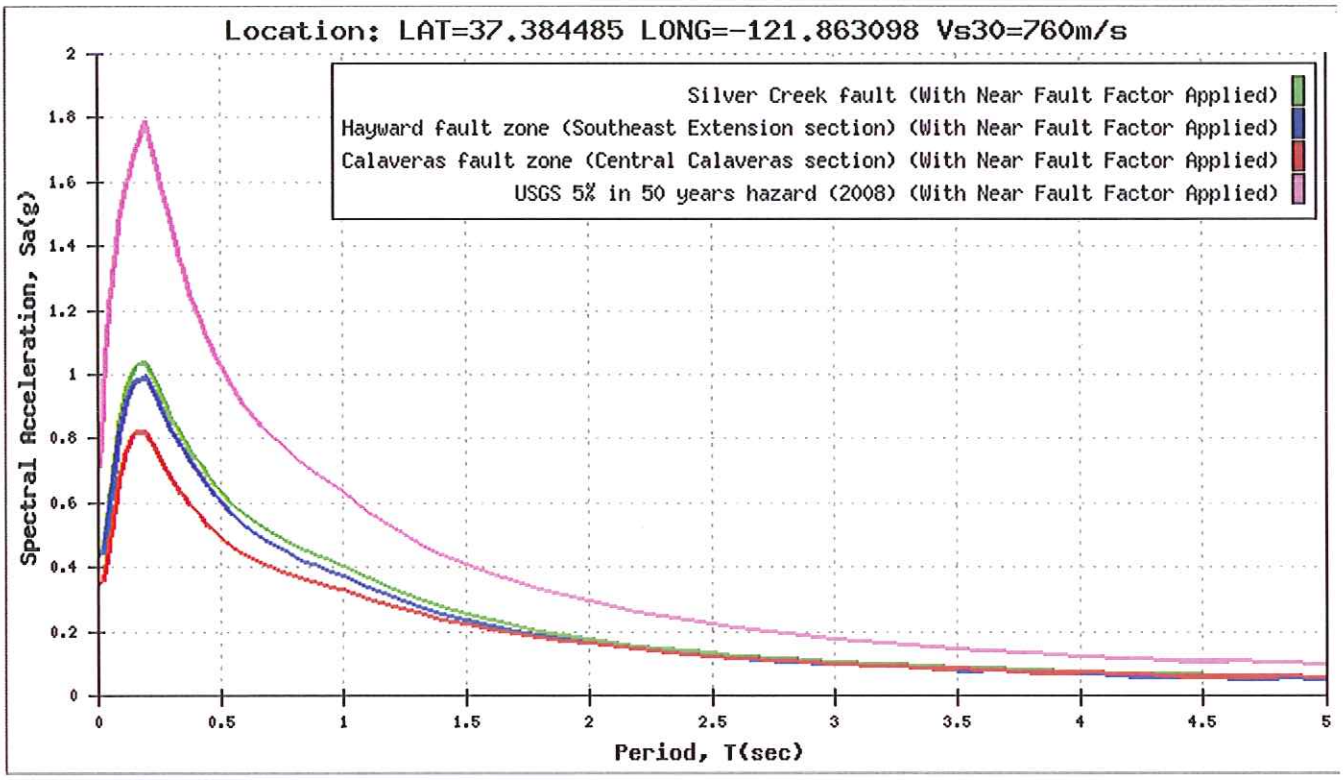
CALCULATED SPECTRA



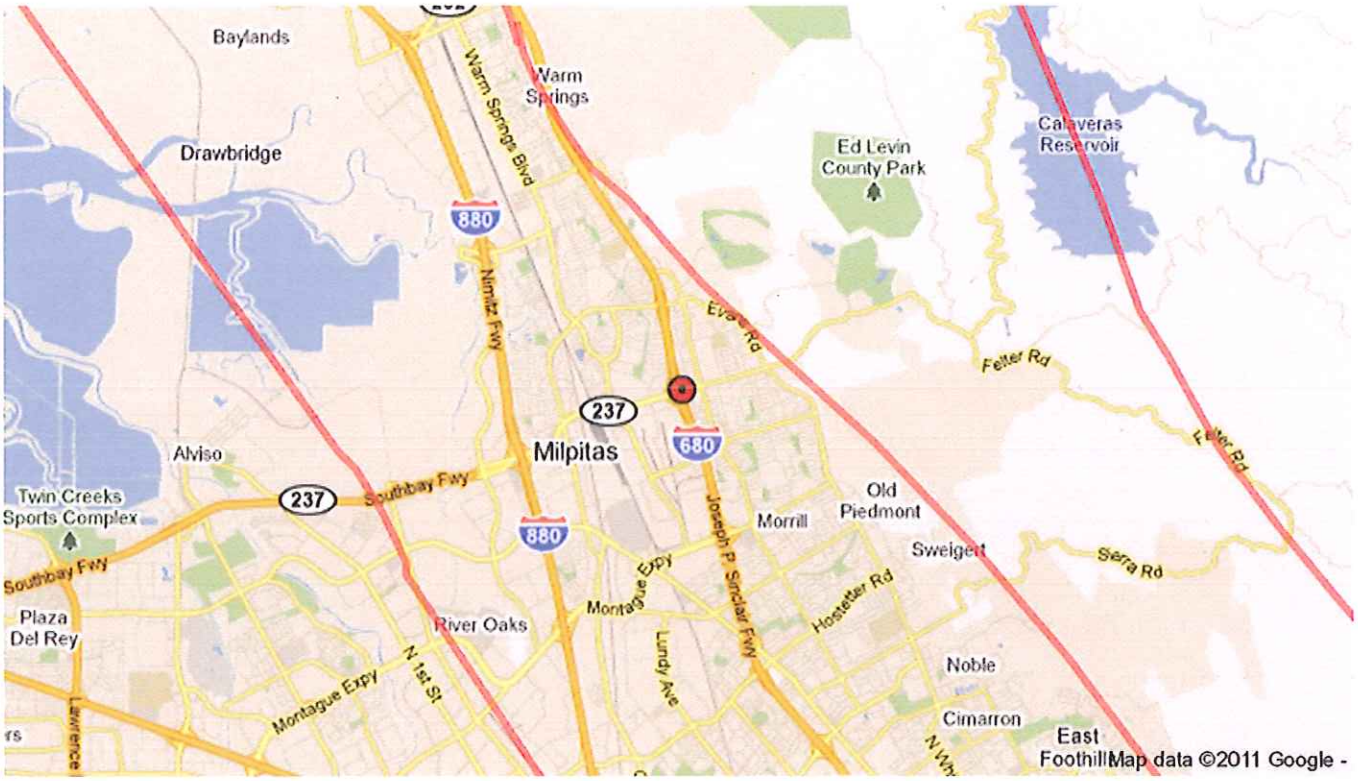
SELECT SITE LOCATION



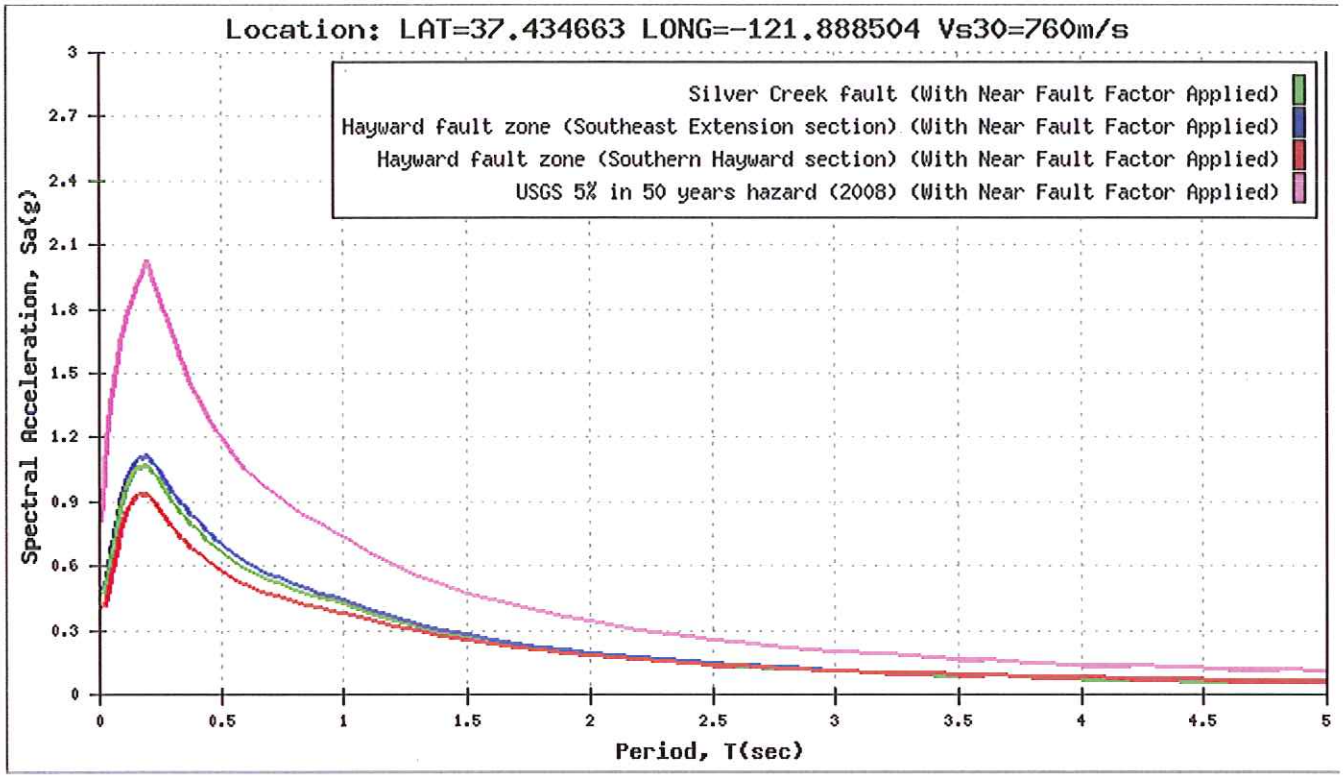
CALCULATED SPECTRA



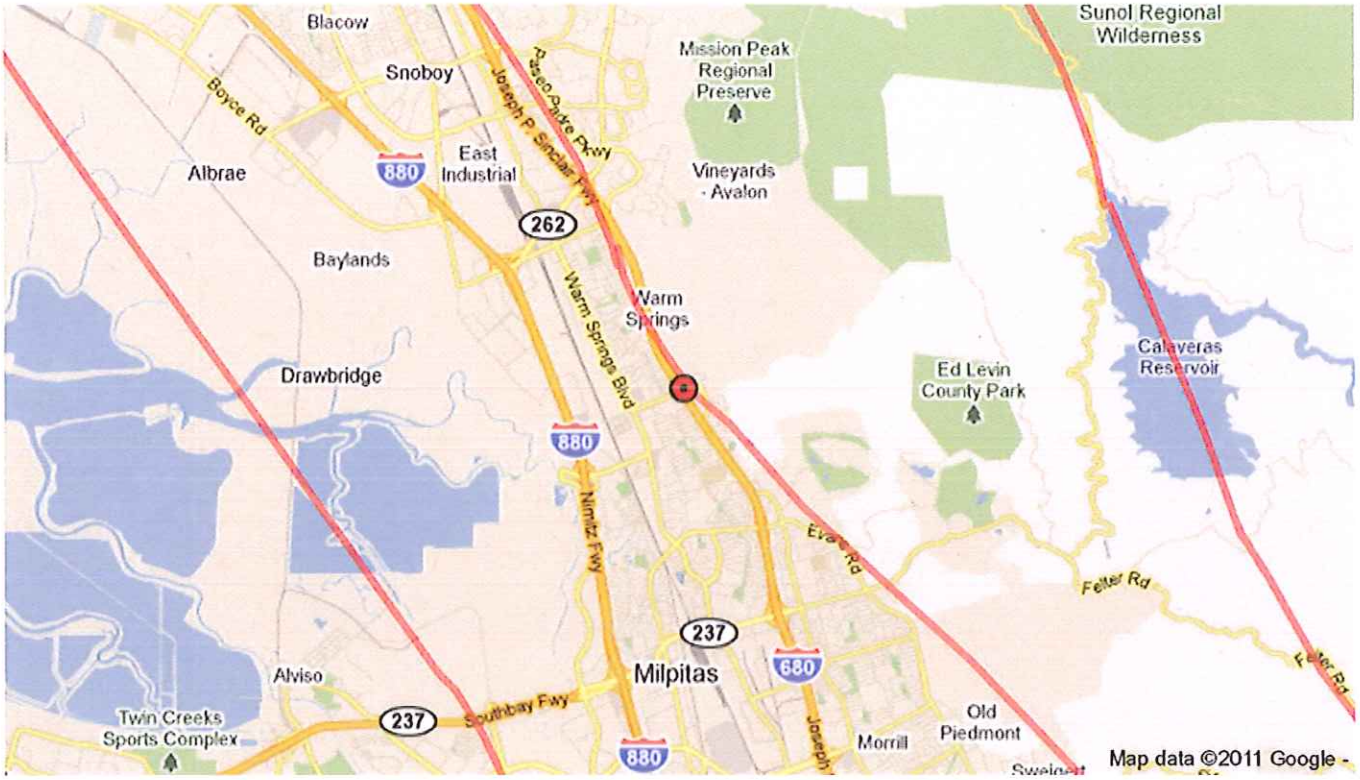
SELECT SITE LOCATION



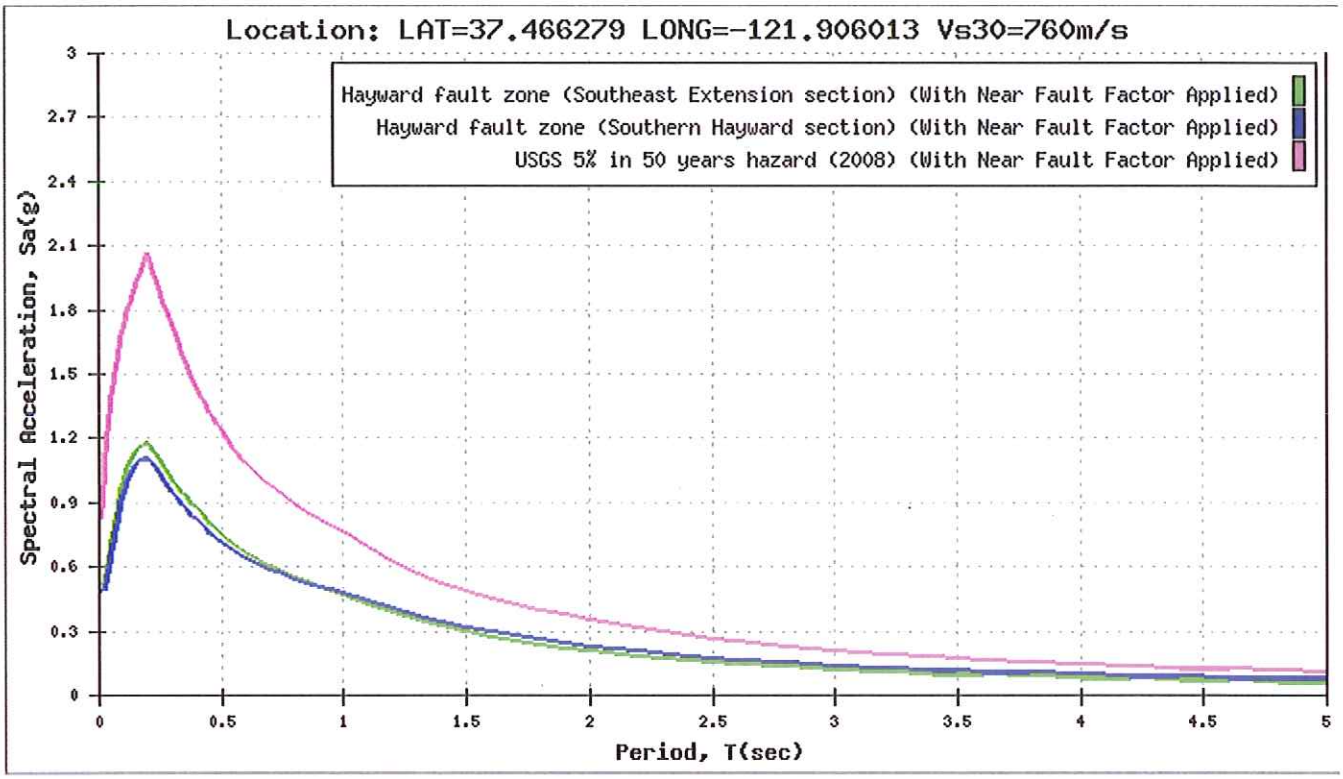
CALCULATED SPECTRA



SELECT SITE LOCATION



CALCULATED SPECTRA



Attachment C

ATTACH FORM DOR-TL-101 HERE

NO. 7941 — 1P

BILLED

DATE RECEIVED 6/17/2011

CALC. BY _____ APPROVED BY _____

DATE REPORTED JUL 15 2011

☐ DISTRICT DIRECTOR ☐ TRANS. LAB.
☐ DIS. MAT LS. ☐ PAV'T. SECTION
☐ RESIDENT ENGINEER ☐ ACCOUNTING
☐ CONSTRUCTION ☐

EXPANSION PRESSURE CH

20

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

SAMPLE IDENTIFICATION CARD

TL-0101 (REV. 10/97)

CARD NUMBER CSA-680-01

☐ PRELIMINARY TESTS
☐ PROCESS TESTS
☐ ACCEPTANCE TESTS
INDEPENDENT ASSURANCE TESTS
☐ DIST. LAB
☐ TRANS. LAB
☐ SPECIAL TESTS

SAMPLE SENT TO:
☐ HDQTRS. LAB
☐ BRANCH LAB
☐ DIST. LAB

FIELD NO.

DIST. LAB NO. 7941 - 1P

LOT NO.

SHIPMENT NO.

P.O. OR REQ. NO.

AUTHORIZATION NO.

SAMPLE OF Soil

FOR USE IN A-11-002 (40 - 43)

SAMPLE FROM Foundation

DEPTH 0x-SCL-680 PM 0.0/9.94

LOCATION OF SOURCE Native Soil

THIS SAMPLE IS SHIPPED IN (NO CONTAINERS)

AND IS ONE OF A GROUP OF

SAMPLES REPRESENTING (TONS, GALS, BBLS, STA. ETC.)

OWNER OR MANUFACTURER

TOTAL QUANTITY AVAILABLE

TEST RESULTS DESIRED ☒ NORMAL ☐ PRIORITY

DATE NEEDED

REMARKS Corrosion test

COVER ADDITIONAL INFORMATION WITH LETTER

DATE SAMPLEED

BY S. Awad TITLE T.E

DIST. CO. RTE. PM 0x-SCL-680 PM 0.0/9.94

LIMITS 0x-153200

CONT. NO.

FED. NO.

RES. ENGR. OR SUPT.

ADDRESS

CONTRACTOR S. Awad

MAIL TO SAME DESTINATION AS SAMPLE

GRADING ANALYSIS

SIEVE	AS RECEIVED	RET. CR.	ADJ. OR COMB. GRADE	AS USED	SPECIF. LIMITS SOUGHT ☐
3					
2½					
2					
1½					
1					
¾					
½					
⅜					
4					
8					
16					
30					
50					
100					
200					
5μ					
1μ					

GRADING AS USED WAS OBTAINED AS FOLLOWS:

% BY WT. | % BY VOL. | TEST NO. | DESCRIPTION

REMARKS: RESISTIVITY = 2256
PH = 7.7

SURFACE

BASE

SUBBASE

GRAVEL EQUIVALENT FACTOR

TRAFFIC INDEX

R VALUE: EXUDATION PRESSURE

EXPANSION PRESSURE

AT EQUILIBRUM SPEC.

INDICATED MINIMUM THICKNESS OF COVER FOR ABOVE CONDITIONS (FEET)

DISTRICT 4 LABORATORY
325 SAN BRUNO AVENUE
SAN FRANCISCO, CA 94103

REPORT OF TESTS ON Foundation Soil (Corrosion)

IF CONTRACT, USE CONTRACT ITEM

SOURCE	CHARGE	EXPENDITURE AUTHORIZATION

SPECIAL DESIGNATION (USE WHEN APPLICABLE)	ACTIVITY OR OBJECT	AMOUNT

TEST SPECIMEN	A	B	C	D
DATE TESTED				
COMPACTOR FOOT PRESSURE P.S.I.				
INITIAL MOISTURE %				
SOAK WATER ML				
WATER ADDED-ML (TOTAL)				
WATER ADDED %				
MOISTURE AT COMPACTION %				
WET WT. OF BRIQUETTE-GMS				
HEIGHT OF BRIQUETTE-INCHES				
DRY DENSITY OF BRIQ. - # CU. FT.				
STABILOMETER P_H AT 2000 LBS.				
DISPLACEMENT				
R-VALUE BY STABILOMETER				
EXUDATION PRES. P.S.I.				
THICK. BY STAB. FEET				
EXPANSION DIAL READING				
THICK. BY EXP. PRESS. FEET				
R-VALUE BY EXPANSION				

TEST RESULTS			SPEC.
LL.	P.L	P.I.	
CV			
S.E.	AS REC'D		
	CRUSHED		
	COMBINED		
LART	GRADE	100 REV.	
		500 REV.	
DUR	D_f		
	D_r		
% CRUSHED PARTICLES			

SP. GR. ☐ BULK (OVE ☐ BULK (SSD ☐ APPAREN

	FINE
AS REC'D.	
CRUSHED	

REL. COMPACTION

	IN PLACE	OI
DENSITY		
MOISTURE		
% REL. COMP.		
SPEC.		

DISTRICT 4 LABORATORY
325 SAN BRUNO AVENUE
SAN FRANCISCO, CA 94103

800 700 600 500 400 300 200 100

EXUDATION PRESSURE (PSI)

-TL-361 (Rev. 10/78)

B/ 46243

T NO. 1941 - 3P

BILLED

DATE RECEIVED

CALC. BY JUN 23 2011 APPROVED BY

DATE REPORTED

☐ DISTR DIRECTOR ☐ TRANS. LAB.
☐ DIS. MAT LS ER. ☐ PAV'T. SECTION
☐ RESIDENT ENGINEER ☐ ACCOUNTING
☒ CONSTRUCTION ☐

ATTACH FORM DCR-TL-101

EXPANSION PRESSURE CH

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

SAMPLE IDENTIFICATION CARD

TL-0101 (REV. 10/97)

CARD NUMBER C S Awad-1

☐ PRELIMINARY TESTS
☐ PROCESS TESTS
☐ ACCEPTANCE TESTS
INDEPENDENT ASSURANCE TESTS
☐ DIST. LAB
☐ TRANS. LAB
☐ SPECIAL TESTS

SAMPLE SENT TO:
☐ HDQTRS. LAB
☐ BRANCH LAB
☐ DIST. LAB

FIELD NO.
DIST. LAB NO. 1941-3P
LOT NO.
SHIPMENT NO.
P.O. OR REQ NO.
AUTHORIZATION NO.

SAMPLE OF Soil
FOR USE IN Foundation
SAMPLE FROM A-11-001 (10' - 11½')
DEPTH
LOCATION OF SOURCE Native Soil

THIS SAMPLE IS SHIPPED IN (NO. CONTAINERS)
AND IS ON E OF A GROUP OF
SAMPLES REPRESENTING (TONS, GALS. BOLS. STA. ETC.)
OWNER OR MANUFACTURER
TOTAL QUANTITY AVAILABLE
TEST RESULTS DESIRED ☒ NORMAL ☐ PRIORITY
DATE NEEDED
REMARKS PI & MA

COVER ADDITIONAL INFORMATION WITH LETTER
DATE SAMPLEED
BY S. Awad TITLE T.E
DIST, CO, RTE, PM 04-SCL-680 PM 0.0/9.94
LIMITS 04-153200
CONT. NO.
FED. NO.
RES. ENGR. OR SUPT. S. Awad
ADDRESS
CONTRACTOR (510) 622-5443

MAIL TO SAME DESTINATION AS SAMPLE

GRADING ANALYSIS

SIEVE	AS RECEIVED	RET. CR.	ADJ. OR COMB. GRADE	AS USED	SPECIF. LIMITS ☐ SOUGHT ☐
3					
2½					
2					
1½					
1	100				
¾	99				
½	93				
⅜	88				
4	73				
8					
16					
30					
50					
100					
200					
5μ					
1μ					

GRADING AS USED WAS OBTAINED AS FOLLOWS:

% BY WT.	% BY VOL.	TEST NO.	DESCRIPTION

REMARKS: See Attached Sheet for MC & PI Results

SURFACE
BASE
SUBBASE
GRAVEL EQUIVALENT FACTOR
TRAFFIC INDEX

R VALUE
EXUDATION PRESSURE
EXPANSION PRESSURE
AT EQUILIBRUM SPEC.

INDICATED MINIMUM THICKNESS OF COVER FOR ABOVE CONDITIONS (FEET)

REPORT OF TESTS ON

Foundation Soil

IF CONTRACT, USE CONTRACT ITEM

SOURCE	CHARGE	EXPENDITURE AUTHORIZATION

SPECIAL DESIGNATION (USE WHEN APPLICABLE)	ACTIVITY OR OBJECT	AMOUNT

TEST SPECIMEN	A	B	C	D	
DATE TESTED					
COMPACTOR FOOT PRESSURE P.S.I.					
INITIAL MOISTURE %					
SOAK WATER ML					
WATER ADDED-ML (TOTAL)					
WATER ADDED %					
MOISTURE AT COMPACTION %					
WET WT. OF BRIQUETTE-GMS					
HEIGHT OF BRIQUETTE-INCHES					
DRY DENSITY OF BRIQ. - # CU. FT.					
STABILOMETER P_H AT 2000 LBS.					
DISPLACEMENT					
R-VALUE BY STABILOMETER					
EXUDATION PRES. P.S.I.					
THICK. BY STAB. FEET					
EXPANSION DIAL READING					
THICK. BY EXP. PRESS. FEET					
R-VALUE BY EXPANSION					

TEST RESULTS

LL. 30 P.L 15 P.I. 15

CV

			SPEC.
S.E	AS REC'D		
	CRUSHED		
	COMBINED		
LART	GRADE	100 REV.	
		500 REV.	
DUR	D_f		
	D_r		

% CRUSHED PARTICLES

SP. GR. ☐ BULK (OVEN ☐ BULK (SSD) ☐ APPARENT

	FINE	CO
AS REC'D.		
CRUSHED		

REL. COMPACTION DA

	IN PLACE	OPTI
DENSITY		
MOISTURE		
% REL. COMP.		
SPEC.		

DISTRICT 4 LABORATORY
325 SAN BRUNO AVENUE
SAN FRANCISCO, CA 94103

800 700 600 500 400 300 200 100
EXUDATION PRESSURE (PSI)

-TL-361 (Rev. 10/78)

MOISTURE CONTENT DETERMINATION(CTM 226)

County: SCL Route: 680 P.M.: 0.0/9.94 SF Lab ID No.: 7941-3P

Limits: PM 0.0/9.94 E.A.: 153200

Date Received: 06/24/11 R.E.: Samuel Awad TET: AU

Date Reported: 07/15/11 Date Calculated: 07/15/11 By: Venu T. Gopal

Hole Number	ID No.	Sample Depth in ft.	Test (MC,/PI/MA/GR)	GROSS WEIGHT		TARE Weight	Net Weight		Wt. Moist.	% Moist.
				Wet	Dry		Wet	Dry		
A-11-001	1	5-6.5	MC	970.5	930.1	99.6	870.9	830.5	40.4	4.9
A-11-001	2	10-11.5	MC, MA, PI	1138.8	1084.5	99.9	1038.9	984.6	54.3	5.5
A-11-001	3	15-16.5	MC	758.7	725.5	100.3	658.4	625.2	33.2	5.3
A-11-001	4	20-26.5	MC	128.1	127.6	103.5	24.6	24.1	0.5	2.1
A-11-001	5	25-26.5	MC	905.3	875.7	98.7	806.6	777.0	29.6	3.8
A-11-001	6	30-31.5	MC	885.8	825.0	99.7	786.1	725.3	60.8	8.4
A-11-001	7	35-36.5	MC	969.2	861.4	101.5	867.7	759.9	107.8	14.2
A-11-001	8	40-41.5	MC	896.7	766.1	100.3	796.4	665.8	130.6	19.6
A-11-001	9	45-46.5	MC	1138.1	984.7	98.9	1039.2	885.8	153.4	17.3
A-11-001	10	50-51.5	MC	1134.0	943.2	100.1	1033.9	843.1	190.8	22.6
A-11-001	11	55-56.5	MC	992.8	855.6	101.1	891.7	754.5	137.2	18.2
A-11-001	12	60-61.5	MC	1147.1	976.6	101.9	1045.2	874.7	170.5	19.5
A-11-001	13	65-66.5	MC	1358.2	1194.0	100.2	1258.0	1093.8	164.2	15.0
A-11-001	14	70-71.5	MC	1542.5	1320.7	100.6	1441.9	1220.1	221.8	18.2
A-11-001	1X	0-5	MC	144.7	141.9	101.5	43.2	40.4	2.8	6.9

A-11-001	2	10-11.5	Liquid Limit	30.0
			Plastic Limit	15.0
			PI	15.0

For A-11-001-2 depth 10-11.5' sample. Mechanical Analysis will be done later, as we are running short of Technicians. Will let you know later. If the results are needed urgently, please e-mail me, we will try to accommodate.

MC- Moisture Content PI - Plasticity Index MA - Mechanical Analysis GR - Grading

TEST NO. 7941 - 3P

BILLED

DATE RECEIVED JUN 23 2011

CALC. BY _____ APPROVED BY _____

DATE REPORTED _____

☐ DISTRICT DIRECTOR ☐ TRANS. LAB.
☐ DIS. MAT LS ☐ PAV'T. SECTION
☐ RESIDENT ENGINEER ☐ ACCOUNTING
☐ CONSTRUCTION ☐

EXPANSION PRESSURE CHA

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION
SAMPLE IDENTIFICATION CARD
TL-0101 (REV. 10/97)

CARD NUMBER C S Awad-1

☐ PRELIMINARY TESTS
☐ PROCESS TESTS
☐ ACCEPTANCE TESTS
INDEPENDENT ASSURANCE TESTS
☐ DIST. LAB
☐ TRANS. LAB
☐ SPECIAL TESTS

SAMPLE SENT TO:
☐ HDQTRS. LAB
☐ BRANCH LAB
☐ DIST. LAB

FIELD NO.
DIST. LAB NO. 7941-3P
LOT NO.
SHIPMENT NO.
P.O. OR REQ NO.
AUTHORIZATION NO.

SAMPLE OF Soil
FOR USE IN Foundation
SAMPLE FROM A-11-001 (10' - 11½')
DEPTH
LOCATION OF SOURCE Native Soil

THIS SAMPLE IS SHIPPED IN (NO. CONTAINERS)
AND IS ON E OF A GROUP OF
SAMPLES REPRESENTING (TONS, GALS. BOLS. STA. ETC.)
OWNER OR MANUFACTURER
TOTAL QUANTITY AVAILABLE
TEST RESULTS DESIRED ☒ NORMAL ☐ PRIORITY
DATE NEEDED
REMARKS PI & MA

COVER ADDITIONAL INFORMATION WITH LETTER
DATE SAMPLEED
BY S. Awad TITLE T.E
DIST. CO. RTE. PM 04-SCL-680 PM 0.0/9.94
LIMITS 04-153200
CONT. NO.
FED. NO.
RES. ENGR. OR SUPT. S. Awad
ADDRESS
CONTRACTOR (510) 622-5443

MAIL TO SAME DESTINATION AS SAMPLE

800 700 600 500 400 300 200 100
EXUDATION PRESSURE (PSI)

GRADING ANALYSIS

SIEVE	AS RECEIVED	RET. CR.	ADJ. OR COMB. GRADE	AS USED	SPECIF. LIMITS SOUGHT
3					
2½					
2					
1½					
1	100				
¾	99				
½	93				
⅜	88				
4	73				
8					
16					
30					
50					
100					
200					
5μ					
1μ					

GRADING AS USED WAS OBTAINED AS FOLLOWS:

% BY WT.	% BY VOL.	TEST NO.	DESCRIPTION

REMARKS: See Attached Sheet for MC & PI Results

SURFACE
BASE
SUBBASE
GRAVEL EQUIVALENT FACTOR
TRAFFIC INDEX

R VALUE
EXUDATION PRESSURE
EXPANSION PRESSURE
AT EQUILIBRUM SPEC.

INDICATED MINIMUM THICKNESS OF COVER FOR ABOVE CONDITIONS (FEET)

REPORT OF TESTS ON Foundation Soil

IF CONTRACT, USE CONTRACT ITEM

SOURCE	CHARGE	EXPENDITURE AUTHORIZATION

SPECIAL DESIGNATION (USE WHEN APPLICABLE)	ACTIVITY OR OBJECT	AMOUNT

TEST SPECIMEN	A	B	C	D
DATE TESTED				
COMPACTOR FOOT PRESSURE P.S.I.				
INITIAL MOISTURE %				
SOAK WATER ML				
WATER ADDED-ML (TOTAL)				
WATER ADDED %				
MOISTURE AT COMPACTION %				
WET WT. OF BRIQUETTE-GMS				
HEIGHT OF BRIQUETTE-INCHES				
DRY DENSITY OF BRIQ. - # CU. FT.				
STABILOMETER P_H AT 2000 LBS.				
DISPLACEMENT				
R-VALUE BY STABILOMETER				
EXUDATION PRES. P.S.I.				
THICK. BY STAB. FEET				
EXPANSION DIAL READING				
THICK. BY EXP. PRESS. FEET				
R-VALUE BY EXPANSION				

TEST RESULTS

			SPEC.
LL. 30	P.L. 15	P.I. 15	
CV			
S.E	AS REC'D		
	CRUSHED		
	COMBINED		
LART	GRADE	100 REV.	
		500 REV.	
DUR	D_f		
	D_t		
% CRUSHED PARTICLES			

SP. GR. ☐ BULK (OVEN) ☐ BULK (SSD) ☐ APPARENT

	FINE	CO
AS REC'D.		
CRUSHED		

REL. COMPACTION DA

	IN PLACE	OPTI
DENSITY		
MOISTURE		
% REL. COMP.		
SPEC.		

DISTRICT 4 LABORATORY
325 SAN BRUNO AVENUE
SAN FRANCISCO, CA 94103

-TL-361 (Rev. 10/78)

MOISTURE CONTENT DETERMINATION(CTM 226)

County: SCL Route: 680 P.M.: 0.0/9.94 SF Lab ID No.: 7941-4P

Limits: PM 0.0/9.94 E.A.: 153200

Date Received: 06/24/11 R.E.: Samuel Awad TET: AU

Date Reported: 07/15/11 Date Calculated: 07/15/11 By: Venu T. Gopal

Hole Number	ID No.	Sample Depth in ft.	Test (MC,/PI/MA/GR)	GROSS WEIGHT		TARE Weight	Net Weight		Wt. Moist.	% Moist.
				Wet	Dry		Wet	Dry		
A-11-002	1	5-6.5	MC	731.1	688.7	101.6	629.5	587.1	42.4	7.2
A-11-002	2	10-11.5	MC	1031.8	980.6	101.4	930.4	879.2	51.2	5.8
A-11-002	3	15-16.5	MC	808.8	772.2	102.0	706.8	670.2	36.6	5.5
A-11-002	4	20-21.5	MC, MA, PI	774.4	725.2	101.6	672.8	623.6	49.2	7.9
A-11-002	5	25-26.5	MC	840.6	807.9	99.5	741.1	708.4	32.7	4.6
A-11-002	6	30-31.5	MC	1161.5	1060.9	101.0	1060.5	959.9	100.6	10.5
A-11-002	7	35-36.5	MC	983.5	874.4	101.6	881.9	772.8	109.1	14.1
A-11-002	8	40-41.5	MC	984.5	900.8	102.0	882.5	798.8	83.7	10.5
A-11-002	9	45-46.5	MC	712.9	602.5	102.0	610.9	500.5	110.4	22.1
A-11-002	10	50-51.5	MC	746.0	640.5	100.9	645.1	539.6	105.5	19.6
A-11-002	11	55-56.5	MC	1132.6	1019.6	101.3	1031.3	918.3	113.0	12.3
A-11-002	12	60-61.5	MC	982.0	860.6	100.7	881.3	759.9	121.4	16.0
A-11-002	13	65-66.5	MC	673.6	585.0	100.3	573.3	484.7	88.6	18.3

A-11-002	4	20-21.5	Liquid Limit	28.0
			Plastic Limit	15.0
			PI	13.0

For A-11-002-4 depth 20-21.5' sample. Mechanical Analysis will be done later, as we are running short of Technicians. Will let you know later. If the results are needed urgently, please e-mail me, we will try to accommodate.

MC- Moisture Content PI - Plasticity Index MA - Mechanical Analysis GR - Grading

T NO. 7941-4P

7941-4P

BILLED

DATE RECEIVED

CALC. BY JUN 23 2011 APPROVED

DATE REPORTED

☐ DISTR DIREC ☐ TRANS. LAB.
☐ DIS. MAT LS ☐ PAV'T. SECTION
☐ RESIDENT ENGINEER ☐ ACCOUNTING
☐ CONSTRUCTION ☐

ATTACH FORM DCR-TL-101 HERE

EXPANSION PRESSURE CI

20

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

SAMPLE IDENTIFICATION CARD

TL-0101 (REV. 10/97)

CARD NUMBER CSAwad-2

☐ PRELIMINARY TESTS
☐ PROCESS TESTS
☐ ACCEPTANCE TESTS
INDEPENDENT ASSURANCE TESTS
☐ DIST. LAB
☐ TRANS. LAB
☐ SPECIAL TESTS

SAMPLE SENT TO:
☐ HDQTRS. LAB
☐ BRANCH LAB
☐ DIST. LAB

FIELD NO.

DIST. LAB NO. 7941-4P

LOT NO.

SHIPMENT NO.

P.O. OR REQ NO.

AUTHORIZATION NO.

SAMPLE OF Soil

FOR USE IN Foundation

SAMPLE FROM A-11-002 (20'-21½)

DEPTH

LOCATION OF SOURCE Native Soil

THIS SAMPLE IS SHIPPED IN (NO CONTAINERS)

AND IS ON E OF A GROUP OF

SAMPLES REPRESENTING (TONS, GALS, BBLS, STA. ETC.)

OWNER OR MANUFACTURER

TOTAL QUANTITY AVAILABLE

TEST RESULTS DESIRED ☒ NORMAL ☐ PRIORITY

DATE NEEDED

REMARKS PI & MA

COVER ADDITIONAL INFORMATION WITH LETTER

DATE SAMPLEED

BY S. Awad TITLE T.E

DIST. CO. RTE. PM 04-SCL-680 PM 0.0/9.94

LIMITS 04-153200

CONT. NO.

FED. NO.

RES. ENGR. OR SUPT. S. Awad

ADDRESS

CONTRACTOR

(510) 622-5443

MAIL TO SAME DESTINATION AS SAMPLE

EXUDATION PRESSURE (PSI)

GRADING ANALYSIS

SIEVE	AS RECEIVED	RET. CR.	ADJ. OR COMB. GRADE	AS USED	SPECIF. LIMITS ☐ SOUGHT ☐
3					
2½					
2					
1½					
1					
¾					
½					
⅜					
4					
8					
16					
30					
50					
100					
200					
5μ					
1μ					

GRADING AS USED WAS OBTAINED AS FOLLOWS:

% BY WT. % BY VOL. TEST NO. DESCRIPTION

REMARKS: See Attached Sheet for MC & PI Results

SURFACE

BASE

SUBBASE

GRAVEL EQUIVALENT FACTOR

TRAFFIC INDEX

R VALUE: EXUDATION PRESSURE

EXPANSION PRESSURE

AT EQUILIBRUM SPEC.

INDICATED MINIMUM THICKNESS OF COVER FOR ABOVE CONDITIONS (FEET)

REPORT OF TESTS ON Foundation Soil

IF CONTRACT, USE CONTRACT ITEM

SOURCE	CHARGE	EXPENDITURE AUTHORIZATION

SPECIAL DESIGNATION (USE WHEN APPLICABLE)	ACTIVITY OR OBJECT	AMOUNT

TEST SPECIMEN	A	B	C	D	E
DATE TESTED					
COMPACTOR FOOT PRESSURE P.S.I.					
INITIAL MOISTURE %					
SOAK WATER ML					
WATER ADDED-ML (TOTAL)					
WATER ADDED %					
MOISTURE AT COMPACTION %					
WET WT. OF BRIQUETTE-GMS					
HEIGHT OF BRIQUETTE-INCHES					
DRY DENSITY OF BRIQ. - # CU. FT.					
STABILOMETER P_H AT 2000 LBS.					
DISPLACEMENT					
R-VALUE BY STABILOMETER					
EXUDATION PRES. P.S.I.					
THICK. BY STAB. FEET					
EXPANSION DIAL READING					
THICK. BY EXP. PRESS. FEET					
R-VALUE BY EXPANSION					

TEST RESULTS			SPEC.
LL. 28 P.L. 15 P.I. 13			
CV			
S.E	AS REC'D		
	CRUSHED		
	COMBINED		
LART	GRADE	100 REV.	
		500 REV.	
DUR	D_f		
	D_c		
% CRUSHED PARTICLES			

SP. GR. ☐ BULK (OVEN DRY) ☐ BULK (SSD) ☐ APPARENT

	FINE	COARSE
AS REC'D.		
CRUSHED		

REL. COMPACTION DATA

	IN PLACE	OPTIMUM
DENSITY		
MOISTURE		
% REL. COMP.		
SPEC.		

DISTRICT 4 LABORATORY
325 SAN BRUNO AVENUE
SAN FRANCISCO, CA 94103

-TL-361 (Rev. 10/78)

MOISTURE CONTEN_ DETERMINATION(CTM 226)

County: SCL Route: 680 P.M.: 0.0/9.94 SF Lab ID No.: 7941-4P

Limits: PM 0.0/9.94 E.A.: 153200

Date Received: 06/24/11 R.E.: Samuel Awad TET: AU

Date Reported: 07/15/11 Date Calculated: 07/15/11 By: Venu T. Gopal

Hole Number	ID No.	Sample Depth in ft.	Test (MC,/PI/MA/GR)	GROSS WEIGHT		TARE Weight	Net Weight		Wt. Moist.	% Moist.
				Wet	Dry		Wet	Dry		
A-11-002	1	5-6.5	MC	731.1	688.7	101.6	629.5	587.1	42.4	7.2
A-11-002	2	10-11.5	MC	1031.8	980.6	101.4	930.4	879.2	51.2	5.8
A-11-002	3	15-16.5	MC	808.8	772.2	102.0	706.8	670.2	36.6	5.5
A-11-002	4	20-21.5	MC, MA, PI	774.4	725.2	101.6	672.8	623.6	49.2	7.9
A-11-002	5	25-26.5	MC	840.6	807.9	99.5	741.1	708.4	32.7	4.6
A-11-002	6	30-31.5	MC	1161.5	1060.9	101.0	1060.5	959.9	100.6	10.5
A-11-002	7	35-36.5	MC	983.5	874.4	101.6	881.9	772.8	109.1	14.1
A-11-002	8	40-41.5	MC	984.5	900.8	102.0	882.5	798.8	83.7	10.5
A-11-002	9	45-46.5	MC	712.9	602.5	102.0	610.9	500.5	110.4	22.1
A-11-002	10	50-51.5	MC	746.0	640.5	100.9	645.1	539.6	105.5	19.6
A-11-002	11	55-56.5	MC	1132.6	1019.6	101.3	1031.3	918.3	113.0	12.3
A-11-002	12	60-61.5	MC	982.0	860.6	100.7	881.3	759.9	121.4	16.0
A-11-002	13	65-66.5	MC	673.6	585.0	100.3	573.3	484.7	88.6	18.3

A-11-002	4	20-21.5	Liquid Limit	28.0
			Plastic Limit	15.0
			PI	13.0

For A-11-002-4 depth 20-21.5' sample. Mechanical Analysis will be done later, as we are running short of Technicians. Will let you know later. If the results are needed urgently, please e-mail me, we will try to accommodate.

MC- Moisture Content PI - Plasticity Index MA - Mechanical Analysis GR - Grading

TEST NO. 7941 - 8P

BILLED

DATE RECEIVED

CALC. BY AUG 0 4 2011 APPROVED BY

DATE REPORTED SEP 0 2 2011

☐ DISTRICT DIRECTOR ☐ TRANS. LAB.
☐ DIS. MAT LSR. ☐ PAV'T. SECTION
☐ RESIDENT ENGINEER ☐ ACCOUNTING
☐ CONSTRUCTION ☐

ATTACH FORM DCR-TL-101 HERE

EXPANSION PRESSURE CHART

GRADING ANALYSIS

SIEVE	AS RECEIVED	RET. CR.	ADJ. OR COMB. GRADE	AS USED	SPECIF. LIMITS ☐ SOUGHT ☐
3					
2½					
2					
1½					
1					
¾					
½					
⅜					
4					
8					
16					
30					
50					
100					
200					
5μ					
1μ					

GRADING AS USED WAS OBTAINED AS FOLLOWS:

% BY WT. % BY VOL. TEST NO. DESCRIPTION

REMARKS: RESISTIVITY = 1072
PH = 7.6

SURFACE

BASE

SUBBASE

GRAVEL EQUIVALENT FACTOR

TRAFFIC INDEX

R VALUE: EXUDATION PRESSURE; EXPANSION PRESSURE; AT EQUILIBRUM SPEC.

INDICATED MINIMUM THICKNESS OF COVER FOR ABOVE CONDITIONS (FEET)

REPORT OF TESTS ON

Foundation Soil (CORROSION)

IF CONTRACT, USE CONTRACT ITEM

SOURCE	CHARGE	EXPENDITURE AUTHORIZATION

SPECIAL DESIGNATION (USE WHEN APPLICABLE)	ACTIVITY OR OBJECT	AMOUNT

TEST SPECIMEN	A	B	C	D	E
DATE TESTED					
COMPACTOR FOOT PRESSURE P.S.I.					
INITIAL MOISTURE %					
SOAK WATER ML					
WATER ADDED-ML (TOTAL)					
WATER ADDED %					
MOISTURE AT COMPACTION %					
WET WT. OF BRIQUETTE-GMS					
HEIGHT OF BRIQUETTE-INCHES					
DRY DENSITY OF BRIQ. - # CU. FT.					
STABILOMETER P_H AT 2000 LBS.					
DISPLACEMENT					
R-VALUE BY STABILOMETER					
EXUDATION PRES. P.S.I.					
THICK. BY STAB. FEET					
EXPANSION DIAL READING					
THICK. BY EXP. PRESS. FEET					
R-VALUE BY EXPANSION					

TEST RESULTS			SPEC.
LL. P.L P.I.			
CV			
S.E	AS REC'D.		
	CRUSHED		
	COMBINED		
LART	GRADE	100 REV.	
		500 REV.	
DUR	D_f		
	D_c		
% CRUSHED PARTICLES			

SP. GR. ☐ BULK (OVEN D ☐ BULK (SSD) ☐ APPARENT

	FINE	COA
AS REC'D.		
CRUSHED		

REL. COMPACTION DA	IN PLACE	OPTIM
DENSITY		
MOISTURE		
% REL. COMP.		
SPEC.		

DISTRICT 4 LABORATORY
325 SAN BRUNO AVENUE
SAN FRANCISCO, CA 94103

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
SAMPLE IDENTIFICATION CARD
TL-0101 (REV. 10/97)

CARD NUMBER: C SAwad -5

☐ PRELIMINARY TESTS
☐ PROCESS TESTS
☐ ACCEPTANCE TESTS
INDEPENDENT ASSURANCE TESTS ☐ DIST. LAB ☐ TRANS. LAB
☐ SPECIAL TESTS

SAMPLE SENT TO: ☐ HDQTRS. LAB ☐ BRANCH LAB ☐ DIST. LAB

FIELD NO.
DIST. LAB NO. 7941-8P
LOT NO.
SHIPMENT NO.
P.O. OR REQ. NO.
AUTHORIZATION NO.

SAMPLE OF: Soil
FOR USE IN: Foundation
SAMPLE FROM: A-11-005 (4'—6')
DEPTH: RW2 Alum Rock Rd-SB 680
LOCATION OF SOURCE: Native Soil

THIS SAMPLE IS SHIPPED IN (NO. CONTAINERS) | AND IS ON E OF A GROUP OF | SAMPLES REPRESENTING (TONS, GALS, BBLS, STA. ETC.)

OWNER OR MANUFACTURER

TOTAL QUANTITY AVAILABLE | TEST RESULTS DESIRED ☐ NORMAL ☐ PRIORITY | DATE NEEDED

REMARKS: Corrosion Test

COVER ADDITIONAL INFORMATION WITH LETTER

DATE SAMPLEED

BY | TITLE

DIST, CO, RTE, PM: 04-SCL-680-PM 0.0-9.94

LIMITS

CONT. NO. 04-153200

FED. NO.

RES. ENGR. OR SUPT. S. Awad

ADDRESS

CONTRACTOR (510) 622-5443

MAIL TO SAME DESTINATION AS SAMPLE

EXUDATION PRESSURE (PSI)

-TL-361 (10/78)

TEST NO. 7941-9P

BILLED

DATE RECEIVED AUG 0 4 2011

CALC. BY _____ APPROVED BY _____

DATE REPORTED SEP 0 2 2011

☐ DISTRICT DIRECTOR ☐ TRANS. LAB.
☐ DIS. MAT LS ☐ PAV'T. SECTION
☐ RESIDENT ENGINEER ☐ ACCOUNTING
☐ CONSTRUCTION ☐

ATTACH FORM DCR-TL-101 HERE

EXPANSION PRESSURE CHART

2.0

1.8

GRADING ANALYSIS

SIEVE	AS RECEIVED	RET. CR.	ADJ. OR COMB. GRADE	AS USED	SPECIF. LIMITS ☐ SOUGHT ☐
3					
2½					
2					
1½					
1					
¾					
½					
⅜					
4					
8					
16					
30					
50					
100					
200					
5μ					
1μ					

GRADING AS USED WAS OBTAINED AS FOLLOWS:

% BY WT. % BY VOL. TEST NO. DESCRIPTION

REMARKS:

RESISTIVITY = 1860
PH = 9.2

SURFACE

BASE

SUBBASE

GRAVEL EQUIVALENT FACTOR

TRAFFIC INDEX

R VALUE: EXUDATION PRESSURE

EXPANSION PRESSURE

AT EQUILIBRUM SPEC.

INDICATED MINIMUM THICKNESS OF COVER FOR ABOVE CONDITIONS (FEET)

REPORT OF TESTS ON

Foundation Soil (CORROSION)

IF CONTRACT, USE CONTRACT ITEM

SOURCE	CHARGE	EXPENDITURE AUTHORIZATION

SPECIAL DESIGNATION (USE WHEN APPLICABLE)	ACTIVITY OR OBJECT	AMOUNT

TEST SPECIMEN	A	B	C	D
DATE TESTED				
COMPACTOR FOOT PRESSURE P.S.I.				
INITIAL MOISTURE %				
SOAK WATER ML				
WATER ADDED-ML (TOTAL)				
WATER ADDED %				
MOISTURE AT COMPACTION %				
WET WT. OF BRIQUETTE-GMS				
HEIGHT OF BRIQUETTE-INCHES				
DRY DENSITY OF BRIQ. - # CU. FT.				
STABILOMETER P_H AT 2000 LBS.				
DISPLACEMENT				
R-VALUE BY STABILOMETER				
EXUDATION PRES. P.S.I.				
THICK. BY STAB. FEET				
EXPANSION DIAL READING				
THICK. BY EXP. PRESS. FEET				
R-VALUE BY EXPANSION				

TEST RESULTS			SPEC.
LL. P.L P.I.			
CV			
S.E	AS REC'D.		
	CRUSHED		
	COMBINED		
LART	GRADE	100 REV.	
		500 REV.	
DUR	D_f		
	D_t		
% CRUSHED PARTICLES			

SP. GR. ☐ BULK (OVEN) ☐ BULK (SSD) ☐ APPARENT

	FINE	CO
AS REC'D.		
CRUSHED		

REL. COMPACTION D	IN PLACE	OPT
DENSITY		
MOISTURE		
% REL. COMP.		
SPEC.		

DISTRICT 4 LABORATORY
325 SAN BRUNO AVENUE
SAN FRANCISCO, CA 94103

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

SAMPLE IDENTIFICATION CARD

TL-0101 (REV. 10/97)

CARD NUMBER CSAwad-6

☐ PRELIMINARY TESTS
☐ PROCESS TESTS
☐ ACCEPTANCE TESTS
INDEPENDENT ASSURANCE TESTS
☐ DIST. LAB
☐ TRANS. LAB
☐ SPECIAL TESTS

SAMPLE SENT TO:
☐ HDQTRS. LAB
☐ BRANCH LAB
☐ DIST. LAB

FIELD NO.

DIST. LAB NO. 7941-9P

LOT NO.

SHIPMENT NO.

P.O. OR REQ. NO.

AUTHORIZATION NO.

SAMPLE OF Soil

FOR USE IN Foundation

SAMPLE FROM R-11-005 (5-7)

DEPTH RW3

LOCATION OF SOURCE Native soil

THIS SAMPLE IS SHIPPED IN (NO. CONTAINERS)

AND IS ONE OF A GROUP OF

SAMPLES REPRESENTING (TONS, GALS, BULS, STA. ETC.)

OWNER OR MANUFACTURER

TOTAL QUANTITY AVAILABLE

TEST RESULTS DESIRED ☐ NORMAL ☐ PRIORITY

DATE NEEDED

REMARKS

COVER ADDITIONAL INFORMATION WITH LETTER

DATE SAMPLEED 7/28/11

BY S. Awad TITLE T. 6

DIST, CO, RTE, PM 04-SCL-680-PM 0.0/9.94

LIMITS 04-153200

CONT. NO.

FED. NO.

RES. ENGR. OR SUPT. S. Awad

ADDRESS

CONTRACTOR

MAIL TO SAME DESTINATION AS SAMPLE

EXUDATION PRESSURE (PSI)

-TL-361 (10/78)

T NO. 7941-10P

BILLED

DATE RECEIVED AUG 0 4 2011

CALC. BY ____ APPROVED BY ____

DATE REPORTED 9/7/2011

☐ DISTR. ENGINEER ☐ TRANS. LAB.
☐ DIS. MAT LS ENGR. ☐ PAV'T. SECTION
☐ RESIDENT ENGINEER ☐ ACCOUNTING
☐ CONSTRUCTION ☐

ATTACH FORM DCR-TL-10 HERE

EXPANSION PRESSURE Ch.

2.0

1.8

GRADING ANALYSIS

SIEVE	AS RECEIVED	RET. CR.	ADJ. OR COMB. GRADE	AS USED	SPECIF. LIMITS ☐ SOUGHT ☐
3					
2½					
2					
1½					
1					
¾					
½					
⅜					
4					
8					
16					
30					
50					
100					
200					
5μ					
1μ					

GRADING AS USED WAS OBTAINED AS FOLLOWS:

% BY WT. % BY VOL. TEST NO. DESCRIPTION

REMARKS:

* pH = 7.86 pH

* Resistivity = 6440 Ω-cm

SURFACE

BASE

SUBBASE

GRAVEL EQUIVALENT FACTOR

TRAFFIC INDEX

R VALUE: EXUDATION PRESSURE

EXPANSION PRESSURE

AT EQUILIBRUM SPEC.

INDICATED MINIMUM THICKNESS OF COVER FOR ABOVE CONDITIONS (FEET)

REPORT OF TESTS ON

Foundation Soil (CORROSION)

IF CONTRACT, USE CONTRACT ITEM

SOURCE	CHARGE	EXPENDITURE AUTHORIZATION

SPECIAL DESIGNATION (USE WHEN APPLICABLE)	ACTIVITY OR OBJECT	AMOUNT

TEST SPECIMEN	A	B	C	D	E
DATE TESTED					
COMPACTOR FOOT PRESSURE P.S.I.					
INITIAL MOISTURE %					
SOAK WATER ML					
WATER ADDED-ML (TOTAL)					
WATER ADDED %					
MOISTURE AT COMPACTION %					
WET WT. OF BRIQUETTE-GMS					
HEIGHT OF BRIQUETTE-INCHES					
DRY DENSITY OF BRIQ. - # CU. FT.					
STABILOMETER P_H AT 2000 LBS.					
DISPLACEMENT					
R-VALUE BY STABILOMETER					
EXUDATION PRES. P.S.I.					
THICK. BY STAB. FEET					
EXPANSION DIAL READING					
THICK. BY EXP. PRESS. FEET					
R-VALUE BY EXPANSION					

TEST RESULTS

			SPEC.
LL.	P.L	P.I.	
CV			
S.E	AS REC'D.		
	CRUSHED		
	COMBINED		
LART	GRADE	100 REV.	
		500 REV.	
DUR	D_f		
	D_t		
% CRUSHED PARTICLES			

SP. GR. ☐ BULK (OVEN DR ☐ BULK (SSD) ☐ APPARENT

	FINE	COAR
AS REC'D.		
CRUSHED		

REL. COMPACTION DAT

	IN PLACE	OPTIM
DENSITY		
MOISTURE		
% REL. COMP.		
SPEC.		

DISTRICT 4 LABORATORY
325 SAN BRUNO AVENUE
SAN FRANCISCO, CA 94103

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

SAMPLE IDENTIFICATION CARD

TL-0101 (REV. 10/97)

CARD NUMBER CS Awad-7

☐ PRELIMINARY TESTS
☐ PROCESS TESTS
☐ ACCEPTANCE TESTS
INDEPENDENT ASSURANCE TESTS
☐ DIST. LAB
☐ TRANS. LAB
☐ SPECIAL TESTS

SAMPLE SENT TO:
☐ HDQTRS. LAB
☐ BRANCH LAB
☐ DIST. LAB

FIELD NO.

DIST. LAB NO. 7941-10P

LOT NO.

SHIPMENT NO.

P.O. OR REQ. NO.

AUTHORIZATION NO.

SAMPLE OF Soil

FOR USE IN Foundation

SAMPLE FROM A-11-008 (4'-4.5')

DEPTH RW3

LOCATION OF SOURCE

THIS SAMPLE IS SHIPPED IN (NO. CONTAINERS) | AND IS ON E OF A GROUP OF | SAMPLES REPRESENTING (TONS, GALS, BBLS, STA. ETC.)

OWNER OR MANUFACTURER

TOTAL QUANTITY AVAILABLE | TEST RESULTS DESIRED ☒ NORMAL ☐ PRIORITY | DATE NEEDED

REMARKS

Corrosion Test

COVER ADDITIONAL INFORMATION WITH LETTER

DATE SAMPLEED 7/21/11

BY S. Awad TITLE T.E

DIST, CO, RTE, PM 04-SCL-680-PM 0.0/9.94

LIMITS

CONT. NO. 04-153200

FED. NO.

RES. ENGR. OR SUPT. S. Awad

ADDRESS

CONTRACTOR

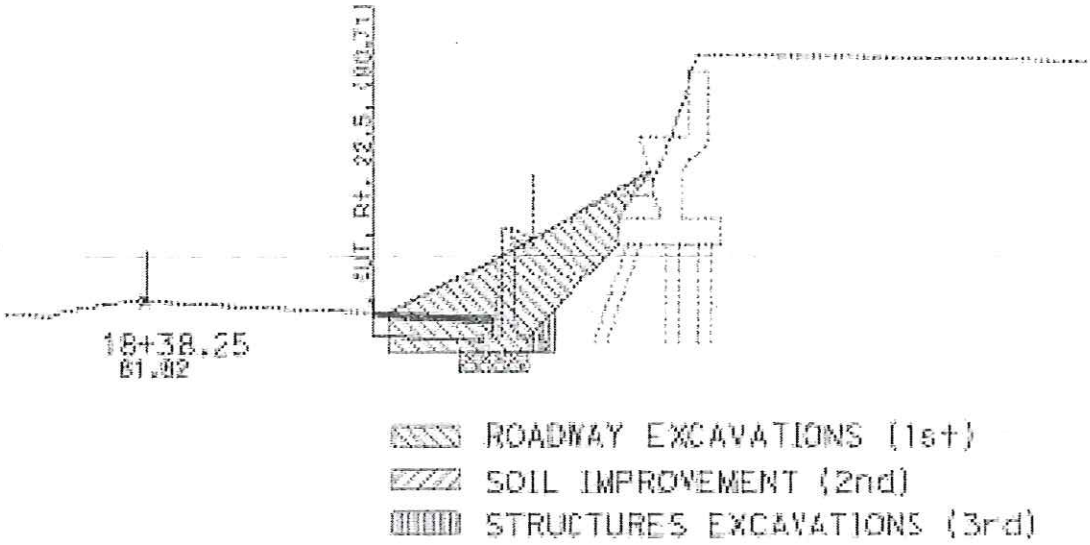
MAIL TO SAME DESTINATION AS SAMPLE

EXUDATION PRESSURE (PSI)

-TL-361 (Rev. 10/78)

87 46243

Attachment D

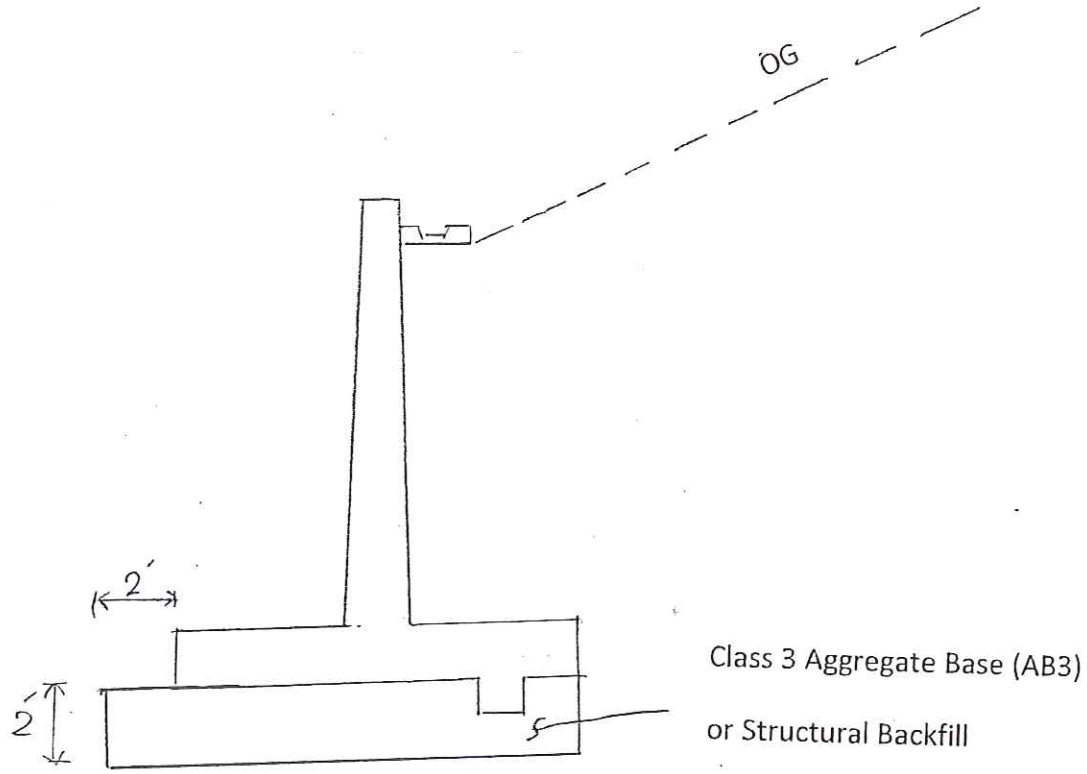


EXCAVATIONS W/ IMPROVEMENT

Typical X-Section- Retaining Wall No. 2

Sta. 1+03 to Sta. 2+23

Attachment D-1



Typical X-Section-Retaining Wall No. 2

Sta. 0+79.56(Begin Wall) to Sta. 1+03

& Sta. 2+23 to Sta. 5+20.76(End Wall)

Attachment D-2

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. HASSAN NIKZAD
District Branch Chief
Design South, SCL B

Date: November 3, 2011

Attention: R. Pouroushasb

File: 04-SCL-680 PM 0.0/9.94
04-153200
Ramp Metering & TOS

S. A

From: S. AWAD/M. HUNG
Transportation Engineers
Office of Geotechnical Design-West
Geotechnical Services
Division of Engineering Services

HOOSHMAND NIKOUI
Chief, Branch A
Office of Geotechnical Design-West
Geotechnical Services
Division of Engineering Services

Subject: Geotechnical Design Report for CMS

1. INTRODUCTION

This memo provides geotechnical design recommendations for two Changeable Message Signs (CMS) Model 500, namely, CMS No. 1 (SB 680), and CMS No. 2 (NB 680). These CMS's are part of the Highway 680 Ramp Metering System and Traffic Operation System (TOS) project elements along Route 680 in Santa Clara County, one on southbound and one on northbound direction. The proposed project limits are from 101/680 connector to Scott Creek Road, a stretch of approximately 10 miles along 680 corridor (Figure 1).

Recommendations contained in this report are based on the submitted layout and cross section plans, field mapping of the site, subsurface exploration, laboratory test results and foundation analysis. This geotechnical report addresses our foundation recommendation for the CMS project. Refer to Table 1 for general CMS information.

Table 1- General CMS information

CMS No.	Direction	Post Mile	Post Type	Height, ft
No. 1	SB	2.03	Model 500	22
No. 2	NB	5.73	Model 500	22

2. PROJECT PURPOSE AND NEED

The need for this project is to relieve congestion and reduce accidents. The purpose is to install ramp metering systems to improve highway operations.

3. SCOPE OF WORK

The following tasks were performed for the preparation of this Geotechnical Design Report:

- Review of as-built plans;
- Field geotechnical exploration, including drilling 2 borings at the project site;
- Laboratory test results on selected samples;
- Geotechnical design analysis; and
- Preparation of this Geotechnical Design Report.

4. SITE GEOLOGY AND SEISMICITY

4.1 Climate

The climate of the job site is considered Mediterranean Climate. Santa Clara County has warm, dry summers and mild, wet winters. Temperatures are highest in July and coldest in January, with an average temperature of 61.3°F. The average high temperature in San Jose is 84°F, in July and August, and average low temperature is 41°F, in December. The average amount of rainfall is approximately 15.08 inches. In the summer, little rainfall occurs. The rainy season begins about October, (0.87 inches) and ends about April (1.02 inches), with the most rain falling in January (3.03 inches). (Data taken from http://www.weather.com)

4.2 Site Geology

The project site is located within the California Coast Ranges geomorphic province within the eastern portion of the Santa Clara Valley. Interstate 680 is located on the land between the Los Buellis Hills and the San Francisco Bay, which comprised of Holocene natural levee, alluvial fan and basin deposits, and Pleistocene alluvial fan deposits. (Figure 2: USGS Open –File Report 98-795 Part 7, Preliminary Geologic Map of the San Jose 30x60 Quadrangle, CA. Compile by Wentworth, Carl, et. al. 1999).

4.3 Seismicity

The project site starts at Highway 101 and ends at Scott Creek Road which is a distance of approximately 10 miles. The two ends of the projects have different controlling faults as shown on Caltrans ARS online website (See Attachment A). For the southern portion of the job, from

101/680 split Berryessa Undercrossing, the controlling fault is the Silver Creek fault. North of Berryessa Undercrossing through the northern end of the project the controlling fault is Hayward Fault Zone (SE Extension Section). Table 2 presents the faults within the project area.

The site is not in the vicinity of any Alquist Priolo earthquake fault zones; therefore surface rupture should not be an issue. But the area immediately north of Scott Creek Road is defined as Special Study Zone, as defined by the Alquist Priolo Milpitas Quadrangle Map. Map is attached (Figure 3).

Table 2 Faults within the Project Site

Location	Fault	Minimum distance to project kilometers (miles)	MCE	PGA (g)
Southern Portion				
101/280/680	Silver Creek	1.14 (0.71)	7.1	0.58
Middle Portion				
Berryessa Road/680	Silver Creek	3.87 (2.40)	7.1	0.45
Berryessa Road/680	Hayward Fault Zone (SE Extension Section)	3.09 (1.92)	6.8	0.44
Berryessa Road/680	Calaveras Fault Zone (Central Calaveras section)	7.06 (4.39)	6.8	0.35
Northern Portion				
237/680	Silver Creek	3.44 (2.14)	7.1	0.47
237/680	Hayward Fault Zone (SE Extension Section)	1.52 (0.94)	6.8	0.49
237/680	Hayward Fault Zone (Southern Hayward Section)	4.86 (3.02)	7.3	0.40
Jacklin/680	Hayward Fault Zone (SE Extension Section)	0.78 (0.48)	6.8	0.52
Jacklin/680	Hayward Fault Zone (Southern Hayward Section)	2.37 (1.47)	7.3	0.48

4.4 Liquefaction

Liquefaction varies over the length of the project. From 101/680 to Capitol Expressway undercrossing and from the Hostetter Road undercrossing to just north of the Jacklin Road undercrossing, liquefaction has had historical occurrences. However, there is no significant liquefaction problem at the CMS sites. The remainder of the project (between Alum Rock to just south of the Hostetter Road undercrossing and north of Jacklin Road) is not within liquefaction zones. The Association of Bay Area Government (ABAG) map for Liquefaction is attached (Figure 4).

5. SUBSURFACE INVESTIGATION

The subsurface exploration was performed by the Office of Geotechnical Design West (OGDW) for CMS #1, and CMS 2 between June and August 2011. It consists of a total of 2 mud-rotary borings with Standard Penetration Tests (SPT) and Pocket Penetrometer (PP) Tests. Soil samples were taken every 5 feet from the Standard Penetration Test (SPT) sampling. Laboratory tests were used to update the soil information. All foundation soil classifications were based on Caltrans "Soil and Rock Logging, Classification, and Presentation Manual". Refer to the LOTBs in the Structure Plans. The LOTB sheets will be submitted when they are ready.

5.1 Changeable Message Sign No. 1 (CMS1)

General information of boring located near the CMS1 site is listed in Table 3.

Table 3 Summary of Field Boring for CMS1

Boring ID	Total Length (ft)	Date of completion	Hammer Efficiency
RC-11-007	41.5	8/23/11	55%

The boring describes the foundation soils as approximately 23 feet of medium stiff to stiff sandy lean clay with gravel. The remainder of the boring describes the foundation soils as dense to very dense well-graded gravel with clay and sand.

The SPT blow counts for sandy and gravelly soil ranged from 11 to as high as of 50 blows per foot. Pocket Penetrometer (PP) tests were conducted on soil samples showing apparent cohesion. The unconfined compressive strength of the clayey soil was estimated varying from 0.50 tsf to 2.00 tsf.

Groundwater was encountered approximately 10 feet below the ground surface at the time of drilling. However, groundwater elevations fluctuate seasonally and may be encountered at higher elevations.

5.2 Changeable Message Sign No. 2 (CMS2)

General information of boring located near the CMS 2 site is listed in Table 4.

Table 4 Summary of Field Boring for CMS2

Boring ID	Total Length (ft)	Date of completion	Hammer Efficiency
A-11-003	41.5	6/9/11	57%

The boring describes the foundation soils as approximately 14 feet of stiff lean clay over by 6 feet of very soft silt. The remainder of the boring is dense silty sand.

The SPT blow count values for silty and sandy/gravelly soil ranged from a low of 4 to as high as of 50 blows per foot. The unconfined compressive strength of the clayey soil was estimated to vary from 0.25 tsf to 3.0 tsf.

Groundwater was encountered at 18 feet below the ground surface at the time of drilling. However, groundwater elevations fluctuate seasonally and may be encountered at higher elevations.

6. GEOTECHNICAL TESTING

6.1 In Situ Testing

For both borings (RC-11-007 & A-11-003), Standard Penetration Test (SPT) was performed at 5-feet interval in soil strata. Pocket Penetrometer (PP) tests were conducted on soil samples showing apparent cohesion. Visual soil classifications were made in the field in accordance with the Unified Soil Classification System. Soil samples were collected at various depths for laboratory testing.

6.2 Laboratory Testing

The laboratory testing program included unit weight tests, moisture content tests, gradation analyses, Atterberg limits tests, corrosion tests. Refer to Attachment B for the laboratory test results.

7. CORROSION EVALUATION

Corrosion studies were conducted in accordance with the requirements of California Test Method No. 643. The Department considers the site to be corrosive to foundation elements if one or more of the following conditions exist for the representative soil samples taken at the site:

> Chloride concentration is greater than or equal to 500 ppm, sulfate concentration is greater than or equal to 2000 ppm, or the pH is 5.5 or less.

The following tables provide the corrosion test summary:

Table 6-Summary of Corrosion Test for CMS1

Boring	*SIC Number*	*Sample Depth*	*Resistivity (Ohm-Cm)*	*pH*	*Chloride Content (ppm)*	*Sulfate Content (ppm)*
RC-11-007	CSA-680-4	6-8	1891	7.6	N/A	N/A

Table 7- Summary of Corrosion Test for CMS2

Boring	*SIC Number*	*Sample Depth*	*Resistivity (Ohm-Cm)*	*pH*	*Chloride Content (ppm)*	*Sulfate Content (ppm)*
A-11-003	CSAwad-02	18-20	1681	7.8	N/A	N/A

Based on the test results from the Materials Engineering Testing Services (METS) of Caltrans, the foundation soils at the proposed CMS signs are considered non-corrosive. Refer to Attachment C for the laboratory test results.

8. FOUNDATION RECOMMENDATION

8.1 Changeable Message Sign No. 1

Based on our estimated soil parameters from our geotechnical investigation for CMS1, we recommend that the 5-feet diameter CIDH pile for Model 500, as specified in May 2006 Caltrans Standard Plans, with a length of 22 ft is suitable for the proposed CMS1.

8.2 Changeable Message Sign No. 2

Based on the estimated soil parameters from our geotechnical investigation and analysis for CMS2, a portion of the foundation soil does not meet the soil criteria specified in May 2006 Caltrans Standard Plans for the foundation of Model 500. We recommend that the design length of the CIDH pile be extended to 27 feet (additional 5 feet to Standard Plans) for the proposed CMS2.

9. CONSTRUCTION CONSIDERATIONS

- CIDH piling shall conform to the provisions in Section 49-4, "Cast-in-Place Concrete Piles," of Standard Specifications.
- Difficult pile installation is anticipated due to the presence of caving soils, high groundwater, and overhead/underground utilities.
- The contractor has the option of using full-length temporary casing. The use of temporary casing will require that it be removed while the concrete is being placed in order to develop the expected pile capacity and to facilitate the casing removal.
- Because of the existing groundwater, the contractor may choose to use a closed system using a concrete pump or a tremie tube to place concrete at the bottom of the holes.

If you have any questions or need additional information, please call Samuel Awad at (510) 622-5443, or Hooshmand Nikoui, Branch Chief at (510) 286-4811.

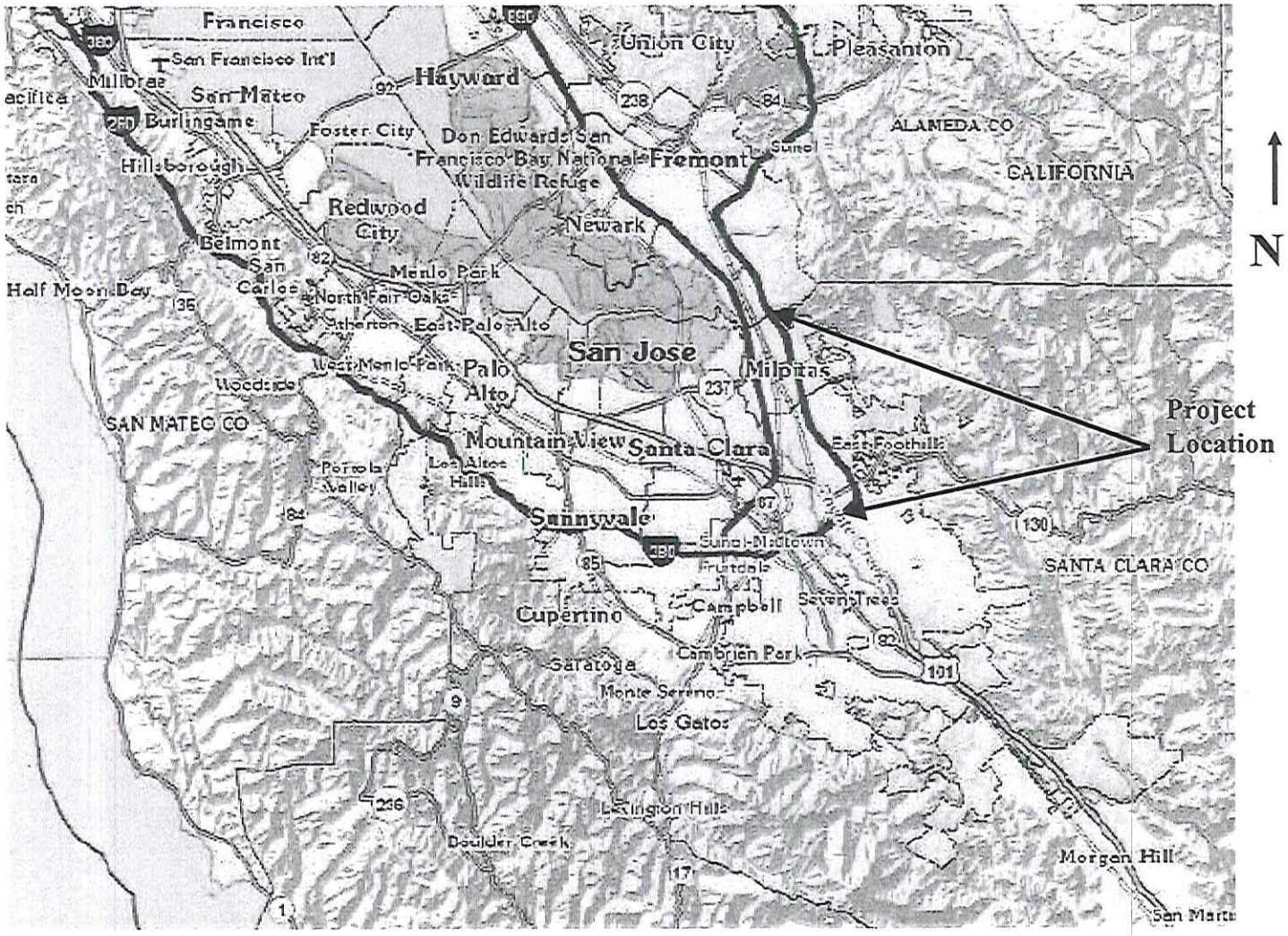
Attachments

c: TPokrywka, HNikoui, SAwad, Daily File, Project File

SAwad /mm/153200

REGISTERED PROFESSIONAL ENGINEER
SAMUEL AWAD
No. 64589
Exp. 6/30/11
CIVIL
STATE OF CALIFORNIA

Figures



MAP TAKEN FROM:
USGS MARE ISLAND QUADRANGLE, 1980

SCALE

Not to Scale

Caltrans

Engineering Service Center
DIVISION OF ENGINEERING SERVICES
OFFICE OF GEOTECHNICAL SERVICES
GEOTECHNICAL DESIGN BRANCH (WEST) – BRANCH B

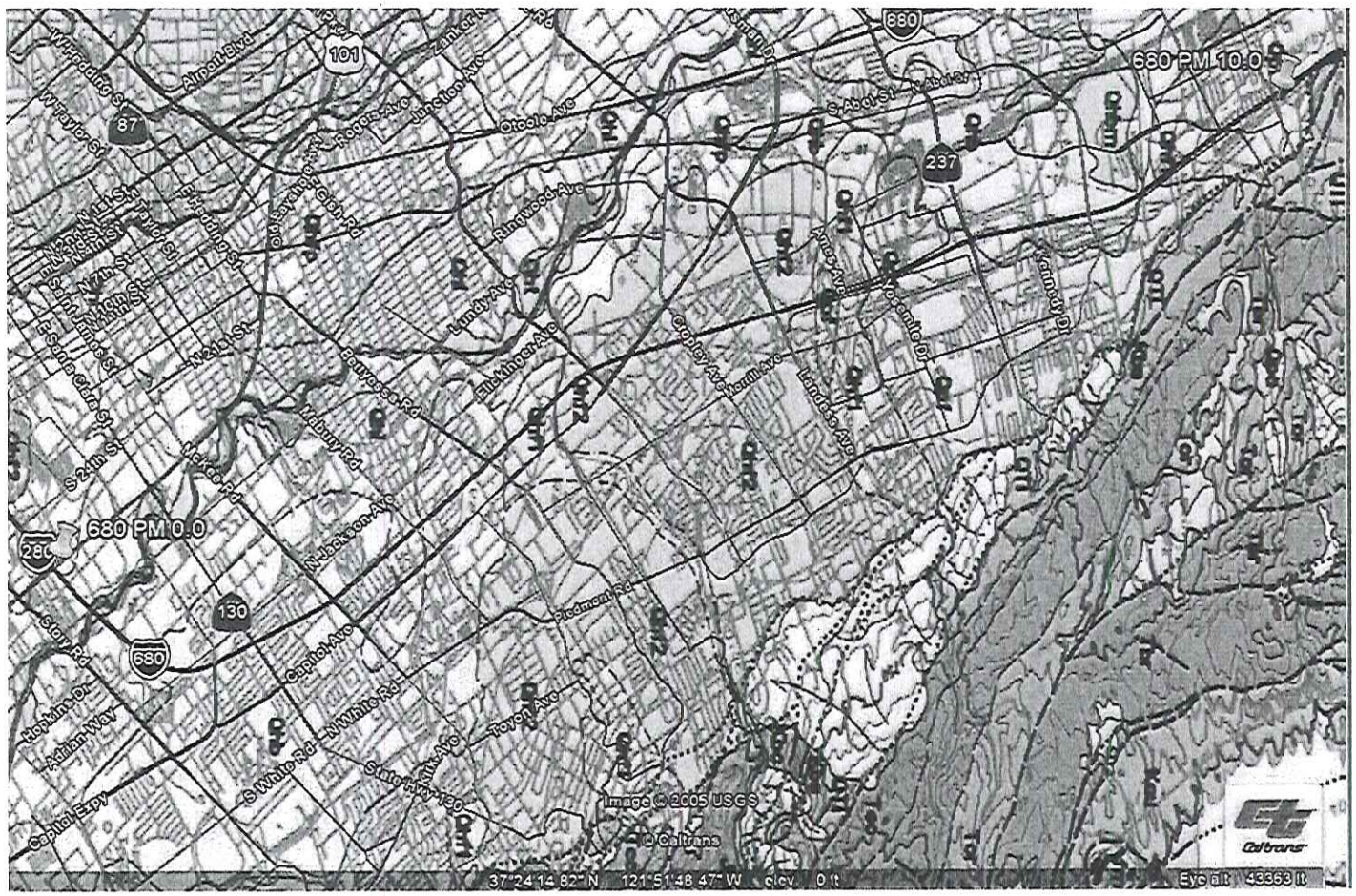
LOCATION MAP

04-SCL-680/	EFIS 0400000426
PM 0.0-9.94	OCTOBER 2011

FIGURE 1

Map taken from: Preliminary Geologic Map of the San Jose 30x60 Quadrangle, CA. Compile by Wentworth, Carl, et. Al. 1999

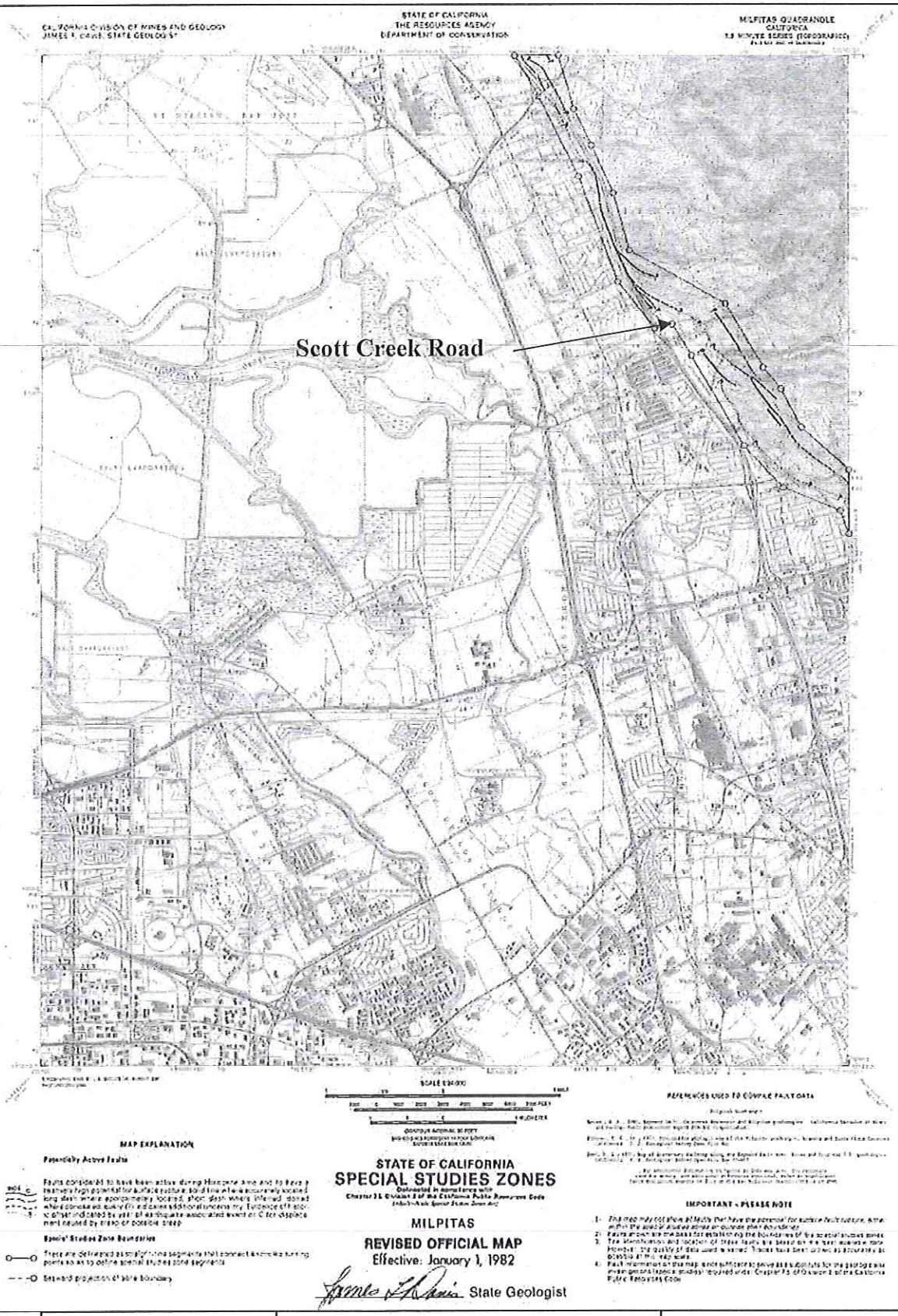
N



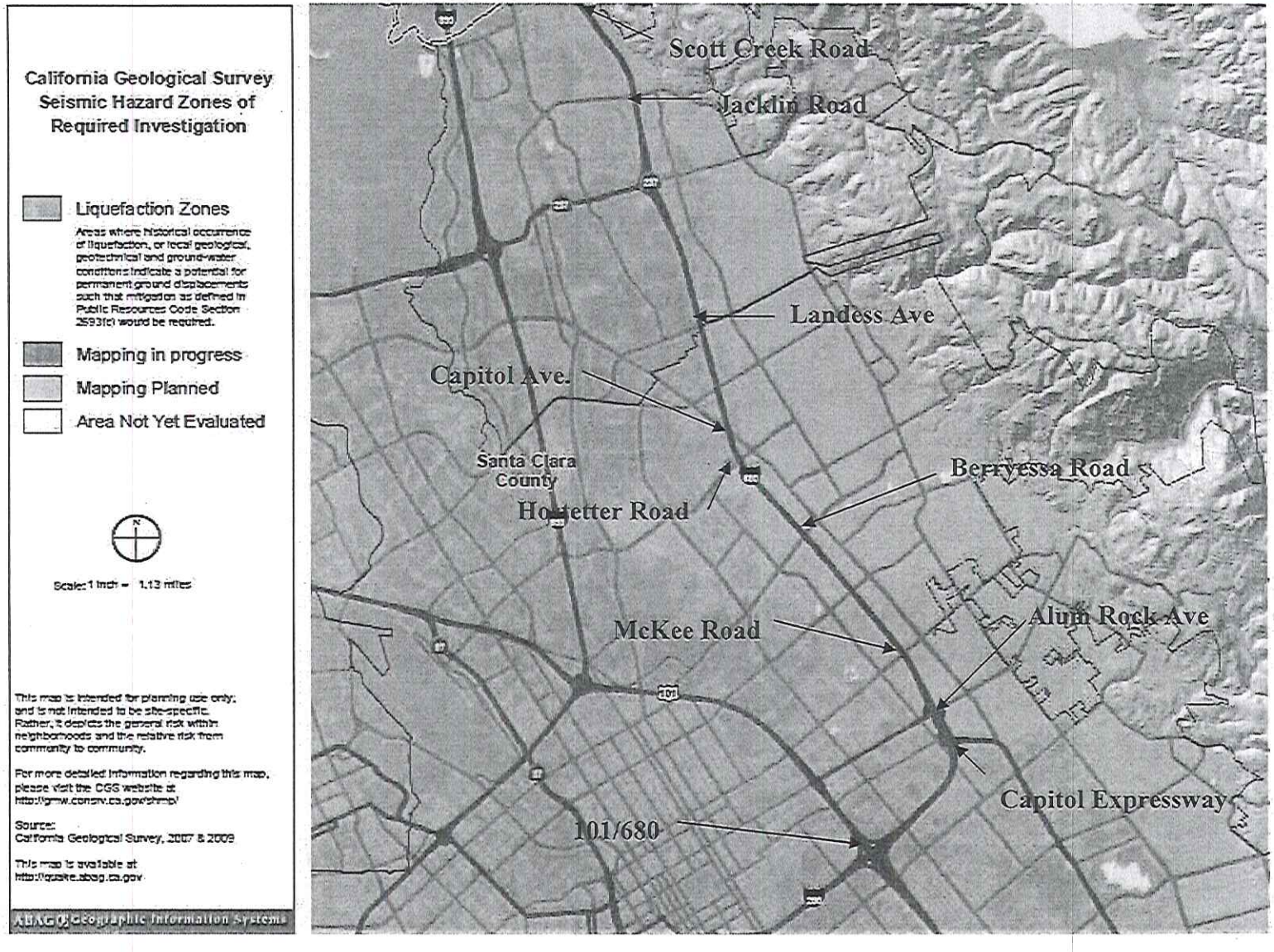
KEY

- Qhf2 Older Alluvial fan deposits (HOLOCENE)
- Qhb Basin deposits (HOLOCENE)
- Qhl Levee deposits (HOLOCENE)
- Qpf Alluvial fan deposits (UPPER PLEISTOCENE)

SCALE: Not to Scale	Caltrans	**Engineering Service Center** DIVISION OF ENGINEERING SERVICES OFFICE OF GEOTECHNICAL SERVICES GEOTECHNICAL DESIGN BRANCH (WEST) – BRANCH B	GEOLOGIC MAP
		04-SCL-680	EFIS 0400000426
		PM 0.0-9.94	OCTOBER 2011
			FIGURE 2



SCALE Not to Scale	Caltrans	**Engineering Service Cente** DIVISION OF ENGINEERING SERVICES OFFICE OF GEOTECHNICAL SERVICES GEOTECHNICAL DESIGN BRANCH (WEST) BRANCH B	ALQUIST PRIOLO MAP 04-SCL-680 EFIS 0400000426 PM 0.0-9.94 OCTOBER 2011 FIGURE 3



MAP TAKEN FROM:
USGS MARE ISLAND QUADRANGLE, 1980

SCALE

Not to Scale

Caltrans

Engineering Service Center
DIVISION OF ENGINEERING SERVICES
OFFICE OF GEOTECHNICAL SERVICES
GEOTECHNICAL DESIGN BRANCH (WEST) – BRANCH B

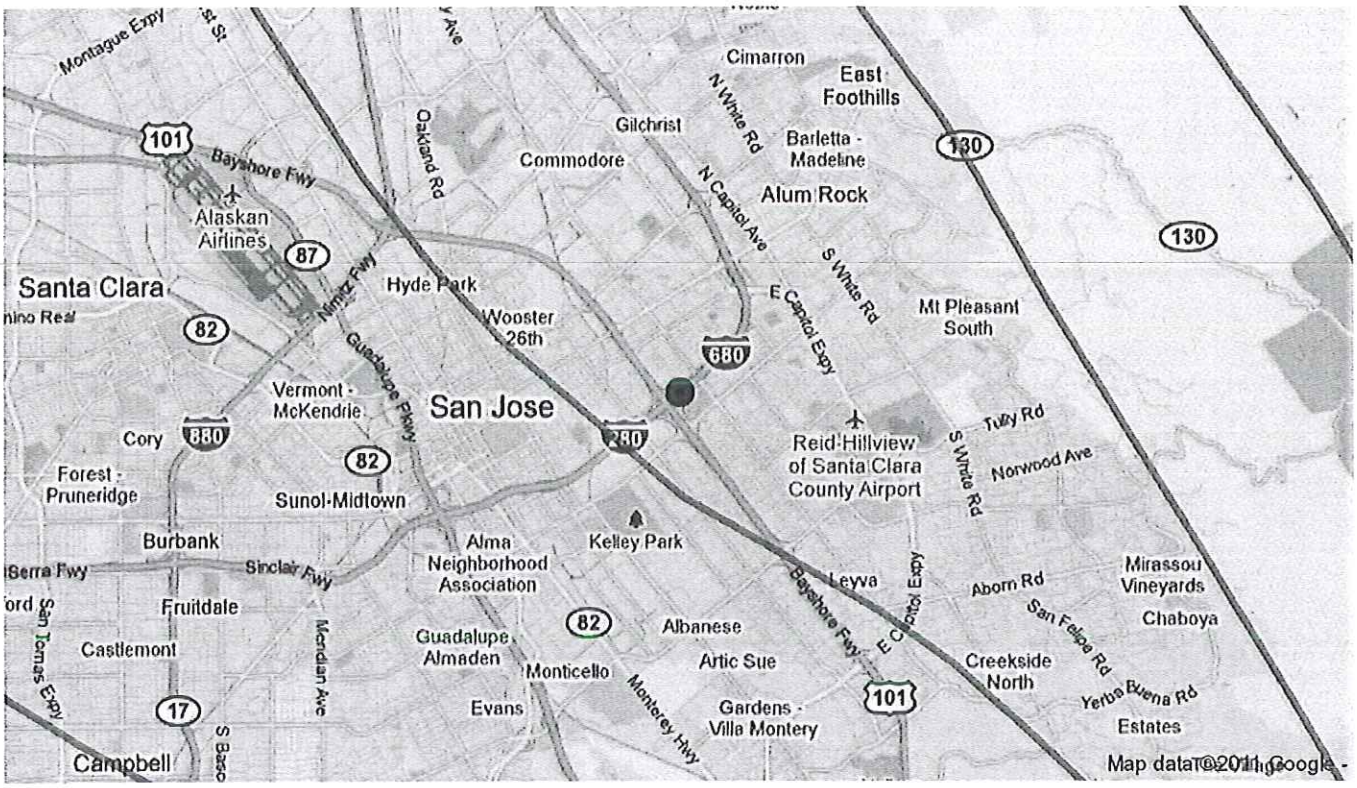
LIQUIFACTION MAP

04-SCL-680	EFIS 0400000426
PM 0.0-9.94	OCTOBER 2011

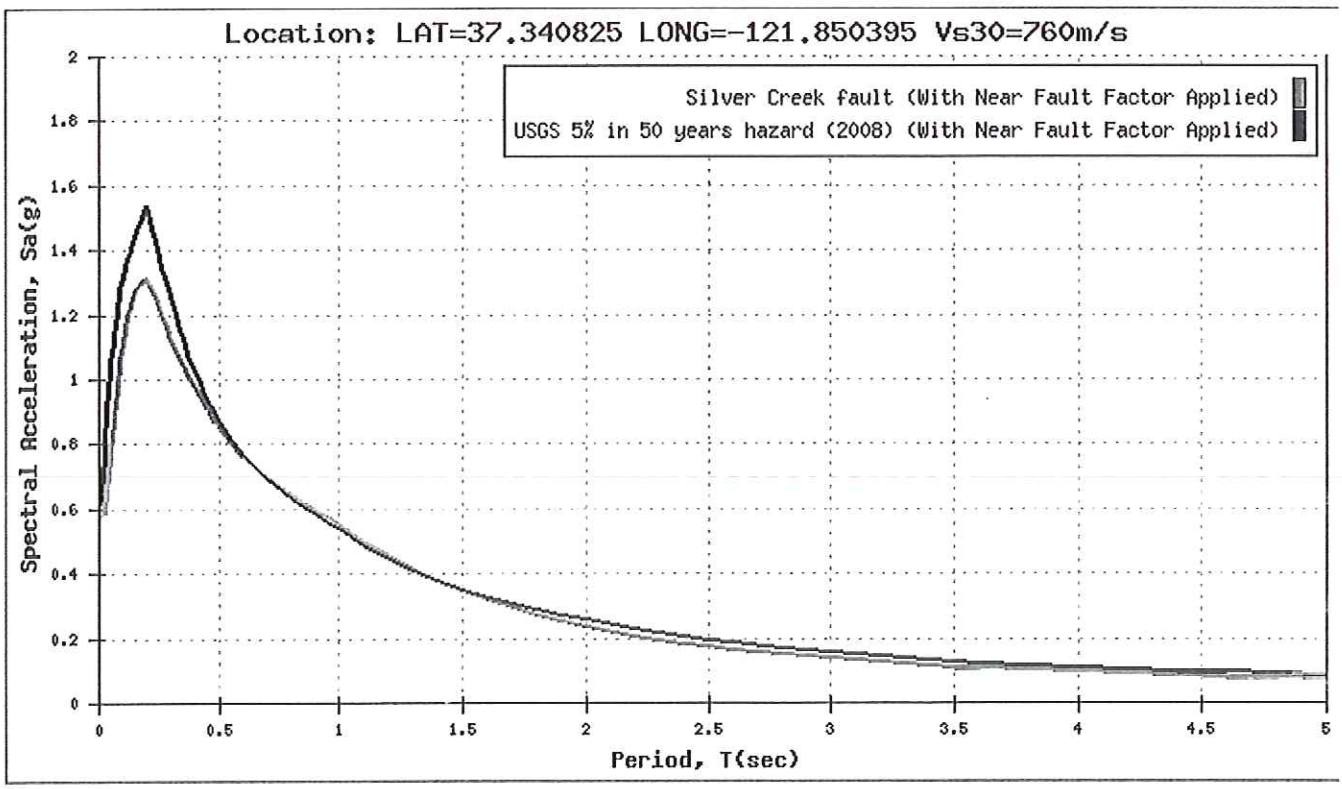
FIGURE 4

Attachment A

SELECT SITE LOCATION



CALCULATED SPECTRA



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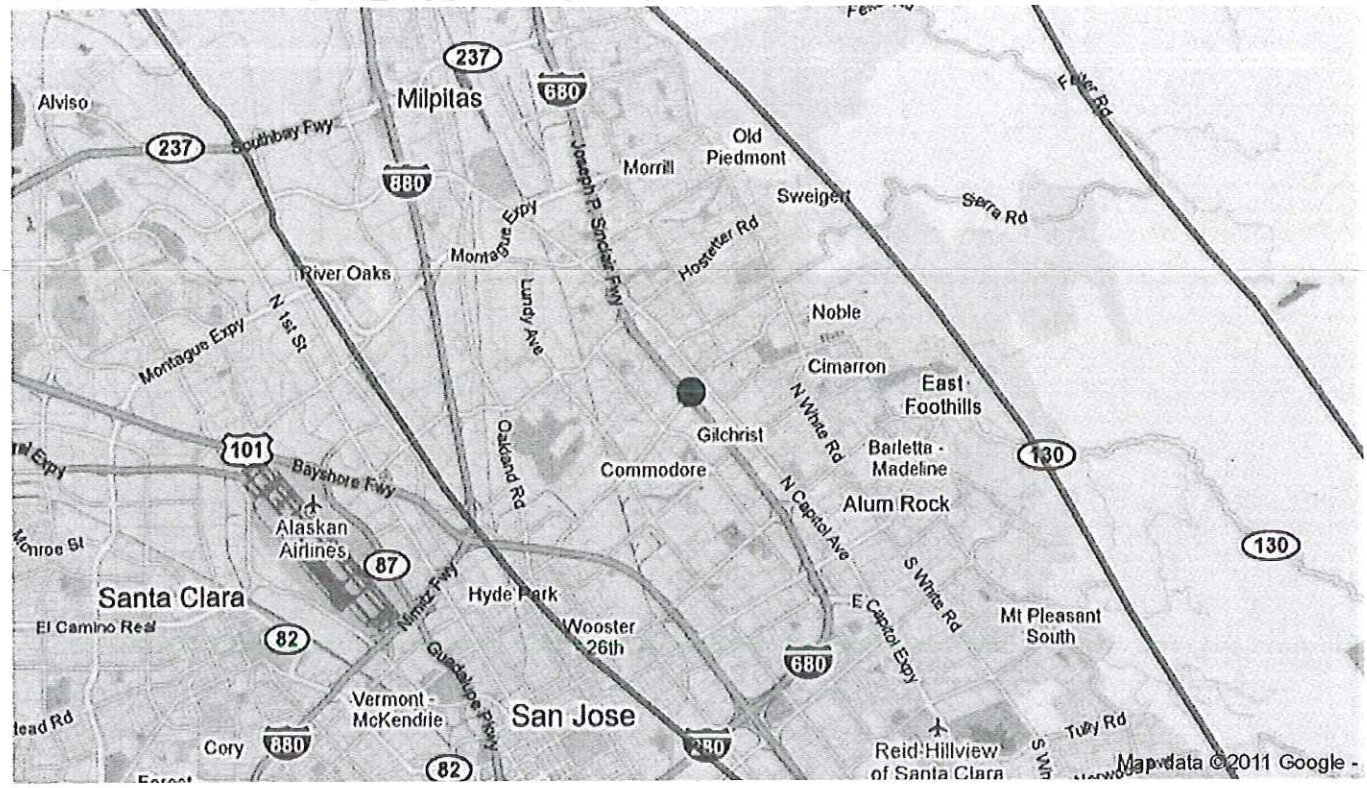

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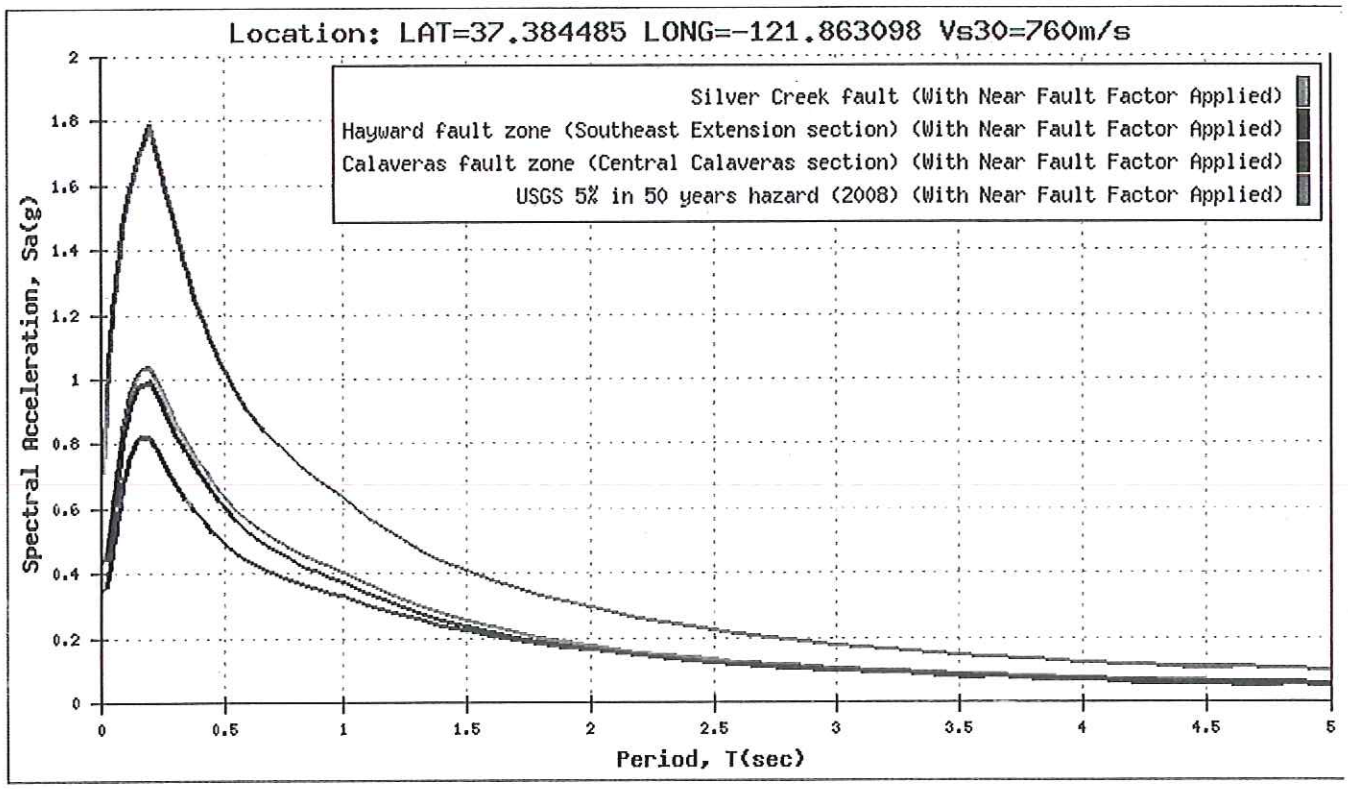
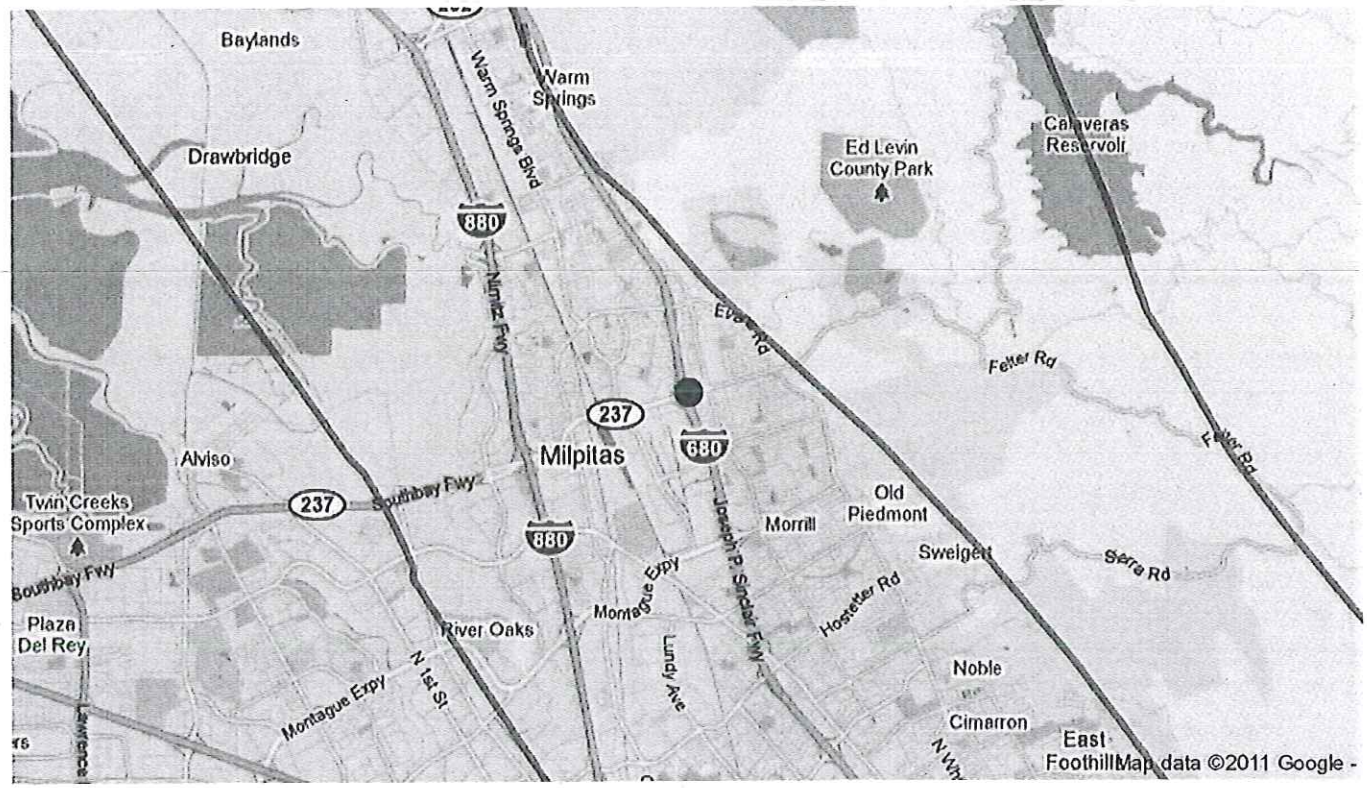


SELECT SITE LOCATION



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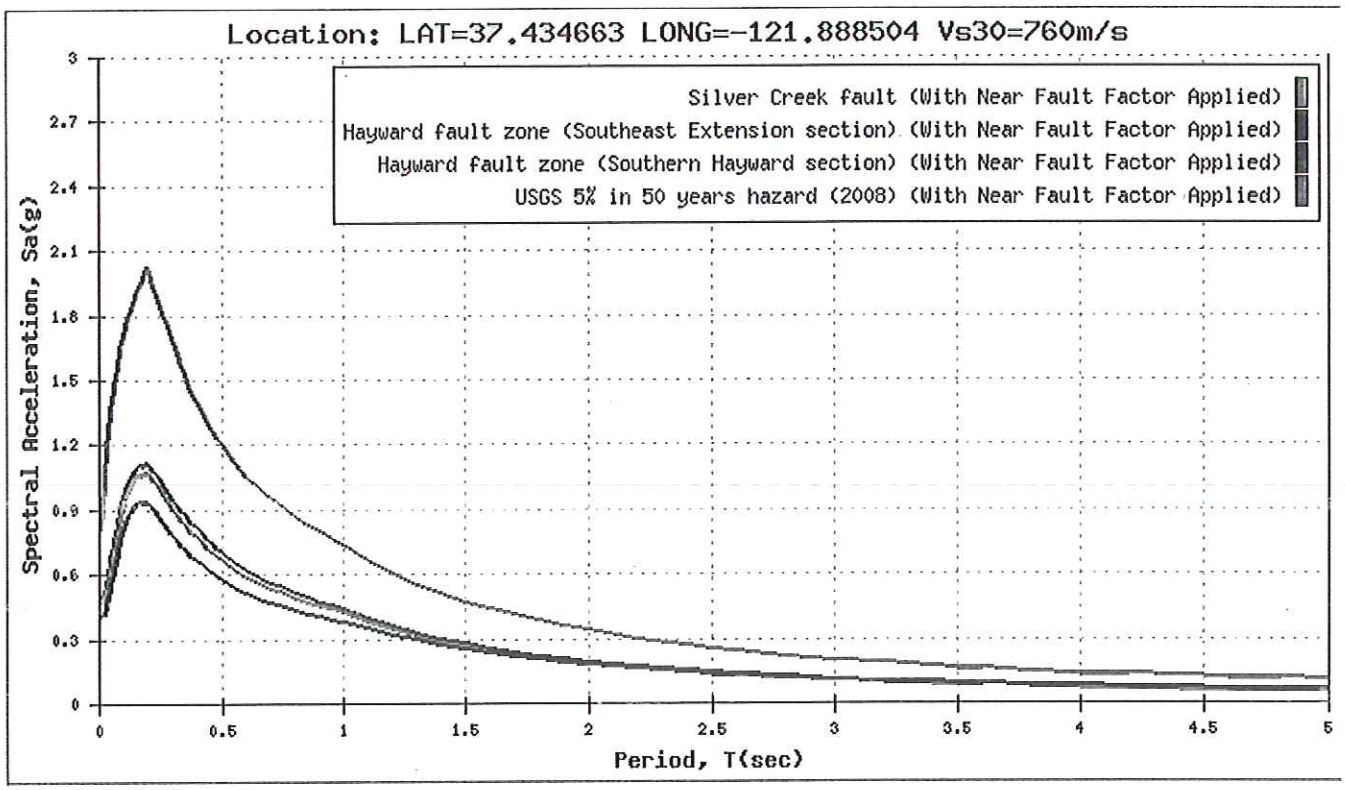
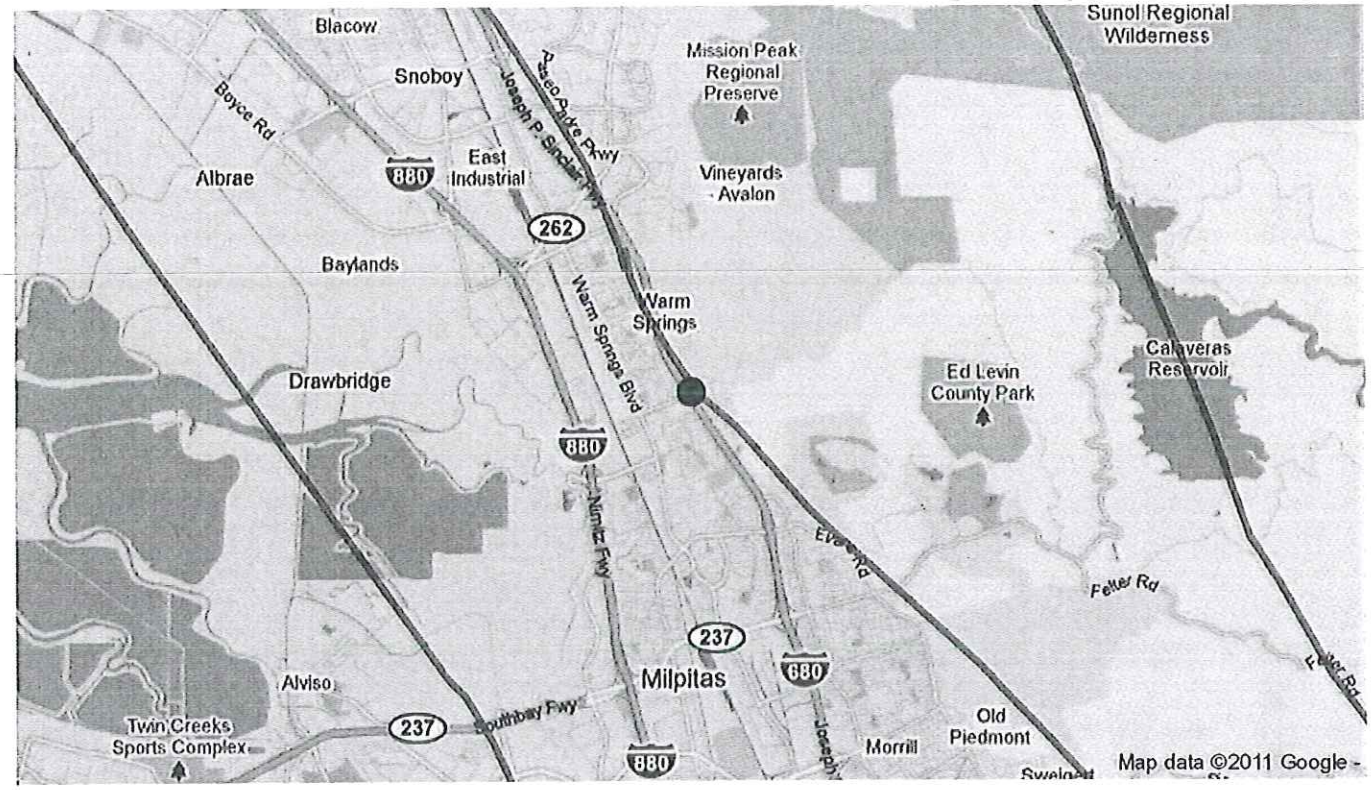


SELECT SITE LOCATION



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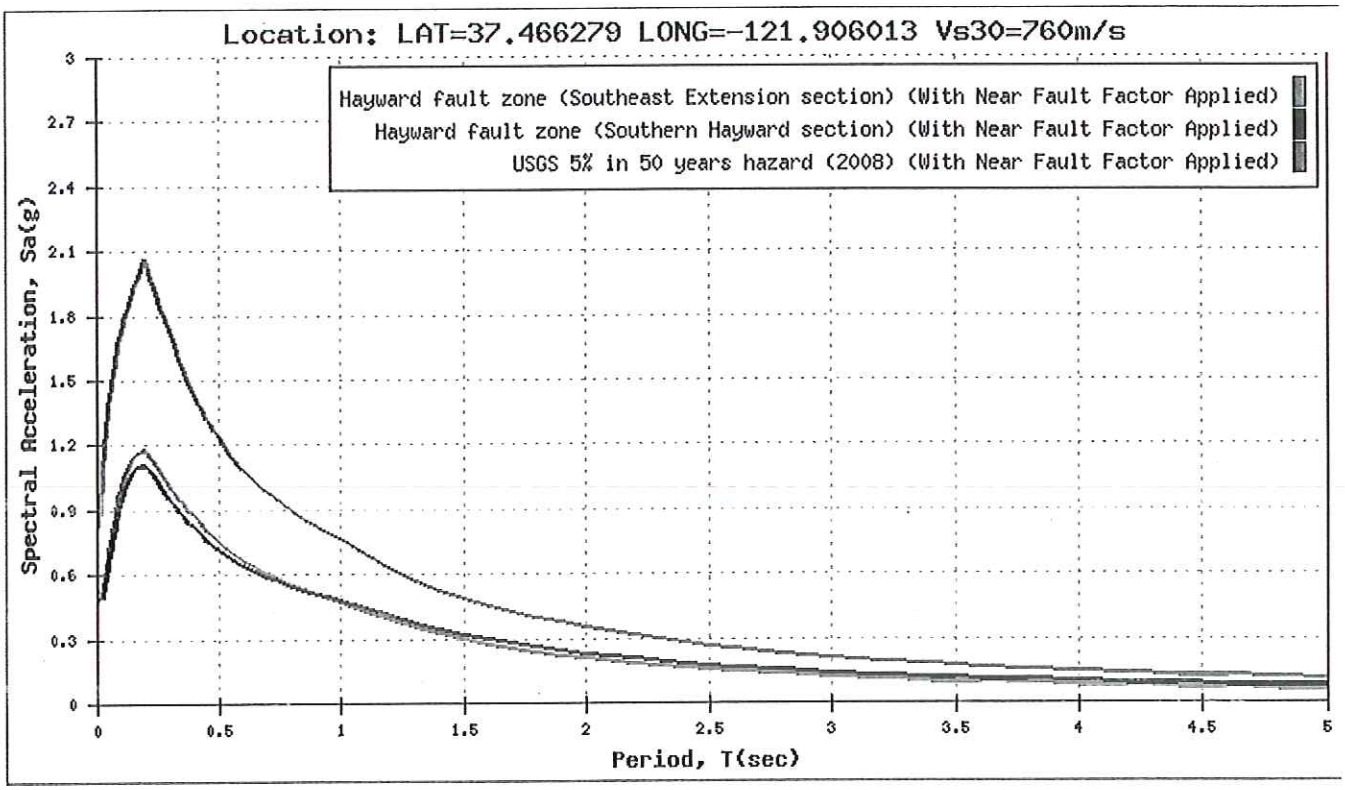

Attachment B

ATTACH FORM DCR-TL-101 HERE

TEST NO. 7941 7P

BILLED

DATE RECEIVED AUG 0 4 2011

CALC. BY _____ APPROVED BY _____

DATE REPORTED SEP 0 2 2011

☐ DISTRICT DIRECTOR ☐ TRANS. LAB.
☐ DIS. MAT LS ER. ☐ PAV'T. SECTION
☐ RESIDENT ENGINEER ☐ ACCOUNTING
☐ CONSTRUCTION ☐

EXPANSION PRESSURE CHART

20

GRADING ANALYSIS

SIEVE	AS RECEIVED	RET. CR.	ADJ. OR COMB. GRADE	AS USED	SPECIF. LIMITS ☐ SOUGHT ☐
3					
2½					
2					
1½					
1					
¾					
½					
⅜					
4					
8					
16					
30					
50					
100					
200					
5μ					
1μ					

GRADING AS USED WAS OBTAINED AS FOLLOWS:

% BY WT.	% BY VOL.	TEST NO.	DESCRIPTION

REMARKS: RESISTIVITY = 1891
PH = 7.6

SURFACE

BASE

SUBBASE

GRAVEL EQUIVALENT FACTOR

TRAFFIC INDEX

R VALUE: EXUDATION PRESSURE

EXPANSION PRESSURE

AT EQUILIBRUM SPEC.

INDICATED MINIMUM THICKNESS OF COVER FOR ABOVE CONDITIONS (FEET)

REPORT OF TESTS ON

Foundation Soil (CORROSION)

IF CONTRACT, USE CONTRACT ITEM

SOURCE	CHARGE	EXPENDITURE AUTHORIZATION

SPECIAL DESIGNATION (USE WHEN APPLICABLE)	ACTIVITY OR OBJECT	AMOUNT

TEST SPECIMEN	A	B	C	D	E
DATE TESTED					
COMPACTOR FOOT PRESSURE P.S.I.					
INITIAL MOISTURE %					
SOAK WATER ML					
WATER ADDED-ML (TOTAL)					
WATER ADDED %					
MOISTURE AT COMPACTION %					
WET WT. OF BRIQUETTE-GMS					
HEIGHT OF BRIQUETTE-INCHES					
DRY DENSITY OF BRIQ. - # CU. FT.					
STABILOMETER P_H AT 2000 LBS.					
DISPLACEMENT					
R-VALUE BY STABILOMETER					
EXUDATION PRES. P.S.I.					
THICK. BY STAB. FEET					
EXPANSION DIAL READING					
THICK. BY EXP. PRESS. FEET					
R-VALUE BY EXPANSION					

TEST RESULTS

			SPEC.
LL.	P.L	P.I.	
CV			
S.E	AS REC'D.		
	CRUSHED		
	COMBINED		
LART	GRADE 100 REV.		
	500 REV.		
DUR	D_f		
	D_i		
% CRUSHED PARTICLES			

SP. GR. ☐ BULK (OVEN DRY) ☐ BULK (SSD) ☐ APPARENT

	FINE	COARSE
AS REC'D.		
CRUSHED		

REL. COMPACTION DATA

	IN PLACE	OPTIMUM
DENSITY		
MOISTURE		
% REL. COMP.		
SPEC.		

DISTRICT 4 LABORATORY
325 SAN BRUNO AVENUE
SAN FRANCISCO, CA 94103

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

SAMPLE IDENTIFICATION CARD

TL-0101 (REV. 10/97)

CARD NUMBER CSAwad-4

☐ PRELIMINARY TESTS
☐ PROCESS TESTS
☐ ACCEPTANCE TESTS
INDEPENDENT ASSURANCE TESTS
☐ DIST. LAB
☐ TRANS. LAB
☐ SPECIAL TESTS

SAMPLE SENT TO:
☐ HDQTRS. LAB
☐ BRANCH LAB
☐ DIST. LAB

FIELD NO.

DIST. LAB NO. 7941-7P

LOT NO.

SHIPMENT NO.

P.O. OR REQ. NO.

AUTHORIZATION NO.

SAMPLE OF Soil

FOR USE IN Foundation

SAMPLE FROM RC-11-007 (6-8')

DEPTH CM 51 SB 680

LOCATION OF SOURCE Native Soil

THIS SAMPLE IS SHIPPED IN (NO. CONTAINERS)

AND IS ON E OF A GROUP OF

SAMPLES REPRESENTING (TONS, GALS, BULS, STA, ETC.)

OWNER OR MANUFACTURER

TOTAL QUANTITY AVAILABLE

TEST RESULTS DESIRED ☒ NORMAL ☐ PRIORITY

DATE NEEDED

REMARKS Corrosion test

COVER ADDITIONAL INFORMATION WITH LETTER

DATE SAMPLEED

BY S. Awad TITLE T.E

DIST, CO, RTE, PM 04-SCL-680-PM 0.0-9.9

LIMITS 04-153200

CONT. NO.

FED. NO. (Project-0400000426)

RES. ENGR. OR SUPT. S. Awad

ADDRESS (510) 622-5443

CONTRACTOR

MAIL TO SAME DESTINATION AS SAMPLE

EXUDATION PRESSURE P.S.I.

-TL-361 (10/78)

ATTACH FORM DCR-TE-10 HERE

T NO. T941 C 2P

BILLED

DATE RECEIVED 6/17/2011

CALC. BY _____ APPROVED BY _____

DATE REPORTED JUL 15 2011

☐ DISTR DIRECTOR ☐ TRANS. LAB.
☐ DIS. MAT LS ENGR. ☐ PAV'T. SECTION
☐ RESIDENT ENGINEER ☐ ACCOUNTING
☐ CONSTRUCTION ☐

EXPANSION PRESSURE C

2 0

GRADING ANALYSIS

SIEVE	AS RECEIVED	RET. CR.	ADJ. OR COMB. GRADE	AS USED	SPECIF. LIMITS ☐ SOUGHT ☐
3					
2½					
2					
1½					
1					
¾					
½					
⅜					
4					
8					
16					
30					
50					
100					
200					
5μ					
1μ					

GRADING AS USED WAS OBTAINED AS FOLLOWS:

% BY WT.	% BY VOL.	TEST NO.	DESCRIPTION

REMARKS:
REGISTIVITY = 1680
PH = 7.8

SURFACE
BASE
SUBBASE

GRAVEL EQUIVALENT FACTOR

TRAFFIC INDEX

R VALUE
EXUDATION PRESSURE
EXPANSION PRESSURE
AT EQUILIBRUM SPEC.

INDICATED MINIMUM THICKNESS OF COVER FOR ABOVE CONDITIONS (FEET)

DISTRICT 4 LABORATORY
325 SAN BRUNO AVENUE
SAN FRANCISCO CA 94103

REPORT OF TESTS ON

IF CONTRACT, USE CONTRACT ITEM

SOURCE	CHARGE	EXPENDITURE AUTHORIZATION

SPECIAL DESIGNATION (USE WHEN APPLICABLE)	ACTIVITY OR OBJECT	AMOUNT

TEST SPECIMEN	A	B	C	D
DATE TESTED				
COMPACTOR FOOT PRESSURE P.S.I.				
INITIAL MOISTURE %				
SOAK WATER ML				
WATER ADDED-ML (TOTAL)				
WATER ADDED %				
MOISTURE AT COMPACTION %				
WET WT. OF BRIQUETTE-GMS				
HEIGHT OF BRIQUETTE-INCHES				
DRY DENSITY OF BRIQ. - # CU. FT.				
STABILOMETER P_H AT 2000 LBS.				
DISPLACEMENT				
R-VALUE BY STABILOMETER				
EXUDATION PRES. P.S.I.				
THICK. BY STAB. FEET				
EXPANSION DIAL READING				
THICK. BY EXP. PRESS. FEET				
R-VALUE BY EXPANSION				

TEST RESULTS			SPEC.
LL.	P.L	P.I.	
CV			
S.E	AS REC'D		
	CRUSHED		
	COMBINED		
LART	GRADE	100 REV.	
		500 REV.	
DUR	D_f		
	D_r		
% CRUSHED PARTICLES			

SP. GR. ☐ BULK (OVE ☐ BULK (SSD ☐ APPARENT	FINE	C
AS REC'D.		
CRUSHED		

REL. COMPACTION D	IN PLACE	OP
DENSITY		
MOISTURE		
% REL. COMP.		
SPEC.		

DISTRICT 4 LABORATORY
325 SAN BRUNO AVENUE
SAN FRANCISCO, CA 94103

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION
SAMPLE IDENTIFICATION CARD
TL-0101 (REV. 10/97)

CARD NUMBER CSA-680-02

☐ PRELIMINARY TESTS
☐ PROCESS TESTS
☐ ACCEPTANCE TESTS
INDEPENDENT ASSURANCE TESTS
☐ DIST. LAB
☐ TRANS. LAB
☐ SPECIAL TESTS

SAMPLE SENT TO:
☐ HDQTRS. LAB
☐ BRANCH LAB
☐ DIST. LAB

FIELD NO.
DIST. ABBRV. T941-2P
LOT NO.
SHIPMENT NO.
P.O. OR REQ. NO.
AUTHORIZATION NO.

SAMPLE OF Soil
FOR USE IN
SAMPLE FROM Foundation
DEPTH A-11-003 (18-26)
LOCATION OF SOURCE Native Soil

THIS SAMPLE IS SHIPPED IN (NO CONTAINERS)
AND IS ON E OF A GROUP OF
SAMPLES REPRESENTING (TONS, GALS, BBLS, STA, ETC)
OWNER OR MANUFACTURER
TOTAL QUANTITY AVAILABLE
TEST RESULTS DESIRED ☒ NORMAL ☐ PRIORITY
DATE NEEDED
REMARKS
Corrosion test

COVER ADDITIONAL INFORMATION WITH LETTER
DATE SAMPLEED
BY S.A
TITLE TE
DIST, CO, RTE, PM 04-SCL-680 PM 0.0/10
LIMITS 04-153200
CONT. NO.
FED. NO.
RES. ENGR. OR SUPT.
ADDRESS S. Awad
CONTRACTOR 510-622-5443

MAIL TO SAME DESTINATION AS SAMPLE

800 700 600 500 400 300 200 100
EXUDATION PRESSURE (PSI)

-TI-361 (Rev 10/78)

ATTACH FORM 300 TO TEST FORM

NO. 79141 -5P

BILLED

DATE RECEIVED JUN 23 2011

CALC. BY _____ APPROVED BY _____

DATE REPORTED _____

☐ DISTRICT DIRECTOR ☐ TRANS. LAB.
☐ DIS. MAT LS ENGR. ☐ PAV'T SECTION
☐ RESIDENT ENGINEER ☐ ACCOUNTING
☐ CONSTRUCTION ☐

EXPANSION PRESSURE CH

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

SAMPLE IDENTIFICATION CARD

TL-0101 (REV. 10/97)

CARD NUMBER CSAWAD-3

☐ PRELIMINARY TESTS
☐ PROCESS TESTS
☐ ACCEPTANCE TESTS
INDEPENDENT ASSURANCE TESTS
☐ DIST. LAB
☐ TRANS. LAB
☐ SPECIAL TESTS

SAMPLE SENT TO:
☐ HDQTRS. LAB
☐ BRANCH LAB
☐ DIST. LAB

FIELD NO.
DIST. LAB NO.
LOT NO.
SHIPMENT NO.
P.O. OR REQ NO
AUTHORIZATION NO.

SAMPLE OF: Soil

FOR USE IN: Foundation

SAMPLE FROM: A-11-003 (10' - 11½')

DEPTH

LOCATION OF SOURCE: Native Soil

THIS SAMPLE IS SHIPPED IN (NO. CONTAINERS) | AND IS ONE OF A GROUP OF | SAMPLES REPRESENTING (TONS, GALS, BDLS STA. ETC.)

OWNER OR MANUFACTURER

TOTAL QUANTITY AVAILABLE | TEST RESULTS DESIRED ☒ NORMAL ☐ PRIORITY | DATE NEEDED

REMARKS: P1 & MA

COVER ADDITIONAL INFORMATION WITH LETTER

DATE SAMPLEED

BY: S. Awad TITLE: T.E

DIST. CO. RTE. PM: 04-SCL-680 PM 0.0/9.94

LIMITS: 04-153206

CONT. NO.

FED. NO.

RES. ENGR. OR SUPT.: S. Awad

ADDRESS

CONTRACTOR

(510) 622-5443

MAIL TO SAME DESTINATION AS SAMPLE

GRADING ANALYSIS

SIEVE	AS RECEIVED	RET. CR.	ADJ. OR COMB. GRADE	AS USED	SPECIF. LIMITS ☐ SOUGHT ☐
3					
2½					
2					
1½					
1					
¾					
½					
⅜					
4					
8					
16					
30					
50					
100					
200					
5μ					
1μ					

GRADING AS USED WAS OBTAINED AS FOLLOWS:

% BY WT.	% BY VOL.	TEST NO.	DESCRIPTION

REMARKS: See Attached Sheet for Atterberg Results

SURFACE

BASE

SUBBASE

GRAVEL EQUIVALENT FACTOR

TRAFFIC INDEX

R VALUE: EXUDATION PRESSURE; EXPANSION PRESSURE; AT EQUILIBRUM SPEC.

INDICATED MINIMUM THICKNESS OF COVER FOR ABOVE CONDITIONS (FEET)

REPORT OF TESTS ON

Foundation Soil (HC, P1, MA)

IF CONTRACT, USE CONTRACT ITEM

SOURCE	CHARGE	EXPENDITURE AUTHORIZATION

SPECIAL DESIGNATION (USE WHEN APPLICABLE)	ACTIVITY OR OBJECT	AMOUNT

TEST SPECIMEN	A	B	C	D	E
DATE TESTED					
COMPACTOR FOOT PRESSURE P.S.I.					
INITIAL MOISTURE %					
SOAK WATER ML					
WATER ADDED-ML (TOTAL)					
WATER ADDED %					
MOISTURE AT COMPACTION %					
WET WT. OF BRIQUETTE-GMS					
HEIGHT OF BRIQUETTE-INCHES					
DRY DENSITY OF BRIQ. - # CU. FT.					
STABILOMETER P_H AT 2000 LBS.					
DISPLACEMENT					
R-VALUE BY STABILOMETER					
EXUDATION PRES. P.S.I.					
THICK. BY STAB. FEET					
EXPANSION DIAL READING					
THICK. BY EXP. PRESS. FEET					
R-VALUE BY EXPANSION					

TEST RESULTS

			SPEC.
LL.	P.L	P.I.	
CV			
S.E	AS REC'D		
	CRUSHED		
	COMBINED		
LART	GRADE 100 REV.		
	500 REV.		
DUR	D_f		
	D_c		
% CRUSHED PARTICLES			

SP. GR. ☐ BULK (OVEN DRY) ☐ BULK (SSD) ☐ APPARENT

	FINE	COAR
AS REC'D.		
CRUSHED		

REL. COMPACTION DAT

	IN PLACE	OPTIM
DENSITY		
MOISTURE		
% REL. COMP.		
SPEC.		

DISTRICT 4 LABORATORY
325 SAN BRUNO AVENUE
SAN FRANCISCO, CA 94103

800 700 600 500 400 300 200 100

EXUDATION PRESSURE (PSI)

-TL-361 (Rev. 10/78)

MOISTURE CONTENT DETERMINATION(CTM 226)

County: SCL Route: 680 P.M.: 0.0/9.94 SF Lab ID No.: 7941-5P

Limits: PM 0.0/9.94 E.A.: 153200

Date Received: 06/24/11 R.E.: Samuel Awad TET: AU

Date Reported: 07/15/11 Date Calculated: 07/15/11 By: Venu T. Gopal

Hole Number	ID No.	Sample Depth	Test (MC,/PI/MA/GR)	GROSS WEIGHT		TARE Weight	Net Weight		Wt. Moist.	% Moist.
				Wet	Dry		Wet	Dry		
A-11-003	1	5-6.5	MC	813.1	685.1	100.6	712.5	584.5	128.0	21.9
A-11-003	2	10-11.5	MC	1041.9	860.1	100.0	941.9	760.1	181.8	23.9
A-11-003	3	15-16.5	MC	1126.6	930.7	100.6	1026.0	830.1	195.9	23.6
A-11-003	4	20-21.5	MC	656.0	546.5	100.2	555.8	446.3	109.5	24.5
A-11-003	5	25-26.5	MC	940.4	786.2	100.4	840.0	685.8	154.2	22.5
A-11-003	]	30-31.5	MC	1267.8	1075.2	101.5	1166.3	973.7	192.6	19.8
A-11-003	7	35-36.5	MC	1327.4	1167.3	99.9	1227.5	1067.4	160.1	15.0
A-11-003	8	40-41.5	MC	891.1	747.3	99.4	791.7	647.9	143.8	22.2
A-11-003	1X	0-5	MC	1710.1	1421.7	100.4	1609.7	1321.3	288.4	21.8

MC- Moisture Content PI - Plasticity Index MA - Mechanical Analysis GR - Grading

TEST NO. 7941 - 3P

BILLED

DATE RECEIVED

CALC. BY _____ APPROVED BY _____

DATE REPORTED _____

☐ DISTRICT DIRECTOR ☐ TRANS. LAB.
☐ DIS. MAT LS ☐ PAV'T. SECTION
☐ RESIDENT ENGINEER ☐ ACCOUNTING
☐ CONSTRUCTION ☐

EXPANSION PRESSURE CHA

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

SAMPLE IDENTIFICATION CARD

TL-0101 (REV. 10/97)

CARD NUMBER C S Awad-1

☐ PRELIMINARY TESTS
☐ PROCESS TESTS
☐ ACCEPTANCE TESTS
INDEPENDENT ASSURANCE TESTS
☐ DIST. LAB
☐ TRANS. LAB
☐ SPECIAL TESTS

SAMPLE SENT TO:
☐ HDQTRS. LAB
☐ BRANCH LAB
☐ DIST. LAB

FIELD NO.
DIST. CARD NO. 7941-3P
LOT NO.
SHIPMENT NO.
P.O. OR REQ. NO.
AUTHORIZATION NO.

SAMPLE OF Soil

FOR USE IN Foundation

SAMPLE FROM A-11-001 (10' - 11½')

DEPTH

LOCATION OF SOURCE Native Soil

THIS SAMPLE IS SHIPPED IN (NO. CONTAINERS) | AND IS ON E OF A GROUP OF | SAMPLES REPRESENTING (TONS, GALS. BULS. STA. ETC.)

OWNER OR MANUFACTURER

TOTAL QUANTITY AVAILABLE | TEST RESULTS DESIRED ☒ NORMAL ☐ PRIORITY | DATE NEEDED

REMARKS PI & MA

COVER ADDITIONAL INFORMATION WITH LETTER

DATE SAMPLEED

BY S. Awad TITLE T.E

DIST. CO. RTE. PM 04-SCL-680 PM 0.0/9.94

LIMITS 04-153200

CONT. NO.

FED. NO.

RES. ENGR. OR SUPT. S. Awad

ADDRESS

CONTRACTOR (510) 622-5443

MAIL TO SAME DESTINATION AS SAMPLE

800 700 600 500 400 300 200 100

EXUDATION PRESSURE (PSI)

GRADING ANALYSIS

SIEVE	AS RECEIVED	RET. CR.	ADJ. OR COMB. GRADE	AS USED	SPECIF. LIMITS SOUGHT ☐
3					
2½					
2					
1½					
1	100				
¾	99				
½	93				
⅜	88				
4	73				
8					
16					
30					
50					
100					
200					
5μ					
1μ					

GRADING AS USED WAS OBTAINED AS FOLLOWS:

% BY WT. | % BY VOL. | TEST NO. | DESCRIPTION

REMARKS: See Attached Sheet for MC & PI Results

SURFACE

BASE

SUBBASE

GRAVEL EQUIVALENT FACTOR

TRAFFIC INDEX

R VALUE: EXUDATION PRESSURE; EXPANSION PRESSURE; AT EQUILIBRUM SPEC.

INDICATED MINIMUM THICKNESS OF COVER FOR ABOVE CONDITIONS (FEET)

REPORT OF TESTS ON Foundation Soil

IF CONTRACT, USE CONTRACT ITEM

SOURCE	CHARGE	EXPENDITURE AUTHORIZATION

SPECIAL DESIGNATION (USE WHEN APPLICABLE)	ACTIVITY OR OBJECT	AMOUNT

TEST SPECIMEN	A	B	C	D
DATE TESTED				
COMPACTOR FOOT PRESSURE P.S.I.				
INITIAL MOISTURE %				
SOAK WATER ML				
WATER ADDED-ML (TOTAL)				
WATER ADDED %				
MOISTURE AT COMPACTION %				
WET WT. OF BRIQUETTE-GMS				
HEIGHT OF BRIQUETTE-INCHES				
DRY DENSITY OF BRIQ. - # CU. FT.				
STABILOMETER P_H AT 2000 LBS.				
DISPLACEMENT				
R-VALUE BY STABILOMETER				
EXUDATION PRES. P.S.I.				
THICK. BY STAB. FEET				
EXPANSION DIAL READING				
THICK. BY EXP. PRESS. FEET				
R-VALUE BY EXPANSION				

TEST RESULTS			SPEC.
LL. 30 P.L. 15 P.I. 15			
CV			
S.E.	AS REC'D		
	CRUSHED		
	COMBINED		
LART	GRADE	100 REV.	
		500 REV.	
DUR	D_f		
	D_c		
% CRUSHED PARTICLES			

SP. GR. ☐ BULK (OVEN ☐ BULK (SSD) ☐ APPARENT

	FINE	CO
AS REC'D.		
CRUSHED		

REL. COMPACTION DA

	IN PLACE	OPTI
DENSITY		
MOISTURE		
% REL. COMP.		
SPEC.		

DISTRICT 4 LABORATORY
325 SAN BRUNO AVENUE
SAN FRANCISCO, CA 94103

-TL-361 (Rev. 10/78)

PRELIMINARY SITE INVESTIGATION REPORT

SCL – 680 TOS
SANTA CLARA COUNTY, CALIFORNIA

PREPARED FOR:
CALIFORNIA DEPARTMENT OF TRANSPORTATION
DISTRICT 4
OFFICE OF ENVIRONMENTAL ENGINEERING
111 GRAND AVENUE, MS8C
OAKLAND, CA 94612

PREPARED BY:
GEOCON CONSULTANTS, INC.
6671 BRISA STREET
LIVERMORE, CA 94550

GEOCON PROJECT NO. E8560-06-32
CALTRANS EA 04-153200
CALTRANS PROJECT # 04-0000-0426-0

FEBRUARY 2012

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B. Laboratory Reports and Chain-of-custody Documentation
C. Lead Regression and Metals Statistical Analysis

REPORT LIMITATIONS

This report has been prepared exclusively for the State of California Department of Transportation (Caltrans) District 4. The information contained herein is only valid as of the date of the report and will require an update to reflect additional information obtained.

This report is not a comprehensive site characterization and should not be construed as such. The findings as presented in this report are predicated on the results of the limited sampling and laboratory testing performed. In addition, the information obtained is not intended to address potential impacts related to sources other than those specified herein. Therefore, the report should be deemed conclusive with respect to only the information obtained. We make no warranty, express or implied, with respect to the content of this report or any subsequent reports, correspondence or consultation. Geocon strived to perform the services summarized herein in accordance with the local standard of care in the geographic region at the time the services were rendered.

The contents of this report reflect the views of the author who is responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the State of California or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

GEOCON CONSULTANTS, INC.

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Sr. Staff Scientist

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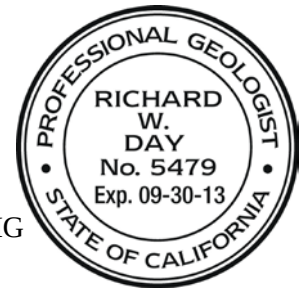
Senior Geologist



CALIFORNIA DEPARTMENT OF TRANSPORTATION – DISTRICT 4
OFFICE OF ENVIRONMENTAL ENGINEERING

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PRELIMINARY SITE INVESTIGATION REPORT

1.0 INTRODUCTION

This Preliminary Site Investigation Report for an area along State Route 680 (SR-680) in Santa Clara County, California was prepared by Geocon Consultants, Inc. under California Department of Transportation (Caltrans) Contract No. 04A3578 and Task Order No. 32 (TO-32), EA 04-153200.

1.1 Project Description and Proposed Improvements

The project location consists of Caltrans right-of-way (ROW) along a 10-mile section of SR-680 in the cities of Fremont, Milpitas, and San Jose SR-680 between Scott Creek Road and the SR-101/SR-680 connector (ACL-680-PM 0.0/9.9) in Santa Clara County, California. Caltrans proposes to install a ramp metering system and Traffic Operation System (TOS) at existing northbound and southbound non-metered ramps. The project location is depicted on the attached Vicinity Map, Figure 1.

1.2 General Objectives

The purpose of the site investigation was to evaluate concentrations of California Assessment Manual 17 (CAM 17) metals, particularly aerially-deposited lead (ADL), total petroleum hydrocarbons as gasoline (TPHg), as diesel (TPHd), and as motor oil (TPHmo), benzene, toluene, ethylbenzene and xylenes (BTEX), methyl tert-butyl ether (MTBE), volatile organic compounds (VOCs), naturally occurring asbestos (NOA), and pH in soil, as well as CAM 17 metals, TPHg/d/mo, BTEX, MTBE, and VOCs in groundwater within the project boundaries.

The information obtained from this investigation will be used by Caltrans to evaluate soil disposal costs and identify health and safety concerns.

2.0 BACKGROUND

2.1 Hazardous Waste Determination Criteria

Regulatory criteria to classify a waste as California hazardous for handling and disposal purposes are contained in the CCR, Title 22, Division 4.5, Chapter 11, Article 3, §66261.24. Criteria to classify a waste as Resource, Conservation, and Recovery Act (RCRA) hazardous are contained in Chapter 40 of the Code of Federal Regulations (40 CFR), Section 261.

For waste containing metals, the waste is classified as California hazardous when: 1) the representative total metal content exceeds the respective Total Threshold Limit Concentration (TTLC); or 2) the representative soluble metal content exceeds the respective Soluble Threshold Limit Concentration (STLC) based on the standard Waste Extraction Test (WET). A waste has the potential of exceeding the STLC when the waste's total metal content is greater than or equal to ten times the respective STLC

value since the WET uses a 1:10 dilution ratio. Hence, when a total metal is detected at a concentration greater than or equal to ten times the respective STLC, and assuming that 100 percent of the total metals are soluble, soluble metal analysis is required. A material is classified as RCRA hazardous, or Federal hazardous, when the representative soluble metal content exceeds the Federal regulatory level based on the Toxicity Characteristic Leaching Procedure (TCLP).

The above regulatory criteria are based on chemical concentrations. Wastes may also be classified as hazardous based on other criteria such as ignitability and corrosivity; however, for the purposes of this investigation, toxicity (i.e., representative lead concentrations) is the primary factor considered for waste classification since waste generated during the construction activities would not likely warrant testing for ignitability or other criteria. Waste that is classified as either California hazardous or RCRA hazardous requires management as a hazardous waste.

2.2 DTSC Variance

The DTSC issued a statewide Variance effective July 1, 2009, regarding the management of ADL-impacted soils within Caltrans right-of-way. Under the Variance, soil that is classified as a non-RCRA hazardous waste, based primarily on ADL content, may be suitable for reuse within Caltrans right-of-way. ADL soil that is classified as a RCRA hazardous waste is not eligible for reuse under the Variance and must be disposed of as a RCRA hazardous waste (Caltrans Type Z-3).

ADL soil reused under the Variance must always be at least five feet above the highest groundwater elevation and, depending on lead concentrations, must be covered with at least one foot of non-hazardous soil or a pavement structure. The ADL soil may not be placed in areas where it might contact groundwater or surface water (such as streams and rivers), and must be buried in locations that are protected from erosion that may result from storm water run-on and run-off.

Review of the statewide Variance indicates the following conditions regarding the reuse and management of ADL-impacted soil as fill material for construction and maintenance operations. If ADL soil meets the Variance criteria but is not intended to be reused within Caltrans right-of-way, then the excavated soil must be disposed of as a California hazardous waste (Caltrans Type Z-2). A copy of the Variance is presented as Appendix A.

Caltrans Type Y-1: ADL soil exhibiting a total lead concentration less than or equal to 1,411 milligrams per kilogram (mg/kg), a DI-WET (WET using deionized water as extractant) lead concentration less than or equal to 1.5 milligrams per liter (mg/l), and a pH value greater than or equal to 5.5 may be reused within the same Caltrans corridor and must be covered with at least one foot of non-hazardous soil.

Caltrans Type Y-2: ADL soil exhibiting a total lead concentration less than or equal to 1,411 mg/kg, a DI-WET lead concentration less than or equal to 1.5 mg/l, and a pH value greater than 5 and less than 5.5 may be reused within the same Caltrans corridor and must be covered and protected from infiltration by a pavement structure.

ADL soil exhibiting a total lead concentration less than or equal to 1,411 mg/kg, a DI-WET lead concentration greater than 1.5 mg/l and less than or equal to 150 mg/l, and a pH value greater than 5 may be reused within the same Caltrans corridor and must be covered and protected from infiltration by a pavement structure.

ADL soil exhibiting a total lead concentration greater than 1,411 mg/kg and less than or equal to 3,397 mg/kg, a DI-WET lead concentration less than or equal to 150 mg/l, and a pH value greater than 5 may be reused within the same Caltrans corridor and must be covered and protected from infiltration by a pavement structure.

Caltrans Type Z-2: ADL soil exhibiting a total lead concentration greater than 3,397 mg/kg, a DI-WET lead concentration greater than 150 mg/l, or a pH value less than or equal to 5 is not eligible for reuse under the Variance and must be disposed of as a California hazardous waste.

Caltrans Type Z-3: ADL soil exhibiting a TCLP lead concentration greater than or equal to 5 mg/l is not eligible for reuse under the Variance and must be disposed of as a RCRA hazardous waste.

2.3 Environmental Screening Levels

The San Francisco Bay Regional Water Quality Control Board (SFRWQCB) has prepared a technical report entitled *Screening For Environmental Concerns At Sites With Contaminated Soil and Groundwater, Interim Final* (May 2008), which presents Environmental Screening Levels (ESLs) for soil, groundwater, soil gas, and surface water, to assist in evaluating sites impacted by releases of hazardous chemicals. The ESLs are conservative values for more than 100 commonly detected contaminants, which may be used to compare with environmental data collected at a site. ESLs are strictly risk assessment tools and "not regulatory clean up standards." The presence of a chemical at concentrations in excess of an ESL does not necessarily indicate that adverse impacts to human health or the environment are occurring; this simply indicates that a potential for adverse risk may exist and that additional evaluation is or "may be" warranted (SFRWQCB, 2008).

The most conservative ESL table was used for this characterization: Table A – Shallow Soil (≤3 meters below ground surface; bgs) – Groundwater is a Current or Potential Source of Drinking Water. The respective ESLs are listed at the end of Tables 3, 4, 6 and 7 for comparative purposes.

3.0 SCOPE OF SERVICES

The scope of services performed under TO-32, EA 04-153200 included the following:

3.1 Pre-field Activities

- Prepared the *Preliminary Site Investigation Workplan* and *Health and Safety Plan*, dated December 6 and December 5, 2011, respectively
- Retained the services of Advanced Technology Laboratories (ATL), a Caltrans-approved and California-certified analytical laboratory, to perform the chemical analyses of soil samples.
- Retained the services of EMSL Analytical, Inc., a Caltrans-approved and California-certified analytical laboratory, to perform asbestos analysis of soil samples.
- Retained the services of D & M Traffic Services to provide traffic control during field operations.
- Notified Underground Service Alert (USA) at least 48 hours prior to field work.

3.2 Field Activities

The field investigation was performed on December 5 through 9 and December 15, 2011, by Geocon staff. The following field activities were performed during the sampling efforts:

- Advanced 80 soil borings at the project location using hand-auger and direct-push techniques. The borings were advanced to a maximum depth of 14.5 feet.
- Collected 251 soil samples for total lead analysis.
- Collected 82 soil samples for selected analysis of CAM 17 metals.
- Collected 81 soil samples for TPHg analysis.
- Collected 82 soil samples for TPHd and TPHmo analyses.
- Collected 81 soil samples for BTEX and MTBE analyses.
- Collected 1 soil sample for VOCs analysis.
- Collected 80 soil samples for pH analysis.
- Collected 80 soil samples for NOA analysis.
- Collected 82 soil samples for selected analysis of CAM 17 metals.
- Collected 1 groundwater sample for selected analysis of CAM 17 metals.
- Collected one groundwater sample for TPHg, TPHd, and TPHmo analyses.
- Collected one groundwater sample for VOCs analysis.
- Transported samples to California-certified environmental laboratories for analysis under standard chain-of-custody (COC) documentation.

4.0 INVESTIGATIVE METHODS

4.1 Sampling Procedures

Soil samples were collected from 80 boring locations identified by the Caltrans TO Manager. Geocon recorded the boring locations using Differential Global Positioning System (DGPS) equipment. Boring coordinates are presented on Table 1 and boring locations are shown on the Site Plan, Figures 2 through 2n.

The soil samples for analysis of CAM 17 metals, TPH, BTEX, MTBE and VOCs were collected in new stainless steel or plastic tubes sealed with Teflon tape and plastic end-caps. Soil samples for total lead and NOA analysis were collected into new resealable plastic bags. Groundwater samples were collected into new plastic or glass jars or vials. Sample containers were labeled and transported to a Caltrans-approved, State-certified environmental laboratory using standard COC documentation. Soil borings were backfilled to surface with soil cuttings.

Geocon provided QA/QC procedures during the field activities. These procedures included washing the sampling equipment with a Liqui-Nox® solution followed by a double rinse with deionized water. Decontamination water was disposed of to the ground surface within Caltrans right-of-way in a manner not to create runoff, away from drain inlets or potential water bodies.

4.2 Laboratory Analyses

Laboratory analyses were performed by ATL and ESML under standard turnaround-time (TAT). The laboratory reports and COC documentation are included in Appendix A.

The soil samples were analyzed as follows:

- 251 samples for total lead using Environmental Protection Agency (EPA) Test Method 6010 ICAP.
- 82 samples for CAM 17 metals according to Title 22 CCR, EPA Test Methods 6010 ICAP and 7471A.
- 54 samples with total lead concentrations equal to or exceeding 50 mg/kg (i.e. equal to or exceeding ten times the STLC of 5.0 mg/l) were further analyzed for WET lead.
- 24 samples with WET lead concentrations exceeding the STLC of 5.0 mg/l were further analyzed for DI-WET lead.
- 21 samples with total lead values over 100 mg/kg and WET lead values above 5.0 mg/l were further analyzed for TCLP lead.
- 21 samples with total chromium concentrations equal to or exceeding 50 mg/kg (i.e. equal to or exceeding ten times the STLC of 5.0 mg/l) were further analyzed for WET chromium.

- 3 samples with total nickel concentrations equal to or exceeding 200 mg/kg (i.e. equal to or exceeding ten times the STLC value of 20 mg/l) were further analyzed for WET nickel.
- 82 samples for TPHd and TPHmo using EPA Test Method 8015B.
- 81 samples for total petroleum hydrocarbons as TPHg using EPA Test Method 8015B.
- 81 samples for BTEX and MTBE using EPA Test Method 8260.
- 1 sample for VOCs using EPA Test Method 8260.
- 80 samples were analyzed using EPA Test Methods 9045C and 9040B for pH.
- 80 samples for NOA analysis using CARB 435.

The groundwater samples were analyzed as follows:

- 1 sample was analyzed for CAM 17 metals according to Title 22 CCR, EPA Test Methods 6010B and 7470.
- 1 sample was analyzed for TPHg, TPHd and TPHmo using EPA Test Method 8015B.
- 1 sample was analyzed for VOCs using EPA Test Method 8260.

4.3 Laboratory QA/QC

QA/QC procedures were performed for each method of analysis with specificity for each analyte listed in the test method's QA/QC. The laboratory QA/QC procedures included the following:

- One method blank for every ten samples, batch of samples or type of matrix, whichever was more frequent.
- One sample analyzed in duplicate for every ten samples, batch of samples or type of matrix, whichever was more frequent.
- One spiked sample for every ten samples, batch of samples or type of matrix; whichever was more frequent, with spike made at ten times the detection limit or at the analyte level.

Prior to submitting the samples to the laboratory, the COC documentation was reviewed for accuracy and completeness.

5.0 INVESTIGATIVE RESULTS

5.1 Subsurface Conditions

Observations during field activities indicated that surface soil at the project location generally consists of loose fine-grained materials consisting of mostly sand and gravel near the soil surface, and denser fine-grained materials below approximately 1 foot bgs. Groundwater was encountered at a depth of 14.5 feet and samples were collected for analyses.

5.2 Laboratory Analytical Results

The analytical results are summarized in Tables 2 to 7 and are summarized below:

- The following metals were not detected above their respective laboratory reporting limits: beryllium, silver, and thallium.
- Total lead was reported at concentrations ranging from 2.5 to 970 mg/kg.
- WET lead was reported at concentrations ranging from <1.0 to 53 mg/l.
- DI-WET lead was reported at concentrations ranging from <0.5 to 1.3 m/l.
- TCLP lead was detected in 5 of the 22 samples analyzed, with reported concentrations ranging from 0.52 to 1.2 mg/l.
- Total chromium was reported at concentrations ranging from 13 to 130 mg/kg.
- WET chromium was not detected at or above the laboratory reporting limit of 1.0 mg/l.
- Total nickel was reported at concentrations ranging from 19 to 260 mg/kg.
- WET nickel was reported at concentrations ranging from <1.0 to 1.7 mg/l.
- Remaining CAM 17 metals were reported in the samples at total concentrations below ten times their respective STLCs.
- TPHg was reported in one sample at a concentration of 1.7 mg/kg.
- TPHd was reported at concentrations of <1.0 to 1,200 mg/kg.
- TPHmo was reported at concentrations of 1.1 to 4,000 mg/kg.
- BTEX, MTBE, and VOCs were not detected in the samples at or above laboratory reporting limits.
- NOA was not detected at or above the laboratory target sensitivity of 0.25%.

5.3 Laboratory Quality Assurance/Quality Control

We reviewed the QA/QC results provided with the laboratory analytical reports. The data indicate non-detect results for the method blanks at or above reporting limits. Dilution was necessary for several samples. The Matrix Spike (MS) and/or Matrix Spike Duplicate (MSD) was outside recovery criteria for several samples, possibly due to matrix interference. The relative percent differences (RPD) for MS/MSD was outside of recovery limits for several samples; therefore the calculation was based on raw values. One matrix spike recovery was outside of acceptance limits, possibly due to sample non-homogeneity. The data was validated by Laboratory Control Samples (LCS). The surrogate was diluted out for several samples. Surrogate recovery was biased low for several samples, possibly due to matrix interferences. Remaining samples and internal laboratory QA/QC samples showed acceptable recoveries and relative percent differences (RPDs). Based on this limited data review, no additional qualifications of the soil data are necessary, and the data are of sufficient quality for the purposes of this report.

5.4 Statistical Evaluation for Lead Detected in Soil Samples

Statistical methods were applied to the total lead data to evaluate: 1) the upper confidence limits (UCLs) of the arithmetic means of the total lead concentrations for each sampling depth; and 2) if an acceptable correlation between total and WET lead concentrations exists that would allow the prediction of WET lead concentrations based on calculated UCLs.

The lead data for the site were divided into 21 sample populations for statistical evaluation which consisted of the following:

A1	S. King Road onramp to SB I-680 (boring B11-1)
A2	S. King Road onramp to NB I-680 (borings B11-2 to B11-3)
B1	S. Jackson Avenue onramp to SB I-680 (borings B11-4 and B11-5)
B2	SB I-680 shoulder and loop ramp to East Capitol Expy (borings B11-6 to B11-9)
B3	East Capital Expy to NB I-680 onramp (borings B11-10 to B11-13)
C1	Alum Rock Avenue loop ramp to SB I-680 (borings B11-14 to B11-20)
C2	Alum Rock Avenue onramp to NB I-680(borings B11-21 to B11-25)
D1	McKee Road onramp to SB I-680 (borings B11-27 to B11-29)
D2	NB I-680 loop ramp to McKee Road (boring B11-30)
D3	McKee Road onramp to NB I-680 (borings B11-31 to B11-34)
E1	Berryessa Rd onramp to SB I-680 (borings B11-35 to B11-37)
E2	Berryessa Rd onramp to NB I-680 and NB I-680 loop ramp to Berryessa Rd (borings B11-38 to B11-41)
F1	SB I-680 shoulder and N. Capitol Avenue onramp to SB I-680 (borings B11-42 to B11-51)
F2	N. Capitol Avenue onramp to NB I-680 (borings B11-52 to B11-60)
G1	Montague Expy onramp to SB I-680 (borings B11-61 and B11-62)
G2	NB I-680 shoulder and Montague Expy onramp to NB I-680 (borings B11-63 to B11-65)
H1	SB I-680 shoulder south of E. Calaveras Dr (borings B11-66 and B11-67)
H2	E. Calaveras onramp to NB I-680 (borings B11-68 and B11-69)
I1	Jacklin Rd onramp to SB I-680 (borings B11-70 to B11-73)
I2	Evans Rd onramp to NB I-680 (borings B11-74 to B11-77)
J1	Scott Creek Rd onramp to SB I-680 (borings B11-78 to B11-81)

5.4.1 Calculating the UCLs for the Arithmetic Mean

The upper one-sided 90% and 95% UCLs of the arithmetic mean are defined as the values that, when calculated repeatedly for randomly drawn subsets of site data, equal or exceed the true mean 90% and

95% of the time, respectively. Statistical confidence limits are the classical tool for addressing uncertainties of a distribution mean. The UCLs of the arithmetic mean concentration are used as the mean concentrations because it is not possible to know the true mean due to the essentially infinite number of soil samples that could be collected from a site. The UCLs therefore account for uncertainties due to limited sampling data. As data become less limited at a site, uncertainties decrease, and the UCLs move closer to the true mean.

Non-parametric bootstrap techniques were used to calculate the UCLs. For those samples in which total lead was not detected, a value equal to one-half of the detection limit was used in the UCL calculation. The bootstrap test results are included in Appendix C. The following tables present the calculated UCLs and statistics for the data sets.

S. King Road onramp to SB I-680 (boring B11-1)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	NC	NC	NC	51	51
1.0 to 1.5	NC	NC	NC	7.0	7.0
2.5 to 3.0	NC	NC	NC	5.5	5.5

NC – Not calculated due to insufficient data set

S. King Road onramp to NB I-680 (borings B11-2 and B11-3)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	NC	NC	505.5	41	970
1.0 to 1.5	NC	NC	6.0	5.3	6.7
2.5 to 3.0	NC	NC	13.8	7.6	20

NC – Not calculated due to insufficient data set

S. Jackson Avenue onramp to SB I-680 (borings B11-4 and B11-5)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	NC	NC	48.5	48	49
1.0 to 1.5	NC	NC	7.3	5.1	9.5
2.5 to 3.0	NC	NC	NC	5.2	5.2

NC – Not calculated due to insufficient data set

SB I-680 shoulder and loop ramp to East Capitol Expy (borings B11-6 to B11-9)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	NC	NC	158.3	73	260
1.0 to 1.5	NC	NC	28.4	9.4	79
2.5 to 3.0	NC	NC	118.8	5.4	340
4.5 to 5.0	NC	NC	4.8	2.7	6.9
7.5 to 8.0	NC	NC	7.1	6.7	7.5

NC – Not calculated due to insufficient data set

East Capital Expy to NB I-680 onramp (borings B11-10 to B11-13)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	NC	NC	110.8	55	210
1.0 to 1.5	NC	NC	9.6	4.2	17
2.5 to 3.0	NC	NC	7.8	6.2	10

NC – Not calculated due to insufficient data set

Alum Rock Avenue loop ramp to SB I-680 (borings B11-14 to B11-20)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	56.9	61.2	43	19	100
1.0 to 1.5	32.5	35.3	21.2	5.1	66
2.5 to 3.0	17.6	19.1	12.3	4.6	34
4.5 to 5.0	NC	NC	7.3	5.4	9.1

NC – Not calculated due to insufficient data set

Alum Rock Avenue onramp to NB I-680 (borings B11-21 to B11-25)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	77.4	87.6	44.3	4.0	160
1.0 to 1.5	141.2	160.1	70.1	3.8	320
2.5 to 3.0	NC	NC	12.7	3.7	25
4.5 to 5.0	NC	NC	NC	11	11
7.5 to 8.0	NC	NC	NC	6.2	6.2

NC – Not calculated due to insufficient data set

McKee Road onramp to SB I-680 (borings B11-27 to B11-29)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	NC	NC	26.3	16	39
1.0 to 1.5	NC	NC	17	8.0	22
2.5 to 3.0	NC	NC	NC	7.1	7.1

NC – Not calculated due to insufficient data set

NB I-680 loop ramp to McKee Road (boring B11-30)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	NC	NC	NC	12	12
1.0 to 1.5	NC	NC	NC	8.4	8.4
2.5 to 3.0	NC	NC	NC	8.1	8.1
4.5 to 5.0	NC	NC	NC	6.6	6.6
7.5 to 8.0	NC	NC	NC	8.1	8.1

NC – Not calculated due to insufficient data set

McKee Road onramp to NB I-680 (borings B11-31 to B11-34)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	NC	NC	107.8	47	200
1.0 to 1.5	NC	NC	22.7	7.8	29
2.5 to 3.0	NC	NC	24.5	17	36

NC – Not calculated due to insufficient data set

Berryessa Rd onramp to SB I-680 (borings B11-35 to B11-37)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	NC	NC	57.7	25	92
1.0 to 1.5	NC	NC	75.7	11	160

NC – Not calculated due to insufficient data set

Berryessa Rd onramp to NB I-680 and NB I-680 loop ramp to Berryessa Rd (borings B11-38 to B11-41)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	NC	NC	144.8	36	230
1.0 to 1.5	NC	NC	135.1	5.4	260
2.5 to 3.0	NC	NC	171.9	3.8	500
4.5 to 5.0	NC	NC	NC	9.1	9.1
7.5 to 8.0	NC	NC	NC	9.2	9.2

NC – Not calculated due to insufficient data set

SB I-680 shoulder and N. Capitol Avenue onramp to SB I-680 (borings B11-42 to B11-51)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	100.4	108	74.3	7.2	180
1.0 to 1.5	46	50.9	30.9	7.5	140
2.5 to 3.0	19.8	21.2	14.8	4.2	39
4.5 to 5.0	NC	NC	NC	5.0	5.0
7.5 to 8.0	NC	NC	NC	3.4	3.4

NC – Not calculated due to insufficient data set

N. Capitol Avenue onramp to NB I-680 (borings B11-52 to B11-60)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	70.4	76.7	50.6	5.4	140
1.0 to 1.5	9.6	10	8.2	4.8	14
2.5 to 3.0	7.3	7.6	6.4	3.7	9.4
5.5 to 6.0	NC	NC	NC	7.4	7.4
9.5 to 10	NC	NC	NC	7.3	7.3
14 to 14.5	NC	NC	NC	5.2	5.2

NC – Not calculated due to insufficient data set

Montague Expy onramp to SB I-680 (borings B11-61 and B11-62)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	NC	NC	26.5	6.9	46
1.0 to 1.5	NC	NC	7.9	7.2	8.6
2.5 to 3.0	NC	NC	5.6	5.3	5.9

NC – Not calculated due to insufficient data set

NB I-680 shoulder and Montague Expy onramp to NB I-680 (borings B11-63 to B11-65)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	NC	NC	122.3	17	210
1.0 to 1.5	NC	NC	27.7	5.0	41
2.5 to 3.0	NC	NC	17.8	2.5	45
4.5 to 5.0	NC	NC	NC	3.2	3.2
7.5 to 8.0	NC	NC	NC	3.4	3.4

NC – Not calculated due to insufficient data set

SB I-680 shoulder south of E. Calaveras Dr (borings B11-66 and B11-67)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	NC	NC	35.6	3.2	68
1.0 to 1.5	NC	NC	61.8	3.5	120
2.5 to 3.0	NC	NC	3.5	3.2	3.8

NC – Not calculated due to insufficient data set

E. Calaveras onramp to NB I-680 (borings B11-68 and B11-69)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	NC	NC	20.5	17	24
1.0 to 1.5	NC	NC	4.7	3.8	5.6
2.5 to 3.0	NC	NC	3.5	2.6	4.4

NC – Not calculated due to insufficient data set

Jacklin Rd onramp to SB I-680 (borings B11-70 to B11-73)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	NC	NC	286.5	36	480
1.0 to 1.5	NC	NC	10.2	4.2	17
2.5 to 3.0	NC	NC	9.9	4.6	19

NC – Not calculated due to insufficient data set

Evans Rd onramp to NB I-680 (borings B11-74 to B11-78)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	88.3	97.9	57.9	5.7	150
1.0 to 1.5	129.9	146.3	75.7	4.4	260
2.5 to 3.0	11.8	12.8	8.5	4.1	20
4.5 to 5.0	NC	NC	NC	8.0	8.0
7.5 to 8.0	NC	NC	NC	7.2	7.2

NC – Not calculated due to insufficient data set

Scott Creek Rd onramp to SB I-680 (borings B11-79 to B11-81)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	NC	NC	36	24	54
1.0 to 1.5	NC	NC	32.3	18	56
2.5 to 3.0	NC	NC	5.9	5.0	7.7

NC – Not calculated due to insufficient data set

5.4.2 Correlation of Total and WET Lead

Total and corresponding WET lead concentrations are bivariate data with a linear structure. This linear structure should allow for the prediction of WET lead concentrations based on the maximum total lead concentrations presented in the tables above.

To estimate the degree of interrelation between total and corresponding WET lead values (x and y, respectively), the *correlation coefficient [r]* is used. The correlation coefficient is a ratio that ranges from +1 to –1. A *correlation coefficient* of +1 indicates a perfect direct relationship between two variables; a *correlation coefficient* of –1 indicates that one variable changes inversely with relation to

the other. Between the two extremes is a spectrum of less-than-perfect relationships, including zero, which indicates the lack of any sort of linear relationship at all. The *correlation coefficient* was calculated for the 54 (x, y) data points (i.e., soil samples analyzed for both total lead [x] and WET lead [y]) from the site. The resulting *coefficient of determination* (r^2) equaled 0.7148, which yields a corresponding *correlation coefficient* (r) of 0.85.

For the *correlation coefficient* that indicates a linear relationship between total and WET lead concentrations, it is possible to compute the line of dependence or a best-fit line between the two variables. A least squares method was used to find the equation of a best-fit line (regression line) by forcing the y-intercept equal to zero since that is a known point. The equation of the regression line was determined to be $y = 0.0524(x)$, where x represents total lead concentrations and y represents predicted WET lead concentrations.

This equation was used to estimate the expected WET lead concentrations for the total lead UCLs for the data set (see Section 5.4.1). Regression analysis results and a scatter plot depicting the (x, y) data points along with the regression line are included in Appendix C. The predicted WET lead concentrations are summarized in Table 8a through 8l.

6.0 CONCLUSIONS

Waste classifications are evaluated based on the 90% UCL of the lead content for the relevant excavation depths; this has historically been considered sufficient to satisfy a good faith effort by the EPA as discussed in SW-846. Risk assessment characterization is based on the 95% UCL of the lead content in the waste for the relevant depths; this is in accordance with the Risk Assessment Guidance for Superfund (RAGS) Volume 1 Documentation for Exposure Assessment. Per Caltrans, the 90% UCLs are to be used to evaluate onsite reuse and the 95% UCLs are to be used to evaluate offsite disposal.

6.1 Lead in Soil

6.1.1 S. King Road onramp to SB I-680

The maximum total lead concentration is less than the TTLC of 1,000 mg/kg and the maximum WET lead concentration is less than 5.0 mg/l. Accordingly, excavated soil would be classified as non-hazardous based on lead content.

6.1.2 S. King Road onramp to NB I-680

The following table summarizes the predicted waste classification for excavated soil based on the maximum total lead values and predicted WET lead concentrations for data collected from this portion of the Site. Weighted averages are calculated by using the maximum total lead concentration for each 0.5-foot depth interval as the value for the underlying 0.5-foot depth interval (unless a sample was collected from the underlying depth interval). The total and WET lead calculations are summarized below and in Table 8a.

Excavation Depth	Maximum Total Lead (mg/kg)	Predicted WET Lead (mg/l)	Waste Classification
0 to 1.0 ft	970	**50.8**	**Hazardous**
Underlying soil (1.0 to 3.0 ft)	*10*	*0.5*	*Non-hazardous*
0 to 2.5 ft	*392*	***20.5***	**Hazardous**
Underlying Soil (2.5 to3.0 ft)	*20*	*1.1*	*Non-hazardous*
0 to 3.0 ft	330	**17.3**	**Hazardous**

Based on the data presented in the above table, soil excavated to a depth of 1.0 foot would be classified as a California hazardous waste since the UCL-predicted WET lead concentration is greater than the lead STLC of 5.0 mg/l. Based on the reported DI-WET and pH results, soil excavated from 0 to 1.0 foot may be reused onsite (as Caltrans Type Y1) in accordance with the DTSC Variance by

placing the excavated soil under clean fill or pavement. Based on the TCLP lead results, excavated soil would not be classified as a RCRA hazardous waste. Underlying soil from 1.0 to 3.0 feet bgs would be classified as non-hazardous based on lead content.

6.1.3 S. Jackson Avenue onramp to SB I-680

The maximum total lead concentration is less than the TTLC of 1,000 mg/kg and less than 50 mg/kg (i.e., less than ten times the STLC of 5 mg/l). Accordingly, excavated soil would be classified as non-hazardous based on lead content.

6.1.4 SB I-680 shoulder and loop ramp to East Capitol Expressway

The following table summarizes the predicted waste classification for excavated soil based on the maximum total lead values and predicted WET lead concentrations for data collected from this portion of the Site. Weighted averages are calculated by using the maximum total lead concentration for each 0.5-foot depth interval as the value for the underlying 0.5-foot depth interval (unless a sample was collected from the underlying depth interval). The total and WET lead calculations are summarized below and in Table 8b.

Excavation Depth	Maximum Total Lead (mg/kg)	Predicted WET Lead (mg/l)	Waste Classification
0 to 1.0 ft	260	**13.6**	**Hazardous**
Underlying soil (1.0 to 8.0 ft)	*118*	***6.2***	**Hazardous**
0 to 2.5 ft	*151*	***7.9***	**Hazardous**
Underlying Soil (2.5 to 8.0 ft)	*128*	***6.7***	**Hazardous**
0 to 4.5 ft	*235*	***12.3***	**Hazardous**
Underlying Soil (4.5 to 8.0 ft)	*7*	*0.4*	*Non-hazardous*
0 to 7.5 ft	*144*	***7.5***	**Hazardous**
Underlying Soil (7.5 to 8.0 ft)	*8*	*0.4*	*Non-hazardous*
0 to 8.0 ft	135	**7.1**	**Hazardous**

Based on the data presented in the above table, soil excavated to a depth of 4.5 feet would be classified as a California hazardous waste since the UCL-predicted WET lead concentration is greater than the lead STLC of 5.0 mg/l. Based on the reported DI-WET and pH results, soil excavated from 0 to 4.5 feet may be reused onsite (as Caltrans Type Y1) in accordance with the DTSC Variance by placing the excavated soil under clean fill or pavement. Based on the TCLP lead results, excavated soil would not be classified as a RCRA hazardous waste.

6.1.5 East Capitol Expressway to NB I-680 onramp

The following table summarizes the predicted waste classification for excavated soil based on the maximum total lead values and predicted WET lead concentrations for data collected from this portion of the Site. Weighted averages are calculated by using the maximum total lead concentration for each 0.5-foot depth interval as the value for the underlying 0.5-foot depth interval (unless a sample was collected from the underlying depth interval). The total and WET lead calculations are summarized below and in Table 8c.

Excavation Depth	Maximum Total Lead (mg/kg)	Predicted WET Lead (mg/l)	Waste Classification
0 to 1.0 ft	210	**11**	**Hazardous**
Underlying soil (1.0 to 3.0 ft)	*15*	*0.8*	*Non-hazardous*
0 to 2.5 ft	*94*	*4.9*	*Non-hazardous*
Underlying Soil (2.5 to3.0 ft)	*10*	*0.5*	*Non-hazardous*
0 to 3.0 ft	80	4.2	*Non-hazardous*

Based on the data presented in the above table, soil excavated to a depth of 1.0 foot would be classified as a California hazardous waste since the UCL-predicted WET lead concentration is greater than the lead STLC of 5.0 mg/l. Based on the reported DI-WET and pH results, soil excavated from 0 to 1.0 foot may be reused onsite (as Caltrans Type Y1) in accordance with the DTSC Variance by placing the excavated soil under clean fill or pavement. Based on the TCLP lead results, excavated soil would not be classified as a RCRA hazardous waste.

6.1.6 Alum Rock Avenue loop ramp to SB I-680

The maximum total lead concentration is less than the TTLC of 1,000 mg/kg and the maximum WET lead concentration is less than 5 mg/l. Accordingly, excavated soil would be classified as non-hazardous based on lead content.

6.1.7 Alum Rock Avenue onramp to NB I-680

The following table summarizes the predicted waste classification for excavated soil based on the calculated weighted averages of the total lead UCLs and predicted WET lead concentrations for data collected from this portion of the Site. For sample depths with incomplete data sets, the maximum lead value was used in calculating averages. Weighted averages are calculated by using the total lead concentration for each 0.5-foot depth interval as the value for the underlying 0.5-foot depth interval (unless a sample was collected from the underlying depth interval). The total and WET lead calculations are summarized below and in Table 8d.

Excavation Depth	90% UCL Total Lead (mg/kg)	90% UCL Predicted WET Lead (mg/l)	95% UCL Total Lead (mg/kg)	Waste Classification
0 to 1.0 ft	77.4	4.1	87.6	*Non-hazardous*
Underlying soil (1.0 to 8.0 ft)	*43*	*2.2*	*47*	*Non-hazardous*
0 to 2.5 ft	116	**6.1**	131	***Hazardous***
Underlying soil (2.5 to 8.0 ft)	*15.7*	*0.8*	*15.7*	*Non-hazardous*
0 to 4.5 ft	75	3.9	84	*Non-hazardous*
Underlying soil (4.5 to 8.0 ft)	*10.3*	*0.5*	*10.3*	*Non-hazardous*
0 to 8.0 ft	*47*	*2.5*	*52*	*Non-hazardous*

90% UCL applicable for waste classification and onsite reuse; 95% UCL applicable for risk assessment and offsite disposal

Based on the data presented in the above table, soil excavated to a depth of 2.5 feet would be classified as a California hazardous waste since the 90% UCL-predicted WET lead concentration is greater than the lead STLC of 5.0 mg/l. Based on the reported DI-WET and pH results, soil excavated from 0 to 2.5 feet may be reused onsite (as Caltrans Type Y1) in accordance with the DTSC Variance by placing the excavated soil under clean fill or pavement. Based on the TCLP lead results, excavated soil would not be classified as a RCRA hazardous waste. Soil excavated below 2.5 feet would be classified as non-hazardous.

6.1.8 McKee Road onramp to SB I-680

The maximum total lead concentration is less than the TTLC of 1,000 mg/kg and less than 50 mg/kg (i.e., less than ten times the STLC of 5 mg/l). Accordingly, excavated soil would be classified as non-hazardous based on lead content.

6.1.9 NB I-680 loop ramp to McKee Road

The maximum total lead concentration is less than the TTLC of 1,000 mg/kg and less than 50 mg/kg (i.e., less than ten times the STLC of 5 mg/l). Accordingly, excavated soil would be classified as non-hazardous based on lead content.

6.1.10 McKee Road onramp to NB I-680

The following table summarizes the predicted waste classification for excavated soil based on the maximum total lead values and predicted WET lead concentrations for data collected from this portion of the Site. Weighted averages are calculated by using the maximum total lead concentration for each 0.5-foot depth interval as the value for the underlying 0.5-foot depth interval (unless a sample was

collected from the underlying depth interval). The total and WET lead calculations are summarized below and in Table 8e.

Excavation Depth	Maximum Total Lead (mg/kg)	Predicted WET Lead (mg/l)	Waste Classification
0 to 1.0 ft	200	**10.5**	**Hazardous**
Underlying soil (1.0 to 3.0 ft)	*31*	*1.6*	*Non-hazardous*
0 to 2.5 ft	*97*	***5.1***	**Hazardous**
Underlying Soil (2.5 to3.0 ft)	*36*	*1.9*	*Non-hazardous*
0 to 3.0 ft	87	4.6	*Non-hazardous*

Based on the data presented in the above table, soil excavated to a depth of 1.0 foot would be classified as a California hazardous waste since the UCL-predicted WET lead concentration is greater than the lead STLC of 5.0 mg/l. Based on the reported DI-WET and pH results, soil excavated from 0 to 1.0 foot may be reused onsite (as Caltrans Type Y1) in accordance with the DTSC Variance by placing the excavated soil under clean fill or pavement. Based on the TCLP lead results, excavated soil would not be classified as a RCRA hazardous waste. Underlying soil from 1.0 to 3.0 feet bgs would be classified as non-hazardous based on lead content.

6.1.11 Berryessa Road onramp to SB I-680

The maximum total lead concentration is less than the TTLC of 1,000 mg/kg and the maximum WET lead concentration is less than 5 mg/l. Accordingly, excavated soil would be classified as non-hazardous based on lead content.

6.1.12 Berryessa Road onramp to NB I-680 and NB I-680 loop ramp to Berryessa Road

The following table summarizes the predicted waste classification for excavated soil based on the maximum total lead values and predicted WET lead concentrations for data collected from this portion of the Site. Weighted averages are calculated by using the maximum total lead concentration for each 0.5-foot depth interval as the value for the underlying 0.5-foot depth interval (unless a sample was collected from the underlying depth interval). The total and WET lead calculations are summarized below and in Table 8f.

Excavation Depth	Maximum Total Lead (mg/kg)	Predicted WET Lead (mg/l)	Waste Classification
0 to 1.0 ft	230	**12**	**Hazardous**
Underlying soil (1.0 to 8.0 ft)	*203*	***10.6***	**Hazardous**
0 to 2.5 ft	*248*	**13**	**Hazardous**
Underlying Soil (2.5 to8.0 ft)	*188*	***10***	**Hazardous**
0 to 4.5 ft	*360*	**18.9**	**Hazardous**
Underlying Soil (4.5 to8.0 ft)	*9.1*	*0.5*	*Non-hazardous*
0 to 7.5 ft	*220*	**11.5**	**Hazardous**
Underlying Soil (7.5 to8.0 ft)	*9.2*	*0.5*	*Non-hazardous*
0 to 8.0 ft	206	**11**	**Hazardous**

Based on the data presented in the above table, soil excavated to a depth of 4.5 feet would be classified as a California hazardous waste since the UCL-predicted WET lead concentration is greater than the lead STLC of 5.0 mg/l. Based on the reported DI-WET and pH results, soil excavated from 0 to 4.5 feet may be reused onsite (as Caltrans Type Y1) in accordance with the DTSC Variance by placing the excavated soil under clean fill or pavement. Based on the TCLP lead results, excavated soil would not be classified as a RCRA hazardous waste. Soil below 4.5 feet would be classified as non-hazardous based on lead content.

6.1.13 SB I-680 shoulder and N. Capitol Avenue onramp to SB I-680

The following table summarizes the predicted waste classification for excavated soil based on the calculated weighted averages of the total lead UCLs and predicted WET lead concentrations for data collected from this portion of the Site. For sample depths with incomplete data sets, the maximum lead value was used in calculating averages. Weighted averages are calculated by using the total lead concentration for each 0.5-foot depth interval as the value for the underlying 0.5-foot depth interval (unless a sample was collected from the underlying depth interval). The total and WET lead calculations are summarized below and in Table 8g.

Excavation Depth	90% UCL Total Lead (mg/kg)	90% UCL Predicted WET Lead (mg/l)	95% UCL Total Lead (mg/kg)	Waste Classification
0 to 1.0 ft	100.4	**5.3**	108	***Hazardous***
Underlying soil (1.0 to 8.0 ft)	*18*	*0.9*	*19*	*Non-hazardous*
0 to 2.5 ft	68	3.5	74	*Non-hazardous*

Underlying soil (2.5 to 8.0 ft)	*10.2*	*0.5*	*10.7*	*Non-hazardous*
0 to 4.5 ft	46	2.4	50	*Non-hazardous*
Underlying soil (4.5 to 8.0 ft)	*4.8*	*0.2*	*4.8*	*Non-hazardous*
0 to 8.0 ft	*28*	*1.5*	*30*	*Non-hazardous*

90% UCL applicable for waste classification and onsite reuse; 95% UCL applicable for risk assessment and offsite disposal

Based on the data presented in the above table, soil excavated to a depth of 1.0 foot would be classified as a California hazardous waste since the 90% UCL-predicted WET lead concentration is greater than the lead STLC of 5.0 mg/l. Based on the reported DI-WET and pH results, soil excavated to a depth of 1.0 foot may be reused onsite (as Caltrans Type Y1) in accordance with the DTSC Variance by placing the excavated soil under clean fill or pavement. Based on the TCLP lead results, excavated soil would not be classified as a RCRA hazardous waste. Soil excavated below 1.0 foot would be classified as non-hazardous based on lead content.

6.1.14 N. Capitol Avenue onramp to NB I-680

The following table summarizes the predicted waste classification for excavated soil based on the calculated weighted averages of the total lead UCLs and predicted WET lead concentrations for data collected from this portion of the Site. For sample depths with incomplete data sets, the maximum lead value was used in calculating averages. Weighted averages are calculated by using the total lead concentration for each 0.5-foot depth interval as the value for the underlying 0.5-foot depth interval (unless a sample was collected from the underlying depth interval). The total and WET lead calculations are summarized below and in Table 8h.

Excavation Depth	90% UCL Total Lead (mg/kg)	90% UCL Predicted WET Lead (mg/l)	95% UCL Total Lead (mg/kg)	Waste Classification
0 to 1.0 ft	70.4	3.7	76.7	*Non-hazardous*
Underlying soil (1.0 to 14.5 ft)	*7.5*	*0.4*	*7.6*	*Non-hazardous*
0 to 2.5 ft	34	1.8	37	*Non-hazardous*
Underlying soil (2.5 to 14.5 ft)	*7.2*	*0.4*	*7.3*	*Non-hazardous*
0 to 5.5 ft	19	1.0	21	*Non-hazardous*
Underlying soil (5.5 to 14.5 ft)	*7.2*	*0.4*	*7.2*	*Non-hazardous*
0 to 9.5 ft	14	0.8	15	*Non-hazardous*
Underlying soil (4.5 to 14.5 ft)	*7.1*	*0.4*	*7.1*	*Non-hazardous*
0 to 14.5 ft	*12*	*0.6*	*12*	*Non-hazardous*

90% UCL applicable for waste classification and onsite reuse; 95% UCL applicable for risk assessment and offsite disposal

Based on the data presented in the above table, soil excavated to a depth of 14.5 feet would be classified as non-hazardous based on lead content since the 90% UCL-predicted WET lead concentration is less than the lead STLC of 5.0 mg/l.

6.1.15 Montague Expy onramp to SB I-680

The maximum total lead concentration is less than the TTLC of 1,000 mg/kg and less than 50 mg/kg (i.e., less than ten times the STLC of 5 mg/l). Accordingly, excavated soil would be classified as non-hazardous based on lead content.

6.1.16 NB I-680 shoulder and Montague Expy onramp to NB I-680

The following table summarizes the predicted waste classification for excavated soil based on the maximum total lead values and predicted WET lead concentrations for data collected from this portion of the Site. Weighted averages are calculated by using the maximum total lead concentration for each 0.5-foot depth interval as the value for the underlying 0.5-foot depth interval (unless a sample was collected from the underlying depth interval). The total and WET lead calculations are summarized below and in Table 8i.

Excavation Depth	Maximum Total Lead (mg/kg)	Predicted WET Lead (mg/l)	Waste Classification
0 to 1.0 ft	210	**11**	**Hazardous**
Underlying soil (1.0 to 8.0 ft)	*23*	*1.2*	*Non-hazardous*
0 to 2.5 ft	*109*	***5.7***	**Hazardous**
Underlying Soil (2.5 to8.0 ft)	*18*	*1.0*	*Non-hazardous*
0 to 4.5 ft	*80*	*4.2*	*Non-hazardous*
Underlying Soil (4.5 to8.0 ft)	*3.2*	*0.2*	*Non-hazardous*
0 to 7.5 ft	*49*	*2.6*	*Non-hazardous*
Underlying Soil (7.5 to8.0 ft)	*3.4*	*0.2*	*Non-hazardous*
0 to 8.0 ft	47	2.4	*Non-hazardous*

Based on the data presented in the above table, soil excavated to a depth of 1.0 feet would be classified as a California hazardous waste since the UCL-predicted WET lead concentration is greater than the lead STLC of 5.0 mg/l. Based on the reported DI-WET and pH results, soil excavated from 0 to 1.0 foot may be reused onsite (as Caltrans Type Y1) in accordance with the DTSC Variance by placing the excavated soil under clean fill or pavement. Based on the TCLP lead results, excavated soil would not be classified as a RCRA hazardous waste. Underlying soil from 1.0 to 8.0 feet bgs would be classified as non-hazardous based on lead content.

6.1.17 SB I-680 shoulder south of E. Calaveras Drive

The following table summarizes the predicted waste classification for excavated soil based on the maximum total lead values and predicted WET lead concentrations for data collected from this portion of the Site. Weighted averages are calculated by using the maximum total lead concentration for each 0.5-foot depth interval as the value for the underlying 0.5-foot depth interval (unless a sample was collected from the underlying depth interval). The total and WET lead calculations are summarized below and in Table 8j.

Excavation Depth	Maximum Total Lead (mg/kg)	Predicted WET Lead (mg/l)	Waste Classification
0 to 1.0 ft	68	3.6	*Non-hazardous*
Underlying soil (1.0 to 3.0 ft)	*91*	*4.8*	*Non-hazardous*
0 to 2.5 ft	*99*	***5.2***	**Hazardous**
Underlying Soil (2.5 to3.0 ft)	*3.8*	*0.2*	*Non-hazardous*
0 to 3.0 ft	83	4.4	*Non-hazardous*

Based on the data presented in the above table, soil excavated to a depth of 2.5 feet would be classified as a California hazardous waste since the UCL-predicted WET lead concentration is greater than the lead STLC of 5.0 mg/l. Based on the reported DI-WET and pH results, soil excavated from 0 to 2.5 feet may be reused onsite (as Caltrans Type Y1) in accordance with the DTSC Variance by placing the excavated soil under clean fill or pavement. Based on the TCLP lead results, excavated soil would not be classified as a RCRA hazardous waste. Soil underlying 2.5 feet would be classified as non-hazardous based on lead content.

6.1.18 East Calaveras onramp to NB I-680

The maximum total lead concentration is less than the TTLC of 1,000 mg/kg and less than 50 mg/kg (i.e., less than ten times the STLC of 5 mg/l). Accordingly, excavated soil would be classified as non-hazardous based on lead content.

6.1.19 Jacklin Road onramp to SB I-680

The following table summarizes the predicted waste classification for excavated soil based on the maximum total lead values and predicted WET lead concentrations for data collected from this portion of the Site. Weighted averages are calculated by using the maximum total lead concentration for each 0.5-foot depth interval as the value for the underlying 0.5-foot depth interval (unless a sample was

collected from the underlying depth interval). The total and WET lead calculations are summarized below and in Table 8j.

Excavation Depth	Maximum Total Lead (mg/kg)	Predicted WET Lead (mg/l)	Waste Classification
0 to 1.0 ft	480	**25.1**	**Hazardous**
Underlying soil (1.0 to 3.0 ft)	*18*	*0.9*	*Non-hazardous*
0 to 2.5 ft	*202*	***10.6***	**Hazardous**
Underlying Soil (2.5 to3.0 ft)	*19*	*1.0*	*Non-hazardous*
0 to 3.0 ft	172	**9.0**	**Hazardous**

Based on the data presented in the above table, soil excavated to a depth of 1.0 feet would be classified as a California hazardous waste since the UCL-predicted WET lead concentration is greater than the lead STLC of 5.0 mg/l. Based on the reported DI-WET and pH results, soil excavated from 0 to 1.0 feet may be reused onsite (as Caltrans Type Y1) in accordance with the DTSC Variance by placing the excavated soil under clean fill or pavement. Based on the TCLP lead results, excavated soil would not be classified as a RCRA hazardous waste. Underlying soil from 1.0 to 3.0 feet bgs would be classified as non-hazardous based on lead content.

6.1.20 Evans Road onramp to NB I-680

The following table summarizes the predicted waste classification for excavated soil based on the calculated weighted averages of the total lead UCLs and predicted WET lead concentrations for data collected from this portion of the Site. For sample depths with incomplete data sets, the maximum lead value was used in calculating averages. Weighted averages are calculated by using the total lead concentration for each 0.5-foot depth interval as the value for the underlying 0.5-foot depth interval (unless a sample was collected from the underlying depth interval). The total and WET lead calculations are summarized below and in Table 8l.

Excavation Depth	90% UCL Total Lead (mg/kg)	90% UCL Predicted WET Lead (mg/l)	95% UCL Total Lead (mg/kg)	Waste Classification
0 to 1.0 ft	88.3	4.6	98	*Non-hazardous*
Underlying soil (1.0 to 8.0 ft)	*35*	*1.8*	*39*	*Non-hazardous*
0 to 2.5 ft	113	**5.9**	127	***Hazardous***
Underlying soil (2.5 to 8.0 ft)	*9.3*	*0.5*	*9.7*	*Non-hazardous*
0 to 4.5 ft	68	3.6	76	*Non-hazardous*
Underlying soil (4.5 to 8.0 ft)	*7.9*	*0.4*	*7.9*	*Non-hazardous*
0 to 8.0 ft	*42*	*2.2*	*46*	*Non-hazardous*

90% UCL applicable for waste classification and onsite reuse; 95% UCL applicable for risk assessment and offsite disposal

Based on the data presented in the above table, soil excavated to a depth of 2.5 feet would be classified as a California hazardous waste since the 90% UCL-predicted WET lead concentration is greater than the lead STLC of 5.0 mg/l. Based on the reported DI-WET and pH results, soil excavated to a depth of 2.5 feet may be reused onsite (as Caltrans Type Y1) in accordance with the DTSC Variance by placing the excavated soil under clean fill or pavement. Based on the TCLP lead results, excavated soil would not be classified as a RCRA hazardous waste. Soil excavated below 2.5 feet would be classified as non-hazardous based on lead content.

6.1.21 Scott Creek Road onramp to SB I-680

The maximum total lead concentration is less than the TTLC of 1,000 mg/kg and the maximum WET lead concentration is less than 5 mg/l. Accordingly, excavated soil would be classified as non-hazardous based on lead content.

6.2 CAM 17 Metals in Soil

Based on a comparison of the total CAM17 metals concentrations to their respective STLCs and TTLCs and the predicted WET lead concentrations calculated above, soil excavated from the Site would not be considered a hazardous waste based on metal content.

The maximum CAM 17 metals concentrations in site soil were compared to ESLs (SFRWQCB, May 2008, Tables A and K-3) and published background levels typically present in California soils as presented in *Background Concentrations of Trace and Major Elements in California Soils* (Kearney Foundation of Soil Science, Division of Agriculture and Natural Resources, University of California, March, 1996.

Arsenic, Cadmium, lead, nickel, and vanadium were reported with concentrations equal to or greater than their respective residential land use ESL values. ESLs and published background concentrations for these elements are summarized in the table below:

Metal	Mean	Maximum	Shallow Soil Residential ESL	Shallow Soil Commercial/ Industrial ESL	Worker Direct Exposure ESL	PUBLISHED BACKGROUND MEAN[1]	PUBLISHED BACKGROUND RANGE [1]
Arsenic	4.38	9.9	0.39	1.6	15	3.5	0.6 to 11.0
Cadmium	1.43	3.0	1.7	7.4	39	0.36	0.05-1.7
Lead	46.4	970	200	750	750	23.9	12.4-97.1
Nickel	69.3	260	150	150	260	57	9.0-509
Vanadium	28.5	67	16	200	770	112	39 to 288

Concentrations reported in mg/kg

1 Kearney Foundation of Soil Science, March 1996

2 Cadmium was reported in 5 of 82 samples analyzed. Average calculated using one-half the detection limit of 1.0 mg/kg for the remaining 77 samples

The reported arsenic concentrations in the soil samples exceed the shallow soil residential and commercial/industrial land use ESLs, however, it is within the published background range and below the construction worker direct exposure ESL. The SFRWQCB *Update to Environmental Screening Levels (ESLs) Technical Document* (*November 2007, Revised May 2008)* states that ambient background concentrations of arsenic typically exceed risk-based screening levels. In such instances, it may be more appropriate to compare site data to regionally-specific established background levels.

The reported cadmium concentrations in the soil samples exceed the shallow soil residential land use ESL and published background range, but are below the commercial/industrial and construction exposure ESLs.

Reported lead concentrations in soil exceed the residential, commercial/industrial, and construction worker direct exposure ESLs and are above reported background ranges.

Reported nickel concentrations in soil exceed the residential and commercial/industrial ESLs and are equal to the construction worker direct exposure ESL. Nickel concentrations are, however, within reported background ranges.

The reported vanadium concentrations in the soil samples exceed the shallow soil residential land use ESL, however, they are below the commercial/industrial and construction exposure ESLs and within the published background range.

Based on the reported arsenic, cadmium, lead, nickel or vanadium concentrations, offsite reuse or disposal of excavated soil may be restricted based on metals content depending on proposed use.

6.3 Organic Compounds in Soil

Organic concentrations in soil were compared to ESLs. BTEX, MTBE, or VOCs were not detected at or above the laboratory reporting limits. TPHg was reported at concentrations ranging from <1.0 to 1.7 mg/kg, below the residential, commercial/industrial land use and construction exposure ESLs. TPHd was reported at concentrations ranging from <1.0 to 830 mg/kg and has a calculated 95% UCL concentration of 42.44 mg/kg, below the residential and commercial/industrial land use ESLs of 83 mg/kg. TPHmo was reported at 1.1 to 4,000 mg/kg and a calculated 95% UCL of 186.6, mg/kg below the residential land use ESL of 370 mg/kg.

6.4 Naturally-Occurring Asbestos in Soil

NOA was not detected in soil samples collected at the Site at or above the laboratory target sensitivity. A summary of NOA results is included in Table 5.

6.5 CAM 17 Metals in Groundwater

One grab-groundwater sample was collected from boring B11-60 and analyzed for CAM 17 metals. Beryllium, molybdenum, selenium, silver and thallium were not detected at or above the laboratory reporting limits. Antimony was reported at a concentration of 0.009 mg/l, exceeding the ESLs for groundwater as a potential source of drinking water, groundwater not as a current or potential source of drinking water, and surface water for freshwater and estuarine environments.. Arsenic, barium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, vanadium and zinc were reported at concentrations exceeding their respective ESLs for groundwater as a current/potential source of drinking water, groundwater not as a current or potential source of drinking water, and surface water for freshwater, marine and estuarine environments. CAM 17 Metals results for the grab-groundwater sample and corresponding ESL values are summarized in Table 6.

Based on the reported CAM 17 metals concentrations, groundwater generated during construction may require treatment to reduce metal content prior to discharge or disposal.

6.6 Organic Compounds in Groundwater

One grab-groundwater sample was collected from boring B11-60 and analyzed for organic compounds. TPHg, TPHd, TPHmo, or VOCs were not detected at or above the laboratory reporting limits. Organic

compounds results for the grab-groundwater sample and corresponding ESL values are summarized in Table 7.

6.7 Worker Protection

The contractor(s) should prepare a project-specific health and safety plan to prevent or minimize worker exposure to metals and petroleum hydrocarbons in soil as well as metals in groundwater. The plan should include protocols for environmental and personnel monitoring, requirements for personal protective equipment, and other health and safety protocols and procedures for the handling of soil and groundwater.