FOR CONTRACT NO.: 04-235634

INFORMATION HANDOUT

MATERIALS INFORMATION

1. Foundation Recommendations, Ringwood POC (Replace), Bridge No. 35-0347, dated April 20, 2010

2. Foundation Recommendations, Hetch Hetchy Aqueduct (Widen), Bridge No. 35-0150M, dated March 10, 2010

3. Foundation Recommendations for the Henderson Retaining Wall, dated April 19, 2010

4. Foundation Review dated April 21, 2010

5. Material Recommendations

6. Preliminary Geotechnical Report

7. Geotech Retaining Wall Recommendation

8. Corrosion Recommendation

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ROUTE: 04-SM-101-0.9/3.6

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

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To: MR. SAMAD HAMOUD
Chief, Design Branch 16
Office of Bridge Design West
Division of Engineering Services

Attn: John Peterson

Date: April 20, 2010

File: 04-SM-101-PM 2.57
04-235631
Ringwood POC (Replace)
Bridge No. 35-0347

From: CAROLINE CHEN
Transportation Engineer
Office of Geotechnical Design-West
Division of Engineering Services

MAHMOOD MOMENZADEH
Chief, Branch C
Office of Geotechnical Design-West
Division of Engineering Services

Subject: Foundation Recommendations

INTRODUCTION

This memorandum provides foundation recommendations for the proposed new Ringwood POC (Bridge No. 35-0347) to replace the existing Ringwood POC (Bridge No. 35-0143), which spans US 101 in the City of Menlo Park, San Mateo County. The proposed replacement is part of the proposed project to add auxiliary lanes in both directions of US 101, from the Embarcadero Road Interchange (PM 52.2) in the City of Palo Alto in Santa Clara County to the Marsh Road interchange (PM 3.6) in the City of Menlo Park in San Mateo County. The existing 6-span bridge will be replaced with new bridge to provide sufficient clearances for the proposed auxiliary lanes. The proposed new bridge will be constructed close to the existing structure.

The following recommendations are based on the available site investigation information and laboratory test results, Geology Report prepared by Rifaat Nashed and Grant Wilcox of Office of Geotechnical Design West, dated November 30, 2009, as well as General Plans/Foundation Plans provided by the Office of Bridge Design-West.

GEOLOGY AND SUBSURFACE CONDITIONS

Site Geology

The project area is entirely covered by Holocene flood Basin deposits. The Basin deposits contains very fine silty clay to clay deposits occupying flat-floored basins at the

distal edge of alluvial fans adjacent to the bay mud. Also contains unconsolidated, locally organic, plastic silt and silty clay deposited in very flat valley floor (USGS, OFR 98-348).

The Franciscan complex forms the basement rock underlies the entire area east of the Pilarcitos fault. The Franciscan complex is composed of weakly to strongly metamorphosed greywacke, argillite, limestone, basalt, serpentinite, chert, and other rocks. The Franciscan rocks in this area overlain by Upper Jurassic to Upper Cretaceous turbidites (USGS, OFR 98-348).

The project site is located 6.7 miles (10.79 km) east of San Andrea Fault (Peninsula section), 67.66 miles (11.79 km) west of Silver Creek Fault, and 7.58 miles (12.2 km) northwest of Cascade Fault. San Andrea Fault, Silver Creek Fault, and Cascade Fault are active faults with Maximum Magnitude (MMax) 7.9, 7.1, and 6.9 in order.

SUBSURFACE CONDITIONS

The subsurface investigation for the existing bridge conducted in August 1954 consisted of one rotary borings (B-1) and three cone penetration soundings (B-1-A, B-2, and B-3). The rotary boring was drilled to approximate depth of 70 ft, or Elevation -54 ft. The deepest penetration sounding reached the maximum depth of 60 ft, or Elevation –42 ft. A new field investigation was performed in Agusut 2009 during which 4 rotary borings (Borings R-09-003 through R-09-006) were drilled to maximum depth of 76.5 ft, or approximate Elevation –59.5 ft by the Office of Geotechnical Design West (OGDW). These boring were drilled at the accessible location near the proposed bridge supports. The elevation of ground surface is approximately 17 ft.

Based on the as-built Log of Test Borings (LOTBs), firm silty clay was encountered in the upper 16 ft to Elevation 0 ft, underlain by stiff to very stiff silty clay and clayey silt with some small gravel to the maximum exploration depth. A layer of dense sand and grave with approximate thickness of 5 ft was uncounted at approximate Elevation –14 ft.

The recent field investigation shows the subsurface predominantly consists of firm to stiff clay interbedded with sand and gravel layers. At three of four boreholes layer of medium dense to dense sand and gravel with thickness varying from about 9 to 18 ft was encountered at depth ranging from 30 to 59 ft below ground surface.

Groundwater was encountered during the investigation and measured at approximate Elevation 5.1 ft in August 1954. Ground water was measured at Elevation 9.5 ft, or 7.5 ft

below ground surface, in Boring R-09-003 and Elevation 3.7 ft, or 13.3 ft below ground surface in Boring R-09-006. The groundwater may vary with passage of time due to surface and subsurface flows and ground surface run-off and other factors that may not be present at the time of investigation. The design ground water table is assumed to be at Elevation 9.5 ft.

SCOUR

Scour is not anticipated to be an issue for this site since there is no watercourse running through the site.

CORROSIVITY

Corrosion samples collected from Borings R-09-003 and R-09-005 during the recent field investigation for adjacent proposed Ringwood POC replacement were tested. Test results shown on Table 1 indicate the site is considered non-corrosive based on the current Caltrans guidelines.

Table 1 Corrosivity Test Results

Location	Depth (ft)	pH	Minimum Resistivity (ohm-cm)	Chloride Content (ppm)	Sulfate Content (ppm)
R-09-003	5-10	7.8	1677	-	-
R-09-005	0-5	8.3	3349	-	-

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exist: 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.

SEISMICITY/LIQUEFACTION POTENTIAL

Hossain Salimi from Office of Geotechnical Design West provided Preliminary Seismic Design Recommendations (PSDR) for this structure on August 11, 2009, before the recent field investigation was conducted. The PSDR concluded that liquefaction potential is considered minimal. A subsequent report dated November 4, 2009, was prepared by Hossain Salimi after the recent field investigation and laboratory testing was completed to provide lateral soil springs. The Report concluded that there is a moderate to high liquefaction potential at Bents 8, 9, 10,11, and 12, based on Boring R-09-003. The soil

subject to liquefaction is a three-foot medium dense sand layer encountered approximately from elevations 4 ft to 1 ft in Boring R-09-003.

EXISTING FOUNDATION

The existing bridge was originally built in 1958 and retrofitted in 1993. Treated timber piles were used to support the bridge in the original construction with design load 30 tons. Piles were driven to elevations ranging from –12.5 ft to –40 ft. Class 70C driven piles were used during the 1993 retrofit, with specified tip elevation –39 ft.

FOUNDATION TYPE RECOMMENDATIONS

Cast-In-Drilled-Hole (CIDH) pile of different sizes are proposed by the structure designer for the bents and spread footings for Abutments 1 and 15. Footings 1 and 2 are proposed to support the reinforced concrete cell wall behind Abutment 1, and Footings 3 and 4 to support concrete cell wall behind Abutment 15. The proposed foundations are considered feasible based on the site conditions and load demand. Foundation design data provided by structure designer and recommendations are presented on Tables 2 through 5. Settlement of CIDH piles under service load is estimated to be less than 1 inch.

Downdrag caused by liquefaction under extreme event is accounted for in the analysis and recommendations. The downdrag load is estimated to be 140 kips per pile for Bents 8 and 9, and 100 kips per pile for Bents 10, 11, and 12. Structure designer should take the downdrag into account as additional load when design piles structurally.

Spread footings at abutments and walls are anticipated to be founded on stiff clay. Permissible gross contact stress presented on Table 3 is calculated based on permissible settlement of 1 inch as specified by the structure designer. Allowable gross bearing capacity is obtained by applying factor of safety 3 to the ultimate gross bearing capacity. The contact pressure determined based on Service Limit State should not exceed lesser of permissible gross contact stress and allowable gross bearing capacity. Footing pressure will be affected by the lateral pressures and design structure loads. Structure designer should calculate the footing contact pressure, and check it with the bearing capacity recommended.

The structure designer should show on the plans, in the pile data table, the design pile tip elevations controlled by the lateral load demands. If the design pile tip elevation required to meet lateral load demands exceeds the specified pile tip elevations given within this report, the Office of Geotechnical Design-West shall be contacted for further

recommendations.

Table 2 Foundation Data Provided by Structure Designer

Support Location	Design Method	Pile Type	Finished Grade Elevation (ft)	Cut-off Elevation (ft)	Pile Cap (ft)		Permissible Settlement under Service Load (in)	No. of Piles per Support
					B	L		
Bent 2-6	LRFD	3 ft CIDH Extension	14.5~15.2	11.5~12.2	N/A	N/A	1	1
Bent 7	LRFD	4 ft CIDH Extension	13.76	110.76	N/A	N/A	1	1
Bent 8	LRFD	4 ft CIDH Extension	16.5	13.5	N/A	N/A	1	1
Bent 9	LRFD	4 ft CIDH Extension	14.52	11.52	N/A	N/A	1	1
Bent 10-14	LRFD	3 ft CIDH Extension	14.5~15.2	11.5~12.2	N/A	N/A	1	1

Table 3 Foundation Design Data and Recommendations for Abutments

Support Location	Effective Footing Size (ft)		BOF Elevation (ft)	Minimum Footing Embedment Depth (ft)	WSD (LRFD Service-1 Limit State)	
	B	L			Permissible Gross Contact Stress (ksf)	Allowable Gross Bearing Capacity (ksf)
Abutment 1	6.6	10	15.5	2.5	2500	2000
Footings 1 & 2	2	107	15.5	2.5	2500	2000
Abutment 15	6.6	10	16	2.5	2500	2000
Footings 3 & 4	2	107	16	2.5	2500	2000

Notes: (1) BOF = Bottom of Footing

Table 4 Foundation Design Data and Recommendations for Bents

Support Location	Pile Type	Cut-Off Elevation (ft)	Service-I Limit State Load per Support (kips)	Total Permissible Support Settlement (inch)	Required factored Nominal Resistance (kips)				Design Pile Tip Elevation (ft)	Specified Pile Tip Elevation (ft)
					Strength Limit		Extreme Event			
					Comp. (φ=0.7)	Tension (φ=0.7)	Comp. (φ=1)	Tension (φ=1)		
Bent 2-6	3 ft CIDH Extension	11.5-12.2	160	1	240	-	200	-	-35 (a-I) –18 (a-II)	-35
Bent 7	4 ft CIDH Extension	10.76	220	1	300	-	270	-	-33 (a-I) -18 (a-II)	-33
Bent 8	4 ft CIDH Extension	13.5	460	1	640	-	360	-	-47 (a-I) –38 (a-II)	-47
Bent 9	4 ft CIDH Extension	11.52	220	1	300	-	270	-	-24 (a-I) -33 (a-II)	-33
Bent 10-12	3 ft CIDH Extension	11.5-12.2	160	1	240	-	200	-	-27 (a-I) -32 (a-II)	-32
Bent 13-14	3 ft CIDH Extension	11.5-12.2	160	1	240	-	200	-	-41 (a-I) -16 (a-II)	-41

Notes:

1. The design tip elevations are controlled by (a-I) Compression (Strength Limit), (a-II) Compression (Extreme Limit).
2. The structure designer is to provide design tip elevations for lateral loads, if there are any.
3. Settlement of CIDH piles under service load is estimated to be less than 1 inch.

Table 5 Pile Data Table

Support Location	Pile Type	Nominal Resistance (kips)		Design Pile Tip Elevation (ft)	Specified Pile Tip Elevation (ft)
		Compression	Tension		
Bent 2-6	3 ft CIDH Extension	350	0	-35 (a)	-35
Bent 7	4 ft CIDH Extension	430	0	-33 (a)	-33
Bent 8	4 ft CIDH Extension	920	0	-47 (a)	-47
Bent 9	4 ft CIDH Extension	430	0	-33 (a)	-33
Bent 10-12	3 ft CIDH Extension	350	0	-32 (a)	-32
Bent 13-14	3 ft CIDH Extension	350	0	-41 (a)	-41

Notes:
1. The design tip elevations are controlled by (a) Compression.
2. The structure designer is to provide design tip elevations for lateral loads, if there are any.

CONSTRUCTION CONSIDERATIONS

- Groundwater is anticipated to be encountered during drilling to install CIDH piles. Wet method is expected.

- Temporary casing maybe needed to prevent caving potential due to the presence of granular soil and the high groundwater table.

- The drilled holes shall not be left open after drilling is completed.

- Spread footings shall be placed neat against competent materials. All loose materials shall be removed prior to placement of concrete and backfilled with structure backfill material (or Class 2 AB) compacted to 95% relative density in lift not exceeding 8 inch to bring up the excavation to the footing grade. Spread footings are anticipated to be founded on stiff clay. If differing soil conditions are encountered at the bottom of footing, Office of Geotechnical Design West should be contacted for further evaluation and recommendations.

- Localized seepage water may be encountered during excavation to install spread footing even though groundwater table is anticipated to be lower than bottom of footing elevation.

The recommendations contained in this report are based on specific project information including structure type, support locations, and design loads that have been provided by the Office of Bridge Design-West. If any changes are made during final project design, the Office of Geotechnical Design-West, should review those changes to determine if these foundation recommendations are still applicable

If you have any questions or need additional information, please contact Caroline Chen at 916-227-5386 or Mahmood Momenzadeh at 510-286-5732.

c. TPokrywka, MMomenzadeh, CChen, HSalimi,
Daily File, Route File, Translab File

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

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To: MR. SAMAD HAMOUD
Chief, Design Branch 16
Office of Bridge Design West
Division of Engineering Services
Attn: John Peterson

Date: March 10, 2010

File: 04-SM-101-PM 2.66
04-235631
Hetch Hetchy Aqueduct (Widen)
Bridge No. 35-0150M

From: CAROLINE CHEN
Transportation Engineer
Office of Geotechnical Design-West
Division of Engineering Services

MAHMOOD MOMENZADEH
Chief, Branch C
Office of Geotechnical Design-West
Division of Engineering Services

Subject: Foundation Recommendations

INTRODUCTION

This memorandum provides foundation recommendations for the proposed widening of Hetch Hetchy Aqueduct Bridge (Bridge No. 35-0150M), in the City of Menlo Park, San Mateo County. The proposed widening is part of the proposed project to add auxiliary lanes in both directions of US 101, from the Embarcadero Road Interchange (PM 52.2) in the City of Palo Alto in Santa Clara County to the Marsh Road interchange (PM 3.6) in the City of Menlo Park in San Mateo County. The existing 5-span Hetch Hetchy Aqueduct Bridge spans and protects the two existing water lines and future water lines. The widening is proposed to accommodate the auxiliary lanes in both northbound and southbound directions.

The following recommendations are based on the available site investigation finding and laboratory test results, Geology Report prepared by Rifaat Nashed and Grant Wilcox of Office of Geotechnical Design West, dated November 30, 2009, as well as General Plans/Foundation Plans provided by the Office of Bridge Design-West.

GEOLOGY AND SUBSURFACE CONDITIONS

Site Geology

The project area is entirely covered by Holocene flood Basin deposits. The Basin deposits contains very fine silty clay to clay deposits occupying flat-floored basins at the

distal edge of alluvial fans adjacent to the bay mud. Also contains unconsolidated, locally organic, plastic silt and silty clay deposited in very flat valley floor (USGS, OFR 98-348).

The Franciscan complex forms the basement rock underlies the entire area east of the Pilarcitos fault. The Franciscan complex is composed of weakly to strongly metamorphosed greywacke, argillite, limestone, basalt, serpentinite, chert, and other rocks. The Franciscan rocks in this area overlain by Upper Jurassic to Upper Cretaceous turbidites (USGS, OFR 98-348).

The project site is located 6.7 miles (10.79 km) east of San Andrea Fault (Peninsula section), 67.66 miles (11.79 km) west of Silver Creek Fault, and 7.58 miles (12.2 km) northwest of Cascade Fault. San Andrea Fault, Silver Creek Fault, and Cascade Fault are active faults with Maximum Magnitude (MMax) 7.9, 7.1, and 6.9 in order.

Subsurface Conditions

The subsurface investigation for the existing bridge conducted in February 1956 consisted of two rotary borings (B-1 and B-3) and three cone penetration soundings (B-2, B-4, and B-5). The deepest rotary boring was drilled to approximate depth of 83 ft, or Elevation -68 ft. The deepest penetration sounding reached the maximum depth of 90 ft, or Elevation –75 ft. A recent field investigation completed by the Office of Geotechnical Design West (OGDW) in March 2009 was conducted for the proposed widening, consisting of two rotary borings (R-09-001 and R-09-002). The maximum exploration depth reached depth 72 ft, or Elevation –55 ft.

Based on the as-built Log of Test Borings (LOTBs), the subsurface soil encountered above Elevation –40 ft was described as loose to medium dense sand with good clayey silt or silt binder with interbeded pebble gravel layers in the boring loggs. Dense to very dense sand and pebble gravel with silt binder was encountered below Elevation –40 ft to the maximum exploration depth. The recent field investigation indicates the subsurface consists of predominantly soft to stiff sandy and gravelly clay with occasional layers of medium dense to dense sand and gravelly sand. The as-built and the recent LOTBs show significant discrepancy in terms of soil type encountered and SPT blow counts. The difference in blow counts is very likely caused by the hammer energy efficiency. The drilling equipment used in the recent field investigation very likely has much higher hammer energy efficiency, which results in much lower SPT blow count. The discrepancy in description of soil type may attribute to changes in soil classification over

the years.

Groundwater was encountered during the investigation and measured at elevation ranging from 6 to 8 ft in February 1956, but was not measured in the field investigation conducted in 2009. Four borings (R-09-003 through R-09-006) were drilled in August 2009 for proposed Ringwood POC (Replace) (Bridge No. 35-0143), which is about 700 ft southeast to the Hetch Hetchy Aqueduct. Ground water was measured at Elevation 9.5 ft in Boring R-09-003 and Elevation 3.7 ft in Boring R-09-006. The design ground water table is assumed to be at Elevation 9.5 ft.

SCOUR

Scour is not anticipated to be an issue for this site since there is no watercourse running through the site.

CORROSIVITY

Corrosion samples collected from Borings R-09-003 and R-09-005 for adjacent proposed Ringwood POC replacement were tested. Test results shown on Table 1 indicate the site is considered non-corrosive based on the current Caltrans guidelines.

Table 1 Corrosivity Test Results

Location	Depth (ft)	pH	Minimum Resistivity (ohm-cm)	Chloride Content (ppm)	Sulfate Content (ppm)
R-09-003	5-10	7.8	1677	-	-
R-09-005	0-5	8.3	3349	-	-

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exist: 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.

SEISMICITY/LIQUEFACTION POTENTIAL

Hossain Salimi from Office of Geotechnical Design West provided Seismic Design Recommendations (SDR) dated December 23, 2009, for this structure. It was concluded in the SDR that liquefaction potential is considered minimal due to the nature of the

materials encountered.

EXISTING FOUNDATION

The existing bridge was originally built in 1958 and widened in the median in 1973. Both original construction and widening used 16 inch Cast-In-Drilled-Hole (CIDH) piles to support the bridge, with specified tip elevation –40 ft. The design load is 32 tons.

FOUNDATION RECOMMENDATIONS

Based on general Plans, foundation data and loads provided by structure designer shown on Tables 2 and 3, and the subsurface conditions, 24 inch Cast-In-Drilled-Hole (CIDH) pile is feasible type of foundation for the proposed structure. Foundation design recommendations are presented on Tables 4 through 6. Settlement of CIDH piles under service load is less than 1 inch.

Table 2 Foundation Data Provided by Structure Designer

Support Location	Design Method	Pile Type	Finished Grade Elevation (ft)	Cut-off Elevation (ft)	Pile Cap (ft)		Permissible Settlement under Service Load (in)	No. of Piles per Support
					B	L		
Abut 1	WSD	24 inch CIDH	16.90	14.57	N/A	N/A	1	2
Bent 2	LRFD	24 inch CIDH Extension	16.92	14.59	N/A	N/A	1	2
Bent 3	LRFD	24 inch CIDH	16.94	14.61	N/A	N/A	1	2
Bent 4	LRFD	24 inch CIDH Extension	16.96	14.63	N/A	N/A	1	2
Bent 5	LRFD	24 inch CIDH Extension	16.98	14.65	N/A	N/A	1	2
Abut 6	WSD	24 inch CIDH Extension	17.00	14.67	N/A	N/A	1	2

Table 3 Foundation Design Loads Provided by Structure Designer

Support Location	Service 1 Limit State (kips)			Strength Limit State (Controlling Group) (kips)				Extreme Event Limit State (Controlling Group) (kips)			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max Per Pile	Per Support	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile
Abut 1	160	80	80	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bents 2 -5	160	N/A	80	230	115	-	-	-	-	-	-
Abut 6	160	80	80	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 4 Foundation Design Data and Recommendations for Abutments

Support Location	Pile Type	Cut-off Elevation (ft)	LRFD Service-I Limit State Load (kips) per Support		LRFD Service-I Limit State Total Load (kips) per Pile (Compression)	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)
			Total	Permanent				
Abut. 1	24 inch CIDH	14.57	160	80	80	160	-42.9 (1)	-42.9
Abut. 6	24 inch CIDH	14.67	160	80	80	160	-42.9 (1)	-42.9

Notes:
1. The design tip elevations are controlled by (1) Compression.

The structure designer should show on the plans, in the pile data table, the design pile tip elevation controlled by the lateral load demands. If the design pile tip elevation required to meet lateral load demands exceeds the specified pile tip elevations given within this report, the Office of Geotechnical Design-West shall be contacted for further recommendations.

Table 5 Foundation Design Data and Recommendations for Bents

Support Location	Pile Type	Cut-Off Elevation (ft)	Service-I Limit State Load per Support (kips)	Total Permissible Support Settlement	Required factored Nominal Resistance (kips)				Design Pile Tip Elevation (ft)	Specified Pile Tip Elevation (ft)
					Strength Limit		Extreme Event			
					Comp. (φ=0.7)	Tension (φ=0.7)	Comp. (φ=1)	Tension (φ=1)		
Bent 2	24 inch CIDH Extension	14.59	160	1	115	-	-	-	-42.9(a-I)	-42.9
Bent 3	24 inch CIDH Extension	14.61	160	1	115	-	-	-	-42.9 (a-I)	-42.9
Bent 4	24 inch CIDH Extension	14.63	160	1	115	-	-	-	-42.9 (a-I)	-42.9
Bent 5	24 inch CIDH Extension	14.65	160	1	115	-	-	-	-42.9 (a-I)	-42.9

Notes:
1. The design tip elevations are controlled by (a-I) Compression (Strength Limit).
2. The structure designer is to provide design tip elevations for lateral loads, if there are any.

Table 6 Pile Data Table

Support Location	Pile Type	Nominal Resistance (kips)		Design Pile Tip Elevation (ft)	Specified Pile Tip Elevation (ft)
		Compression	Tension		
Abut 1	24 inch CIDH Extension	160	0	-42.9 (1)	-42.9
Bent 2	24 inch CIDH Extension	165	0	-42.9 (1)	-42.9
Bent 3	24 inch CIDH Extension	165	0	-42.9 (1)	-42.9
Bent 4	24 inch CIDH Extension	165	0	-42.9 (1)	-42.9
Bent 5	24 inch CIDH Extension	165	0	-42.9 (1)	-42.9
Abut 5	24 inch CIDH Extension	160	0	-42.9 (1)	-42.9

Notes:
1. The design tip elevations are controlled by (1) Compression.
2. The structure designer is to provide design tip elevations for lateral loads, if there are any.

CONSTRUCTION CONSIDERATIONS

- Groundwater is anticipated to be encountered during drilling to install CIDH piles. Wet method is expected.

- Temporary casing may be needed to prevent caving potential due to the presence of granular soil and the high groundwater table.

- The drilled holes shall not be left open after drilling is completed.

The recommendations contained in this report are based on specific project information including structure type, support locations, and design loads that have been provided by the Office of Bridge Design-West. If any changes are made during final project design,

the Office of Geotechnical Design-West, should review those changes to determine if these foundation recommendations are still applicable

If you have any questions or need additional information, please contact Caroline Chen at 916-227-5386 or Mahmood Momenzadeh at 510-286-5732.

c. TPokrywka, MMomenzadeh, CChen, Translab File, RE Pending,
Project Manager

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. SAMAD HAMOUD
Chief, Design Branch 16
Office of Engineering Services

Date: April 19, 2010

Attention: J. Peterson

File: 04-SM-101 PM 0.0/3.6
04-235631
Retaining Wall

From: DAVID NESBITT
Transportation Engineer
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

MAHMOOD MOMENZADEH
Chief, Branch C
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

Subject: Foundation Recommendations for the Henderson Retaining Wall.

This memorandum presents our final foundation recommendations for the Henderson Retaining Wall. This memo supersedes the previous recommendations.

1. PROPOSED PROJECT

The purpose of the proposed project is to add an auxiliary lane to both directions of Route 101, from the Embarcadero Road Interchange (PM 52.2) in the City of Palo Alto, Santa Clara County to the Marsh Road Interchange (PM 3.6) in the City of Menlo Park, San Mateo County. The construction of the auxiliary lane will require the construction of one retaining wall located just south of the Henderson UP (PM 3.4) on the west side of Route 101. Henderson Retaining Wall (originally defined as RTW #1) is located between Stations 161+70 and 170+00 on the NS3 line. The wall height ranges from approximately 1.5 ft to 7.0 ft.

The wall LOL limits defined by SD extends from Sta 10+000 to 18+30.038. Structure Design recommended use of Wall Type 7 from Station 10+00 to Stations 11+00 and from Station 11+24 to Station 18+30.038. SD also recommended use of Wall Type 1 for the section between Station 11+00 to Station 11+24, which is adjacent to a buried storage tank. No information is available on the exact location of the storage tank and the condition of the existing backfill soil behind the tank. Based on the cross section provided to us, an average soil thickness of about 3.5 ft will be removed from the area behind the tank where footing of the Type 1 wall is to be located.

2. SITE GEOLOGY AND SEISMICITY

The regional and site geology are described in the Preliminary Geotechnical Report dated July 2007.

The table below lists the active faults near the project area and the peak ground accelerations that could be expected from a maximum credible earthquake from each of these faults for the Henderson Retaining Wall.

FAULT	Distance from project (miles)	Maximum Credible Earthquake	Peak Ground Acceleration
San Andreas	14.4 km (8.9)	8.0	0.40 g
Monte Vista	11.6 km (7.2)	6.5	0.28 g
Hayward	19.9 km (12.4)	7.5	0.27 g

3. FIELD INVESTIGATION and LABORATORY TESTING

A total of 4 soil borings were drilled adjacent to the proposed retaining wall locations. Soil borings R-09-102, R-09-103 and R-09-104 were drilled, adjacent to the alignment of Henderson Retaining Wall (RTW #1), to a depth of 26.5 ft below the existing ground surface. Soil boring R-09-101 was drilled for Retaining wall # 2, which has been deleted from this project. Caltrans Drilling Services drilled the borings in March 2009. The soil borings were drilled using the rotary wash method. Samples were collected using a spilt spoon sampler 2.0- inch OD (SPT), and a 2.5- inch OD push sampler (Modified California Sampler).

Several samples from all four borings have been submitted for laboratory testing. Laboratory tests and corrosion test results are included in Appendix A. The corrosion test result indicates the site is non-corrosive.

4. SUBSURFACE SOIL/ROCK AND GROUNDWATER CONDITIONS

Based on the results of the boreholes drilled, the subsurface soil below the Henderson Retaining Wall is anticipated to consist of clay layer overlaying a gravel layer with sand. The gravel layer is underlained by a clay-sandy clay layer.

The upper clay ranges in thickness from 3 to 8 ft. The average of pocket penetrometer value is 1.5 tsf, indicating a stiff material. The gravel layer ranges in thickness from 0 to 6 ft in the three borings. Based on the corrected SPT values, the gravel layer is medium dense. The lower clay layer ranges from a clay to a sandy clay. The pocket penetrometer values in this layer range from 0.5 to 2.5 tsf indicating material that is soft to very stiff.

Groundwater was encountered at depth approximately 3.0 ft below the ground surface at boring R-09-102. The boring was left open for several hours before grouting. Groundwater was encountered but not measured in borings R-09-101, R-09-103 and R-09-104.

5. GEOTECHNICAL RECOMMENDATIONS

A major concern for the Henderson Retaining Wall is the close proximity of the existing soundwall above the proposed retaining wall location. According to Caltrans As-Built dated December 1991, the existing soundwall is constructed on a spread footing at the top of the slope above the proposed retaining wall location. There is also a 20-inch gas line and residential housing located directly behind the soundwall.

The following recommendations for the Henderson Retaining Wall is based on the subsurface soil conditions, groundwater elevations, topography, and the existing structures adjacent to the proposed retaining wall location.

- To achieve the required bearing capacity of 2.0 ksf for the proposed retaining walls Type 1 and 7, the contractor will be required to excavate an additional two feet below of the proposed footing grade. Also, excavate an additional one-foot beyond the heel and toe of the wall (Figure 1). Place sub-grade enhancement geotextile and backfill with structural backfill material. The structural backfill material will be placed and compacted in accordance to the Caltrans Standard Specifications.

- A global and local slope stability analyses have been performed for the back cut for the Type 7 retaining wall. The Type 7 retaining wall can be constructed without the use of temporary shoring if the following requirements are meet:

  1. The temporary back cut for the construction of the Type 7 retaining wall shall not be steeper than 1 (V): 1(H).

  2. The top of the temporary excavation back cut, for the construction of the Type 7 retaining wall, cannot be within 15 feet of the face of the existing soundwall (Figure 2). If the top of the temporary excavation back cut comes within 15 feet of the face of the soundwall, temporary shoring will be required. The Engineer should review the temporary shoring plans. We recommend that a typical cross section similar to Figure 2 be included in the plans.

- Structure Design should review the stability (for the sliding and rocking modes) of the storage tank due to construction of the proposed Wall Type 1 adjacent to tank using the following geotechnical parameters:

  1. Active and passive equivalent fluid pressure 40 pcf and 180-pcf on the active and passive sides of storage tank, respectively parallel to and a friction coefficient of 0.25 on the sides perpendicular to the wall.

  2. Additional uniform active lateral pressure of 240-psf on the side adjacent to the wall footing assuming an average footing pressure of 2000 psf and assuming a friction angle of 30 degrees and unit weight of 120 pcf for the existing backfill material around the tank.

- Footing for the Type 1 retaining wall cannot be constructed on top of the underground storage.

- The excavation and construction of the Type 1 retaining wall adjacent to the storage tank will require the use of temporary shoring to stabilize the slope. The temporary shoring is required to stabilize the slope below the existing soundwall. The Engineer should review the temporary shoring plans.

- Dewatering of the footing excavation maybe required due to location of the groundwater table. Therefore, it is recommended that the sub-grade enhancement Geotextile (Class B2) and structural backfill material be placed immediately after footing excavation is exposed. A copy of the special provision for the sub-grade enhancement geotextile is attached in Appendix A.

- Retaining wall backfill should be placed and compacted in accordance to the Caltrans Standard Specifications with the slope above the retaining wall not steeper than 2(H): 1(V). The on-site excavated material, which is free from organic material and debris, can be used for the retaining wall backfill outside the limits of the structure backfill as shown on the plans.

If the requirements for the Type 1 and Type 7 retaining walls described above cannot be achieved, we are recommending the construction of a soldier pile and lagging wall with a maximum height of approximately 5 feet. The soldier pile and lagging wall will eliminate need for temporary shoring, additional footing excavation, and the sub-grade enhancement geotextile.

Geotechnical Design Parameter for Soldier Pile wall

If a Type 7 or Type 1 retaining wall cannot be constructed, then a soldier pile and lagging wall should be constructed.

We recommend using an effective friction angle (ϕ'_f) = 28 degrees, a Unit weight (γ) =120 lb/ft^3, coefficient of active lateral earth pressure (k_a) = 0.60, a coefficient of passive pressure (k_p)= 2.8 (use a safety factor of 2.0), friction angle of between backfill material and back of (δ) = 17 degrees, and angle of backfill surface to the horizontal (β) = 26 degrees. Use an arching factor of 2.0

Please refer to Figure 5.5.5.6-3 of the Bridge Design Specifications dated August 2004 for the earth pressure distributions along the wall (Figure 3).

6. CONSTRUCTION CONSIDERATIONS

We are recommending that our Office review the proposed cut slope and shoring design. We also recommend that a Geotechnical Engineer, from the Office of GDW-Branch C,

should be on site to inspect the earthwork, including any excavation and shoring during construction. We are also recommending construction monitoring of the existing soundwall during the construction of RTW1. Survey points should be located at the top or near the top of the soundwall to monitor movement. The movement should be limited to 0.01% (H), (H= height of the soundwall). The Office of GDW-Branch C should be notified immediately, if the movement exceeds 0.01% H.

* * * * *

If you have any questions or need additional information, please call David Nesbitt at 510-622-0104, or Mahmood Momenzadeh at 510-286-5732.

Attachments

c: TPokrywka, MMomenzadeh, DNesbitt, TNemariam, ADing, Daily File, Route File, RE Pending, Project Manager

DNesbitt/mm

REGISTERED PROFESSIONAL ENGINEER
MAHMOOD MOMENZADEH
No. GE 2685
Exp. 12/31/2010
GEOTECHNICAL
STATE OF CALIFORNIA

STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION

QUANTITY CALCULATIONS

SHEET 1 OF 1

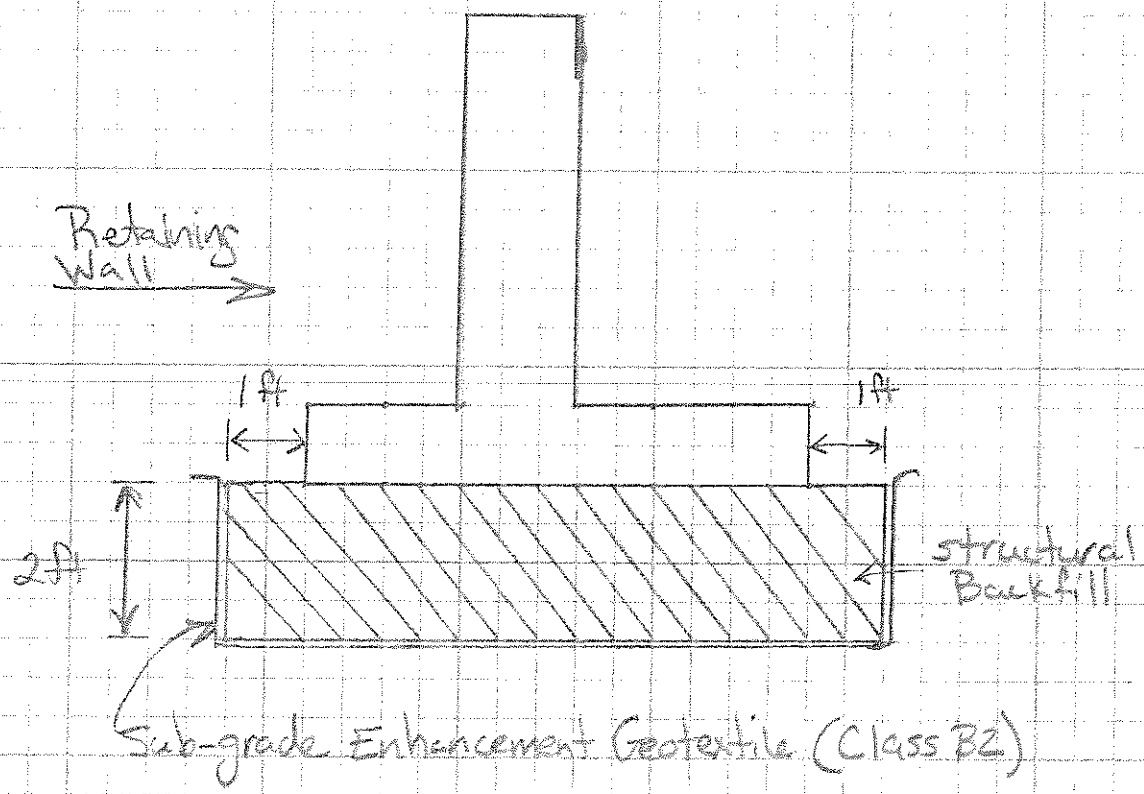
ITEM: Henderson Retaining Wall

LOCATION: 04-SM-101, PM 0.0/3.6

CALC BY: David Nesbitt

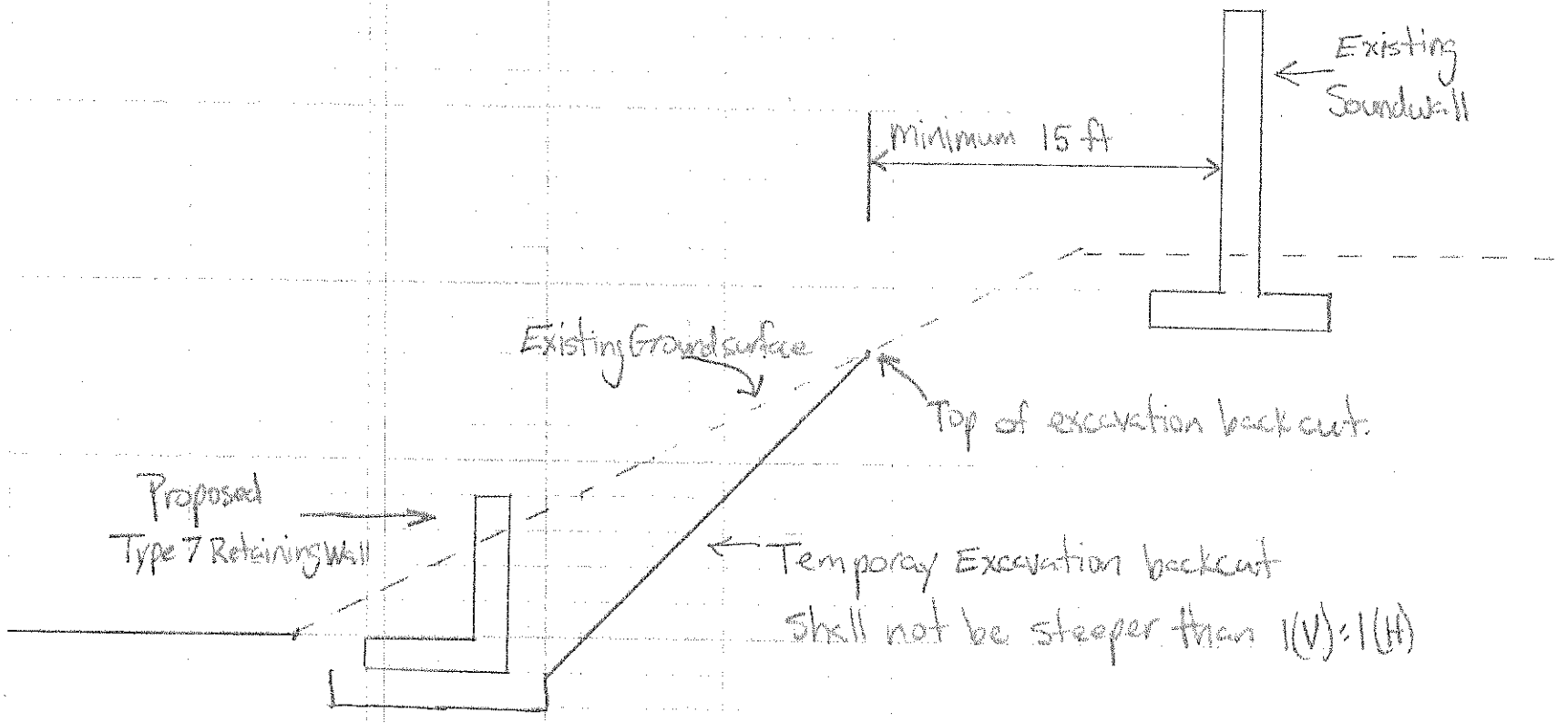
DATE: 4/12/10

EA: 04-235631



Not to scale

Figure 1; Typical footing excavation for Type 1 or Type 7 Retaining Wall.



Not to scale.

Figure 2: Typical cross section for Type 7 Retaining Wall

*Note: If the top of the temporary excavation back cut comes within 15 feet of the face of the soundwall, temporary shoring will be required.

24-SM-101, PM 0.0/5.6
David Nesbitt

4/12/10

EA: 04-235631

Soldier Pile Wall Information.

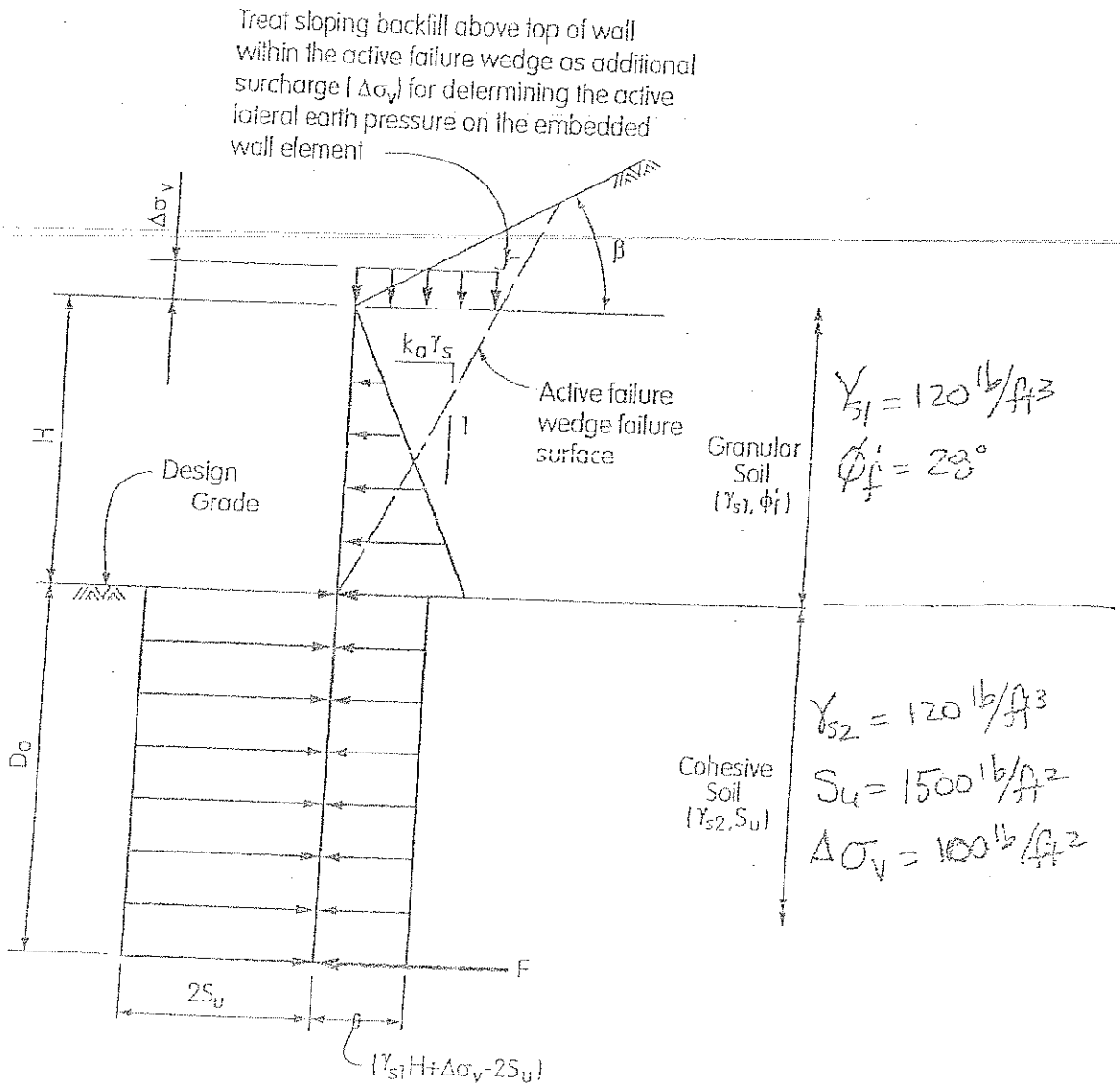


Figure 5.5.5.6-3 Simplified Lateral Earth Pressure Distributions for Temporary Non-gravity Cantilevered Walls with Vertical Wall Elements Embedded in Cohesive Soil and Retaining Granular Soil

EA: 04-235681, 04-SM-101, PM 0.0/3.6, David Naskitt 4/12/10

Figure 3

APPENDIX A

CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

GL TRACKING NO : 09-015
Dist - EA: 04-235611
Report Date: July 9, 2009
Page: 1/1

CLASSIFICATION TEST SUMMARY

SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
R-09-101_2																		32	17		17.8	
R-09-101_4																		31	15	109.3	18.6	
R-09-101_5						100	98	95	90	82	74	62	33	16	12	5	1				24.0	
R-09-102_1					100	97	85	76	58	47	38	30	20	12	10	3	1				13.7	
R-09-102_4																		32	10	94.1	27.9	
R-09-103_3																		39	22	96.5	26.1	
R-09-104_2				100	91	83	71	66	52	42	35	29	22	16	13	5	2				14.0	
R-09-104_3																		31	16		19.7	

0781 - 1P

BILLED

MAY 21 2009

CALC. BY _____ APPROVED BY _____

JUL 01 2009

DATE REPORTED _____

☐ DISTRICT DIP TR ☐ TRANS. LA
☐ DIS. MAT LS R ☐ PAV'T. SEC
☐ RESIDENT ENGINEER ☐ ACCOUNTIN
☐ CONSTRUCTION ☐

TL 101 (REV. 8-76)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SAMPLE IDENTIFICATION NO. C238657

☐ PRELIMINARY TESTS
☐ PROCESS TESTS
☐ ACCEPTANCE TESTS
INDEPENDENT ASSURANCE TESTS
☐ SPECIAL TESTS

SAMPLE SENT TO
☐ HDQTRS. LAB
☐ BRANCH LAB
☐ DIST. LAB
☐ FIELD LAB
☐ SPECIAL AUTHORIZATION NO.

FIELD NO. _____
DIST. LAB NO. _____
LOT NO. _____ OR
PROJ. NO. _____
04-235611

0781-1P

SAMPLE OF Native material
FOR USE IN Foundation
SAMPLE FROM Boring OS-R-103
DEPTH 2-5'
LOCATION OF SOURCE ~~OS-R-103~~

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 Corrosion Test (pH + Resistivity)

COVER ADDITIONAL INFORMATION WITH LETTER
DATE SAMPLED _____
BY _____ TITLE _____
DIST., CO., RTE., P.M. 04-SM-101 PM ~~2.6~~ 30
LIMITS _____
CONT. NO. 04-235611
FED. NO. _____
RES. ENGR. OR SUPT. David Nesbitt
ADDRESS 111 Grand Ave, Oak. MS-6 (8th floor)
CONTRACTOR 510-622-5104
fax 510-286-4595

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

RESISTIVITY = 2360 Ω-CM
Specs: 1000 Ω-CM (MIN)

REMARKS pH = 7.70
Specs: 5.6 (MIN)

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

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 PL PI		
CV		
S.E. AS REC'D		
S.E. CRUSHED		
S.E. COMBINED		
L.A.R.T. GRADE 100 REV		
L.A.R.T. GRADE 500 REV		
DUR D_f		
DUR D_i		
% CRUSHED PARTICLES		

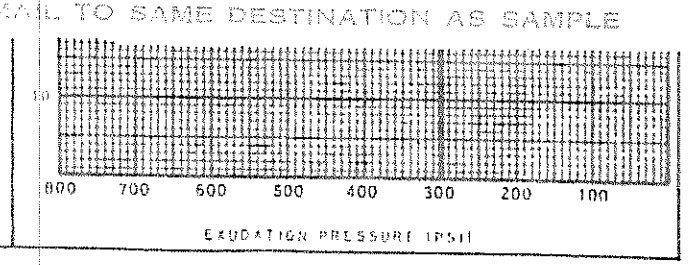
SP. GR. ☐ BULK (OVEN) ☐ BULK (SSD) ☐ APPARENT

	FINE	C
AS REC'D.		
CRUSHED		

REL. COMPACTION D

	IN PLACE	OP
DENSITY		
MOISTURE		
% REL. COMP		
SPEC.		

RICHARD CHAN
DISTRICT MATERIALS ENGINEER
BRANCH CHIEF, MATERIALS B



TL-361 (Rev. 10/78)

Use for subgrade enhancement geotextile (SEG).

Determine the SEG class based on the "Guide for Designing Subgrade Enhancement Geotextiles" on the Department's Pavement Engineering Website: http://www.dot.ca.gov/hq/esc/Translab/ope/Subgrade-Enhancement-Geotextile-Guide.pdf

Use BEES item code (regardless of Class):

198205 Subgrade Enhancement Geotextile

10-1.__ SUBGRADE ENHANCEMENT GEOTEXTILE

GENERAL

Summary

This work includes placing subgrade enhancement geotextile (SEG) between the subgrade and structural section.

Submittals

2

Submit a Certificate of Compliance under Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

MATERIALS

3

SEG must comply with the specifications for subgrade enhancement geotextile in Section 88-1.08, "Separation and Stabilization," of the Standard Specifications.

4*. Insert the Class.

SEG must be Class _B2_.

CONSTRUCTION

5

Do not use SEG made with polyester within 4 inches of recycled concrete.

6

Before placement, remove loose or extraneous material and sharp objects that may come in contact with SEG.

7

Place SEG:

1. In compliance with the manufacturer's recommendations
2. Longitudinally along the roadway alignment
3. Without wrinkles

8

Overlap adjacent borders of rolls at least 2 feet. Overlap the ends of rolls at least 2 feet in the direction you spread the material covering SEG.

9

You may fold or cut SEG to conform to curves. If you cut, overlap at least 1-1/2 feet. Hold the overlap in place, choosing from:

1. Staples
2. Pins
3. Piles of material to be placed on the SEG

10

Do not:

1. Stockpile material on SEG
2. Operate equipment or vehicles directly on SEG
3. Place more SEG than can be covered in 72 hours
4. Compact with a sheepsfoot or other non-smooth roller
5. Turn vehicles on material placed directly over SEG

11

Before operating equipment on material placed over SEG, place 6 inches of material compacted with either a smooth-wheeled roller with no vibrations or a rubber-tired roller.

12

Repair or replace damaged SEG. Repairing consists of placing new SEG with at least 3 feet of overlap from the edges of the damaged area.

MEASUREMENT AND PAYMENT

13

The contract item for subgrade enhancement geotextile is measured by the square yard for the actual area placed. Overlaps are not measured for payment.

14

The contract price paid per square yard for subgrade enhancement geotextile includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in placing subgrade enhancement geotextile, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Table 2. The required properties of Subgrade Enhancement Geotextile (SEG)

Property and Related Test Method	Requirements				
	Separation (SEP) Application		**Stabilization** (STAB) Application		
	Class A1 (Woven)	Class A2 (Nonwoven)	Class B1 (Woven)	Class B2 (Woven)	Class B3 (Nonwoven)
Elongation at break, % ASTM Designation: D 4632	<50	≥50	<50	<50	≥50
Grab tensile strength (minimum), kN ASTM Designation: D 4632	1.10	0.70	–	1.40	0.90
Wide Width Tensile Strength (minimum) at 5% strain, kN/m ASTM Designation: D 4595	–	–	29	–	–
Wide Width Tensile Strength (minimum) at ultimate strain, kN/m ASTM Designation: D 4595	–	–	70	–	–
Tear strength (minimum), kN ASTM Designation: D 4533	0.40	0.25	–	0.50	0.35
Puncture strength (minimum), kN ASTM Designation: D 6241	2.20	1.38	2.75	2.75	1.92
Permittivity (minimum), sec^{-1} ASTM Designation: D 4491	0.05	0.05	0.20	0.20	0.20
Apparent opening size (maximum), mm ASTM Designation: D 4751	0.30	0.30	0.60	0.30	0.30
Ultraviolet stability (retained strength after 500 hrs exposure) (minimum), % ASTM Designation: D 4355	70	70	70	70	70
Geotextile polymer type	Polyester or polypropylene				

Note: A copy of Table 2 in US Customary units is provided in Appendix B of this Guide (Section 15)

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

To: Structure Design
1. Preliminary Report
2. R.E. Pending File
3. Specifications & Estimates
4. File

Date: 4/2 /10

Henderson — Structure Name: RW

Geotechnical Services
1. GS (Sacramento)
2. GS

District: 04 — County: SM — Route: 01 — Post ~~Km~~: 3.06

District: Project Development — District Project Engineer

04-235631 — E.A. Number

RETW — Structure Number

Foundation Report By: D. Nasbitt — Dated: 4/19/10

Reviewed By: J. Patterson (OSD) — R. Price (GS)

General Plan Dated: 4/15/10 — Foundation Plan Dated: 4/ /10

☒ No changes. ☐ The following changes are necessary.

FOUNDATION CHECKLIST

- ✓ Pile Types and Design Loads
- ✓ Pile Lengths
- ✓ Predrilling
- ✓ Pile Load Test
- Substitution of H Piles For Concrete Piles ☐ Yes ☐ ✓ No
- Footing Elevations, Design Loads, and Locations
- ✓ Seismic Data
- ✓ Location of Adjacent Structures and Utilities
- ✓ Stability of Cuts or Fills
- ✓ Fill Time Delay
- ✓ Effect of Fills on Abutments and Bents
- ✓ B's
- ✓ urcharge
- ✓ oach Paving Slabs
- ✓ r
- ✓ nd Water
- ✓ ie Seals/Type D Excavation

Office of Structure Design — Branch No. BR16 — Geotechi Services

Rev. 10/02

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

To: Structure Design
1. Preliminary Report
2. R.E. Pending File
3. Specifications & Estimates
4. File

Geotechnical Services
1. GS (Sacramento)
2. GS

District Project Development — District Project Engineer

Date: 4/21/10

Hetch Hetchy Aqueduct
Str e Name

04 - SM - 101 - 2.68
District Count Route Post Km

04-235431 — E.A. Number
35-150M — Structure Number

Foundation Report By: C. Chen
Dated: 3/10/1

Reviewed By: J. Patterson (OSD) R. Price (GS)

General Plan Dated: 4/15/10
Foundation Plan Dated: 4/6/10

☒ No changes. ☐ The following changes are necessary.

FOUNDATION CHECKLIST

- ✓ Pile Types and Design Loads
- ✓ Pile Lengths
- ✓ Predrilling
- ✓ Pile Load Test
- ✓ Substitution of H Piles For Concrete Piles ☐ Yes ☒ No
- ✓ Footing Elevations, Design Loads, and Locations
- ✓ Seismic Data
- ✓ Location of Adjacent Structures and Utilities
- ✓ Stability of Cuts or Fills
- ✓ Fill Time Delay
- ✓ Effect of Fills on Abutments and Bents
- ✓ 3's
- ✓ urcharge
- ✓ oach Paving Slabs
- ✓ ir
- ✓ nd Water
- ✓ ie Seals/Type D Excavation

Office of Structure Design — Branch No. BR16 — Geotech Services

Rev. 10/02

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

To: Structure Design
1. Preliminary Report
2. R.E. Pending File
3. Specifications & Estimates
4. File

Geotechnical Services
1. GS (Sacramento)
2. GS

District Project Development

District Project Engineer

Date: 4/21

Ringwood — Str — POC — e Name

04 — 5m — District — Count

101 — 2.03 — Route — Post-Km

04-23563 — E.A. Number

35-0347 — Structure Number

Foundation Report By: C. Chan — Dated: 1/6/1

Reviewed By: J. Patterson (OSD) — R. Price (GS)

General Plan Dated: 4/15/10 — Foundation Plan Dated: 4/1 /10

☒ No changes. ☐ The following changes are necessary.

FOUNDATION CHECKLIST

- ___ Pile Types and Design Loads
- ✓ Pile Lengths
- ___ Predrilling
- ___ Pile Load Test
- ___ Substitution of H Piles For Concrete Piles ☐ Yes ☒ No
- ___ Footing Elevations, Design Loads, and Locations
- ___ Seismic Data
- ___ Location of Adjacent Structures and Utilities
- ___ Stability of Cuts or Fills
- ✓ Fill Time Delay
- ✓ Effect of Fills on Abutments and Bents
- ___ B's
- ___ urcharge
- ___ oach Paving Slabs
- ___ ir
- ✓ nd Water
- ✓ ie Seals/Type D Excavation

Office of Structure Design — BR 16 Branch No. — Geotechi Services

Rev. 10/02

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: TEBLEZ NEMARIAM
District Branch Chief
Design Peninsula

Attn: Aijun Ding

Date: January 20, 2010
File: 04-SM-101-PM 0.9/3.6
04-235631
Aux. Lane Widening

From: **RICK D'ONOFRIO, P.E.**
Materials Design Engineer
Engineering Services I – Materials C

REGISTERED PROFESSIONAL ENGINEER
RICHARD M. D'ONOFRIO
C 66054
EXP. 10-30-2010
CIVIL
STATE OF CALIFORNIA

RICHARD CHAN, P.E.
District Materials Engineer
District Branch Chief
Engineering Services I – Materials C

Subject: 65% PS&E Submitted Review.

This memo is in response to your request to review the 65% PS&E submittal for auxiliary lane widening on Route 101 in San Mateo County from PM 0.9 to 3.6.

After reviewing the submittal, we offer the following comments:

PS&E PLANS

TYPICAL X-SECTIONS, X-1

1) Under Structural Section Notes – Please add three Structural Sections (Structural Sections #5, #6 and #7):
   a. *Structural Section #5* (1.00' HMA(A)/0.55'AB(2)/0.85' PM (3) with filter fabric) is used in area for reconstructing Underdrain system with 0.15' RHMA-G Overlay.
   b. *Structural Section #6* (0.15' RHMA-G/1.00' HMA(A)/0.45'AB(2)/0.85' PM (3), with filter fabric) is used in area for reconstructing of Underdrain system that doesn't allow for 0.15' RHMA-G Overlay.
   c. *Structural Section #7* (0.15' RHMA-G/1.30' to 1.45' HMA (A)) is used at widening area for constructing storage tank.
2) Under Abbreviations – Please add PRF (Pavement Reinforcing Fabric) and CTB (Cement Treated Base).
3) For the lower Typical section –
   a. The existing shoulder section for both NB and SB should consisting of 0.15' RAC- G/0.10'AC/PRF/0.35'AC/0.50' CTB/0.50' ISM
   b. Please replace existing NB traveled way pavement section (0.75'-0.92' AC/0.33' CTS/0.50' ISM) with (0.67' PCC/0.33' CTS/0.50' ISM).
   c. Please replace Structural Section #3 with Structural Section #2.
4) For the Upper Typical section –

a. Please change the Station From (152+84 to 161.18.5) to (153+35 to 174+45) for NB direction and (152+86 to 174+90) for SB direction. This is the PCC area that the existing shoulder section can be used as traveled way.
b. For NB Direction-
   i. The existing shoulder section should be "0.25' AC/ 0.50'CTB/0.50'ISM".
   ii. Please add the last layer of 0.50' Filter Materials to the existing traveled way pavement section.
c. For SB direction –
   i. Please replace existing traveled way section "0.75'-0.92' PCC/0.33' CTS/0.50'ISM" with "0.75'-0.92' PCC/0.17' Cushion Course/0.50' ISM". This existing traveled way section is also the same for the existing shoulder section.
   ii. For the right side widening pavement section, please replace "Structural Section #1" with "Structural Section #5" or "Structural Section #6" to match the new permeable layer for the new Underdrain system or "Structural Section #7" for area reconstructing over storage tank.

TYPICAL X-SECTIONS X-2

5) This Typical Section X-2 can be deleted. Please see our comment 4a.

TYPICAL X-SECTIONS X-3

6) The bottom Typical Section can be deleted. Please see our comment 4a.
7) For the Upper Typical Section in SB Direction –
   a. The existing shoulder section should be "0.25' AC/0.50' CTB/0.50' ISM".
8) For Upper Typical Section in NB Direction –
   a. The existing shoulder section should be "0.15' RAC-G/0.10'AC/PRF/.30'AC/0.50'CTB/0.50' ISM".
   b. Also add a statement to the widening section stating that "Existing Edgedrain System to be removed."
   c. The existing traveled way section should be 0.15' RAC-G/0.10'AC/PRF/.10'AC to 0.95' Max. AC Leveling /0.67'PCC/0.33' CTS/0.50' ISM".
9) Please add painted post miles markers on the face of existing concrete barriers every 0.10 mile.

CONSTRUCTION DETAILS C-1

10) The new pavement section over storage box should be 0.15' RHMA-G/1.30' to 1.45' HMA (A).

CONSTRUCTION DETAILS C-2

11) Paving Comform at MBGR. Detail – The Word "Comform" is misspelled. The dimensions for conform detail should be in feet. Please change the thickness of "1¼" to 0.10' and also change the thickness of "¼" to "0.02"

CONSTRUCTION DETAILS C-3

12) The Choker area should be 3-feet wide instead of 1-foot wide.

13) For AC Pavement Longitudinal Conform- The overlay lip thickness should be 0.02' and the cold plane length should be 30 feet.

SPECIAL PROVISIONS

14) In SSP 39-150, Paragraph #15, the asphalt rubber binder grade must be PG 64-16.

15) In SSP 39-400, Paragraph #24, please delete it because there is no OGFC layer for this project; in Paragraph #34, under "MEASUREMENT AND PAYMENT", please also add " HMA Type A or RHMA-G" between "treating " and "aggregate".

16) In SSP 39-450, in Paragraph #374 under "MEASUREMENT AND PAYMENT", please also add "Type A or RHMA-G" between "HMA and "aggregate".
17) Please delete SSP 40-020 (Replace Concrete Pavement), PCC slab replacement is not needed.
18) Please add SSP 41-151 for spalled joint repair.

If you have any questions or need additional information, please contact Rick D'Onofrio at 622-1776.

c: Route File, Daily File
R. D'Onofrio

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: TEBLEZ NEMARIAM
District Branch Chief
Design Peninsula

Attn: Aijun Ding

Date: August 31, 2009
File: 04-SCL-101-PM 52.3/52.6
04-SM-101-PM 0.0/3.6
04-235611
Aux. Lane Widening

From: **RICK D'ONOFRIO, P.E.**
Materials Design Engineer
Engineering Services I – Materials C

RICHARD CHAN, P.E.
District Materials Engineer
District Branch Chief
Engineering Services I – Materials C

REGISTERED PROFESSIONAL ENGINEER
RICHARD M. D'ONOFRIO
C 66054
EXP. 6-30-2010
CIVIL
STATE OF CALIFORNIA

Subject: Revised R-Value and Alternative Pavement Sections (Permeable/ATPB/Storage Box Sections)

Based on the latest review of the existing R-value collected from previous jobs and our Materials files we are revising the R-value used in this job from 15 to 25.

Per a request made at a recent PDT meeting a request was made by Design for thinner pavement structural sections as a means of preventing possible conflicts with existing utilities. We feel there should be no concerns with utility interference with the current proposed Aux Lane/shoulder sections, but we are providing these sections nonetheless. The existing As-Built sections show thicknesses in the range of 1.48'-1.70'. Thus, the minimum alternative section (Structural Section Type II below) of 1.70' (-0.10' HMA (OGFC)) full depth HMA will meet the maximum pavement structural section thickness.

You Office has also made a request for us to provide a pavement structural section for permeable materials and ATPB (Structural Sections III and IV below, respectively) as well as the structural section above the "storage box" found under the SB lanes near the Henderson UP (Structure Type V).

I. Revised Proposed Structural Section:

Design Factors: TI_{40}=14 Rvalue = 25 Required G.E. =3.36'

Thickness	Gf	G.E.
0.10' HMA (OGFC*)		N/A
0.15' RHMA-G	1.64	0.25'
0.55' HMA (A)	1.64	0.90'
0.75' LCB	1.90	1.40'
0.95' AS (4)	1.00	0.95'
2.50'		3.50'

* Note: For NB direction only, between PM 52.3/52.6

II. Alternative Sections: (Full Depth HMA Section)

Design Factors: TI_{40}=14 Rvalue = 25 Required G.E. =3.36'

Thickness	Gf	G.E.
0.10' HMA (OGFC*)		N/A
0.15' RHMA-G	2.18	0.33'
1.45' HMA (A)	2.18	3.16'
1.70'		3.49'

* Note: For NB direction only, between PM 52.3/52.6

III. Permeable Section with Underdrain System (From NS3 157+34.46 to 166+34.46) SB Direction Only:

Design Factors: TI_{40}=14 Rvalue = 25 Required G.E. =3.36'

a) Permeable layer **without** RHMA Overlay

Thickness	Gf	G.E.
0.15' RHMA-G	1.94	0.29'
1.00' HMA (A)	1.94	1.94'
0.40' AB (3)	1.10	0.44'
0.85' PM (3)	1.00	0.85'
2.40'		3.52'

b) Permeable layer **with** RHMA Overlay

Thickness	Gf	G.E.
0.15' RHMA-G	1.94	0.29'
1.00' HMA (A)	1.94	1.94'
0.55' AB (3)	1.10	0.61
0.85' PM (3)	1.00	0.85'
2.55'		3.69'

Note: The Class 3 permeable materials should be wrapped around with filter fabric.

IV. ATPB Section (From NS# 134+16.29 to 139+09.29) SB Direction Only:

Design Factors: TI_{40}=14 Rvalue = 25 Required G.E. =3.36'

Thickness	Gf	G.E.
0.15' RHMA-G	1.65	0.25'
0.55' HMA (A)	1.65	0.91'

0.25' ATPB	1.40	0.35'
0.50' LCB	1.90	1.43'
0.95' AS (4)	1.00	0.95'
2.40'		3.89'

The existing shoulder sections can be saved and used as traveled way section except to remove and reconstruct the 6" wide edgedrain system.

V. Storage Box Section (NS3 162+72.69 to 162+90.51):

Design Factors: TL_{40}=14 Rvalue = 25 Required G.E. =3.36'

Thickness		Gf	G.E.
0.15'	RHMA-G	2.18	0.33'
1.45'	HMA (A)	2.18	3.16'
1.60'			3.49'

The minimum cover over the storage box per the provided Design Study is 1.45'. We therefore recommend a full depth HMA section of 0.15' RHMA-G/1.30' HMA (A) over the storage box area.

If you have any questions or need additional information, please contact Rick D'Onofrio at 622-1778.

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: TEBLEZ NEMARIAM
District Branch Chief
Design Peninsula

Attn: Aijun Ding

Date: August 24, 2009
File: 04-SCL-101-PM 52.3/52.6
04-SM-101-PM 0.0/3.6
04-235611
Aux. Lane Widening

From: **RICK D'ONOFRIO, P.E.**
Materials Design Engineer
Engineering Services I – Materials C

RICHARD CHAN, P.E.
District Materials Engineer
District Branch Chief
Engineering Services I – Materials C

Subject: Revised R-Value and Alternative Pavement Sections (Permeable/ATPB/Storage Box Sections)

Based on the latest review of the existing R-value collected from previous jobs and our Materials files we are revising the R-value used in this job from 15 to 25.

Per a request made at a recent PDT meeting a request was made by Design for thinner pavement structural sections as a means of preventing possible conflicts with existing utilities. We feel there should be no concerns with utility interference with the current proposed Aux Lane/shoulder sections, but we are providing these sections nonetheless. The existing As-Built sections show thicknesses in the range of 1.48'-1.70'. Thus, the minimum alternative section (Structural Section II below) of 1.70' (-0.10' HMA (OGFC) full depth HMA will meet the maximum pavement structural section thickness.

You Office has also made a request for us to provide a pavement structural section for permeable materials and ATPB (Structural Sections III and IV below, respectively) as well as the structural section above the "storage box" found under the SB lanes near the Henderson UP (Item V).

I. Revised Proposed Structural Section:

Design Factors: TI_{40}=14 Rvalue = 25 Required G.E. =3.36'

Thickness	Gf	G.E.
0.10' HMA (OGFC*)		N/A
0.15' RHMA-G	1.64	0.25'
0.55' HMA (A)	1.64	0.90'
0.75' LCB	1.90	1.40'
0.95' AS (4)	1.00	0.95'
2.50'		3.50'

* Note: For NB direction only, between PM 52.3/52.6

II. Alternative Sections: (Full Depth HMA Section)

Design Factors: TI_{40}=14 Rvalue = 25 Required G.E. =3.36'

Thickness	Gf	G.E.
0.10' HMA (OGFC*)		N/A
0.15' RHMA-G	2.18	0.33'
1.45' HMA (A)	2.18	3.16'
1.70'		3.49'

* Note: For NB direction only, between PM 52.3/52.6

III. Permeable Section with Underdrain System (From NS3 157+34.46 to 166+34.46) SB Direction Only:

Design Factors: TI_{40}=14 Rvalue = 25 Required G.E. =3.36'

Permeable layer **without** RHMA Overlay

Thickness	Gf	G.E.
0.15' RHMA-G	1.94	0.29'
1.00' HMA (A)	1.94	1.94'
0.40' AB (3)	1.10	0.44'
0.85' PM (3)	1.00	0.85'
2.40'		3.52'

Permeable layer **with** RHMA Overlay

Thickness	Gf	G.E.
0.15' RHMA-G	1.94	0.29'
1.00' HMA (A)	1.94	1.94'
0.55' AB (3)	1.10	0.61
0.85' PM (3)	1.00	0.85'
2.55'		3.69'

IV. ATPB Section (From NS# 134+16.29 to 139+09.29) SB Direction Only:

Design Factors: TI_{40}=14 Rvalue = 25 Required G.E. =3.36'

Thickness	Gf	G.E.
0.15' RHMA-G	1.65	0.25'
0.55' HMA (A)	1.65	0.91'
0.25' ATPB	1.40	0.35'
0.50' LCB	1.90	1.43'
0.95' AS (4)	1.00	0.95'
2.53'		3.89'

The existing shoulder sections can be saved and used as traveled way section except to remove and reconstruct the 6" wide edgedrain system.

V. Storage Box Section (NS3 162+72.69 to 162+90.51):

Design Factors: TL_{40}=14 Rvalue = 25 Required G.E. =3.36'

Thickness		Gf	G.E.
0.15'	RHMA-G	2.18	0.33'
1.45'	HMA (A)	2.18	3.16'
1.60'			3.49'

The minimum cover over the storage box per the provided Design Study is 1.45'. We therefore, recommend a full depth HMA section of 0.15'RHMA-G/1.30' HMA (A) over the storage box area.

If you have any questions or need additional information, please contact Rick D'Onofrio at 622-1778.

Richard Chan/D04/Caltrans/CAGov
08/26/2009 08:41 AM

To Teblez Nemariam/D04/Caltrans/CAGov@DOT, Aijun Ding/D04/Caltrans/CAGov@DOT, Taslima Khanum/D04/Caltrans/CAGov@DOT
cc
bcc
Subject Materials Recommendation for SM 101 Project (Ea 04-235611)

Hi Teblez/Aijun/Taslima,

Here is the materials recommendation memo for the SM 101 Project (Ea 04-235611). The signed Memo will email to you next week, because Rick is on vacation in Japan. Can you please save about 80k under supplemental fund for repair failed slabs and PCC spalls if needed. We can work with RE during Construction. I will be in the field in SCL County for the 280 project with Resident Engineer for looking at the additiona failed PCC slabs. If you have any question, please call my cell. Thanks.

memo-ea04235611-sm_scl-101.doc

Richard Chan, PE
District Materials Engineer
District 4 - Office of Engineering Services - I (Materials)
Office 510.286.5881 or Calnet 8.541.5881
Cell 510.719.7255
Fax 510.286.4839

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

DAILY FILE

Flex your power!
Be energy efficient!

To: TEBLEZ NEMARIAN
District Branch Chief
Office Design South-Peninsula

Date: July 17, 2007

File: 04-SM/SCL-101
PM 0.0/3.6 & 52.3/52.6
04-235610

Attention: Anand Garg

From: RICK D'ONOFRIO, P.E.
Materials Design Engineer
Engineering Services I – Materials C

REGISTERED PROFESSIONAL ENGINEER
RICHARD M. D'ONOFRIO
C 66054
EXP. 6/30/08
CIVIL
STATE OF CALIFORNIA

Concurred by: RICHARD CHAN, P.E.
District Materials Engineer
District Branch Chief, Mat C

Subject: PSR/PR Review

This memo is in response to your PSR/PR package to, among other things, widen ramps and Route 101 from the Embarcadero Road Interchange to the Marsh Road Interchange in order to accommodate additional auxiliary lanes in both directions. This PSR presents two alternatives. Alternative #1 would require some narrowing of the left (median) shoulder in order to fit the new auxiliary lane within the existing sound walls. Alternative #2 proposes a standard left (median) shoulder of 10' and the subsequent relocation of some existing sound walls.

EXISTING CONDITIONS

Route 101 is a 4-lane freeway (each direction) with predominantly AC paving with approximately 3.8 miles of either 3 or 4 lane PCC. A site trip was conducted in 2006 as well as several in June and July of 2007. Contract #04-0C8904 (PM 40.2/52.6) shows that for the SCL portion (PM 52.3/52.6) of this proposed project, the AC surfaces in both the Northbound and Southbound lanes have recently been overlaid with 0.10' OGAC/0.10' RAC-G in the NB direction and remove/replace 0.15' RAC-G in the SB HOV lane only. The existing structural sections are defined further below.

Regarding the SM portion, Contract # 04-0C9504 is currently in construction and has either ground the existing PCC slabs or cold-planed and paved the existing OGAC ramps and mainline with 0.15' RAC-G. The existing structural sections, including the new RAC-G surfacing, is summarized below:

TABLE 1

EXISTING STRUCTURAL SECTIONS: SM-101 (PM 0.0/3.6)			
NORTHBOUND		SOUTHBOUND	
PM	Pavement Type	PM	Pavement Type
0.0-2.8	45 mm RAC-G/ 147 mm AC/204 mm PCC/100 mm CTS	0.0-3.4	204 mm PCC/100 mm CTS/150 mm ISM
2.8-3.2	229-279 mm PCC 100 mm CTS/150 mm ISM	3.4-5.0	45 mm RAC-G/76 mm AC/204 mm PCC/101 mm CTS
3.2-5.0	45 mm RAC-G/107 mm AC/204 mm PCC/101 mm CTS/150 mm ISM	HOV – Lane No. 1 consists of 45 mm RAC-G/320 mm AC between PM 0.0/3.2	

TABLE 2

EXISTING SHOULDER SECTIONS: SM-101 (PM 0.0/3.6)			
NORTHBOUND			
PM	Inside Shoulder	PM	Outside Shoulder
0.0-3.2	45 mm RAC-G/122 mm AC(A)/213 mm ACB(A)	0.0-2.8 3.2-3.4	45 mm RAC-G /var. AC Leveling/var. AS(4)
3.3-5.0	45 mm RAC-G/122 mm AC(A)/213 mm ACB(A)	2.8-3.2	Existing PCC pavement over CTB
SOUTHBOUND			
0.0-3.2	45 mm RAC-G/122 mm AC/213 mm ACB	0.0-3.6	45 mm RAC-G/180 mm AC/var. AS(4)
3.2-5.0	45 mm RAC-G/122 mm AC(A)/213 mm ACB(A)		

As previously mentioned, the short section of SCL 101 (PM 52.3/52.6), per Contract 04-0C8904, page X-2, shows the following:

Southbound Mainline:

HOV:	45 mm RAC-G/268 mm AC
Outside Lanes:	229 mm PCC/100 mm CTB
Outside Shoulders:	76 mm AC/152 mm AB(2)
Inside Shoulders:	45 mm RAC-G/107 mm AC(A)/213 mm ACB(A)

Northbound Mainline:

HOV:	30 mm OGAC-G/30 mm RAC-G/241 mm AC
Outside Lanes:	30 mm RAC-G/30 mm OGAC/52-186 mm AC/228-280 mm PCC
Outside Shoulders:	30 mm RAC-G/30 mm OGAC/76 mm AC/152 mm AB(2)
Inside Shoulders:	30 mm OGAC/30 mm RAC-G/30 mm OGAC/122 mm AC(A)/213 mm ACB(A)

Table 3, below, shows that all but one of the ramps for this proposed project have recently also been re-paved with 0.15' or 0.20' (45mm or 60 mm) RAC-G.

Ramps:

TABLE 3

#	Ramp Description	Existing Pavement Conditions
1	Embarcadero Rd NB diagonal on ramp	Newly paved, one lane. Remove/replace with 45 *or* 60 mm RAC-G
2	University Ave NB on ramp	Newly paved, one lane. Remove/replace with 45 mm RAC-G.
3	Willow Road NB loop on-ramp	Newly paved, one lane. Remove/replace with 45 mm RAC-G.
4	Willow Rd NB diagonal on ramp	Newly paved, one lane. Remove/replace with 45 mm RAC-G.
5	Marsh Rd SB diagonal on ramp	Newly paved, with additional diamond lane, 45 mm RAC-G
6	Willow Rd SB loop on ramp	Older, good condition, one lane
7	Willow Rd SB diagonal on ramp	Newly paved, one lane. Remove/replace with 45 mm RAC-G.
8	University Ave SB diagonal on ramp	1 lane newly paved, other lane older pavement. Remove/replace with 45 mm RAC-G.

RECOMMENDATIONS

PSR Alternative 1:

As mentioned above, Alternative #1 would require some narrowing of the left (median) shoulder in order to fit the new auxiliary lane within the existing sound walls. Therefore, some of the existing median would have to be used as a traveled way. The existing median sections are adequate for mainline traffic loading but the outside shoulders are not. Because most of the shoulders are now overlayed with either AC(A) or RAC-G, as well as the majority of the traveled-way, (including most of lane #1 of the PCC segment of roadway), only AC(A) and RAC-G structural sections will be considered.

Caltrans current policy regarding RAC-G placement is that it should not be put directly on base or sub-base materials. Therefore, the structural sections below will include a DGAC layer beneath the RAC-G. We have assumed the gravel factor (G_f) is the same for DGAC and RAC-G. Also, our preliminary weight estimate using 0.15' RAC-G shows the anticipated tonnage will easily exceed the minimum 5000-ton requirement. Finally, the Highway design manual does not encourage having AC(A) adjacent to RAC-G. Therefore, because new RAC-G is already on the traveled-way, the proposed new sections should include a RAG-G layer as well.

Because the mainline has just been overlaid, we do not recommend any overlay be placed there. The OGAC layer placed between PM 52.3/52.6 on the NB direction, though, will need to be removed and replaced due to staging construction. The auxiliary lane and right shoulders should have the following structural section:

I. Auxiliary Lane/Right Shoulders

Design Factors: $TI_{20} = 13$ $R_v = 15$ (Both our estimates) Required G.E. = 3.53'

Option 1

Thickness	G.E.
0.15' RAC-G	0.25'
0.50' AC(A)	0.82'
0.75' CTB(A)	1.26'
1.30' AS(4)	1.28'
2.70'	3.61'

Option 2 ("Full Depth " AC)

Thickness	G.E.
0.15' RAC-G	0.28'
0.75' AC(A)	1.38'
1.05 ACB'	1.96'
2.05'	3.62'

For the RAC-G material, we recommend a ½" max grading using a PG 64-16 binder. For the AC(A), a ¾" max coarse grading using a PG 64-10 binder is recommended.

PSR Alternative #2

This alternative proposes a standard left (median) shoulder of 3 meters. The existing median shoulder widths are in many cases less than that. Consequently, the entire lane striping would need to shift toward the right resulting in some of the #1 lane to be converted to shoulder. This would not require any structural changes. Therefore the above recommendations would still be valid for the auxiliary and right shoulders.

III. Ramps (*Both Alternatives*)

As stated earlier, 7 out of the 8 ramps listed in this project have just been overlaid with 45 or 60 mm RAC-G. Therefore, no additional paving of existing ramps where the new RAC-G is present is required. The two ramps, #6 and #8, with older existing AC, should remove and replace the AC with 0.15' RAC-G. For the widening or reconfiguring portions, we recommend the following structural sections:

Design Factors: $TI_{20} = 10$ (medium classification) $R_v = 15$ Req'd G.E. = 2.72'

Option 1

Thickness	G.E.
0.15' RAC-G	0.26'
0.40' AC(A)	0.61'
0.85' AB(3)	0.92'
0.95' AS(4)	0.94'
2.35'	2.73'

Option 2 ("Full Depth" AC)

Thickness	G.E.
0.15' RAC-G	0.35'
1.10' AC(A)	2.54'
1.25'	2.89'

We recommend the same gradings and binders used above.

Please contact Rick D'Onofrio at 622-1776 if you have any questions.

c: Route File, Daily File
R. D'Onofrio/

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
Division of Engineering Services
Office of Geotechnical Design - West

COPY FOR
DEPT.
ATTN. Ajay

PRELIMINARY GEOTECHNICAL REPORT

AUXILIARY LANES FROM EMBARCADERO ROAD TO MARSH ROAD

04 – SM-101 PM 0.0/3.6, SCL-101 PM 52.3/52.6
04 – 235610

REGISTERED GEOLOGIST
ANNA SOJOURNER
No. 7537
Exp. 12/31/2007
STATE OF CALIFORNIA

PREPARED BY:

ANNA SOJOURNER
Engineering Geologist
Geotechnical Design – West
Branch B

WORK SUPERVISED BY:

GRANT WILCOX
Branch Chief
Geotechnical Design - West
Branch B

JULY 2007

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APPENDIX 1

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1. INTRODUCTION

This report evaluates the potential geotechnical impacts of the proposal to add lanes on Highway 101 between Embarcadero Road and Marsh Road in Santa Clara and San Mateo Counties (Figure 1). There are currently two alternatives under consideration. It is our conclusion that there are no significant unmitigable geotechnical conditions for either alternative and the project can be constructed as proposed.

The purpose of this report is to document subsurface geotechnical conditions, provide analyses of anticipated site conditions as they pertain to the project, and to recommend design and construction criteria. Foundation reports for structures within the project limits will be provided under separate cover.

Field work and subsurface exploration, laboratory tests and analyses will be performed as part of the Geotechnical Design Report to evaluate wall design, groundwater, and to determine soil strengths and any geotechnical mitigation needed.

2. PERTINENT REPORTS AND INVESTIGATIONS

A search of Caltrans records indicates that there have been no major slipouts, landslides, or other geotechnical problems in the project area. Preliminary Geotechnical Reports for adjacent sections of the freeway were written by Parikh Consultants. Published references used in this study can be found at the end of the report.

3. DESCRIPTION OF PROJECT ALTERNATIVES AND EXISTING FACILITIES

The proposed project will widen the existing six-lane freeway corridor by one lane in each direction from the Embarcadero Road Interchange in Palo Alto (Santa Clara County) to the Marsh Road Interchange in Menlo Park (San Mateo County). The lanes will be added to the outside.

Both alternatives will require realignment of on-ramps and off-ramps to accommodate HOV and auxiliary lanes. Two bridges will be replaced, the Henderson Underpass Railroad Bridge (San Mateo PM 3.4) and the Ringwood Avenue Pedestrian Overcrossing (San Mateo PM 2.57). A stormwater lift station near the Henderson Underpass will need to be relocated. The new alignment crosses the Hetch Hetchy Aqueduct at San Mateo PM 1.76.

The San Francisquito Creek Bridge (San Mateo PM 0.0) will be replaced in a separate project.

3.1 Alternative 1

Alternative 1 would keep the existing soundwalls in place, and narrow the shoulders as needed to accommodate the additional lanes. At the Henderson Underpass, two retaining walls will be placed in the depressed section. The left wall lies between Stations 249+10 and 260+00, and has a maximum height of about 18.5 feet at Station 255+90. The right wall lies between Stations 253+20 and 254+20 and has a maximum height of 18.75 feet at Station 254+00. Alternative 1 is the preferred alternative.

3.2 Alternative 2

Alternative 2 would move the existing soundwalls to keep standard shoulder widths throughout the corridor. Retaining walls would be required as described for Alternative 1. Alternative 2 would require right-of-way purchase, and the frontage road would have to be rebuilt.

4. PHYSICAL SETTING

4.1 Climate

The project site lies in East Palo Alto and Menlo Park, less than 2 miles west of the San Francisco Bay. The site has a Mediterranean climate, with moderate, wet winters, and warmer dry summers. Most rainfall occurs in winter, from December to February. Low fog may occur, particularly in the summer, but is less common here than at other Bay Area locations.

4.2 Topography and Drainage

The project lies on coalescing alluvial fans that drain the Coast Ranges to the west into the bay. The project is mostly flat, with a depressed section at the Henderson Underpass (San Mateo PM 3.4). To the west, the hills of the Coast Ranges rise to approximately 1,000 feet or higher.

San Francisquito Creek crosses the alignment at the San Mateo-Santa Clara County line.

4.3 Man-Made and Natural Features Of Engineering And Construction Significance

Bridges and overpasses will require widening to accommodate additional lanes. Soundwalls line the route and will require either narrower shoulders or will need to be moved.

The Ringwood Avenue Pedestrian Overcrossing and Henderson Underpass Railroad Structure will be replaced and lengthened. The Hetch Hetchy Bridge will be widened to accommodate the wider freeway. On-ramps will be widened at Embarcadero Road northbound, University Avenue, north- and southbound, Willow Avenue, north- and southbound, and Marsh Road southbound.

There is a stormwater lift station at the Henderson underpass that will require relocation to accommodate the widening of the freeway. The adequacy of the system to carry a 50-year storm will require study.

5. GEOLOGY

5.1 Regional

The site lies on the alluvial plain on the west side of southern San Francisco Bay, at the foot of the Coast Ranges. Alluvial fans and late Quaternary deposits coalesce in the plain. Numerous creeks and sloughs flow roughly from west to east and drain the hills into the bay.

The San Francisco Bay Area is highly seismically active, and several active faults lie within a few miles of the site.

5.2 Site

The freeway passes through Quaternary alluvium (Figure 2), including Holocene basin deposits and flood-plain deposits. Most of the native soil is unconsolidated sediments. Logs of Test Borings from several structures along the project area are included in Appendix 1. They generally show stiff clay with sand and silt.

The freeway lies on areas with moderate to high liquefaction susceptibility (Figure 3).

5.3 Soils

The project site soils are mapped by the Soils Conservation Service (Web Soil Survey) as Urban Fill, meaning that the native soils have been stripped or reworked in construction and are no longer mappable. Urban Fill soils may have widely different engineering properties, so testing would be required to determine the specific engineering properties of the site soils.

6. GEOTECHNICAL CONSIDERATIONS

6.1 Excavation Characteristics

The project site soils may vary, from very soft where disturbed to hard where consolidated or cemented alluvium is present. We have not performed site geologic mapping, but Quaternary alluvium is present all along the proposed alignment, and known to be several hundred feet thick in the South Bay. Hard rock is not expected to be encountered in construction. Studies for the Geotechnical Design Report will describe more specifically the characteristics of materials in the areas requiring excavation.

6.2 Erosion

The area is mostly flat and erosion is not considered a problem along this alignment. District 4 Landscape Architecture should be consulted for erosion protection along any proposed new slopes.

6.3 Groundwater

Logs of Test Borings (Appendix 1) show groundwater at approximately 2 feet elevation throughout the project site. The roadway lies at approximately 10 to 20 feet elevation. The proposed retaining walls may require construction dewatering.

6.4 Seismicity

The San Francisco Bay Area is highly seismically active, with numerous large regional faults. The San Andreas and Hayward Faults pass within a few miles of the site. Several major earthquakes were recorded in the last 150 years, all of which would have caused ground shaking at the site.

The USGS (2003) assigns a 62% probability that a major earthquake will occur on a fault in the Bay Area in the next 30 years (Working Group, 2003). A major

earthquake in the Bay Area could result in severe groundshaking at the project site and trigger secondary damage such as liquefaction or settlement.

No known active or potentially active faults cross the proposed alignment. Faults close to the project alignment are tabulated below, and the expected peak ground accelerations (PGA) are given. Distances were measured from the closest point along the proposed alignment to the fault using Jennings (1997). The Maximum Credible Earthquake (MCE) and Peak Ground Acceleration, in g, were derived from Mualchin (1996).

Table 1 Peak Ground Acceleration

Fault	Distance (km)	MCE	PGA (g)
San Andreas	12.5	8	0.48
Hayward	16.75	7½	0.33
Monte Vista	6.25	6½	0.35

The hazard is controlled by the San Andreas Fault.

6.4.1 Historical Seismicity

The site experienced strong ground shaking during the 1906 Great San Francisco Earthquake and during the 1989 Loma Prieta Earthquake. The site is likely to experience strong shaking in the future.

6.5 Liquefaction Susceptibility

Highway 101 passes through areas mapped as having a moderate to high liquefaction susceptibility (Figure 3; Knudsen, et al., 2000). Logs of Test Borings indicate that the groundwater table lies approximately 6 to 18 feet below ground level (Appendix 1). Detailed soil borings should be drilled for all structures and retaining walls to determine if liquefiable sediments are present.

6.6 Settlement

Soft sediments can settle under load. As part of geotechnical exploration of the site, borings can help determine the settlement potential. Settlement is not known to have occurred at this site previously.

6.7 Slope Stability

The area is mostly flat and natural slope stability should not be a concern.

7. POTENTIAL PROJECT IMPACTS ON MAN-MADE AND NATURAL FEATURES

The Hetch Hetchy aqueduct at San Mateo PM 1.76 and the Ringwood Avenue Pedestrian Overcrossing at San Mateo PM 2.57 will both be widened as part of this widening project. A pump station at the Henderson Underpass at San Mateo PM 3.4 will need to be moved. If Alternative 2 is selected, soundwalls may be moved.

8. HAZARDOUS WASTE IMPACT

An Initial Site Assessment has been completed for the project. There is a potential for aerially deposited lead contamination in the right-of-way, but the ADL materials may be used as fill material on site.

9. PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

9.1 Exploration and Investigations

Geotechnical Exploration is necessary to determine groundwater levels, soil types and strengths, and susceptibility to liquefaction or settlement. Several investigative methods should be used, including but not limited to: geologic mapping, soil borings, cone penetrometry studies, and geophysical studies.

Vertical borings will be advanced where walls are proposed or where soil stability should be investigated. The borings will characterize the geologic materials at depth, determine the suitability of the sites, and provide input into wall design. Groundwater levels should be measured to determine the need for dewatering in construction or wall design.

To characterize the subsurface at proposed wall locations, at least one boring is required per 200 lineal feet of wall, to a depth 2 to 2½ times the height of the wall. The left wall will require 6 vertical borings of 50 feet depth, and the right wall will require one boring, also 50 feet deep. In addition to Standard Penetration Tests (SPT) performed every 5 feet, pocket penetrometer readings should be taken on core samples as they are logged. Samples should be taken for moisture content and corrosion.

Two additional Cone Penetrometry (CPT) borings for the longer wall may be useful to find soil type, strength, moisture content, and groundwater depth.

9.2 Dewatering

We are not aware of any areas that currently require dewatering or suffer settlement or other secondary effects of dewatering. The exploratory drilling for the Geotechnical Design Report will help characterize the site soils and determine the likelihood of settlement, and delineate any areas that will require dewatering during construction.

All walls proposed for the project should include dewatering features, such as horizontal drains or underdrains.

9.3 Corrosion

Corrosivity tests will be conducted as part of the Geotechnical Design Report.

10. REFERENCES

Brabb, E.E., Graymer, R.W., and Jones, D.L., 2000, Geologic Map and Database of the Palo Alto 30 x 60 Quadrangle, California, U.S. Department Of The Interior Miscellaneous Field Studies Map MF- 2332.

Jennings, C.W., 1994, Fault Activity Map of California and Adjacent Areas, Department of Conservation, State of California, Scale, 1: 750,000.

Knudsen, K.L., Sowers, J.M., Witter, R.C., Wentworth, C.M., and Helley, E.J., 2000, Preliminary maps of Quaternary deposits and liquefaction susceptibility, nine-county San Francisco Bay region, California: a digital database, U.S. Geological Survey Open-File Report 00-444

Mualchin, L., 1996, A technical report to accompany the Caltrans California seismic hazard map, Caltrans, 64 p.

Soil Conservation Service Web Soil Survey, http://websoilsurvey.nrcs.usda.gov/app/

Wagner, D.L., Bortugno, E.J., and McJunkin, R.D., 1990, Geologic Map of the San Francisco-San Jose Quadrangle, California Division of Mines and Geology, Scale 1: 250,000.

Working Group of California Earthquake Probabilities, 2003, Summary of Earthquake Probabilities in the San Francisco Bay Region: 2003 – 2032, USGS Open-File Report 03-214, 235 p.

FIGURES

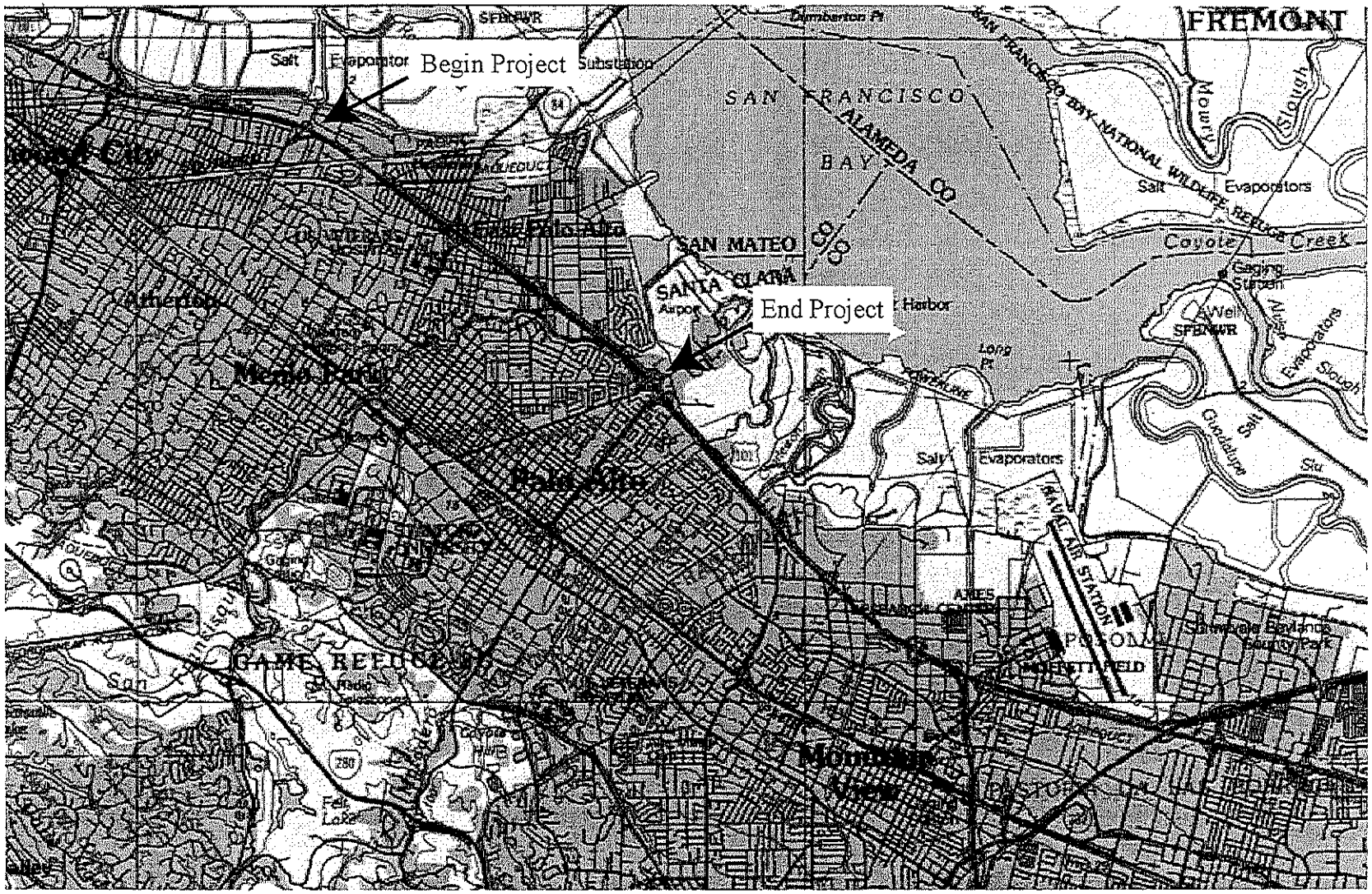
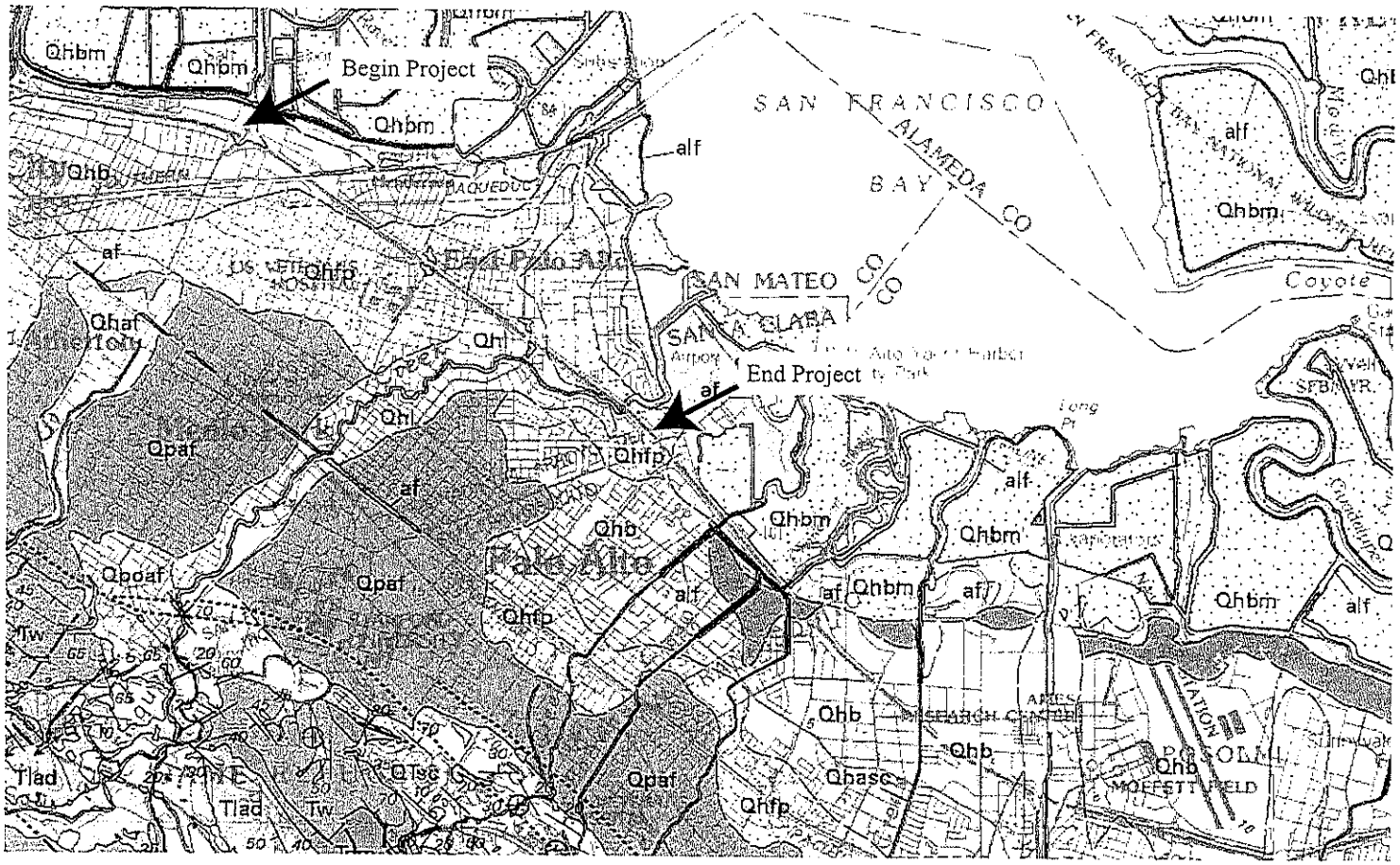


	Figure 1	**Location Map**
	SM 101 0.0-3.6 / SCL 101 52.3-52.6	
	EA 04-235610	July, 2007



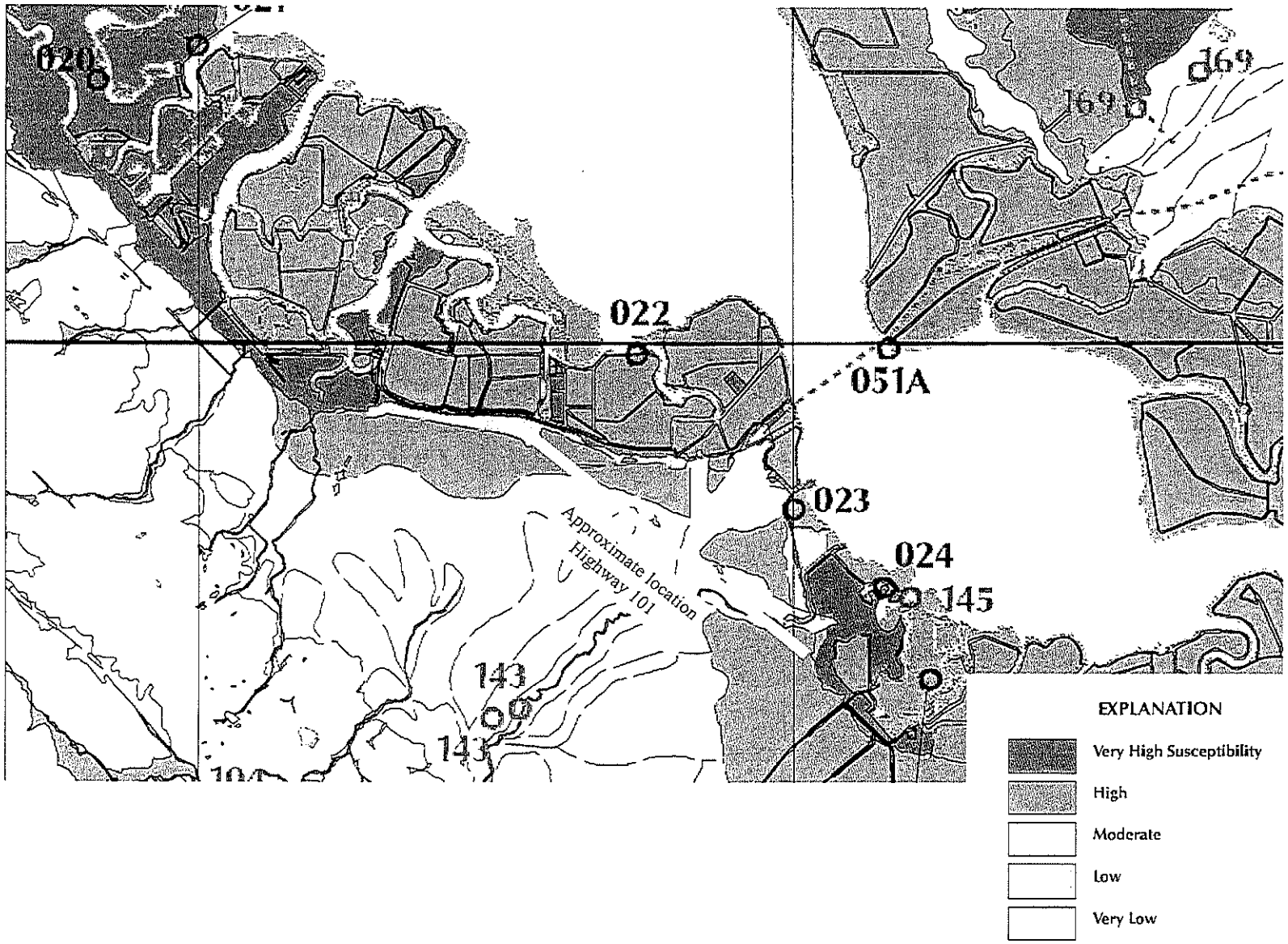
af Artificial Fill (Historic)
Qhb Basin Deposits (Holocene)
Qhfp Flood plain Deposits (Holocene)
Qhl Natural Leveee Deposits (Holocene)
Qpaf Alluvial Fan (Pleistocene)
Qhbm Bay Mud (Holocene)

Source: Brabb, E.E., Graymer, R.W., and Jones, D.L., 2000, Geologic Map and Database of the Palo Alto 30 x 60 Quadrangle, California, U.S. Department Of The Interior Miscellaneous Field Studies Map MF- 2332.

Figure 2 **Geology Map**

SM 101 0.0-3.6 / SCL 101 52.3-52.6

EA 04-235610 July, 2007



Source: Knudsen, K.L., Sowers, J.M., Witter, R.C., Wentworth, C.M., and Helley, E.J., 2000, Preliminary maps of Quaternary deposits and liquefaction susceptibility, nine-county San Francisco Bay region, California: a digital database, U.S. Geological Survey Open-File Report 00-444

Figure 3 Liquefaction Susceptibility Map

SM 101 0.0-3.6 / SCL 101 52.3-52.6

EA 04-235610 July, 2007

APPENDIX ONE

LOGS OF TEST BORINGS

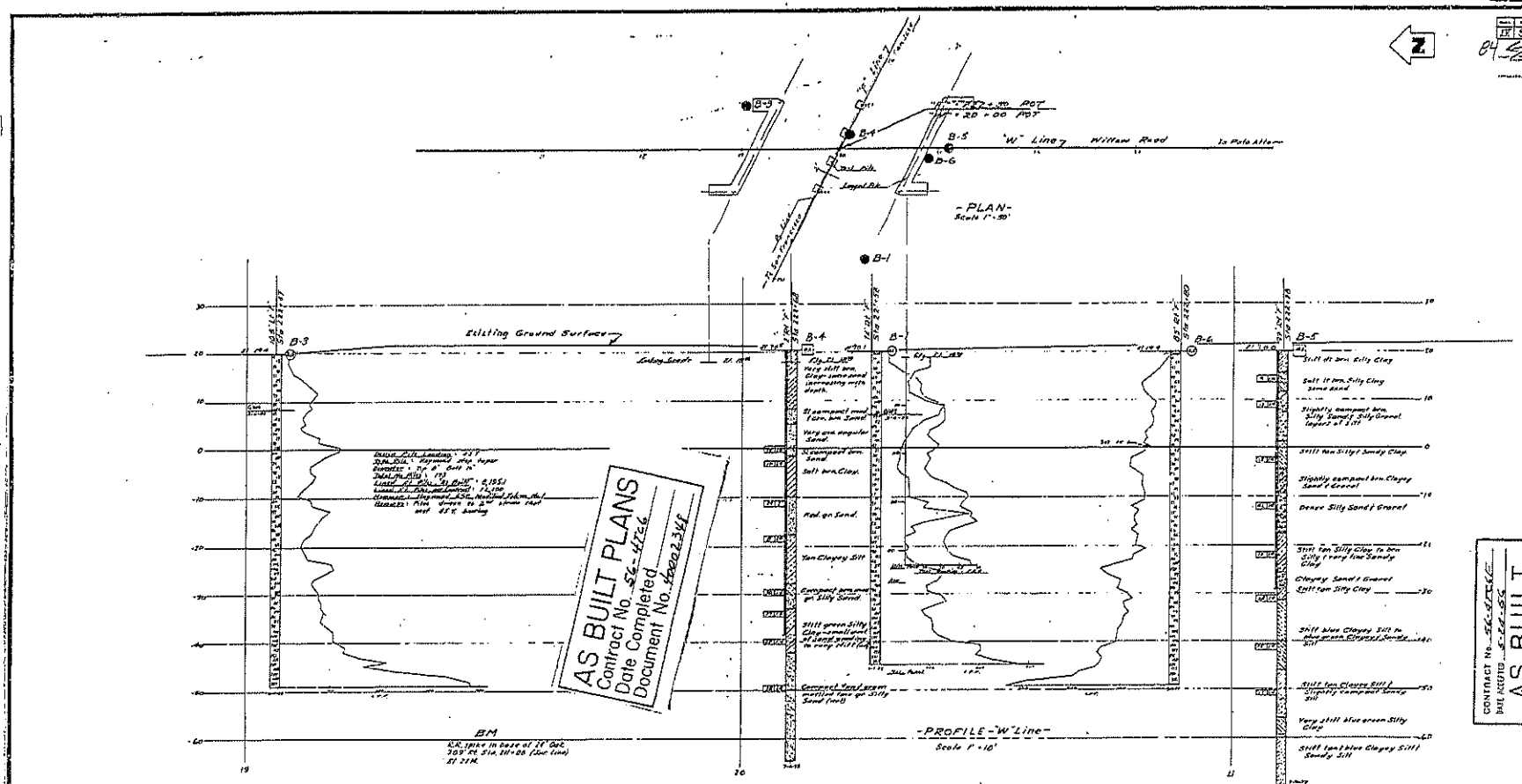
U-181 (26)

District	County	Route	Number
2	CAL		

District	County	Route	Number
IX	SM	280	D

84 February 21, 1

BRIDGE DEPARTMENT



Classification of Material Based on Standard Grade Size Limits

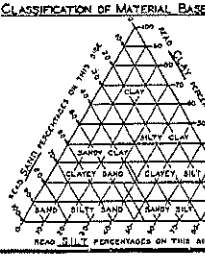


Diagram showing the basis for estimates of grade size distribution used in determination of class names.

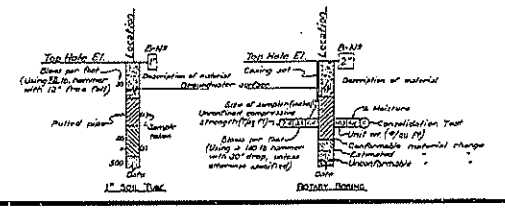
If gravel is present in appreciable amounts the term "gravelly" may be added to the class name, viz. "gravelly sand" the terms "coarse", "medium" and "fine" when used to describe gravel, sand and silt refer to standard grade size limits.

Legend of Earth Materials

- Gravel
- Sand
- Silt
- Clay
- Sandy Clay or Clayey Sand
- Sandy Silt or Silty Sand
- Silty Clay or Clayey Silt
- Peat and/or Organic Clay
- Filled Material
- Igneous Rock
- Sedimentary Rock
- Metamorphic Rock

Legend of Boring Operations

- Plan of any boring
- Penetrometer
- 2½" Core penetrometer
- Sampler boring (dry)
- Rotary boring (wet)
- Auger boring (dry)
- Jet boring
- Core boring
- Test pit



Notes

The contractor's attention is directed to section 2, article 10 standard specifications and to the special provisions accompanying this sc

Classification of earth material as shown on this sheet is base field inspection and is not to be construed to imply mechanical anal

Penetrometer borings having a rate of penetration measured p per foot are driven with a No 2 Griersman-Terry air hammer at

State of California
Department of Public Works
Division of Highways

WILLOW RD. SEP.

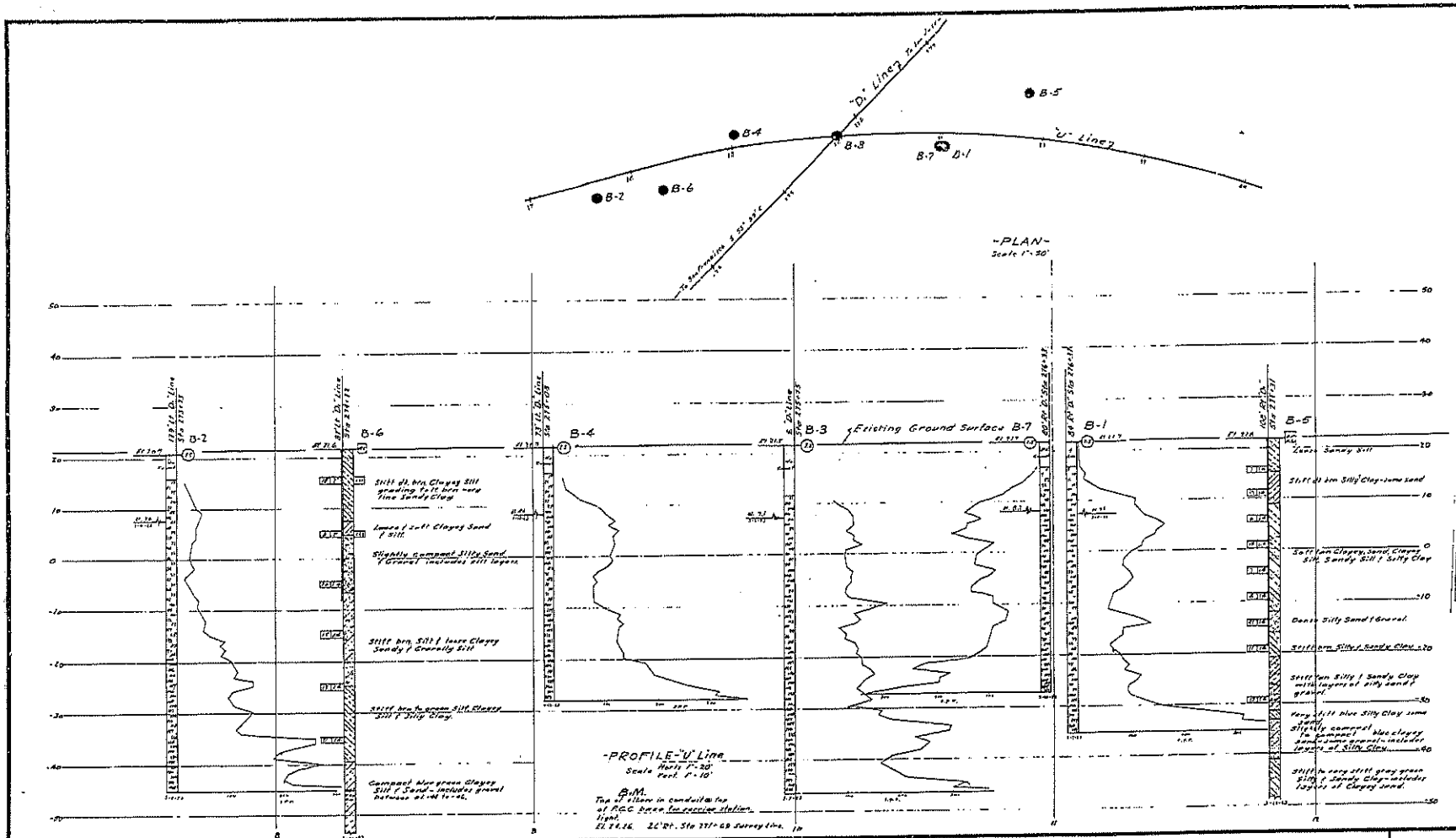
LOG OF TEST BORINGS

Scale As Shown | Bridge 35-84 | File E-35 | Drawing

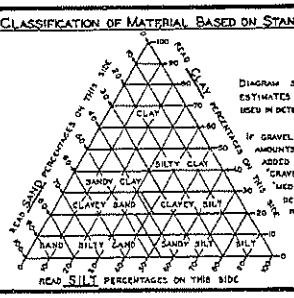
2941 E

I hereby certify that this is a true and accurate copy of the above document taken under my direction and control on this date in Sacramento, California pursuant to authorization by the Director of Public Works.

Date ____ Signature ____ Title ____



Classification of Material Based on Standard Grade Size Limits



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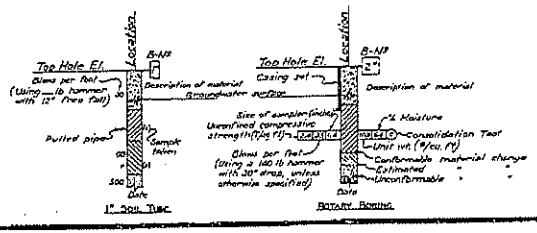
- Sampler boring (DIY)
- Rotary boring (WET)
- Auger boring (DRY)
- Jet boring
- Core boring
- Test pit



Notes

The contractor's attention is directed to Section
Standard Specifications and to the Special Provisions Accom
Classification of earth material as shown on thi
field inspection and is not to be construed to imply
Penetrometer borings having a rate of penetrat
per foot are driven with a No 2 McKiernan-Terry A

State of California
Department of Public Works
Division of Highways

UNIVERSITY A

LOG OF TEST BOR

Scale: H. 1" = 20' V. 1" = 10' | Bridge 55-113 R | File

AS BUILT PL
Contract No. 57-47C
Date Completed
Document No. 40002

CONTRACT No.
DATE ACCEPTED
AS B
RESIDENT ENGINEER
REVISIONS BY

BRIDGE DEPARTMENT

84

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE AS-BUILT DRAWING TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE ____ SIGNATURE ____ TITLE ____

F-101 (20)

SINGLE COLUMN RETROFIT - PROJECT 42					
DIST.	COUNTY	ROUTE	POST MILES - TOTAL PROJECT	Sheet No.	Total Sheets
04	SCL	101			

ENGINEERING GEOLOGY BRANCH - TRANSPORTATION MATERIALS & RESEARCH

CERTIFIED ENGINEERING GEOLOGIST - PROJECT GEOLOGIST

RINGWOOD AVE POC

LOG OF TEST BORINGS

NOTE: THIS LOG OF TEST BORINGS IS AVAILABLE ON MICROFILM AT OFFICE OF STRUCTURES DESIGN SACRAMENTO, CALIFORNIA

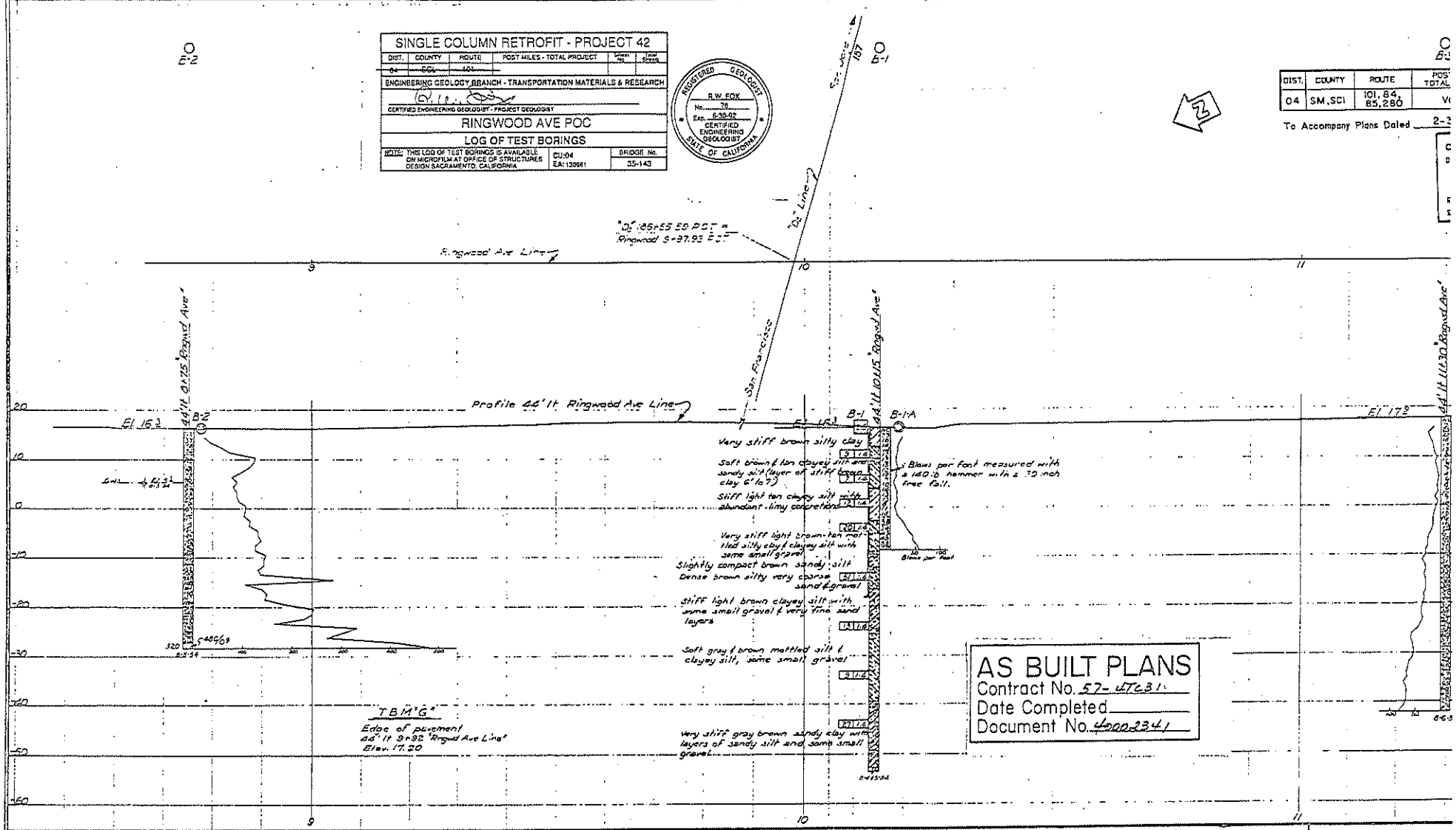
CU:04 EA: 130981

BRIDGE No. 35-143

REGISTERED GEOLOGIST — R.W. FOX No. 76 Exp. 6-30-02 — CERTIFIED ENGINEERING GEOLOGIST — STATE OF CALIFORNIA

DIST.	COUNTY	ROUTE	POST TOTAL
04	SM, SCl	101, 84, 85, 280	V

To Accompany Plans Dated 2-



BRIDGE DEPARTMENT

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

DIAGRAM SHOWING THE BASIS FOR ESTIMATES OF GRADE SIZE DISTRIBUTION USED IN DETERMINATION OF CLASS NAMES. IF GRAVEL IS PRESENT IN APPRECIABLE AMOUNTS THE TERM "GRAVELLY" MAY BE ADDED TO THE CLASS NAME, VIZ. "GRAVELLY SAND". THE TERMS "COARSE", "MEDIUM" AND "FINE" WHEN USED TO DESCRIBE SAND, SILT AND GRAVEL REFER TO STANDARD GRADE SIZE LIMITS.

CLAY PERCENTAGES — SAND PERCENTAGES — SILT PERCENTAGES

CLAY, SILTY CLAY, SANDY CLAY, CLAYEY SAND, CLAYEY SILT, SAND, SILTY SAND, SANDY SILT, SILT

LEGEND OF EARTH MATERIALS

- GRAVEL
- SAND
- SILT
- CLAY
- SANDY CLAY OR CLAYEY SAND
- SANDY SILT OR SILTY SAND
- SILTY CLAY OR CLAYEY SILT
- PEAT AND/OR ORGANIC MATTER
- FILL MATERIAL
- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

LEGEND OF BORING OPERATIONS

- PLAN OF ANY BORING
- PENETROMETER
- 2¼" CONE PENETROMETER
- SAMPLER BORING (DRY)
- ROTARY BORING (WET)
- AUGER BORING (DRY)
- JET BORING
- CORE BORING
- TEST PIT

1" SOIL TUBE — ROTARY BORING — PENETRATION BORING

The contractor's attention is directed and to the Special Provisions accompany Classification of earth material as sh not to be construed to imply exactness

RINGWOOD AVENUE

LOG OF

SCALE 1" = 10' BRIDGE 35-1

PREL DRAWING NO. 2448

SILLIMAN

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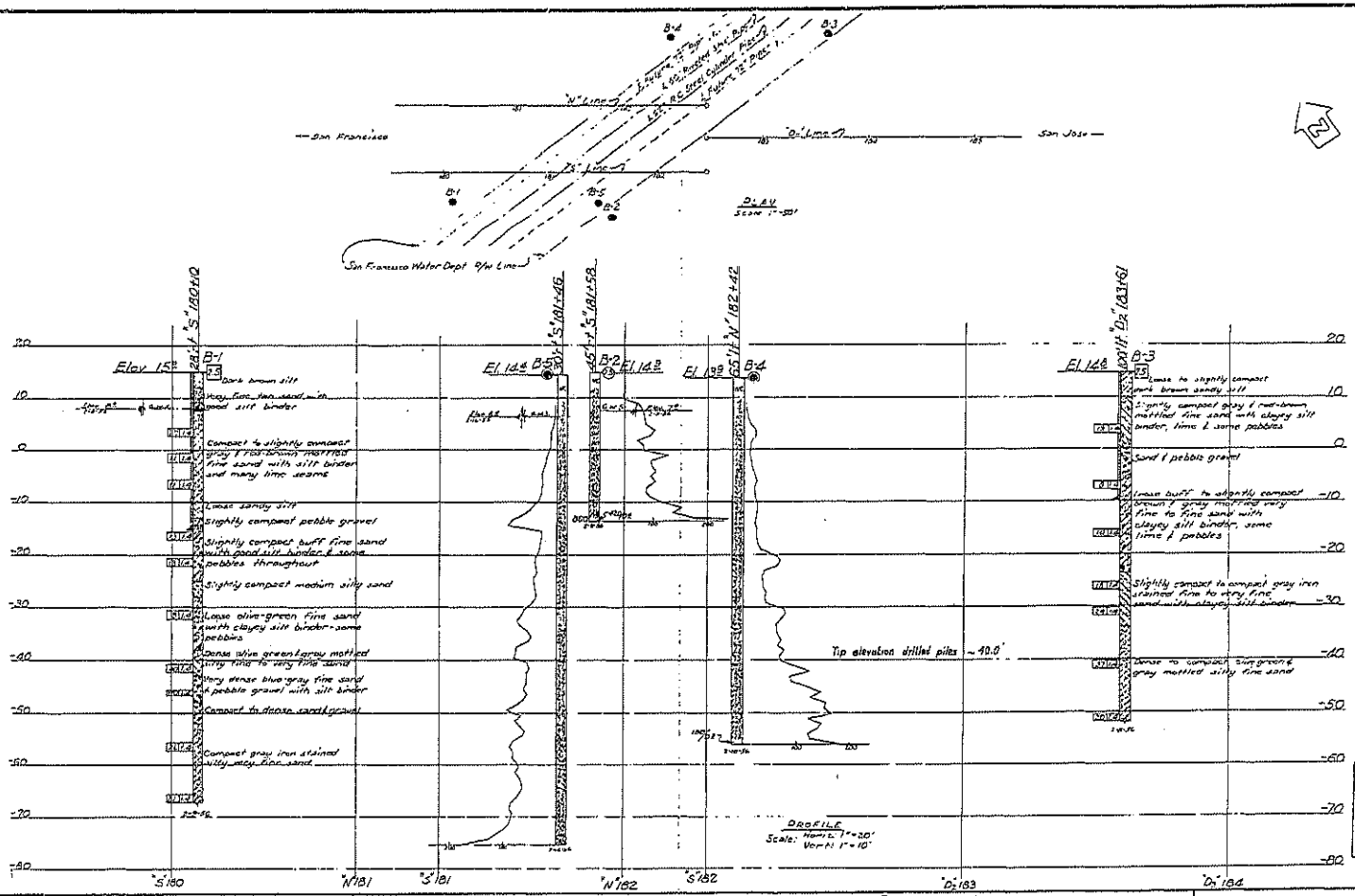
F-181 (29)

DIST.	COUNTY	ROUTE	POSTMILE
7	CAL.		105

DIST.	COUNTY	ROUTE	POSTMILE
VI	SM	82	14.0

July 16, 192

BRIDGE DEPARTMENT



AS BUILT PLANS
Contract No. 57-47C31-F
Date Completed
Document No. 4000.234

CONTRACT No. 57-47C31-F
DATE ACCEPTED 6-26-58
AS BUILT
RESIDENT ENGINEER F.W. Stronsberg
REVISIONS BY B. Campbell DATE 5-26-6

FILE BUILT	F. A. Hinz	2-56
DRAWN	J. V. Dyer	2-56
CHECKED	W. A. Kowalski	4-56
	Layout Engineer Robert B. Stronsberg	
	Bridge Engineer L. Hardin Wolfe	

Classification of Material Based on Standard Grade Size Limits

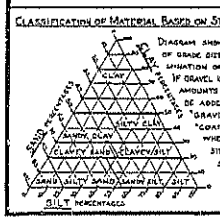


Diagram showing the basis for estimates of grade size distribution used in determination of class names.

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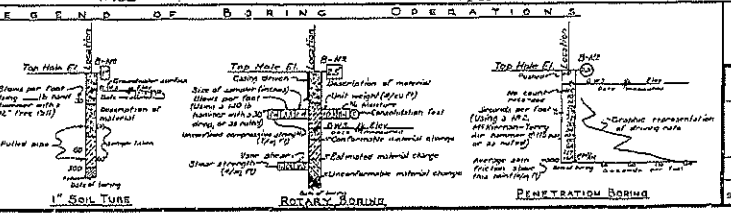

Notes

The contractor's attention is directed to Section 2, Article (c) of the Standard Specifications and to the Special Provision accompanying this set of plans.

Classification of earth material as shown on this sheet is based upon field inspection and not to be construed to imply mechanical analysis.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

HETCH HETCHY AQUEDUCT

LOG OF TEST BORINGS

SCALE As shown | BRIDGE 35-150 | FILE [illegible] | DRAWING C-4834-4

105

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE LAST DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON MICRO-DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

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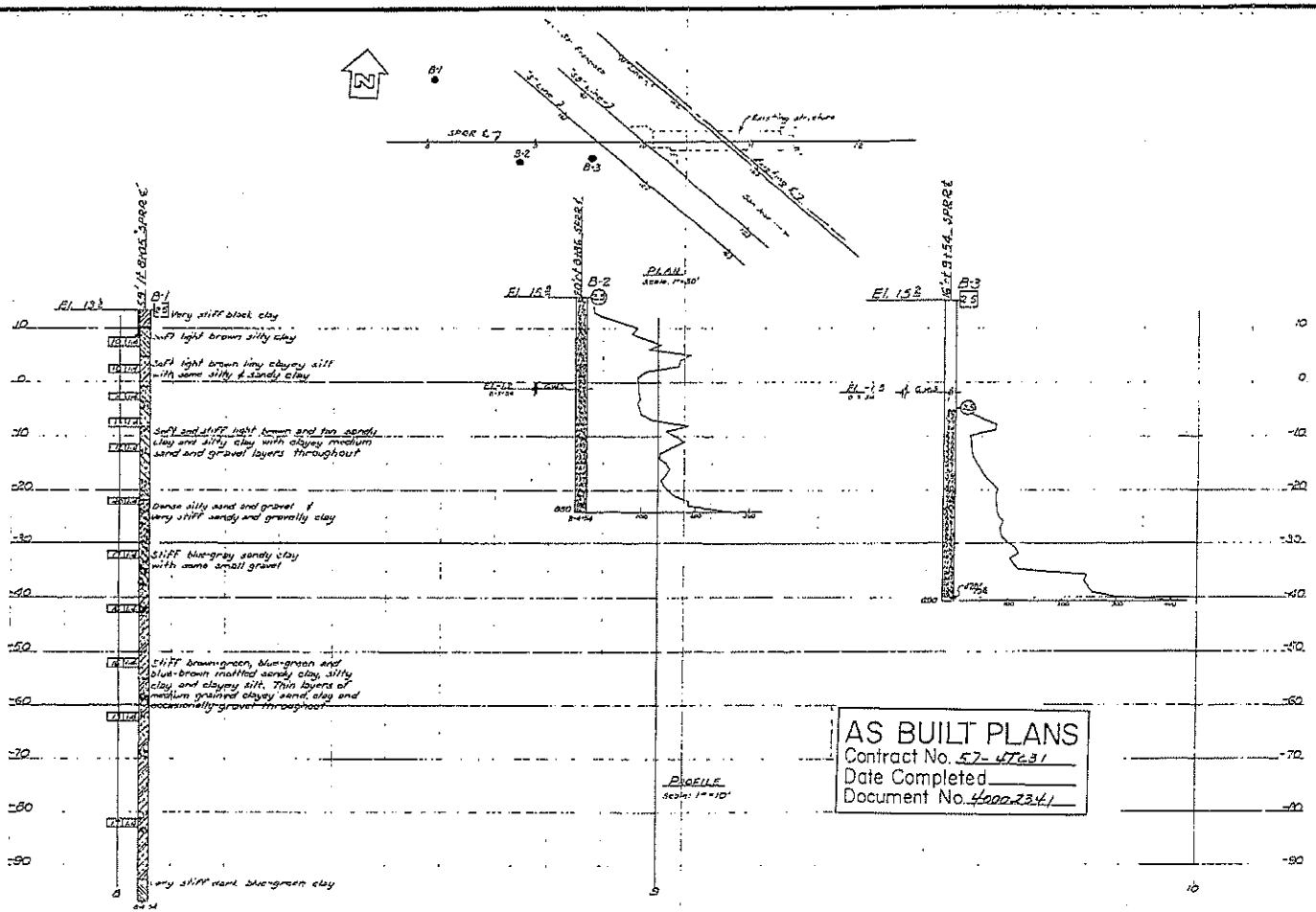
F-181 (B9)

FED. ROAD DIV. NO.	STATE	PROJECT
7	CAL.	

DESIGNED	CHECKED	DRAWN
AK	JM	

July

BRIDGE DEPARTMENT



R.M. No. 4
"X" on end of curb at south end SPRR Underpass 41' approx. Sta 172+69
Elev. 15.98

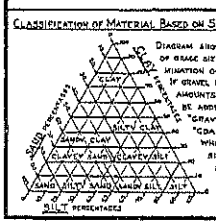
AS BUILT PLANS
Contract No. 57-477231
Date Completed
Document No. 4000-2341

CONTRACT No.
DATE ACCEPTED
AS BU
RESIDENT ENGINEER E.W.
REVISIONS BY

No chang

FIELD BOOK	H.B. Taylor 8.56
	K.S. Ho 8.56
CREWS	Ho, Dent, Scott
	T.L. Simpson

Classification of Material Based on Standard Grade Size Limits



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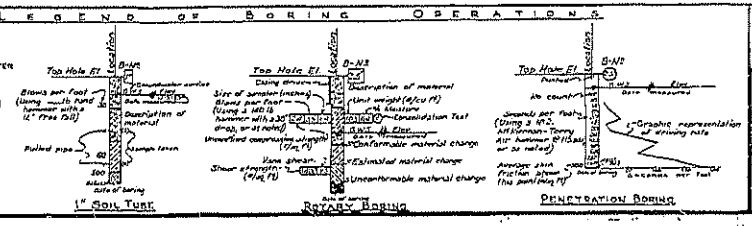

Notes

The contractor's attention is directed to Section 2, Article (c) of the S and in the Special Provisions accompanying this set of plans.
Classification of earth material as shown on this sheet is based upon not to be construed to imply mechanical analysis.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

HENDERSON UNDERPASS E.

LOG OF TEST BORIN

SCALE As shown | BRIDGE 35-112 | FILE E-7 | DRAWING

PR-1519 94

94

PR-1519-3

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE SIGNATURE TITLE

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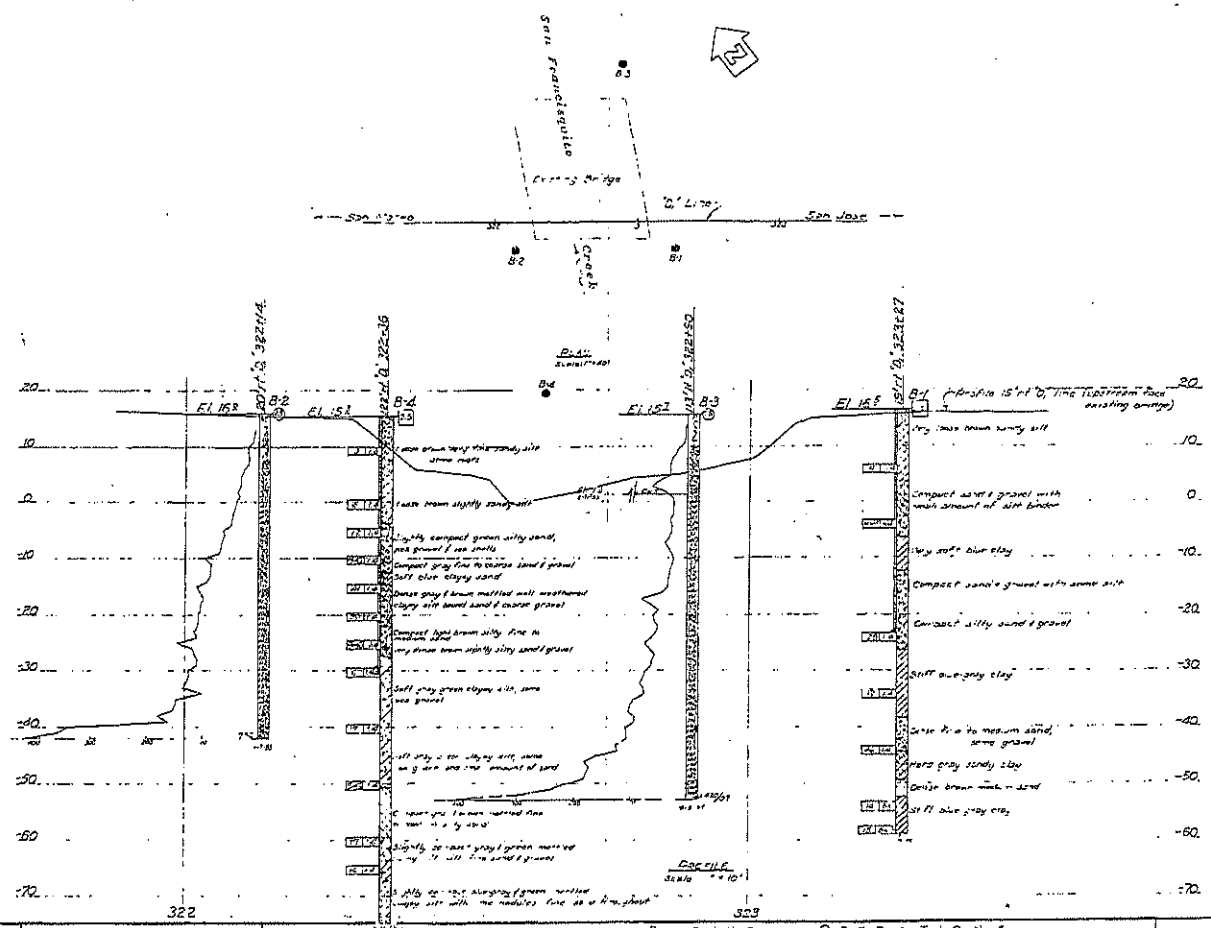
BRIDGE DEPARTMENT



AS BUILT PLAN
Contract No. 57-47C237
Date Completed
Document No. 40002342

CONTRACT No.
DATE ACCEPTED
AS BUILT
RESIDENT ENGINEER
REVISIONS BY DATE

Classification of Material Based on Standard Grade Size Limits

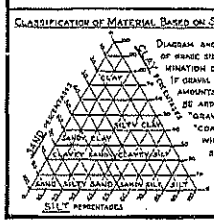


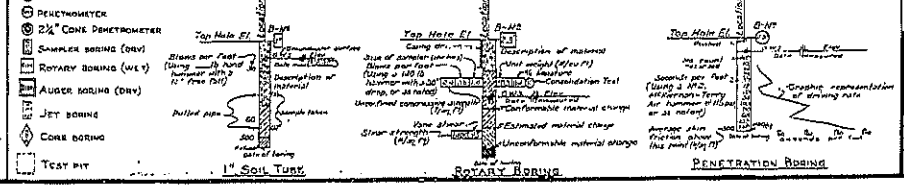
Diagram showing the basis for estimates of grade size distribution used in determination of class names.
If gravel is present in appreciable amounts the term "gravelly" may be added to the class name, viz. "gravelly sand." The terms "coarse," "medium" and "fine" which used to describe sand, silt and gravel refer to standard grade size limits.

Legend of Earth Materials

- Gravel
- Sand
- Silt
- Clay
- Sandy Clay or Clayey Sand
- Sandy Silt or Silty Sand
- Silty Clay or Clayey Silt
- Peat and/or Organic Matter
- Fill Material
- Igneous Rock
- Sedimentary Rock
- Metamorphic Rock

Legend of Boring Operations

- Plan of any boring
- Penetrometer
- 2½" Cone Penetrometer
- Sampler boring (dry)
- Rotary boring (wet)
- Auger boring (dry)
- Jet boring
- Core boring
- Test pit



Notes

The contractor's attention is directed to Section 2, Article (c) of the Specifications and to the Special Provisions accompanying this set of plans.
Classification of earth material as shown on this sheet is based upon field and is to be construed to imply mechanical analysis.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

BRIDGE ACROSS SAN FRANCISQUITO

LOG OF TEST BORINGS

SCALE | BRIDGE 35-3 | FILE E-7 | DRAWING

T-19

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.
DATE June 28, 1971 SIGNATURE TITLE

ClibPDF - www.fastio.com

NO AS BUILT CHANGES
NO AS BUILT CHANGES

AS BUILT

CORRECTIONS BY _____
CONTRACT NO. 04-235664
DATE _____

DIST	COUNTY
04	SM

Bobby O.
REGISTERED GEO

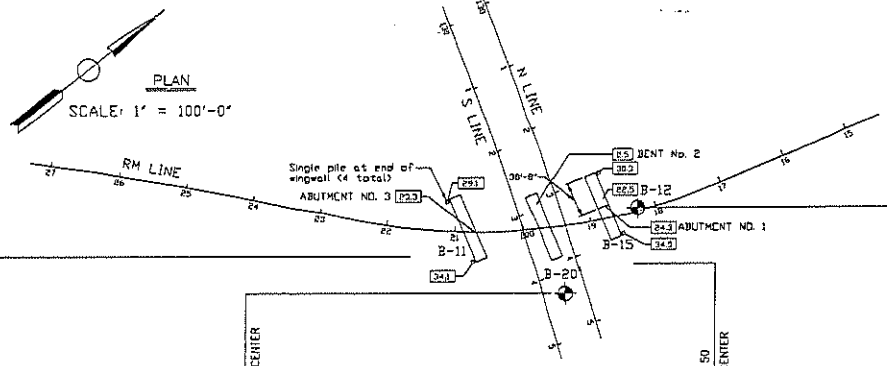
PLANS APPROVAL

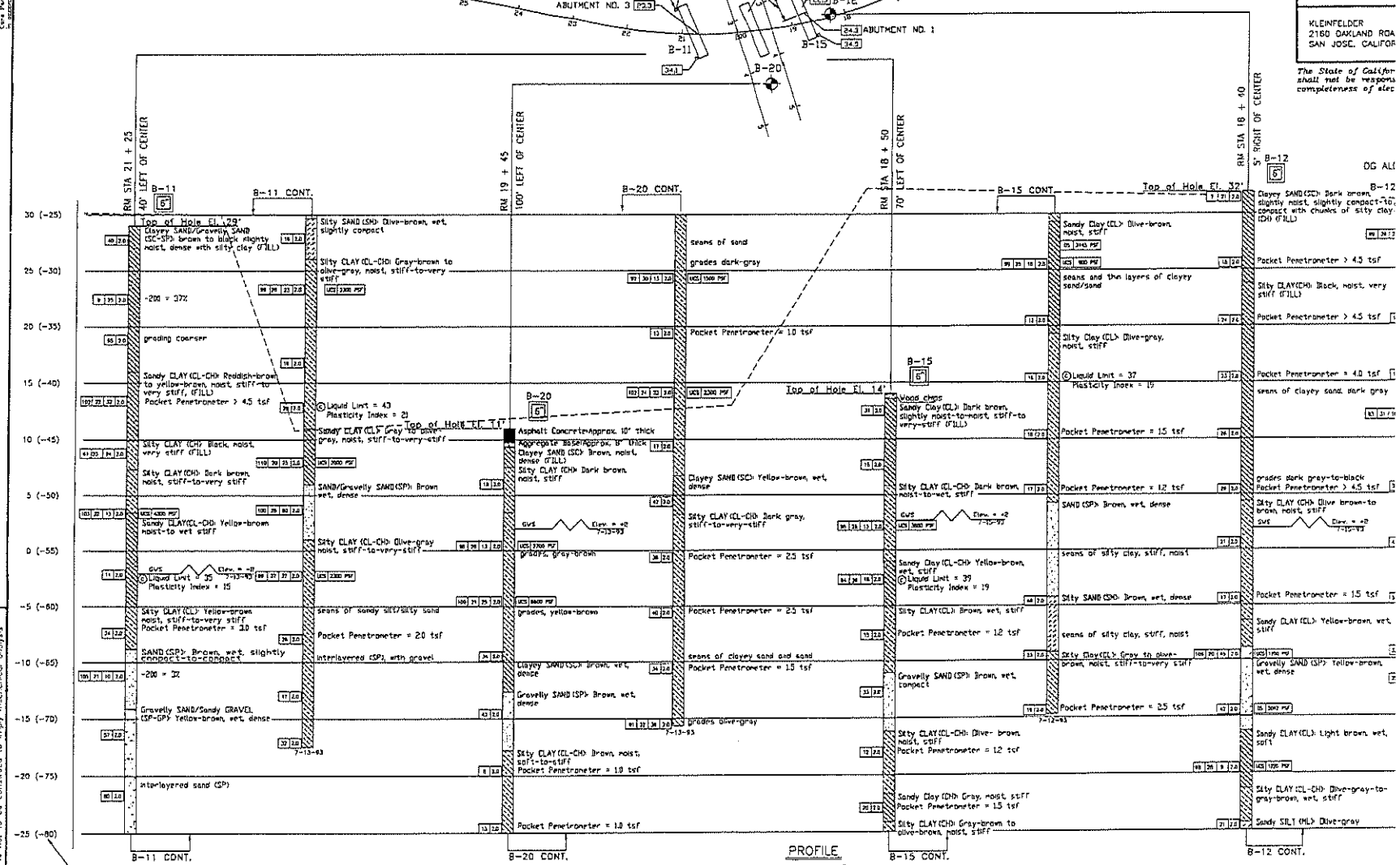
SAN MATEO COUNTY
1250 SAN CARLOS
SAN CARLOS, CALIF

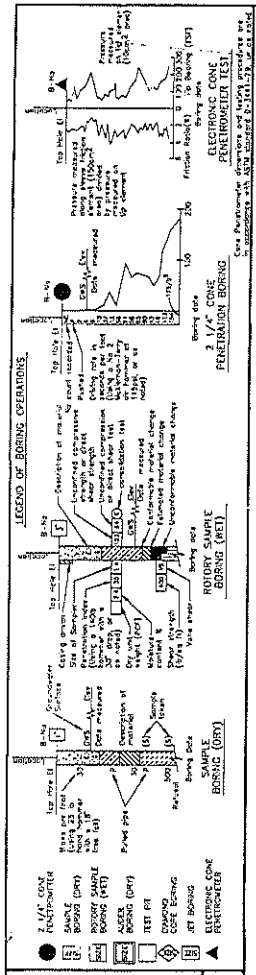
KLEINFELDER
2160 OAKLAND ROA
SAN JOSE, CALIFOR

The State of Califor
should not be respons
completeness of elec

NOTE:
TOP OF BORE HOLE ELEVATIONS REFERENCED TO BENCHMARK NO. AB-82, BRASS DISK SET IN THE MARSH ROAD OVERCROSS STA RM 17 + 18 ELEVATION 33.58.







DESIGN OVERSIGHT	DRAWN BY	M. DONALDSON	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
1-8-95 SIGN OFF DATE	CHECKED BY	B. YUKIMURU	PROJECT ENGINEER
	FIELD INVESTIGATOR	P. SCHMIDT	
	DATE		

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04217
EA 235661

PARTIDE NO.	35-0066
POST MILE	3.6

ROUTE 84/101 SEPA

LOG OF TES

DISREGARD PRINTS BEARING EARLIER REVISION DATES

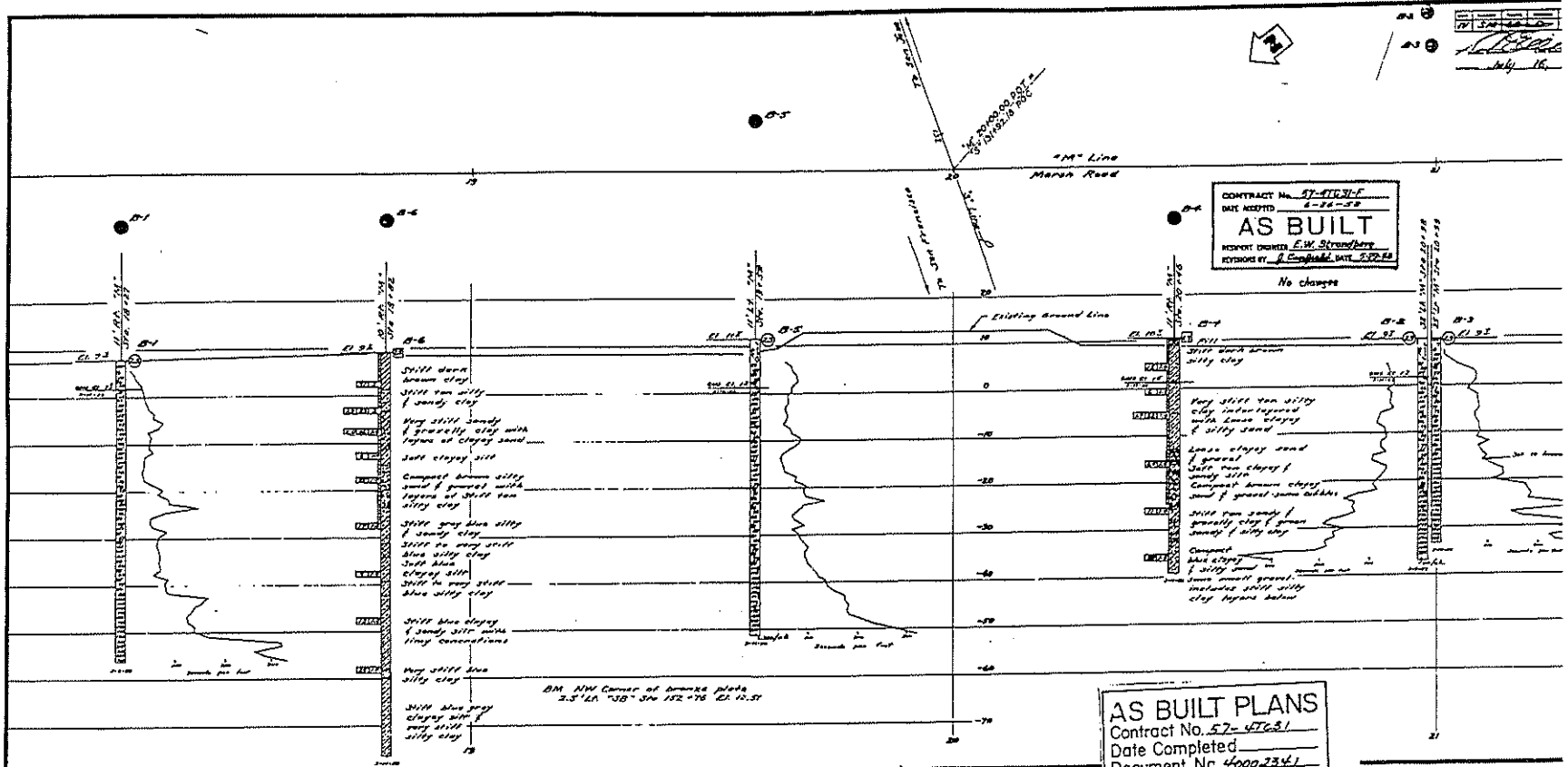
REVISION DATES 8/29/94

ClibPDF - www.fastio.com

TO ACCOMPANY PLANS DATED	DIST	COUNTY
	04	SM

F-181 (29)

BRIDGE DEPARTMENT



Classification of Material Based on Standard Grade Size Limits

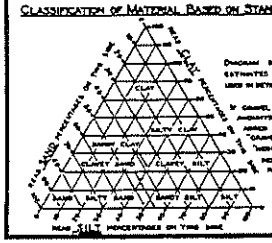


Diagram showing the bands for estimates of grade size distribution used in determination of class names.

If gravel is present in appreciable amounts the term "gravelly" may be added to the class name, i.e. "gravelly sand; the terms "coarse" "medium" and "fine" when used to describe gravel, sand and silt refer to standard grade size limits.

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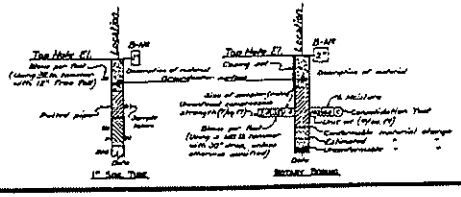
- Core boring
- Test pit



Notes

The contractor's attention is directed to section 2, article 52 standard specifications and to the special provisions pertaining thereto.

Classification of earth material as shown on this sheet is based on field inspection and is not to be construed to imply mechanical analysis.

Penetrometer borings having a rate of penetration exceeding 100 feet per foot are driven with a 140 pound-thirty inch hammer at

MARSH ROAD OVERCROSSIN

LOG OF TEST BORINGS

SCALE: 1" = 10' | Bridge 35-66 | File E-35 | Drawing

LOG 3 6

80

DESIGN OVERSIGHT 1-12-95	NOTE: ADDITIONAL AS-BUILT FOUNDATION DATA MAY BE AVAILABLE AT THE OFFICE OF TRANSPORTATION MATERIALS AND RESEARCH 5900 FOLSOM BOULEVARD SACRAMENTO, CALIFORNIA 95819.	DESIGN BY / CHECKED	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
BRM DFT DATE		DETAILS BY / CHECKED	PROJECT ENGINEER
		QUANTITIES BY / CHECKED	

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04217
EA 235561

BRIDGE NO.	ROUTE 84/101 SE
35-0066	
POST MILE 3.6	AS-BUILT LOG

DISREGARD PRINTS BEARING EARLIER REVISION DATES — REVISION DATES 6/26/14

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David Nesbitt/D04/Caltrans/CAGov
01/12/2010 10:34 AM

To Aijun Ding/D04/Caltrans/CAGov@DOT
cc Teblez Nemariam/D04/Caltrans/CAGov@DOT, John E Peterson/HQ/Caltrans/CAGov@DOT, Mahmood Momenzadeh/D04/Caltrans/CAGov
bcc
Subject 101 Aux Lane Retaining Wall Recommendations and Attachments

History: This message has been forwarded.

Here is the updated recommendations for the 101 Aux Lane Retaining Wall Recommendations with the figures and Attachments. Hard copies will follow in the mail.

101 Aux Lane Retaining Wall Updated Recomm.pdf

David Nesbitt
Transportation Engineer
Office of Geotechnical Design - West
111 Grand Ave, 8th floor, MS-16
Oakland, CA 94623

(510) 622-0104 Office
(510) 301-4373 Cell
(510) 286-4839 Fax

----- Forwarded by David Nesbitt/D04/Caltrans/CAGov on 01/12/2010 10:31 AM -----

David Nesbitt/D04/Caltrans/CAGov
01/07/2010 11:03 AM

To Aijun Ding/D04/Caltrans/CAGov
cc Teblez Nemariam/D04/Caltrans/CAGov@DOT, John E Peterson/HQ/Caltrans/CAGov@DOT
Subject Memos for RW and Design/Plan Review

Attached below is the updated Retaining Wall recommendations and the Design/ Plan Review memos. A hard copy of the memos will follow.

101 Aux Lane Updated RW Recommendations.pdf

101 Aux Lane DesignPlan Review.pdf

Thanks

David Nesbitt
Transportation Engineer
Office of Geotechnical Design - West
111 Grand Ave, 8th floor, MS-16
Oakland, CA 94623

(510) 622-0104 Office

(510) 301-4373 Cell
(510) 286-4839 Fax

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MS. TEBLEZ NEMARIAM
District Branch Chief
Office of Design Peninsula

Date: January 6, 2010

Attention: A. Ding

File: 04-SM-101 PM 0.0/3.6
04–SCL-101 PM 52.3/52.6
04-235611
Retaining Wall Recommendation

From: DAVID NESBITT
Transportation Engineer
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

MAHMOOD MOMENZADEH
Chief, Branch C
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

Subject: Retaining Wall Recommendations

This memorandum presents our geotechnical recommendations for Retaining Wall #1 (RTW1). This memo supersedes the recommendations for RTW1 dated May 29, 2009.

1. PROPOSED PROJECT

The purpose of the proposed project is to add an auxiliary lane to both directions of Route 101, from the Embarcadero Road Interchange (PM 52.2) in the City of Palo Alto, Santa Clara County to the Marsh Road Interchange (PM 3.6) in the City of Menlo Park, San Mateo County. The construction of the auxiliary lane will require the construction of one retaining wall located just south of the Henderson UP (PM 3.4) on the west side of Route 101. Retaining Wall #1 is located between Stations 161+70 and 170+00 on the NS3 line. The wall height ranges from approximately 1.5 ft to 7.0 ft.

The wall LOL limits defined by SD extends from Sta 10+000 to 18+30.038. Structure Design recommended use of Wall Type 7 from Station 10+00 to Stations 11+00 and from Station 11+24 to Station 18+30.038. SD also recommended use of Wall Type 1 for the section between Station 11+00 to Station 11+24, which is adjacent to a buried storage tank. No information is available on the exact location of the storage tank and the condition of the existing backfill soil behind the tank. Based on the cross section provided to us, an average soil thickness of about 3.5 ft will be removed from the area behind the tank where footing of the Type 1 wall is to be located.

2. SITE GEOLOGY AND SEISMICITY

The regional and site geology are described in the Preliminary Geotechnical Report dated July 2007.

The table below lists the active faults near the project area and the peak ground accelerations that could be expected from a maximum credible earthquake from each of these faults for Retaining Wall #1.

FAULT	Distance from project (miles)	Maximum Credible Earthquake	Peak Ground Acceleration
San Andreas	14.4 km (8.9)	8.0	0.40 g
Monte Vista	11.6 km (7.2)	6.5	0.28 g
Hayward	19.9 km (12.4)	7.5	0.27 g

3. FIELD INVESTIGATION

A total of 4 soil borings were drilled adjacent to the proposed retaining wall locations. Three-soil boring were drilled for Retaining Wall #1 (RTW #1), and one soil boring was drilled for Retaining Wall #2 (RTW #2). Retaining wall #2 (RTW #2) has been deleted from this project. Caltrans Drilling Services drilled the borings in March 2009. The soil borings were drilled using the rotary wash method. Samples were collected using a spilt spoon sampler 2.0- inch OD (SPT), and a 2.5- inch OD push sampler (Modified California Sampler). Several samples from all three borings have been submitted for laboratory testing. Laboratory tests results will be included in the Log Of Test Borings (LOTB).

A copy of the As-Built LOTBs for the Henderson UP and the existing soundwalls will be included with the LOTBs from this project. The Logs of Test Borings for this project is currently being prepared, and will be submitted at a later date once completed.

4. SUBSURFACE SOIL/ROCK AND GROUNDWATER CONDITIONS

Retaining Wall #1 (RTW #1)

Soil borings R-09-102, R-09-103 and R-09-104 were drilled, adjacent to the alignment of Retaining Wall #1, to a depth of 26.5 ft below the existing ground surface. Soil boring R-09-101 was drilled for Retaining wall # 2, which has been deleted from this project. The soil borings samples for Retaining Wall #1 consisted of clay layer overlaying a gravel layer with sand. The gravel layer is underlained by a clay-sandy clay layer.

The upper clay ranges in thickness from 3 to 8 ft. The average of pocket penetrometer value is 1.5 tsf, indicating a stiff material. The gravel layer ranges in thickness from 0 to 6 ft in the three borings. Based on the corrected SPT values, the gravel layer is medium dense. The lower clay layer ranges from a clay to a sandy clay. The pocket penetrometer values in this layer range from 0.5 to 2.5 tsf indicating material that is soft to very stiff.

Groundwater Condition

Groundwater was encountered at depth approximately 3.0 ft below the ground surface at boring R-09-102. The boring was left open for several hours before grouting. Groundwater levels were not measured at the remaining boring locations.

5. GEOTECHNICAL RECOMMENDATIONS

The following recommendation for Retaining Wall #1 (RTW #1) is based on the subsurface soil conditions, groundwater elevations, topography, and the existing structures adjacent to the proposed retaining wall location.

A major concern for Retaining Wall #1 is the close proximity of the existing soundwall above the proposed retaining wall location. According to Caltrans As-Built dated December 1991, the existing soundwall is constructed on a spread footing at the top of the slope above the proposed retaining wall location. There is also a 20-inch gas line and residential housing located directly behind the soundwall.

- To achieve the required bearing capacity of 2.0 ksf for the proposed retaining walls Type 1 and 7, the contractor will be required to excavate an additional two feet below of the proposed footing grade. Also, excavate an additional one-foot

beyond the heel and toe of the wall (Figure 2). Place sub-grade enhancement fabric and backfill with Class II aggregate base material. The Class II aggregate base material will be placed and compacted in accordance to the Caltrans Standard Specifications.

- A global and local slope stability analysis has been performed for the back cut for the Type 7 retaining wall. The Type 7 retaining wall can be constructed without the use of temporary shoring. However, the top of the temporary excavation back cut, for the construction of the retaining wall, cannot be within 15 feet of the face of the existing soundwall (Figure 1). If the top of the temporary excavation back cut comes within 15 feet of the face of the soundwall, temporary shoring will be required.

- Structure Design should review the stability (for the sliding and rocking modes) of the storage tank due to construction of the proposed Wall Type 1 adjacent to tank using the following geotechnical parameters:

  Active and passive equivalent fluid pressure 40 pcf and 180-pcf on the active and passive sides of storage tank, respectively parallel to and a friction coefficient of 0.25 on the sides perpendicular to the wall. Additional uniform active lateral pressure of 240-psf on the side adjacent to the wall footing assuming an average footing pressure of 2000 psf and assuming a friction angle of 30 degrees and unit weight of 120 pcf for the existing backfill material around the tank

- Footing for the Type 1 retaining wall cannot be constructed on top of the underground storage.

- The excavation and construction of the Type 1 retaining wall adjacent to the storage tank will require the use of temporary shoring to stabilize the slope. The temporary shoring is required to stabilize the slope below the existing soundwall.

- Dewatering of the footing excavation maybe required due to location of the groundwater table. Therefore, it is recommended that the sub-grade enhancement fabric and Class II aggregate base material is placed immediately after footing excavation is exposed.

- Retaining wall backfill should be placed and compacted in accordance to the Caltrans Standard Specifications with the slope above the retaining wall not steeper than 2(H): 1(V).

If the requirements for the Type 1 and Type 7 retaining walls described above cannot be achieved, we are recommending the construction of a soldier pile and lagging wall with a maximum height of approximately 5 feet. The soldier pile and lagging wall will eliminate need for temporary shoring, additional footing excavation, and the sub-grade enhancement fabric.

Geotechnical Design Parameter for Soldier Pile wall

If a Type 7 or Type 1 retaining wall cannot be constructed, then a soldier pile and lagging wall should be constructed.

We recommend using an effective friction angle (ϕ'_f) = 28 degrees, a Unit weight (γ) =120 lb/ft^3, coefficient of active lateral earth pressure (k_a) = 0.60, a coefficient of passive pressure (k_p)= 2.8 (use a safety factor of 2.0), friction angle of between backfill material and back of (δ) = 17 degrees, and angle of backfill surface to the horizontal (β) = 26 degrees. Use an arching factor of 2.0

Please refer to Figure 5.5.5.6-3 of the Bridge Design Specifications dated August 2004 for the earth pressure distributions along the wall (Figure 3).

6. CONSTRUCTION CONSIDERATIONS

We are recommending that our Office review the proposed cut slope and shoring design. We also recommend that a Geotechnical Engineer, from the Office of GDW-Branch C, should be on site to inspect the earthwork, including any excavation and shoring during construction. We are also recommending construction monitoring of the existing soundwall during the construction of RTW1. Survey points should be located at the top or near the top of the soundwall to monitor movement. The movement should be limited to 0.01% (H), (H= height of the soundwall). The Office of GDW-Branch C should be notified immediately, if the movement exceeds 0.01% H.

* * * * *

If you have any questions or need additional information, please call David Nesbitt at 510-622-0104, or Mahmood Momenzadeh at 510-286-5732.

Attachments

c: TPokrywka, MMomenzadeh, JPeterson, Daily File, Route File

DNesbitt/mm

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

QUANTITY CALCULATIONS

04-SM-101

David Nesbitt

11/09/09

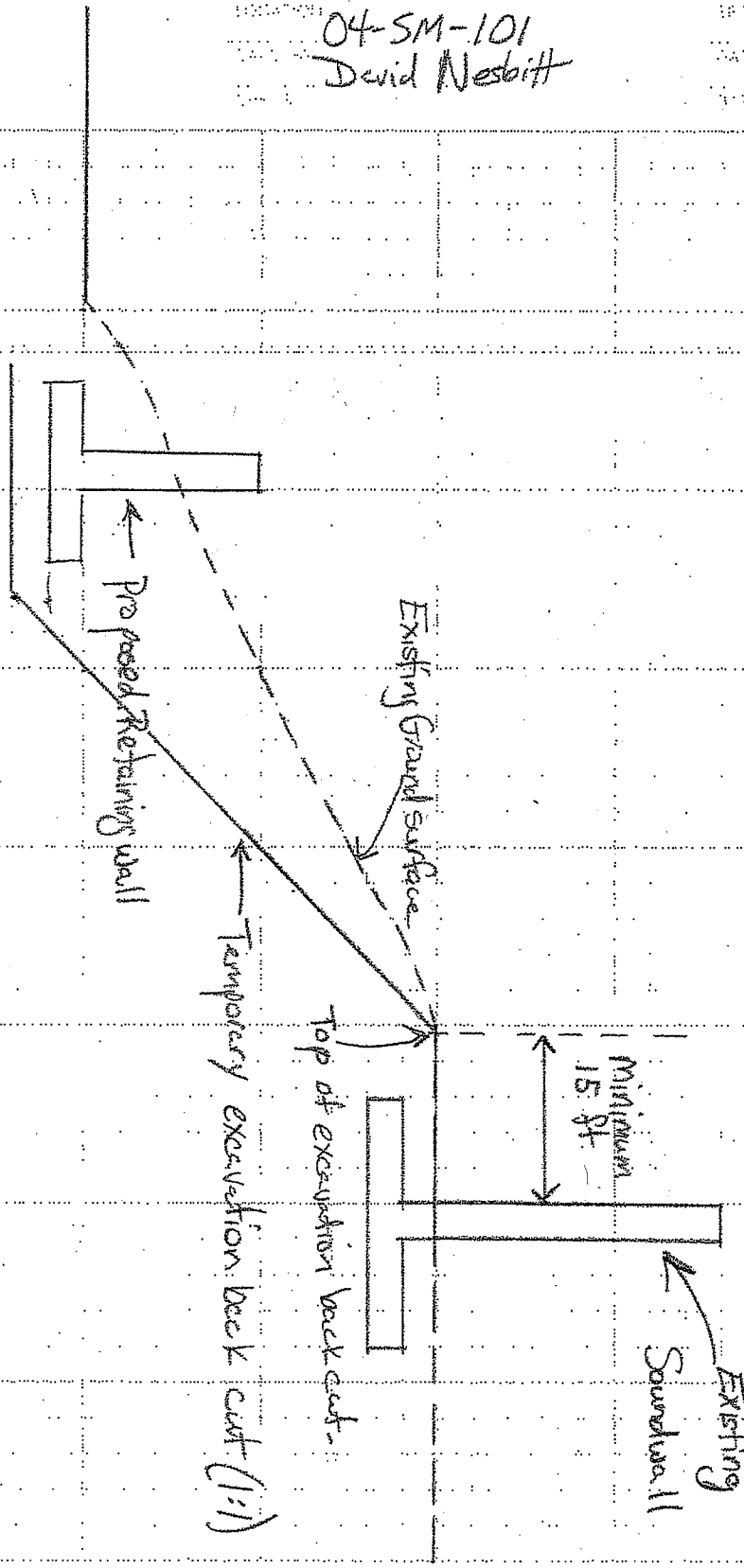


Figure 1.

04-SM-101 PM 0.0/3.6
EA: 04-233611

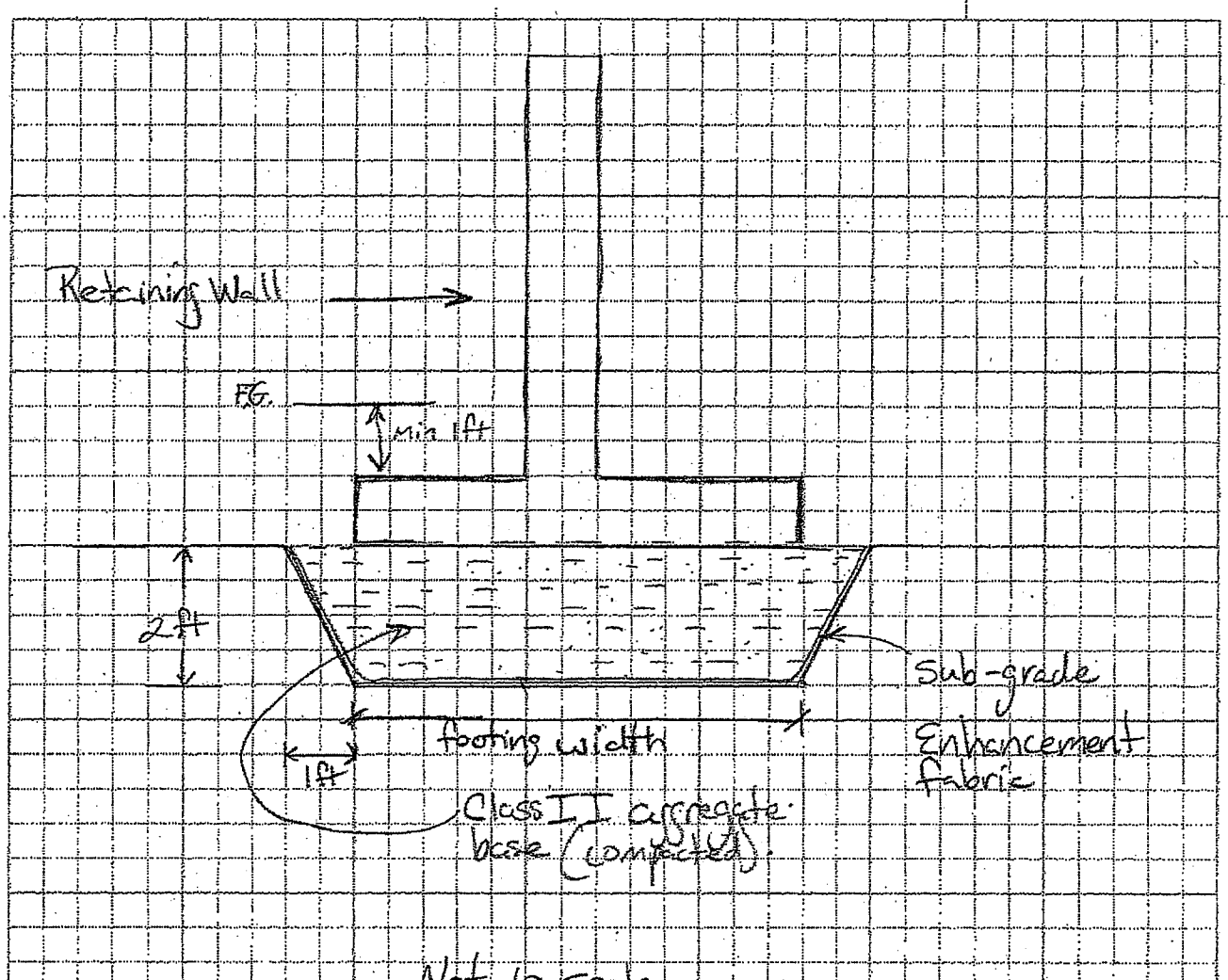
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION.

QUANTITY CALCULATIONS

DC-CEM-4501 (OLD HC-52 REV. 11/92) 7541-3520-0

SHEET 1 OF 1

JOB STAMP	ITEM	FILE NO
EA: 235611 04-SM-101 PM 0.0/3.6	LOCATION	SEGREGATION YES ☐ NO ☐
	CALC. BY David Nesbitt	DATE 4/26/09
	CHK. BY	DATE



Not to scale

Figure 2: Type 1 or 7 retaining wall footing excavation detail.

POSTED BY DATE POSTED TO

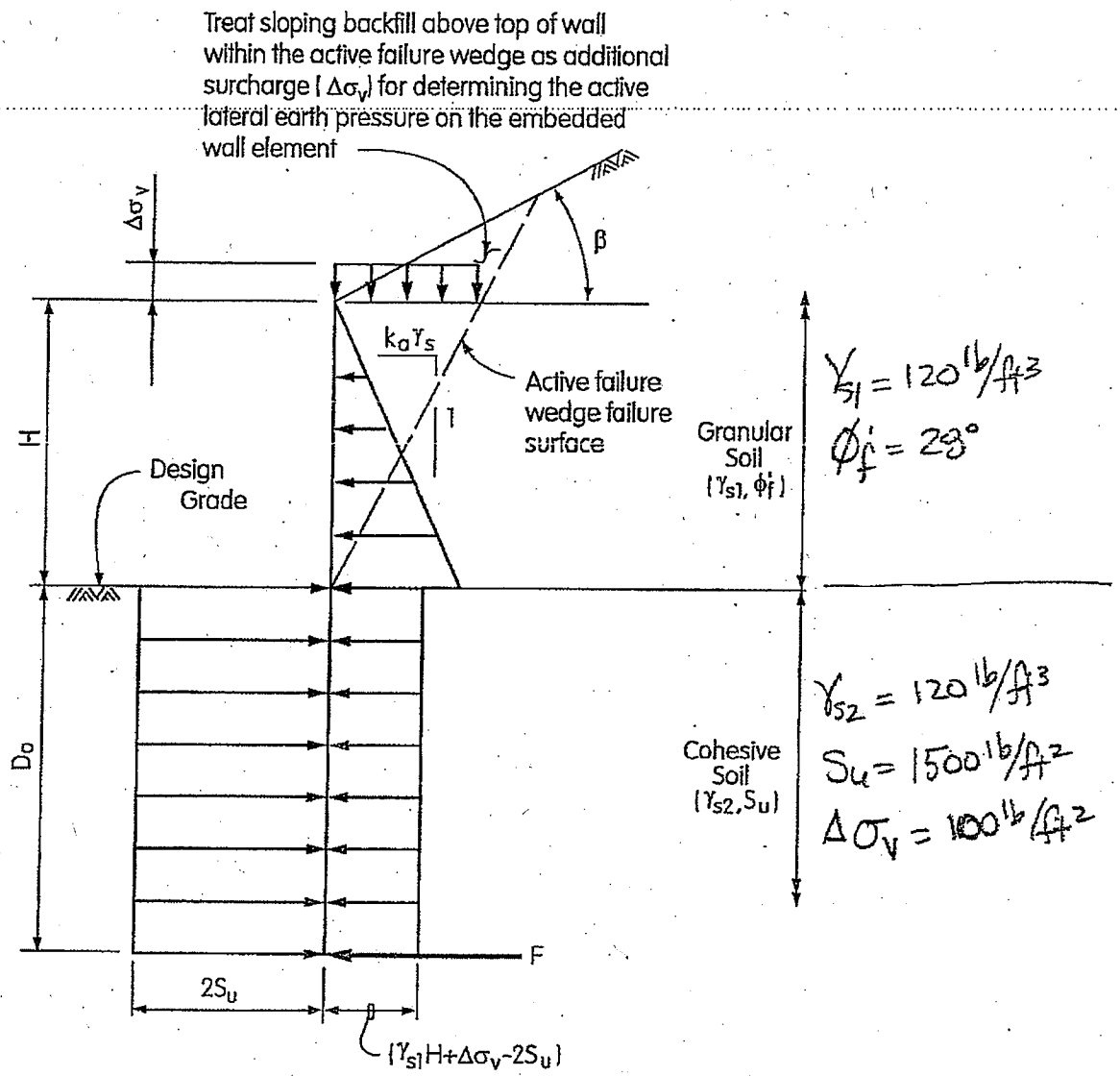


Figure 5.5.5.6-3 Simplified Lateral Earth Pressure Distributions for Temporary Non-gravity Cantilevered Walls with Vertical Wall Elements Embedded in Cohesive Soil and Retaining Granular Soil

Figure 3

10-1.__ SUBGRADE ENHANCEMENT FABRIC

Subgrade enhancement fabric shall be placed where shown on the plans and locations designated by the Engineer in accordance with the special provisions.

Subgrade enhancement fabric shall be manufactured from one or more of the following materials: polyester, nylon, or polypropylene.

Subgrade enhancement fabric shall conform to the following:

Specification	Requirement	
	Woven	Non-Woven
Weight, grams per square meter, min. ASTM Designation: D 3776	200	200
Grab tensile strength (25-mm grip), kilonewtons, min. in each direction ASTM Designation: D 4632	0.90	0.81
Modulus (Tensile strength at 10% Elongation) kilonewtons, min.	1,200	NA
Elongation at break, percent min. ASTM Designation: D 4632	35 max.	50 min.

Subgrade enhancement fabric shall be furnished in an appropriate protective cover that shall protect it from ultraviolet radiation and from abrasion due to shipping and handling, and shall remain in said cover until installation.

Subgrade enhancement fabric shall be accompanied by a Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificate of Compliance," of the Standard Specifications. The subgrade to receive the fabric, immediately prior to placing, shall conform to the compaction and elevation tolerance specified in Section 25-1.03, "Subgrade," of the Standard Specifications and these special provisions and shall be free or loose or extraneous material and sharp objects that may be damage the fabric during installation.

Subgrade enhancement fabric shall be handled and placed in accordance with the manufacturer's recommendations and shall be positioned longitudinally along the alignment, and pulled taut to form a wrinkle-free mat.

Adjacent borders of the fabric shall be overlapped a minimum of 450 mm.

The amount of subgrade enhancement fabric placed shall be limited to that which can be covered with aggregate base or other material, as shown on the plans, within 72 hours.

Should the fabric be damaged during placing, the damaged section shall be repaired by placing a new piece of fabric over the damaged area. Said piece of fabric shall be large enough to cover the damaged area and to provide a minimum 1-m overlap on all edges. Damage to the fabric resulting from the Contractor's vehicles, equipment, or operations shall be repaired at the Contractor's expense.

During spreading and compaction of the aggregate base material, of other material placed immediately above the fabric, vehicles and equipment shall not be driven directly on the fabric. A sufficient thickness of material shall be maintained between the fabric and the equipment to prevent damage to the fabric.

The quantity of subgrade enhancement fabric to be paid for will be measured by the square foot of area covered, not including additional fabric for overlap.The contract price paid per cubic meter for subgrade enhancement fabric shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in placing the fabric, complete in place as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: TEBLEZ NEMARIAN
District Branch Chief
Design Peninsula

Attention: Aijun Ding

Date: June 17, 2009

File: 04-SM/SCL-101
PM 0.0/3.6 & 52.3/52.6
04-235611

From: RICK D'ONOFRIO, P.E.
Materials Design Engineer
Engineering Services I – Materials C

REGISTERED PROFESSIONAL ENGINEER
RICHARD M. D'ONOFRIO
C 66054
EXP. 6-30-2010
CIVIL
STATE OF CALIFORNIA

Concurred by: RICHARD CHAN, P.E.
District Materials Engineer
District Branch Chief, Mat C

Subject: Corrosion Study Recommendation

This memo gives our alternative Materials recommendation for concrete culvert, metal and plastic pipe materials. The corrosion input data was taken from previous Contract #04-360354, SM 101 (PM 0.0/6.6) in the early 1970's.

Based on the corrosion tests, we have concluded that the above site is corrosive. Results from the analysis are in the attached Table. All four samples were taken near the Hetch Hetchy Aqueduct.

Concrete Culverts

1. Use Type II modified Portland cement per Caltrans Standard Specifications for all culverts. This recommendation is based on the attached Culvert Corrosion Studies Sheet. Use the standard concrete cover over the reinforcing steel.
2. Use Standard RCP

Metal Pipes

For metal pipes, use the following alternatives:

1) 12 gauge (2.8 mm) corrugated steel pipe (CSP).
2) 18 gauge (1.3 mm) CSP with Polymeric Sheet Coating (PSC), both sides.
3) Do not use CAP/CASP.

Teblez Nemarian
Attn: Aijun Ding
June 17, 2009

Plastic Pipe

Thermoplastic pipes may be used as an alternate in this project for a 50-year service life. The maximum fill height over plastic culverts is a function of the type and size of the plastic pipe. Plastic pipes shall conform to Section 64 of Caltrans Standard Specification.

Please contact Rick D'Onofrio at 622-1776 if you have any questions.

c: Route File, Daily File
R. D'Onofrio/dg

CULVERT CORROSION STUDY

CO.-RTE.-K.P.: SM-101-PM 0.0/3.6
EA: 04-235611

Sample Dated:
Prepared By: Rick D'Onofrio

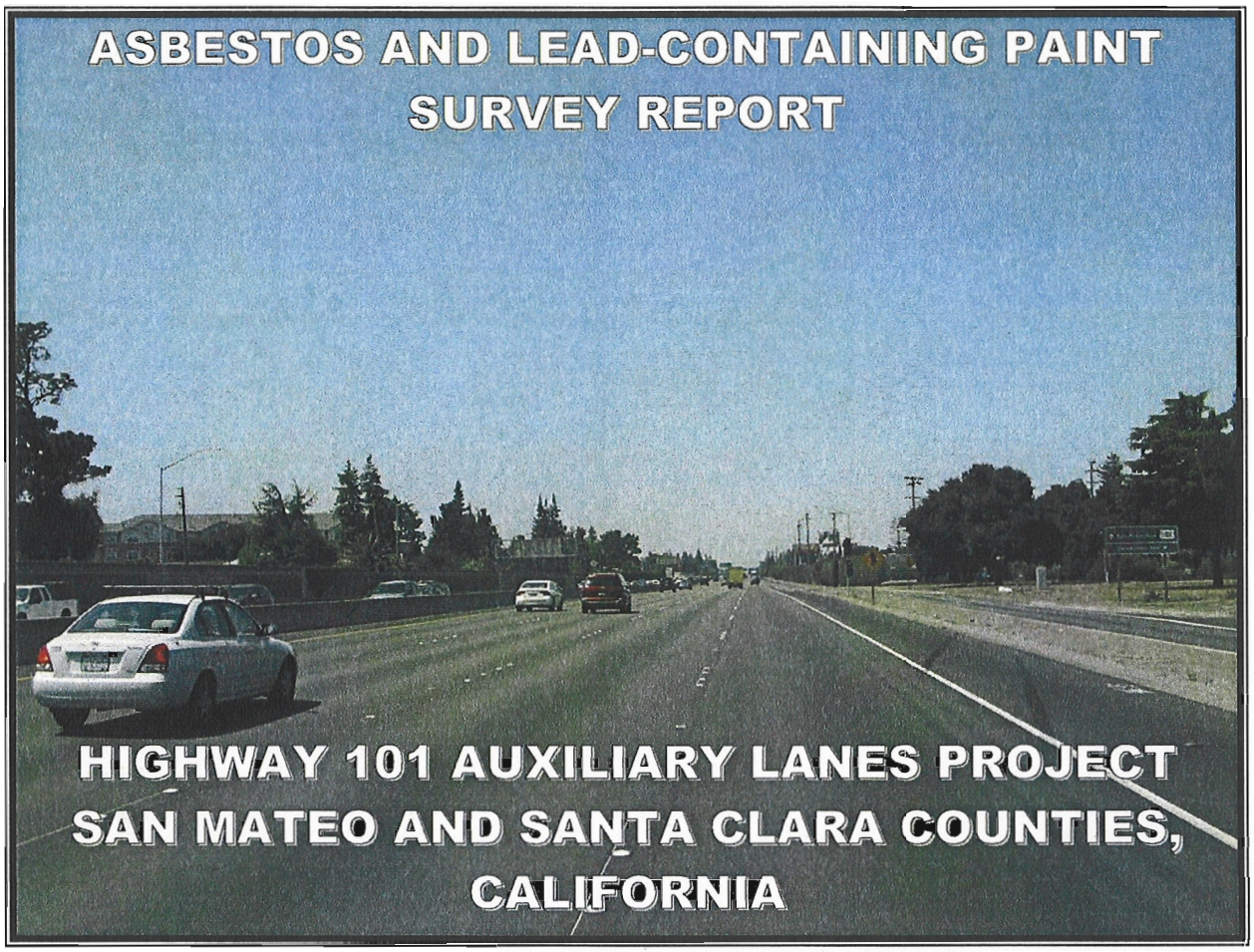
FIELD INVESTIGATION				LABORATORY TEST					CORRUGATED STEEL PIPE (CSP)									RCP, CAP AND CASP
						SOLUBLE SALTS (PPM)			FACTORS (YEARS)									RECOMMENDATIONS FOR:
									*1.0	*1.3	*1.6	*2.2	*2.8	+25	+6/8	+15		
SITE NO.	STATION /OFFSET	DESCRIPTION & REMARKS 1. EXISTING CULVERT (SIZE, TYPE, GAGE, %LOSS) 2. CHANNEL	ABRASION POTENTIAL	SAMPLE NO.	RESISTIVITY (OHMS-CM)	PH	SO4	Cl	1.3 mm	1.6 mm	2 mm	2.8 mm	3.5 mm	SOILS ONLY BC	WATER ONLY BC	BC PI	DESIGN LIFE YEARS	LINE 1) CONCRETE SPECIFICATIONS LINE 2) RCP SPECIFICATIONS LINE 3) CAP AND CASP SPECIFICATIONS LINE 4) PSC for CSP SPECIFICATIONS
4	D-11	Soil Sample		1d	800	7.3			26	----	----	----	----	*	----	----	51	1) USE STD TYPE II CONCRETE SPECIFICATION
																		2) USE STANDARD RCP
												57	----	----	----	----	57	3) DO NOT USE CAP/CASP
																		4) USE PSC FOR 1.3 MM CSP w/o BC
4	D-12	Soil Sample		2d	1200	8.2			27	----	----	----	----	*	----	----	52	1) USE STD TYPE II CONCRETE SPECIFICATION
																		2) USE STANDARD RCP
												59	----	----	----	----	59	3) DO NOT USE CAP/CASP
																		4) USE PSC FOR 1.3 MM CSP w/o BC
4	D-13	Soil Sample		3d	1200	8.3			27	----	----	----	----	*	----	----	52	1) USE STD TYPE II CONCRETE SPECIFICATION
																		2) USE STANDARD RCP
												59	----	----	----	----	59	3) DO NOT USE CAP/CASP
																		4) USE PSC FOR 1.3 MM CSP w/o BC
4	W-14	Water Sample		4w	1000	7.3			27	----	----	----	----	----	----	----	NA	1) USE STD TYPE II CONCRETE SPECIFICATION
											44	----	----	----	*	----	50	2) USE STANDARD RCP
												60	----	----	----	----	60	3) DO NOT USE CAP/CASP
																		4) USE PSC FOR 1.3 MM CSP w/o BC
										###	###	###	###	######	#######	###	#######	
										###	###	###	###	######	#######	###	#######	
										###	###	###	###	######	#######	###	#######	
										###	###	###	###	######	#######	###	#######	

CMP - CORRUGATED METAL PIPE
CMPA - CORRUGATED METAL PIPE ARCH
CAP - CORRUGATED ALUMINIUM PIPE
CASP - CORRUGATED ALUMINIZED STEEL PIPE
RCP - REINFORCED CONCRETE PIPE
CSP - CORRUGATED STEEL PIPE

BC - BITUMINOUS COATED
PI - PAVED INVERT
CPI - PAVED INVERT CONCRETE
RCB - REINFORCED CONCRETE BOX
RCA - REINFORCED CONCRETE ARCH
PSC - POLYMERIC SHEET COATING FOR CSP

N - NONE
S - SLIGHT
M - MODERATE
H - HEAVY

NC - NON-CORROSIVE
(SULPHATE < 2000 PPM)
(CHLORIDE < 500 PPM)
" " NO SOLUBLE SALT ANALYSIS



PREPARED FOR:
CALTRANS DISTRICT 4
OFFICE OF ENVIRONMENTAL ENGINEERING
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PREPARED BY:
GEOCON CONSULTANTS, INC.
6671 BRISA STREET
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GEOCON PROJECT NO. E8435-06-36
TASK ORDER NO. 36
CALTRANS EA 04-235611

DECEMBER 2009

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A. Laboratory Analytical Reports and Chain-of-Custody Documentation

REPORT LIMITATIONS

This asbestos and lead-containing paint (LCP) survey was conducted in conformance with generally accepted standards of practice for identifying and evaluating asbestos and LCP in structures. Due to the nature of structure surveys, asbestos and LCP use, and laboratory analytical limitations, some asbestos or LCP in the structures may not have been identified. Structure spaces such as cavities, crawlspaces, and pipe chases may have been concealed to our investigator. Previous structure renovation work may have concealed or covered spaces or materials, or may have partially demolished materials and left debris in inaccessible areas. Additionally, renovation activities may have partially replaced asbestos with indistinguishable non-asbestos materials. Asbestos or LCP may exist in areas of the structures not accessible or sampled in conjunction with this Task Order.

During renovation or demolition operations, suspect materials may be uncovered which are different from those accessible for sampling during this assessment. Personnel in charge of renovation/demolition should be alerted to note materials uncovered during such activities that differ substantially from those included in this or previous assessment reports. If suspect materials are found, additional sampling and analysis should be performed to determine if the materials contain asbestos or lead.

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 authors who are 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

Chris Giuntoli, CAC
Senior Project Scientist

David Watts, CAC
Senior Project Scientist

CALIFORNIA DEPARTMENT OF TRANSPORTATION – DISTRICT 4
OFFICE OF ENVIRONMENTAL ENGINEERING

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EXECUTIVE SUMMARY

This asbestos and lead-containing paint (LCP) survey report for the San Mateo (SM) and Santa Clara (SCL) United States Highway 101 Auxiliary Lanes Project was prepared by Geocon Consultants, Inc., under California Department of Transportation (Caltrans) Contract No. 04A2912 and Task Order 36 (TO-36), under EA 04-235611. This work was conducted at Highway 101 Post Mile (PM) SCL 52.2 in the City of Palo Alto, Santa Clara County, to PM SM 3.6 in the City of Menlo Park, San Mateo County, California. We performed an asbestos and LCP survey on the following bridges and structures at the project location:

- San Francisquito Creek Bridge (Bridge No. 35-0013),
- Ringwood Pedestrian Overcrossing (POC) [Bridge No. 35-0143],
- Hetch Hetchy Aqueduct Bridge (Bridge No. 35-0150M).connectors to the northbound and southbound Marina Viaduct; and
- Northbound and southbound Highway 101 soundwalls (between Marsh Road and Embarcadero Road).

The project location is depicted on the Vicinity Map, Figure 1, and Site Plans, Figures 2 and 3. Caltrans has requested an investigation at the project location to provide data regarding the presence of asbestos and LCP at the bridges prior to roadway widening activities.

This report documents the investigation sampling methods and laboratory analytical data. The primary objective of our survey was to determine and quantify asbestos and LCP at the project location prior to renovation or demolition activities. The information obtained from this investigation will be used by Caltrans to coordinate proposed renovation or demolition activities, determine appropriate abatement/disposal costs, and identify health and safety concerns during improvements.

The field investigation was performed on July 7 and August 11, 2009. The following field activities were performed during asbestos and LCP sampling efforts:

- Collected 26 bulk suspect asbestos samples at the project location;
- Collected two suspect LCP samples at the project location; and
- Transported samples to Caltrans-approved, California-certified environmental laboratories.

Samples were collected from locations as shown on the Site Plans (Figures 2 and 3). Suspect asbestos and LCP sample identification numbers are presented in Tables 1 and 2, respectively. Materials represented by the samples collected are presented in the Site Photographs.

The Hetch Hetchy Aqueduct Bridge (Bridge No. 35-0150M) was observed to be a below grade structure and no above-ground bridge components were identified for sampling.

Bulk suspect asbestos samples were collected after first wetting friable material with a light mist of water. The samples were then cut from the substrate and transferred to labeled containers and sealed. Fourteen suspect materials were identified during the survey (see Table 1). Sampling locations were distributed throughout the homogeneous areas (spaces where the material was observed).

We relinquished bulk samples for asbestos analysis using standard chain-of-custody documentation. Asbestos content was determined using EPA Test Method 600/R-93/116 for polarized light microscopy (PLM). We requested laboratory analyses to be within a 5-day turn-around-time.

Bulk paint samples were collected using techniques presented in U.S. Department of Housing and Urban Development (HUD) guidelines. One paint system was identified during the survey (see Table 2).

> *It was not Geocon's intent during this inspection to conduct an evaluation of lead-based paint hazards in accordance with HUD guidelines. HUD protocol generally requires a very extensive sampling strategy that includes sampling of paint on each surface type.*

We relinquished the bulk paint samples for lead analysis using standard chain-of-custody documentation. Total lead content was determined using EPA Test Method 6010B. Waste Extraction Test (WET) lead content was determined following EPA Test Method 7420. We requested laboratory analyses to be within a 5-day turn-around-time.

No asbestos was detected in samples of the suspect materials collected. A summary of the analytical laboratory test results for asbestos is presented in Table 1. Reproductions of the laboratory report and chain-of-custody documentation are presented in Appendix A.

The laboratory analyses for lead paint indicated bulk samples representing intact multi-layer graffiti abatement paint used on the Ringwood POC (Bridge No. 35-0143) exhibited total lead concentrations of 130 milligrams per kilogram (mg/kg) and 150 mg/kg, and WET lead concentrations of 1.9 milligrams per liter (mg/l) and 4.6 mg/l, respectively.

Geocon paint sample laboratory results are summarized in Table 2. Reproductions of the lead laboratory report and chain-of-custody documentation are presented in Appendix A.

We provide the following conclusions and recommendations based on the results of our investigation.

In accordance with Bay Area Air Quality Management District (BAAQMD) Regulation 11, Rule 2, written notification is required ten working days prior to commencement of *any* demolition activity (whether asbestos is present or not). In accordance with Title 8, CCR 341.9, written notification to the nearest Cal/OSHA district office is required at least 24 hours prior to certain asbestos-related work.

Based on the analytical test results, we recommend that all paints at the project location be treated as lead-containing for purposes of determining the applicability of the Cal/OSHA lead standard during any future maintenance, renovation, or demolition activities. This recommendation is based on LCP sample results and the fact that lead was a common ingredient of paints manufactured before 1978 and is still an ingredient of some industrial paints. In accordance with Title 8, CCR, Section 1532.1(p), written notification to the nearest Cal/OSHA district office is required at least 24 hours prior to certain lead-related work.

1.0 INTRODUCTION

This asbestos and lead-containing paint (LCP) survey report for the San Mateo (SM) and Santa Clara (SCL) United States Highway 101 Auxiliary Lanes Project was prepared by Geocon Consultants, Inc., under California Department of Transportation (Caltrans) Contract No. 04A2912 and Task Order 36 (TO-36), under EA 04-235611. This work was conducted at Highway 101 Post Mile (PM) SCL 52.2 in the City of Palo Alto, Santa Clara County, to PM SM 3.6 in the City of Menlo Park, San Mateo County, California. This report documents the investigation sampling methods and laboratory analytical data.

1.1 Site Description and Proposed Improvements

We performed an asbestos and LCP survey on the following bridges and structures at the project location:

- San Francisquito Creek Bridge (Bridge No. 35-0013),
- Ringwood Pedestrian Overcrossing (POC) [Bridge No. 35-0143],
- Hetch Hetchy Aqueduct Bridge (Bridge No. 35-0150M).connectors to the northbound and southbound Marina Viaduct; and
- Northbound and southbound Highway 101 soundwalls (between Marsh Road and Embarcadero Road).

The project location is depicted on the Vicinity Map, Figure 1, and Site Plans, Figures 2 and 3. Caltrans has requested an investigation at the project location to provide data regarding the presence of asbestos and LCP prior to roadway widening activities.

1.2 Purpose

This report documents the investigation sampling methods and laboratory analytical data. The primary objective of our survey was to determine and quantify asbestos and LCP at the project location prior to renovation or demolition activities. The information obtained from this investigation will be used by Caltrans to coordinate proposed renovation or demolition activities, determine appropriate abatement/disposal costs, and identify health and safety concerns during improvements.

2.0 BACKGROUND

The *Code of Federal Regulations (CFR),* 40 CFR 61, Subpart M, National Emissions Standards for Hazardous Air Pollutants (NESHAP) and Federal Occupational Safety and Health Administration (FED OSHA) classify asbestos-containing material (ACM) as any material or product that contains *greater than* 1% asbestos. Nonfriable ACM is classified by NESHAP as either Category I or Category II material defined as follows:

- **Category I** – asbestos-containing packings, gaskets, resilient floor coverings, and asphalt roofing products.
- **Category II** – all remaining types of nonfriable asbestos-containing material not included in Category I that when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Regulated asbestos-containing material (RACM), a hazardous waste when friable, is classified as any manufactured material that contains *greater than* 1% asbestos by dry weight *and* is:

- Friable; or
- Category I material that has become friable; or
- Category I material that has been subjected to sanding, grinding, cutting, or abrading; or
- Category II nonfriable material that has a high probability of becoming crumbled, pulverized, or reduced to a powder during demolition or renovation activities.

Activities that disturb materials containing *any* amount of asbestos are subject to certain requirements of the Cal/OSHA asbestos standard contained in Title 8, CCR Section 1529. Typically, removal or disturbance of more than 100 square feet of material containing more than 0.1% asbestos must be performed by a registered asbestos abatement contractor, but associated waste labeling is not required if the material contains 1% or less asbestos. When the asbestos content of a material exceeds 1%, virtually all requirements of the standard become effective.

Materials containing more than 1% asbestos are also subject to NESHAP regulations (40 CFR Part 61, Subpart M). RACM (friable ACM and nonfriable ACM that will become friable during demolition operations) must be removed from structures prior to demolition. Certain nonfriable ACM and materials containing 1% or less asbestos may remain in structures during demolition; however, there are waste handling/disposal issues and Cal/OSHA work requirements that must be followed. Contractors are responsible for segregating and characterizing waste streams prior to disposal.

With respect to potential worker exposure, notification, and registration requirements, Cal/OSHA defines asbestos-containing construction material (ACCM) as construction material that contains more than 0.1% asbestos (Title 8, CCR 341.6).

2.2 Lead Paint

Construction activities (including demolition) that disturb materials or paints containing *any* amount of lead are subject to certain requirements of the Cal/OSHA lead standard contained in Title 8, CCR, Section 1532.1. Deteriorated paint is defined by Title 17, CCR, Division 1, Chapter 8, §35022 as a surface coating that is cracking, chalking, flaking, chipping, peeling, non-intact, failed, or otherwise separating from a component. Demolition of a deteriorated LCP component would require waste characterization and appropriate disposal. Most landfill facilities and recyclers currently accept intact LCP on a component; however, contractors are responsible for segregating and characterizing waste streams prior to disposal.

For a solid waste containing lead, the waste is classified as California hazardous when: 1) the total lead content equals or exceeds the respective Total Threshold Limit Concentration (TTLC) of 1,000 milligrams per kilogram (mg/kg); or 2) the soluble lead content equals or exceeds the respective Soluble Threshold Limit Concentration (STLC) of 5 milligrams per liter (mg/l) based on the standard Waste Extraction Test (WET). A waste has the potential for exceeding the lead STLC when the waste's total lead content is greater than or equal to ten times the respective STLC value since the WET uses a 1:10 dilution ratio. Hence, when total lead is detected at a concentration greater than or equal to 50 mg/kg, and assuming that 100 percent of the total lead is soluble, soluble lead analysis is required. Lead-containing waste is classified as "Resource, Conservation, and Recovery Act" (RCRA) hazardous, or Federal hazardous, when the soluble lead content equals or exceeds the Federal regulatory level of 5 mg/l 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; however, for the purposes of this investigation, toxicity (i.e., 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.

Potential hazards exist to workers who remove or cut through LCP coatings during demolition. Dust containing hazardous concentrations of lead may be generated during scraping or cutting materials coated with LCP. Torching of these materials may produce lead oxide fumes. Therefore, air monitoring and/or respiratory protection may be required during the demolition of materials coated with LCP. Guidelines regarding regulatory provisions for construction work where workers may be exposed to lead are presented in the Title 8, CCR, Section 1532.1.

2.3 Architectural Drawings and Previous Survey Activities

Architectural drawings and previous survey reports for the project were not available for our review.

3.0 SCOPE OF SERVICES

The following scope of services was performed:

3.1 Pre-Field Activities

- Retained the services of EMSL, Inc. (EMSL), a Caltrans-approved laboratory accredited by the National Voluntary Laboratory Accreditation Program (NVLAP), to perform the asbestos analyses.
- Retained the services of Advance Technology Laboratories, Inc. (ATL), a Caltrans-approved laboratory, to perform the lead paint analyses.

3.2 Field Activities

Mr. Chris Giuntoli, a California-certified Asbestos Consultant (CAC), Certification No. 02-3163 (expiration June 18, 2010), and Certified Lead Paint Inspector with the California Department of Public Health (DPH), Certification No. I-5502 (expiration June 14, 2010) performed the asbestos and LCP survey on July 7 and August 11, 2009. Twenty-six bulk samples of suspect ACM were collected. Two bulk samples of suspect LCP were collected.

4.0 INVESTIGATIVE METHODS

4.1 Asbestos

Bulk suspect asbestos samples were collected after first wetting friable material with a light mist of water. The samples were then cut from the substrate and transferred to labeled containers and sealed. We observed 14 suspect materials during the survey (see Table 1). Sampling locations were distributed throughout the homogeneous areas (spaces where the material was observed).

We relinquished bulk samples for asbestos analysis using standard chain-of-custody documentation. Asbestos content was determined using EPA Test Method 600/R-93/116 for polarized light microscopy (PLM). We requested laboratory analyses to be within a 5-day turn-around-time.

4.2 Lead Paint

Bulk paint samples were collected using techniques presented in U.S. Department of Housing and Urban Development (HUD) guidelines. One paint system was identified during the survey (see Table 2).

> *It was not Geocon's intent during this inspection to conduct an evaluation of lead-based paint hazards in accordance with HUD guidelines. HUD protocol generally requires a very extensive sampling strategy that includes sampling of paint on each surface type.*

We relinquished the bulk paint samples for lead analysis using standard chain-of-custody documentation. Total lead content was determined using EPA Test Method 6010B. WET lead content was determined following EPA Test Method 7420. We requested laboratory analyses to be within a 5-day turn-around-time.

5.0 INVESTIGATIVE RESULTS

5.1 Asbestos

No asbestos was detected in samples of the suspect materials collected. A summary of the analytical laboratory test results for asbestos is presented in Table 1. Reproductions of the laboratory report and chain-of-custody documentation are presented in Appendix A.

5.2 Lead Paint

The laboratory analyses for lead paint indicated bulk samples representing intact multi-layer graffiti abatement paint used on the Ringwood POC (Bridge No. 35-0143) exhibited total lead concentrations of 130 and 150 mg/kg, and WET lead concentrations of 1.9 and 4.6 mg/l, respectively.

Geocon paint sample laboratory results are summarized in Table 2. Reproductions of the lead laboratory report and chain-of-custody documentation are presented in Appendix A.

6.0 CONCLUSIONS

6.1 Asbestos

Asbestos was not detected in samples of the suspect materials collected during our survey of the bridges and structures at the project location. Consequently, the Cal/OSHA asbestos standard does not apply for activities disturbing materials at the bridges and structures included in our survey. In addition, debris from planned improvement activities would not be considered a California hazardous waste based on asbestos content.

In accordance with Bay Area Air Quality Management District (BAAQMD) Regulation 11, Rule 2, written notification is required ten working days prior to commencement of *any* demolition activity (whether asbestos is present or not). In accordance with Title 8, CCR 341.9, written notification to the nearest Cal/OSHA district office is required at least 24 hours prior to certain asbestos-related work.

6.2 Lead Paint

Based on the analytical test results, we recommend that all paints at the project location be treated as lead-containing for purposes of determining the applicability of the Cal/OSHA lead standard during any future maintenance, renovation, and demolition activities. This recommendation is based on LCP sample results and the fact that lead was a common ingredient of paints manufactured before 1978 and is still an ingredient of some industrial paints. In accordance with Title 8, CCR, Section 1532.1(p), written notification to the nearest Cal/OSHA district office is required at least 24 hours prior to certain lead-related work. The LCP identified during our survey would not be considered a California or Federal hazardous waste based on lead content.

TABLE 1
SUMMARY OF ANALYTICAL LABORATORY TEST RESULTS - ASBESTOS
HIGHWAY 101 AUXILIARY LANE PROJECT
SAN MATEO AND SANTA CLARA COUNTIES, CALIFORNIA

Polarized Light Microscopy (PLM) - EPA Test Method 600/R-93/116

Sample ID	Description of Suspect Material	Approximate Quantity	Friable	Site Photo	Asbestos Content
RAPOC-1A RAPOC-1B	Ringwood POC (Bridge 35-0143) brown fiber board	NA	NA	2	ND ND
SFC-1A SFC-1B	San Francisquito Creek Bridge (Bridge 35-0013) brown fiber board	NA	NA	9	ND ND
SM101-1A SM101-1B	Soundwall mortar	NA	NA	14	ND ND
SM101-2A SM101-2B	Brown fiber board (soundwall)	NA	NA	15	ND ND
SM101-3A SM101-3B	Soundwall mortar	NA	NA	14	ND ND
SM101-4A SM101-4B	Brown fiber board (soundwall)	NA	NA	15	ND ND
SM101-5A SM101-5B	Soundwall mortar	NA	NA	14	ND ND
SM101-6A SM101-6B	Brown fiber board (soundwall)	NA	NA	15	ND ND
SM101-7A SM101-7B	Soundwall mortar	NA	NA	14	ND ND

TABLE 1
SUMMARY OF ANALYTICAL LABORATORY TEST RESULTS - ASBESTOS
HIGHWAY 101 AUXILIARY LANE PROJECT
SAN MATEO AND SANTA CLARA COUNTIES, CALIFORNIA

Polarized Light Microscopy (PLM) - EPA Test Method 600/R-93/116

Sample ID	Description of Suspect Material	Approximate Quantity	Friable	Site Photo	Asbestos Content
SM101-8A SM101-8B	Brown fiber board (soundwall)	NA	NA	15	ND ND
SM101-9A SM101-9B	Soundwall mortar	NA	NA	14	ND ND
SM101-10A SM101-10B	Brown fiber board (soundwall)	NA	NA	15	ND ND
SM101-11A SM101-11B	Soundwall mortar	NA	NA	14	ND ND
SM101-12A SM101-12B	Brown fiber board (soundwall)	NA	NA	15	ND ND

Notes:
NA = Not applicable
ND = No asbestos fibers detected

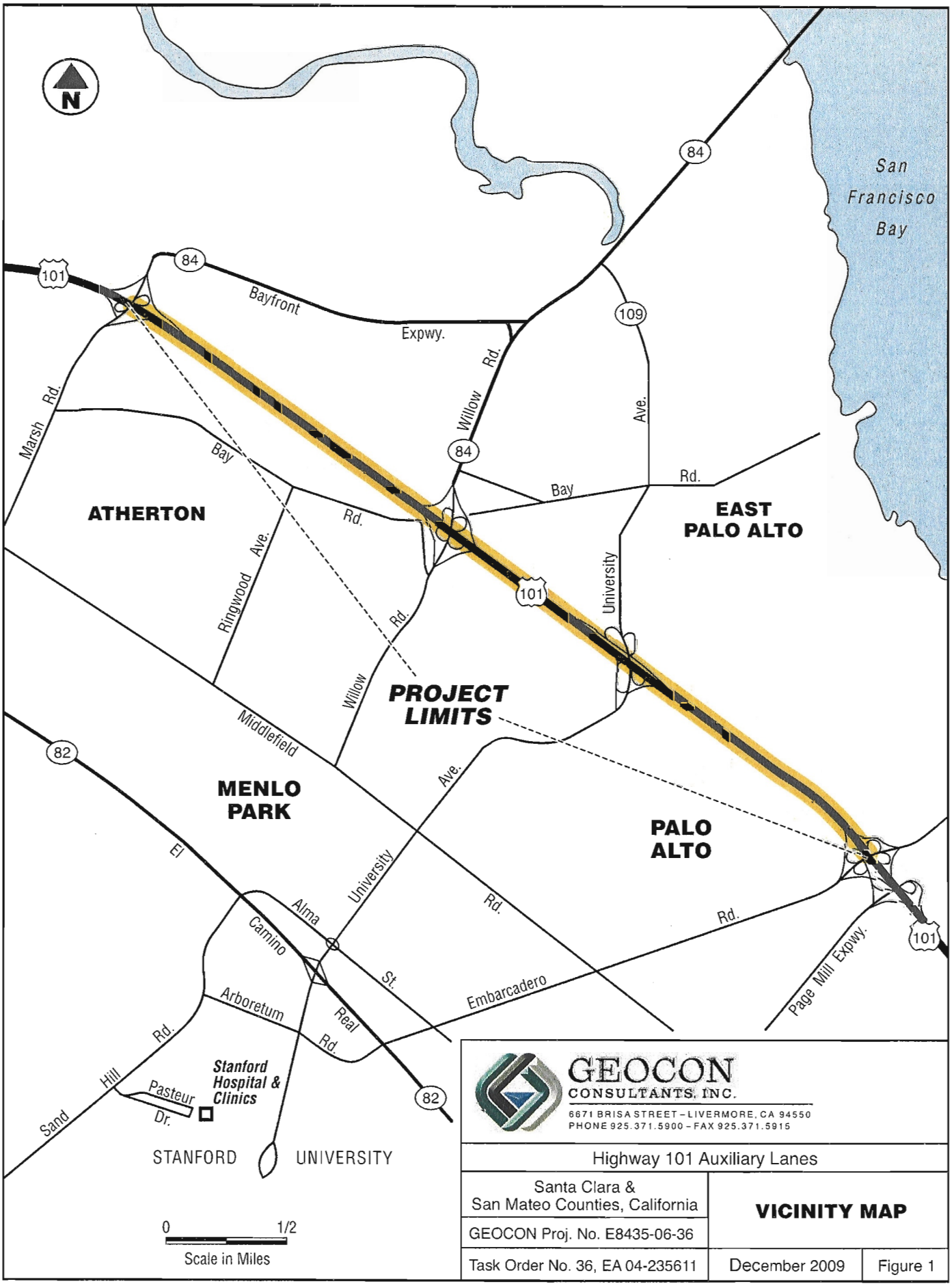
TABLE 2
SUMMARY OF ANALYTICAL LABORATORY TEST RESULTS - PAINT
HIGHWAY 101 AUXILIARY LANE PROJECT
SAN MATEO AND SANTA CLARA COUNTIES, CALIFORNIA

Total & Soluble Lead

Bridge No.	Sample No.	Paint Description	Approximate Quantity Peeling/Flaking	Site Photo	Total Lead (mg/kg)	WET Lead (mg/l)
35-0143	RAPOC-P1A	White graffiti abatement paint	Intact	3	130	1.9
	RAPOC-P1B				150	4.6

Notes:

mg/kg = milligrams per kilogram (EPA Test Method 6010)
WET = Waste Extraction Test (EPA Test Method 7420)
mg/l = milligrams per liter



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Highway 101 Auxiliary Lanes

Santa Clara & San Mateo Counties, California

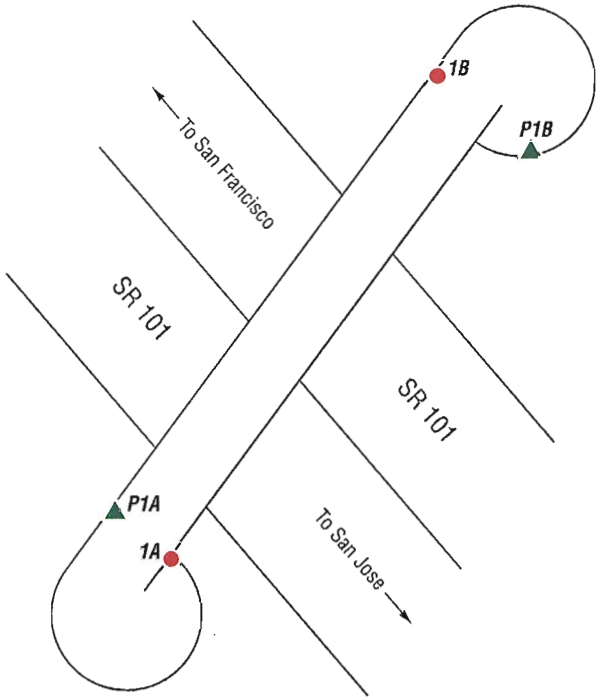
GEOCON Proj. No. E8435-06-36

Task Order No. 36, EA 04-235611

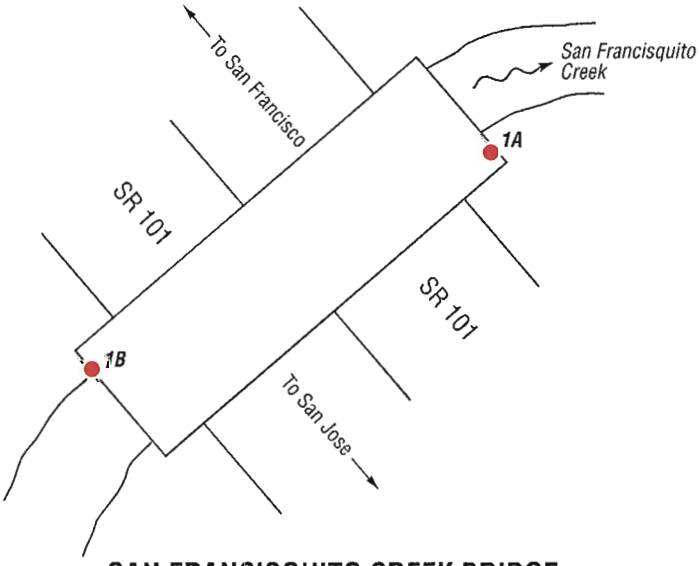
VICINITY MAP

December 2009

Figure 1



RINGWOOD POC
(Bridge 35-0143)



SAN FRANCISQUITO CREEK BRIDGE
(Bridge 35-0013)

N

NOT TO SCALE

LEGEND:

- ● Approximate Asbestos Sample Location
- ▲ Approximate Paint Sample Location

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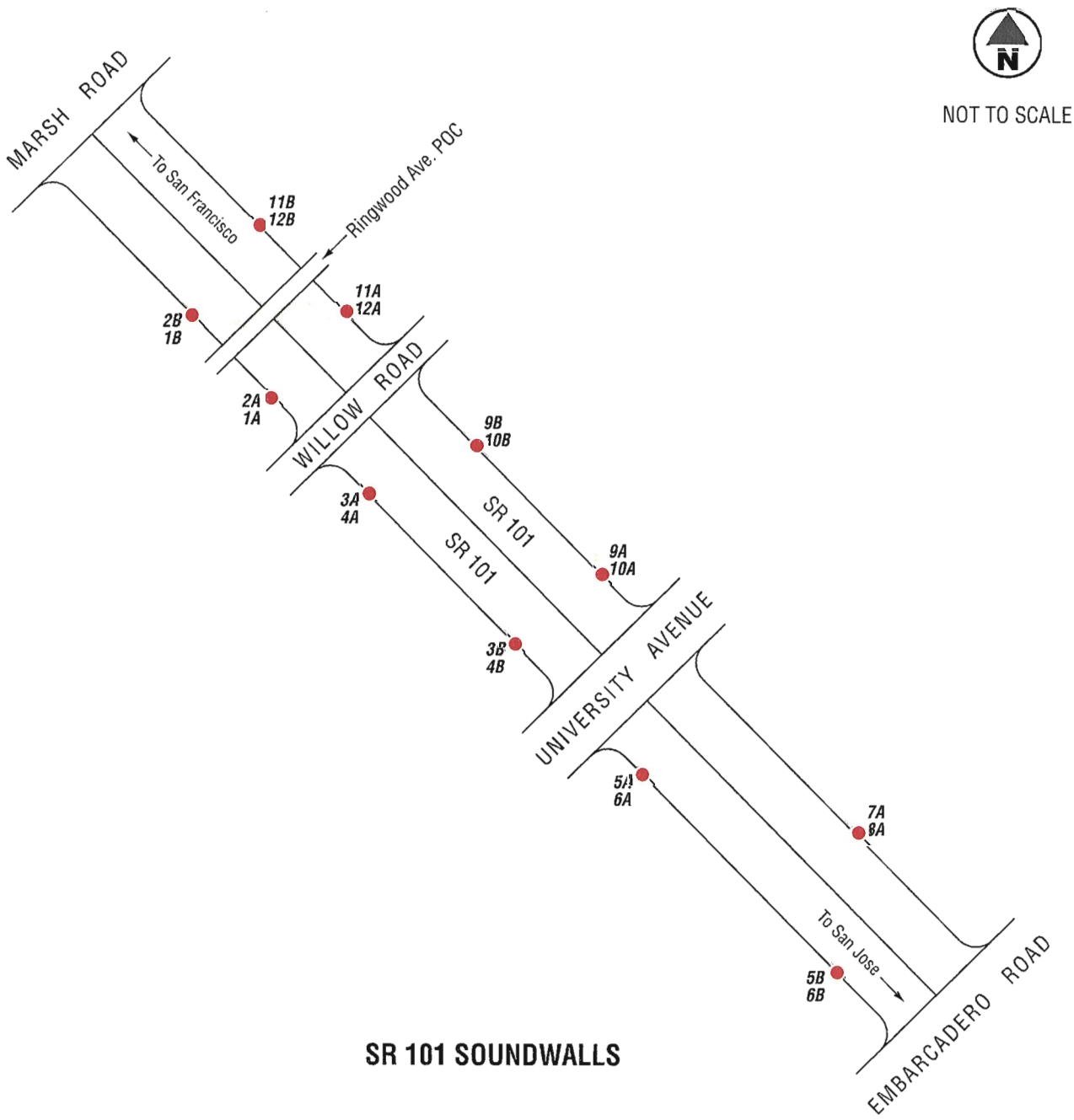
Highway 101 Auxiliary Lanes		
Santa Clara & San Mateo Counties, California	**SITE PLAN – BRIDGES**	
GEOCON Proj. No. E8435-06-36		
Task Order No. 36, EA 04-235611	December 2009	Figure 2



SR 101 SOUNDWALLS

LEGEND:

- Approximate Asbestos Sample Location

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Highway 101 Auxiliary Lanes		
Santa Clara & San Mateo Counties, California	**SITE PLAN – SOUNDWALLS**	
GEOCON Proj. No. E8435-06-36		
Task Order No. 36, EA 04-235611	December 2009	Figure 3

Photo 1 – Novato Creek Bridge, northbound SR 101 (Bridge No. 27-0089R)

Photo 2 – Bridge No. 27-0089R asbestos-containing guard rail shim

Photo 3 – Bridge No. 27-0089R black drain pipe

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PHOTOGRAPHS 1, 2, & 3		
Marin Sonoma Narrows – Segment A Project Marin County, California		
E8435-06-40	Task Order No. 40	December 2009

Photo 4 – Hetch Hetchy Aqueduct Bridge (Bridge No. 35-0150M) vicinity at Iris Lane and Van Buren Road (no aboveground bridge structure)

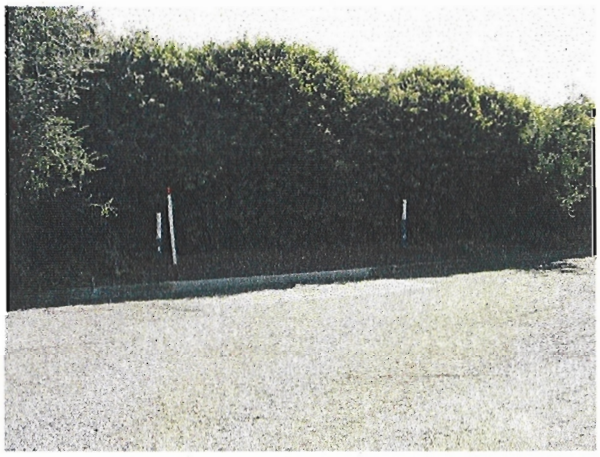

Photo 5 – Hetch Hetchy Aqueduct Bridge (Bridge No. 35-0150M) at southbound Highway 101/Van Buren Road soundwall (no aboveground bridge structure)

Photo 6 – Hetch Hetchy Aqueduct Bridge (Bridge No. 35-0150M) at northbound Highway 101/Pierce Road soundwall (no aboveground bridge structure)

Photo 7 – Hetch Hetchy Aqueduct Bridge (Bridge No. 35-0150M) utility marker at Iris Lane and Van Buren Road

Photo 8 – San Francisquito Creek Bridge (Bridge No. 35-0013)

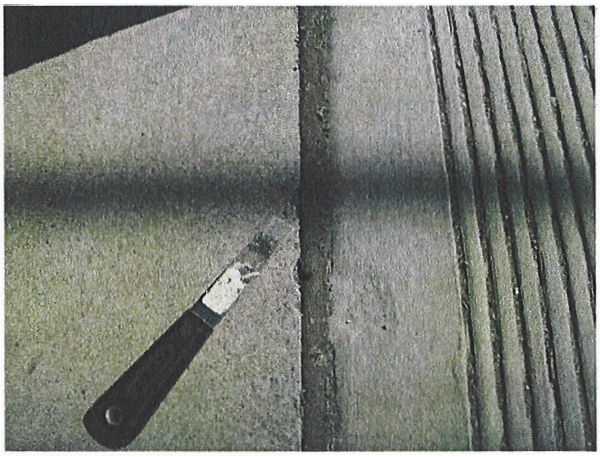

Photo 9 – San Francisquito Creek Bridge (Bridge No. 35-0013) brown fiberboard at sidewalk joints

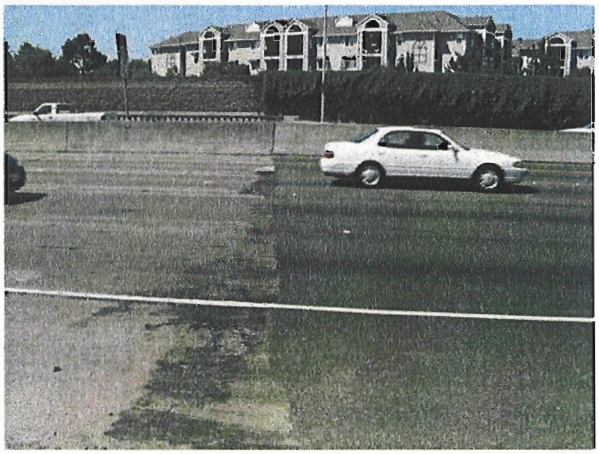

Photo 10 – San Francisquito Creek Bridge (Bridge No. 35-0013) north deck joint (no suspect materials)

Photo 11 – San Francisquito Creek Bridge (Bridge No. 35-0013) south deck joint (non-suspect material)

Photo 12 – Typical soundwalls along southbound Highway 101 within the project limits

Photo 13 – Typical soundwalls along northbound Highway 101 within the project limits

Photo 14 – Typical soundwall mortar within the project limits

Photo 15 – Typical soundwall brown fiberboard within the project limits

APPENDIX A

EMSL Analytical, Inc
2235 Polvorosa Ave., Suite 230, San Leandro, CA 94577
Phone: (510) 895-3675 Fax: (510) 895-3680 Email: milpitaslab@emsl.com

Attn: **Chris Giuntoli**
Geocon Consultants
6671 Brisa Street
Livermore, CA 94550

Fax: (925) 371-5915 Phone: (925) 371-5900
Project: **E8435-06-36**

Customer ID: GECN21
Customer PO: E8435-06-36
Received: 07/07/09 5:43 PM
EMSL Order: 090905340
EMSL Proj:
Analysis Date: 7/10/2009

RECEIVED
JUL 23 2009
By

Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	%	Non-Asbestos Fibrous	%	Non-Fibrous	Asbestos % Type
RAPOC-1A-Fiber board *090905340-0001*		Brown Fibrous Homogeneous	20%	Cellulose	80%	Non-fibrous (other)	**None Detected**
RAPOC-1B Fiber board *090905340-0002*		Brown Fibrous Homogeneous	70%	Cellulose	30%	Non-fibrous (other)	**None Detected**
SFC-1A-Fiber board *090905340-0003*		Brown Fibrous Homogeneous	60%	Cellulose	40%	Non-fibrous (other)	**None Detected**
SFC-1B Fiber board *090905340-0004*		Brown Fibrous Homogeneous	70%	Cellulose	30%	Non-fibrous (other)	**None Detected**

Analyst(s)

Jorge Leon (2)
Nonette Patron (2)

Baojia Ke, Laboratory Manager
or other approved signatory

Due to magnification limitations inherent in PLM, asbestos fibers in dimensions below the resolution capability of PLM may not be detected. Samples reported as <1% or none detected may require additional testing by TEM to confirm asbestos quantities. The above test report relates only to the items tested and may not be reproduced in any form without the express written approval of EMSL Analytical, Inc. EMSL's liability is limited to the cost of analysis. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client.Samples received in good condition unless otherwise noted.
Samples analyzed by EMSL Analytical, Inc San Leandro 2235 Polvorosa Ave., Suite 230, San Leandro CA NVLAP Lab Code 101048-3, MA AA000201, WA C2007

THIS IS THE LAST PAGE OF THE REPORT.

0909052340

EMSL ANALYTICAL, INC.

EMSL – San Leandro • 2235 Polvorosa Ave, Suite 230, San Leandro, CA 94577

(888) 455-3675 • Phone (510) 895-3675 • Fax (510) 895-3680 • sanleandrolab@emsl.com

EMSL Rep:	DAN KOCHER	*Third Party Billing*	*requires written authorization from third party*
Company:	GECCON	EMSL-Bill to:	
Contact:	CHRIS GIUNTOLI	Contact:	
Address:	6671 BRISA ST	Address:	
City & State:	LIVERMORE, CA Zip 94550	City & State:	Zip
Phone:	925-371-5900	Fax:	
☒ Email Results	GIUNTOLI@GECCONINC.COM	☐ Fax results	
Project Name or Number:	E8435-06-36	Purchase Order Number:	

TURNAROUND TIME

☐ 3 Hours	☐ 6 Hours	☐ 24 Hours	☐ 48 Hours	☐ 72 Hours	☒ 5 Days	☐ 10 Days

SAMPLE MATRIX

☐ Air	☒ Bulk	☐ Soil	☐ Wipe	☐ Micro-Vac	☐ Drinking Water	☐ Wastewater	☐ Chips	☐ Other

ASBESTOS ANALYSIS

PCM - Air
- ☐ NIOSH 7400 (A) Issue 2, August 1994
- ☐ OSHA w/ Time Weighted Average

TEM AIR
- ☐ AHERA 40 CFR, Part 763 Subpart E
- ☐ NIOSH 7402 Issue 2
- ☐ EPA Level II

PLM - Bulk
- ☒ EPA 600/R-93/116
- ☐ + Add Gravimetric Reduction (EPA NOB)

PLM CARB 435 Level: ☐ A (0.25%) ☐ B (0.1%)
- ☐ NIOSH 9002
- ☐ EPA Point Count (400 Points)
- ☐ + Add Gravimetric Reduction (EPA NOB)
- ☐ EPA Point Count (1,000 Points)
- ☐ + Add Gravimetric Reduction (EPA NOB)
- ☐ Standard Addition Point Count

SOILS

PLM CARB 435 Level: ☐ A (0.25%) ☐ B (0.1%)
TEM CARB 435 Level: ☐ B (0.1%) ☐ C (0.01%) ☐ D (0.001%) ☐ E (0.0005%) ☐ F (0.0001%)
- ☐ EMSL MSD 9000 Method fibers/gram
- ☐ Superfund EPA 540-R097-028 (dust generation)

EPA Protocol ☐ Qualitative ☐ Quantitative

TEM BULK
- ☐ TEM EPA NOB, EPA 600/R-93/116 Section 2.5.5.1 (TEM % by VAE)
- ☐ Chatfield SOP-1988-02
- ☐ TEM EPA 600/R-93/116 Section 2.5.5.2 (TEM % by Mass)

TEM MICROVAC
- ☐ ASTM D 5755 (Quantitative)

TEM WIPE
- ☐ ASTM D-6480 (Quantitative)

TEM WATER
- ☐ EPA 100.2 (> 10 microns)
- ☐ Modified EPA 100.2 (> 0.5 microns)

OTHER:

LEAD ANALYSIS

Flame Atomic Absorption
- ☐ Wipe, SW846-7420 ☐ ASTM ☐ non ASTM
- ☐ Soil, SW846-7420
- ☐ Air, NIOSH 7082
- ☐ Chips, SW846-7420 or AOAC 5.009 (974.02)
- ☐ Wastewater, SW 846-7420

☐ TCLP LEAD SW846-1311/7420

Graphite Furnace Atomic Absorption
- ☐ Air, NIOSH 7105
- ☐ Wastewater, SW846-7421
- ☐ Soil, SW846-7421
- ☐ Drinking Water, EPA 239.2

ICP – Inductively Coupled Plasma
- ☐ Wipe, SW846-6010 ☐ ASTM ☐ non ASTM
- ☐ Soil, SW846-6010
- ☐ Air, NIOSH 7300

MATERIALS ANALYSIS
- ☐ Particle Identification
- ☐ Full Particle Identification
- ☐ Dust Mites and Insect Fragments
- ☐ Particle Size & Distribution
- ☐ Product Comparison
- ☐ Paint Characterization
- ☐ Failure Analysis
- ☐ Corrosion Analysis
- ☐ Glove Box Containment Study
- ☐ Petrographic Examination of Concrete
- ☐ Portland Cement in Workplace Atmospheres (OSHA ID-143)
- ☐ Man Made Vitreous Fibers - MMVF's
- ☐ Synthetic Fiber Identification
- ☐ Other:

MICROBIAL ANALYSIS

Air Samples
- ☐ Mold & Fungi by Air O Cell
- ☐ Mold & Fungi by Agar Plate count & id
- ☐ Bacterial Count and Gram Stain
- ☐ Bacterial Count and Identification

Water Samples
- ☐ Total Coliforms, Fecal Coliforms
- ☐ Escherichia Coli, Fecal Streptococcus
- ☐ Legionella
- ☐ Salmonella
- ☐ Giardia and Cryptosporidium

Wipe and Bulk Samples
- ☐ Mold & Fungi – Direct Examination
- ☐ Mold & Fungi – (Culture follow up to direct examination if necessary)
- ☐ Mold & Fungi - Culture (Count & ID)
- ☐ Mold & Fungi - Culture (Count only)
- ☐ Bacterial Count & Gram Stain
- ☐ Bacterial Count & Identification (3 most prominent types)
- ☐ Other:

IAQ ANALYSIS
- ☐ Nuisance Dust (NIOSH 0500 & 0600)
- ☐ Airborne Dust (PM10, TSP)
- ☐ Silica Analysis by XRD ☐ NIOSH 7500
- ☐ HVAC Efficiency
- ☐ Carbon Black
- ☐ Airborne Oil Mist
- ☐ Other:

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Received:	[signature]	Date:	[illegible]	Time:	5:42 pm
Relinquished:		Date:		Time:	
Received:		Date:		Time:	

EMSL ANALYTICAL, INC.

EMSL – San Leandro * 2235 Polvorosa Ave, Suite 230, San Leandro, CA 94577

	SAMPLE NUMBER	SAMPLE DESCRIPTION	LOCATION	VOLUME Air (L) Area (Inches sq.)
1	RAFCC-1A	BROWN FIBERBOARD		
2	RAFCC-1B	↓		
3	SFC-1A	BROWN FIBERBOARD		
4	SFC-1B	↓		
5				
6				
7				
8				
9				
10				
11				
12				
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14				
15				
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18				
19				
20				
21				
22				
23				
24				
25				

Client Sample # (S) _____ - _____ TOTAL SAMPLE # _____

Relinquished: _____ Date: _____ Time: _____
Received: _____ Date: _____ Time: _____
Relinquished: _____ Date: _____ Time: _____
Received: _____ Date: _____ Time: _____

EMSL Analytical, Inc
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Attn: **Chris Giuntoli**
Geocon Consultants
6671 Brisa Street
Livermore, CA 94550

Fax: (925) 371-5915 Phone: (925) 371-5900
Project: **E8435-06-36**

Customer ID: GECN21
Customer PO: E8435-06
Received: 08/21/09 9:00 AM
EMSL Order: 090906820

EMSL Proj: E8435-06-**
Analysis Date: 8/25/2009

Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos %	Fibrous	Non-Asbestos %	Non-Fibrous	Asbestos % Type
SM101-1A-Mortar *090906820-0001*		Red Non-Fibrous Homogeneous			100%	Non-fibrous (other)	**None Detected**
SM101-1B-Mortar *090906820-0002*		Red Non-Fibrous Homogeneous			100%	Non-fibrous (other)	**None Detected**
SM101-2A-Fiber Board *090906820-0003*		Brown Fibrous Homogeneous	90%	Cellulose	10%	Non-fibrous (other)	**None Detected**
SM101-2B-Fiber Board *090906820-0004*		Brown Fibrous Homogeneous	90%	Cellulose	10%	Non-fibrous (other)	**None Detected**
SM101-3A-Mortar *090906820-0005*		Red Non-Fibrous Homogeneous			100%	Non-fibrous (other)	**None Detected**
SM101-3B-Mortar *090906820-0006*		Red Non-Fibrous Homogeneous			100%	Non-fibrous (other)	**None Detected**
SM101-4A-Fiber Board *090906820-0007*		Brown Fibrous Homogeneous	90%	Cellulose	10%	Non-fibrous (other)	**None Detected**

Analyst(s)

Grant Mays (22)

Baojia Ke, Laboratory Manager
or other approved signatory

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Samples analyzed by EMSL Analytical, Inc San Leandro 2235 Polvorosa Ave., Suite 230, San Leandro CA NVLAP Lab Code 101048-3, MA AA000201, WA C2007

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Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos %	Fibrous	Non-Asbestos %	Non-Fibrous	Asbestos % Type
SM101-4B-Fiber Board *090906820-0008*		Brown Fibrous Homogeneous	90%	Cellulose	10%	Non-fibrous (other)	**None Detected**
SM101-5A-Mortar *090906820-0009*		Red Non-Fibrous Homogeneous			100%	Non-fibrous (other)	**None Detected**
SM101-5B-Mortar *090906820-0010*		Red Non-Fibrous Homogeneous			100%	Non-fibrous (other)	**None Detected**
SM101-6A-Fiber Board *090906820-0011*		Brown Fibrous Homogeneous	90%	Cellulose	10%	Non-fibrous (other)	**None Detected**
SM101-6B-Fiber Board *090906820-0012*		Brown Fibrous Homogeneous	90%	Cellulose	10%	Non-fibrous (other)	**None Detected**
SM101-7A-Mortar *090906820-0013*		Red Non-Fibrous Homogeneous			100%	Non-fibrous (other)	**None Detected**

Analyst(s)

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Baojia Ke, Laboratory Manager
or other approved signatory

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Fax: (925) 371-5915 Phone: (925) 371-5900
Project: **E8435-06-36**

Customer ID: GECN21
Customer PO: E8435-06
Received: 08/21/09 9:00 AM
EMSL Order: 090906820

EMSL Proj: E8435-06-**
Analysis Date: 8/25/2009

Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos %	Fibrous	Non-Asbestos %	Non-Fibrous	Asbestos % Type
SM101-8A-Fiber Board *090906820-0014*		Brown Fibrous Homogeneous	90%	Cellulose	10%	Non-fibrous (other)	**None Detected**
SM101-9A-Mortar *090906820-0015*		Red Non-Fibrous Homogeneous			100%	Non-fibrous (other)	**None Detected**
SM101-9B-Mortar *090906820-0016*		Red Non-Fibrous Homogeneous			100%	Non-fibrous (other)	**None Detected**
SM101-10A-Fiber Board *090906820-0017*		Brown Fibrous Homogeneous	90%	Cellulose	10%	Non-fibrous (other)	**None Detected**
SM101-10B-Fiber Board *090906820-0018*		Brown Fibrous Homogeneous	90%	Cellulose	10%	Non-fibrous (other)	**None Detected**
SM101-11A-Mortar *090906820-0019*		Red Non-Fibrous Homogeneous			100%	Non-fibrous (other)	**None Detected**
SM101-11B-Mortar *090906820-0020*		Red Non-Fibrous Homogeneous			100%	Non-fibrous (other)	**None Detected**

Analyst(s)

Grant Mays (22)

Baojia Ke, Laboratory Manager
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Customer ID: GECN21
Customer PO: E8435-06
Received: 08/21/09 9:00 AM
EMSL Order: 090906820

EMSL Proj: E8435-06-**
Analysis Date: 8/25/2009

Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	%	Non-Asbestos Fibrous	%	Non-Asbestos Non-Fibrous	Asbestos % Type
SM101-12A-Fiber Board *090906820-0021*		Brown Fibrous Homogeneous	90%	Cellulose	10%	Non-fibrous (other)	**None Detected**
SM101-12B-Fiber Board *090906820-0022*		Brown Fibrous Homogeneous	90%	Cellulose	10%	Non-fibrous (other)	**None Detected**

Analyst(s)

Grant Mays (22)

Baojia Ke, Laboratory Manager
or other approved signatory

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0905060820

EMSL – San Leandro • 2235 Polvorosa Ave, Suite 230, San Leandro, CA 94577

(888) 455-3675 • Phone (510) 895-3675 • Fax (510) 895-3680 • sanleandrolab@emsl.com

EMSL Rep:	DAN KOCHER	*Third Party Billing*	*requires written authorization from third party*
Company:	GEOCON	EMSL-Bill to:	
Contact:	CHRIS GIONTOLI	Contact:	
Address:	6671 BRISA ST	Address:	
City & State:	LIVERMORE, CA Zip 94550	City & State:	Zip
Phone:	925-371-5900	Fax:	
☒ Email Results	GIONTOLI@GEOCONINC.COM	☐ Fax results	
Project Name or Number:	E8438-06-06	Purchase Order Number:	

TURNAROUND TIME

☐ 3 Hours	☐ 6 Hours	☐ 24 Hours	☐ 48 Hours	☐ 72 Hours	☒ 5 Days	☐ 10 Days

SAMPLE MATRIX

☐ Air	☒ Bulk	☐ Soil	☐ Wipe	☐ Micro-Vac	☐ Drinking Water	☐ Wastewater	☐ Chips	☐ Other

ASBESTOS ANALYSIS

PCM - Air
- ☐ NIOSH 7400 (A) Issue 2: August 1994
- ☐ OSHA w/ Time Weighted Average

TEM AIR
- ☐ AHERA 40 CFR, Part 763 Subpart E
- ☐ NIOSH 7402 Issue 2
- ☐ EPA Level II

PLM - Bulk
- ☒ EPA 600/R-93/116
- ☐ **+ Add Gravimetric Reduction (EPA NOB)**
- PLM CARB 435 Level: ☐ A (0.25%) ☐ B (0.1%)
- ☐ NIOSH 9002
- ☐ EPA Point Count (400 Points)
- ☐ **+ Add Gravimetric Reduction (EPA NOB)**
- ☐ EPA Point Count (1,000 Points)
- ☐ **+ Add Gravimetric Reduction (EPA NOB)**
- ☐ Standard Addition Point Count

SOILS
- PLM CARB 435 Level: ☐ A (0.25%) ☐ B (0.1%)
- TEM CARB 435 Level: ☐ B (0.1%) ☐ C (0.01%) ☐ D (0.001%) ☐ E (0.0005%) ☐ F (0.0001%)
- ☐ EMSL MSD 9000 Method fibers/gram
- ☐ Superfund EPA 540-R097-028 (dust generation)
- EPA Protocol ☐ Qualitative ☐ Quantitative

TEM BULK
- ☐ TEM EPA NOB, EPA 600/R-93/116 Section 2.5.5.1 (TEM % by VAE)
- ☐ Chatfield SOP-1988-02
- ☐ TEM EPA 600/R-93/116 Section 2.5.5.2 (TEM % by Mass)

TEM MICROVAC
- ☐ ASTM D 5755 (Quantitative)

TEM WIPE
- ☐ ASTM D-6480 (Quantitative)

TEM WATER
- ☐ EPA 100.2 (≥ 10 microns)
- ☐ Modified EPA 100.2 (≥ 0.5 microns)

OTHER:

LEAD ANALYSIS

Flame Atomic Absorption
- ☐ Wipe, SW846-7420 ☐ ASTM ☐ non ASTM
- ☐ Soil, SW846-7420
- ☐ Air, NIOSH 7082
- ☐ Chips, SW846-7420 or AOAC 5.009 (974.02)
- ☐ Wastewater, SW 846-7420

- ☐ TCLP LEAD SW846-1311/7420

Graphite Furnace Atomic Absorption
- ☐ Air, NIOSH 7105
- ☐ Wastewater, SW846-7421
- ☐ Soil, SW846-7421
- ☐ Drinking Water, EPA 239.2

ICP – Inductively Coupled Plasma
- ☐ Wipe, SW846-6010 ☐ ASTM ☐ non ASTM
- ☐ Soil, SW846-6010
- ☐ Air, NIOSH 7300

MATERIALS ANALYSIS
- ☐ Particle Identification
- ☐ Full Particle Identification
- ☐ Dust Mites and Insect Fragments
- ☐ Particle Size & Distribution
- ☐ Product Comparison
- ☐ Paint Characterization
- ☐ Failure Analysis
- ☐ Corrosion Analysis
- ☐ Glove Box Containment Study
- ☐ Petrographic Examination of Concrete
- ☐ Portland Cement in Workplace Atmospheres (OSHA ID-143)
- ☐ Man Made Vitreous Fibers – MMVF's
- ☐ Synthetic Fiber Identification
- ☐ Other:

MICROBIAL ANALYSIS

Air Samples
- ☐ Mold & Fungi by Air O Cell
- ☐ Mold & Fungi by Agar Plate count & id
- ☐ Bacterial Count and Gram Stain
- ☐ Bacterial Count and Identification

Water Samples
- ☐ Total Coliforms, Fecal Coliforms
- ☐ Escherichia Coli, Fecal Streptococcus
- ☐ Legionella
- ☐ Salmonella
- ☐ Giardia and Cryptosporidium

Wipe and Bulk Samples
- ☐ Mold & Fungi – Direct Examination
- ☐ Mold & Fungi – (Culture follow up to direct examination if necessary)
- ☐ Mold & Fungi – Culture (Count & ID)
- ☐ Mold & Fungi – Culture (Count only)
- ☐ Bacterial Count & Gram Stain
- ☐ Bacterial Count & Identification (3 most prominent types)
- ☐ Other:

IAQ ANALYSIS
- ☐ Nuisance Dust (NIOSH 0500 & 0600)
- ☐ Airborne Dust (PM10, TSP)
- ☐ Silica Analysis by XRD ☐ NIOSH 7500
- ☐ HVAC Efficiency
- ☐ Carbon Black
- ☐ Airborne Oil Mist
- ☐ Other:

Relinquished:	[signature]	Date:	8/20/09	Time:	17:45
Received:	[signature]	Date:	8/21/09	Time:	9:00 AM
Relinquished:		Date:		Time:	
Received:		Date:		Time:	

C9C906820

EMSL ANALYTICAL, INC.

EMSL – San Leandro ◆ 2235 Polvorosa Ave, Suite 230, San Leandro, CA 94577

	SAMPLE NUMBER	SAMPLE DESCRIPTION	LOCATION	VOLUME Air (L) Area (Inches sq.)
1	SM101-1A	MORTAR		
2	SM101-1B	↓		
3	SM101-2A	BROWN FIBERBOARD		
4	SM101-2B	↓		
5	SM101-3A	MORTAR		
6	SM101-3B	↓		
7	SM101-4A	BROWN FIBER BOARD		
8	SM101-4B	↓		
9	SM101-5A	MORTAR		
10	SM101-5B	↓		
11	SM101-6A	BROWN FIBER BOARD		
12	SM101-6B	↓		
13	SM101-7A	MORTAR		
14	SM101-8A	BROWN FIBERBOARD		
15	SM101-9A	MORTAR		
16	SM101-9B	↓		
17	SM101-10A	BROWN FIBER BOARD		
18	SM101-10B	↓		
19	SM101-11A	MORTAR		
20	SM101-11B	↓		
21	SM101-12A	BROWN FIBERBOARD		
22	SM101-12B	↓		
23				
24				
25				

Client Sample # (S) _____ - _____ TOTAL SAMPLE # _____

Relinquished: _____ Date: _____ Time: _____
Received: M. Lawson Date: 8/21/09 Time: 0900 F/E
Relinquished: _____ Date: _____ Time: _____
Received: _____ Date: _____ Time: _____

July 16, 2009

RECEIVED
JUL 24 2009
By

ACCREDITED IN ACCORDANCE WITH nelac

Chris Giuntoli
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550

TEL: (925) 371-5900
FAX: (925) 371-5915

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
CSDLAC No.: 10196

Workorder No.: 106308

RE: E8435-06-36

Attention: Chris Giuntoli

Enclosed are the results for sample(s) received on July 09, 2009 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

for Eddie F. Rodriguez
Laboratory Director

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Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *16-Jul-09*

CLIENT: Geocon Consultants, Inc.
Project: E8435-06-36

Lab Order: 106308

Lab ID: 106308-001 **Collection Date:** 7/7/2009
Client Sample ID: RAPOC-P1A **Matrix:** PAINT CHIP

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP6_090716A	QC Batch: 56577				PrepDate: 7/14/2009	Analyst: **SRB**
Lead	130	4.0		mg/Kg	1	7/16/2009 12:26 PM

Lab ID: 106308-002 **Collection Date:** 7/7/2009
Client Sample ID: RAPOC-P1B **Matrix:** PAINT CHIP

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP6_090716A	QC Batch: 56577				PrepDate: 7/14/2009	Analyst: **SRB**
Lead	150	4.0		mg/Kg	1	7/16/2009 12:27 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories *3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040*

Advanced Technology Laboratories
5275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *16-Jul-09*

CLIENT: Geocon Consultants, Inc.
Work Order: 106308
Project: E8435-06-36

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-56577** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/14/2009** RunNo: **110838**
Client ID: **PBS** Batch ID: **56577** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/15/2009** SeqNo: **1744611**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	1.0									

Sample ID: **LCS-56577** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/14/2009** RunNo: **110838**
Client ID: **LCSS** Batch ID: **56577** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/15/2009** SeqNo: **1744612**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	48.342	1.0	50.00	0	96.7	80	120				

Sample ID: **106317-009ADUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/14/2009** RunNo: **110838**
Client ID: **ZZZZZZ** Batch ID: **56577** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/15/2009** SeqNo: **1744615**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.194	1.0						5.500	5.72	20	

Sample ID: **106317-009AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/14/2009** RunNo: **110838**
Client ID: **ZZZZZZ** Batch ID: **56577** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/15/2009** SeqNo: **1744617**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	110.238	1.0	125.0	5.500	83.8	33	120				

Sample ID: **106317-009AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/14/2009** RunNo: **110838**
Client ID: **ZZZZZZ** Batch ID: **56577** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/15/2009** SeqNo: **1744618**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	111.159	1.0	125.0	5.500	84.5	33	120	110.2	0.832	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CHAIN OF CUSTODY RECORD

Pg 1 of 1

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: 7/8/09

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: GSE

Sample Condition Upon Receipt
1. CHILLED Y☑ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☑ N☐ 6. PRESERVED Y☐ N☐

Client: GSE CORP
Attn: CHRIS GIUNTOLI
Address: 6671 BRISA ST
City: LIVERMORE State: CA Zip Code: 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

Project Name:
Project #: E8435-06-36
Sampler: (Printed Name) CHRIS GIUNTOLI (Signature)

Relinquished by: (Signature and Printed Name)	Date	Time	Received by: (Signature and Printed Name)	Date	Time
	7/8/09	1645		7/8/09	0815
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: C GIUNTOLI 7/8/09
Print Name Date
Signature

Send Report To: Attn: SAME Co: _____ Address _____ City _____ State _____ Zip _____

Bill To: Attn: SAME Co: _____ Address _____ City _____ State _____ Zip _____

Special Instructions/Comments:
* SOLUBLE LEAD MAY BE REQUESTED BASED ON TOTAL LEAD RESULTS

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	TOTAL LEAD *	SOIL	WATER	GROUND WATER	WASTEWATER	GRAB	COMP	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	[illegible]	RAPOC-P1A	7/7/09										X						X		E	1	P	B	
	↓	RAPOC-P1B	↓										X						X		↓	↓	↓	↓	

SPECIFY APPROPRIATE MATRIX

Q A / Q C: RTNE ☐ CT ☑ SWRCB ☐ Logcode _____ OTHER _____

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

RECEIVED
JUL 29 2009

July 24, 2009

ACCREDITED IN ACCORDANCE WITH nelac By

Chris Giuntoli
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550

TEL: (925) 371-5900
FAX: (925) 371-5915

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
CSDLAC No.: 10196

Workorder No.: 106308

RE: E8435-06-36

Attention: Chris Giuntoli

Enclosed are the results for sample(s) received on July 09, 2009 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

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Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *24-Jul-09*

CLIENT: Geocon Consultants, Inc.
Project: E8435-06-36

Lab Order: 106308

Lab ID: 106308-001 **Collection Date:** 7/7/2009
Client Sample ID: RAPOC-P1A **Matrix:** PAINT CHIP

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)						
WET				**WET/ EPA 7420**		
RunID: AA2_090721A	QC Batch: 56673			PrepDate:	7/17/2009	Analyst: IL
Lead	1.9	0.25		mg/L	1	7/21/2009 09:39 AM

Lab ID: 106308-002 **Collection Date:** 7/7/2009
Client Sample ID: RAPOC-P1B **Matrix:** PAINT CHIP

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)						
WET				**WET/ EPA 7420**		
RunID: AA2_090721A	QC Batch: 56673			PrepDate:	7/17/2009	Analyst: IL
Lead	4.6	0.25		mg/L	1	7/21/2009 09:40 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: 24-Jul-09

CLIENT: Geocon Consultants, Inc.
Work Order: 106308
Project: E8435-06-36

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_ST

Sample ID: **MB-56673A** SampType **MBLK** TestCode: **7420_ST** Units: **mg/L** Prep Date: **7/17/2009** RunNo: **110970**
Client ID: **PBS** Batch ID: **56673** TestNo: **WET/ EPA 74 WET** Analysis Date: **7/21/2009** SeqNo: **1746912**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-56673** SampType: **LCS** TestCode: **7420_ST** Units: **mg/L** Prep Date: **7/17/2009** RunNo: **110970**
Client ID: **LCSS** Batch ID: **56673** TestNo: **WET/ EPA 74 WET** Analysis Date: **7/21/2009** SeqNo: **1746913**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.152	0.25	5.000	0	103	80	120				

Sample ID: **106306-012A-DUP** SampType: **DUP** TestCode: **7420_ST** Units: **mg/L** Prep Date: **7/17/2009** RunNo: **110970**
Client ID: **ZZZZZZ** Batch ID: **56673** TestNo: **WET/ EPA 74 WET** Analysis Date: **7/21/2009** SeqNo: **1746918**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.463	0.25						0.4415	4.83	20	

Sample ID: **106306-012A-MS** SampType: **MS** TestCode: **7420_ST** Units: **mg/L** Prep Date: **7/17/2009** RunNo: **110970**
Client ID: **ZZZZZZ** Batch ID: **56673** TestNo: **WET/ EPA 74 WET** Analysis Date: **7/21/2009** SeqNo: **1746919**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.919	0.25	5.000	0.4415	110	80	120				

Sample ID: **106306-012A-MSD** SampType: **MSD** TestCode: **7420_ST** Units: **mg/L** Prep Date: **7/17/2009** RunNo: **110970**
Client ID: **ZZZZZZ** Batch ID: **56673** TestNo: **WET/ EPA 74 WET** Analysis Date: **7/21/2009** SeqNo: **1746920**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.868	0.25	5.000	0.4415	109	80	120	5.919	0.873	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
  Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

Rachelle Arada

From: Chris Giuntoli [giuntoli@geoconinc.com]
Sent: Friday, July 17, 2009 9:50 AM
To: Rachelle Arada
Subject: FW: Results/EDD - E8435-06-36 (106308)

Hi Rachelle,

Can you please help with this request?

Thanks
Chris

From: Chris Giuntoli [mailto:giuntoli@geoconinc.com]
Sent: Friday, July 17, 2009 9:44 AM
To: 'Diane Galvan'
Subject: RE: Results/EDD - E8435-06-36 (106308)

Hi Diane,

For Workorder No. 106308, please run WETs for lead on both paint samples on a standard TAT.

Thanks,
Chris

From: Diane Galvan [mailto:Diane@atlglobal.com]
Sent: Thursday, July 16, 2009 6:08 PM
To: giuntoli@geoconinc.com
Cc: livermore@geoconinc.com
Subject: Results/EDD - E8435-06-36 (106308)

Hi Chris,

Here are the results and Excel EDD.

Thanks,

Diane Galvan
Project Coordinator

Advanced Technology Laboratories
www.atlglobal.com
Tel: (562) 989-4045 ext. 238
Fax: (562) 989-4040

Advanced Technology Laboratories is a full-service environmental lab providing organic and inorganic analyses of soil, water, wastewater, storm water and hazardous waste samples. ATL is accredited by the State of California, NELAP and State of Nevada and holds various SBE, DBE and MBE certificates and a USDA soil permit. ATL takes pride in providing our customers with quick turnaround time, excellent customer service and defensible data while offering very competitive rates. *Advanced Technology Labs - Your Partner for Quality Environmental Testing*

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Long Form - Storm Water Data Report

Caltrans

Dist-County-Route: 04-SM-101, 04-SCL-101

Post Mile Limits: PM 0.0/3.6 in SM
PM 52.2/52.6 in SCL

Project Type: Highway Widening

EA: 235610

RU: 243

Program Identification: STIP

Phase: ☐ **PID** ☒ **PA/ED** ☐ **PS&E**

Regional Water Quality Control Board(s): San Francisco Bay Region, RB-2

Is the project required to consider incorporating Treatment BMPs? ☒ Yes ☐ No

If yes, can Treatment BMPs be incorporated into the project? ☒ Yes ☐ No

If No, a Technical Data Report must be submitted to the RWQCB at least 30 days prior to Advertisement. List submittal date: _____

Total Disturbed Soil Area: 8.4 acres (3.4 hectares)

Estimated Construction Start Date: 04/01/2011 Construction Completion Date: 11/01/2013

Notification of Construction (NOC) Date to be submitted: 05/01/2010

Notification of ADL reuse (if Yes, provide date) ☒ Yes Date: TBD ☐ No

Separate Dewatering Permit (if Yes, permit number) ☒ Yes Permit #: TBD ☐ No

This Report has been prepared under the direction of the following Licensed Person. The Licensed Person attests to the technical information contained herein and the data upon which recommendations, conclusions, and decisions are based. Professional Engineer or Landscape Architect stamp required at PS&E.

AIJUN DING, *Registered Project Engineer* — Date: 12/17/2007

I have reviewed the storm water quality design issues and find this report to be complete, current, and accurate:

RONALD MORIGUCHI, *Project Manager* — Date: 12/21/07

Thong Nguyen for **ROBERT BRAGA**, *Designated Maintenance Representative* — Date: 12/21/07

DAVID YAM, *Designated Landscape Architect Representative* — Date: 12/27/07

REGISTERED PROFESSIONAL ENGINEER
AIJUN DING
No. C58899
Exp. 06/30/2009
CIVIL
STATE OF CALIFORNIA

STAMP
[Required for PS&E only]

for **KAMRAN NAKHJIRI**, *District/Regional SW Coordinator or Designee* — Date: 12/21/07

STORM WATER DATA INFORMATION

1. Project Description

The project proposes to widen US 101 to add auxiliary lanes in each direction from the Embarcadero Road Interchange (PM 52.2) in the City of Palo Alto in Santa Clara County to the Marsh Road interchange (PM 3.6) in the City of Menlo Park in San Mateo County. In addition to the auxiliary lanes, other major components of the project include:

- Replacement of the Ringwood Pedestrian Overcrossing (POC) to provide sufficient clearance for the proposed auxiliary lanes.
- Widening of the Hetch Hetchy Aqueduct Bridge.
- Realignment of existing off-ramps and on-ramps, widening of on-ramps to provide HOV bypass lane or lanes, and in conjunction with the installation of ramp metering system.

Existing sound walls within the project limits will not be demolished and moved.

Information provided by Design South Peninsula estimates the disturbed soil area to be 8.4 acres (3.4 hectares) from highway widening activities. There will be about 2.8 hectares (6.92 acres) of additional impervious surface as a result of the project. Adding auxiliary lanes also require reinforcing existing shoulder pavement base/subbase layers before repaving so the new lanes could support traffic. Rework on these pavements constitutes disturbance of soil and considered as a component of surface areas that need runoff treatment by the San Francisco Bay Regional Water Quality Board. Design South Peninsula computed the reworked area of adding auxiliary lanes to be 2.8 hectares (6.92 acres). The total of additional impervious area and the rework area as a result of the project will be about 13.84 acres or 5.60 hectares.

The project limits are within a highly urbanized area mainly residential and commercial land use on both sides of the freeway with parallel frontage roads separated mostly by sound walls from US 101. The cities of Menlo Park, East Palo Alto and Palo Alto are urban Municipal Separate Storm Sewer Systems (MS4s) located in the counties of San Mateo and Santa Clara, respectively.

2. Define Site Data and Storm Water Quality Design Issues

Route 101 project limits occupy two hydrologic areas, Santa Clara Palo Alto hydrologic area 205.50 and South Bay San Mateo Bayside hydrologic area 204.40 with a combined watershed of 251,000 acres. San Francisquito Creek cuts across Route-101 at the south end of the project limits and drains 1.5 miles east to San Francisco Bay South. San Francisco Bay South is 303d listed for chlordane, diazinon, dichlorodiphenyltrichloroethane (DDT), dieldrin, dioxin compounds, exotic species, furan compounds, mercury, polychlorinated biphenyl (PCBs), and selenium. None of these pollutants are Department targeted design constituents. San Francisquito Creek is impaired with diazinon and sedimentation, the latter being a pollutant of concern that needs to be addressed for permanent treatment by the Department.

With sedimentation as a targeted design constituent (TDC) at San Francisquito Creek, a project soil disturbance of 8.4 acres could result to potential discharge of cut and fill materials to this receiving waterbody. San Francisquito Creek has the following existing beneficial uses:

- Cold and warm freshwater habitat
- Fish migration (steelhead)
- Fish spawning
- Wildlife habitat

Beneficial uses lost must be replaced by mitigation of at least equal function, value and area. A water quality certification (401 permit) will be applied upon requirement of a 404 federal permit from the Army Corps of Engineers.

High-risk areas are locations where spills from Department owned right-of-ways, activities, or facilities can discharge directly to municipal or domestic water supply reservoirs or ground water percolation facilities. Additional sites may be added to the high-risk list based on discussion between the RWQCB and Department.

No high-risk areas are found in the vicinity of the project limits. The project area is generally flat and is mostly a blend of commercial and residential land use.

Presently, the cities of Palo Alto and Menlo Park have no requirement or concern.

San Francisco Bay Region climate is Mediterranean in character with dry warm summers and wet cool winters. Rainy season is from October 15 to April 15. Rainfall on these hydrologic areas average 22 inches annually while temperatures range from 38°F to 73°F throughout the year. The project belongs to the Santa Clara Valley San Mateo Groundwater Basin 2-9.03. The basin is composed of alluvial fan deposits formed by tributaries to San Francisco Bay, that drain the basin. Water bearing formations of the San Mateo subbasin are comprised of two groups: the Santa Clara Formation of Plio-Pleistocene age and the Quaternary age alluvial deposits. The Quaternary alluvium constitutes the most important water bearing formation of this basin and basically all larger yielding wells acquire their water from it. Groundwater contamination of chlorinated solvents may be encountered during construction of retaining wall and relocation of storm drain lift station from Henderson Underpass to Marsh Road. Test boring logs show groundwater at approximately 2 feet throughout the project site indicating dewatering at proposed retaining wall sites. Elevations over the four-mile limit range from –2.9 feet at Henderson Underpass (PM 3.04) to 27 feet at midway (PM 1.4) between University Avenue and Willow Road interchanges

Except at the ramp interchanges, the project limits is mostly paved and considered as urban land classified under hydrologic group D of low permeability and high runoff potential. Aerially Deposited Lead (ADL) encountered will most probably fall within the Department Variance (Type Y material) and may be used as fill material on site. As urban fill the native soils have been stripped or reworked in construction and no longer mappable, hence, testing would be required to determine specific engineering properties of site soils. The proposed improvements do not require embankment construction so the ADL material would have to be placed within an interchange if a suitable site can be found, or buried under the structural section and the clean over-excavated material off hauled.

Acquisition of adjacent parcels for BMPs may not improve treatment of runoff because the surrounding area is paved and urbanized except at the open areas of interchanges.

Slope embankments do not support Route 101 project limits but are mainly bounded by sound walls and retaining walls at the outside shoulders. Construction will be scheduled to minimize soil-disturbing work during the rainy season and runoffs are collected from stabilized drains and conveyances. Any slope stabilization concern will be resolved by erosion control measures.

Historically, no treatment BMPs were installed within the project limits of San Mateo or Santa Clara Route 101 due to siting constraints. A small detention basin was created in 1993 (EA 138104) at Willow Road Interchange (PM 1.87) to reduce stormwater runoff flows across Route 101 during major storm events. It was not intended nor considered as a treatment BMP.

3. Regional Water Quality Control Board Agreements

San Francisco Bay Regional Water Quality Control Board (RQWCB) has water quality jurisdiction of the project. The RWQCB prescribed no Total Maximum Daily Load (TMDL) or effluent limits yet for sedimentation/siltation in San Franciscquito Creek, Per schedule posted 3/31/05. No schedule yet set for the TMDL as of May 2007 TMDL update report.

No negotiated understanding or agreements relating to permanent treatment or 401 certifications have yet been discussed.

4. Describe Proposed Design Pollution Prevention BMPs to be used on the Project.

Downstream Effects Related to Potentially Increased Flow

There will be insignificant changes in velocity or volume of downstream flow, no increase in sediment loading potential, and no hydraulic changes because the work involves reinforcing roadbed structures of what is already paved shoulders redesigned as auxiliary lanes conforming to existing slopes.

Slope/Surface Protection Systems

Except for ramp interchanges, slopes gradient are relatively flat throughout the project limits due to sound walls, retaining walls and curbs bounding the edge of traveled way.

Concentrated Flow Conveyance Systems

Conveyances are mainly closed channels with potential ditches where space and down gradient permit. Pipes are connected to urban drain system discharging east towards San Francisco Bay South.

Preservation of Existing Vegetation

Clearing and grubbing will be performed in ramp interchanges tapered to conform to added auxiliary lanes. ESAs off limits to contractors, if any, will be subject to delineation by Biology. Per inquiry with environmental planner natural sciences (Kevin Melanephy, July 17, 07) there are no biology ESA areas within the project limits. However, there are areas adjacent to the project that is off-limits to workers and erosion control treatments. Currently there is a need to avoid San Francisquito Creek channel but there may be other locations that are identified as the planning phase continues. ESAs, flood plains, wetlands, problem soils, and steep slopes are not common in this urbanized and mostly paved segment of Route-101.

5. Describe Proposed Permanent Treatment BMPs to be used on the Project

Treatment will be aimed at sedimentation/siltation as a targeted design constituent particularly at San Francisquito Creek where it is an impairment and undergoing TMDL process with the RB-2.

The San Francisco Bay RWQCB prescribes treatment of 100% equivalent water quality volume (WQV) or water quality flow (WQF) of the site or at least 100% WQV/WQF created from additional impervious and reworked areas of the project. Given space limitations within project limits, Caltrans is required to reduce pollutants to the maximum extent practicable (MEP) under MS4 NPDES permit requirements.

The following treatment BMP selections have been approved by Caltrans to address sedimentation. Feasibility of each treatment BMP will be evaluated in the following order of effectiveness under existing project limit conditions.

- Infiltration Devices
- Media Filters - Austin Sand Filter/Delaware Filter, or Wet Basin
- Detention Device, Biofiltration Strip, or MCTT
- Biofiltration Swale

Infiltration devices are most effective in treating stormwater total suspended solids (TSS). Infiltration basins are depressions used to detain stormwater runoff until it percolates into the groundwater table. An infiltration trench is typically a long and narrow excavation that is lined with filter fabric and backfilled with stone aggregate or gravel to form an underground basin. To be feasible, infiltration device sites require sufficient soil permeability, low groundwater table for influents to avoid affecting groundwater quality, and ample elevation for drainage and maintenance. In contrast, the project has predominantly impervious urban land fill belonging to hydrologic soil group D. Its terrain is relatively flat with maximum elevation difference of 29 feet over a four-mile length. Any remaining unpaved areas at interchanges are not down gradient from the highway structural section nor are there 30-feet recovery zones that can be created as safe distance from infiltration devices. Infiltration is not appropriate due to siting constraints.

Media Filters direct stormwater into a first chamber where the larger sediments and particulates settle out then meter the partially treated effluent into a second chamber to be filtered through a sand media. The two media filters -- **Austin Filter** is at grade and open, while **Delaware Filter** is below grade and closed. Both will perform better if the tributary area has a relatively high percentage of impervious area, and low sediment loading which the project surrounding satisfies. Sites proposed for media filters, however, must have sufficient hydraulic head to operate by gravity (3 to 6 ft) between the inflow to the initial chamber and effluent outflow from the second chamber that project sites may not offer. Unless concurrence for the use of Delaware Sand Filters can be obtained from the local vector control agencies, the placement of a Delaware Sand Filter, which maintains a permanent pool of water in the sedimentation chamber, should be avoided in locations where there are concerns about vector control. The project's limited right of way cannot meet relatively high space

requirements are for sedimentation basin and sand filter. Sand filters can be relatively expensive to construct and maintain. Media filters are inappropriate as stormwater treatment BMP for this project.

Wet Basins are detention systems comprised of a permanent pool of water, a temporary storage volume above the permanent pool, and a shoreline zone planted with aquatic vegetation. The site under consideration for a wet basin should if possible be located where the visual aesthetics of the permanent pool is considered a benefit (such as a roadside rest area or vista point). Wet basins are sited where a permanent pool of water can be maintained from a dry weather flow source. Significant off-site drainage with year round base flow is needed. For highways in residential or commercial areas, a combined drainage area greater than 20 acres is recommended. A wet basin usually has an area of 1 to 3 percent of the contributing drainage area. Keeping the basin from being dry without a continuous source of water flow would pose a problem. Wet basins must be properly maintained to prevent stratification and anoxic conditions, which would allow resuspension of solids and release of nutrients and metals. There are potential problems associated with mosquitoes and the device may become a regulated wetland if not consistently maintained per an established schedule. No site within the project limits could satisfy siting requirements rendering wet basins not feasible as a treatment BMP.

Detention Devices are impoundments that collect stormwater from the highways via storm drain inlets. The basin captures and detains the design water quality runoff volume (typically for 48 hrs.) prior to discharge typically through a perforated riser. The basin removes floatable debris and coarse suspended solids. Pollutant removal is achieved primarily through settling of sediments and particulate forms of pollutants. Detention requires sufficient hydraulic head and high space requirements not found in the project limits. The approved Project Study Report under section 5.4 mentioned a 900 cubic meter capacity detention basin was created in 1993 to reduce stormwater runoff flow crossing Route-101. This basin at Willow Road Interchange (PM 1.87) was not listed as a treatment device but it may be retrofitted and possibly serve as a treatment BMP for the project subject to further evaluation of its present condition, preliminary design factors, and drainage area treated. Mitigated runoff flow crossing from west to east of Route 101, however, indicates that the stormwater serviced may originate from drainage areas outside the project limits. Pending further information to confirm its feasibility, this detention basin as treatment BMP may be pursued among other alternatives throughout this phase. If properly retrofitted, a detention basin treating stormwater out side of the Department right of way may be considered as off-site treatment. Ocular inspection showed no detention basin was visible.

Biofiltration strips are relatively flat vegetated areas that accept sheet flow from storm water runoff and remove pollutants through filtration and infiltration. Soundwalls, retaining walls and paved shoulders or barriers bound the project with no flat embankments for sheet flow to travel and be treated. Areas where vegetated treatment sites could possibly be established along the project are insignificant. Biofiltration strips are not feasible given the limited areas for vegetation cover that satisfies siting requirements. Nonetheless, efforts to establish vegetation at every possible opportunity for erosion or treatment will be undertaken in the project.

Multi-Chambered Treatment Trains (MCTTs) is a vault type three-chamber device used to catch stormwater, settle solids, and filter pollutants in stages. This BMP needs ample space, at least five feet of hydraulic head, and periodic media replacement requirements. It is more costly than media filters and mainly used in critical source facilities such as storage areas and fueling stations. The project does not satisfy siting requirements for MCTTs to be feasible.

Biofiltration Swales are vegetated channels, typically configured as trapezoidal or v-shaped channels that receive and convey stormwater flows while meeting water quality criteria and other flow criteria. Stormwater runoff within the project is not conveyed in open channels but directly drain into inlets where it is carried by enclosed pipes to the storm drain system. Open sites are not always at down gradient and upstream of outfalls to justify diversion of concentrated flow for treatment by bioswales.

All Caltrans approved BMPs may not be feasible due to right of way limitations and lack of necessary hydraulic head as common factors in varying degrees. Sound walls, retaining walls, paved shoulders and barriers, interchanges or bridge structures bounding both sides of Route 101 pose little opportunities to install treatment BMPs along the project limits. With the exception of above grade vegetated areas at interchange ramps and slim prospect of a detention basin, the highly urbanized and paved surrounding preclude treatment

on-site. Demolishing perimeter structures to expand right of way through acquisition of adjacent parallel frontage paved roads will not address this constraint, and may create other design, traffic and social problems.

In a discussion with Hydraulics (Yuanzheng Ge, May 21, 2007) potential sites were identified for bioswales at a ditch from PM 1.4 southbound where the soundwall begins to Willow Road on ramp PM 1.8, and at Marsh Road northbound to PM 3.3. These sites still needs further investigation throughout the planning phase. Some roadway side gutters along on/off-ramps may be modified as bioswales.

Hydraulics is not inclined in retrofitting detention facilities designed that reduce peak discharges to serve as stormwater treatment BMP. In their observation surface storage inside cloverleaf is usually high. Such storage may allow surface water temporary accumulate, however, it does not meet the treatment requirement and may not be considered for pavement runoff treatment purpose due to two reasons: (1) insignificant amount of flow from the roadway pavement, and (2) insignificant detention time provided. The run-off treated may not come from the project limits.

Stormwater staff ocular inspection of the project limits (June 8, 2007) presented eleven potential sites of two bioswales and nine biostrips that treat a combined drainage area of 8.7 acres. These sites are not sufficient to meet treatment requirements of 13.84 acres added impervious/reworked area. This figure at PAED is tentative and still subject to further comments and additional information from other concerned units (environmental, hydraulics, maintenance among others) as the project advances to PS&E. Details of treatment TBMPs sites are outlined in the attached TBMP Summary Spreadsheet.

There will be at least a deficit of 5.14 acres of additional impervious plus reworked area, which cannot be performed on-site and should on-site treatment prove to be totally infeasible for Caltrans approved treatment BMPs, pursuing other alternatives include:

- Obtaining credits from other Caltrans projects within the same watershed that have excess treatment;
- Off-site treatment of stormwater at least equivalent to drainage area of reworked surfaces added, and;
- Allocation of funds set aside for off-site treatment that would indirectly benefit water quality (i.e. public education, technical studies for incorporation of treatment BMPs within the watershed, etc.).

Project allocation for permanent stormwater mitigation measures will be in line with cost estimate provisions of the Project Planning Design Guide (PPDG, March 2007).

6. Describe Proposed Temporary Construction Site BMPs to be used on Project

Temporary BMPs will be applied during construction activities to reduce the pollutants in the storm water discharges and minimize erosion throughout construction. The area is mostly flat along this alignment except at the interchanges. In this auxiliary lanes project, construction site BMPs (CSBMP) will include but not limited to ESA fence, silt fence, temporary fiber rolls, temporary cover, and temporary drainage inlet protection. These treatments BMPs are designed to stop or minimize erosion and improve stormwater quality during the construction phase of the project.

To comply with the conditions of the Caltrans NPDES Permit, and address the temporary water quality impacts resulting from the construction activities in this project, standard special provision (SSP) 07-345 will be included in the PS&E. This SSP will require the contractor to prepare a Storm Water Pollution Prevention Plan (SWPPP) and implement construction site Best Management Practices that may include:

- Soil Stabilization Practices: Hydroseeding, Soil Binders, Geotextile and Plastic Covers
- Sediment Control Practices: Silt Fence, Straw Bale Barrier, Check Dams, Storm Drain Inlet Protection
- Tracking Control: Stabilized Construction Entrances, Street Sweeping and Vacuuming
- Non-storm Water Management: Construction Site Dewatering, Vehicle and Equipment Operations (Fueling, Cleaning and Maintenance of vehicles will not be allowed on-site)
- Waste Management: Spill Prevention and Control, Solid and Hazardous Waste Management, Concrete Waste Management

Among those CSBMP incorporated as lump sum includes the preparation of stormwater pollution prevention plan (SWPPP), construction site management, and additional water pollution control.

This project will involve construction over a period of two winter seasons. The number of winter seasons is factored into the cost estimate for each construction site BMP chosen as a line item of work. A detailed summary of quantities and costs for Construction Site BMPs as a part of the Storm Water BMP will be prepared at the PS&E phase. Appendix of the Project Planning and Design Guide estimates cost of stormwater related items for highway widening projects at the present phase.

7. Maintenance BMPs (Drain Inlet Stenciling)

Drain inlet stenciling is required within cities, towns, and communities with populations of 10,000 or more, or within designated MS4 areas; however, drainage inlets located at the freeway where no pedestrian traffic is expected may not need stenciling. The number and location of drainage inlets exposed to pedestrians will be identified at the design phase.

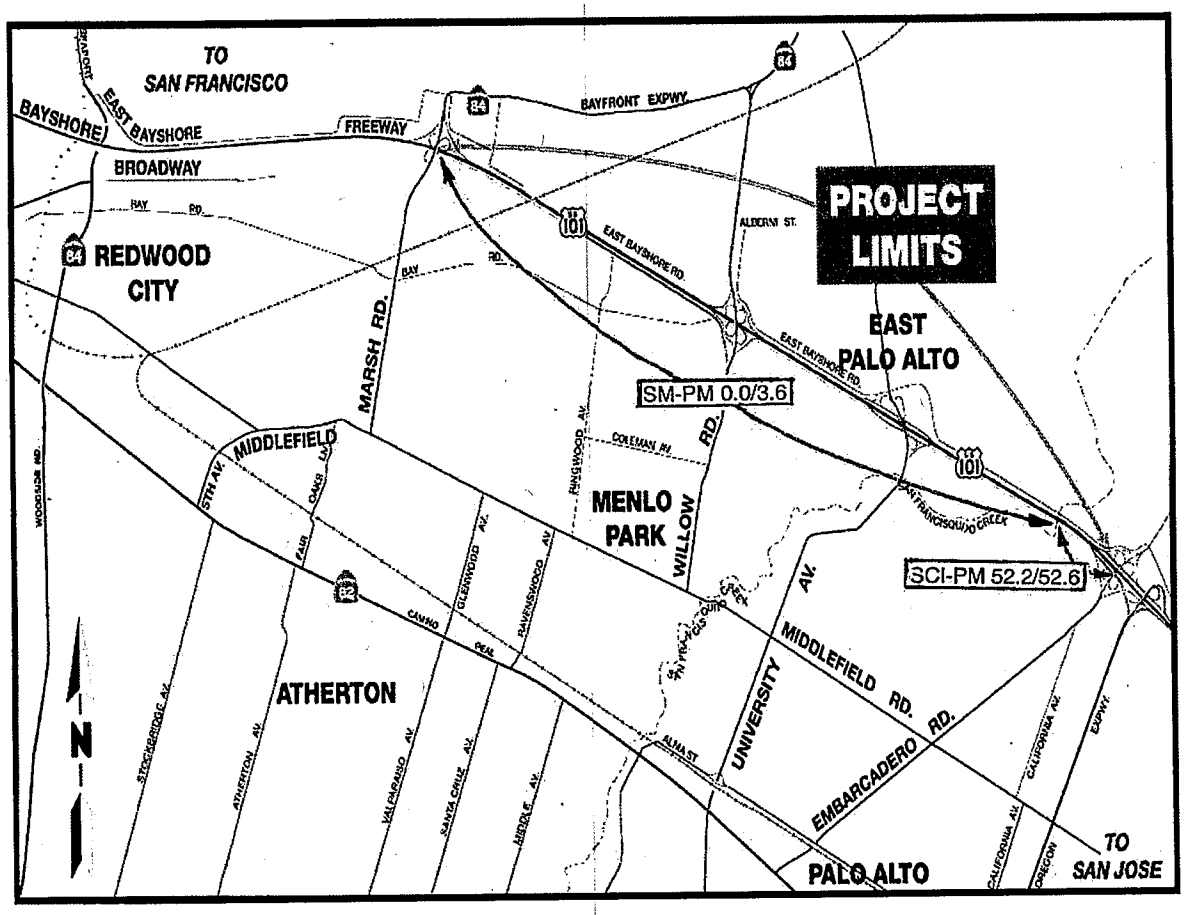
REQUIRED ATTACHMENTS

⇒ **Vicinity Map**
⇒ **Evaluation Documentation Form (EDF)**

SUPPLEMENTAL ATTACHMENTS

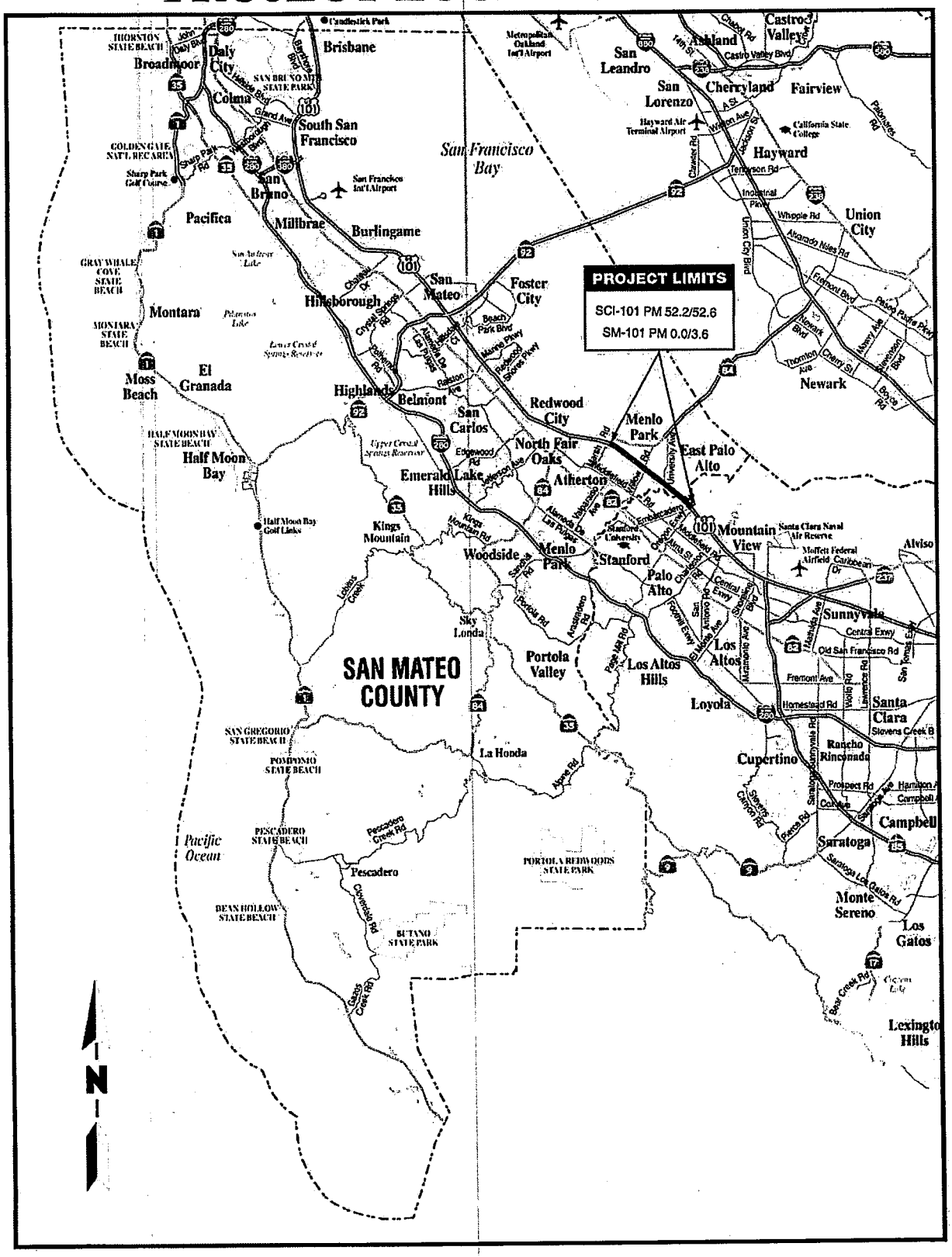
Note: Supplement Attachments are to be supplied during the SWDR approval process; where noted, some of these items may only be required on a project-specific basis.

⇒ Storm Water BMP Cost Summary
⇒ BMP cost information from: Preliminary Project Cost Estimate (PPCE) PA/ED phase;
⇒ Checklist SW-1, Site Data Sources
⇒ Checklist SW-2, Storm Water Quality Issues Summary
⇒ Checklist SW-3, Measures for Avoiding or Reducing Potential Storm Water BMPs
⇒ Checklists DPP-1, Parts 1–5 (Design Pollution Prevention BMPs) [only those parts that were applicable]
⇒ Checklists T-1, Parts 1–10 (Treatment BMPs) [only those Parts that were applicable]



VICINITY MAP

PROJECT LOCATION MAP



Evaluation Documentation Form

DATE: Apr 13, 2007

See Figure 4-1, Project Evaluation Process for Consideration of Permanent Treatment BMPS

EA: **235610**

NO.	CRITERIA	YES	NO	SUPPLEMENTAL INFORMATION FOR EXEMPTION
1.	Begin Project Evaluation regarding requirement for consideration of Treatment BMPs	☒		Go to 2
2.	Is this an emergency project?	☐	☒	If **Yes**, go to 11. If **No**, continue to 3.
3.	Have TMDLs Or Other Pollution Control Requirements been established for surface waters within the project limits?	☒	☐	If **Yes**, contact the District/Regional NPDES coordinator to discuss the Department's obligations under the TMDL (if Applicable) or Pollution Control Requirements, go to 10 or 4 (as determined by the NPDES Coordinator). BSL *(Dist./Reg. SW Coordinator initials)* If **No**, continue to 4.
4.	Is the project within an urban MS4?	☒	☐	If **Yes**, continue to 5. ***(Santa Clara and San Mateo Counties)*** If **No**, go to 11.
5.	Is the project directly or indirectly discharging to surface waters?	☒	☐	If **Yes**, continue to 6. If **No**, go to 11.
6.	Is this a new facility or major reconstruction?	☒	☐	If **Yes**, continue to 8. If **No**, go to 7.
7.	Will there be a change in line/grade or hydraulic capacity?	☐	☐	If **Yes**, continue to 8. If **No**, go to 11.
8.	Is the Disturbed Soil Area (DSA) created by the project greater than or equal to 3.0 acres or does the project result in a net increase of one acre or more of new impervious surface?	☒	☐	If **Yes**, continue to 10. If **No**, go to 9. *8.40 acres (Total DSA quantity)* *6.92 acres (New Impervious Area)*
9.	Is the project part of a Common Plan of Development?	☐	☐	If **Yes**, continue to 10. If **No**, go to 11.
10.	Project is required to consider approved Treatment BMPs.	☒	See Sections 2.4 and either Section 5.5 or 6.5 for BMP Evaluation and Selection Process. Complete Checklist T-1 in this Appendix E.	
11.	Project is not required to consider Treatment BMPs. _____*(Dist./Reg. SW Coord. Initials)* _____*(Project Engineer Initials)* _____ *(Date)*	☐	Document for Project Files by completing this form, and attaching it to the SWDR.	

This project will involve construction over a period of two winter seasons. The number of winter seasons is factored into the cost estimate for each construction site BMP chosen as a line item of work. A detailed summary of quantities and costs for Construction Site BMPs as a part of the Storm Water BMP will be prepared at the PS&E phase. Appendix of the Project Planning and Design Guide estimates cost of stormwater related items for highway widening projects at the present phase.

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⇒ Checklist SW-2, Storm Water Quality Issues Summary
⇒ Checklist SW-3, Measures for Avoiding or Reducing Potential Storm Water BMPs
⇒ Checklists DPP-1, Parts 1–5 (Design Pollution Prevention BMPs) [only those parts that were applicable]
⇒ Checklists T-1, Parts 1–10 (Treatment BMPs) [only those Parts that were applicable]

Storm Water Cost Summary

EA	235610
County	Santa Clara/San Mateo
Route	SR-101
Post Mile	0.0/3.6 in SM
	52.2/52.6 in SCL

Constrcution Cost $58,620,000

Construction Site BMPs	$1,172,400.00
Design Pollution Prevention BMPs	$351,720.000
Permanent Treatment BMPs	$ 968,800.00
Total Cost for Water Quality	$2,492,920.00

COST ESTIMATE FOR DRAFT PROJECT REPORT

District-County-Route:	04-SCL/SM-101
PM:	SCL 52.2/52.6
	SM 0.0/3.6
EA:	235610
Program Code:	HB4C

PROJECT DESCRIPTION

Proposed Improvements: **Widen Route 101 to add auxiliary lanes in both directions from Embarcadero Road Interchange (I/C) to Marsh Road I/C**

Alternative: **Alternative No. 1 - Non-standard left (median) shoulders**

Limits: **Embarcadero Road Interchange (I/C) to Marsh Road I/C**

SUMMARY OF PROJECT COST ESTIMATE

TOTAL ROADWAY ITEMS	$63,270,000		
TOTAL STRUCTURE ITEMS	$6,567,000		
SUBTOTAL CONSTRUCTION COSTS	$69,837,000		
TOTAL RIGHT OF WAY ITEMS	$50,000		
TOTAL PROJECT CAPITAL OUTLAY COSTS		$69,887,000	**(2008 Dollars)**

Prepared by Project Engineer:

(Phone) (Date)

Approved by Project Manager:

(Phone) (Date)

District-County-Route: 04-SCL/SM-101
PM: SCL 52.2/52.6
SM 0.0/3.6
EA: 235610
Program Code: HB4C

I. ROADWAY ITEMS

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Section 1 - Earthwork					
Roadway Excavation	73,358	CY	$32	$2,310,777	
				$0	
Clearing & Grubbing	1	LS	$395,040	$395,040	
Develop Water Supply	1	LS	$109,396	$109,396	
				Subtotal Earthwork	$2,815,213
Section 2 - Pavement Structural Section					
Hot Mix Asphalt (A)	25,058	Ton	$85	$2,129,930	
Cement-Treated Base (A)	16,364	CY	$85	$1,390,940	
Aggregate Base (3)	2,389	CY	$45	$107,505	
Aggregate Subbase (4)	31,307	CY	$30	$939,210	
Rubberized AC (G)	6,752	Ton	$90	$607,680	
Pavement Overlay	1	LS	$7,000,000	$7,000,000	
Blanket & Edge Drains		LF		$0	
Open Graded Friction Course (OGFC)	375	Ton	$110	$41,250	
				Subtotal Pavement Structural Section	$12,216,515
Section 3 - Drainage					
Large Drainage Facilities		LS		$0	
Storm Drains					
Storm Drain Lift Station (Relocate)	1	EA	$0	$0	
Channel Improvements	1	LS	-	-	
Storm Drain Inlets	1	LS	$2,205,000	$2,205,000	
				Subtotal Drainage	$2,205,000

District-County-Route:	04-SCL/SM-10
PM:	SCL 52.2/52.6
	SM 0.0/3.6
EA:	235610
Program Code:	HB4C

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Section 4 - Specialty Items					
Sound Walls / Foundation		SQFT		$0	
Retaining Walls	2,736	CY	$680	$1,860,480	
Minor Con-Curb/Gutter/Sidewalk	722	CY	$32	$22,736	
Barriers and Guardrails	1,411	LF	$105	$148,129	
Spalled PCC Joint Repair	1	LS	$150,000	$150,000	
Resident Engineer Office Space	66	Mo	$9,724	$641,787	
Erosion Control	1	LS	-	-	
Non Storm Water Discharge	1	LS	-	-	
Landscaping/Irrigation	1	LS	$2,488,957	$2,488,957	
Dewatering	1	LS	$63,000	$63,000	
Water Pollution Control Measures	1	LS	$0	-	
Remove Sound Wall		LF		$0	
Environmental Mitigation	1	LS	-	-	
Hazardous Waste	1	LS	$6,000,000	$6,000,000	
Construction Site BMPs	1	LS	$1,172,400	$1,172,400	
Design Pollution Prevention BMPs	1	LS	$385,500	$385,500	
Permanent Treatment BMPs	1	LS	$968,800	$968,800	
				Subtotal Specialty Items	$13,901,790
Section 5 - Traffic Items					
TOS	1	LS	$3,465,000	$3,465,000	
Lighting	1	LS	$1,050,000	$1,050,000	
Traffic Signal Modifications		EA			
Ramp Meters	LS	EA	$745,520	$745,520	
Overhead Sign Structures	1	LS	$3,045,000	$3,045,000	
Roadside Signs	1	LS	$105,000	$105,000	
Traffic Delineation Items	207,021	LF	$1.05	$217,372	
Traffic Control System	1	LS	$1,185,000	$1,185,000	
Transportation Management Plan	1	LS	$210,000	$210,000	
Temporary Railing (Type K)	45,572	LF	$16	$729,152	
COZEEP	340	DAY	$2,100	$714,000	
				Subtotal Traffic Items	$11,466,044
				TOTAL SECTIONS 1 thru 5	$42,605,000

District-County-Route:	04-SCL/SM-101
PM:	SCL 52.2/52.6
	SM 0.0/3.6
EA:	235610
Program Code:	HB4C

				Unit Cost	Section Cost
Section 6 - Minor Items					
Subtotal Sections 1 thru 5	$42,605,000	X	10%	$4,260,500	
				TOTAL MINOR ITEMS	$4,261,000
Section 7 - Roadway Mobilization					
Subtotal Sections 1 thru 5	$42,605,000				
Minor Items	$4,261,000				
Sum	$46,866,000	X	10%	$4,686,600	
				TOTAL ROADWAY MOBILIZATION	$4,687,000
Section 8 - Roadway Additions					
Supplemental Work					
Subtotal Sections 1 thru 5	$42,605,000				
Minor Items	$4,261,000				
Sum	$46,866,000	X	10%	$4,686,600	
Contingencies					
Subtotal Sections 1 thru 5	$42,605,000				
Minor Items	$4,261,000				
Sum	$46,866,000	X	15%	$7,029,900	
				TOTAL ROADWAY ADDITIONS	$11,717,000
				TOTAL ROADWAY ITEMS (Subtotal Sections 1 - 8)	$63,270,000

Estimate Prepared By:

1

District-County-Route:	04-SCL/SM-101
PM:	SCL 52.2/52.6
	SM 0.0/3.6
EA:	235610
Program Code:	HB4C

II. STRUCTURE ITEMS	Structure (1)	Structure (2)	Structure (3)	Structure (4)
Bridge Name	Henderson UP	Hetch Hetchy	Ringwood POC	San Francisquito Cr Br
Bridge No.	35-0012	35-0150M	35-0143	35-0013
Structure Type	Steel	Concrete	Concrete	CIP Slab
Width (FT) - out to out	43.00	22.00	13.00	220'-2'
Lengths (FT)	266	129	170	Varies
Total Area (SF)	11,527	2,840	2,210	19,381
Footing Type (pile/spread)	Pile	Pile	Pile	Pile
Cost per SF	?	?	?	$150
Including:				
Mobilization: 10% &				
Contingency: 25%		$136,769	$1,095,372	
Ramp Structure	0	0	?	N/A
Remove Bridge		$0	$1,320,000	
Total Cost - 2006 Dollars		$488,458	$5,467,861	
Total Cost - 2007 Dollars	$0	$513,000	$5,741,000	$0

	SUBTOTAL STRUCTURE ITEMS (2007 Dollars)	$6,254,000
	SUBTOTAL STRUCTURE ITEMS (2008 Dollars)	$6,567,000
Railroad Related Costs	$0	
	SUBTOTAL RAILROAD ITEMS	$0
	TOTAL STRUCTURES PLUS RAILROAD ITEMS	$6,567,000

District-County-Route:	04-SCL/SM-101
PM:	SCL 52.2/52.6
	SM 0.0/3.6
EA:	235610
Program Code:	HB4C

1

III. RIGHT OF WAY ITEMS

		Year 2008	
A. Acquisition, including excess lands and damages to remainder(s) and Goodwill			
B. Utility Relocation (State/Local share)		$50,000	
C. Relocation Assistance			
D. Clearance/Demolition			
E. Title and Escrow Fees			
TOTAL RIGHT OF WAY ITEMS		$50,000	

Anticipated Date of Right of Way Certification Nov-10
(Date to which Values are Escalated)

F. Construction Contract Work

Brief Description of Work:

CAPITAL COST ESTIMTE SUMMARY

Year 2008 Dollars

District-County-Route:	04-SM-101
PM:	SCI 52.2/52.6
	SM 0.0/3.6
EA:	235610
Program Code:	HB4C

Alternative No. 1	Construction Capital		R/W Capital	Total
	Roadway	Structure (*)		
	$63,270,000	$6,567,000	$50,000	$69,887,000
Totals	$63,270,000	$6,567,000		
	$69,837,000		$50,000	**$69,887,000**

Note: *w/o replacemnt of Henderson UP, Pump Station, Retaining Walls
(Per Management decision)
Including additional fund of $7.0M for overlay.

PROJECT COST ESTIMATE SUMMARY

Year 2008 & 2012 Dollars

District-County-Route:	04-SM-101
PM:	SCI 52.2/52.6
	SM 0.0/3.6
EA:	235610
Program Code:	HB4C

BASELINE PROJECT COST

Project Cost Component	2008 Dollars	5% Esclated to Year 2012	Remarks
Capital Costs			
R/W Capital	$50,000	$61,000	
Construction Capital: Roadway	$63,270,000	$76,905,000	
Structure	$6,567,000	$7,982,000	
Capital Cost Subtotals:	**$69,887,000**	**$84,948,000**	
Support Costs			
PA/ED Phase	$4,190,000	$4,400,000	
Design Support (PS&E)	$7,682,000	$8,893,000	
R/W Support	$5,000	$6,000	
Construction Support	$10,476,000	$12,733,000	
Support Cost Subtotals:	**$22,353,000**	**$26,032,000**	
Grand Totals	**$92,240,000**	**$110,980,000**	

Checklist SW-1, Site Data Sources

Prepared by: Benhur F. Batoon Date: July 13, 2007 District-Co-Route: 04-SCL/SM-101
KP (PM): SM- PM 0.0/3.6, SCL- PM 52.2/52.6 EA: 235610
RWQCB: San Francisco Bay Regional Water Quality Control Board, RB-2

Information for the following data categories should be obtained, reviewed and referenced as necessary throughout the project planning phase. Collect any available documents pertaining to the category and list them and reference your data source. For specific examples of documents within these categories, refer to Section 5.5 of this document. Example categories have been listed below; add additional categories, as needed. Summarize pertinent information in Section 2 of the SWDR.

DATA CATEGORY/SOURCES	Date
Topographic	
• US Geological Survey – TerraServer USA	2005
•	
•	
Hydraulic	
• San Mateo Hydromodification Management Plan	May 12, 2005
•	
•	
Soils	
• Natural Resources Cooperative Soils Survey	September 01, 2006
• Groundwater Bulletin 118 – Santa Clara Valley Groundwater Basin	February 27, 2004
• Preliminary Geotechnical Report, D4 – Sojourner/Wilcox	July 19, 2007
Climatic	
•	
•	
•	
Water Quality	
• Water Quality Planning Tool	
• Monthly Total Maximum Daily Load (TMDL) Update	May 3, 2007
• California 303d List of Water Quality Limited Segments	Oct 25, 2006
Other Data Categories	
• Approved Project Study Report – Mark Thomas & Company Inc.	September 9, 2004
• Project Planning and Design Guide (PPDG)	May 2007
• NPDES Permit Order No.99-06-DWQ	July 15, 1999
•	
•	
•	

Checklist SW-2, Storm Water Quality Issues Summary

Prepared by: Benhur F. Batoon Date: April 13, 2007 District-Co-Route: 04-SCL/SM-101
KP (PM): SM- PM 0.0/3.6, SCL- PM 52.2/52.6 EA: 235610
RWQCB: San Francisco Bay Regional Water Quality Control Board, RB-2

The following questions provide a guide to collecting critical information relevant to project storm water quality issues. Complete responses to applicable questions, consulting other Caltrans functional units (Environmental, Landscape Architecture, Maintenance, etc.) and the District/Regional NPDES Coordinator as necessary. Summarize pertinent responses in Section 2 of the SWDR.

1. Determine the receiving waters that may be affected by the project throughout the project life cycle (i.e., construction, maintenance and operation).	☒Complete	☐NA
2. For the project limits, list the 303(d) impaired receiving water bodies and their constituents of concern.	☒Complete	☐NA
3. Determine if there are any High Risk Areas (municipal or domestic water supply reservoirs or groundwater percolation facilities) within the project limits. Consider appropriate spill contamination and spill prevention control measures for these new areas.	☒Complete	☐NA
4. Determine the RWQCB special requirements, including TMDLs, effluent limits, etc.	☒Complete	☐NA
5. Determine regulatory agencies seasonal construction and construction exclusion dates or restrictions required by federal, state, or local agencies.	☒Complete	☐NA
6. Determine if a 401 certification will be required.	☒Complete	☐NA
7. List rainy season dates.	☒Complete	☐NA
8. Determine the general climate of the project area. Identify annual rainfall and rainfall intensity curves.	☒Complete	☐NA
9. If considering Treatment BMPs, determine the soil classification, permeability, erodibility, and depth to groundwater.	☒Complete	☐NA
10. Determine contaminated or hazardous soils within the project area.	☒Complete	☐NA
11. Determine the total disturbed soil area of the project.	☒Complete	☐NA
12. Describe the topography of the project site.	☒Complete	☐NA
13. List any areas outside of the Caltrans right-of-way that will be included in the project (e.g. contractor's staging yard, work from barges, easements for staging, etc.) **TBD**	☐Complete	☐NA
14. Determine if additional right-of-way acquisition or easements and right-of-entry will be required for design, construction and maintenance of BMPs. If so, how much? **TBD**	☐Complete	☐NA
15. Determine if a right-of-way certification is required.	☐Complete	☐NA
16. Determine the estimated unit costs for right-of-way should it be needed for Treatment BMPs, stabilized conveyance systems, lay-back slopes, or interception ditches. **TBD**	☐Complete	☐NA
17. Determine if project area has any slope stabilization concerns.	☒Complete	☐NA
18. Describe the local land use within the project area and adjacent areas.	☒Complete	☐NA
19. Evaluate the presence of dry weather flow.	☐Complete	☒NA

Checklist SW-3, Measures for Avoiding or Reducing Potential Storm Water Impacts

Prepared by: Benhur F. Batoon Date: April 13, 2007 District-Co-Route: 04-SCL/SM-101
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The PE must confer with other functional units, such as Landscape Architecture, Hydraulics, Environmental, Materials, Construction and Maintenance, as needed to assess these issues. Summarize pertinent responses in Section 2 of the SWDR.

Options for avoiding or reducing potential impacts during project planning include the following:

1. Can the project be relocated or realigned to avoid/reduce impacts to receiving waters or to increase the preservation of critical (or problematic) areas such as floodplains, steep slopes, wetlands, and areas with erosive or unstable soil conditions?	☐Yes	☒No	☐NA
2. Can structures and bridges be designed or located to reduce work in live streams and minimize construction impacts?	☐Yes	☒No	☐NA
3. Can any of the following methods be utilized to minimize erosion from slopes:			
a. Disturbing existing slopes only when necessary?	☒Yes	☐No	☐NA
b. Minimizing cut and fill areas to reduce slope lengths?	☐Yes	☐No	☒NA
c. Incorporating retaining walls to reduce steepness of slopes or to shorten slopes?	☒Yes	☐No	☐NA
d. Acquiring right-of-way easements (such as grading easements) to reduce steepness of slopes?	☐Yes	☐No	☒NA
e. Avoiding soils or formations that will be particularly difficult to re-stabilize?	☒Yes	☐No	☐NA
f. Providing cut and fill slopes flat enough to allow re-vegetation and limit erosion to pre-construction rates?	☐Yes	☐No	☒NA
g. Providing benches or terraces on high cut and fill slopes to reduce concentration of flows?	☐Yes	☐No	☒NA
h. Rounding and shaping slopes to reduce concentrated flow?	☐Yes	☐No	☒NA
i. Collecting concentrated flows in stabilized drains and channels?	☒Yes	☐No	☐NA
4. Does the project design allow for the ease of maintaining all BMPs?	☒Yes	☐No	
5. Can the project be scheduled or phased to minimize soil-disturbing work during the rainy season?	☒Yes	☐No	
6. Can permanent storm water pollution controls such as paved slopes, vegetated slopes, basins, and conveyance systems be installed early in the construction process to provide additional protection and to possibly utilize them in addressing construction storm water impacts?	☒Yes	☐No	☐NA

Design Pollution Prevention BMPs
Checklist DPP-1, Part 1

Prepared by: Benhur F. Batoon Date: April 13, 2007 District-Co-Route: 04-SCL/SM-101
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Consideration of Design Pollution Prevention BMPs

1. Consideration of Downstream Effects Related to Potentially Increased Flow [to streams or channels]?

(a) Will project increase velocity or volume of downstream flow?	☐Yes	☒No	☐NA
(b) Will the project discharge to unlined channels?	☒Yes	☐No	☐NA
(c) Will project increase potential sediment load of downstream flow?	☐Yes	☒No	☐NA
(d) Will project encroach, cross, realign, or cause other hydraulic changes to a stream that may affect downstream channel stability?	☐Yes	☒No	☐NA

If Yes was answered to any of the above questions, consider ***Downstream Effects Related to Potentially Increased Flow***, complete the DPP-1, Part 2 checklist.

2. Slope/Surface Protection Systems

(a) Will project create new slopes or modify existing slopes? **Ramp widening/realignment to conform to auxiliary lanes**	☒Yes	☐No	☐NA

If Yes was answered to the above question, consider ***Slope/Surface Protection Systems***, complete the DPP-1, Part 3 checklist.

3. Concentrated Flow Conveyance Systems

(a) Will the project create or modify ditches, dikes, berms, or swales?	☒Yes	☐No	☐NA
(b) Will project create new slopes or modify existing slopes?	☐Yes	☒No	☐NA
(c) Will it be necessary to direct or intercept surface runoff?	☒Yes	☐No	☐NA
(d) Will cross drains be modified?	☐Yes	☒No	☐NA

If Yes was answered to any of the above questions, consider ***Concentrated Flow Conveyance Systems***; complete the DPP-1, Part 4 checklist.

4. Preservation of Existing Vegetation

a) It is the goal of the Storm Water Program to maximize the protection of desirable existing vegetation to provide erosion and sediment control benefits on all projects. ☒Complete

Consider ***Preservation of Existing Vegetation***, complete the DPP-1, Part 5 checklist.

Design Pollution Prevention BMPs
Checklist DPP-1, Part 2

Prepared by: Benhur F. Batoon Date: April 13, 2007 District-Co-Route: 04-SCL/SM-101
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Downstream Effects Related to Potentially Increased Flow

1. Review total paved area and reduce to the maximum extent possible. ☒Complete
2. Review channel lining materials and design for stream bank erosion control. **TBD** ☐Complete
   (a) See Chapters 860 and 870 of the HDM. ☐Complete
   (b) Consider channel erosion control measures within the project limits as well as downstream. Consider scour velocity. ☒Complete
3. Include, where appropriate, energy dissipation devices at culvert outlets. **TBD** ☐Complete
4. Ensure all transitions between culvert outlets/headwalls/wingwalls and channels are smooth to reduce turbulence and scour. ☒Complete
5. Include, if appropriate, detention facilities to reduce peak discharges. ☒Complete

Design Pollution Prevention BMPs
Checklist DPP-1, Part 3

Prepared by: Benhur F. Batoon Date: April 13, 2007 District-Co-Route: 04-SCL/SM-101
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Slope / Surface Protection Systems

1. What are the proposed areas of cut and fill? (attach plan or map) ☐Complete

2. Were benches or terraces provided on high cut and fill slopes to reduce concentration of flows? ☐Yes ☒No

3. Were slopes rounded and/or shaped to reduce concentrated flow? ☒Yes ☐No

4. Were concentrated flows collected in stabilized drains or channels? ☒Yes ☐No

5. Are slopes > 1:4 vertical:horizontal (V:H))? ☐Yes ☒No

   If Yes, an erosion control plan must be prepared or approved by the District Landscape Architect.

6. Are slopes > 1:2 (V:H)? ☐Yes ☒No

   If Yes, Geotechnical Services must prepare a Geotechnical Design Report, and the District Landscape Architect should prepare or approve an erosion control plan. Concurrence must be obtained from the District Maintenance Storm Water Coordinator for slopes steeper than 1:2 (V:H).

7. Estimate the change to the impervious areas that will result from this project. **2.8 ha (6.9 ac) of reworked existing impervious** ☒Complete

VEGETATED SURFACES

1. Identify existing vegetation. ☒Complete
2. Evaluate site to determine soil types, appropriate vegetation and planting strategies. **Preliminary soil studies conducted; vegetation strategy TBD** ☐Complete
3. How long will it take for permanent vegetation to establish? ☒Complete
4. Minimize overland and concentrated flow depths and velocities. **TBD** ☐Complete

HARD SURFACES

1. Are hard surfaces required? ☐Yes ☐No

   If Yes, document purpose (safety, maintenance, soil stabilization, etc.), types, and general locations of the installations. ☐Complete

Review appropriate SSPs for Vegetated Surface and Hard Surface Protection Systems. ☐Complete

Design Pollution Prevention BMPs
Checklist DPP-1, Part 4

Prepared by: Benhur F. Batoon Date: April 13, 2007 District-Co-Route: 04-SCL/SM-101

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Concentrated Flow Conveyance Systems

Ditches, Berms, Dikes and Swales

1. Consider Ditches, Berms, Dikes, and Swales as per Chapters 813, 836, and 860 of the HDM. **TBD** ☐Complete
2. Evaluate risks due to erosion, overtopping, flow backups or washout. **TBD** ☐Complete
3. Consider outlet protection where localized scour is anticipated. **TBD** ☐Complete
4. Examine the site for run-on from off-site sources. **TBD** ☐Complete
5. Consider channel lining when velocities exceed scour velocity for soil. **TBD** ☐Complete

Overside Drains

1. Consider downdrains, as per Index 834.4 of the HDM. **TBD** ☐Complete
2. Consider paved spillways for side slopes flatter than 1:4 V:H. **TBD** ☐Complete

Flared Culvert End Sections

1. Consider flared end sections on culvert inlets and outlets as per Chapter 827 of the HDM. **TBD** ☐Complete

Outlet Protection/Velocity Dissipation Devices

1. Consider outlet protection/velocity dissipation devices at outlets, including cross drains, as per Chapters 827 and 870 of the HDM. **TBD** ☐Complete

Review appropriate SSPs for Concentrated Flow Conveyance Systems. ☐Complete

TBD at PS&E

Design Pollution Prevention BMPs
Checklist DPP-1, Part 5

Prepared by: Benhur F. Batoon Date: April 13, 2007 District-Co-Route: 04-SCL/SM-101

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Preservation of Existing Vegetation

1. Review Preservation of Property, Standard Specifications 16.1.01 and 16-1.02 (Clearing and Grubbing) to reduce clearing and grubbing and maximize preservation of existing vegetation. ☒Complete

2. Has all vegetation to be retained been coordinated with Environmental, and identified and defined in the contract plans? ☐Yes ☐No

3. Have steps been taken to minimize disturbed areas, such as locating temporary roadways to avoid stands of trees and shrubs and to follow existing contours to reduce cutting and filling? **No roadway relocation; cut/fill limited to aux lanes** ☒Complete

4. Have impacts to preserved vegetation been considered while work is occurring in disturbed areas? ☒Yes ☐No

5. Are all areas to be preserved delineated on the plans? ☐Yes ☐No

Treatment BMPs

Checklist T-1, Part 1

Prepared by: Benhur F. Batoon Date: May 10, 2007 District-Co-Route: 04-SCL/SM-101

KP (PM): SM- PM 0.0/3.6, SCL- PM 52.2/52.6 EA: 235610

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Consideration of Treatment BMPs

This checklist is used for projects that require the consideration of Approved Treatment BMPs, as determined from the process described in Section 4 (Project Treatment Consideration) and the Evaluation Documentation Form (EDF). This checklist will be used to determine which Treatment BMPs should be considered for each watershed and sub-watersheds within the project. Supplemental data will be needed to verify siting and design applicability for final incorporation into a project.

Complete this checklist for each phase of the project, when considering Treatment BMPs. Use the responses to the questions as the basis when developing the narrative in Section 5 of the Storm Water Data Report to document that Treatment BMPs have been appropriately considered.

Answer all questions, unless otherwise directed.

1. Dry Weather Flow Diversion

   (a) Are dry weather flows generated by Caltrans anticipated to be persistent? ☐Yes ☒No

   (b) Is a sanitary sewer located on or near the site? ☐Yes ☒No

   (c) Is the domestic wastewater treatment authority willing to accept flow? ☐Yes ☒No

   If Yes was answered to all of these questions consider Dry Weather Flow Diversion, complete and attach Part 3 of this checklist

2. Is the receiving water on the 303(d) list for litter/trash or has a TMDL been issued for litter/trash? ☐Yes ☒No

   If Yes, consider Gross Solids Removal Devices (GSRDs), complete and attach Part 6 of this checklist. Note: Biofiltration Systems, Infiltration Basins, Detention Devices, Media Filters, MCTTs, and Wet Basins also can capture litter – consult with District/Regional NPDES if these devices should be considered to meet litter/trash TMDL.

3. Is project located in an area (e.g., mountain regions) where traction sand is applied more than twice a year?
   If Yes, consider ***Traction Sand Traps***, complete and attach **Part 7** of this checklist. ☐Yes ☒No

4. (a) Are there local influent limits for infiltration or Basin Plan restrictions or other local agency prohibitions that would restrict the use of the infiltration devices? ☐Yes ☒No

   (b) Would infiltration pose a threat to local groundwater quality as determined by the District/Regional NPDES Storm Water Coordinator? ☒Yes ☐No

(b) Would infiltration pose a threat to local groundwater quality as determined by the District/Regional Storm Water Coordinator? ☐Yes ☐No

If the answer to either part of Question 4 is Yes, then Infiltration Devices are infeasible and the consideration of Infiltration Devices should not be made when completing Questions 5 through 17.

5. (a) Does the project discharge to any 303(d) listed water body? ☐Yes ☐No
If No, go to Question 17, General Purpose Pollutant Removal

(b) If Yes, is the identified pollutant(s) considered a Targeted Design Constituent (TDC) (check all that apply):

___phosphorus, ___nitrogen, ___total copper, ___dissolved copper,

___total lead ___dissolved lead, ___total zinc, ___dissolved zinc,

_x_sediments, ___general metals [unspecified metals].

(c) If only one TDC is checked above, continue to Question 6. ☒Complete

(d) If more than one TDC is checked, contact your District/Regional NPDES Coordinator to determine priority before continuing with this checklist. ☐Complete

6. Consult with the District/Regional Storm Water Coordinator to determine whether Treatment BMP selection will be affected by any existing or future TMDL requirements. ☒Complete

The following questions show the approved Treatment BMPs in order of preference based on load reduction (performance) for the listed constituent and lifetime costs for the device, excluding right-of-way. Note that a line separates Treatment BMPs into groups of approximately equal effectiveness and within each grouping, any of the Treatment BMPs may be selected for placement if meeting site conditions. In the space provided next to the BMP, use Yes or a check mark to indicate a positive response.

If none of the listed Treatment BMPs for a specific constituent of concern (TDC) can be sited, go to Step #17 (General Purpose Pollutant Removal) to determine whether another Treatment BMP can be incorporated into the project.

***For the SWDRs developed for the PID and PA/ED phases of a project:* Consider all approved Treatment BMPs listed that can be reasonably incorporated into the project for each TDC.**

***For the SWDR developed for the PS&E phase:* Indicate (Yes or check mark) only those BMPs that will be incorporated into the project.**

7. Is phosphorus the TDC? [Use this constituent if "eutrophic" or "nutrients" is the TDC for the water body.] If Yes, consider: ☐Yes ☒No

_____Infiltration Devices
_____Austin Sand Filters

8. Is nitrogen the TDC? If Yes, consider: ☐Yes ☒No

_____ Infiltration Devices
_____ Austin Sand Filters
_____ Delaware Filter
_____ Detention Device
_____ MCTT

9. Is copper (total) the TDC? If Yes for total Copper, consider: ☐Yes ☒No

_____ Infiltration Devices
_____ Wet Basins
_____ Biofiltration Strips
_____ Detention Device
_____ Biofiltration Swales
_____ Austin Sand Filter
_____ Delaware Filter
_____ MCTT

10. Is copper (dissolved) the TDC? If Yes for dissolved Copper, consider: ☐Yes ☒No

_____ Infiltration Devices
_____ Biofiltration Strips
_____ Wet Basin
_____ Biofiltration Swale

11. Is lead (total) the TDC? If Yes for total Lead, consider: ☐Yes ☒No

_____ Infiltration Devices
_____ Wet Basin
_____ Biofiltration Strips
_____ Austin Sand Filter
_____ **Delaware Filter**
_____ Detention Device
_____ Biofiltration Swales
_____ MCTT

12. Is lead (dissolved) the TDC? If Yes for dissolved Lead, consider: ☐Yes ☒No

_____ Infiltration Devices
_____ Biofiltration Strips
_____ Wet Basin
_____ Detention Device
_____ Biofiltration Swales
_____ Austin Sand Filter

13. Is zinc (total) the TDC? If Yes for total Zinc, consider: ☐Yes ☒No

_____ Infiltration Devices
_____ Delaware Filter
_____ Wet Basin
_____ Biofiltration Strips
_____ Biofiltration Swales
_____ Austin Sand Filter
_____ MCTT
_____ Detention Devices

14. Is zinc (dissolved) the TDC? If Yes for dissolved Zinc, consider: ☐Yes ☒No

_____ Infiltration Devices
_____ Delaware Filter
_____ Biofiltration Strip
_____ Biofiltration Swale
_____ Austin Sand Filter
_____ MCTT

15. Is sediment (total suspended solids [TSS]) the TDC? If Yes for TSS, consider: ☒Yes ☐No

_____ Infiltration Devices
_____ Austin Sand Filter
_____ Delaware Filter
_____ Wet Basin
_____ Detention Device
__x__ Biofiltration Strip
_____ MCTT
__x__ Biofiltration Swale

16. Are "General Metals" or (unspecified) "Metals" the TDC? If Yes for General Metals, consider: ☐Yes ☒No

_____ Infiltration Devices
_____ Biofiltration Strips
_____ Wet Basin
_____ Biofiltration Swale
_____ Austin Sand Filter
_____ Delaware Filter
_____ MCTT

17. General Purpose Pollutant Removal.: When it is determined that there are no TDCs, consider the Treatment BMPs in the order listed below. ☐Yes ☒No

_____ Infiltration Devices
_____ Biofiltration Strips
_____ Wet Basin
_____ Biofiltration Swale
_____ Austin Sand Filter
_____ Detention Device
_____ Delaware Filter
_____ MCTT

18. Biofiltration
(a) Are site conditions and climate favorable to allow suitable vegetation to be established? ☒Yes ☐No

(b) Have Biofiltration strips and swales been considered to the extent practicable? Note: Biofiltration BMPs should be considered for all projects, even if other Treatment BMPs are placed. ☒Yes ☐No

If No to (a) or (b), document justification in Section 5 of the SWDR.

19. After completing the above, complete and attach the checklists shown below for every Treatment BMP under consideration ☒Complete

    x Biofiltration Strips and Biofiltration Swales: Checklist T-1, Part 2
    ____ Dry Weather Diversion: Checklist T-1, Part 3
    x Infiltration Devices: Checklist T-1, Part 4
    x Detention Devices: Checklist T-1, Part 5
    ____ GSRDs: Checklist T-1, Part 6
    ____ Traction Sand Traps: Checklist T-1, Part 7
    x Media Filter [Austin Sand Filter and Delaware Filter]: Checklist T-1, Part 8
    x Multi-Chambered Treatment Train: Checklist T-1, Part 9
    ____ Wet Basins: Checklist T-1, Part 10

20. (a) Estimate what percentage of WQV/WQF will be treated by the preferred Treatment BMP(s): _____% **TBD** ☐Complete

    (b) Have Treatment BMPs been considered for use in parallel or series to increase this percentage? **TBD** ☐Yes ☐No

21. Prepare cost estimate, including right-of-way, for selected Treatment BMPs and include as supplemental information for SWDR approval. **TBD** ☐Complete

Treatment BMPs

Checklist T-1, Part 2

Prepared by: Benhur F. Batoon Date: May 10, 2007 District-Co-Route: 04-SCL/SM-101

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Biofiltration Swales / Biofiltration Strips

Feasibility

1. Do the climate and site conditions allow vegetation to be established? ☒Yes ☐No

2. Are flow velocities < 1.2 m/s (4 fps) (i.e. low enough to prevent scour of the vegetated bioswale as per HDM Table 873.31)? ☒Yes ☐No

   If No to either question above, Biofiltration Swales and Biofiltration Strips are not feasible.

3. Are Biofiltration Swales proposed at sites where known hazardous soils or contaminated groundwater plumes exist? ☐Yes ☒No
   If Yes, consult with District/Regional NPDES Coordinator about how to proceed.

4. Does adequate area exist within the right-of-way to place biofiltration device(s)? ☒Yes ☐No
   If Yes, continue to the Design Elements section. If No, continue to Question 5.

5. If adequate area does not exist within right-of-way, can suitable, additional right-of-way be acquired to site biofiltration devices and how much right-of way would be needed to treat WQF? 2.67(6.62) ha (ac) ☐Yes ☐No
   If Yes, continue to Design Elements section. If No, continue to Question 6.

6. If adequate area cannot be obtained, document in Section 5 of the SWDR that the inability to obtain adequate area prevents the incorporation of these Treatment BMPs into the project. ☒Complete

Design Elements

* **Required** Design Element – A "Yes" response to these questions is required to further the consideration of this BMP into the project design. Document a "No" response in Section 5 of the SWDR to describe why this Treatment BMP cannot be included into the project design.

** **Recommended** Design Element – A "Yes" response is preferred for these questions, but not required for incorporation into a project design.

1. Has the District Landscape Architect provided vegetation mixes appropriate for climate and location? * **To be supplied at PS&E** ☐Yes ☐No

2. Can the bioswale be designed as a conveyance system under any expected flows > the WQF event, as per HDM Chapter 800? * (e.g. freeboard, minimum slope, etc.) ☒Yes ☐No

3. Can the bioswale be designed as a water quality treatment device under the WQF while meeting the required HRT, depth, and velocity criteria? * ☒Yes ☐No

4. Is the maximum length of a biostrip ≤ 91 m (300 ft)? * ☒Yes ☐No

5. Has the minimum width (in the direction of flow) of the invert of the bioswale received the concurrence of Maintenance? * **4 feet minimum invert** ☒Yes ☐No

6. Can bioswales be located in natural or low cut sections to reduce maintenance problems caused by animals burrowing through the berm of the swale? ** ☒Yes ☐No

7. Is the biostrip sized as long as possible in the direction of flow (HRT ≥ 5 minutes)? ** ☒Yes ☐No

8. Has biofiltration been considered for locations upstream of other Treatment BMPs, as part of a treatment train? ** ☒Yes ☐No

Treatment BMPs
Checklist T-1, Part 3

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Dry Weather Flow Diversion

Feasibility

1. Is dry-weather flow diversion acceptable to a Publicly Owned Treatment Works (POTW)? ☐Yes ☒No
2. Would a connection require ordinary (i.e., not extraordinary) plumbing to implement? ☐Yes ☒No

   If No to either question above, Dry Weather Flow Diversion is not feasible.

3. Does adequate area exist within the right-of-way to place Dry Weather Flow Diversion devices? ☐Yes ☒No
   If Yes, continue to Design Elements sections. If No, continue to Question 4.
4. If adequate area does not exist within right-of-way, can suitable, additional right-of-way be acquired to site Dry Weather Flow Diversion devices and how much right-of way would be needed? _____ ha (ac) ☐Yes ☒No
   If Yes, continue to the Design Elements section.

   If No, continue to Question 5.
5. If adequate area cannot be obtained, document in Section 5 of the SWDR that the inability to obtain adequate area prevents the incorporation of this Treatment BMP into the project. ☒Complete

Design Elements

* **Required** Design Element – A "Yes" response to these questions is required to further the consideration of this BMP into the project design. Document a "No" response in Section 5 of the SWDR to describe why this Treatment BMP cannot be included into the project design.

** **Recommended** Design Element – A "Yes" response is preferred for these questions, but not required for incorporation into a project design.

1. Does the existing sanitary sewer pipeline have adequate capacity to accept project dry weather flows, or can an upgrade be implemented to handle the anticipated dry weather flows within the project's budget and objectives? * ☐Yes ☐No
2. Can the connection be designed to allow for Maintenance vehicle access? * ☐Yes ☐No
3. Can gate, weir, or valve be designed to stop diversion during storm events? * ☐Yes ☐No
4. Can the inlet be designed to reduce chances of clogging the diversion pipe or channel? * ☐Yes ☐No
5. Can a back flow prevention device be designed to prevent sanitary sewage from entering storm drain? * ☐Yes ☐No

Treatment BMPs
Checklist T-1, Part 4

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Infiltration Devices

Feasibility

1. Does local Basin Plan or other local ordinance provide influent limits on quality of water that can be infiltrated, and would infiltration pose a threat to groundwater quality as determined by the District/Regional NPDES Storm Water Coordinator? ☒Yes ☐No
2. Does infiltration at the site compromise the integrity of any slopes in the area? ☒Yes ☐No
3. Per survey data or U.S. Geological Survey (USGS) Quad Map, are existing slopes at the proposed device site >15%? ☒Yes ☐No
4. At the invert, does the soil type classify as NRCS Hydrologic Soil Group (HSG) D, or does the soil have an infiltration rate < 1.3 cm/hr (0.5 inches/hr)? ☒Yes ☐No
5. Is site located over a previously identified contaminated groundwater plume? ☒Yes ☐No

   If Yes to any question above, **Infiltration Devices are not feasible; stop here** and consider other approved Treatment BMPs.

6. (a) Does site have groundwater within 3 m (10 ft) of basin invert? ☐Yes ☐No

   (b) Does site investigation indicate that the infiltration rate is significantly greater than 6.4 cm/hr (2.5 inches/hr)? ☐Yes ☐No

   If Yes to either part of Question 6, the RWQCB must be consulted, and the RWQCB must conclude that the groundwater quality will not be compromised, before approving the site for infiltration. ☐Yes ☐No

7. Does adequate area exist within the right-of-way to place infiltration device(s)? If Yes, continue to Design Elements sections. If No, continue to Question 8. ☐Yes ☐No
8. If adequate area does not exist within right-of-way, can suitable, additional right-of-way be acquired to site infiltration devices and how much right-of way would be needed to treat WQV? _____ ha (ac) ☐Yes ☐No

   If Yes, continue to Design Elements section.

   If No, continue to Question 9.

9. If adequate area cannot be obtained, document in Section 5 of the SWDR that the inability to obtain adequate area prevents the incorporation of this Treatment BMP into the project. ☐Complete

Design Elements – Infiltration Basin

* **Required** Design Element – A "Yes" response to these questions is required to further the consideration of this BMP into the project design. Document a "No" response in Section 5 of the SWDR to describe why this Treatment BMP cannot be included into the project design.

** **Recommended** Design Element – A "Yes" response is preferred for these questions, but not required for incorporation into a project design.

1. Has a detailed investigation been conducted, including subsurface soil investigation, in-hole conductivity testing and groundwater elevation determination? (This report must be completed for PS&E level design.) * ☐Yes ☐No
2. Has a flood control spillway with scour protection been provided? * ☐Yes ☐No
3. Is the Infiltration Basin size sufficient to capture the WQV while maintaining a 40-48 hour drawdown time? (Note: the WQV must be ≥ 123m^3 [0.1 acre-feet]) * ☐Yes ☐No
4. Can access be placed to the invert of the Infiltration Basin? * ☐Yes ☐No
5. Can the Infiltration Basin be designed with adequate freeboard above the WQV elevation? * ☐Yes ☐No
6. Can the Infiltration Basin be designed with interior side slopes no steeper than 1V:3H (with approval by District Maintenance, with 1:4 preferred)? * ☐Yes ☐No
7. Can vegetation be established in the Infiltration Basin? ** ☐Yes ☐No
8. Can diversion be designed, constructed, and maintained to bypass flows exceeding the WQV? ** ☐Yes ☐No
9. Can a gravity-fed Maintenance/Emergency Drain be placed? ** ☐Yes ☐No

Design Elements – Infiltration Trench

* **Required** Design Element – (see definition above)
** **Recommended** Design Element – (see definition above)

1. Has a detailed investigation been conducted, including subsurface soil investigation, in-hole conductivity testing and groundwater elevation determination? (This report must be completed for PS&E level design.) * ☐Yes ☐No
2. Is the surrounding soil within Hydrologic Soil Groups (HSG) Types A or B? * ☐Yes ☐No
3. Is the volume of the Infiltration Trench equal to at least the 3x the WQV, while maintaining a drawdown time of ≤ 72 hours? (Note: the WQV must be ≥ 123m^3 [0.1 acre-feet], unless the District/Regional NPDES Coordinator will allow a volume between 80 m^3 and 123 m^3 to be considered.) * ☐Yes ☐No
4. Is the depth of the Infiltration Trench ≤ 4 m, and is the depth < the width? * ☐Yes ☐No
5. Can an observation well be placed in the trench? * ☐Yes ☐No
6. Can access be provided to the Infiltration Trench? * ☐Yes ☐No
7. Can pretreatment be provided to capture sediment in the runoff (such as using biofiltration)? * ☐Yes ☐No
8. Can flow diversion be designed, constructed, and maintained to bypass flows exceeding the WQV? ** ☐Yes ☐No
9. Can a perimeter curb or similar device be provided (to limit wheel loads upon the trench)? ** ☐Yes ☐No

Treatment BMPs
Checklist T-1, Part 5

Prepared by: Benhur F. Batoon Date: May 10, 2007 District-Co-Route: 04-SCL/SM-101
KP (PM): SM- PM 0.0/3.6, SCL- PM 52.2/52.6 EA: 235610
RWQCB: San Francisco Bay Regional Water Quality Control Board, RB-2

Detention Devices

Feasibility

1. Is there sufficient head to prevent objectionable backwater conditions in the upstream drainage systems? ☐Yes ☒No

2. 2a) Is the volume of the detention device equal to at least the WQV? (Note: the WQV must be ≥ 123m^3 [0.1 acre-feet]) ☐Yes ☒No

   Only **answer (b) if the detention device is being used also to capture traction sand.**

   2b) Is the total volume of the detention device at least equal to the WQV and the anticipated volume of traction sand, while maintaining a minimum 300 mm freeboard (1 ft)? ☐Yes ☐No

3. Is basin invert ≥ 3 m above seasonally high groundwater or can it be designed with an impermeable liner? (Note: If an impermeable liner is used, the seasonally high groundwater elevation must not encroach within 300 mm (12 inches) of the invert.) ☐Yes ☒No

If No to any question above, then **Detention Devices are not feasible**.

4. Does adequate area exist within the right-of-way to place Detention Device(s)? ☐Yes ☐No

   If Yes, continue to the Design Elements section. If No, continue to Question 5.

5. If adequate area does not exist within right-of-way, can suitable, additional right-of-way be acquired to site Detention Device(s) and how much right-of way would be needed to treat WQV? _____ ha (ac) ☐Yes ☐No

   If Yes, continue to the Design Elements section. If No, continue to Question 6.

6. If adequate area cannot be obtained, document in Section 5 of the SWDR that the inability to obtain adequate area prevents the incorporation of this Treatment BMP into the project. ☐Complete

Design Elements

* **Required** Design Element – A "Yes" response to these questions is required to further the consideration of this BMP into the project design. Document a "No" response in Section 5 of the SWDR to describe why this Treatment BMP cannot be included into the project design.

** **Recommended** Design Element – A "Yes" response is preferred for these questions, but not required for incorporation into a project design.

1. Has the geotechnical integrity of the site been evaluated to determine potential impacts to surrounding slopes due to incidental infiltration? If incidental infiltration through the invert of an unlined detention device is a concern, consider using an impermeable liner. * ☐Yes ☐No
2. Has the location of the detention device been evaluated for any effects to the adjacent roadway and subgrade? * ☐Yes ☐No
3. Can a minimum freeboard of 300 mm (12 in) be provided above the WQV? * ☐Yes ☐No
4. Is an emergency outlet provided? * ☐Yes ☐No
5. Is the drawdown time of the detention basin within 24 to 72 hours? * ☐Yes ☐No
6. Is the basin outlet designed to minimize clogging (minimum outlet orifice diameter of 13 mm (0.5 inches)? * ☐Yes ☐No
7. Are the inlet and outlet structures designed to prevent scour and re-suspension of settled materials, and to enhance quiescent conditions? * ☐Yes ☐No
8. Can vegetation be established in an earthen basin at the invert and on the side slopes for erosion control and to minimize re-suspension? * ☐Yes ☐No
9. Has sufficient access for Maintenance been provided? * ☐Yes ☐No
10. Is the side slope ratio of earthen berms 1V:3H or flatter? ** (Note: If No, District Maintenance must approve.) ☐Yes ☐No
11. If significant sediment is expected from nearby slopes, can the detention device be designed with additional volume equal to the expected annual loading? ** ☐Yes ☐No
12. Is flow path as long as possible (≥ 2:1 length to width ratio is recommended)? ** ☐Yes ☐No

Treatment BMPs
Checklist T-1, Part 6

Prepared by: Benhur F. Batoon Date: May 10, 2007 District-Co-Route: 04-SCL/SM-101
KP (PM): SM- PM 0.0/3.6, SCL- PM 52.2/52.6 EA: 235610
RWQCB: San Francisco Bay Regional Water Quality Control Board, RB-2

Gross Solids Removal Devices (GSRDs)

Feasibility

1. Is the receiving water body downstream of the tributary area to the proposed GSRD on a 303(d) list or has a TMDL for litter been established? ☐Yes ☒No

2. Are the devices sized for peak HDM design flow or can peak flow be diverted? ☐Yes ☒No

3. Are the devices sized to contain gross solids (litter and vegetation) for a period of one year? ☐Yes ☒No

4. Is there sufficient access for maintenance and large equipment (vacuum truck)? ☐Yes ☒No

   If No to any question above, then **Gross Solids Removal Devices are not feasible**. Note that Biofiltration Systems, Infiltration Devices, Detention Devices, Dry Weather Flow Diversion, MCTT, Media Filters, and Wet Basins may be considered for litter capture, but consult with District/Regional NPDES if proposed to meet a TMDL for litter.

4. Does adequate area exist within the right-of-way to place Gross Solids Removal Devices? ☐Yes ☐No
   If Yes, continue to Design Elements section. If No, continue to Question 5.

5. If adequate area does not exist within right-of-way, can suitable, additional right-of-way be acquired to site Gross Solids Removal Devices and how much right-of way would be needed? _____ ha (ac) ☐Yes ☐No
   If Yes, continue to the Design Elements section. If No, continue to Question 6.

6. If adequate area cannot be obtained, document in Section 5 of the SWDR that the inability to obtain adequate area prevents the incorporation of this Treatment BMP into the project. ☐Complete

Design Elements – Linear Radial Device

* **Required** Design Element – A "Yes" response to these questions is required to further the consideration of this BMP into the project design. Document a "No" response in Section 5 of the SWDR to describe why this Treatment BMP cannot be included into the project design.

** **Recommended** Design Element – A "Yes" response is preferred for these questions, but not required for incorporation into a project design.

1. Does sufficient hydraulic head exist to place the Linear Radial GSRD? * ☐Yes ☐No
2. Was the litter accumulation rate of $0.7m^3/ha/yr$ ($10\ ft^3/ac/yr$) (or a different rate recommended by Maintenance) used to size the device? * ☐Yes ☐No
3. Where the standard detail sheets used for the layout of the devices? **
   If No, consult with Headquarters Office of Storm Water Management and District/Regional NPDES. ☐Yes ☐No

Design Elements – Inclined Screen

* **Required** Design Element – A "Yes" response to these questions is required to further the consideration of this BMP into the project design. Document a "No" response in Section 5 of the SWDR to describe why this Treatment BMP cannot be included into the project design.

** **Recommended** Design Element – A "Yes" response is preferred for these questions, but not required for incorporation into a project design.

1. Does sufficient hydraulic head exist to place the Inclined Screen GSRD? * ☐Yes ☐No
2. Was the litter accumulation rate of $0.7m^3/ha/yr$ ($10\ ft^3/ac/yr$) (or a different rate recommended by Maintenance) used to size the device? * ☐Yes ☐No
3. Were the standard details sheets used for the layout of the devices? **
   If No, consult with Headquarters Office of Storm Water Management and District NPDES. ☐Yes ☐No

Treatment BMPs
Checklist T-1, Part 7

Prepared by: Benhur F. Batoon Date: May 10, 2007 District-Co-Route: 04-SCL/SM-101
KP (PM): SM- PM 0.0/3.6, SCL- PM 52.2/52.6 EA: 235610
RWQCB: San Francisco Bay Regional Water Quality Control Board, RB-2

Traction Sand Traps

Feasibility

1. Can a Detention Device be sized to capture the estimated traction sand and the WQV from the tributary area?
   If Yes, then a separate Traction Sand Trap may not be necessary. Coordinate with the District/Regional Storm Water Coordinator and also complete Checklist T-1, Part 5. ☐Yes ☐No

2. Is the Traction Sand Trap proposed for a site where sand or other traction enhancing substances are applied to the roadway at least twice per year? ☐Yes ☐No

3. Is adequate space provided for Maintenance Staff and equipment access for annual cleanout? ☐Yes ☐No

   If the answer to either Question 2 or 3 is No, then a Traction Sand Trap is not feasible.

4. Does adequate area exist within the right-of-way to place Traction Sand Traps? ☐Yes ☐No
   If Yes, continue to Design Elements section. If No, continue to Question 5.

5. If adequate area does not exist within right-of-way, can suitable, additional right-of-way be acquired to site Traction Sand Traps and how much right-of way would be needed? _____ ha (ac) ☐Yes ☐No
   If Yes, continue to the Design Elements section. If No, continue to Question 6.

6. If adequate area cannot be obtained, document in Section 5 of the SWDR that the inability to obtain adequate area prevents the incorporation of this Treatment BMP into the project. ☐Complete

NOT APPLICABLE

Design Elements

* **Required** Design Element – A "Yes" response to these questions is required to further the consideration of this BMP into the project design. Document a "No" response in Section 5 of the SWDR to describe why this Treatment BMP cannot be included into the project design.

** **Recommended** Design Element – A "Yes" response is preferred for these questions, but not required for incorporation into a project design.

1. Was the local Caltrans Maintenance Station contracted to provide the amount of traction sand used annually at the location? * (Detention Device or CMP type) List application rate reported. _____ ☐Yes ☐No

2. Does the traction sand trap have enough volume to store settled sand over the winter using the formula presented in Appendix B, Section B.5? * (Detention Device or CMP type) ☐Yes ☐No

3. Is the invert of the traction sand trap 1 to 2 m (3.3 to 6.6 ft) above seasonally high groundwater? * (CMP type) ☐Yes ☐No

4. Is the maximum depth of the storage within 3 m (10 ft) of the ground surface, or another depth as required by District Maintenance? * (CMP type) ☐Yes ☐No

5. Has the District/Regional NPDES Storm Water Coordinator been contacted to ensure that the traction sand trap is not classified as a regulated underground injection well? * (CMP type) ☐Yes ☐No

6. Can peak flow be diverted around the device? ** (CMP type) ☐Yes ☐No

7. Within the tributary area, have the unstabilized areas (that would contribute sediment in addition to traction sand) been minimized as much as possible?**(Detention Device or CMP type) ☐Yes ☐No

8. Is 150 mm (6 inches) separation provided between the top of the captured traction sand and the outlet from the device, in order to minimize re-suspension of the solids? ** (CMP type) ☐Yes ☐No

Treatment BMPs
Checklist T-1, Part 8

Prepared by: Benhur F. Batoon Date: May 10, 2007 District-Co-Route: 04-SCL/SM-101
KP (PM): SM- PM 0.0/3.6, SCL- PM 52.2/52.6 EA: 235610
RWQCB: San Francisco Bay Regional Water Quality Control Board, RB-2

Media Filters

Caltrans has approved two types of Media Filter: Austin Sand Filters and Delaware Filters. Austin Sand filters are typically designed for larger drainage areas, while Delaware Filters are typically designed for smaller drainage areas. The Austin Sand Filter is constructed with an open top and may have a concrete or earthen invert, while the Delaware is always constructed in as a vault. See Appendix B, Media Filters, for a further description of Media Filters.

Feasibility – Austin Sand Filter

1. Is the volume of the Austin Sand Filter equal to at least the WQV using a 40 to 48 hour drawdown? (Note: the WQV must be ≥ 123m^3 [0.1 acre-feet]) ☐Yes ☒No

2. Is there sufficient hydraulic head to operate the device (minimum 0.9 m [3 ft] between the inflow and outflow chambers)? ☐Yes ☒No

   If No to either question above, then an Austin Sand Filter is not feasible.

3. Does adequate area exist within the right-of-way to place an Austin Sand Filter(s)? ☐Yes ☒No
   If Yes, continue to Design Elements sections. If No, continue to Question 4.

4. If adequate area does not exist within right-of-way, can suitable, additional right-of-way be acquired to site the device and how much right-of way would be needed to treat WQV? _____ ha (ac) ☐Yes ☒No
   If Yes, continue to the Design Elements section.

   If No, continue to Question 5.

5. If adequate area cannot be obtained, document in Section 5 of the SWDR that the inability to obtain adequate area prevents the incorporation of this Treatment BMP into the project. ☒Complete

   If an Austin Sand Filter meets these feasibility requirements, continue to the Design Elements – Austin Sand Filter below.

Feasibility- Delaware Filter

1. Is the volume of the Delaware Filter equal to at least the WQV using a 40 to 48 hour drawdown? (Note: the WQV must be ≥ 123m^3 [0.1 acre-feet], consult with District/Regional NPDES if a lesser volume is under consideration.) ☐Yes ☒No

2. Is there sufficient hydraulic head to operate the device (minimum 0.9 m [3 ft] between the inflow and outflow chambers)? ☐Yes ☒No

3. Would a permanent pool of water be allowed by the local vector control agency? ☐Yes ☒No

If No to any question, then a **Delaware Filter is not feasible**

4. Does adequate area exist within the right-of-way to place a Delaware Filter (s)? ☐Yes ☐No
   If Yes, continue to Design Elements sections. If No, continue to Question 5.

5. If adequate area does not exist within right-of-way, can suitable, additional right-of-way be acquired to site the device and how much right-of way would be needed to treat WQV? _____ ha (ac) ☐Yes ☐No
   If Yes, continue to the Design Elements section. If No, continue to Question 6.

6. If adequate area cannot be obtained, document in Section 5 of the SWDR that the inability to obtain adequate area prevents the incorporation of this Treatment BMP into the project. ☐Complete

   If a Delaware Filter is still under consideration, continue to the Design Elements – Delaware Filter section.

Design Elements – Austin Sand Filter

* **Required** Design Element – A "Yes" response to these questions is required to further the consideration of this BMP into the project design. Document a "No" response in Section 5 of the SWDR to describe why this Treatment BMP cannot be included into the project design.
** **Recommended** Design Element – A "Yes" response is preferred for these questions, but not required for incorporation into a project design.

1. Is the drawdown time of the 2nd chamber between 40 and 48 hours? * ☐Yes ☐No

2. Is access for Maintenance vehicles provided to the Austin Sand Filter? * ☐Yes ☐No

3. Is a bypass/overflow provided for storms > WQV? * ☐Yes ☐No

4. Is the flow path length to width ratio for the sedimentation chamber of the "full" Austin Sand Filter ≥ 2:1? ** ☐Yes ☐No

5. Can pretreatment be provided to capture sediment and litter in the runoff (such as using biofiltration)? ** ☐Yes ☐No

6. Can the Austin Sand Filter be placed using an earthen configuration? ** ☐Yes ☐No
   If No, go to Question 8.

7. Is the Austin Sand Filter invert separated from the seasonally high groundwater table by ≥ 3m? * ☐Yes ☐No
   If No, design with an impermeable liner.

8. Can the Austin Sand Filter be placed in an offline configuration? ** ☐Yes ☐No

Design Elements – Delaware Filter

* **Required** Design Element – A "Yes" response to these questions is required to further the consideration of this BMP into the project design. Document a "No" response in Section 5 of the SWDR to describe why this Treatment BMP cannot be included into the project design.
** **Recommended** Design Element – A "Yes" response is preferred for these questions, but not required for incorporation into a project design.

1. Can the first chamber be sized for the WQV? * ☐Yes ☐No
2. Is the drawdown time of the 2nd chamber between 40 and 48 hours? * ☐Yes ☐No
3. Is access for Maintenance vehicles provided to the Delaware Filter? * ☐Yes ☐No
4. Is a bypass/overflow provided for storms > WQV? ** ☐Yes ☐No
5. Can pretreatment be provided to capture sediment and litter in the runoff (such as using biofiltration)? ** ☐Yes ☐No
6. Can the Delaware Filter be placed in an offline configuration? ** ☐Yes ☐No

Treatment BMPs
Checklist T-1, Part 9

Prepared by: Benhur F. Batoon Date: May 10, 2007 District-Co-Route: 04-SCL/SM-101
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RWQCB: San Francisco Bay Regional Water Quality Control Board, RB-2

MCTT (Multi-Chambered Treatment Train)

Feasibility

1. Is the proposed location for the MCTT located to serve a "critical source area" (i.e. vehicle service facility, parking area, paved storage area, or fueling station)? ☐Yes ☒No
2. Is the WQV ≥ 123 m³? ☐Yes ☒No
3. Would a permanent pool of water be allowed by the local vector control agency? ☐Yes ☒No
   If No to any question above, then an **MCTT is not feasible.**
4. Does adequate area exist within the right-of-way to place an MCTT(s)? ☐Yes ☐No
   If Yes, continue to Design Elements sections. If No, continue to Question 5.
5. If adequate area does not exist within right-of-way, can suitable, additional right-of-way be acquired to site the device and how much right-of way would be needed to treat WQV? _____ ha (ac) ☐Yes ☐No
   If Yes, continue to Design Elements section. If No, continue to Question 6.
6. If adequate area cannot be obtained, document in Section 5 of the SWDR that the inability to obtain adequate area prevents the incorporation of this Treatment BMP into the project. . ☐Complete

Design Elements

* **Required** Design Element – A "Yes" response to these questions is required to further the consideration of this BMP into the project design. Document a "No" response in Section 5 of the SWDR to describe why this Treatment BMP cannot be included into the project design.

** **Recommended** Design Element – A "Yes" response is preferred for these questions, but not required for incorporation into a project design.

1. Is the maximum depth of the 3rd chamber ≤ 4 m below ground surface and has Maintenance accepted this depth? * ☐Yes ☐No
2. Is the drawdown time in the 3rd chamber between 40 and 48 hours? * ☐Yes ☐No
3. Is access for Maintenance vehicles provided to the MCTT? * ☐Yes ☐No
4. Is there sufficient hydraulic head to operate the device? * ☐Yes ☐No
5. Has a bypass/overflow been provided for storms > WQV? * ☐Yes ☐No
6. Can pretreatment be provided to capture sediment and litter in the runoff (such as using biofiltration)? ** ☐Yes ☐No

Treatment BMPs
Checklist T-1, Part 10

Prepared by: Benhur F. Batoon Date: May 10, 2007 District-Co-Route: 04-SCL/SM-101
KP (PM): SM- PM 0.0/3.6, SCL- PM 52.2/52.6 EA: 235610
RWQCB: San Francisco Bay Regional Water Quality Control Board, RB-2

Wet Basin

Feasibility

1. Is the volume of the Wet Basin above the permanent pool equal to at least the WQV using a 40 to 48 hour drawdown? (Note: the WQV must be ≥ 123m^3 [0.1 acre-feet] and the permanent pool must be at least 3x the WQV.) ☐Yes ☒No

2. Is a permanent source of water available in sufficient quantities to maintain the permanent pool for the wet basin? ☐Yes ☒No

   Answer either question 3 or question 4:

3. For Wet Basins with a proposed invert above the seasonally high groundwater, Are NRCS Hydrologic Soil Groups [HSG] C and D at the proposed invert elevation, or can an impermeable liner be used? (Note: If an impermeable liner is used, the seasonally high groundwater elevation must not encroach within 300 mm (12 in) of the invert.) ☐Yes ☒No

4. For Wet Basins with a proposed invert below the groundwater table: Can written approval from the local Regional Water Quality Control Board be obtained to place the wet basin in direct hydraulic connectivity to the groundwater? ☐Yes ☒No

5. Would a permanent pool of water be allowed by the local vector control agency? ☐Yes ☒No

   If No to any question above, then a **Wet Basin is not feasible.**

6. Does adequate area exist within the right-of-way to place a Wet Basin? ☐Yes ☒No
   If Yes, continue to Design Elements sections.

   If No, continue to Question 7.

7. If adequate area does not exist within right-of-way, can suitable, additional right-of-way be acquired to site the device and how much right-of way would be needed to treat WQV? _____ ha (ac) ☐Yes ☒No
   If Yes, continue to Design Elements section.

   If No, continue to Question 8.

8. If adequate area cannot be obtained, document in Section 5 of the SWDR that the inability to obtain adequate area prevents the incorporation of this Treatment BMP into the project. ☒Complete

Design Elements

* **Required** Design Element – A "Yes" response to these questions is required to further the consideration of this BMP into the project design. Document a "No" response in Section 5 of the SWDR to describe why this Treatment BMP cannot be included into the project design.

** **Recommended** Design Element – A "Yes" response is preferred for these questions, but not required for incorporation into a project design.

1. Can a controlled outlet and an overflow structure be designed for storm events larger than the WQV? * ☐Yes ☐No
2. Is access for Maintenance vehicles provided? * ☐Yes ☐No
3. Is the drawdown time for WQV events between 24 and 72 hours? * ☐Yes ☐No
4. Has appropriate vegetation been selected for each hydrologic zone? * ☐Yes ☐No
5. Can all design elements required by the local vector control agency be incorporated? * ☐Yes ☐No
6. Has a minimum flow path length-to-width ration of at least 2:1 been provided? ** ☐Yes ☐No
7. Has an upstream bypass been provided for storms > WQV? ** ☐Yes ☐No
8. Can pretreatment be provided to capture sediment and litter in the runoff (such as using biofiltration, or a forebay)? ** ☐Yes ☐No
9. Can public access be restricted using a fence if proposed at locations accessible on foot by the public? ** ☐Yes ☐No

WATER QUALITY INFORMATION HANDOUT

CONTRACT NO. 04-235634

04-San Mateo-101-PM 0.9/3.6

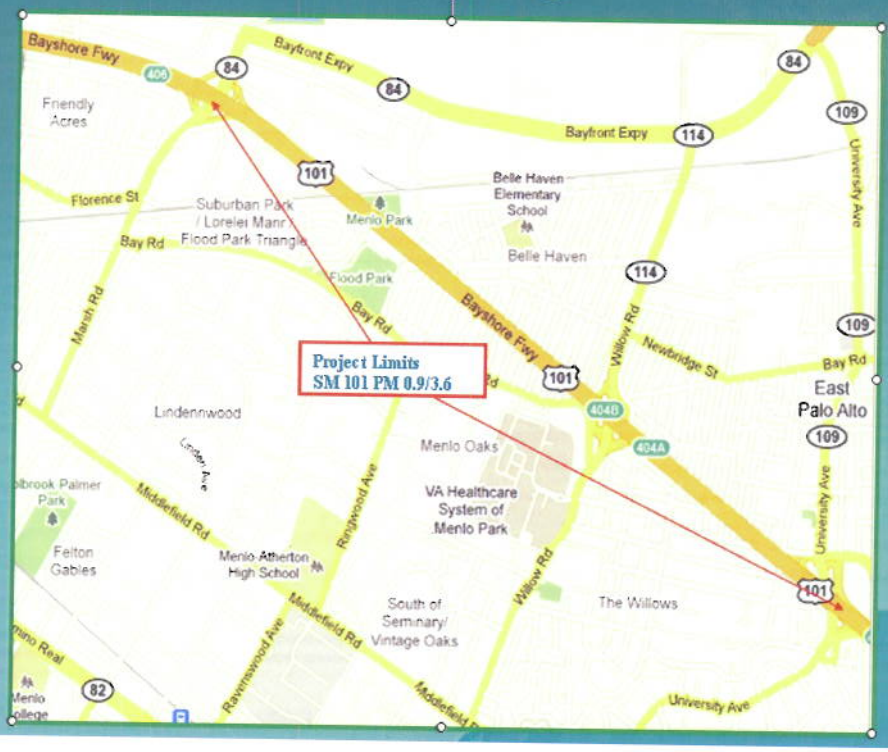
Add Auxiliary Lanes

California Department of Transportation
District 4
Water Quality Program
111 Grand Avenue
Oakland, California 94612

May 2010

1. Project Vicinity

Location Map



2. Risk Assessment

	A	B	C
1	**Sediment Risk Factor Worksheet**		**Entry**
2	**A) R Factor**		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	**R Factor Value**		59.29
6	**B) K Factor (weighted average, by area, for all site soils)**		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	**K Factor Value**		0.28
10	**C) LS Factor (weighted average, by area, for all slopes)**		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	**LS Factor Value**		0.46
14			
15	**Watershed Erosion Estimate (=RxKxLS) in tons/acre**	7.636552	
16	**Site Sediment Risk Factor**	**Low**	
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Receiving Water (RW) Risk Factor Worksheet	Entry	Score
A. Watershed Characteristics	**yes/no**	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment**? For help with impaired waterbodies please check the attached worksheet or visit the link below: 2006 Approved Sediment-impared WBs Worksheet http://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml **OR**	no	Low
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? http://www.ice.ucdavis.edu/geowbs/asp/wbquse.asp		

Combined Risk Level Matrix

Receiving Water Risk	Sediment Risk: Low	Sediment Risk: Medium	Sediment Risk: High
Low	Level 1	Level 2	
High	Level 2		Level 3

Project Sediment Risk: Low

Project RW Risk: Low

Project Combined Risk: Level 1

3. Information of Construction Site (Temporary) BMPs

Description of Construction Site (Temporary) BMPs

This project requires implementation of a Storm Water Pollution Prevention Plan (SWPPP). Potential water quality impacts will be reduced to the Maximum Extent Practicable through proper implementation of the SWPPP and inclusion of Standard Special Provisions (SSPs) for Temporary Construction Site Best Management Practices (BMPs) into the project.

Construction Site BMPs will be incorporated into the Construction Contract by way of the Storm Water Pollution Prevention Plan SSP 07-345 and will include consideration for Soil Stabilization, Sediment Control, Tracking Control, Wind Erosion Control, Non-Storm Water Controls and Waste Management and Material Pollution Controls.

The following Construction Site BMPs have been designated as separate Bid Line Items:

Construction Site Management: This non-storm water discharge and waste management practice includes considerations for operations relating to construction activities including: paving and grinding operations, illicit connection/ illegal discharge detection and reporting, vehicle and equipment cleaning, vehicle and equipment fueling, vehicle and equipment maintenance, concrete curing and concrete finishing, solid west management, material delivery and storage, material use, stockpile management, concrete waste management, sanitary/septic waste management and liquid waste management.

Temporary check dams will be used in small open channels, in steep channels where high velocities are expected, and during the establishment of grass linings of ditches and temporary ditches that do not warrant establishment of erosion-resistant linings.

Street Sweeping: This sediment control practice minimizes the amount of derbies and sediment on the roadway from entering storm drain system or watercourses. Street sweeping has been included as an item of work to ensure that the contractor will maintain at least one sweeper on the job site at all time during the period that sweeping work is required. Sweepers will be self-loading, motorized, and will have spray nozzles. Sweeper may include a vacuum apparatus. Street sweeping will be performed immediately after soil disturbance activities occur or offsite tracking of material is observed. Street sweeping will be performed so that dust is minimized. If dust generation is excessive or sediment pickup is ineffective, use of water or a vacuum will be required.

Temporary Construction Entrances and Stabilized Construction Roadway limit the deposition of sediment on paved public roads at the entrance and exits of projects.

Temporary Concrete Washout Bins prevents pollution by limiting the washout of concrete waste and waste water to a specific location. Concrete washout bins are used in the vicinity of areas where structure construction is proposed, which include retaining wall and drainage structures.

Temporary Drainage Inlet Protection minimizes the amount of sediment entering storm drain systems.

Linear sediment barriers including silt fence, sandbag barriers and straw bale barriers reduce the amount of sediment leaving slopes by filtering sheet runoff. The Contour Grading, Cross Sections, and Layout plans were reviewed to identify the cuts, fills and areas of soil disturbance. linear sediment barrier will be deployed at the toe of all embankment slopes, cut slopes and around soil stockpiles. Include at the limit of soil disturbance adjacent to ESAs.

Temporary Hydraulic Mulch (Type BFM): This soil stabilization practice reduces erosion by protecting unfinished construction slopes. This is a short term protection from wind and water induced erosion until the slopes are finished and permanent erosion control materials can be applied. Temporary Hydraulic Mulch is extremely useful on projects that are complex, have considerable disturbed soil area, and extend through at least one rainy season. This BMP will be used in combination with Move In/Move Out (Erosion Control). This is a short term protection from wind and water induced erosion until the slopes are finished and permanent erosion control materials can be applied.

Move In/Move Out (Erosion Control): This soil stabilization practice provides for the mobilization of labor, material, and equipment. Utilization allows for several applications of permanent erosion control materials as slopes are finished or taken out of active use.

TEMPORARY WATER POLLUTION CONTROL PLAN

EA 235631

FOR ACCURATE RIGHT OF WAY AND ACCESS DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Temporary Drainage Protection

Temporary Check Dam

NOTES:

1. ALL TIES ARE TO THE CENTER OF DRAINAGE INLET OR MANHOLES UNLESS OTHERWISE NOTED
2. Exist DRAINAGE LOCATIONS ARE APPROXIMATE ONLY, VERIFY LOCATION AND ELEVATION BEFORE MODIFYING Exist DRAINAGE FACILITIES.
3. TOP OF GRATE ELEVATIONS INCLUDE INLET DEPRESSION.
4. CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

LEGEND:

- No. — DRAINAGE SYSTEM NUMBER
- DRAINAGE UNIT
- GLD
- Abn Exist PIPE
- REMOVE Exist PIPE
- V OR TRAPEZOIDAL DITCH
- DITCH w/ BIOSWALE

ABBREVITIONS:

GLD = GRATED LINE DRAIN
SGD = STANDARD GUTTER DEPRESSION
PT = POINT
S = SLOPE
DA = DEPRESSION APRON
APC = ALTERNATIVE PIPE CULVERT(SEE APC TABLE FOR ALLOWED PIPE TYPES-EITHER PLASTIC OR RCP)
RCP = REINFORCED CONCRETE PIPE
RSP = ROCK SLOPE PROTECTION
HW = HEAD WALL
MH = MAN HOLE
DI = DRAINAGE INLET
AFES = ALTERNATIVE FLARED END SECTION (CORRESPONDS TO THE PIPE TYPE SELECTED)
W/ = WITH
PMP-E = PERFORATED METAL PIPE

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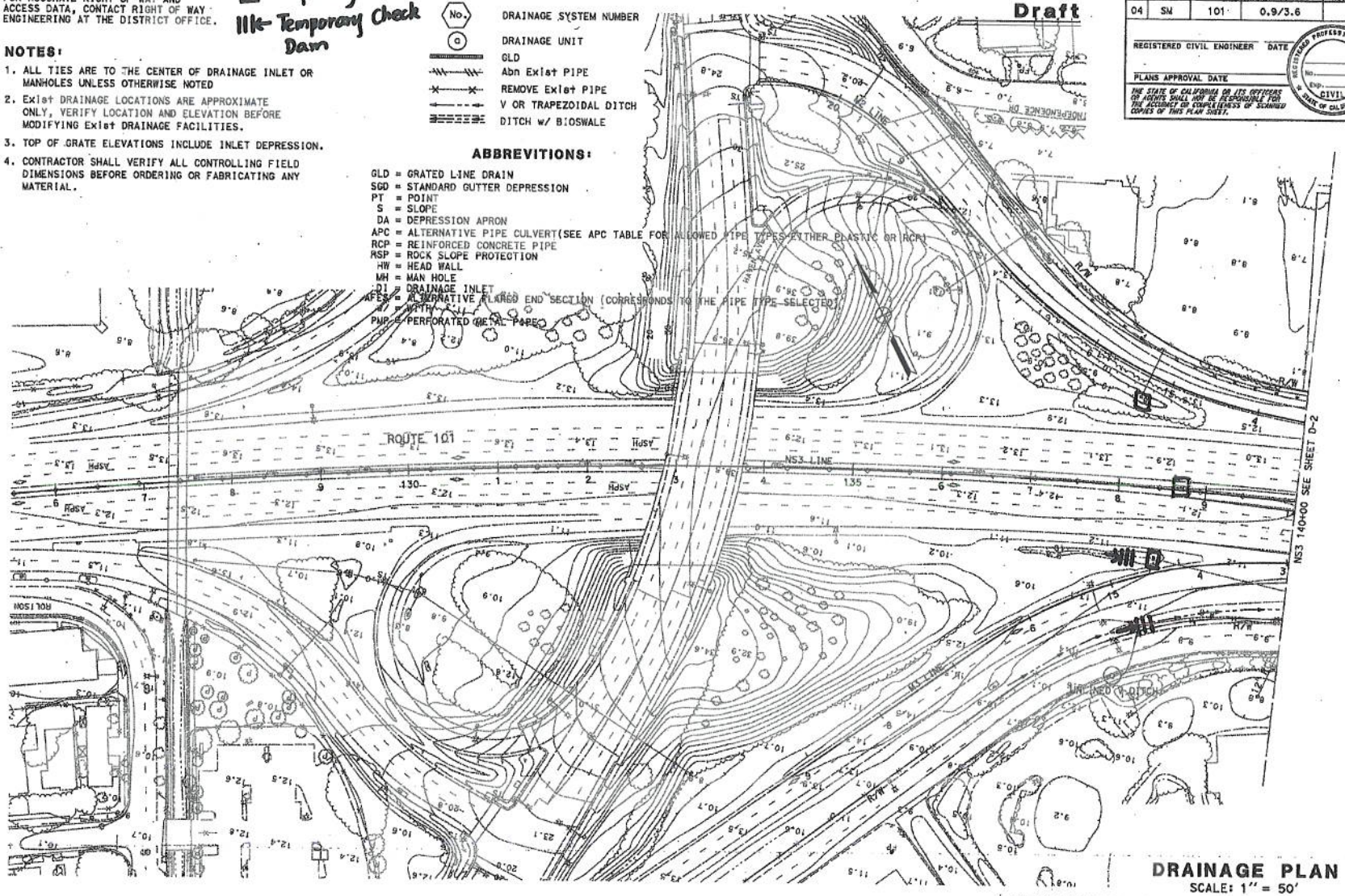

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

REGISTERED CIVIL ENGINEER DATE

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REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

DRAINAGE PLAN

SCALE: 1" = 50'

THIS PLAN ACCURATE FOR DRAINAGE WORK ONLY

D-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

DESIGN

FUNCTIONAL SUPERVISOR: James Ley

CALCULATED-DESIGNED BY: A

CHECKED BY: A

REVISED BY: A

DATE REVISED: A

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DATE PLOTTED => 27-FEB-2010
TIME PLOTTED => 11:26

LAST REVISED 02-02-10

BORDER LAST REVISED 4/11/2008

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USERNAME => s129144
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CU 04243

EA 235631

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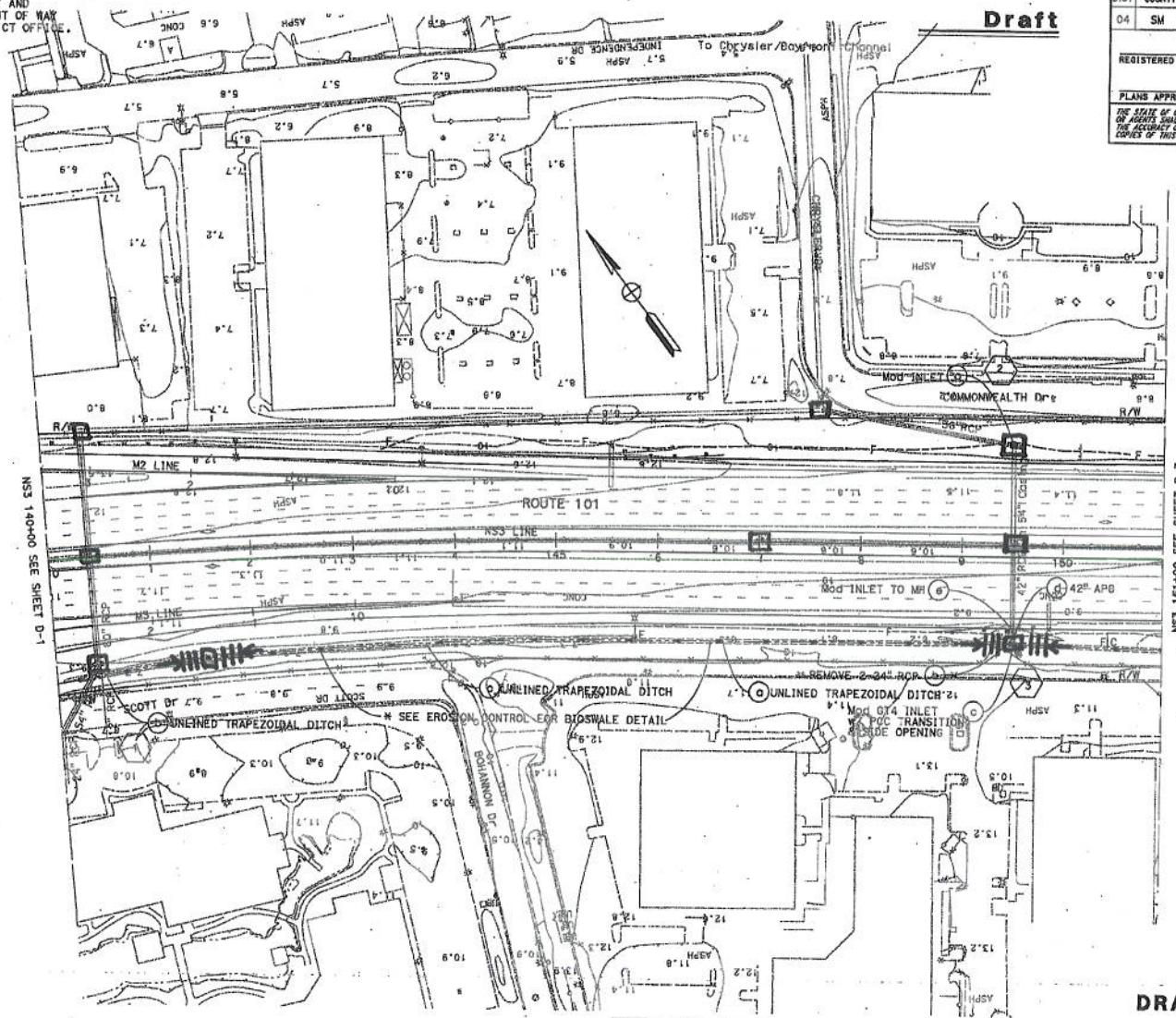

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DRAINAGE PLAN

SCALE: 1" = 50'

D-2

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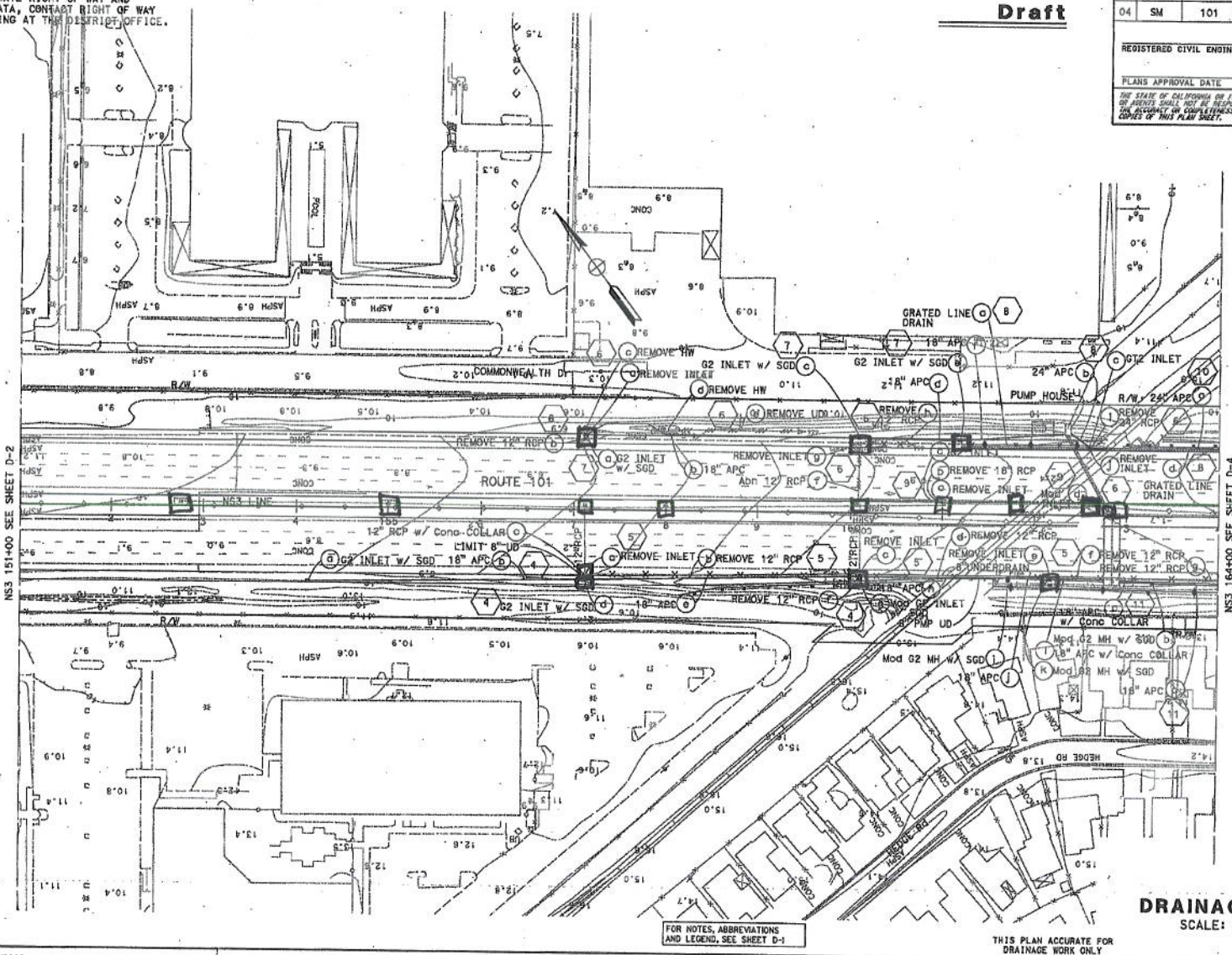

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET D-1

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DRAINAGE PLAN

SCALE: 1" = 50'

D-3

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EA 235631

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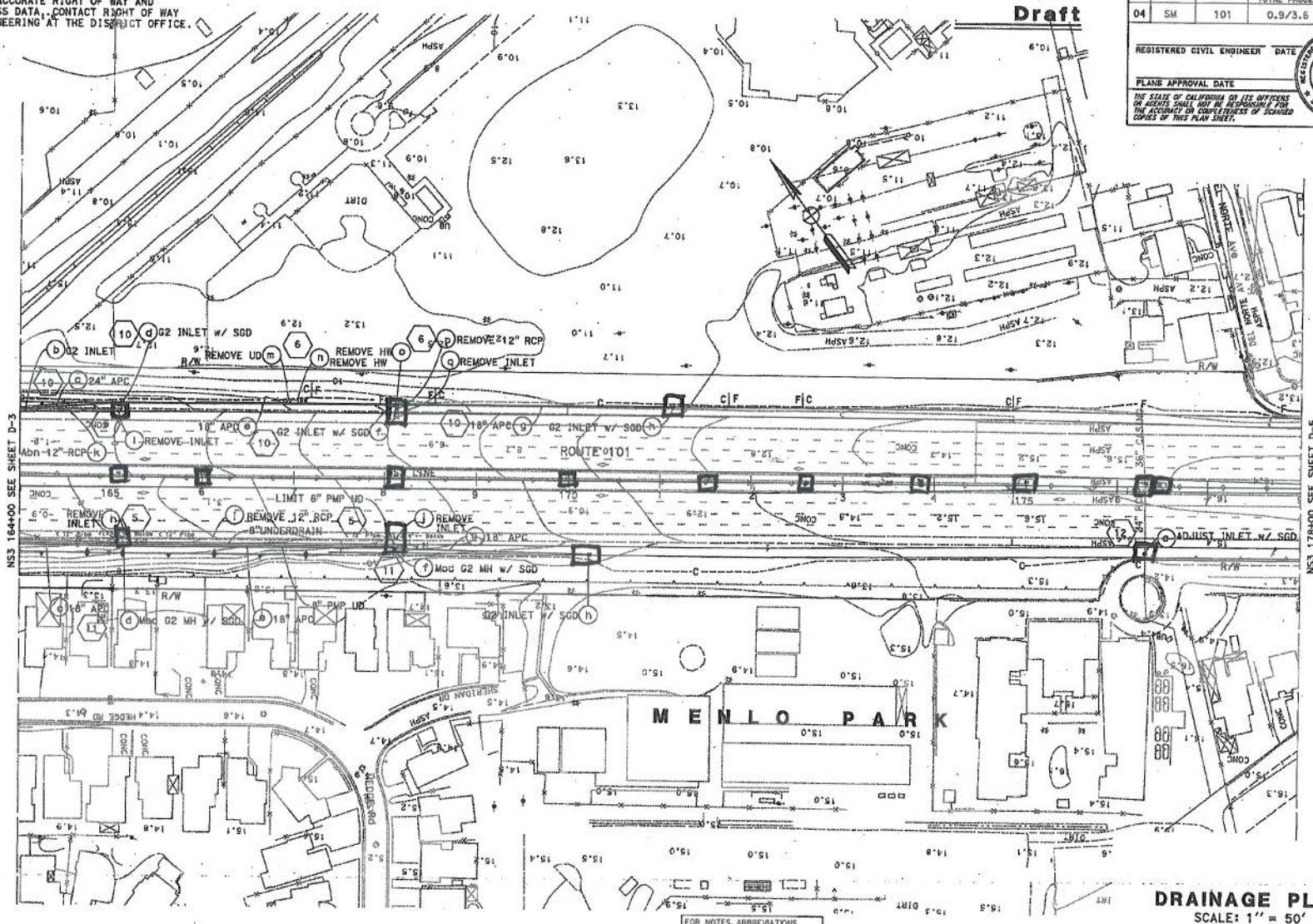

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET D-1

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DRAINAGE PLAN

SCALE: 1" = 50'

D-4

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

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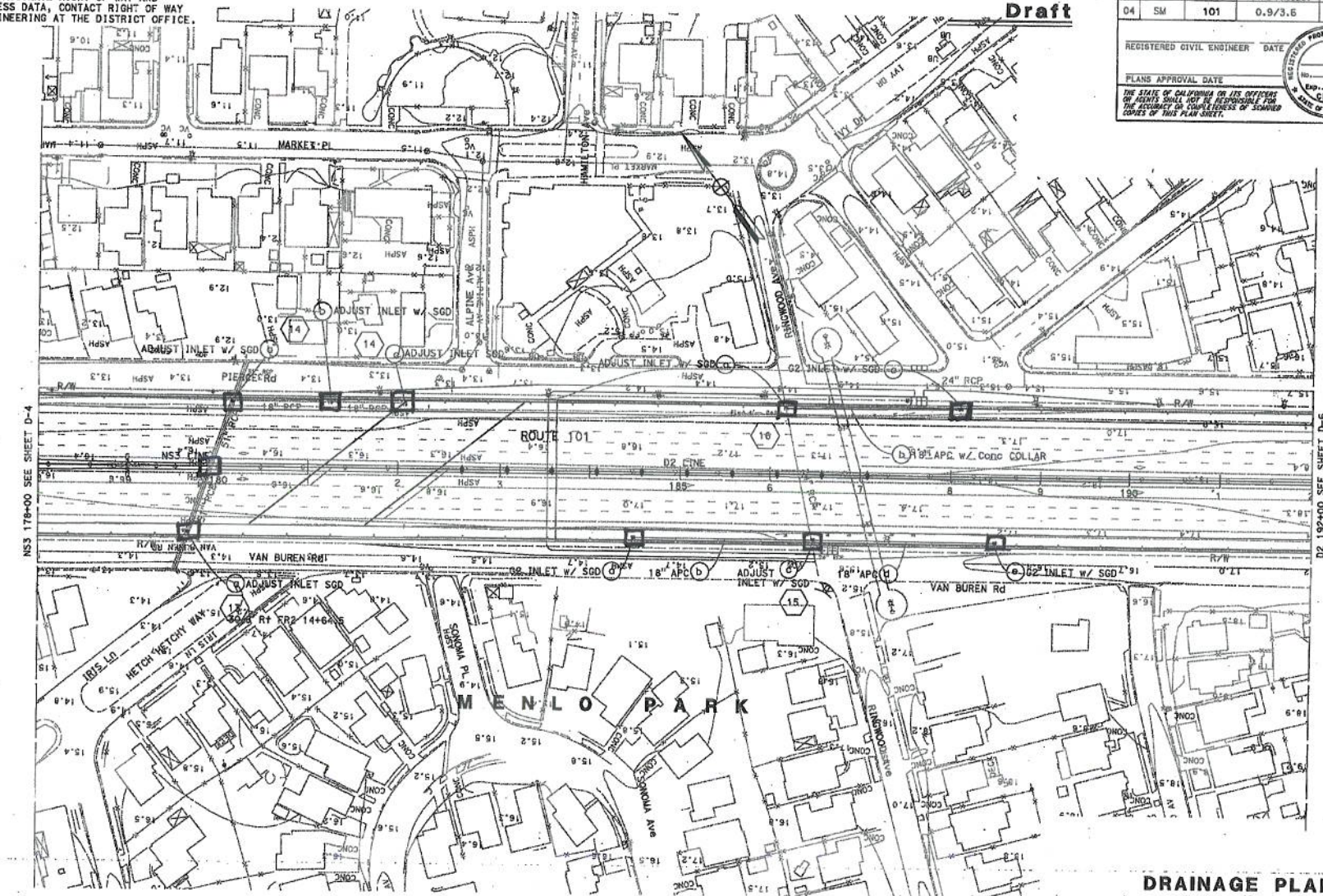

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET D-1

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DRAINAGE PLAN

SCALE: 1" = 50'

D-5

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

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FUNCTIONAL SUPERVISOR: James Ley

CALCULATED-DESIGNED BY: A

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USERNAME => s129144

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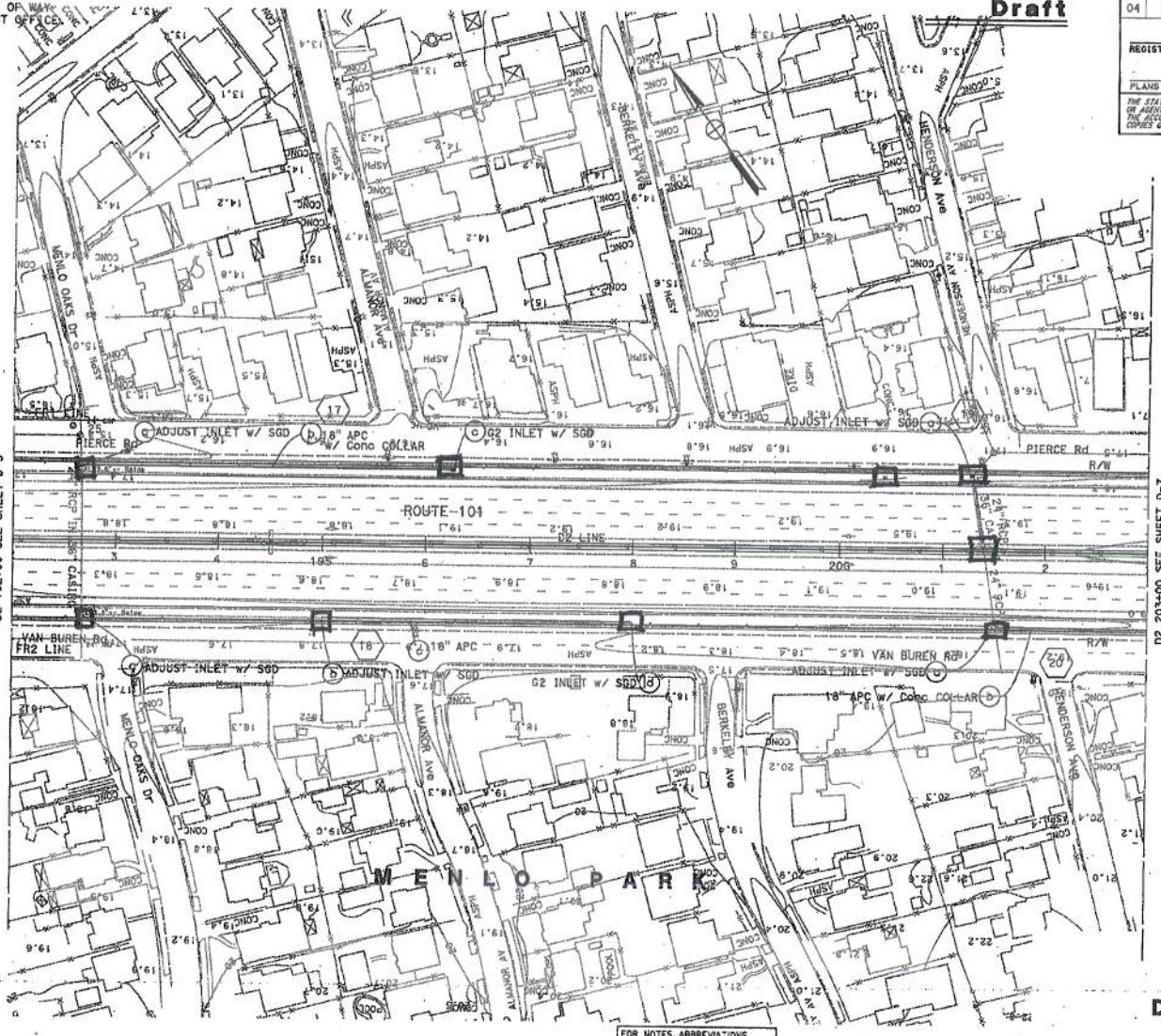

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SCALE: 1" = 50'

D-6

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FUNCTIONAL SUPERVISOR: James Ley

CALCULATED-DESIGNED BY: A

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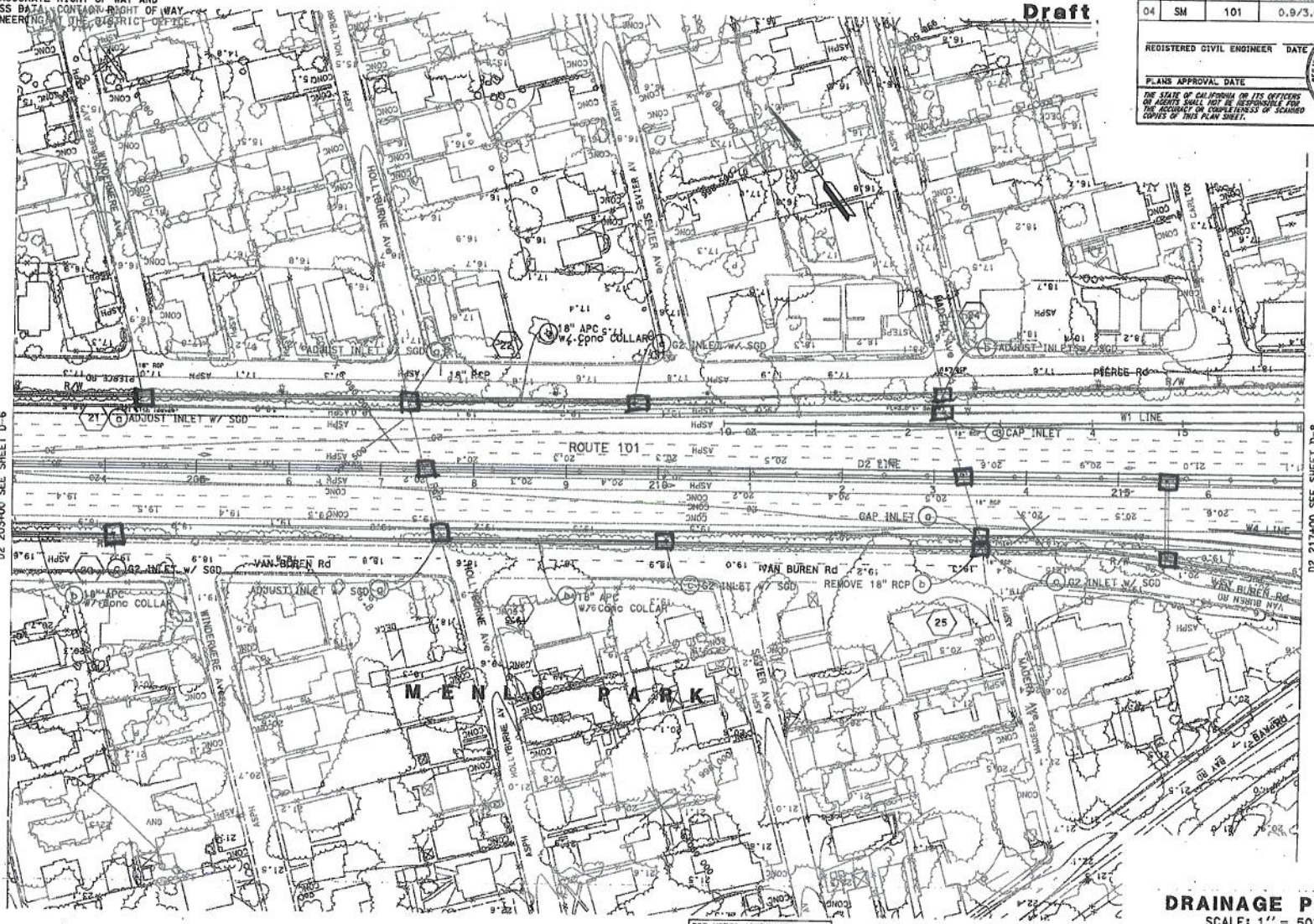

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET D-1

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DRAINAGE PLAN

SCALE: 1" = 50'

D-7

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EA 235631

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02-02-10

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

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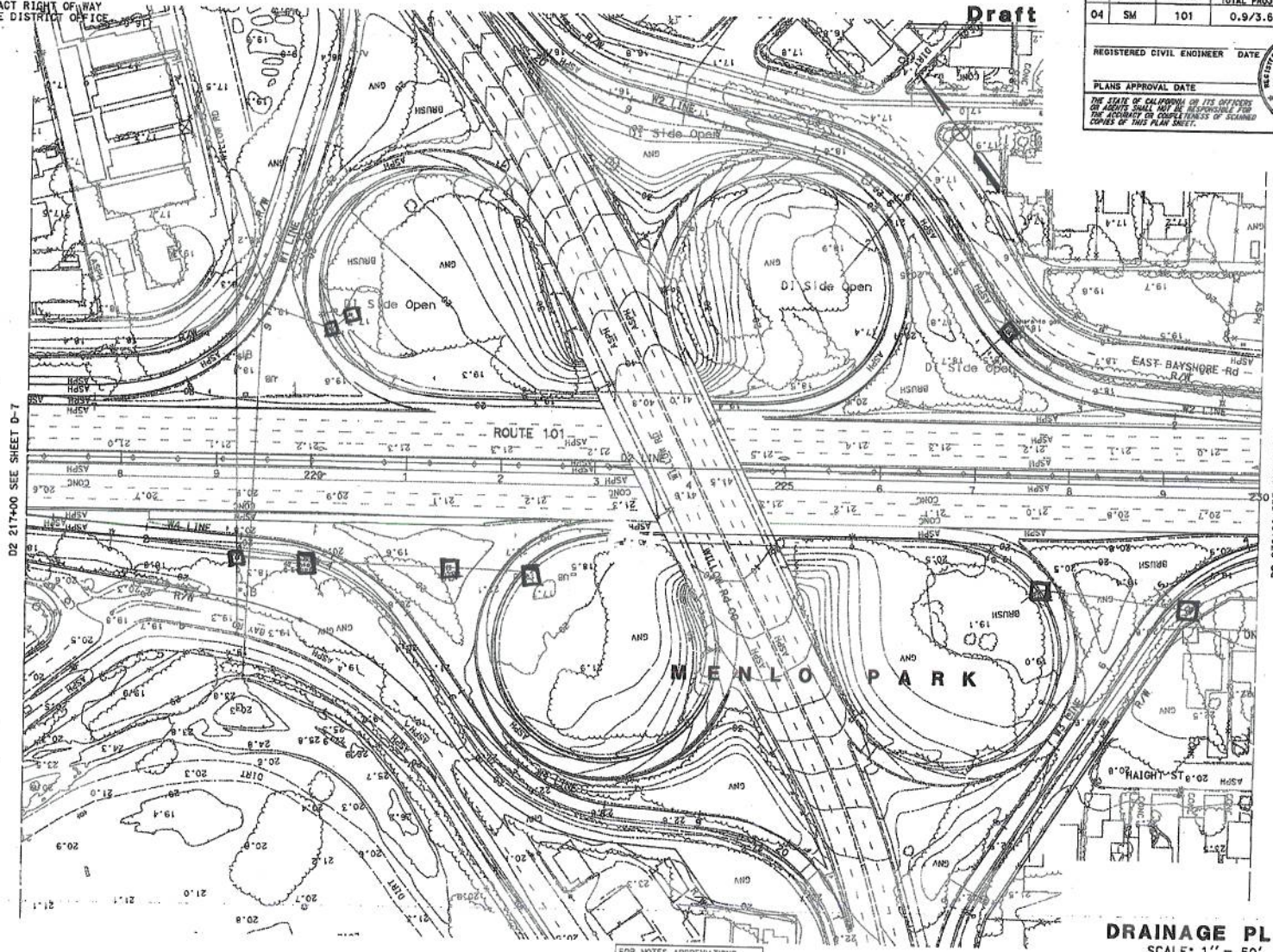

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DRAINAGE PLAN

SCALE: 1" = 50'

D-8

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

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FUNCTIONAL SUPERVISOR: James Ley

CALCULATED-DESIGNED BY: A

CHECKED BY: A

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USERNAME => s129144

DGN FILE => 4235631c008.dgn

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EA 235631

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

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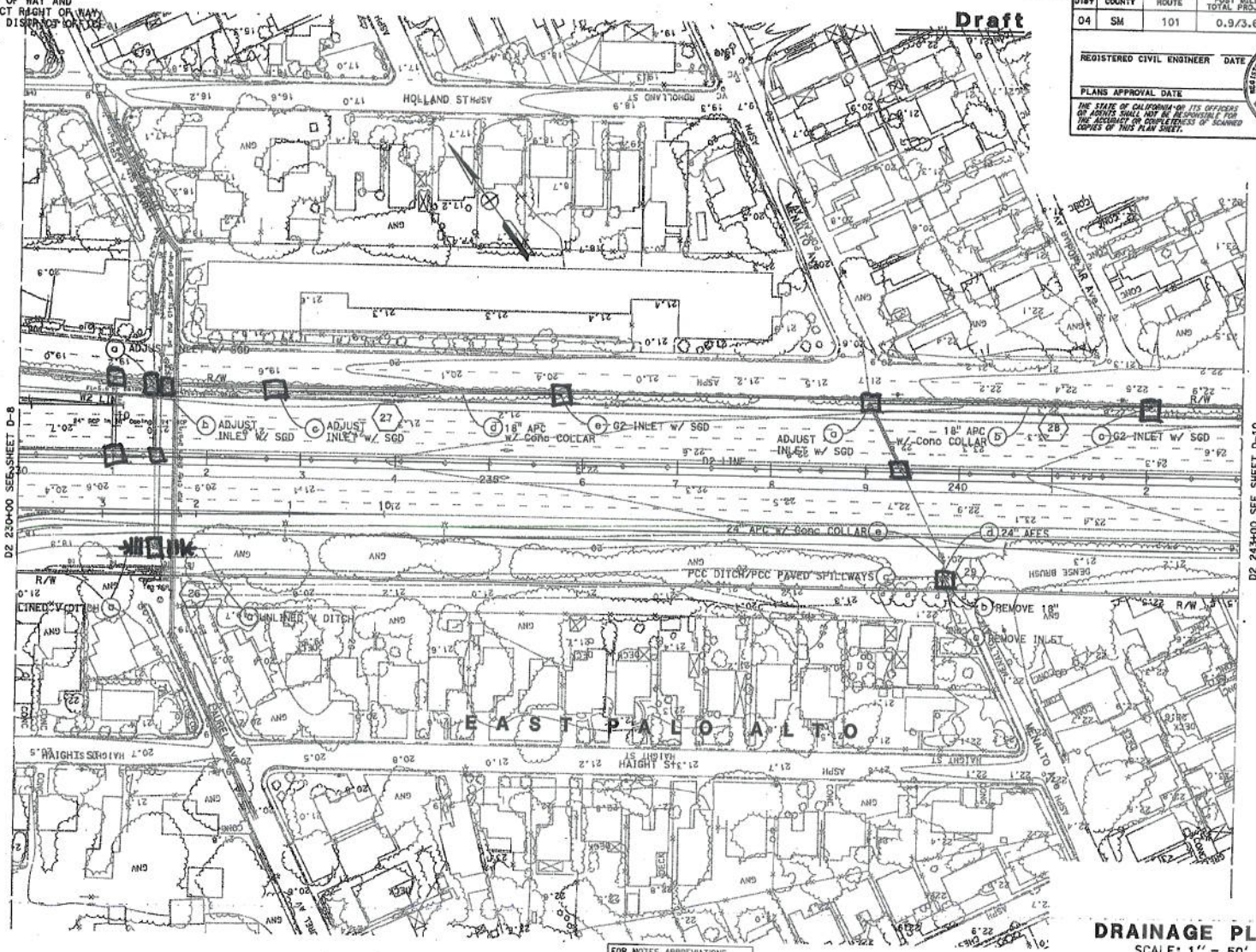

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET D-1

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DRAINAGE PLAN

SCALE: 1" = 50'

D-9

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans DESIGN

FUNCTIONAL SUPERVISOR: James Loy

CALCULATED-DESIGNED BY: A

CHECKED BY: A

REVISED BY: A

DATE REVISED: A

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RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

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DGN FILE => 423563ic0009.dgn

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EA 235631

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DATE PLOTTED => 27-FEB-2010
TIME PLOTTED => 11:35

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

REGISTERED CIVIL ENGINEER DATE

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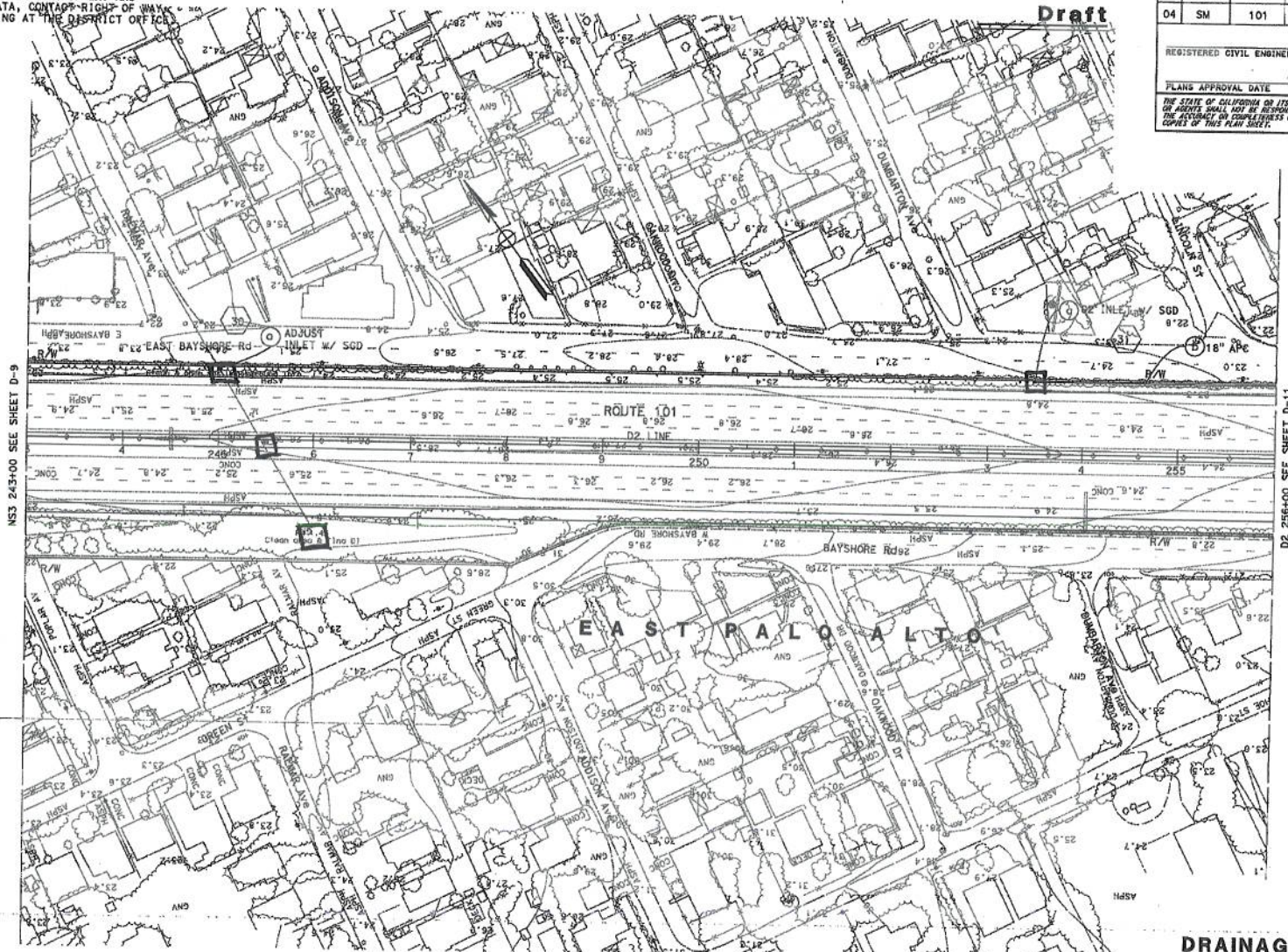

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET D-1

THIS PLAN ACCURATE FOR DRAINAGE WORK ONLY

DRAINAGE PLAN

SCALE: 1" = 50'

D-10

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

DESIGN

FUNCTIONAL SUPERVISOR: James Loy

CALCULATED-DESIGNED BY | CHECKED BY

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RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s129144
DGN FILE => 423563ia010.dgn

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EA 235631

LAST REVISION 02-02-10 | DATE PLOTTED => 27-FEB-2010 | TIME PLOTTED => 11:36

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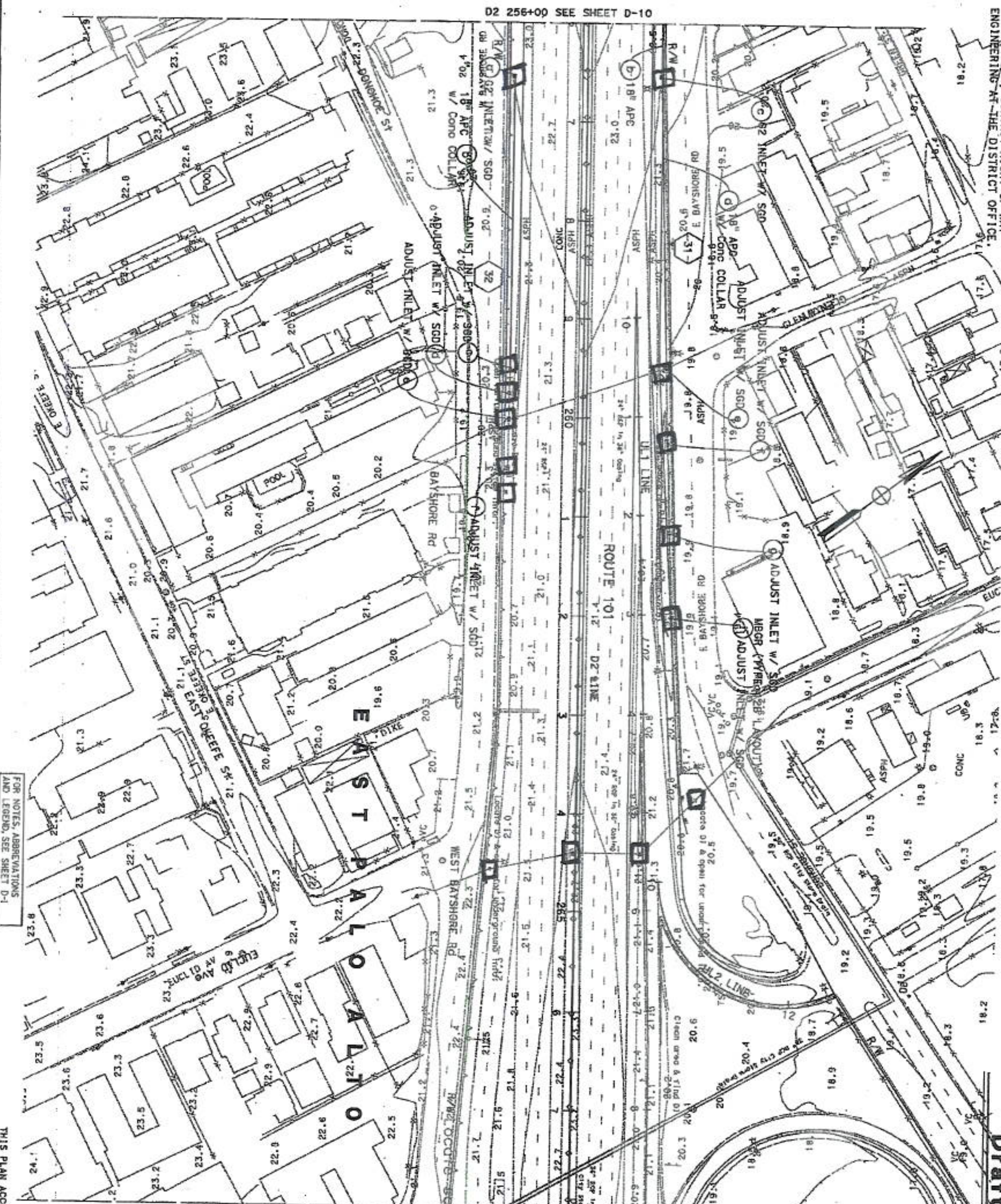
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	A	REVISED BY	A
Caltrans DESIGN	James Ley	CHECKED BY	A	DATE REVISED	A

D2 256+00 SEE SHEET D-10



D2 268+00 SEE SHEET D-12

BORDER LAST REVISED 4/1/2008

RELATIVE BORDER SCALE IS IN INCHES

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET D-1

USERNAME => s129144
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CU 04243

EA 235631

DRAINAGE PLAN

SCALE: 1" = 50'

D-11

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

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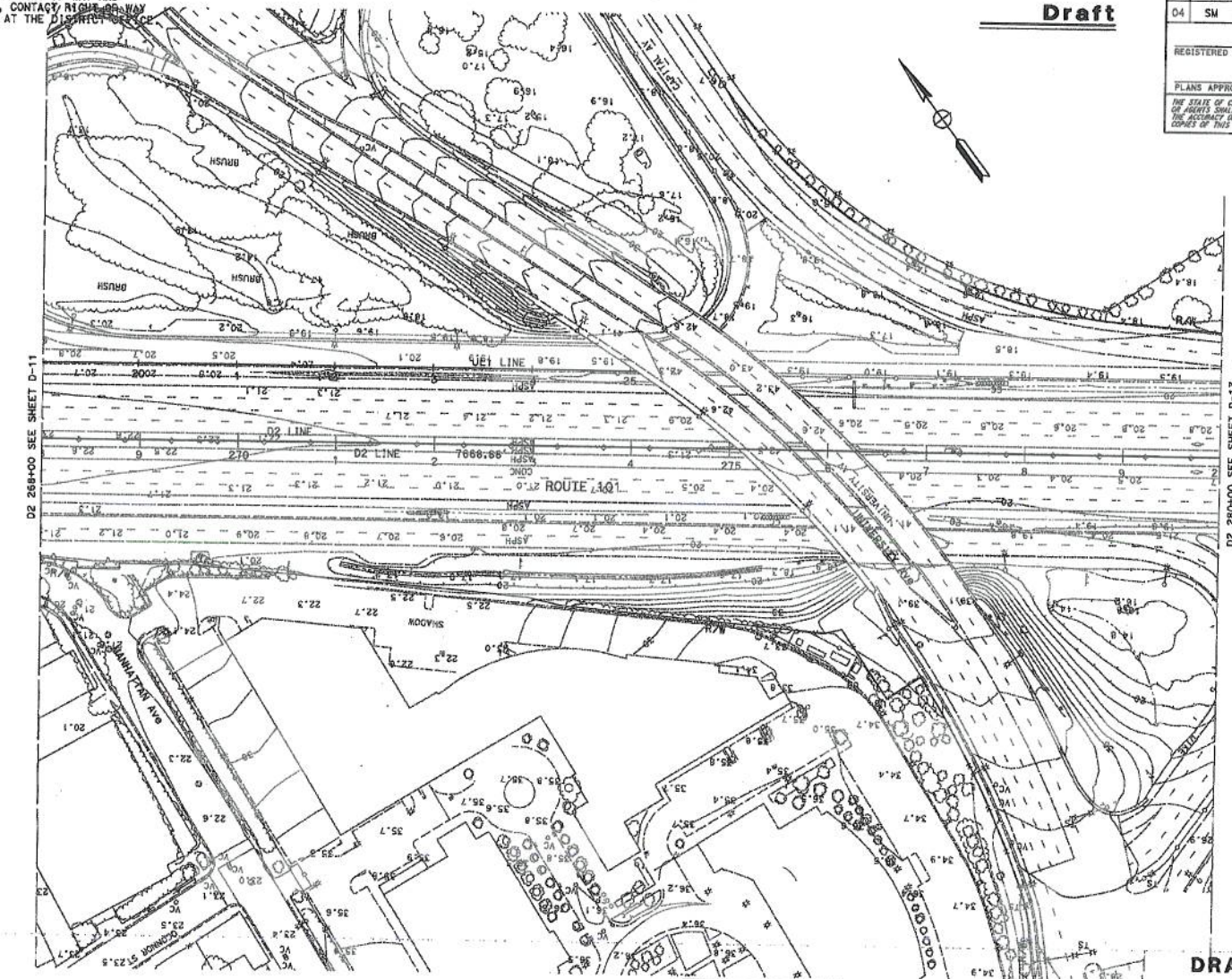


FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET D-1

THIS PLAN ACCURATE FOR DRAINAGE WORK ONLY

DRAINAGE PLAN

SCALE: 1" = 50'

D-12

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

DESIGN

FUNCTIONAL SUPERVISOR: Jonas Ley

CALCULATED-DESIGNED BY: A

CHECKED BY: A

REVISED BY: A

DATE REVISED: A

J:\hermie\235631\workingfiles\4235631o012.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => a129144

DGN FILE => 4235631o012.dgn

CU 04243

EA 235631

LAST REVISION 02-02-10

DATE PLOTTED => 27-FEB-2010

TIME PLOTTED => 11:37

FOR ACCURATE RIGHT OF WAY AND ACCESS DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Temp Construction Entrance

TSF Temp Silt Fence

TFR Temp Fiber Roll

Draft

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

REGISTERED CIVIL ENGINEER DATE

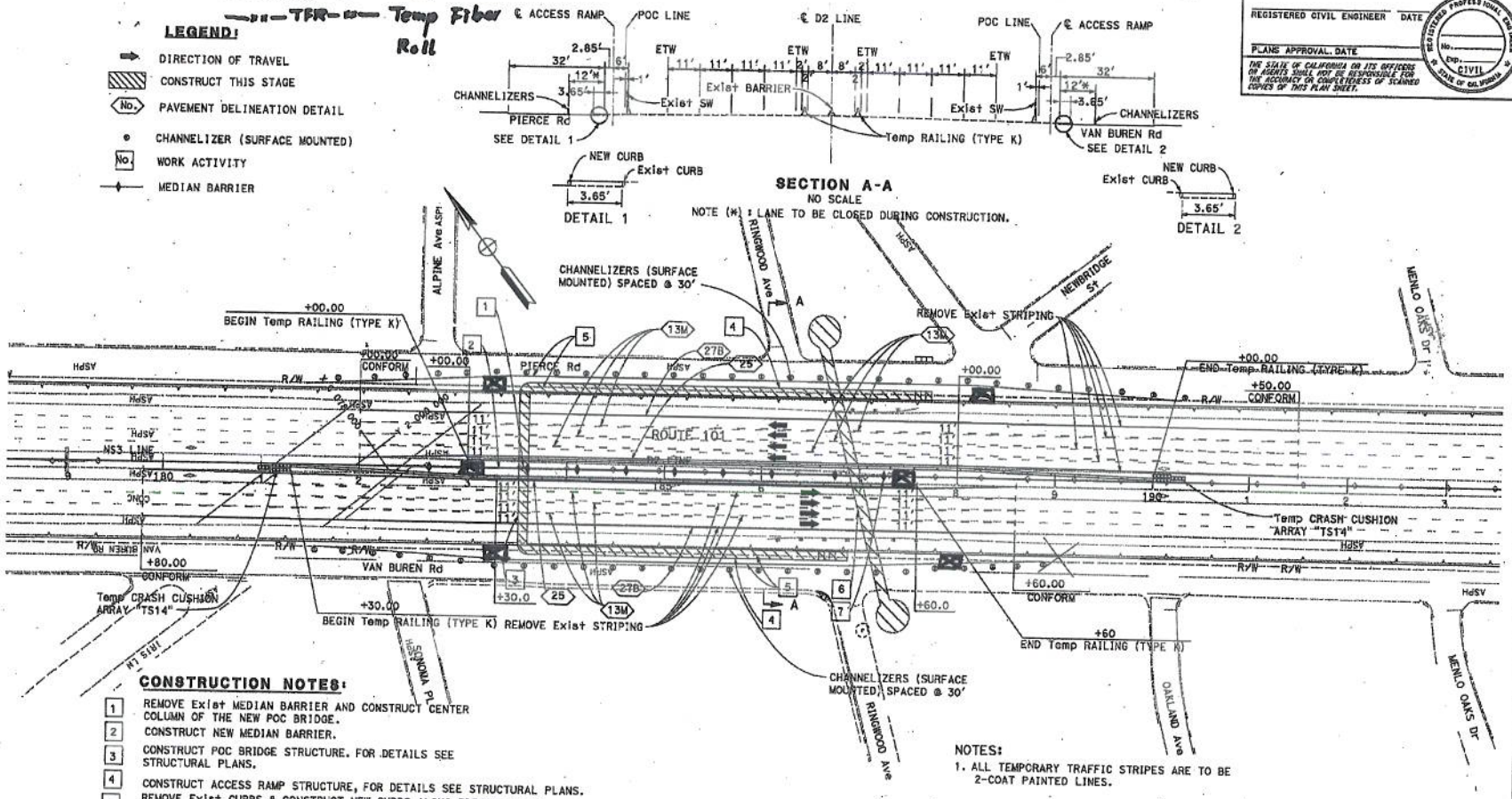
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

LEGEND:

- DIRECTION OF TRAVEL
- CONSTRUCT THIS STAGE
- PAVEMENT DELINEATION DETAIL
- CHANNELIZER (SURFACE MOUNTED)
- WORK ACTIVITY
- MEDIAN BARRIER



CONSTRUCTION NOTES:

1. REMOVE Exist MEDIAN BARRIER AND CONSTRUCT CENTER COLUMN OF THE NEW POC BRIDGE.
2. CONSTRUCT NEW MEDIAN BARRIER.
3. CONSTRUCT POC BRIDGE STRUCTURE. FOR DETAILS SEE STRUCTURAL PLANS.
4. CONSTRUCT ACCESS RAMP STRUCTURE, FOR DETAILS SEE STRUCTURAL PLANS.
5. REMOVE Exist CURBS & CONSTRUCT NEW CURBS ALONG FREEWAY SIDE OF FRONTAGE ROADS.
6. REMOVE Exist POC.
7. REMOVE Exist POC COLUMN AND CONSTRUCT MEDIAN BARRIER.
8. CONSTRUCT OUTSIDE WIDENING BETWEEN WILLOW Rd/UNIVERSITY Ave, INCLUDING NB UNIVERSITY Ave ON RAMP.
9. AFTER COMPLETION OF STAGE 1, REMOVE PAVEMENT MARKERS AND THE REMAINING Exist THERMOPLASTIC STRIPES AND MARKINGS.
10. CONSTRUCT RHMA-G OVERLAY BRTWEEN D2 230+50 AND 260+00 AS SHOWN ON THE PLANS.
11. STRIPE PAVEMENT DELINEATION FROM D2 230+00 TO 260+00 SEE SHEET PD-9 TO PD-11.

NOTES:

1. ALL TEMPORARY TRAFFIC STRIPES ARE TO BE 2-COAT PAINTED LINES.

There are 133 DIs withing the project Limit

STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN

STAGE 1

SCALE: 1" = 50'

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

SC-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

DESIGN

FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISED BY

DATE REVISED

J:\thermie\235631\workingfiles\423563mo001.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s129144

DGN FILE => 423563mo001.dgn

CU 04243

EA 235631

LAST REVISION 02-27-10

DATE PLOTTED => 27-FEB-2010

TIME PLOTTED => 16:44

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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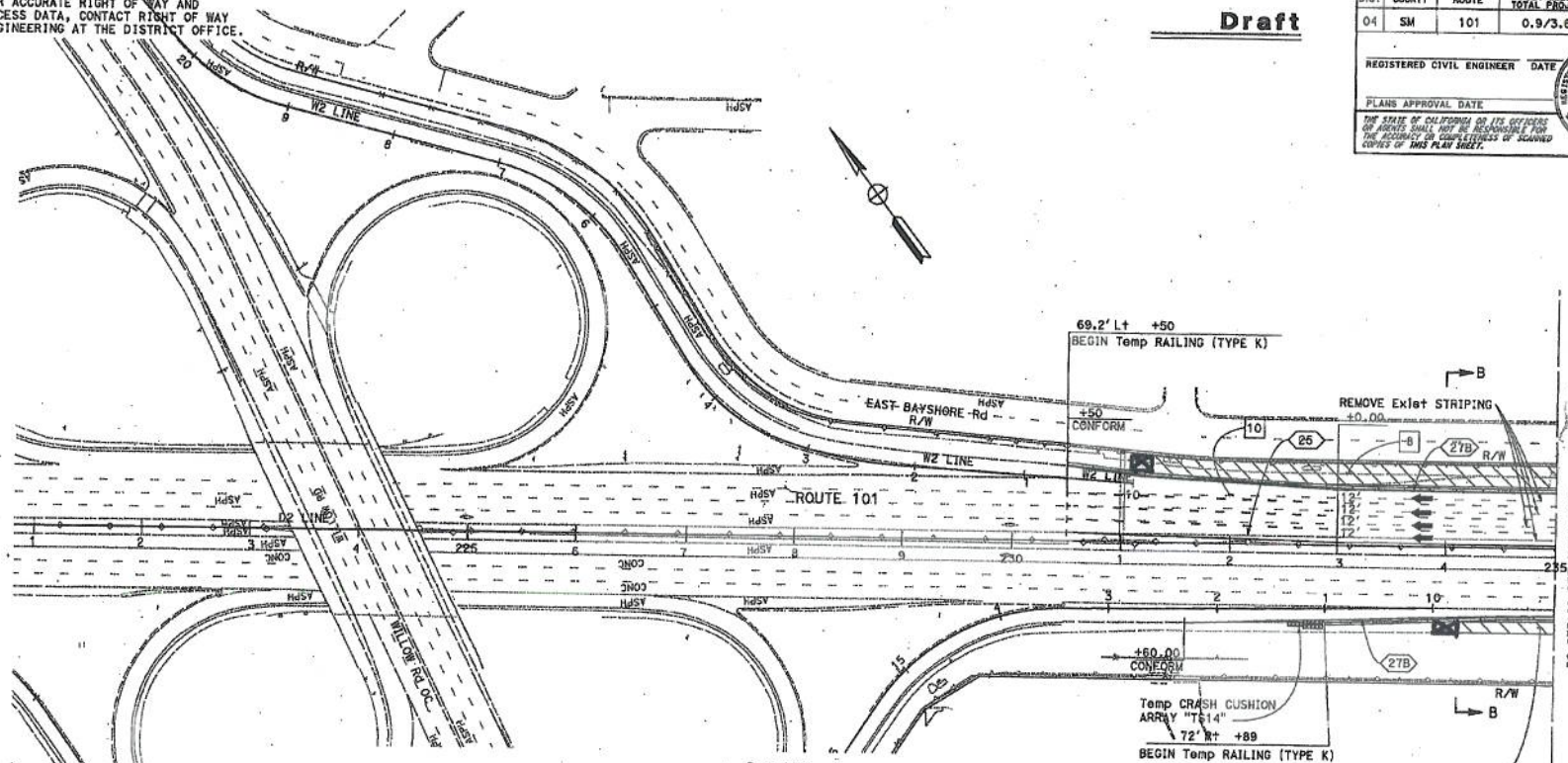
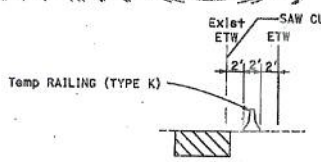
REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

Draft

FOR ACCURATE RIGHT OF WAY AND ACCESS DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.





DETAIL 2
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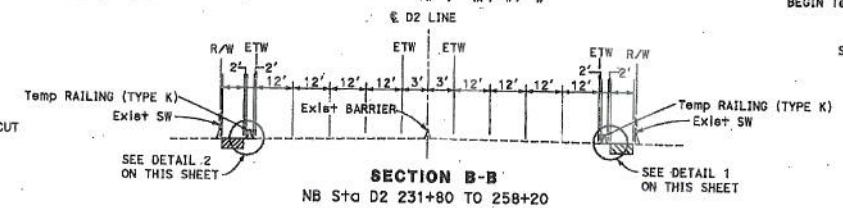
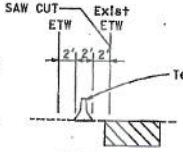


SECTION B-B
NB Sta D2 231+80 TO 258+20
SB Sta D2 236+80 TO 260+00
NO SCALE



DETAIL 1
NO SCALE

STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN

STAGE 1

SCALE: 1" = 50'

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET SC-1

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

SC-2

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
DESIGN

FUNCTIONAL SUPERVISOR | CALCULATED-DESIGNED BY | CHECKED BY | REVISED BY | DATE REVISED

J:\thermie\235631\workingfiles\423563mc002.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s129144
DGN FILE => 423563mc002.dgn

CU 04243

EA 235631

LAST REVISION DATE PLOTTED => 27-FEB-2010
TIME PLOTTED => 10:46
02-24-10

FOR ACCURATE RIGHT OF WAY AND ACCESS DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Draft

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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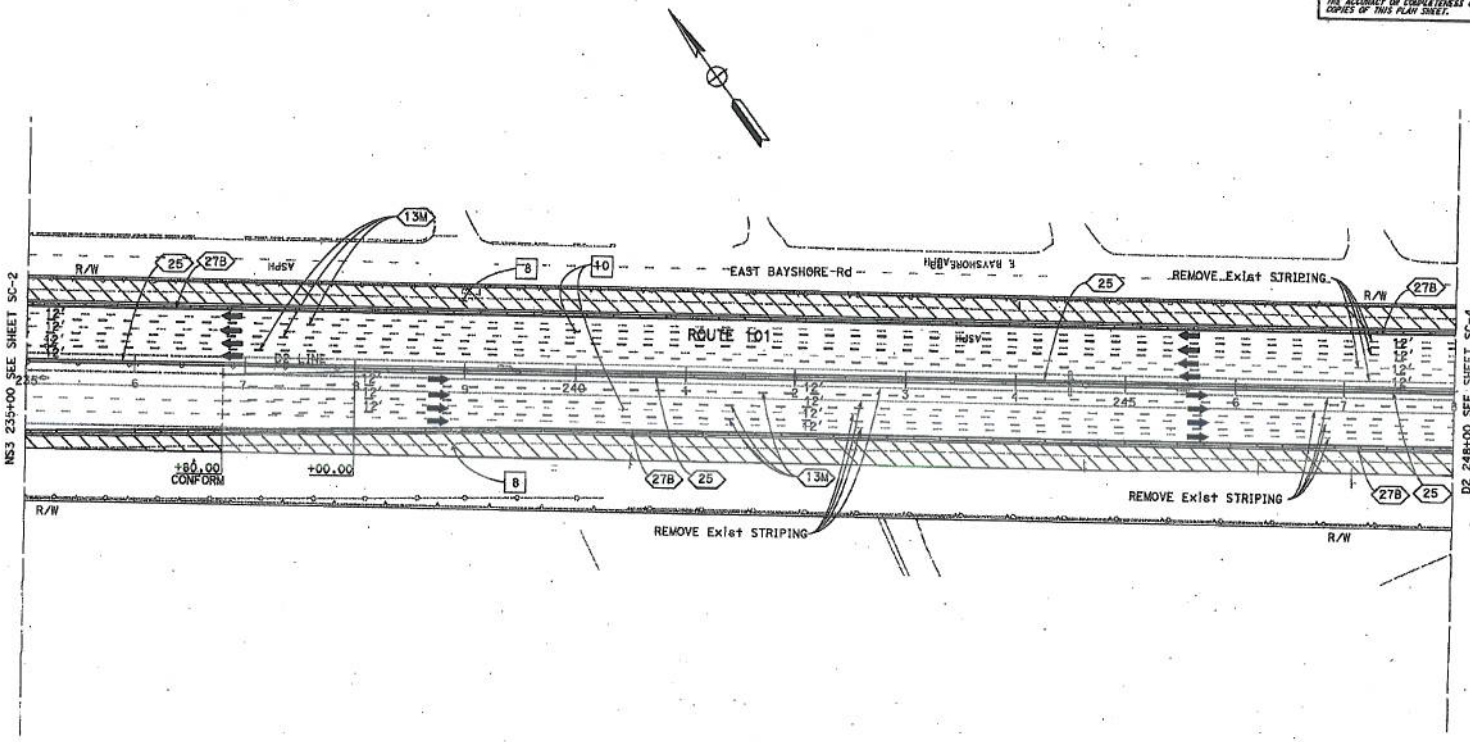
REGISTERED PROFESSIONAL ENGINEER NO. EXP. CIVIL STATE OF CALIFORNIA



STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN

STAGE 1

SCALE: 1" = 50'

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET SC-1

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

SC-3

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

DESIGN

FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISED BY

DATE REVISED

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s129144
DGN FILE => 423563na003.dgn

CU 04243

EA 235631

LAST REVISION DATE PLOTTED => 27-FEB-2019
TIME PLOTTED => 10:47

02-18-10

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FOR ACCURATE RIGHT OF WAY AND ACCESS DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Draft

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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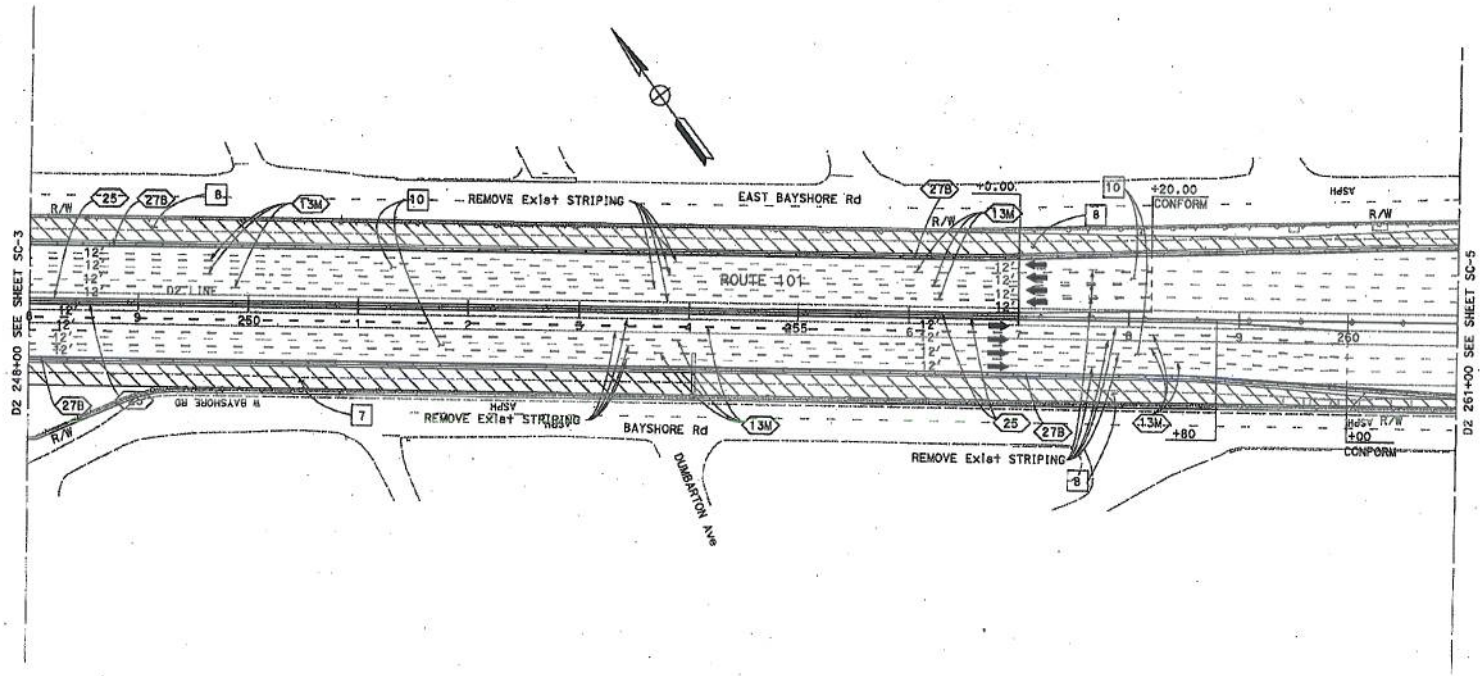
REGISTERED PROFESSIONAL ENGINEER No. EXP. CIVIL STATE OF CALIFORNIA



STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN

STAGE 1

SCALE: 1'' = 50'

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET SC-1

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

SC-4

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

DESIGN

FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISED BY

DATE REVISED

J:\thermie\235631\workingfiles\423563mo004.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s129144

DGN FILE => 423563mo004.dgn

CU 04243

EA 235631

LAST REVISION DATE PLOTTED => 27-FEB-2010

TIME PLOTTED => 15:46

02-18-10

FOR ACCURATE RIGHT OF WAY AND ACCESS DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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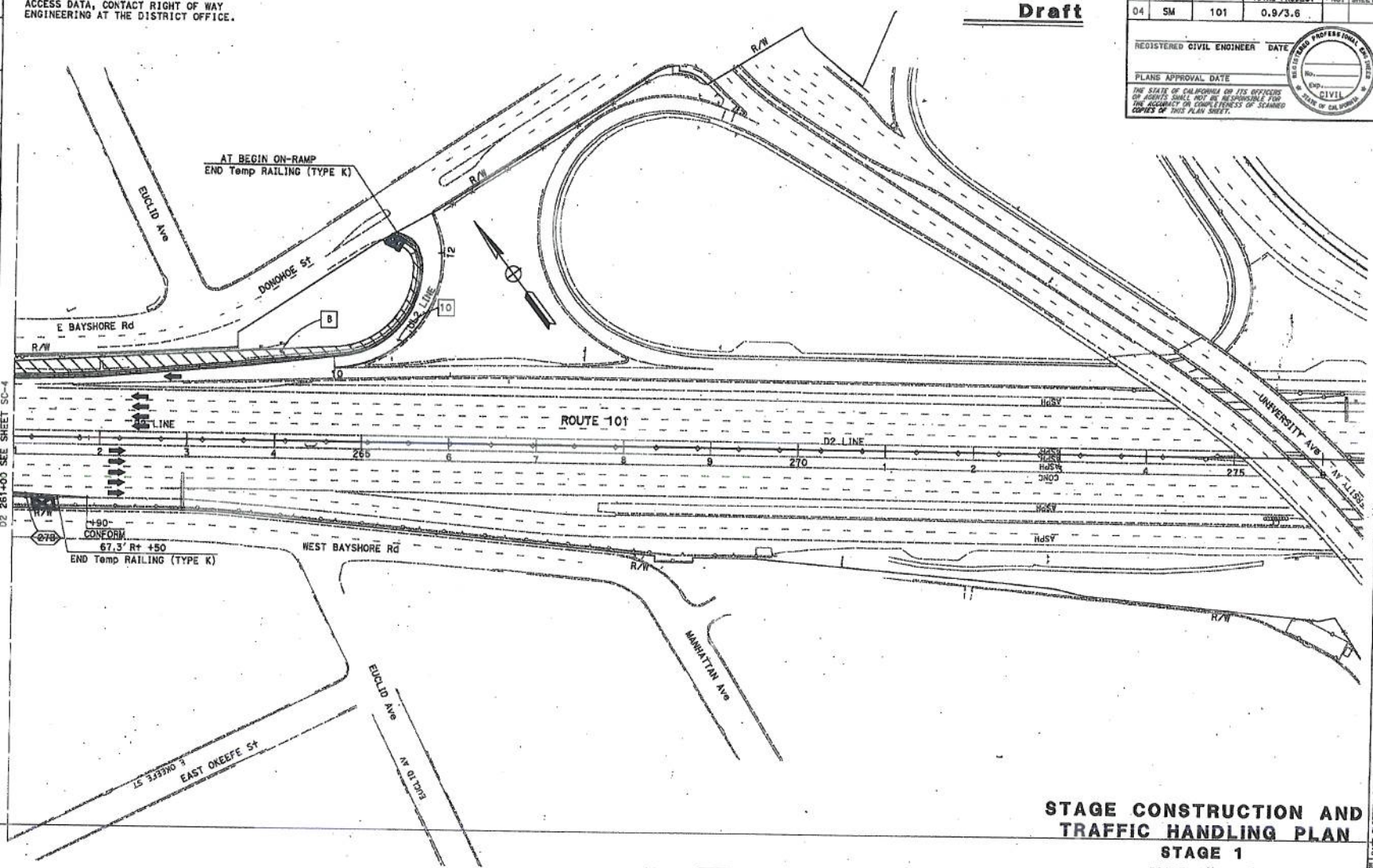
REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

DESIGN

FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISED BY

DATE REVISED

J:\thermie\235631\workingfiles\423563mo005.dgn

STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN

STAGE 1

SCALE: 1" = 50'

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET SC-1

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

SC-5

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s129144
DGN FILE => 423563mo005.dgn

CU 04243

EA 235631

TEST PLOTTER

DATE PLOTTED => 27-FEB-2010
TIME PLOTTED => 10:50

02-27-10

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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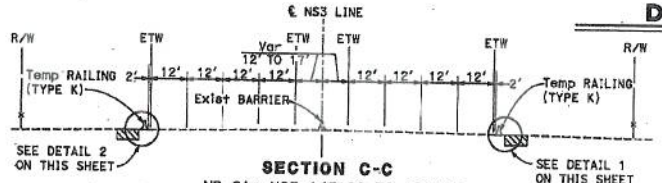
REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

Draft

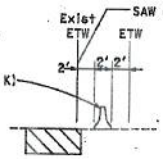
FOR ACCURATE RIGHT OF WAY AND ACCESS DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

LEGEND:

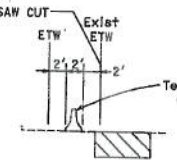
- DIRECTION OF TRAVEL
- CONSTRUCT THIS STAGE
- No. PAVEMENT DELINEATION DETAIL
- CHANNELIZER (SURFACE MOUNTED)
- No. WORK ACTIVITY



SECTION C-C
NB Sta NS3 145+00 TO 152+85
SB Sta NS3 144+30 TO 152+85
NO SCALE



DETAIL 2
NO SCALE



DETAIL 1
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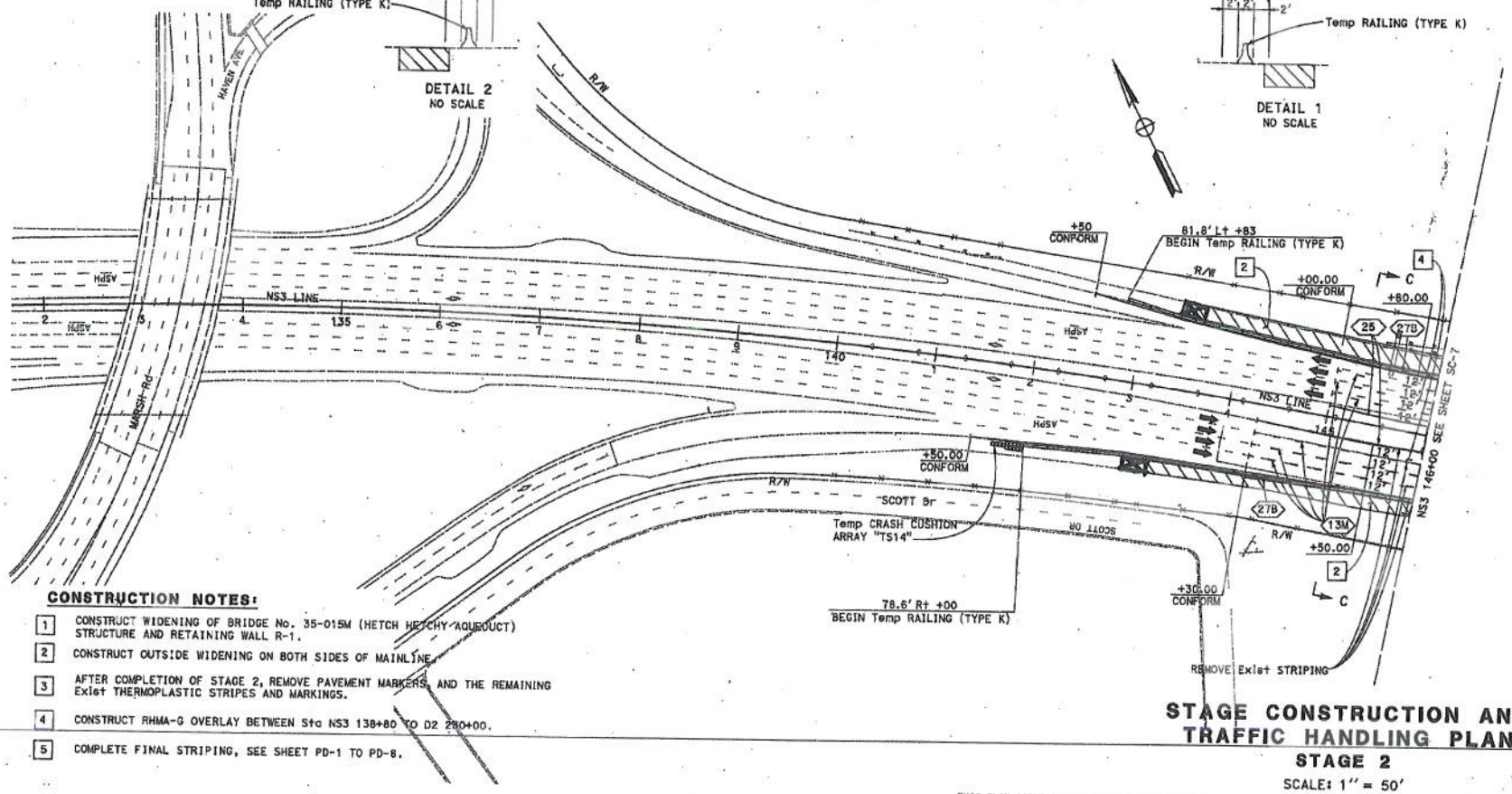

CONSTRUCTION NOTES:

1. CONSTRUCT WIDENING OF BRIDGE No. 35-015M (HETCH HETCHY AQUEDUCT) STRUCTURE AND RETAINING WALL R-1.
2. CONSTRUCT OUTSIDE WIDENING ON BOTH SIDES OF MAINLINE.
3. AFTER COMPLETION OF STAGE 2, REMOVE PAVEMENT MARKERS, AND THE REMAINING Exist THERMOPLASTIC STRIPES AND MARKINGS.
4. CONSTRUCT RHMA-G OVERLAY BETWEEN Sta NS3 138+80 TO D2 280+00.
5. COMPLETE FINAL STRIPING, SEE SHEET PD-1 TO PD-8.

STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN

STAGE 2

SCALE: 1" = 50'

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

SC-6

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
DESIGN
FUNCTIONAL SUPERVISOR
CALCULATED-DESIGNED BY
CHECKED BY
REVISED BY
DATE REVISED

J:\thermile\235631\workingfiles\423563ma006.dgn

BORDER LAST REVISED 4/11/2008
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3
USERNAME => a128144
DGN FILE => 423563ma006.dgn
CU 04243
EA 235631
LAST REVISION DATE PLOTTED => 27-FEB-2010
TIME PLOTTED => 11:17
02-24-10

FOR ACCURATE RIGHT OF WAY AND ACCESS DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Draft

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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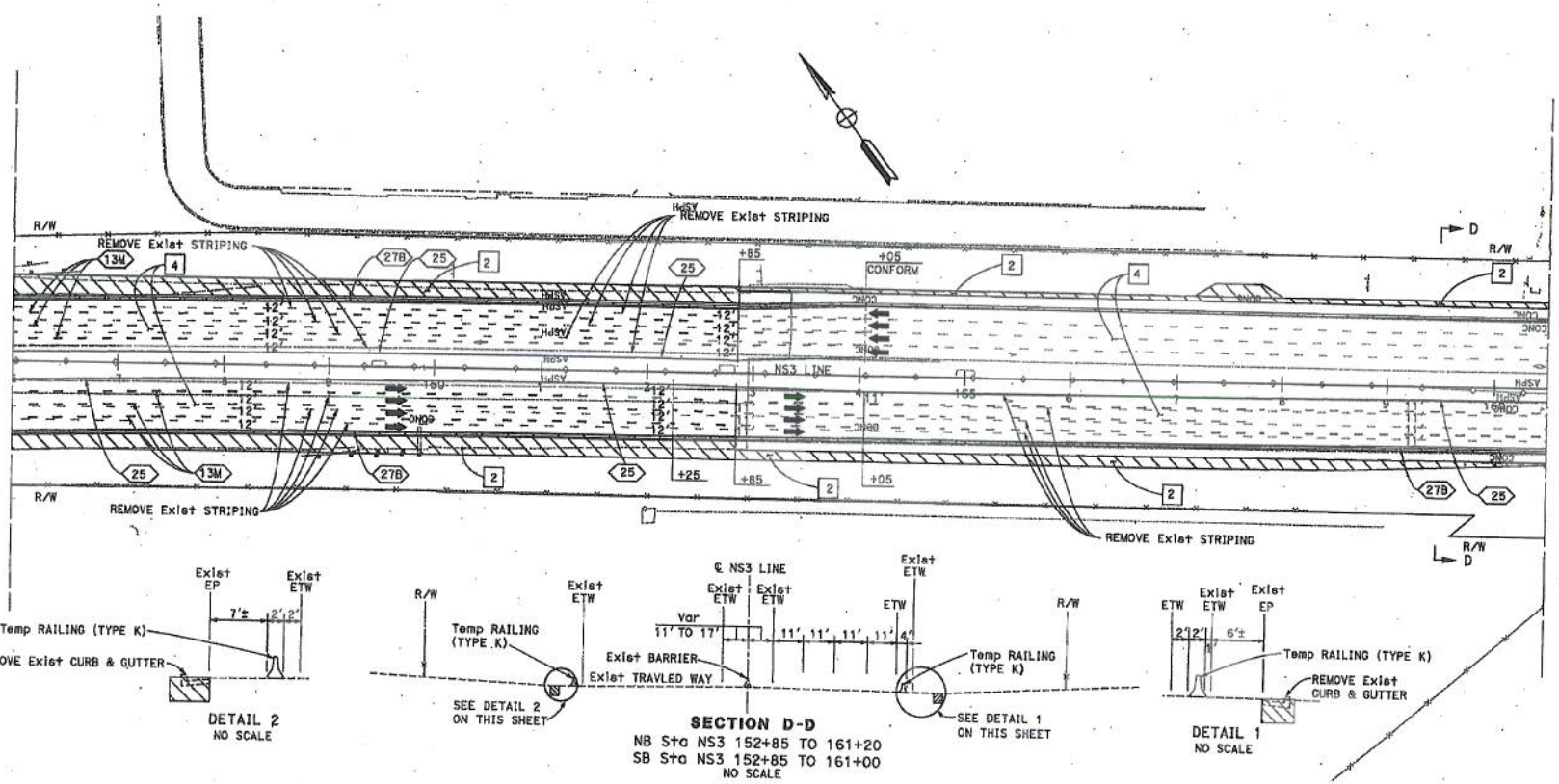
REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA



SECTION D-D
NB Sta NS3 152+85 TO 161+20
SB Sta NS3 152+85 TO 161+00
NO SCALE

STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN

STAGE 2

SCALE: 1" = 50'

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET SC-6

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

SC-7

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans DESIGN

FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISED BY

DATE REVISED

J:\thermie\235631\workingFiles\423563mo007.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s129144
DGN FILE => 423563mo007.dgn

CU 04243

EA 235631

LAST REVISION 02-27-10

DATE PLOTTED => 21-FEB-2010
TIME PLOTTED => 16:57

FOR ACCURATE RIGHT OF WAY AND ACCESS DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Draft

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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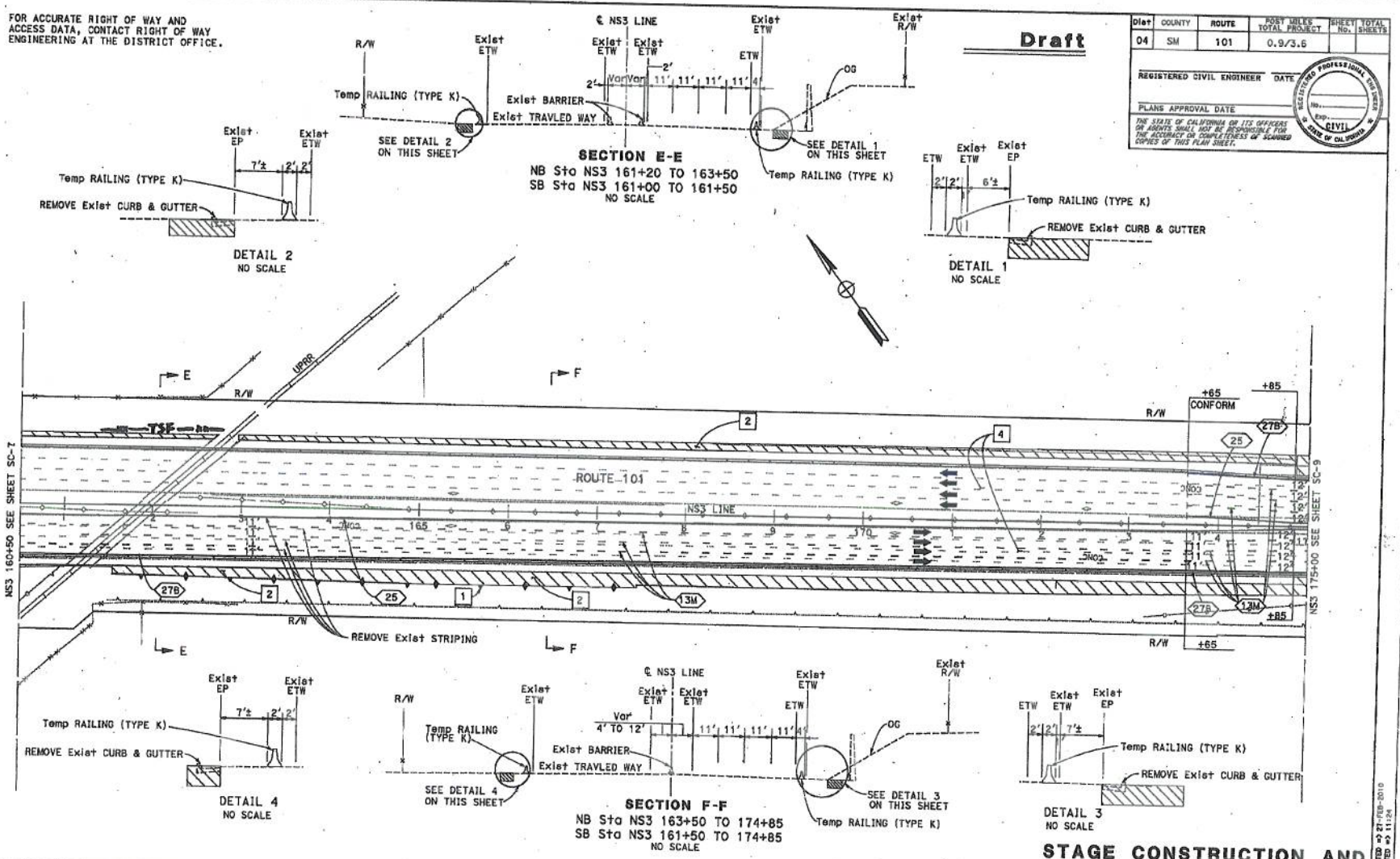
REGISTERED PROFESSIONAL ENGINEER No. EXP. CIVIL STATE OF CALIFORNIA



STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN

STAGE 2

SCALE: 1" = 50'

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET SC-6

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

SC-8

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

DESIGN

FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISED BY

DATE REVISED

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s129144

DGN FILE => 423563ma008.dgn

CU 04243

EA 235631

LAST REVISION 02-27-10

DATE PLOTTED => 27-FEB-2010

TIME PLOTTED => 11:24

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FOR ACCURATE RIGHT OF WAY AND ACCESS DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Draft

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

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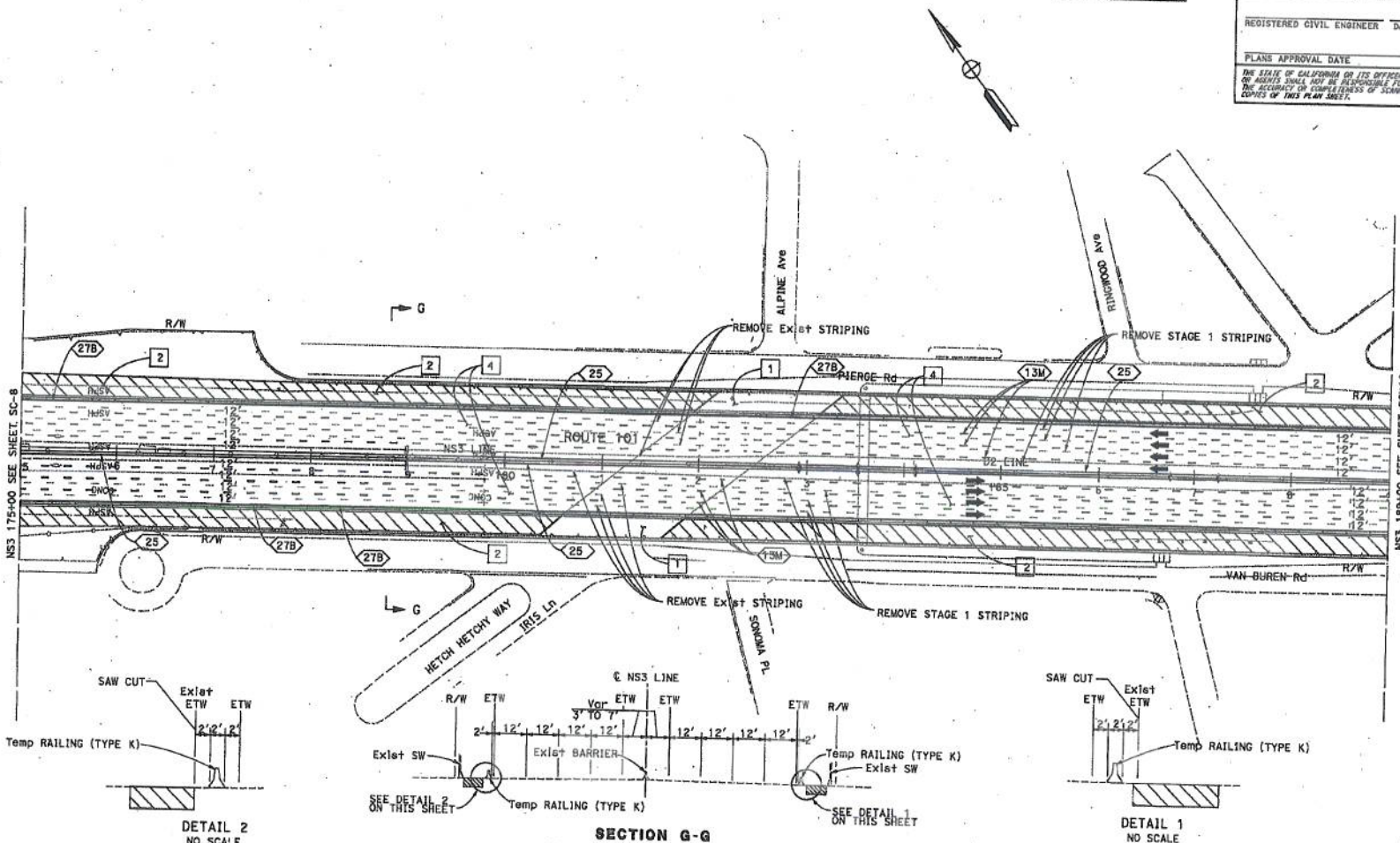
REGISTERED PROFESSIONAL ENGINEER NO. EXP. CIVIL STATE OF CALIFORNIA



DETAIL 2
NO SCALE

SECTION G-G
Sta NS3 176+00 TO 182+60.15
NO SCALE

DETAIL 1
NO SCALE

STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN

STAGE 2

SCALE: 1" = 50'

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET SC-6

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

SC-9

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
DESIGN
FUNCTIONAL SUPERVISOR
CALCULATED-DESIGNED BY
CHECKED BY
REVISED BY
DATE REVISED

j:\thermale\235631\workingfiles\423563ma009.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => e129144
DGN FILE => 423563ma009.dgn

CU 04243

EA 235631

LAST REVISION
DATE PLOTTED => 25-FEB-2010
TIME PLOTTED => 11:10
02-27-10

FOR ACCURATE RIGHT OF WAY AND ACCESS DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Draft

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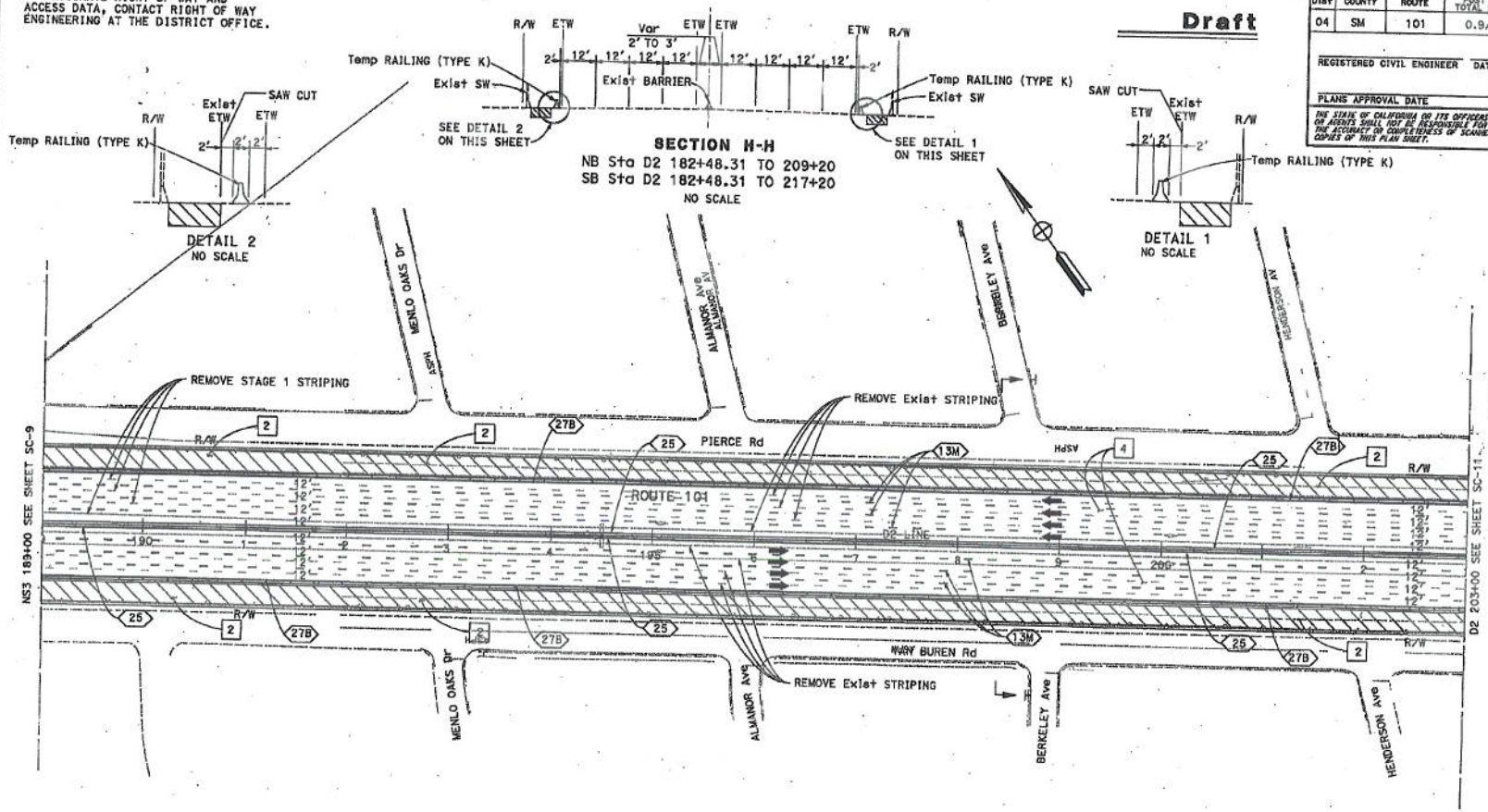

STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN

STAGE 2

SCALE: 1" = 50'

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET SC-6

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

DESIGN

FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISED BY

DATE REVISED

J:\thermie\235631\workingfiles\423563ma010.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s129144

DGN FILE => 423563ma010.dgn

CU 04243

EA 235631

LAST REVISION DATE PLOTTED => 27-FEB-2010

TIME PLOTTED => 11:12

02-27-10

SC-10

FOR ACCURATE RIGHT OF WAY AND ACCESS DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Draft

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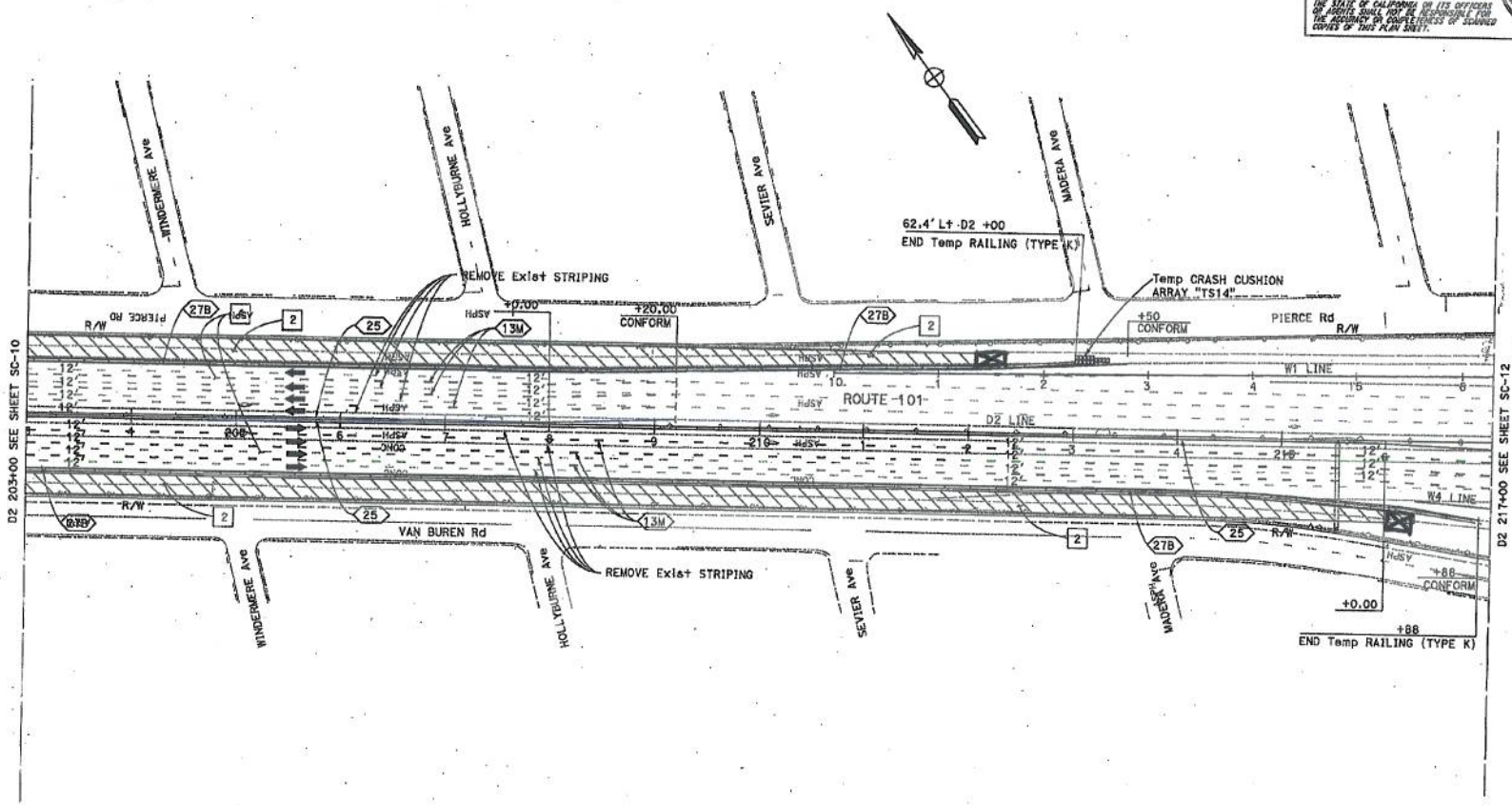
REGISTERED PROFESSIONAL ENGINEER No. EXP. CIVIL STATE OF CALIFORNIA



STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN

STAGE 2

SCALE: 1" = 50'

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET SC-6

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

SC-11

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

DESIGN

FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISED BY

DATE REVISED

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BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => c129144
DGN FILE => 423563mo011.dgn

CU 04243

EA 235631

LOCC SUBMISSION DATE PLOTTED => 27-FEB-2010 TIME PLOTTED => 11:13
02-27-10

FOR ACCURATE RIGHT OF WAY AND ACCESS DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

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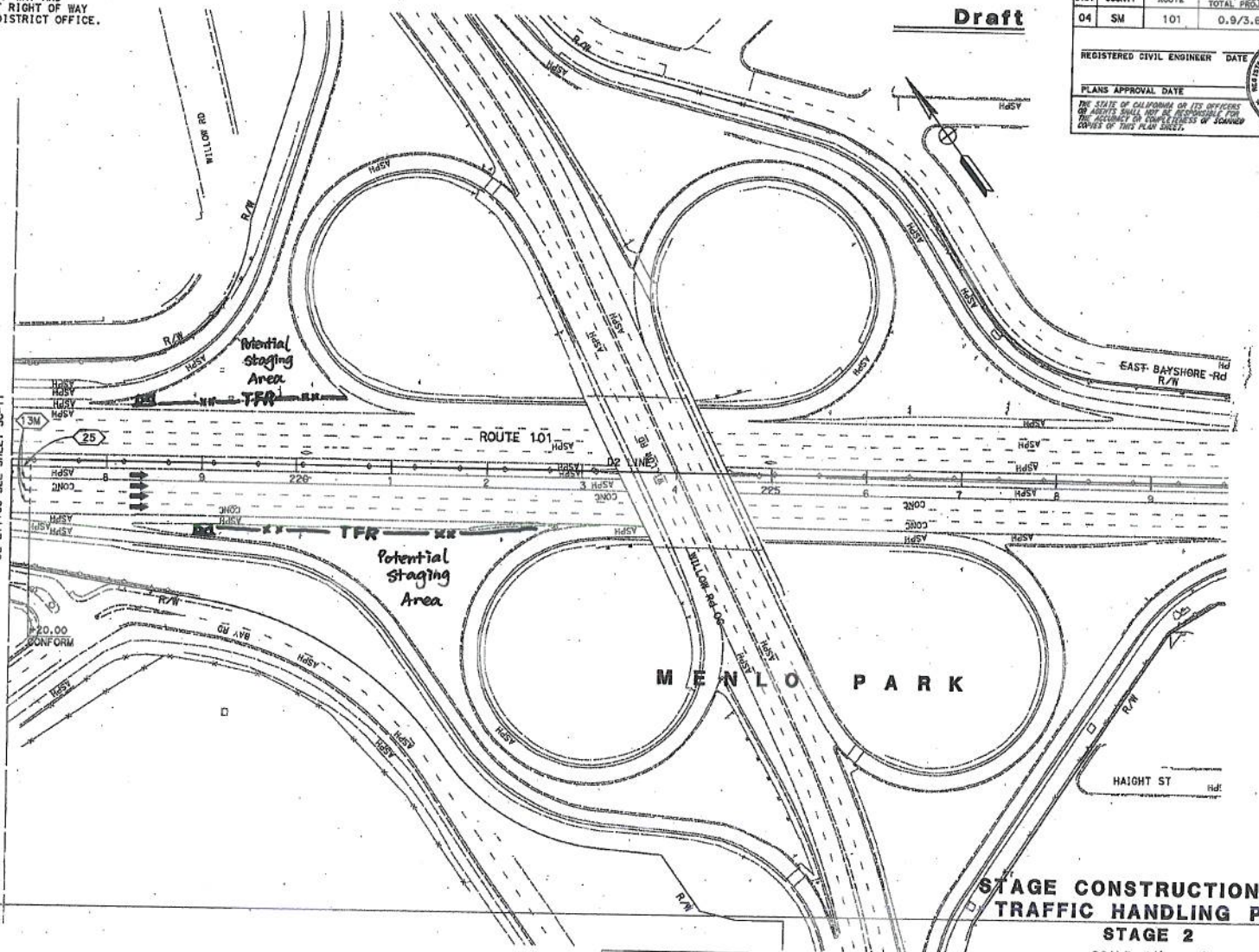
REGISTERED PROFESSIONAL ENGINEER No. EXP. CIVIL STATE OF CALIFORNIA



FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET SC-6

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN

STAGE 2

SCALE: 1'' = 50'

SC-12

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans DESIGN

FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISED BY

DATE REVISED

J:\thermie\235631\workingfiles\423563mo012.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s129144

DGN FILE => 423563mo012.dgn

CU 04243

EA 235631

LAST REVISION

DATE PLOTTED => 21-FEB-2010

TIME PLOTTED => 11:14

02-27-10

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT
04	SM	101	0.9/3.6

LICENSED LANDSCAPE ARCHITECT

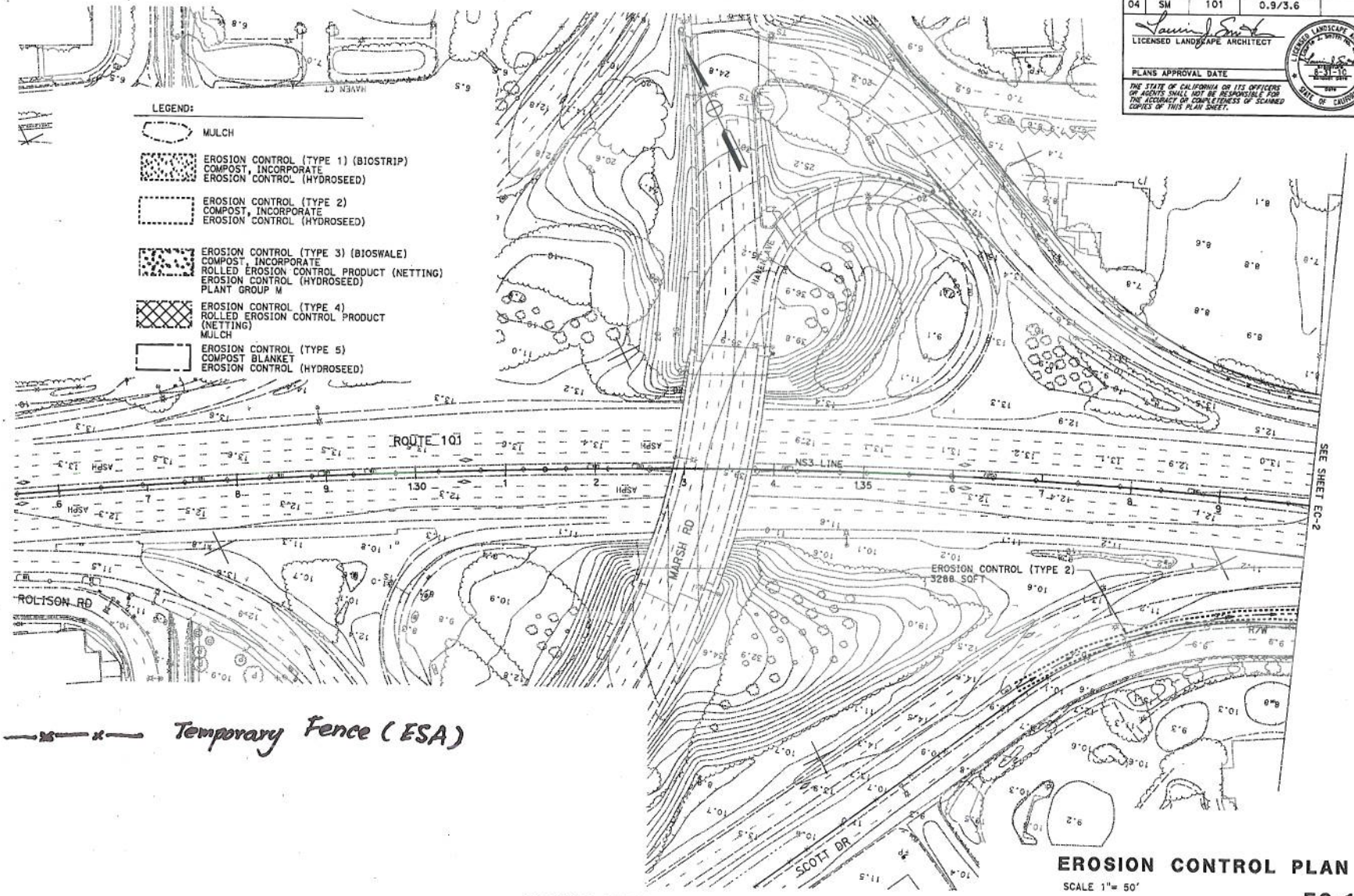
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LICENSED LANDSCAPE ARCHITECT — STATE OF CALIFORNIA

LEGEND:

- MULCH
- EROSION CONTROL (TYPE 1) (BIOSTRIP) COMPOST, INCORPORATE EROSION CONTROL (HYDROSEED)
- EROSION CONTROL (TYPE 2) COMPOST, INCORPORATE EROSION CONTROL (HYDROSEED)
- EROSION CONTROL (TYPE 3) (BIOSWALE) COMPOST, INCORPORATE ROLLED EROSION CONTROL PRODUCT (NETTING) EROSION CONTROL (HYDROSEED) PLANT GROUP M
- EROSION CONTROL (TYPE 4) ROLLED EROSION CONTROL PRODUCT (NETTING) MULCH
- EROSION CONTROL (TYPE 5) COMPOST BLANKET EROSION CONTROL (HYDROSEED)



THIS PLAN IS ACCURATE FOR EROSION CONTROL WORK ONLY.

EROSION CONTROL PLAN

SCALE 1"= 50'

EC-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

WATER QUALITY

SENIOR LANDSCAPE ARCHITECT: DAVID W YAM

CALCULATED-DESIGNED BY: LAURIE J SMITH

CHECKED BY: ALEX MC DONALD

REVISED BY

DATE REVISED

LAST REVISION 12-15-09

DATE PLOTTED => 26-FEB-2010

TIME PLOTTED => 17:30

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s112969

DGN FILE => 423563ea001.dgn

CU 04343

EA 235631

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

LICENSED LANDSCAPE ARCHITECT

PLANS APPROVAL DATE

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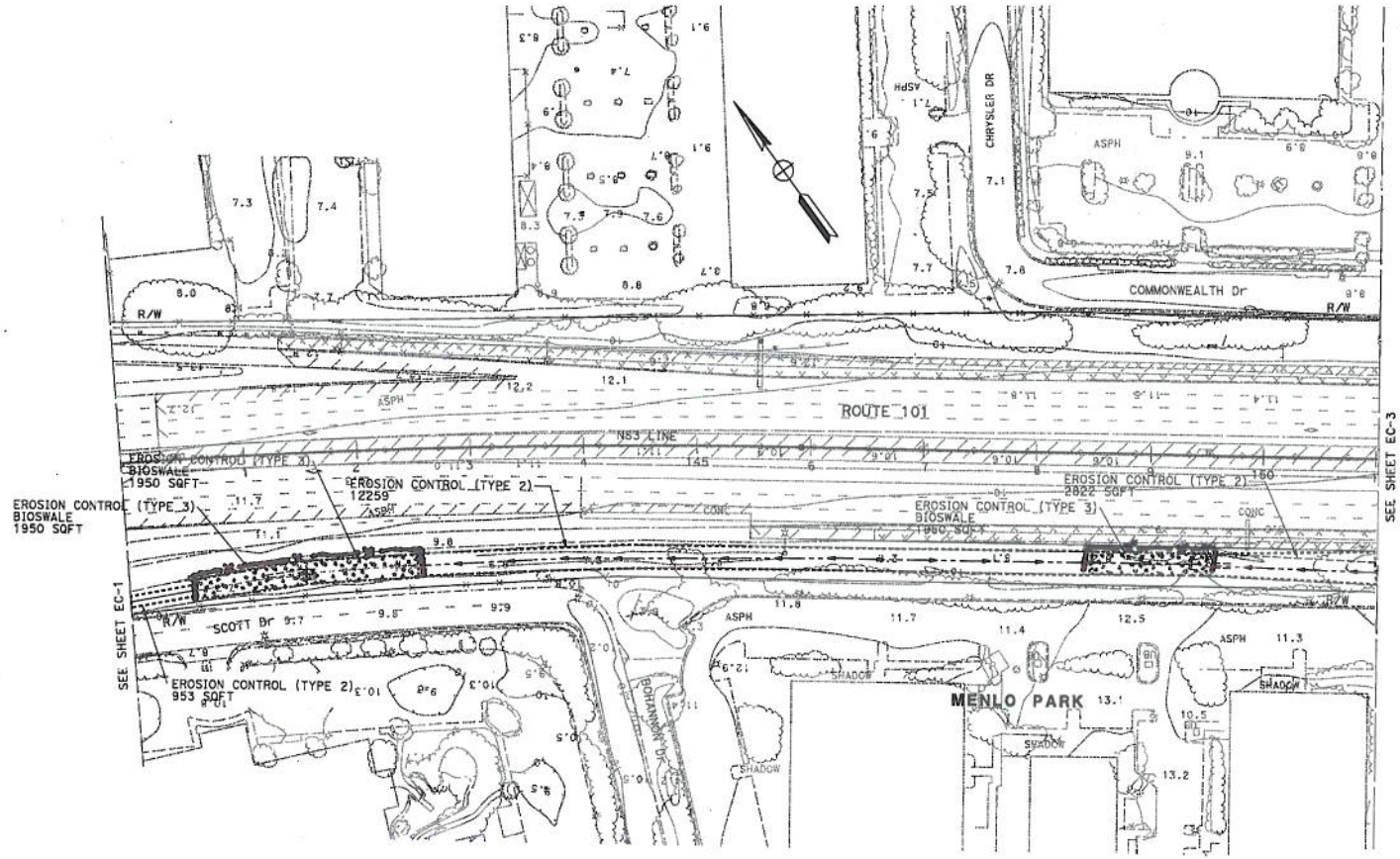
LICENSED LANDSCAPE ARCHITECT 6-11-10 STATE OF CALIFORNIA



THIS PLAN IS ACCURATE FOR EROSION CONTROL WORK ONLY

EROSION CONTROL PLAN

SCALE 1"= 50'

EC-2

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

WATER QUALITY

SENIOR LANDSCAPE ARCHITECT: DAVID W YAM

CALCULATED-DESIGNED BY: LAURIE J SMITH

CHECKED BY: ALEX MC DONALD

REVISED BY

DATE REVISED

LAST REVISION: DATE PLOTTED => 26-FEB-2010 TIME PLOTTED => 17:30

12-16-09

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s112369

DGN FILE => 423563ge002.dgn

CU 04343

EA 235634

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

LICENSED LANDSCAPE ARCHITECT

PLANS APPROVAL DATE

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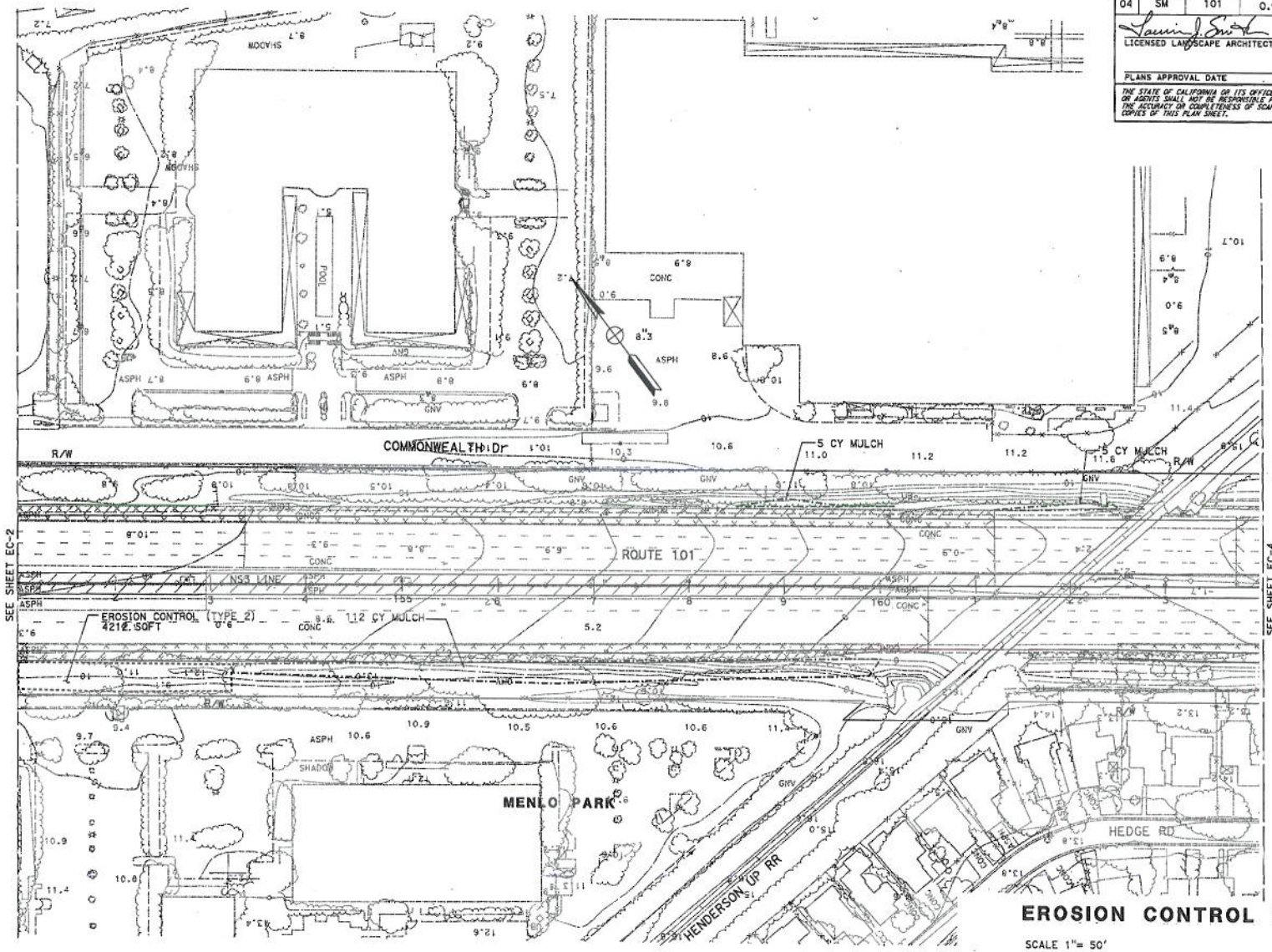
LICENSED LANDSCAPE ARCHITECT — LAURIE J. SMITH — No. 2969 — 6-11-10 — STATE OF CALIFORNIA



EROSION CONTROL PLAN

SCALE 1"= 50'

EC-3

THIS PLAN IS ACCURATE FOR EROSION CONTROL WORK ONLY

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	SENIOR LANDSCAPE ARCHITECT	CALCULATED-DESIGNED BY	LAURIE J SMITH	REVISED BY
Caltrans	DAVID W YAM	CHECKED BY	ALEX MC DONALD	DATE REVISED

WATER QUALITY

LAST REVISION 01-13-10 | DATE PLOTTED => 26-FEB-2010 | TIME PLOTTED => 17:31

BORDER LAST REVISED 4/11/2008 | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | USERNAME => s112969 | DGN FILE => 423563ge003.dgn | CU 04343 | EA 235631

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

LICENSED LANDSCAPE ARCHITECT

PLANS APPROVAL DATE

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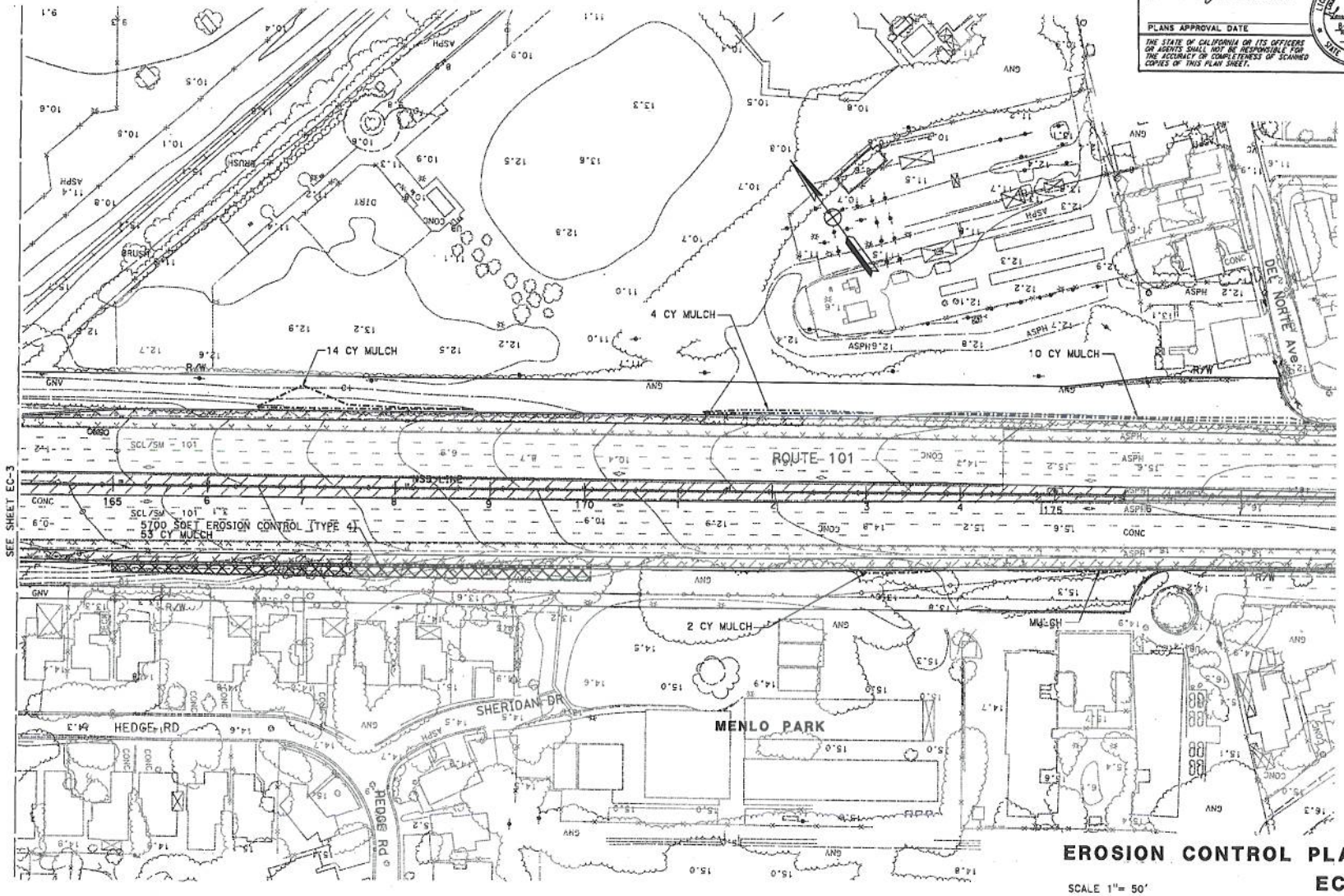
LICENSED LANDSCAPE ARCHITECT — STATE OF CALIFORNIA



EROSION CONTROL PLAN

SCALE 1"= 50'

EC-4

THIS PLAN IS ACCURATE FOR EROSION CONTROL WORK ONLY.

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	SENIOR LANDSCAPE ARCHITECT	CALCULATED-DESIGNED BY	LAURIE J SMITH	REVISED BY
Caltrans	WATER QUALITY	DAVID W YAM	CHECKED BY	ALEX MC DONALD	DATE REVISED

LAST REVISED | DATE PLOTTED => 26-FEB-2010 | 02-03-10 | TIME PLOTTED => 17:31

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s112969
DGN FILE => 423563ge004.dgn

CU 04343 | EA 235631

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

LICENSED LANDSCAPE ARCHITECT

PLANS APPROVAL DATE

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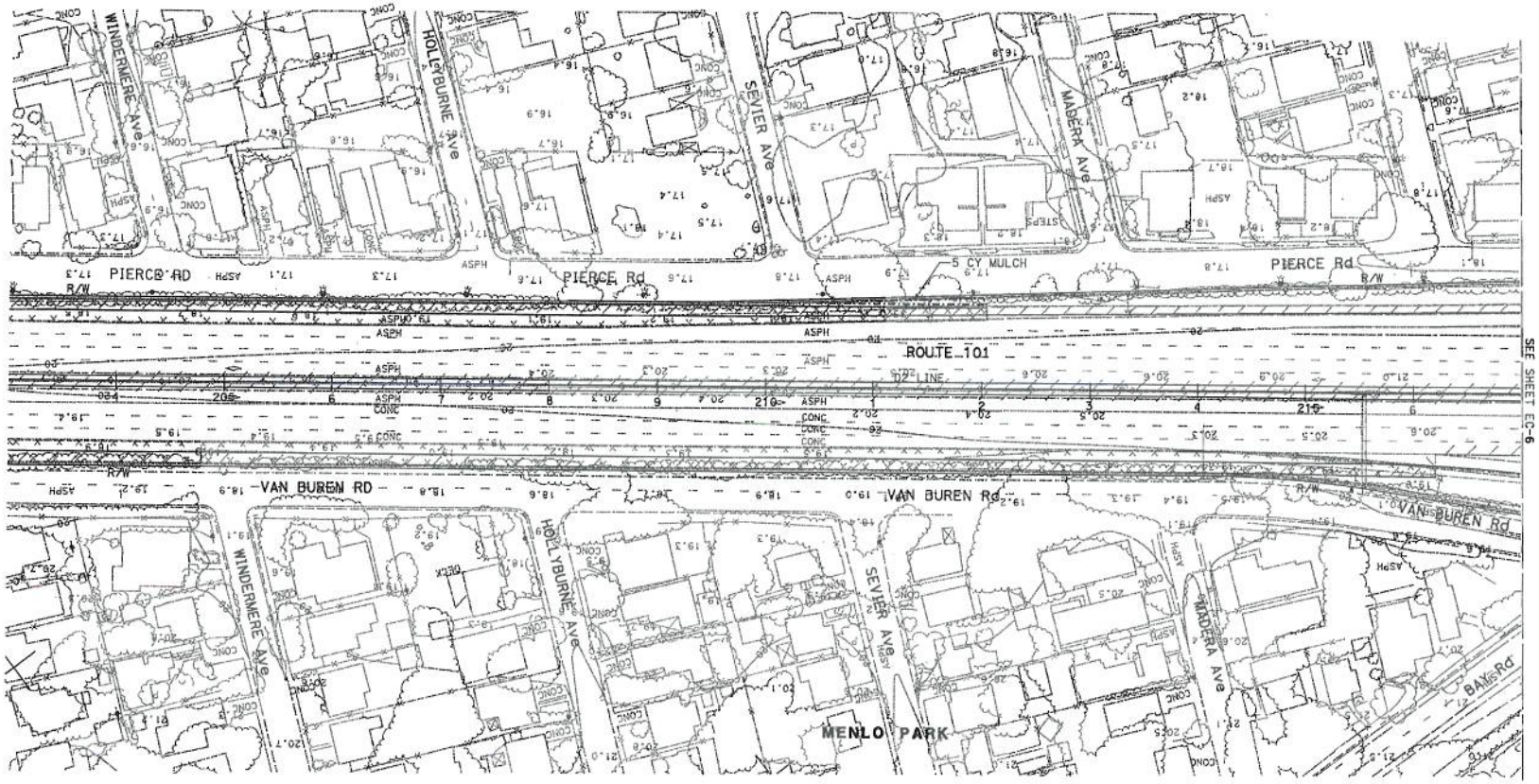
LICENSED LANDSCAPE ARCHITECT — LAURIE J. SMITH — 8-31-10 — STATE OF CALIFORNIA



EROSION CONTROL PLAN

SCALE 1"= 50'

EC-5

THIS PLAN IS ACCURATE FOR EROSION CONTROL WORK ONLY.

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

WATER QUALITY

SENIOR LANDSCAPE ARCHITECT: DAVID W YAM

CALCULATED-DESIGNED BY: LAURIE J SMITH

CHECKED BY: ALEX MC DONALD

REVISED BY

DATE REVISED

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s112969

DGN FILE => 423563ge005.dgn

CU 04343

EA 235631

LAST REVISION 02-03-10

DATE PLOTTED => 26-FEB-2010

TIME PLOTTED => 17:31

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

LICENSED LANDSCAPE ARCHITECT

PLANS APPROVAL DATE

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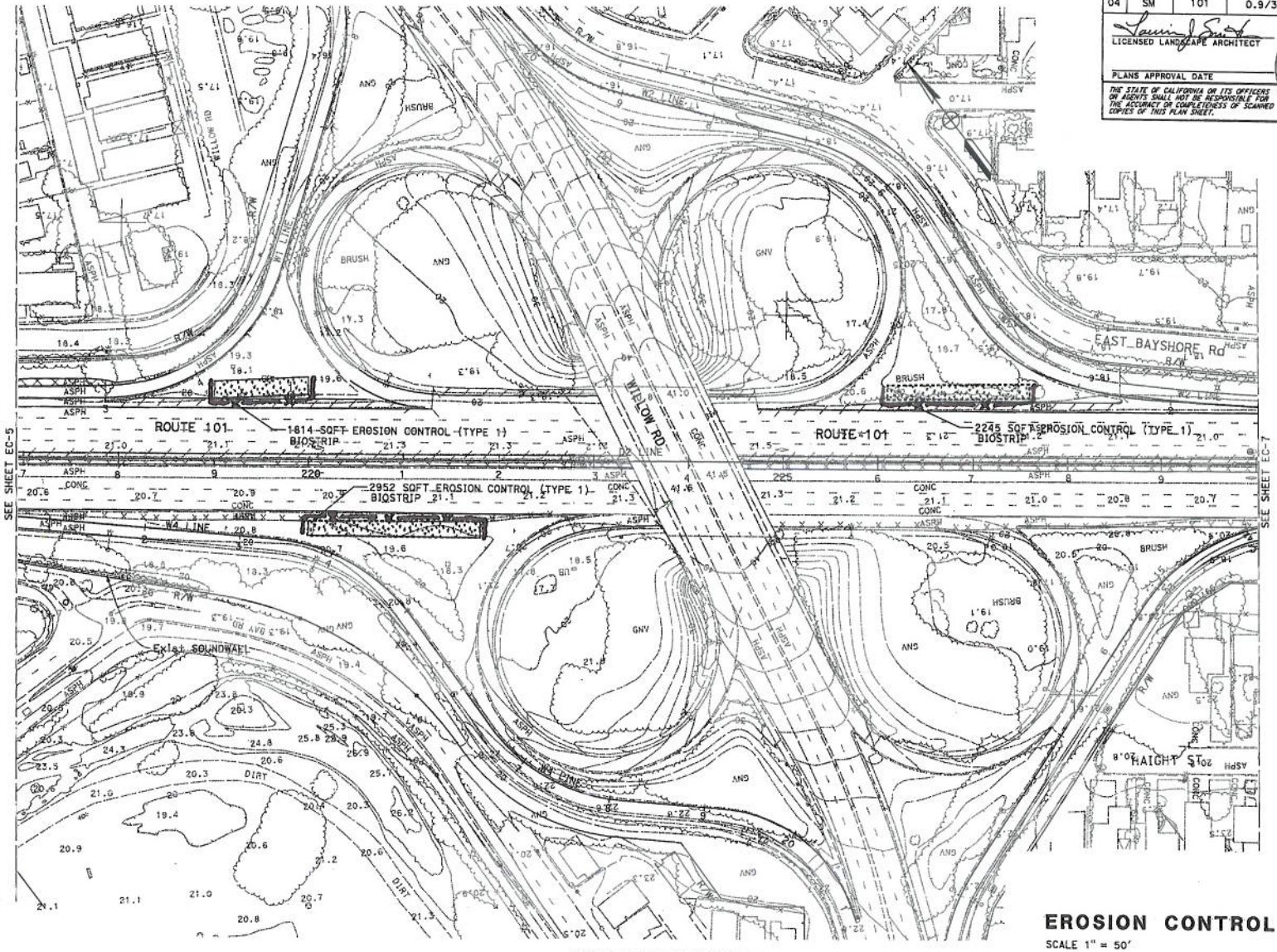
LICENSED LANDSCAPE ARCHITECT — STATE OF CALIFORNIA



EROSION CONTROL PLAN

SCALE 1" = 50'

EC-6

THIS PLAN IS ACCURATE FOR EROSION CONTROL WORK ONLY.

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

WATER QUALITY

SENIOR LANDSCAPE ARCHITECT: DAVID W YAM

CALCULATED-DESIGNED BY: LAURIE J SMITH

CHECKED BY: ALEX MC DONALD

REVISED BY

DATE REVISED

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s112969

DGN FILE => 423563ge006.dgn

CU 04343

EA 235631

LAST REVISION 02-10-10

DATE PLOTTED => 26-FEB-2010

TIME PLOTTED => 17:32

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

LICENSED LANDSCAPE ARCHITECT

PLANS APPROVAL DATE

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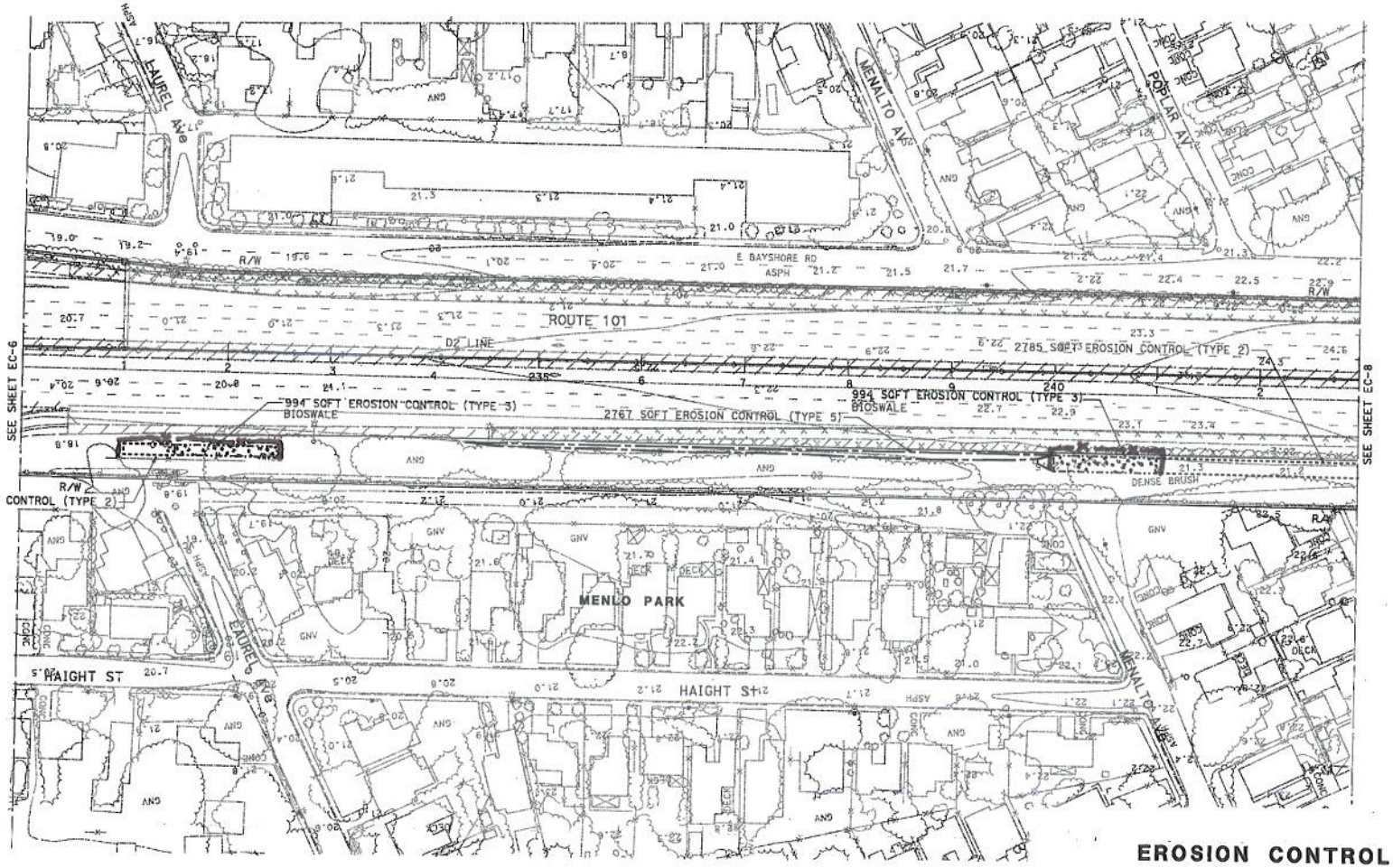
LICENSED LANDSCAPE ARCHITECT — STATE OF CALIFORNIA



THIS PLAN IS ACCURATE FOR EROSION CONTROL WORK ONLY.

EROSION CONTROL PLAN

SCALE 1" = 50'

EC-7

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	SENIOR LANDSCAPE ARCHITECT	CALCULATED-DESIGNED BY	LAURIE J SMITH	REVISED BY	
Caltrans	DAVID W YAM	CHECKED BY	ALEX MC DONALD	DATE REVISED	
WATER QUALITY					

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s112969
DGN FILE => 423563ge007.dgn

CU 04343

EA 235631

LAST REVISION 02-16-10

DATE PLOTTED => 26-FEB-2010
TIME PLOTTED => 17:32

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

LICENSED LANDSCAPE ARCHITECT

PLANS APPROVAL DATE

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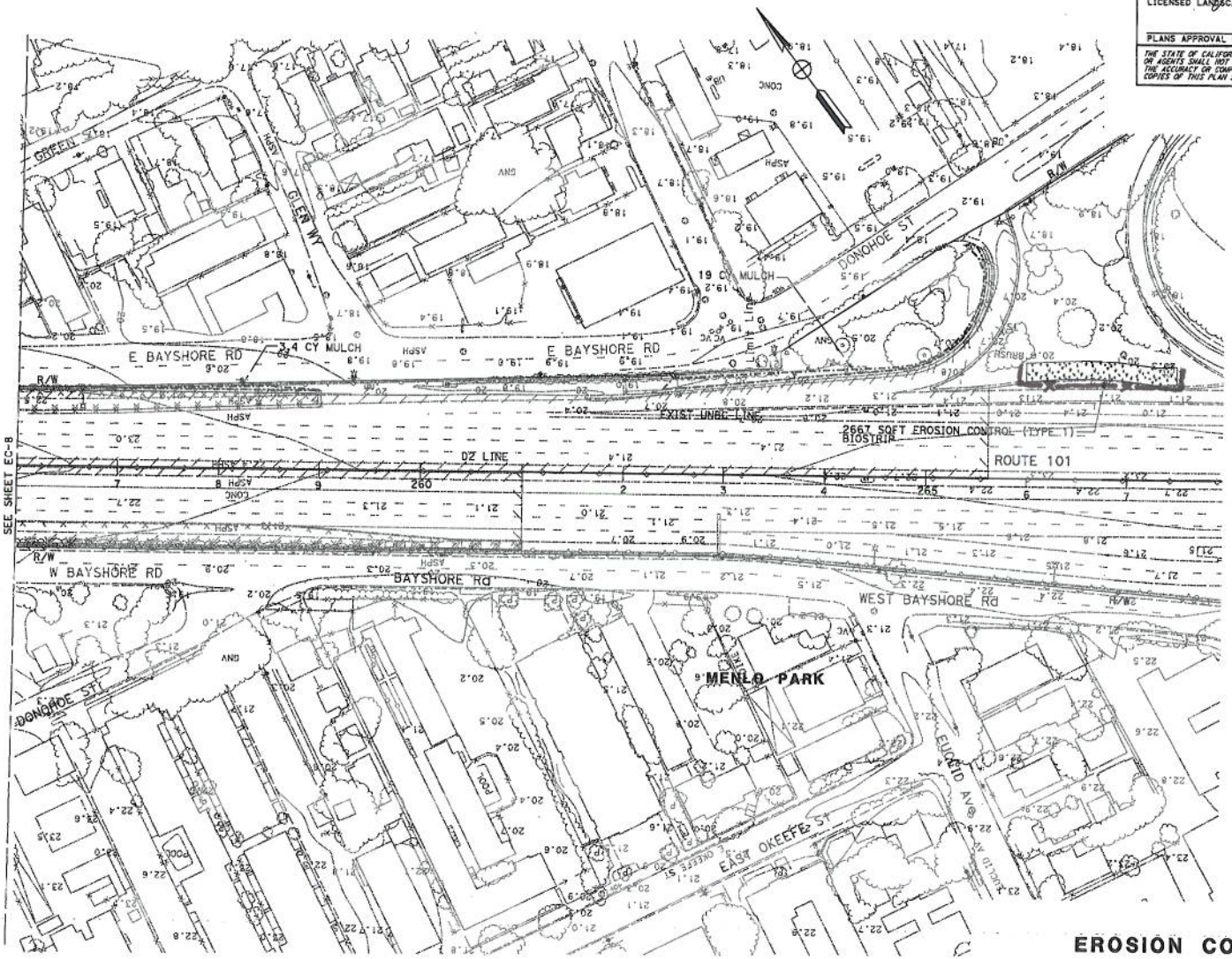
LICENSED LANDSCAPE ARCHITECT — LAURIE J. SMITH — 8-31-10 — STATE OF CALIFORNIA



THIS PLAN IS ACCURATE FOR EROSION CONTROL WORK ONLY.

EROSION CONTROL PLAN

SCALE 1" = 50'

EC-9

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

WATER QUALITY

SENIOR LANDSCAPE ARCHITECT: DAVID W YAM

CALCULATED-DESIGNED BY: LAURIE J SMITH

CHECKED BY: ALEX MC DONALD

REVISED BY

DATE REVISED

LAST REVISION 12-15-09

DATE PLOTTED => 26-FEB-2010

TIME PLOTTED => 17:33

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s112969

DGN FILE => 423563ge009.dgn

CU 04343

EA 235631

4. Information of Permanent Treatment BMPs and Erosion Control

Describe Proposed Permanent Treatment BMPs to be used on the Project.

Treatment BMP Strategy

Treatment BMPs were considered because this is a widening project with an added impervious area of more than 1 ac and soil disturbance area (DSA) of more than 3 ac.

A targeted design constituent (TDC) is "a pollutant that has been identified during departmental runoff characterization studies to be discharging with a load or concentration that commonly exceeds allowable standards and that is considered treatable by currently available department-approved treatment BMPs".

The following treatment BMP selections have been approved by Caltrans to address sedimentation.

-Infiltration Devices
-Biofiltration Strips and Wet Basins
-Biofiltration Swales
-Media Filters
-Detention Devices
-Multi Chambered Treatment Trains

The proposed widening would be constructed on existing Caltrans right of way limits and surrounded by an exceptionally developed area on both sides of the freeway mainly coffined by parallel frontage roads and sound walls. In addition lack of necessary hydraulic head, low soil permeability, relatively high ground water level, existing trees and vegetation pose little opportunities to install treatment BMPs along the project limits. There are only few exceptional areas, which treatment BMPs could be accommodated within project limits.

Treatment BMPs for this project would be provided to the Maximum Extent Practicable (MEP) by multiple biofiltration swales and strips. The total proposed treated impervious area would be 6.1 ac which is greater than 100 % of the added impervious area, and 80% of the sum of the added and reworked impervious area.

The treatment BMPs proposed for this project is summarized in Table 1.

Biofiltration Strips

Biofiltration strips are relatively flat vegetated surfaces that accept sheet flow from storm water runoff and remove pollutants by filtration through grass, sedimentation, adsorption to soil or grass and/or infiltration through the soil.

Biofiltration strips are second in rank after infiltration devices for general pollutant removal consideration.

The biofiltration strips were designed according to current Caltrans District 4 standards. A detailed drawing is provided in the Erosion Control Details included in contract plans and included in the attachments of this report. The strip would be 15 ft long on a maximum 4:1 (H: V) slope and would include a 3 ft clearance from the edge of the shoulder. The strips would be applied with erosion control (Hydroseed) to promote vegetation growth and prevent the formation of rills and gullies. The locations of the proposed biofiltration strips are listed in Table1.

Biofiltration Swales

Biofiltration swales are vegetated channels that receive directed flow and convey storm water. They remove pollutants by filtration through grass, sedimentation, absorption to soil or grass and infiltration through the soil. Swales are mainly effective at removing debris and solid particles, while some constituents are removed by adsorption to the soil.

Biofiltration swales are ranked third for general pollutant removal consideration. The feasibility requirements for biofiltration swales are similar to those biofiltration strips; the main difference is swales have the ability to receive concentrated flows without the possibility of erosion and/or loss of vegetation.

The locations of proposed biofiltration swales are listed in table 1.

A detailed drawing is provided in Erosion Control Details and Drainage Control Details included in the attachments of this report and in the Contract Plans. The biofiltration swales are designed with a 4:1 (H: V) side slope. The bottom width of all are proposed to be 4 ft and they have the longitudinal slopes that would meet the proposed outfall / inlet grade while preventing velocities that could result in downstream scour or creation of rills and gullies. Erosion is further mitigated through application of erosion control (Hydroseed) and placement of rolled erosion control product (Netting) along the entire length and width of the Swale. Linear planting would be placed along the bottom width of swale to prevent erosion and establish vegetation growth. The underdrain system composed of 8" diameter slotted pipe, centered beneath biofiltration swales and surrounded by permeable material inside the trench would be provided. The proposed under drain system will direct and collect storm water seepage to proposed drainage system. A layer of filter fabric will be laid on top of permeable material to eliminate the intrusion of compost into permeable material. The impermeable liner would be placed over finished excavation line eliminating the percolation of drained water into the soil partly contaminated with ADL.

Table 1

EA 235631, Roadway Widening, 04-SM-101, PM 0.9/3.6

Proposed locations for Treatment BMPs consideration

No	Treatment Type	Begin Sta.	End Sta.	L or R	Treated impervious Area (ac)	Q_{WQ} cfs	Q_{25} cfs	s %	b ft	z ft	n_{WQ}	n_{25}	d_{WQ} ft	d_{25} ft	V_{WQ} ft/sec	L ft	T min
1	BSW_1	140+50	141+50	R	0.66	0.22	3.12	0.5	4	4	0.24	0.1	0.27	0.71	0.16	100	10.42
2	BSW_2	141+50	142+50	R	1.02	0.24	3.47	0.5	4	4	0.24	0.1	0.29	0.75	0.17	100	9.8
3	BSW_3	148+50	149+50	R	0.58	0.14	1.93	1	4	4	0.24	0.1	0.17	0.46	0.17	100	9.8
4	BSW_4	231+50	232+50	R	1.46	0.37	5.37	0.3	4	4	0.24	0.1	0.47	1.05	0.16	100	7.29
5	BSW_5	240+00	241+00	R	1.54	0.40	5.71	0.56	4	4	0.24	0.1	0.41	1	0.21	100	7.94
6	BST_1	220+00	221+80	R	0.27												
7	BST_2	219+00	220+00	L	0.15												
8	BST_3	226+10	227+60	L	0.22												
9	BST_4	266+00	267+50	L	0.22												
			Total		6.12												

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT
04	SM	101	0.9/3.6

LICENSED LANDSCAPE ARCHITECT

PLANS APPROVAL DATE

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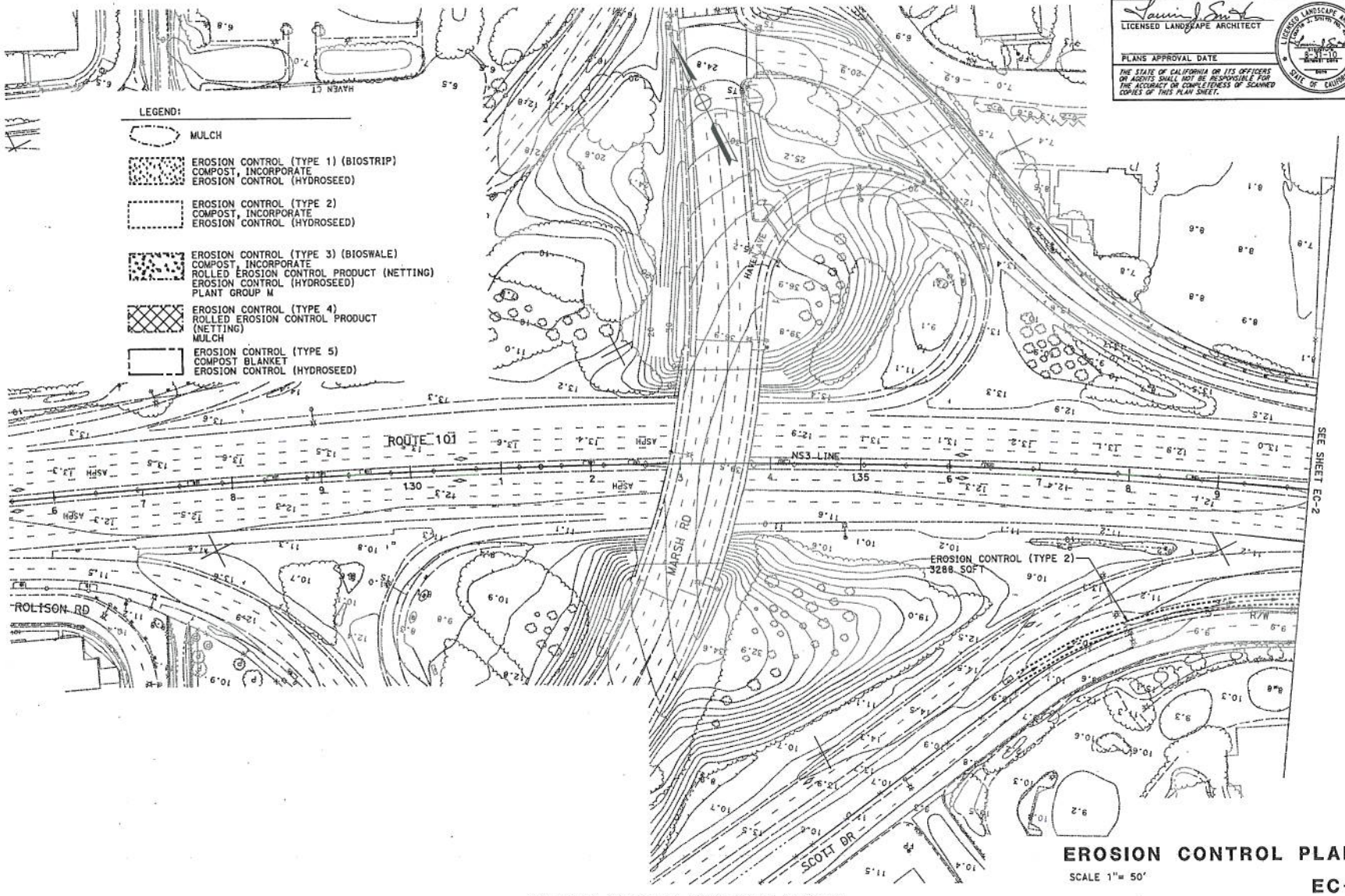
LICENSED LANDSCAPE ARCHITECT — LAURIE J. SMITH — 8-31-10 — STATE OF CALIFORNIA

LEGEND:

- MULCH
- EROSION CONTROL (TYPE 1) (BIOSTRIP) COMPOST, INCORPORATE EROSION CONTROL (HYDROSEED)
- EROSION CONTROL (TYPE 2) COMPOST, INCORPORATE EROSION CONTROL (HYDROSEED)
- EROSION CONTROL (TYPE 3) (BIOSWALE) COMPOST, INCORPORATE ROLLED EROSION CONTROL PRODUCT (NETTING) EROSION CONTROL (HYDROSEED) PLANT GROUP M
- EROSION CONTROL (TYPE 4) ROLLED EROSION CONTROL PRODUCT (NETTING) MULCH
- EROSION CONTROL (TYPE 5) COMPOST BLANKET EROSION CONTROL (HYDROSEED)



EROSION CONTROL PLAN

SCALE 1"= 50'

EC-1

THIS PLAN IS ACCURATE FOR EROSION CONTROL WORK ONLY.

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

WATER QUALITY

SENIOR LANDSCAPE ARCHITECT: DAVID W YAM

CALCULATED-DESIGNED BY: LAURIE J SMITH

CHECKED BY: ALEX MC DONALD

REVISED BY

DATE REVISED

LAST REVISION 12-15-09

DATE PLOTTED => 26-FEB-2010

TIME PLOTTED => 11:30

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => a112969

DGN FILE => 423563ge001.dgn

CU 04343

EA 235631

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

LICENSED LANDSCAPE ARCHITECT

PLANS APPROVAL DATE

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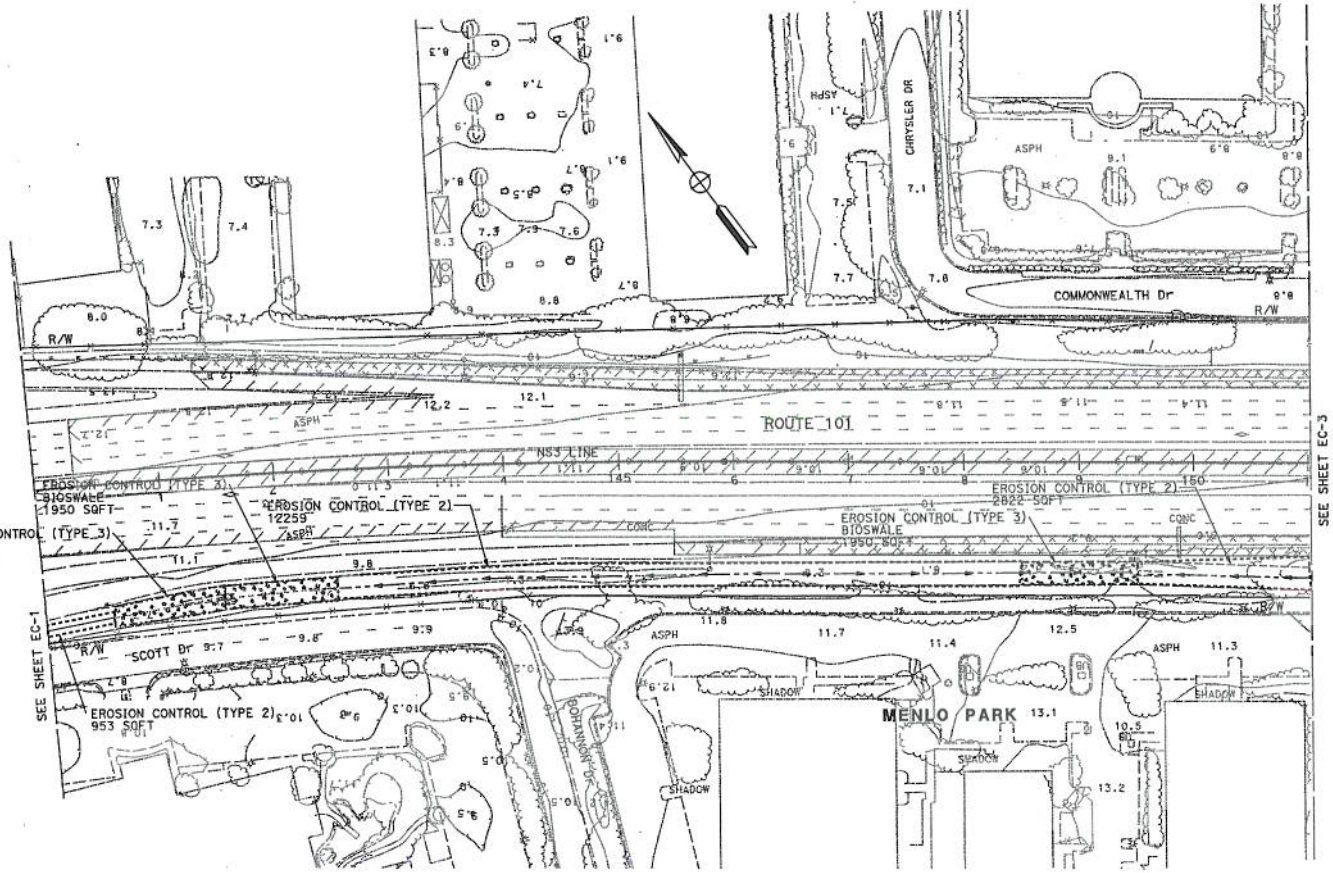

EROSION CONTROL PLAN

SCALE 1"= 50'

EC-2

THIS PLAN IS ACCURATE FOR EROSION CONTROL WORK ONLY

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

WATER QUALITY

SENIOR LANDSCAPE ARCHITECT: DAVID W YAM

CALCULATED-DESIGNED BY: LAURIE J SMITH

CHECKED BY: ALEX MC DONALD

REVISED BY

DATE REVISED

LAST REVISION 12-16-09

DATE PLOTTED => 26-FEB-2010

TIME PLOTTED => 17:35

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s112969

DGN FILE => 423563ge002.dgn

CU 04343

EA 235634

District	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

LICENSED LANDSCAPE ARCHITECT

PLANS APPROVAL DATE

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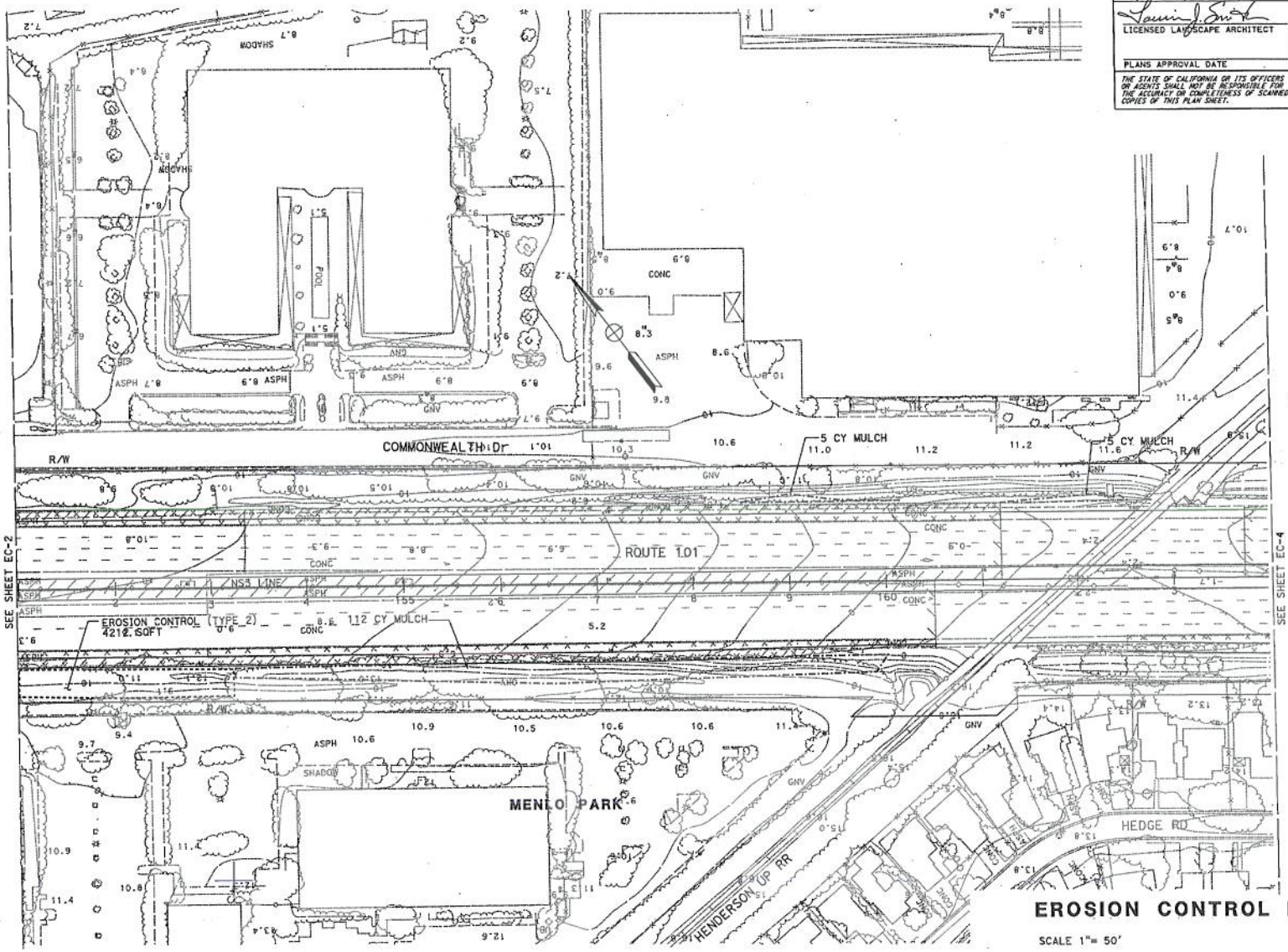
LICENSED LANDSCAPE ARCHITECT — STATE OF CALIFORNIA



EROSION CONTROL PLAN

SCALE 1" = 50'

EC-3

THIS PLAN IS ACCURATE FOR EROSION CONTROL WORK ONLY

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

WATER QUALITY

SENIOR LANDSCAPE ARCHITECT: DAVID W YAM

CALCULATED-DESIGNED BY: LAURIE J SMITH

CHECKED BY: ALEX MC DONALD

REVISED BY

DATE REVISED

DATE PLOTTED => 26-FEB-2010

TIME PLOTTED => 11:31

DATE REVISED 01-13-10

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s112969

DGN FILE => 423563ge003.dgn

CU 04343

EA 235631

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

LICENSED LANDSCAPE ARCHITECT

PLANS APPROVAL DATE

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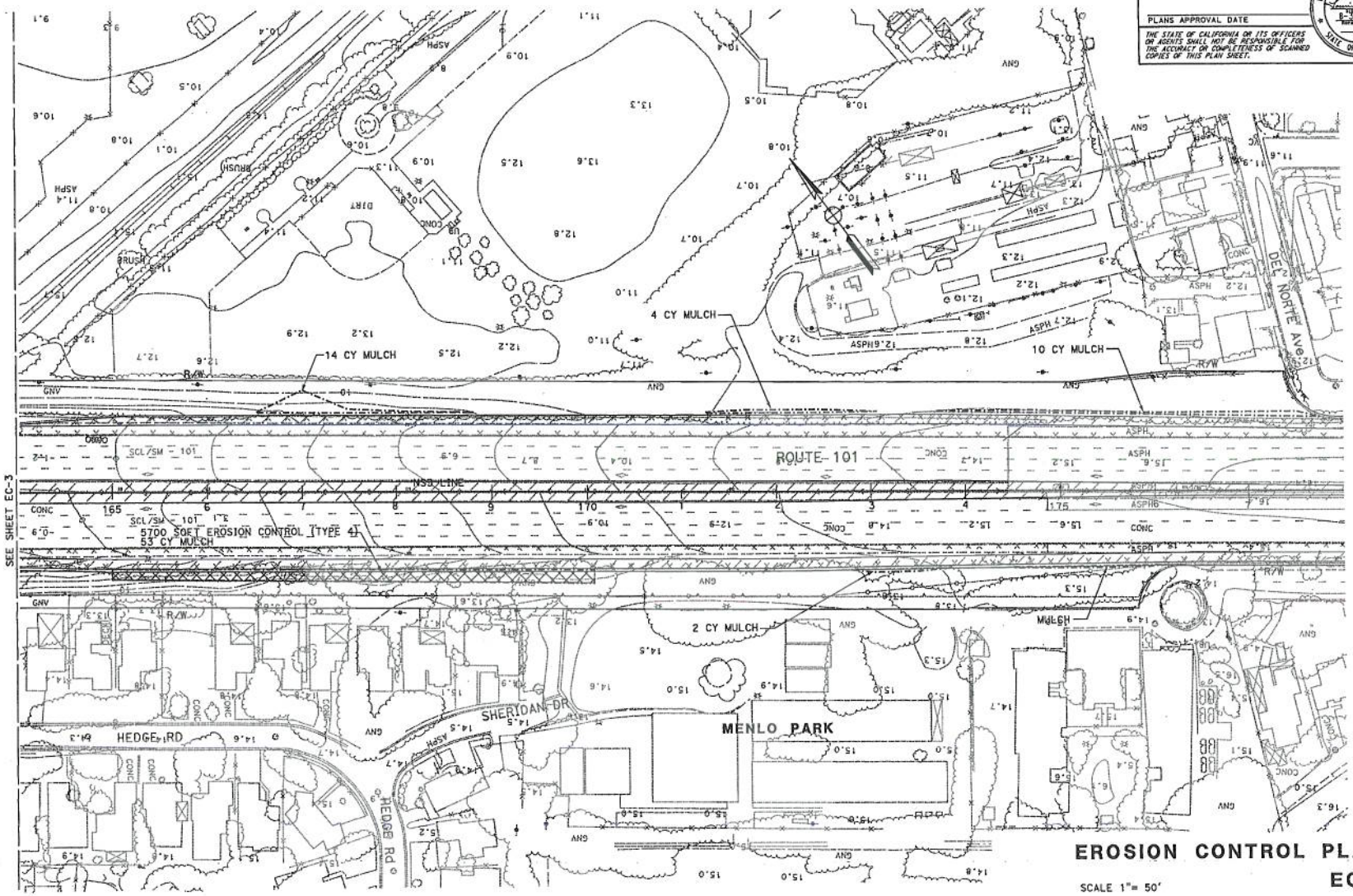
LICENSED LANDSCAPE ARCHITECT — LAURIE J. SMITH — No. 2522 — 8-31-10 — EXPIRATION DATE — DATE — STATE OF CALIFORNIA



EROSION CONTROL PLAN

SCALE 1"= 50'

EC-4

THIS PLAN IS ACCURATE FOR EROSION CONTROL WORK ONLY.

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

WATER QUALITY

SENIOR LANDSCAPE ARCHITECT: DAVID W YAM

CALCULATED-DESIGNED BY: LAURIE J SMITH

CHECKED BY: ALEX MC DONALD

REVISED BY

DATE REVISED

LAST REVISION 02-03-10

DATE PLOTTED => 26-FEB-2010

TIME PLOTTED => 17:31

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s112969

DGN FILE => 423563ge004.dgn

CU 04343

EA 235631

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

LICENSED LANDSCAPE ARCHITECT

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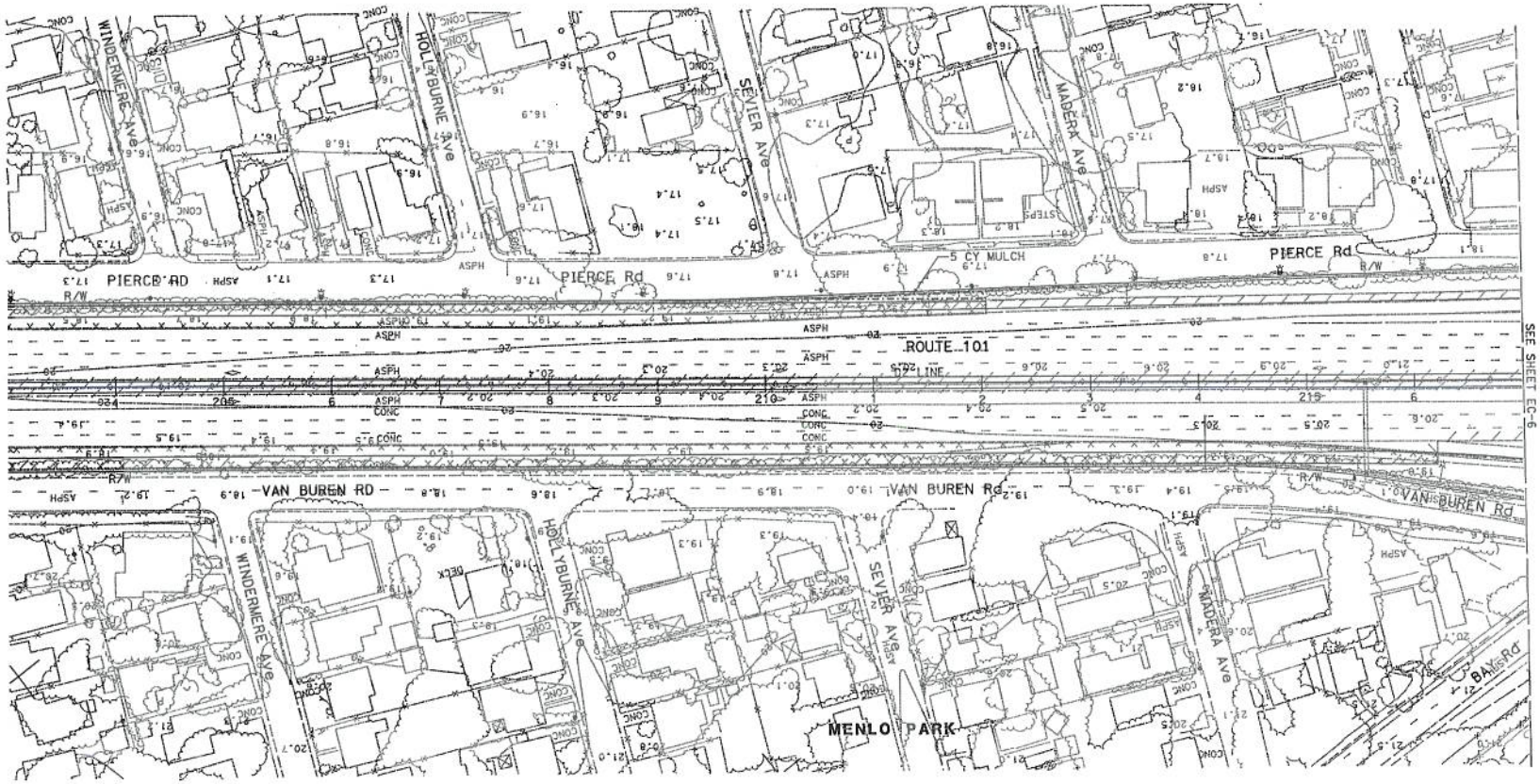

EROSION CONTROL PLAN

SCALE 1"= 50'

EC-5

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STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

WATER QUALITY

SENIOR LANDSCAPE ARCHITECT: DAVID W YAM

CALCULATED-DESIGNED BY: LAURIE J SMITH

CHECKED BY: ALEX MC DONALD

REVISED BY

DATE REVISED

LAST REVISION 02-03-10

DATE PLOTTED => 26-FEB-2010

TIME PLOTTED => 17:31

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DGN FILE => 423563ge005.dgn

CU 04343

EA 235631

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
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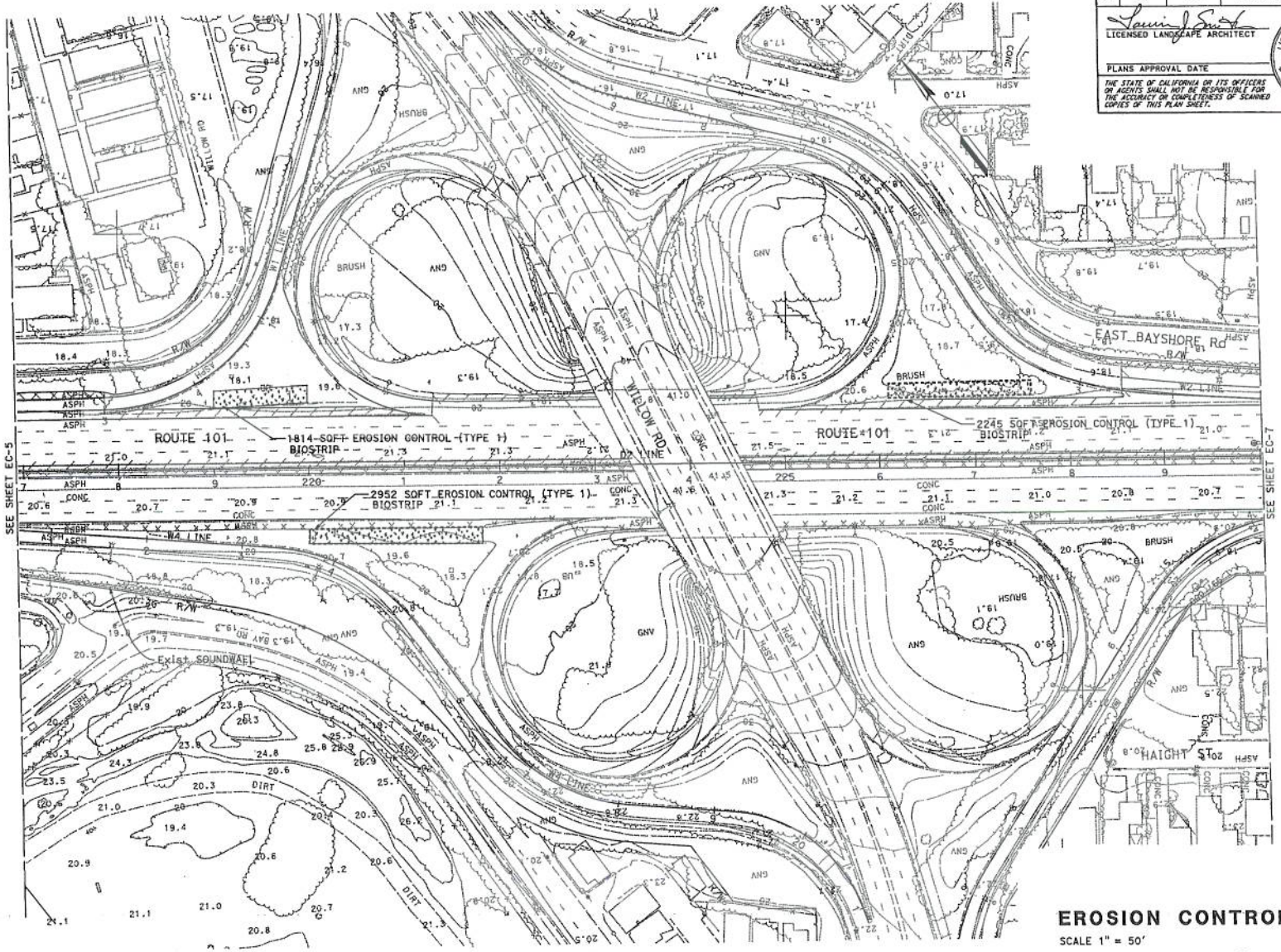

EROSION CONTROL PLAN

SCALE 1" = 50'

EC-6

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STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

WATER QUALITY

SENIOR LANDSCAPE ARCHITECT: DAVID W YAM

CALCULATED-DESIGNED BY: LAURIE J SMITH

CHECKED BY: ALEX MC DONALD

REVISED BY

DATE REVISED

LAST REVISION 02-10-10

DATE PLOTTED => 26-FEB-2010

TIME PLOTTED => 17:32

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s112969

DGN FILE => 423563ga006.dgn

CU 04343

EA 235631

DIst	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

LICENSED LANDSCAPE ARCHITECT

PLANS APPROVAL DATE

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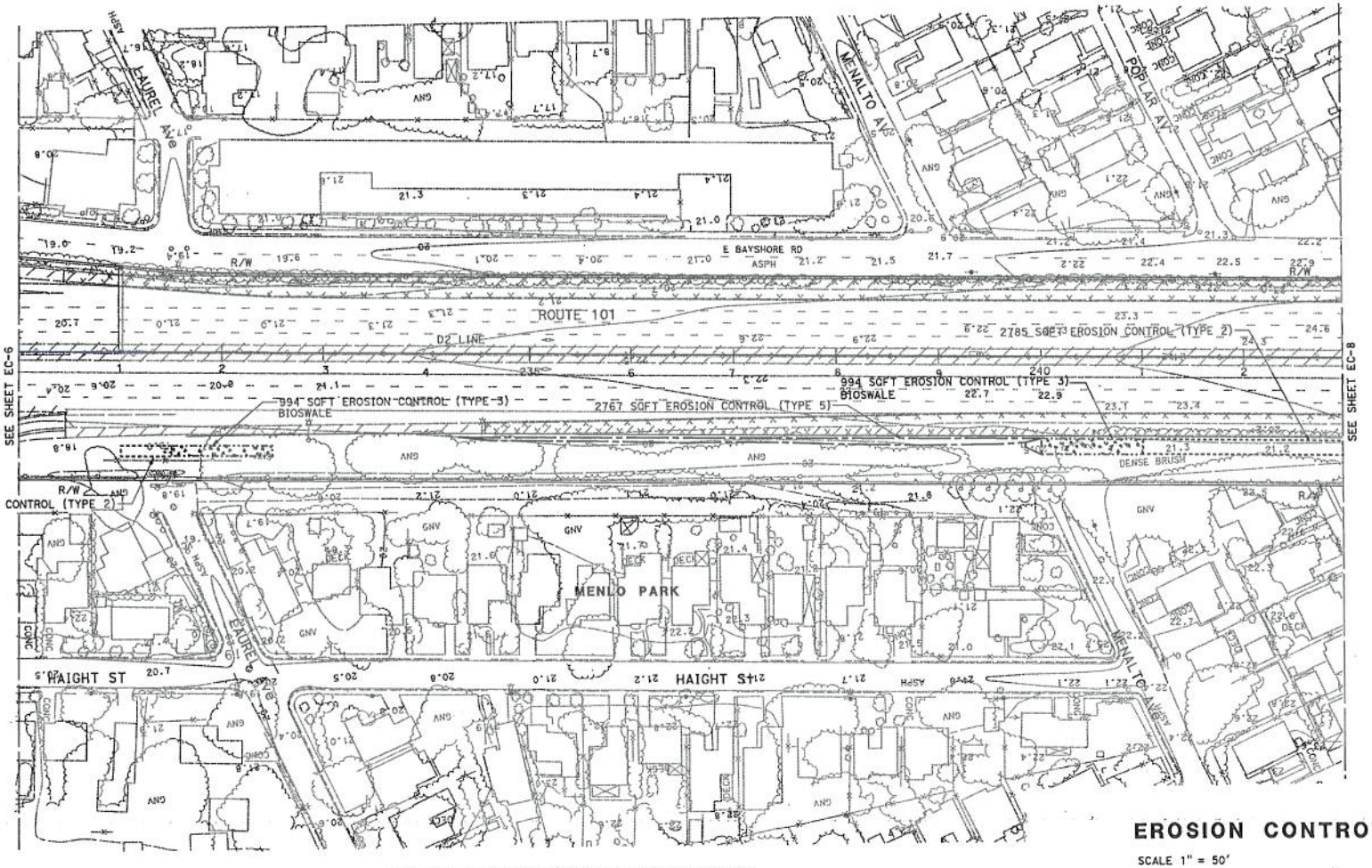
LICENSED LANDSCAPE ARCHITECT LAURIE J. SMITH 5-31-10 STATE OF CALIFORNIA



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EROSION CONTROL PLAN

SCALE 1" = 50'

EC-7

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	SENIOR LANDSCAPE ARCHITECT	CALCULATED-DESIGNED BY	LAURIE J SMITH	REVISED BY
Caltrans	DAVID W YAM	CHECKED BY	ALEX MC DONALD	DATE REVISED
WATER QUALITY				

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

LICENSED LANDSCAPE ARCHITECT

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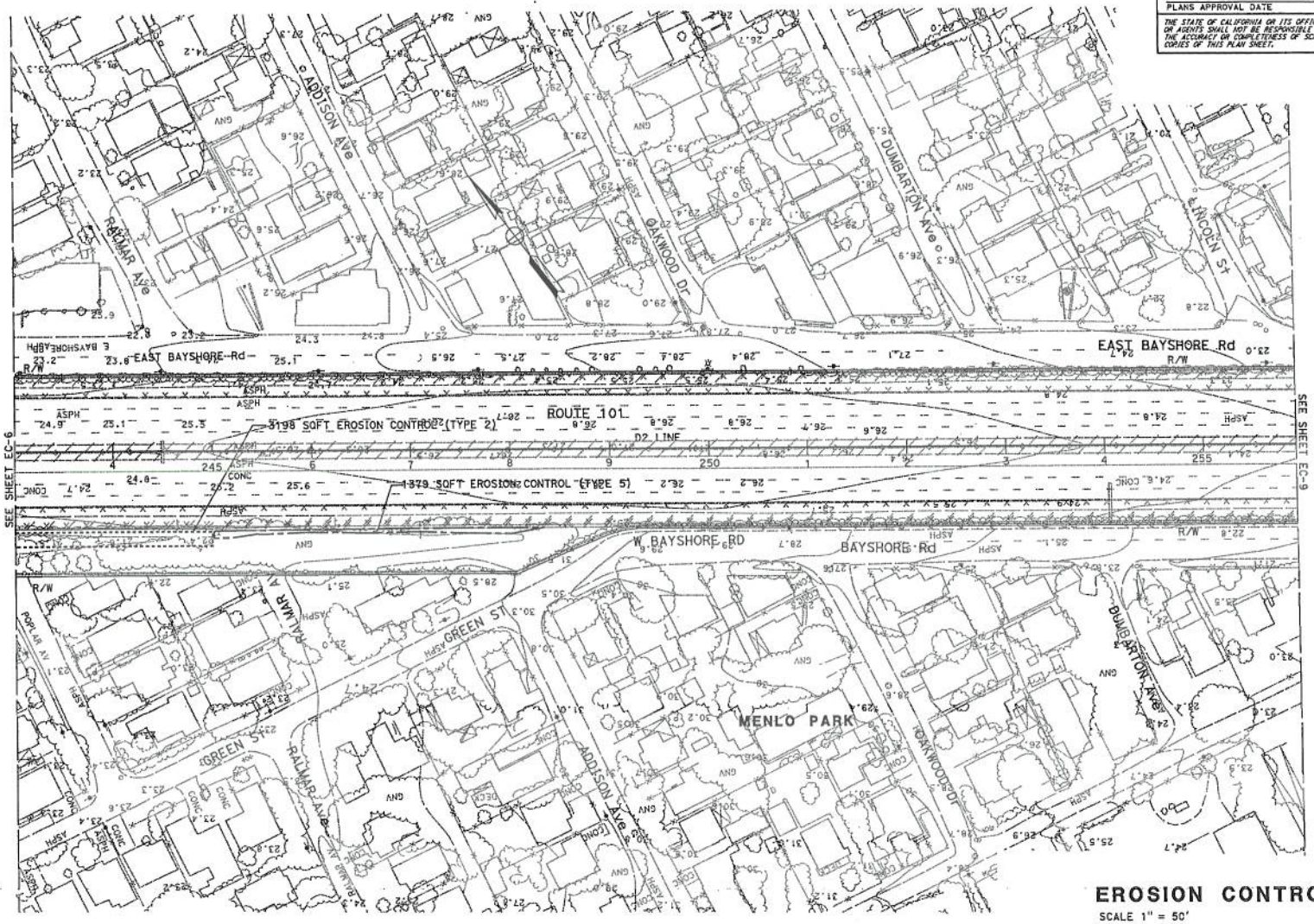

EROSION CONTROL PLAN

SCALE 1" = 50'

EC-8

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STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

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WATER QUALITY

SENIOR LANDSCAPE ARCHITECT: DAVID W YAM

CALCULATED-DESIGNED BY: LAURIE J SMITH

CHECKED BY: ALEX MC DONALD

REVISED BY

DATE REVISED

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USERNAME => s112969
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CU 04343

EA 235631

LAST REVISION 12-15-09

DATE PLOTTED => 26-FEB-2010
TIME PLOTTED => 11:33

DIst	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	0.9/3.6		

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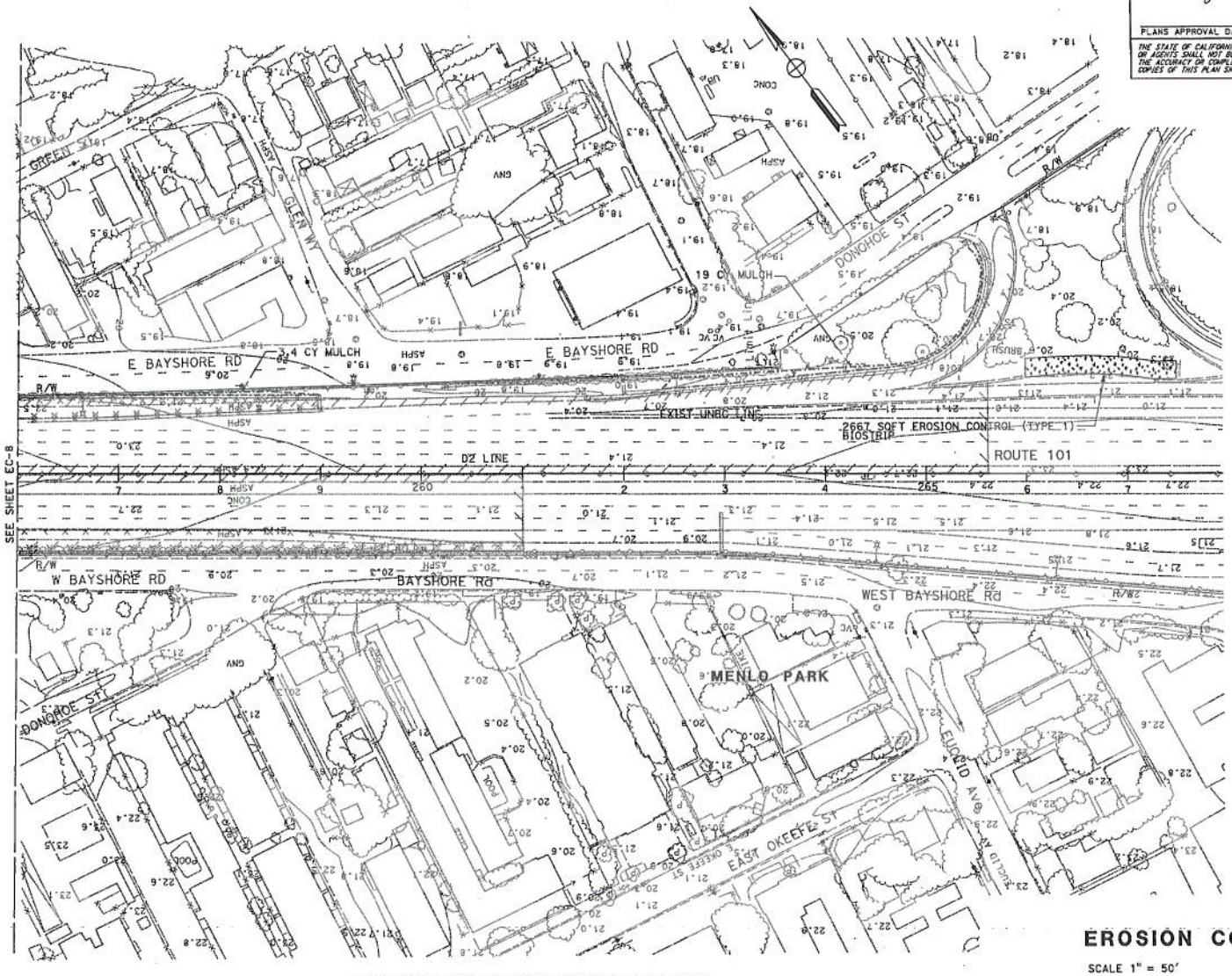
LICENSED LANDSCAPE ARCHITECT — STATE OF CALIFORNIA



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EROSION CONTROL PLAN

SCALE 1" = 50'

EC-9

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	SENIOR LANDSCAPE ARCHITECT	CALCULATED-DESIGNED BY	LAURIE J SMITH	REVISED BY
Caltrans	DAVID W YAM	CHECKED BY	ALEX MC DONALD	DATE REVISED
WATER QUALITY				

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM		0.9/3.6		

LICENSED LANDSCAPE ARCHITECT

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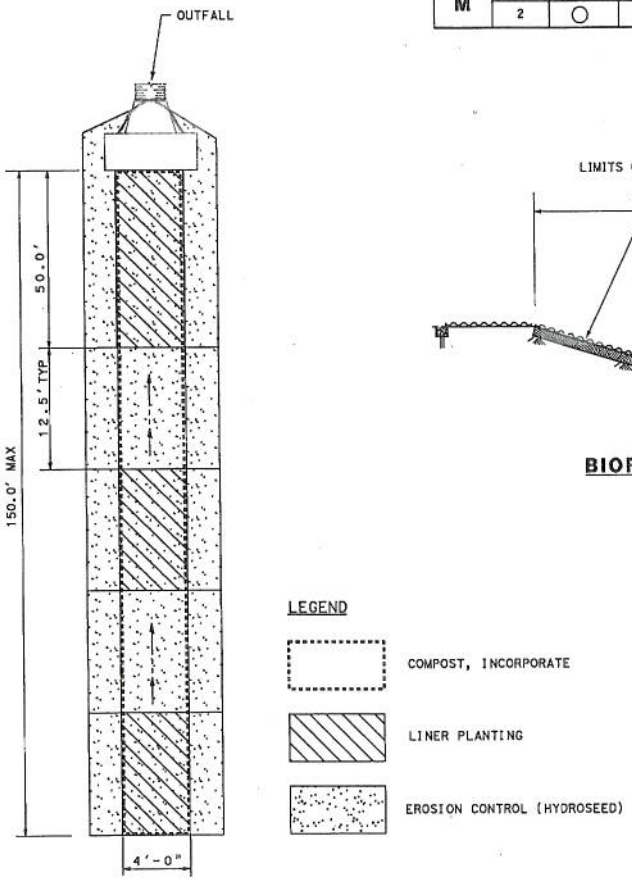
DRAFT

PLANT LIST AND PLANTING SPECIFICATIONS

PLANT GROUP	PLANT No	SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE	QUANTITY EACH
M	1	X	ELYMUS GLAUCUS, BERKELEY	BLUE WILD RYE, BERKELEY	LINER	618
	2	O	HORDEUM BRACHYANTHERUM	MEADOW BARLEY	LINER	618



PLAN

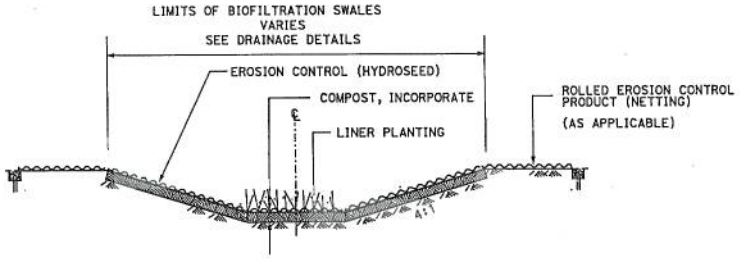
BIOFILTRATION SWALE TYP

LEGEND

COMPOST, INCORPORATE

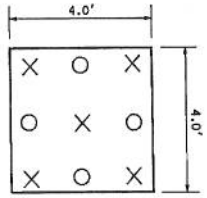
LINER PLANTING

EROSION CONTROL (HYDROSEED)



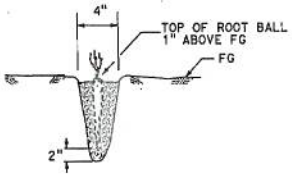
SECTION

BIOFILTRATION SWALE TYP



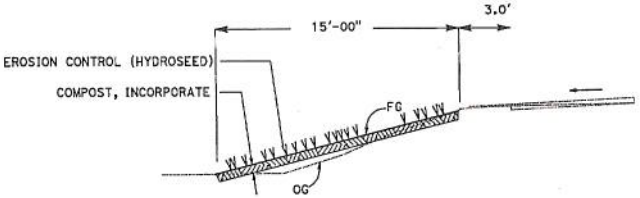
Group M spacing
X = Liner Species
O = Liner Species
(9 Plants)

TYPICAL LINER PLANT SPACING



SECTION

PLANT BASIN (LINER)



SECTION

BIOFILTRATION STRIP TYP

EROSION CONTROL DETAIL

NO SCALE

ECD-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
WATER QUALITY

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CALCULATED-DESIGNED BY: LAURIE J SMITH
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REVISED BY
DATE REVISED

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CU 04343

EA 235611

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM&M	101	52.2/52.6 0.0/3.6		

LICENSED LANDSCAPE ARCHITECT

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LICENSED LANDSCAPE ARCHITECT LAURIE J. SMITH STATE OF CALIFORNIA

EROSION CONTROL QUANTITIES

LOCATION	EROSION CONTROL TYPE	PLANT (GROUP M)	COMPOST, INCORPORATE	EROSION CONTROL (COMPOST BLANKET)	EROSION CONTROL (HYDROSEED)	ROLLED EROSION CONTROL PRODUCT (NETTING)	MULCH
STA		EA	SQYD	CY	SQFT	SQFT	CY
136+84 TO 140+50 R	2	-	471	-	4241	-	-
140+50 TO 141+50 R	3	154	216	-	1950	1950	-
141+50 TO 142+50 R	3	154	216	-	1950	1950	-
142+50 TO 148+50 R	2	-	1362	-	12259	-	-
148+50 TO 149+50 R	3	154	216	-	1950	1950	-
149+50 TO 153+22 R	2	-	782	-	7034	-	-
153+22 TO 160+00 R	-	-	-	-	-	-	112
158+52 TO 160+16 L	-	-	-	-	-	-	5
161+20 TO 162+54 L	-	-	-	-	-	-	5
165+00 TO 170+00 R	4	-	-	-	-	5700	53
167+51 TO 168+82 L	-	-	-	-	-	-	14
171+25 TO 173+07 L	-	-	-	-	-	-	4
172+77 TO 173+83 R	-	-	-	-	-	-	2
173+70 TO 177+75 L	-	-	-	-	-	-	10
174+47 TO 176+03 R	-	-	-	-	-	-	2
210+44 TO 212+06 L	-	-	-	-	-	-	5
219+00 TO 220+00 L	1	-	202	-	1814	-	-
220+00 TO 221+80 R	1	-	328	-	2952	-	-
226+10 TO 227+60 L	1	-	249	-	2245	-	-
231+00 TO 231+50 R	2	-	56	-	507	-	-
231+50 TO 232+50 R	3	154	110	-	994	994	-
234+10 TO 240+00 R	5	-	-	0.8	2767	-	-
240+00 TO 241+00 R	3	154	110	-	994	994	-
241+00 TO 245+00 R	2	-	665	-	5983	-	-
245+00 TO 248+35 R	5	-	-	2.2	1379	-	-
257+00 TO 259+00 L	-	-	-	-	-	-	4
262+40 TO 265+60 L	-	-	-	-	-	-	19
TOTAL		770.0	4983.0	3.0	49019.0	13538.0	235.0

EROSION CONTROL QUANTITIES

ECQ-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

SENIOR LANDSCAPE ARCHITECT: DAVID WANAM

CALCULATED-DESIGNED BY: LAURIE J SMITH

CHECKED BY: ALEX MC DONALD

REVISED BY

DATE REVISED

LAST REVISION 08-04-09

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USERNAME => s112969

DGN FILE => 423563gh001.dgn

CU 04343

EA 235611

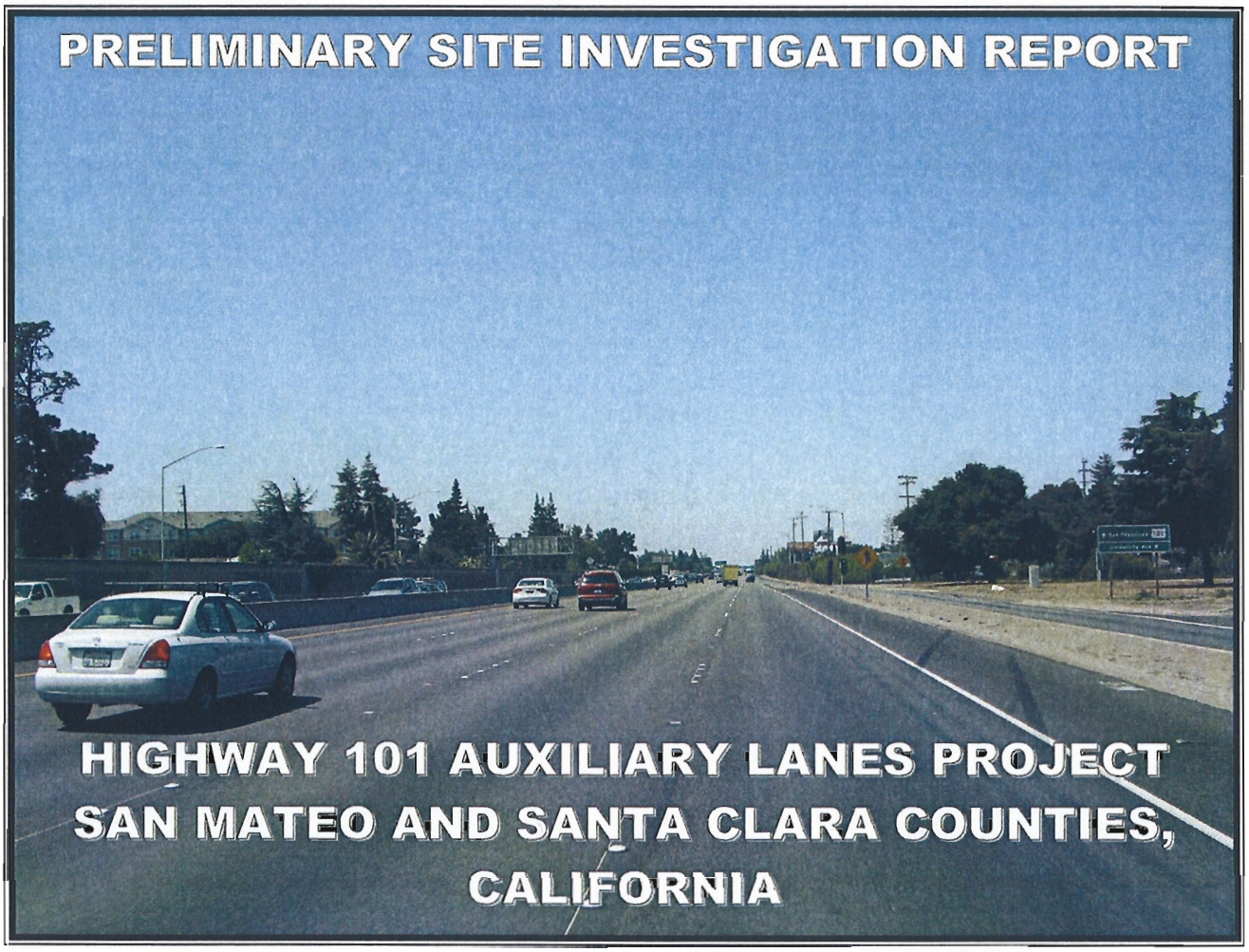
5. Other Stormwater Information

Rainfall Intensity of the Project Area

25-Yr, 24 Hour event, 0.187 inches/hour

2-Yr, 1 hour event, 0.410 inches/hour

6. Copy of Notice of Construction (NOC)



PRELIMINARY SITE INVESTIGATION REPORT

HIGHWAY 101 AUXILIARY LANES PROJECT
SAN MATEO AND SANTA CLARA COUNTIES, CALIFORNIA

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

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

GEOCON PROJECT NO. E8435-06-36
CALTRANS EA 04-235611

DECEMBER 2009

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2. Summary of Lead and pH Results - Soil
3. Summary of CAM 17 Metals Results - Soil
4. Summary of Organics Results - Soil
5. Summary of Grab-Groundwater Sample Results
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APPENDICES

A. City of Menlo Park Encroachment Permit and San Mateo County Drilling Permit
B. Laboratory Reports and Chain-of-custody Documentation -CD
C. Lead Regression and Metals Statistics

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.

Lauren Vigliotti
Senior Staff Geologist

Richard Day, CEG, CHG
Senior Geologist, Vice President

PROFESSIONAL GEOLOGIST
RICHARD W. DAY
No. 5479
Exp. 09-30-11
STATE OF CALIFORNIA

CALIFORNIA DEPARTMENT OF TRANSPORTATION – DISTRICT 4
OFFICE OF ENVIRONMENTAL ENGINEERING

Reviewed By:	Recommended By:	Approved By:
Ana Uribe	Chris Wilson, PE	Allen Baradar, PE, REA
Task Order Manager	District Branch Chief	District Office Chief

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Doug Krause, CIH 530.758.6397 530.758.6506 fax dskrause@pacbell.net	Krause & Associates 216 F. Street, Suite 162 Davis, CA 95616 (*Geocon Subcontractor*)	Health and Safety
Diane Galvan 562.989.4045 562.989.4040 fax diane@atlglobal.com	Advanced Technology Laboratories 1510 E. 33rd Street Signal Hill, CA 90807 (*Geocon Subcontractor*)	Sample Analysis

EXECUTIVE SUMMARY

We prepared this Preliminary Site Investigation Report for the United States Highway 101 (US 101) Auxiliary Lane Addition project under California Department of Transportation (Caltrans) Contract No. 04A2912 and Task Order (TO) 36, EA 04-235611. The project location is depicted on the Vicinity Map, Figure 1, and the Site Plan, Figure 2.

The purpose of the investigation was to evaluate the concentrations of metals, including aerially deposited lead (ADL), in soil and total petroleum hydrocarbons (TPH) and volatile organic compounds (VOCs) in soil and groundwater at the Site. The information obtained from this investigation will be used by Caltrans to determine soil disposal costs and to identify health and safety concerns during proposed construction activities.

The field investigation was performed on August 10-13, 18, 24, 25, and 31, 2009, by Geocon staff John Love, Professional Geologist (PG), and Chris Merritt, PG. The following field activities were performed during the sampling efforts:

- Advanced a total of 136 soil borings at the Site to a maximum depth of 18 feet using direct-push drilling and hand-auger techniques. One-hundred-twenty-three borings were advanced to a depth of 2.5 feet, nine borings were advanced to a depth of 6 feet, and four borings were advanced to a depth of 18 feet.
- Collected a total of 438 soil samples. Selected soil samples were analyzed for total and soluble lead, California Assessment Manual (CAM) 17 metals, TPH and/or VOCs.
- Collected four grab-groundwater samples for analysis of TPH and VOCs.
- Transported samples to Advanced Technology Laboratories (ATL) for analysis under standard chain-of-custody (COC) documentation.

Laboratory analytical results are presented on Tables 2 through 5. Reproductions of the laboratory reports and chain-of-custody documentation are provided as Appendix A.

Predicted Soluble (Waste Extraction Test; WET) Lead Results

The lead data for the Site were treated as 16 separate sample populations for statistical evaluation. The waste classifications for each of the sample populations are provided in Tables 6a through 6p, and are summarized as follows:

Soil excavated to a depth of **2.0 feet** would be classified as California hazardous and will require disposal at a Class I landfill facility. Underlying soil (i.e., deeper than 2.0 feet) would be classified as non-hazardous:

a) US 101 Southbound (SB) - Borings B-1 to B-67

b) US 101 SB excluding Willow Road Overcrossing (OC) and University Avenue OC - Borings B-1 to B-25, B-32 to B-42, and B-53 to B-67

c) US 101 SB excluding Willow Road OC - Borings B-1 to B-25 and B-32 to B-67

e) US 101 SB excluding University Avenue OC - Borings B-1 to B-42 and B-53 to B-67

f) US 101 SB at University Avenue OC - Borings B-43 to B-52

g) US 101 Northbound (NB) - Borings B-68 to B-137

h) US 101 NB excluding Willow Road OC and University Avenue OC - Borings B-68 to B-97, B-102 to B-111, and B-122 to B-137

i) US 101 NB excluding Willow Road OC - Borings B-68 to B-97 and B-102-B-137

k) US 101 NB excluding University Avenue OC - Borings B-68 to B-111 and B-122 to B-137

m) US 101 SB from Marsh Road to University Avenue – Borings B-1 to B-48

n) US 101 SB from University Avenue to Embarcadero Road – Borings B-49 to B-67

p) US 101 NB from University Avenue to Embarcadero Road – Borings B-117 to B-137

Soil excavated to a depth of **1.0 foot** would be classified as California hazardous and will require disposal at a Class I landfill facility. Underlying soil (i.e., deeper than 1.0 foot) would be classified as non-hazardous:

d) US 101 SB at Willow Road OC - Borings B-26 to B-31

l) US 101 NB at University Avenue OC - Borings B-113 to B-121

Soil excavated to a depth of **2.5 feet** would be classified as California hazardous and will require disposal at a Class I landfill facility. Underlying soil (i.e., deeper than 2.5 feet) would be classified as non-hazardous:

j) US 101 NB at Willow Road OC - Borings B-98- to B-101

o) US 101 NB from Marsh Road to University Avenue – Borings B-68 to B-116

CAM 17 Metals

The 95% UCL values for arsenic and vanadium in the soil samples collected at the Site are greater than their respective residential land use ESLs and are less than the commercial/industrial land use ESLs. The SFRWQCB *November 2007 Update to Environmental Screening Levels (ESLs) Technical Document* 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.

background mean concentrations, with the exception of antimony, which is within the published background range.

Offsite reuse or disposal of excavated soil may be restricted based on metals content.

Organics

Soil

TPHg and VOCs were not detected above the laboratory reporting limits. The reported TPHd and TPHmo concentrations were below their respective ESLs.

Grab-Groundwater

Organic compounds were not detected above their respective laboratory reporting limits in the grab-groundwater samples, with the exception of 4-isopropyltoluene, which does not have a published ESL value.

Worker Protection

Per Caltrans' requirements, the contractor(s) should prepare a project-specific health and safety plan to prevent or minimize worker exposure to impacted soil and 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.

1.0 INTRODUCTION

This Preliminary Site Investigation Report for the United States Highway 101 (US 101) Auxiliary Lane Addition project was prepared by Geocon Consultants, Inc. under California Department of Transportation (Caltrans) Contract No. 04A2912 and Task Order (TO) 36, EA 04-235611.

Asbestos-containing materials (ACMs) surveys of the Ringwood pedestrian overcrossing (POC), the Hetch Hetchy Aqueduct Bridge, and the Francisquito Creek Bridge were also conducted under TO 36. The results of the ACM surveys are presented under separate cover in the *Asbestos and Lead-Containing Paint Survey Report,* dated December 2009.

1.1 Project Description and Proposed Improvements

The project area consists of US 101 from the intersection with Embarcadero Road in the City of Palo Alto to Marsh Road (the Site) in the City of Menlo Park, California. The Site extends between Post Miles (PM) 52.2 in Palo Alto, Santa Clara County, to PM 3.6 in Menlo Park, San Mateo County. Caltrans is proposing to add approximately four miles of auxiliary lane in both directions of US 101. The site location is depicted on the Vicinity Map, Figure 1.

1.2 General Objectives

The purpose of the investigation was to evaluate the concentrations of metals, including aerially deposited lead (ADL), in soil and total petroleum hydrocarbons (TPH) and volatile organic compounds (VOCs) in soil and groundwater at the Site. The information obtained from this investigation will be used by Caltrans to determine soil disposal costs and to identify health and safety concerns during proposed construction activities.

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 total metal content exceeds the respective Total Threshold Limit Concentration (TTLC); or 2) the 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 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., 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 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 tables were used for this characterization: Table A – Shallow Soil (≤3 meters below ground surface; bgs) – Groundwater is a Current or Potential Source of Drinking Water and Table K-2 – Direct Exposure Soil Screening Levels for Commercial / Industrial Worker Exposure Scenario. The respective ESLs are listed at the end of Tables 3 and 4 for comparative purposes.

3.0 SCOPE OF SERVICES

The scope of services requested by Caltrans under TO-36, EA 04-235611 included the following:

3.1 Pre-field Activities

- Prepared a *Workplan* dated June 25, 2009, that describes the requested scope of services and quality assurance/quality control (QA/QC) sampling and laboratory procedures.
- Prepared a site-specific health and safety plan to provide guidelines on the use of personal protective equipment and the health and safety procedures implemented during the field activities.
- Prepared a traffic control plan and obtained an encroachment permit from the City of Menlo Park Department of Public Works (a copy of the encroachment permit is provided in Appendix A).
- Obtained soil boring permit from the San Mateo County Health Services Division (a copy of the soil boring permit is provided in Appendix A).
- Retained the services of Caltrans-approved, California-licensed laboratories to perform the sample analyses.
- Retained the services of Caltrans-approved, utility location surveyor.
- Notified Underground Service Alert (USA) at least 48 hours prior to fieldwork involving drilling or direct-push sampling activities.
- Arranged traffic control on surface streets with D & M Traffic Services and along US 101 with Caltrans.

3.2 Field Activities

The field investigation was performed on August 10-13, 18, 24, 25, and 31, 2009, by Geocon staff John Love, Professional Geologist (PG), and Chris Merritt, PG. The following field activities were performed during the sampling efforts:

- Advanced a total of 136 soil borings at the Site to a maximum depth of 18 feet using direct-push drilling and hand-auger techniques. One-hundred-twenty-three borings were advanced to a depth of 2.5 feet, nine borings were advanced to a depth of 6 feet, and four borings were advanced to a depth of 18 feet.
- Collected a total of 438 soil samples. Selected soil samples were analyzed for total and soluble lead, California Assessment Manual (CAM) 17 metals, TPH and/or VOCs.
- Collected four grab-groundwater samples for analysis of TPH and VOCs.
- Transported samples to Advanced Technology Laboratories (ATL) for analysis under standard chain-of-custody (COC) documentation.

4.0 INVESTIGATIVE METHODS

4.1 Sampling Procedures

Soil samples were collected from 136 boring locations identified by the Caltrans TO Manager. Boring locations are shown on the Site Plans, Figure 2a-h, and were surveyed using Differential Global Positioning System (DGPS) equipment. Boring coordinates are presented on Table 1.
Soil samples were collected from the borings as follows:

- B-1 through B-111 and B-113 through B-137 (except for those borings listed below) at depth intervals of 0 to 0.5 foot, 1.0 to 1.5 feet, and 2.0 to 2.5 feet.
- B-7, B-60, B-73 through B-78 and B-131 at depth intervals of 0 to 0.5 foot, 1.0 to 1.5 feet, 2.0 to 2.5 feet, 4.0 to 4.5 feet and 6.0 to 6.5 feet.
- B17, B-19, B-84 and B-87 at depth intervals of 0 to 0.5 foot, 1.0 to 1.5 feet, 2.0 to 2.5 feet, 6.0 to 6.5 feet, 12 to 12.5 feet and 18 to 18.5 feet.

In addition, grab-groundwater samples were collected from borings B-17, B-19, B-75 and B-84.

Soil and groundwater samples were collected using a Geoprobe direct-push sample rig or a hand auger if access was limited. Soil samples collected using the Geoprobe direct-push rig were obtained by hydraulically advancing a three- to five-foot-long stainless steel core-barrel sampler lined with an acetate sample tube into undisturbed soil. Soil samples were collected for laboratory analysis by cutting an approximately 6-inch-long section of the acetate tube from the target sample depth, capping the ends with Teflon tape and plastic end caps, and then placing the sample tube in a chest cooled with ice for storage and delivery to the analytical laboratory. Soil samples collected using a hand-auger were placed in 8-ounce glass jars with threaded Teflon-lined plastic lids prior to being stored in a chest cooled with ice.

Grab-groundwater samples were collected by placing temporary PVC well casings into the open boreholes and then pumping groundwater through the well casing using ¼-inch-diameter disposable polyethylene tubing fitted with a check valve. Groundwater was discharged at ground surface into the appropriate sample containers where it was then placed in a chest cooled with ice for transport to the analytical laboratory.

Sample containers were labeled and transported to a Caltrans-approved, certified environmental laboratory using standard COC documentation. Shallow soil borings (≤6 feet) were back-filled to surface with soil cuttings; borings advanced to groundwater were backfilled with neat cement grout.

Geocon and their subcontractors conducted 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 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 under a standard seven-day turn-around-time. A CD containing the laboratory reports and COC documentation are presented as Appendix B.
Soil samples were analyzed as follows:

- Two-hundred-twenty-six samples for CAM 17 metals according to Title 22 CCR, Environmental Protection Agency (EPA) Test Methods 6010 ICAP and 7471A.
- Two-hundred-twelve samples for total lead using EPA Method 6010 ICAP.
- Per Caltrans request, 124 samples were further analyzed for WET lead using EPA Method 7420 and 45 samples were analyzed for TCLP lead using EPA Method 1445.
- Nine samples, which were collected from the 10 to 10.5-foot depth interval, for TPH as gasoline (TPHg), TPH as diesel (TPHd), and TPH as motor oil (TPHmo) using EPA Test Method 8015M.
- Nine samples for VOCs, including benzene, toluene, ethylbenzene, and xylenes (BTEX) using EPA Test Method 8260B.
- Seventy-six soil samples for pH using EPA Method 9045.

The four grab-groundwater samples were analyzed for the following:

- TPHg, TPHd, and TPHmo using EPA Test Method 8015M.
- VOCs, including BTEX, using EPA Test Method 8260B.

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 laboratories, the COC documentation was reviewed for accuracy and completeness (Appendix B).

5.0 INVESTIGATIVE RESULTS

5.1 Subsurface Conditions

Near surface soils (0 to 2 feet) encountered along the US 101 corridor between Embarcadero Road in Palo Alto and Marsh Road in Menlo Park consisted primarily of dry to slightly moist intermixed sand, silt, and gravel with some clay being observed throughout the area. Soils deeper than two feet typically consisted of dark brown silty and sandy clay.

Groundwater was measured in borings B-17, B-19, and B-84 drilled near the Ringwood POC at depths ranging from 12.5 to 13.5 feet.

5.2 Laboratory Analytical Results

A summary of the analytical results for soil and grab-groundwater samples collected at the Site are presented in Tables 2 through 5. A CD containing the laboratory reports and chain-of-custody documentation are presented as Appendix B.

5.2.1 Soil

- The following CAM 17 metals were not detected above their respective laboratory reporting limits: beryllium, silver, and thallium.
- Remaining CAM 17 metals, with the exception of lead, were reported in the samples at concentrations less than ten times their respective STLCs.
- Total lead was reported at concentrations ranging from of 1.5 mg/kg to 5,300 mg/kg, with 30 samples equal to or exceeding the TTLC of 1,000 mg/kg.
- WET lead was reported as <0.25 mg/l in 2 of the 124 sampled analyzed. It was reported at concentrations ranging from 0.39 mg/l to 71 mg/l in the other 122 samples.
- TCLP lead was reported as <0.25 mg/l in 7 of the 45 samples analyzed. It was reported at concentrations ranging from 0.30 mg/l to 71 mg/l in the other 38 samples.
- TPHg was not detected above the laboratory reporting limit of 1.0 mg/kg in the samples.
- TPHd was reported at concentrations ranging from <1.0 to 5.8 mg/kg.
- TPHmo was reported in the samples at concentrations ranging from <1.0 to 13 mg/kg.
- VOCs, including BTEX, were not detected above their respective laboratory reporting limits.
- Soil pH values ranged from 7.0 to 8.7.

5.2.2 Grab-Groundwater

- TPHg, TPHd and TPHmo were not detected above their respective laboratory reporting limits.
- VOCs were not detected in the samples, with the exception of 4-isopropyltoluene at a concentration of 0.82 micrograms per liter (µg/l) in sample B-75.

5.3 Laboratory QA/QC

We reviewed the QA/QC results provided with the laboratory analytical reports. The data indicate non-detect results for the method blanks.

Matrix spike and/or matrix spike duplicates (MS/MSDs) were outside recovery criteria for several samples. The relative percent differences (RPDs) of the duplicate samples for several of the analyses were outside criteria. The RPDs for several of the MSDs for the analyses were outside criteria. Additionally, the surrogate recoveries were diluted out of two samples. However, the Case Narratives in the laboratory reports state that each analytical batch was validated by the laboratory control sample (LCS). The data showed acceptable recoveries and RPDs for the remainder of the duplicates and matrix spikes. Dilution was necessary for several analyses due to sample matrix.

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

The lead data for the Site were treated as 16 separate sample populations for statistical evaluation, which consisted of the following:

a) US 101 Southbound (SB) - Borings B-1 to B-67

b) US 101 SB excluding Willow Road Overcrossing (OC) and University Avenue OC - Borings B-1 to B-25, B-32 to B-42, and B-53 to B-67

c) US 101 SB excluding Willow Road OC - Borings B-1 to B-25 and B-32 to B-67

d) US 101 SB at Willow Road OC - Borings B-26 to B-31

e) US 101 SB excluding University Avenue OC - Borings B-1 to B-42 and B-53 to B-67

f) US 101 SB at University Avenue OC - Borings B-43 to B-52

g) US 101 Northbound (NB) - Borings B-68 to B-137

h) US 101 NB excluding Willow Road OC and University Avenue OC - Borings B-68 to B-97, B-102 to B-111, and B-122 to B-137

i) US 101 NB excluding Willow Road OC - Borings B-68 to B-97 and B-102-B-137

j) US 101 NB at Willow Road OC - Borings B-98- to B-101

k) US 101 NB excluding University Avenue OC - Borings B-68 to B-111 and B-122 to B-137

l) US 101 NB at University Avenue OC - Borings B-113 to B-121

m) US 101 SB from Marsh Road to University Avenue – Borings B-1 to B-48

n) US 101 SB from University Avenue to Embarcadero Road – Borings B-49 to B-67

o) US 101 NB from Marsh Road to University Avenue – Borings B-68 to B-116

p) US 101 NB from University Avenue to Embarcadero Road – Borings B-117 to B-137

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 statistical methods used are discussed in a book entitled *Statistical Methods for Environmental Pollution Monitoring,* by Richard Gilbert; in an EPA *Technology Support Center Issue* document entitled, *The Lognormal Distribution in Environmental Applications,* by Ashok Singh et. al., dated December 1997; and in a book entitled *An Introduction to the Bootstrap,* by Bradley Efron and Robert J. Tibshirani.

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 used to calculate the UCLs are discussed in the previously referenced EPA document and in *An Introduction to the Bootstrap.* For those samples in which total lead was not detected at concentrations exceeding the laboratory reporting limit, 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 each data set.

US 101 SB
Borings B-1 to B-67

SAMPLE INTERVAL (feet)	90% TOTAL LEAD UCL (mg/kg)	95% TOTAL LEAD UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	MINIMUM VALUE (mg/kg)	MAXIMUM VALUE (mg/kg)
0.0 to 0.5	551.7	588.5	411.5	2.5	5,300
1.0 to 1.5	372.3	398.2	275.5	2.5	4,100
2.0 to 2.5	62.9	69.7	43.8	1.0	830

US 101 SB excluding Willow Road OC and University Avenue OC
Borings B-1 to B-25, B-32 to B-42, and B-53 to B-67

SAMPLE INTERVAL (feet)	90% TOTAL LEAD UCL (mg/kg)	95% TOTAL LEAD UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	MINIMUM VALUE (mg/kg)	MAXIMUM VALUE (mg/kg)
0.0 to 0.5	329.3	349.9	257.3	2.5	2,000
1.0 to 1.5	431.3	468.1	312.7	2.5	4,100
2.0 to 2.5	79.2	85.8	53.5	2.5	830

US 101 SB excluding Willow Road OC
Borings B-1 to B-25 and B-32 to B-67

SAMPLE INTERVAL (feet)	90% TOTAL LEAD UCL (mg/kg)	95% TOTAL LEAD UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	MINIMUM VALUE (mg/kg)	MAXIMUM VALUE (mg/kg)
0.0 to 0.5	431.8	463.9	322.3	2.5	4,600
1.0 to 1.5	394.5	423.6	294.6	2.5	4,100
2.0 to 2.5	68.3	72.9	46.5	1.0	830

US 101 SB at Willow Road OC
Borings B-26 to B-31

SAMPLE INTERVAL (feet)	90% TOTAL LEAD UCL (mg/kg)	95% TOTAL LEAD UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	MINIMUM VALUE (mg/kg)	MAXIMUM VALUE (mg/kg)
0.0 to 0.5	2,274	2,547	1,318	100	5,300
1.0 to 1.5	108.8	116.3	81.8	15	150
2.0 to 2.5	23.0	24.6	16.6	2.5	35

US 101 SB excluding University Avenue OC
Borings B-1 to B-42 and B-53 to B-67

SAMPLE INTERVAL (feet)	90% TOTAL LEAD UCL (mg/kg)	95% TOTAL LEAD UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	MINIMUM VALUE (mg/kg)	MAXIMUM VALUE (mg/kg)
0.0 to 0.5	502	536.6	369	2.5	5,300
1.0 to 1.5	392.3	426.8	288.4	2.5	4,100
2.0 to 2.5	72.2	78.8	49.6	2.5	830

US 101 SB at University Avenue OC
Borings B-43 to B-52

SAMPLE INTERVAL (feet)	90% TOTAL LEAD UCL (mg/kg)	95% TOTAL LEAD UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	MINIMUM VALUE (mg/kg)	MAXIMUM VALUE (mg/kg)
0.0 to 0.5	1,202	1,374	653.7	17	4,600
1.0 to 1.5	346.1	382.4	201.9	8.0	1,200
2.0 to 2.5	16.2	18.0	10.9	1.0	49

US 101 NB
Borings B-68 to B-137

SAMPLE INTERVAL (feet)	90% TOTAL LEAD UCL (mg/kg)	95% TOTAL LEAD UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	MINIMUM VALUE (mg/kg)	MAXIMUM VALUE (mg/kg)
0.0 to 0.5	649.7	683.5	525.7	2.5	5,300
1.0 to 1.5	227.1	240.9	182.7	1.5	1,300
2.0 to 2.5	70.8	78.2	41.5	2.4	1,900

US 101 NB excluding Willow Road OC and University Avenue OC
Borings B-68 to B-97, B-102 to B-111, and B-122 to B-137

SAMPLE INTERVAL (feet)	90% TOTAL LEAD UCL (mg/kg)	95% TOTAL LEAD UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	MINIMUM VALUE (mg/kg)	MAXIMUM VALUE (mg/kg)
0.0 to 0.5	585.4	615.2	485.6	2.5	2,700
1.0 to 1.5	242.1	258.8	192.1	1.5	1,300
2.0 to 2.5	87.3	101.1	44.4	2.4	1,900

US 101 NB excluding Willow Road
Borings B-68 to B-97 and B-102 to B-137

SAMPLE INTERVAL (feet)	90% TOTAL LEAD UCL (mg/kg)	95% TOTAL LEAD UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	MINIMUM VALUE (mg/kg)	MAXIMUM VALUE (mg/kg)
0.0 to 0.5	549.9	577	460	2.5	2,700
1.0 to 1.5	219.5	231.8	171.9	1.5	1,300
2.0 to 2.5	76.3	86.6	39.3	2.4	1,900

US 101 NB at Willow Road OC
Borings B-98 to B-101

SAMPLE INTERVAL (feet)	90% TOTAL LEAD UCL (mg/kg)	95% TOTAL LEAD UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	MINIMUM VALUE (mg/kg)	MAXIMUM VALUE (mg/kg)
0.0 to 0.5	Not Calculated	Not Calculated	1,594	27	5,300
1.0 to 1.5	Not Calculated	Not Calculated	357	65	790
2.0 to 2.5	Not Calculated	Not Calculated	260.8	15	820

US 101 NB excluding University Avenue OC
Borings B-68 to B-111 and B-122 to B-137

SAMPLE INTERVAL (feet)	90% TOTAL LEAD UCL (mg/kg)	95% TOTAL LEAD UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	MINIMUM VALUE (mg/kg)	MAXIMUM VALUE (mg/kg)
0.0 to 0.5	699.6	742.7	559.5	2.5	5,300
1.0 to 1.5	256.3	267	203.1	1.5	1,300
2.0 to 2.5	101	114.5	58.8	2.4	1,900

US 101 NB at University Avenue OC
Borings B-113 to B-121

SAMPLE INTERVAL (feet)	90% TOTAL LEAD UCL (mg/kg)	95% TOTAL LEAD UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	MINIMUM VALUE (mg/kg)	MAXIMUM VALUE (mg/kg)
0.0 to 0.5	496.1	547.6	300.3	21	1,500
1.0 to 1.5	62.3	66.7	46.6	8.5	100
2.0 to 2.5	9.0	9.3	7.6	2.5	14

US 101 SB from Marsh Road to University Avenue
Borings B-1 to B-48

SAMPLE INTERVAL (feet)	90% TOTAL LEAD UCL (mg/kg)	95% TOTAL LEAD UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	MINIMUM VALUE (mg/kg)	MAXIMUM VALUE (mg/kg)
0.0 to 0.5	626.8	667.1	441.9	2.5	5,300
1.0 to 1.5	257.1	275.3	197	2.5	1,400
2.0 to 2.5	57.5	62.0	39.9	2.5	560

US 101 SB from University Avenue to Embarcadero Road
Borings B-49 to B-67

SAMPLE INTERVAL (feet)	90% TOTAL LEAD UCL (mg/kg)	95% TOTAL LEAD UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	MINIMUM VALUE (mg/kg)	MAXIMUM VALUE (mg/kg)
0.0 to 0.5	492.6	538	334.6	19	2,000
1.0 to 1.5	760.3	839.5	473.8	5.3	4,100
2.0 to 2.5	106	122.7	53.8	1.0	830

US 101 NB from Marsh Road to University Avenue
Borings B-68 to B-116

SAMPLE INTERVAL (feet)	90% TOTAL LEAD UCL (mg/kg)	95% TOTAL LEAD UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	MINIMUM VALUE (mg/kg)	MAXIMUM VALUE (mg/kg)
0.0 to 0.5	705.3	753	547.2	2.5	5,300
1.0 to 1.5	236.3	252	182	1.5	1,300
2.0 to 2.5	123.8	139.1	70.4	2.4	1,900

US 101 NB from University Avenue to Embarcadero Road
Borings B-117 to B-137

SAMPLE INTERVAL (feet)	90% TOTAL LEAD UCL (mg/kg)	95% TOTAL LEAD UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	MINIMUM VALUE (mg/kg)	MAXIMUM VALUE (mg/kg)
0.0 to 0.5	648.1	690.9	476.6	12	1,900
1.0 to 1.5	264.8	287.7	184.1	2.5	1,200
2.0 to 2.5	11.8	12.3	10.3	2.5	20

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 UCLs calculated above in Section 5.4.1.

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 124 (x, y) data points (i.e., soil samples analyzed for both total lead [x] and WET lead [y]). To achieve an acceptable correlation, the 15 data points with the highest squared residual WET lead concentrations were eliminated from the regression analysis. The resulting *coefficient of determination* (r^2) equaled 0.6573, which yields a corresponding *correlation coefficient* (r) of 0.81.

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 $y = 0.046(x)$, 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 UCLs calculated in for samples collected from the Site (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 Tables 6a to 6p.

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 I 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 Predicted WET Lead Results

6.1.1 US 101 SB

The following table summarizes the predicted WET lead concentrations and the waste classification for excavated soil based on the calculated weighted averages of the total lead UCLs and the relationship between total and WET lead for data collected at the Site. 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 in Table 6a.

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 foot	552	**25**	589	**Hazardous**
Underlying soil (1.0 to 2.5 ft)	*269*	***12***	*289*	***Hazardous***
0 to 2.0 feet	462	**21**	493	**Hazardous**
Underlying Soil (2.0 to 2.5 ft)	*63*	*2.9*	*70*	*Non-Hazardous*
0 to 2.5 feet	*382*	***18***	*409*	**Hazardous**

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

Based on the data in the above table, soil excavated from the surface to a depth of 2.0 feet would be classified as a California hazardous waste since the 90% UCL-predicted WET lead concentrations are greater than the lead STLC of 5.0 mg/l. Based on the TCLP lead results excavated soil would not be considered a RCRA hazardous waste. Soil excavated to a depth of 2.0 feet will require disposal at a Class I landfill facility. Underlying soil (i.e., deeper than 2.0 feet) would be classified as non-hazardous.

6.1.2 US 101 SB excluding Willow Road OC and University Avenue OC

The following table summarizes the predicted WET lead concentrations and the waste classification for excavated soil based on the calculated weighted averages of the total lead UCLs and the relationship between total and WET lead for data collected at the Site. The total and WET lead calculations are summarized in Table 6b.

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 foot	329	**15**	350	**Hazardous**
Underlying soil (1.0 to 2.5 ft)	*314*	***14***	*341*	***Hazardous***
0 to 2.0 feet	380	**17**	409	**Hazardous**
Underlying Soil (2.0 to 2.5 ft)	*79*	*3.6*	*86*	*Non-Hazardous*
0 to 2.5 feet	*320*	***15***	*344*	**Hazardous**

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

Based on the data in the above table, soil excavated from the surface to a depth of 2.0 feet would be classified as a California hazardous waste since the 90% UCL-predicted WET lead concentrations are greater than the lead STLC of 5.0 mg/l. Based on the TCLP lead results excavated soil would not be considered a RCRA hazardous waste. Soil excavated to a depth of 2.0 feet will require disposal at a Class I landfill facility. Underlying soil (i.e., deeper than 2.0 feet) would be classified as non-hazardous.

6.1.3 US 101 SB excluding Willow Road OC

The following table summarizes the predicted WET lead concentrations and the waste classification for excavated soil based on the calculated weighted averages of the total lead UCLs and the relationship between total and WET lead for data collected at the Site. The total and WET lead calculations are summarized in Table 6c.

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 foot	432	**20**	464	**Hazardous**
Underlying soil (1.0 to 2.5 ft)	*286*	***13***	*307*	***Hazardous***
0 to 2.0 feet	413	**19**	444	**Hazardous**
Underlying Soil (2.0 to 2.5 ft)	*68*	*3.1*	*73*	*Non-Hazardous*
0 to 2.5 feet	*344*	***16***	*370*	**Hazardous**

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

Based on the data in the above table, soil excavated from the surface to a depth of 2.0 feet would be classified as a California hazardous waste since the 90% UCL-predicted WET lead concentrations are greater than the lead STLC of 5.0 mg/l. Based on the TCLP lead results excavated soil would not be considered a RCRA hazardous waste. Soil excavated to a depth of 2.0 feet will require disposal at a Class I landfill facility. Underlying soil (i.e., deeper than 2.0 feet) would be classified as non-hazardous.

6.1.4 US 101 SB at Willow Road OC

The following table summarizes the predicted WET lead concentrations and the waste classification for excavated soil based on the calculated weighted averages of the total lead UCLs and the relationship between total and WET lead for data collected at the Site. The total and WET lead calculations are summarized in Table 6d.

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 foot	2,274	**105**	2,547	**Hazardous**
Underlying soil (1.0 to 2.5 ft)	*80*	*3.7*	*86*	*Non-Hazardous*
0 to 2.0 feet	1,191	**55**	1,332	**Hazardous**
Underlying Soil (2.0 to 2.5 ft)	*23*	*1.1*	*25*	*Non-Hazardous*
0 to 2.5 feet	*958*	***44***	*1,070*	**Hazardous**

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

Based on the data in the above table, soil excavated from the surface to a depth of 1.0 foot would be classified as a California hazardous waste since the 90% UCL-predicted WET lead concentrations are greater than the lead STLC of 5.0 mg/l. Based on the TCLP lead results excavated soil would not be

considered a RCRA hazardous waste. Soil excavated to a depth of 1.0 foot will require disposal at a Class I landfill facility. Underlying soil (i.e., deeper than 1.0 foot) would be classified as non-hazardous.

6.1.5 US 101 SB excluding University Avenue OC

The following table summarizes the predicted WET lead concentrations and the waste classification for excavated soil based on the calculated weighted averages of the total lead UCLs and the relationship between total and WET lead for data collected at the Site. The total and WET lead calculations are summarized in Table 6e.

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 foot	502	**23**	537	**Hazardous**
Underlying soil (1.0 to 2.5 ft)	*286*	***13***	*311*	***Hazardous***
0 to 2.0 feet	447	**21**	482	**Hazardous**
Underlying Soil (2.0 to 2.5 ft)	*72*	*3.3*	*79*	*Non-Hazardous*
0 to 2.5 feet	*372*	***17***	*401*	**Hazardous**

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

Based on the data in the above table, soil excavated from the surface to a depth of 2.0 feet would be classified as a California hazardous waste since the 90% UCL-predicted WET lead concentrations are greater than the lead STLC of 5.0 mg/l. Based on the TCLP lead results excavated soil would not be considered a RCRA hazardous waste. Soil excavated to a depth of 2.0 feet will require disposal at a Class I landfill facility. Underlying soil (i.e., deeper than 2.0 feet) would be classified as non-hazardous.

6.1.6 US 101 SB at University Avenue OC

The following table summarizes the predicted WET lead concentrations and the waste classification for excavated soil based on the calculated weighted averages of the total lead UCLs and the relationship between total and WET lead for data collected at the Site. The total and WET lead calculations are summarized in Table 6f.

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 foot	1,202	**55**	1,374	**Hazardous**
Underlying soil (1.0 to 2.5 ft)	*236*	***11***	*261*	***Hazardous***
0 to 2.0 feet	774	**36**	878	**Hazardous**
Underlying Soil (2.0 to 2.5 ft)	*16*	*0.74*	*18*	*Non-Hazardous*
0 to 2.5 feet	*622*	***29***	*706*	**Hazardous**

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

Based on the data in the above table, soil excavated from the surface to a depth of 2.0 feet would be classified as a California hazardous waste since the 90% UCL-predicted WET lead concentrations are greater than the lead STLC of 5.0 mg/l. Based on the TCLP lead results excavated soil would not be considered a RCRA hazardous waste. Soil excavated to a depth of 2.0 feet will require disposal at a Class I landfill facility. Underlying soil (i.e., deeper than 2.0 feet) would be classified as non-hazardous.

6.1.7 US 101 NB

The following table summarizes the predicted WET lead concentrations and the waste classification for excavated soil based on the calculated weighted averages of the total lead UCLs and the relationship between total and WET lead for data collected at the Site. The total and WET lead calculations are summarized in Table 6g.

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 foot	650	**30**	684	**Hazardous**
Underlying soil (1.0 to 2.5 ft)	*175*	***8.0***	*187*	***Hazardous***
0 to 2.0 feet	438	**20**	462	**Hazardous**
Underlying Soil (2.0 to 2.5 ft)	*71*	*3.3*	*78*	*Non-Hazardous*
0 to 2.5 feet	*365*	***17***	*385*	**Hazardous**

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

Based on the data in the above table, soil excavated from the surface to a depth of 2.0 feet would be classified as a California hazardous waste since the 90% UCL-predicted WET lead concentrations are greater than the lead STLC of 5.0 mg/l. Based on the TCLP lead results excavated soil would not be

considered a RCRA hazardous waste. Soil excavated to a depth of 2.0 feet will require disposal at a Class I landfill facility. Underlying soil (i.e., deeper than 2.0 feet) would be classified as non-hazardous.

6.1.8 US 101 NB excluding Willow Road OC and University Avenue OC

The following table summarizes the predicted WET lead concentrations and the waste classification for excavated soil based on the calculated weighted averages of the total lead UCLs and the relationship between total and WET lead for data collected at the Site. The total and WET lead calculations are summarized in Table 6h.

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 foot	585	**27**	615	**Hazardous**
Underlying soil (1.0 to 2.5 ft)	*191*	***8.8***	*206*	***Hazardous***
0 to 2.0 feet	414	**19**	437	**Hazardous**
Underlying Soil (2.0 to 2.5 ft)	*87*	*4.0*	*101*	*Non-Hazardous*
0 to 2.5 feet	*348*	***16***	*370*	**Hazardous**

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

Based on the data in the above table, soil excavated from the surface to a depth of 2.0 feet would be classified as a California hazardous waste since the 90% UCL-predicted WET lead concentrations are greater than the lead STLC of 5.0 mg/l. Based on the TCLP lead results excavated soil would not be considered a RCRA hazardous waste. Soil excavated to a depth of 2.0 feet will require disposal at a Class I landfill facility. Underlying soil (i.e., deeper than 2.0 feet) would be classified as non-hazardous.

6.1.9 US 101 NB excluding Willow Road OC

The following table summarizes the predicted WET lead concentrations and the waste classification for excavated soil based on the calculated weighted averages of the total lead UCLs and the relationship between total and WET lead for data collected at the Site. The total and WET lead calculations are summarized in Table 6i.

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 foot	550	**25**	577	**Hazardous**
Underlying soil (1.0 to 2.5 ft)	*172*	***7.9***	*183*	***Hazardous***
0 to 2.0 feet	385	**18**	404	**Hazardous**
Underlying Soil (2.0 to 2.5 ft)	*76*	*3.5*	*87*	*Non-Hazardous*
0 to 2.5 feet	*323*	***15***	*341*	**Hazardous**

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

Based on the data in the above table, soil excavated from the surface to a depth of 2.0 feet would be classified as a California hazardous waste since the 90% UCL-predicted WET lead concentrations are greater than the lead STLC of 5.0 mg/l. Based on the TCLP lead results excavated soil would not be considered a RCRA hazardous waste. Soil excavated to a depth of 2.0 feet will require disposal at a Class I landfill facility. Underlying soil (i.e., deeper than 2.0 feet) would be classified as non-hazardous.

6.1.10 US 101 NB at Willow Road OC

The following table summarizes the predicted WET lead concentrations and the waste classification for excavated soil based on the calculated weighted averages of the maximum total lead concentrations and the relationship between total and WET lead for data collected at the Site. Maximum concentrations were conservatively used because UCLs cannot be calculated for a data set that consists of less than four unique values. The total and WET lead calculations are summarized in Table 6j.

Excavation Depth	Maximum Total Lead (mg/kg)	Predicted WET Lead (mg/l)	Waste Classification
0 to 1.0 foot	5,300	**244**	**Hazardous**
Underlying soil (1.0 to 2.5 ft)	*800*	***37***	***Hazardous***
0 to 2.0 feet	3,045	**140**	**Hazardous**
Underlying Soil (2.0 to 2.5 ft)	*820*	***38***	***Hazardous***
0 to 2.5 feet	*2,600*	***120***	**Hazardous**

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

Based on the data in the above table, soil excavated from the surface to a depth of 2.5 feet would be classified as a California hazardous waste since the 90% UCL-predicted WET lead concentrations are greater than the lead STLC of 5.0 mg/l. Based on the TCLP lead results excavated soil would not be

considered a RCRA hazardous waste. Soil excavated to a depth of 2.5 feet will require disposal at a Class I landfill facility.

6.1.11 US 101 NB excluding University Avenue OC

The following table summarizes the predicted WET lead concentrations and the waste classification for excavated soil based on the calculated weighted averages of the total lead UCLs and the relationship between total and WET lead for data collected at the Site. The total and WET lead calculations are summarized in Table 6k.

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 foot	700	**32**	743	**Hazardous**
Underlying soil (1.0 to 2.5 ft)	*205*	***9.4***	*216*	***Hazardous***
0 to 2.0 feet	478	**22**	505	**Hazardous**
Underlying Soil (2.0 to 2.5 ft)	*101*	*4.6*	*115*	*Non-Hazardous*
0 to 2.5 feet	*403*	***19***	*427*	**Hazardous**

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

Based on the data in the above table, soil excavated from the surface to a depth of 2.0 feet would be classified as a California hazardous waste since the 90% UCL-predicted WET lead concentrations are greater than the lead STLC of 5.0 mg/l. Based on the TCLP lead results excavated soil would not be considered a RCRA hazardous waste. Soil excavated to a depth of 2.0 feet will require disposal at a Class I landfill facility. Underlying soil (i.e., deeper than 2.0 feet) would be classified as non-hazardous.

6.1.12 US 101 NB at University Avenue OC

The following table summarizes the predicted WET lead concentrations and the waste classification for excavated soil based on the calculated weighted averages of the total lead UCLs and the relationship between total and WET lead for data collected at the Site. The total and WET lead calculations are summarized in Table 6l.

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 foot	496	**23**	**548**	**Hazardous**
Underlying soil (1.0 to 2.5 ft)	*45*	*2.0*	*48*	*Non-Hazardous*
0 to 2.0 feet	279	**13**	**307**	**Hazardous**
Underlying Soil (2.0 to 2.5 ft)	*9.0*	*0.41*	*9.3*	*Non-Hazardous*
0 to 2.5 feet	*225*	***10***	*248*	**Hazardous**

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

Based on the data in the above table, soil excavated from the surface to a depth of 1.0 foot would be classified as a California hazardous waste since the 90% UCL-predicted WET lead concentrations are greater than the lead STLC of 5.0 mg/l. Based on the TCLP lead results excavated soil would not be considered a RCRA hazardous waste. Soil excavated to a depth of 1.0 foot will require disposal at a Class I landfill facility. Underlying soil (i.e., deeper than 1.0 foot) would be classified as non-hazardous.

6.1.13 US 101 SB from Marsh Road to University Avenue

The following table summarizes the predicted WET lead concentrations and the waste classification for excavated soil based on the calculated weighted averages of the total lead UCLs and the relationship between total and WET lead for data collected at the Site. The total and WET lead calculations are summarized in Table 6m.

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 foot	627	**29**	667	**Hazardous**
Underlying soil (1.0 to 2.5 ft)	*191*	***8.8***	*204*	***Hazardous***
0 to 2.0 feet	442	**20**	471	**Hazardous**
Underlying Soil (2.0 to 2.5 ft)	*57*	*2.6*	*62*	*Non-Hazardous*
0 to 2.5 feet	*365*	*17*	*389*	**Hazardous**

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

Based on the data in the above table, soil excavated from the surface to a depth of 2.0 feet would be classified as a California hazardous waste since the 90% UCL-predicted WET lead concentrations are greater than the lead STLC of 5.0 mg/l. Based on the TCLP lead results excavated soil would not be

considered a RCRA hazardous waste. Soil excavated to a depth of 2.0 feet will require disposal at a Class I landfill facility. Underlying soil (i.e., deeper than 2.0 feet) would be classified as non-hazardous.

6.1.14 US 101 SB from University Avenue to Embarcadero Road

The following table summarizes the predicted WET lead concentrations and the waste classification for excavated soil based on the calculated weighted averages of the total lead UCLs and the relationship between total and WET lead for data collected at the Site. The total and WET lead calculations are summarized in Table 6n.

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 foot	493	**23**	538	**Hazardous**
Underlying soil (1.0 to 2.5 ft)	*542*	***25***	*601*	***Hazardous***
0 to 2.0 feet	626	**29**	689	**Hazardous**
Underlying Soil (2.0 to 2.5 ft)	*106*	*4.9*	*123*	*Non-Hazardous*
0 to 2.5 feet	*522*	***24***	*576*	**Hazardous**

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

Based on the data in the above table, soil excavated from the surface to a depth of 2.0 feet would be classified as a California hazardous waste since the 90% UCL-predicted WET lead concentrations are greater than the lead STLC of 5.0 mg/l. Based on the TCLP lead results excavated soil would not be considered a RCRA hazardous waste. Soil excavated to a depth of 2.0 feet will require disposal at a Class I landfill facility. Underlying soil (i.e., deeper than 2.0 feet) would be classified as non-hazardous.

6.1.15 US 101 NB from Marsh Road to University Avenue

The following table summarizes the predicted WET lead concentrations and the waste classification for excavated soil based on the calculated weighted averages of the total lead UCLs and the relationship between total and WET lead for data collected at the Site. The total and WET lead calculations are summarized in Table 6o.

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 foot	705	**32**	753	**Hazardous**
Underlying soil (1.0 to 2.5 ft)	*199*	***9.1***	*214*	***Hazardous***
0 to 2.0 feet	471	**22**	503	**Hazardous**
Underlying Soil (2.0 to 2.5 ft)	*124*	***5.7***	*139*	***Hazardous***
0 to 2.5 feet	*401*	***18***	*430*	**Hazardous**

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

Based on the data in the above table, soil excavated from the surface to a depth of 2.5 feet would be classified as a California hazardous waste since the 90% UCL-predicted WET lead concentrations are greater than the lead STLC of 5.0 mg/l. Based on the TCLP lead results excavated soil would not be considered a RCRA hazardous waste. Soil excavated to a depth of 2.5 feet will require disposal at a Class I landfill facility.

6.1.16 US 101 NB from University Avenue to Embarcadero Road

The following table summarizes the predicted WET lead concentrations and the waste classification for excavated soil based on the calculated weighted averages of the total lead UCLs and the relationship between total and WET lead for data collected at the Site. The total and WET lead calculations are summarized in Table 6p.

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 foot	648	**30**	691	**Hazardous**
Underlying soil (1.0 to 2.5 ft)	*180*	***8.3***	*196*	***Hazardous***
0 to 2.0 feet	456	**21**	489	**Hazardous**
Underlying Soil (2.0 to 2.5 ft)	*12*	*0.54*	*12*	*Non-Hazardous*
0 to 2.5 feet	*368*	***17***	*394*	**Hazardous**

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

Based on the data in the above table, soil excavated from the surface to a depth of 2.0 feet would be classified as a California hazardous waste since the 90% UCL-predicted WET lead concentrations are greater than the lead STLC of 5.0 mg/l. Based on the TCLP lead results excavated soil would not be considered a RCRA hazardous waste. Soil excavated to a depth of 2.0 feet will require disposal at a

Class I landfill facility. Underlying soil (i.e., deeper than 2.0 feet) would be classified as non-hazardous.

6.2 CAM 17 Metals

The CAM 17 metals concentrations in site soil were compared to ESLs (Table A, SFRWQCB, May 2008). The following metals were reported at concentrations greater than their respective ESL values in the soil samples collected at the Site: antimony, arsenic, cadmium, chromium, mercury, vanadium, and zinc. Arsenic and zinc were reported at concentrations exceeding their respective residential and commercial/industrial land use ESLs for shallow soil (≤3 meters; SFRWQCB, Table A). Antimony, cadmium, mercury, and vanadium were reported at concentrations exceeding their respective residential land use ESLs for shallow soil.

Upper one-sided 95% UCLs were calculated for the full set of metals concentrations with reported exceedances of ESLs. The 95% UCLs were compared with ESLs and with 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). The bootstrap results are included in Appendix C. The calculated standard bootstrap UCLs, ESLs and published background concentrations are summarized in the table below:

95% UCLs, ESLs and Published Background Concentrations for Selected Metals

Metal	95% UCL	Shallow Soil Residential ESL	Shallow Soil Commercial/ Industrial ESL	Direct Exposure Construction Worker ESL	PUBLISHED BACKGROUND MEAN[1]	PUBLISHED BACKGROUND RANGE [1]
Antimony	1.9	6.3	40	310	0.60	0.15 to 1.95
Arsenic	1.4	0.39	1.6	15	3.5	0.6 to 11.0
Cadmium	1.2	1.7	7.4	39	0.36	0.05 to1.70
Chromium*	46.3	750	750	1,200,000	122	23 to 1,579
Mercury	0.10	1.3	10	58	0.26	0.05 to 0.90
Vanadium	53.8	16	200	770	112	39 to 288
Zinc	151.8	600	600	230,000	149	88 to 236

Concentrations reported in milligrams per kilogram (mg/kg)

[1] Kearney Foundation of Soil Science, March 1996

* = Value is for Chromium III, no standard for total chromium.

The 95% UCL values for arsenic and vanadium in the soil samples collected at the Site are greater than their respective residential land use ESLs and are less than the commercial/industrial land use

ESLs. The SFRWQCB *November 2007 Update to Environmental Screening Levels (ESLs) Technical Document* 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 calculated 95% UCLs for antimony, cadmium, chromium, mercury and zinc are less than their respective ESLs. The 95% UCLs for these metals are all less than their respective published background mean concentrations, with the exception of antimony, which is within the published background range.

Offsite reuse or disposal of excavated soil may be restricted based on metals content.

6.3 Organics

6.3.1 Soil

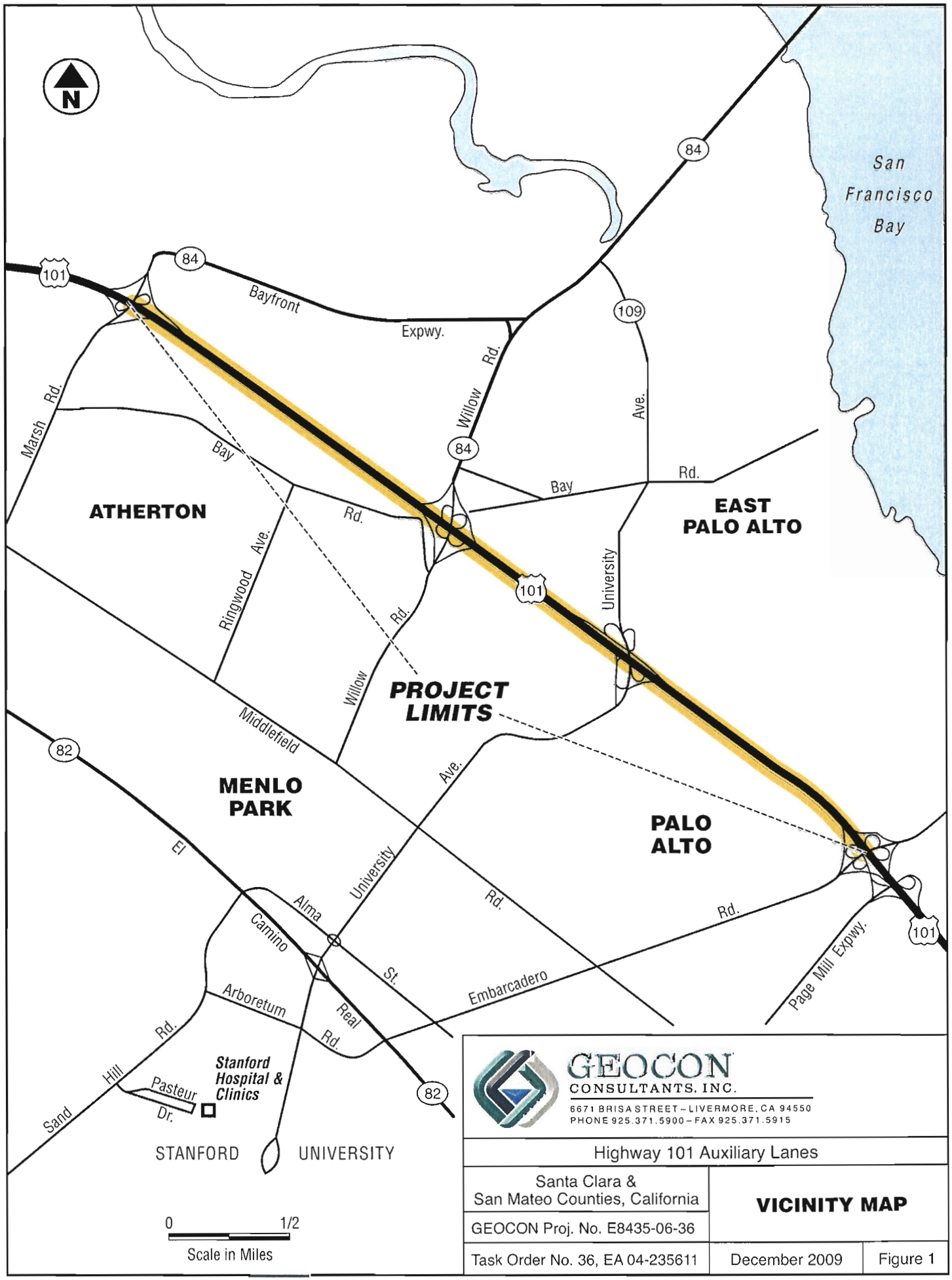
TPHg and VOCs were not detected above the laboratory reporting limits. The reported TPHd and TPHmo concentrations were below their respective ESLs.

6.3.2 Grab-Groundwater

Organic compounds were not detected above their respective laboratory reporting limits in the grab-groundwater samples, with the exception of 4-isopropyltoluene, which does not have a published ESL value.

6.4 Worker Protection

Per Caltrans' requirements, the contractor(s) should prepare a project-specific health and safety plan to prevent or minimize worker exposure to impacted soil and 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.



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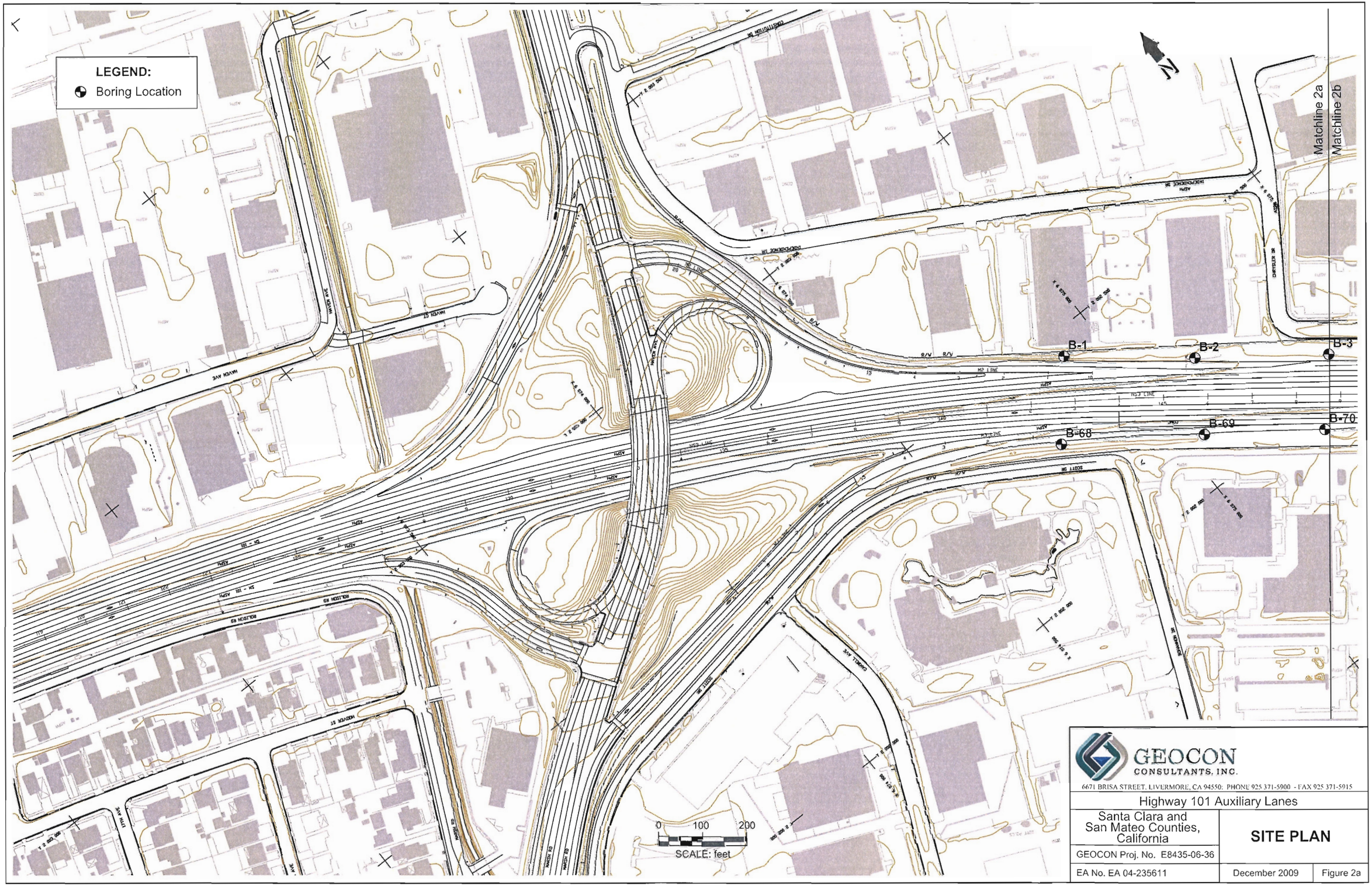
PHONE 925.371.5900 – FAX 925.371.5915

Highway 101 Auxiliary Lanes	
Santa Clara & San Mateo Counties, California	**VICINITY MAP**
GEOCON Proj. No. E8435-06-36	
Task Order No. 36, EA 04-235611	December 2009 — Figure 1



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Highway 101 Auxiliary Lanes

Santa Clara and San Mateo Counties, California

SITE PLAN

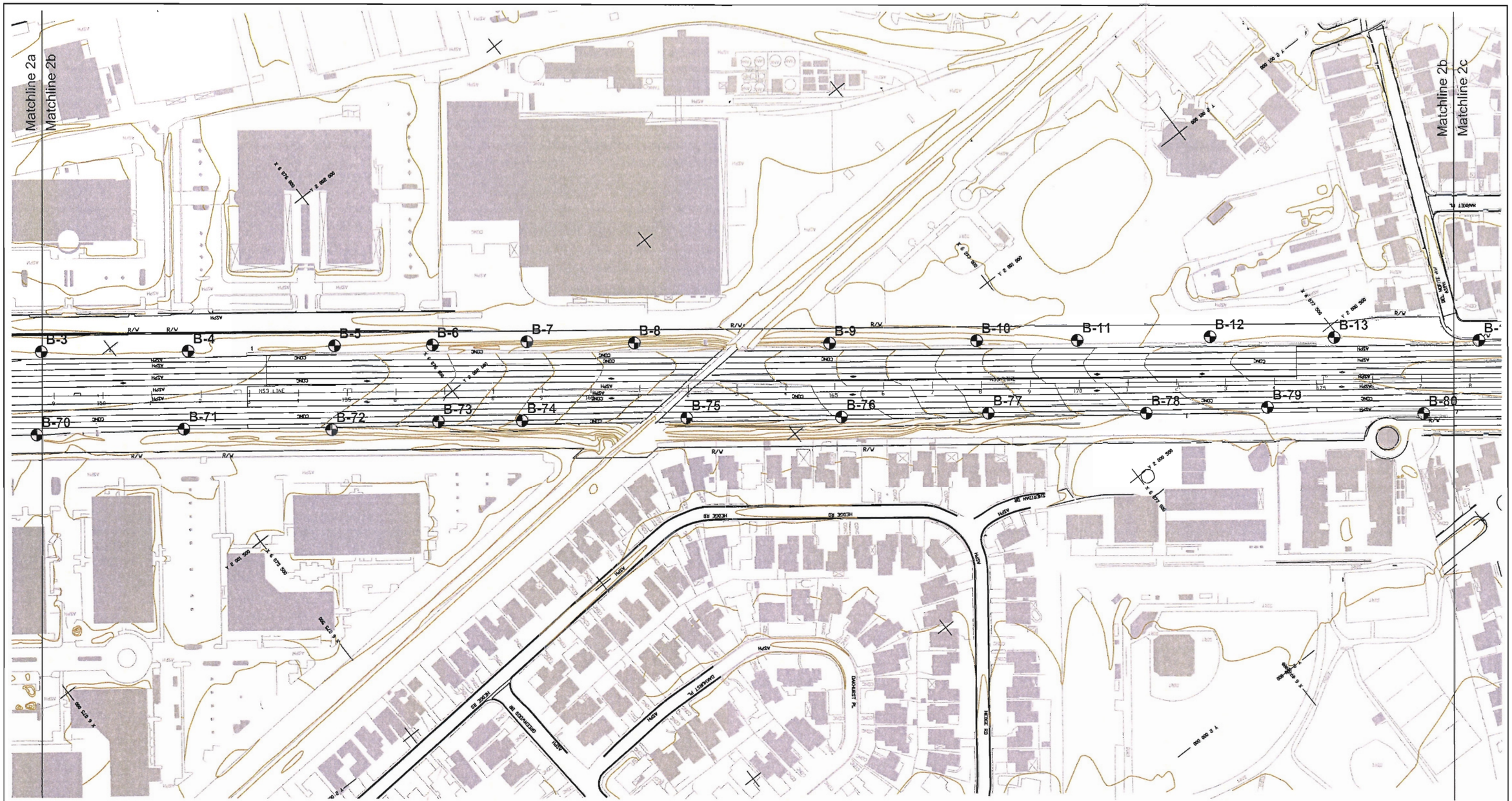
GEOCON Proj. No. E8435-06-36

EA No. EA 04-235611

December 2009

Figure 2a

SITE0110



LEGEND:

Boring Location

0 100 200

SCALE: feet

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Highway 101 Auxiliary Lanes

Santa Clara and San Mateo Counties, California

SITE PLAN

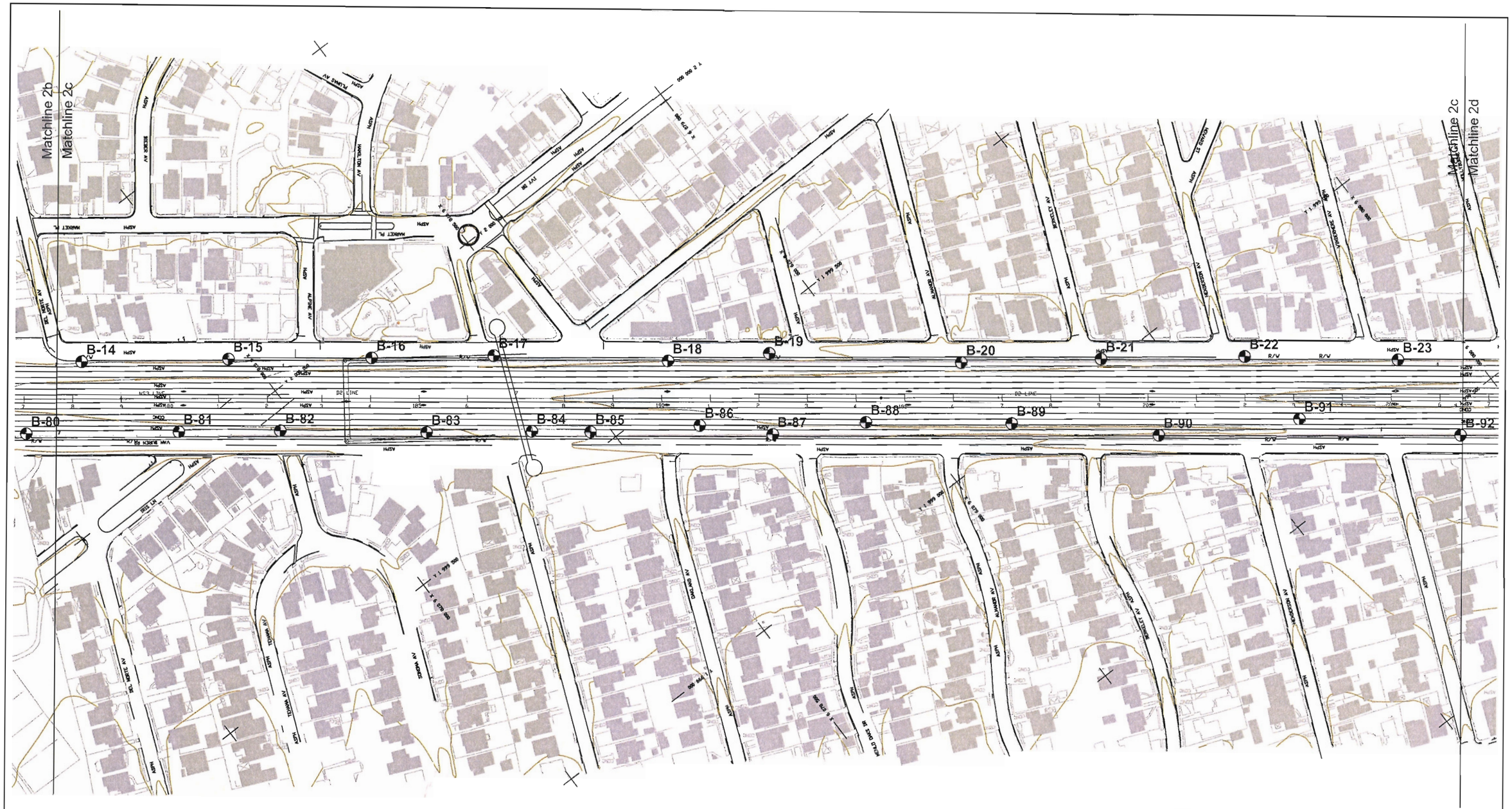
GEOCON Proj. No. E8435-06-36

EA No. EA 04-235611

December 2009

Figure 2b

SITE0110



LEGEND:

Boring Location

N

0 100 200

SCALE: feet

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Highway 101 Auxiliary Lanes

Santa Clara and San Mateo Counties, California

SITE PLAN

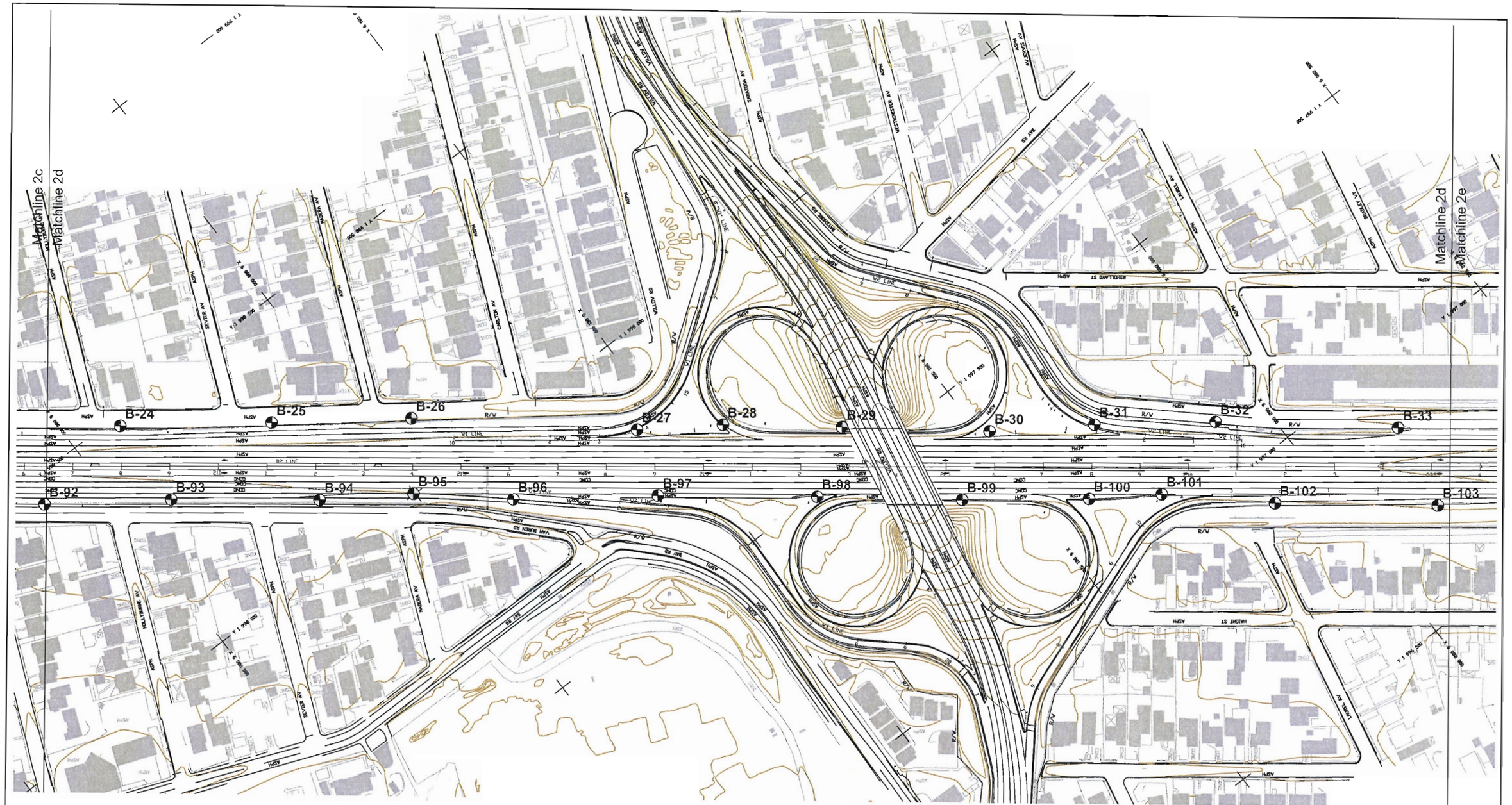
GEOCON Proj. No. E8435-06-36

EA No. EA 04-235611

December 2009

Figure 2c

SITE0110



LEGEND:

Boring Location

0 100 200

SCALE: feet

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Highway 101 Auxiliary Lanes

Santa Clara and San Mateo Counties, California

SITE PLAN

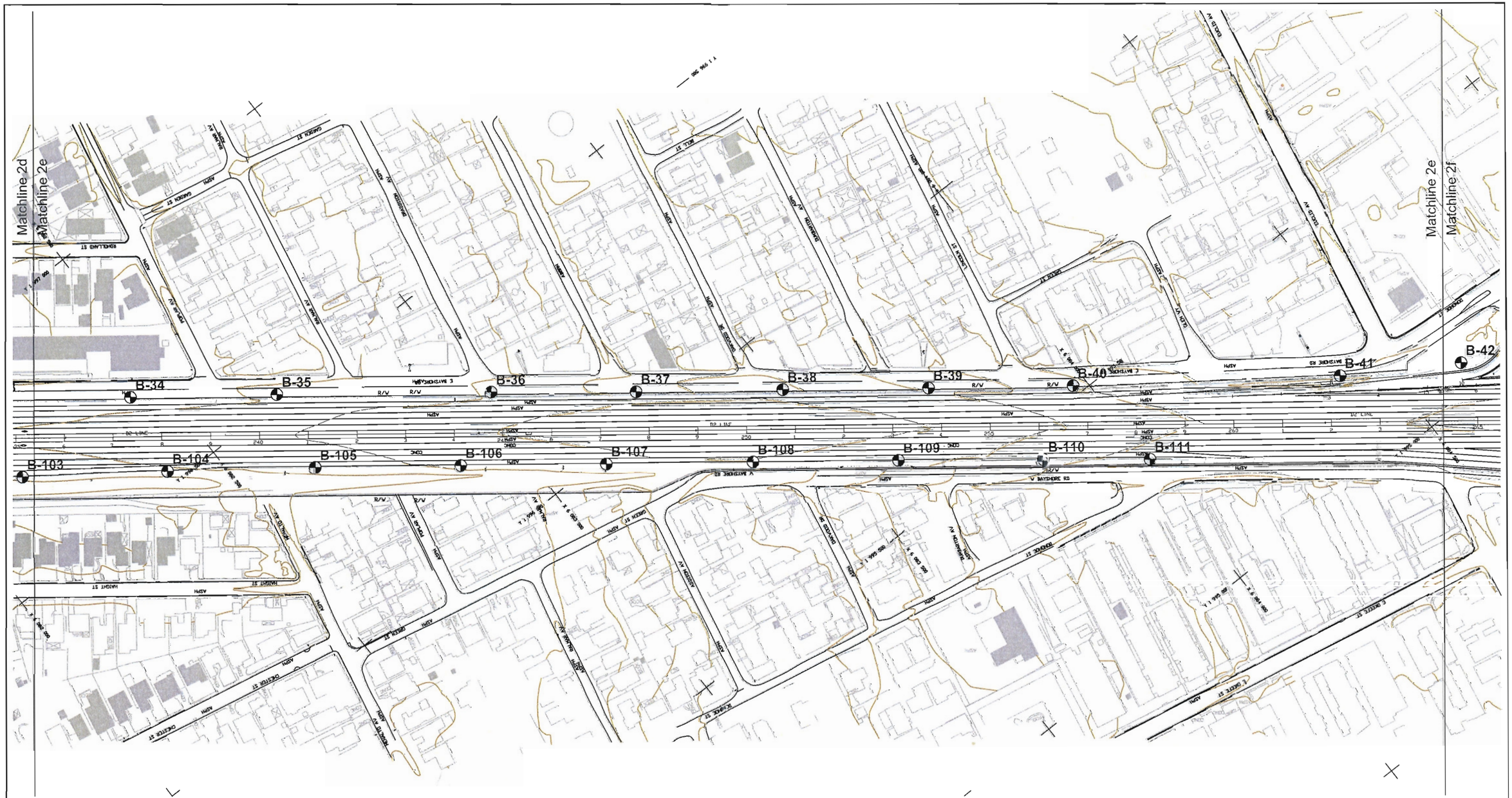
GEOCON Proj. No. E8435-06-36

EA No. EA 04-235611

December 2009

Figure 2d

SITE0110



LEGEND:

Boring Location

N

0 100 200

SCALE: feet

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Highway 101 Auxiliary Lanes

Santa Clara and San Mateo Counties, California

SITE PLAN

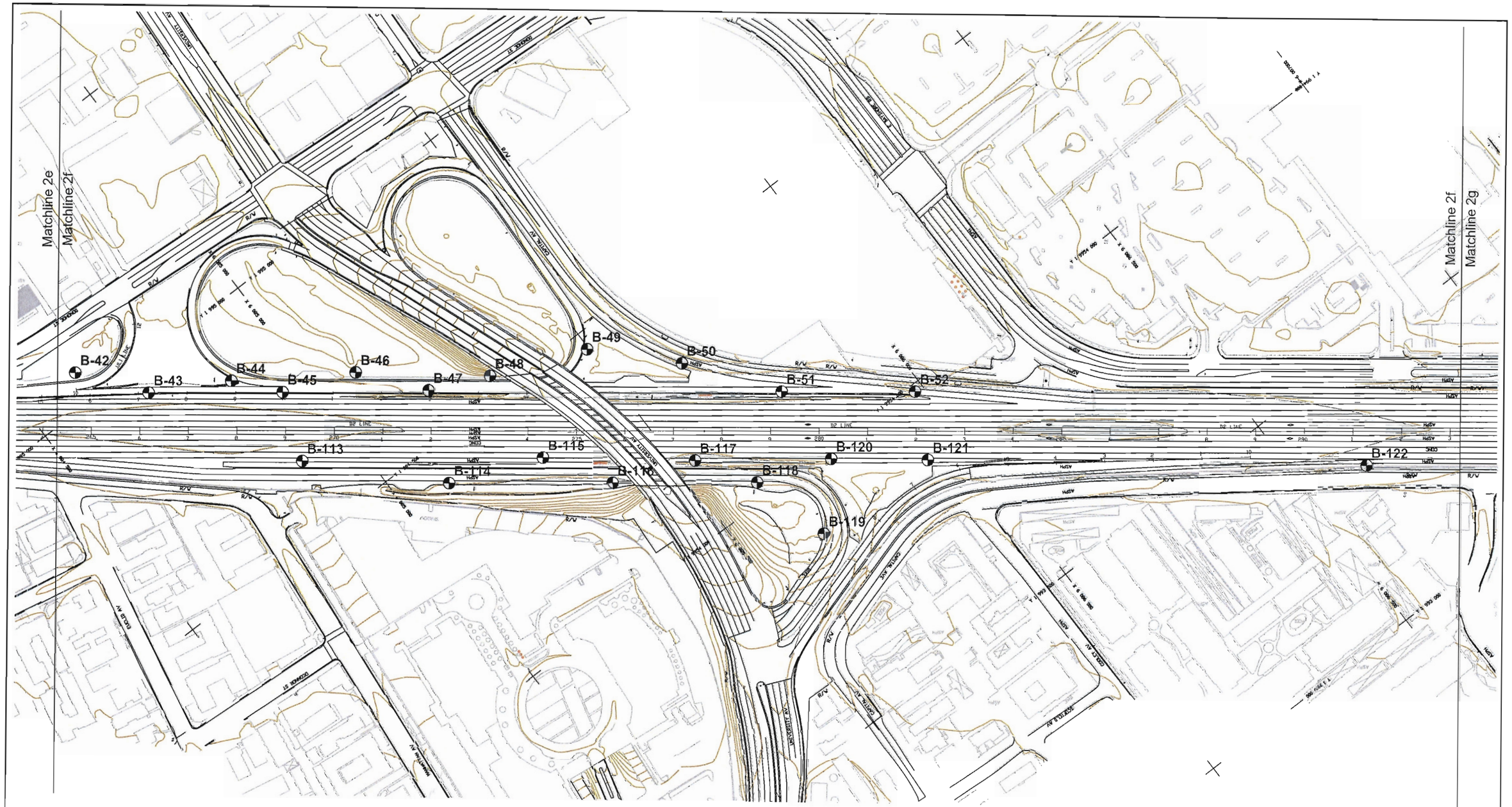
GEOCON Proj. No. E8435-06-36

EA No. EA 04-235611

December 2009

Figure 2e

SITE0110



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Highway 101 Auxiliary Lanes

Santa Clara and San Mateo Counties, California

SITE PLAN

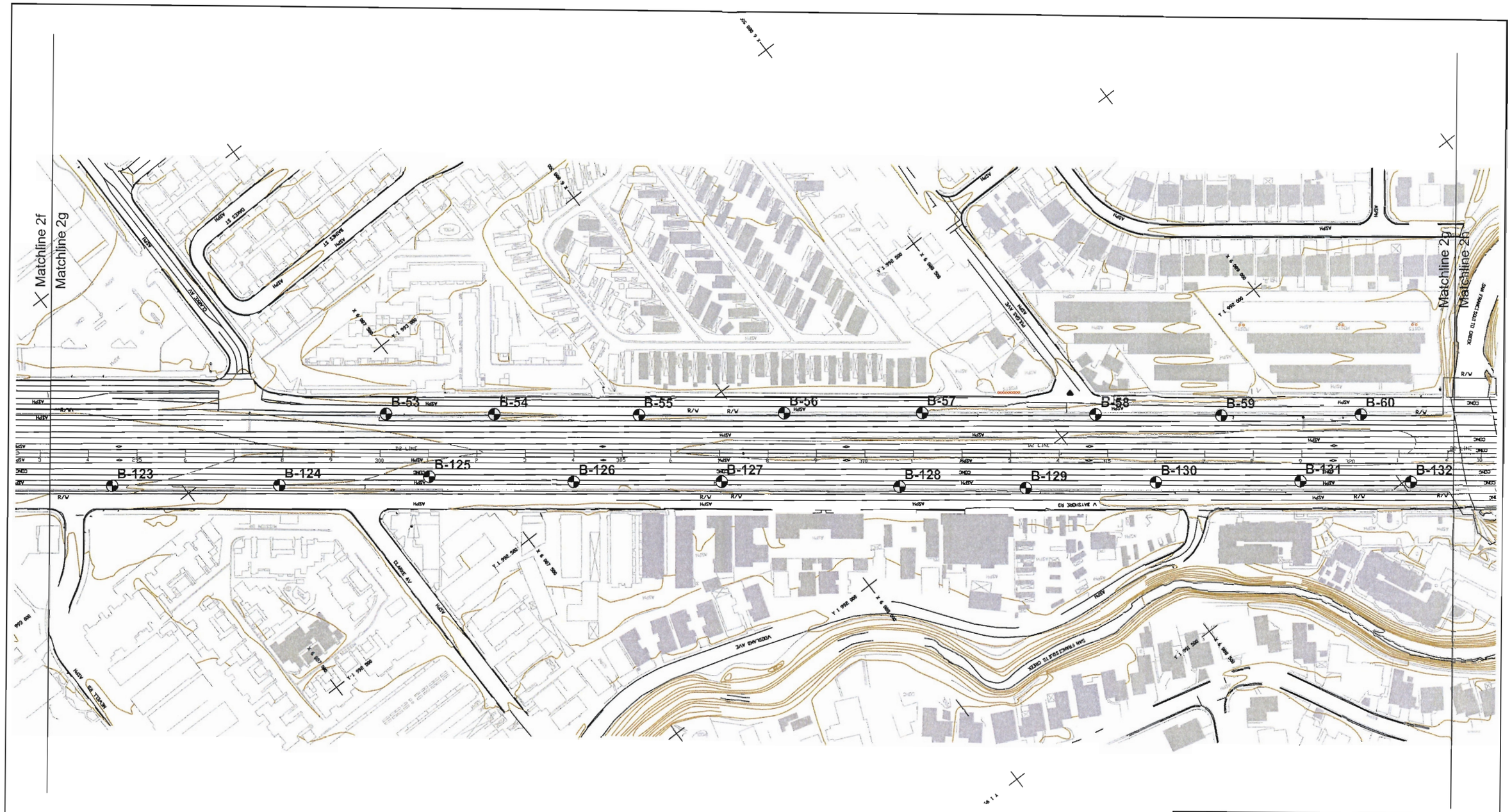
GEOCON Proj. No. E8435-06-36

EA No. EA 04-235611

December 2009

Figure 2f

SITE0110



LEGEND:

Boring Location

N

0 100 200

SCALE: feet

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Highway 101 Auxiliary Lanes

Santa Clara and San Mateo Counties, California

SITE PLAN

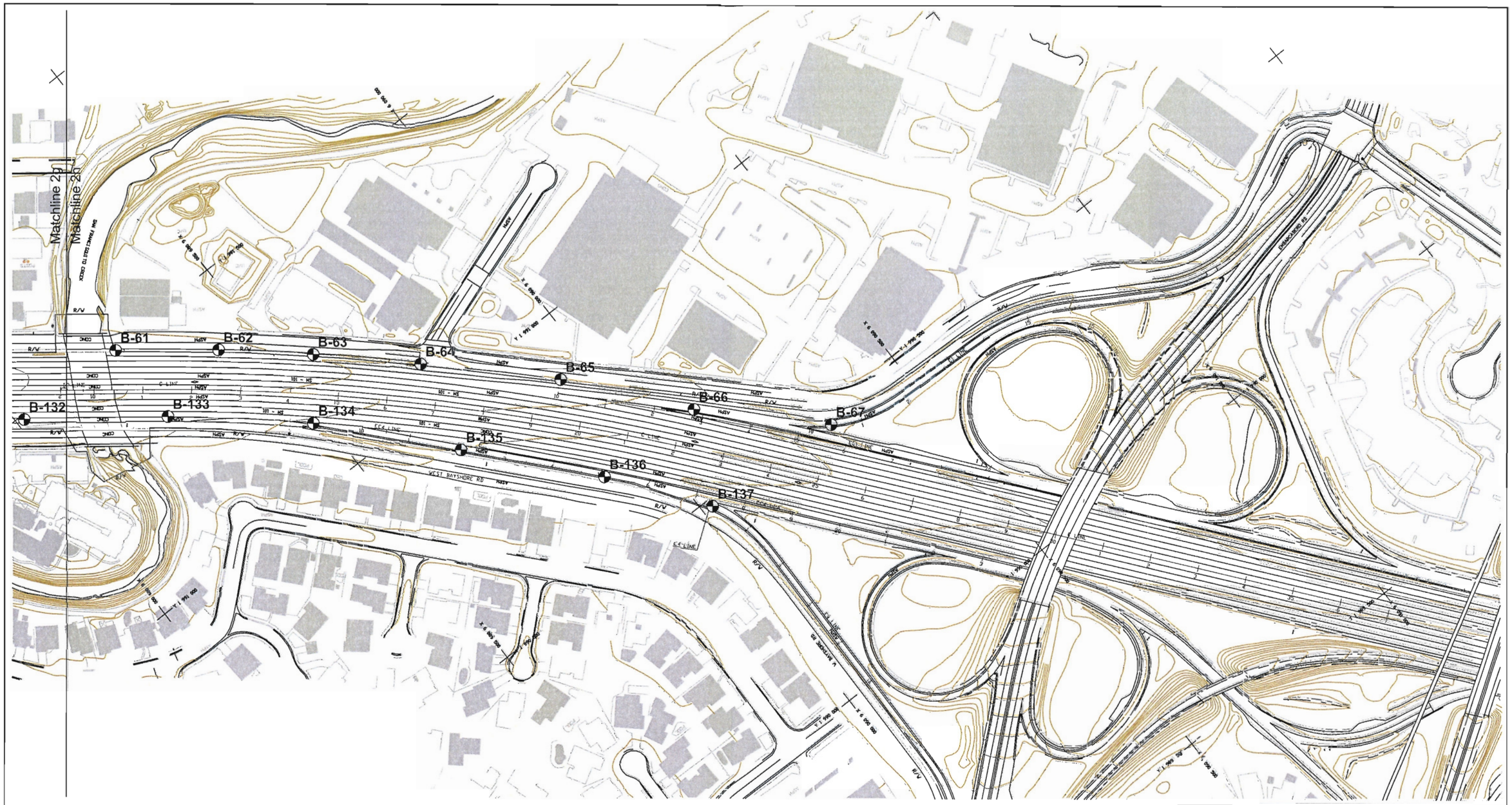
GEOCON Proj. No. E8435-06-36

EA No. EA 04-235611

December 2009

Figure 2g

SITE0110



LEGEND:

Boring Location

N

0 100 200

SCALE: feet

GEOCON CONSULTANTS, INC.

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Highway 101 Auxiliary Lanes

Santa Clara and San Mateo Counties, California

SITE PLAN

GEOCON Proj. No. E8435-06-36

EA No. EA 04-235611

December 2009

Figure 2h

SITE0110

TABLE 1
Boring Coordinates
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Boring	Northing	Easting
B-1	2,002,446.309	6,074,910.656
B-2	2,002,260.699	6,075,141.045
B-3	2,002,081.012	6,075,384.226
B-4	2,001,896.906	6,075,622.235
B-5	2,001,721.634	6,075,865.281
B-6	2,001,599.343	6,076,024.775
B-7	2,001,485.651	6,076,181.794
B-8	2,001,348.256	6,076,353.959
B-9	2,001,101.857	6,076,669.769
B-10	2,000,920.889	6,076,909.823
B-11	2,000,795.027	6,077,073.107
B-12	2,000,633.868	6,077,292.202
B-13	2,000,476.731	6,077,491.387
B-14	2,000,289.795	6,077,721.038
B-15	2,000,110.089	6,077,963.512
B-16	1,999,933.837	6,078,198.398
B-17	1,999,784.338	6,078,401.617
B-18	1,999,557.533	6,078,679.334
B-19	1,999,443.181	6,078,854.631
B-20	1,999,188.014	6,079,156.451
B-21	1,999,019.430	6,079,388.881
B-22	1,998,843.345	6,079,627.035
B-23	1,998,646.847	6,079,872.078
B-24	1,998,479.016	6,080,102.407
B-25	1,998,295.232	6,080,353.437
B-26	1,998,127.871	6,080,587.959
B-27	1,997,826.559	6,080,943.772
B-28	1,997,727.394	6,081,090.707
B-29	1,997,574.285	6,081,283.255
B-30	1,997,382.996	6,081,519.355
B-31	1,997,262.815	6,081,699.530
B-32	1,997,115.492	6,081,901.848
B-33	1,996,878.079	6,082,192.356
B-34	1,996,693.327	6,082,435.960
B-35	1,996,513.039	6,082,675.252
B-36	1,996,245.678	6,083,025.233
B-37	1,996,062.921	6,083,259.489
B-38	1,995,881.099	6,083,499.797
B-39	1,995,699.235	6,083,736.981
B-40	1,995,519.944	6,083,973.414
B-41	1,995,198.136	6,084,417.155
B-42	1,995,065.897	6,084,628.631
B-43	1,994,941.101	6,084,723.766
B-44	1,994,857.484	6,084,873.638
B-45	1,994,775.042	6,084,943.491
B-46	1,994,715.919	6,085,087.448
B-47	1,994,595.605	6,085,184.900
B-48	1,994,542.400	6,085,303.800

TABLE 1
Boring Coordinates
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Boring	Northing	Easting
B-49	1,994,464.136	6,085,496.276
B-50	1,994,322.707	6,085,634.374
B-51	1,994,152.199	6,085,762.596
B-52	1,993,985.513	6,085,981.139
B-53	1,992,883.124	6,087,422.287
B-54	1,992,747.120	6,087,599.693
B-55	1,992,564.565	6,087,836.138
B-56	1,992,386.674	6,088,076.288
B-57	1,992,214.222	6,088,302.727
B-58	1,991,995.120	6,088,584.610
B-59	1,991,835.945	6,088,789.316
B-60	1,991,662.919	6,089,018.964
B-61	1,991,486.187	6,089,251.610
B-62	1,991,357.127	6,089,418.304
B-63	1,991,231.759	6,089,565.182
B-64	1,991,080.731	6,089,727.702
B-65	1,990,879.289	6,089,935.383
B-66	1,990,663.933	6,090,113.300
B-67	1,990,466.578	6,090,317.079
B-68	2,002,293.865	6,074,783.337
B-69	2,002,112.092	6,075,051.309
B-70	2,001,953.288	6,075,272.788
B-71	2,001,777.023	6,075,517.779
B-72	2,001,590.504	6,075,754.905
B-73	2,001,468.909	6,075,938.681
B-74	2,001,364.641	6,076,075.200
B-75	2,001,161.954	6,076,344.889
B-76	2,000,968.586	6,076,596.277
B-77	2,000,790.197	6,076,838.131
B-78	2,000,591.500	6,077,093.000
B-79	2,000,448.399	6,077,296.335
B-80	2,000,242.451	6,077,540.327
B-81	2,000,054.115	6,077,792.164
B-82	1,999,929.309	6,077,958.636
B-83	1,999,743.709	6,078,195.633
B-84	1,999,613.413	6,078,369.473
B-85	1,999,539.025	6,078,464.483
B-86	1,999,413.304	6,078,650.851
B-87	1,999,307.551	6,078,759.000
B-88	1,999,210.562	6,078,926.080
B-89	1,999,026.268	6,079,162.459
B-90	1,998,823.041	6,079,388.241
B-91	1,998,673.656	6,079,637.928
B-92	1,998,446.341	6,079,880.071
B-93	1,998,295.400	6,080,093.500
B-94	1,998,109.600	6,080,335.300
B-95	1,998,002.460	6,080,497.200
B-96	1,997,867.715	6,080,654.718

TABLE 1
Boring Coordinates
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Boring	Northing	Easting
B-97	1,997,693.249	6,080,895.934
B-98	1,997,492.071	6,081,155.618
B-99	1,997,305.630	6,081,388.927
B-100	1,997,148.695	6,081,598.021
B-101	1,997,065.091	6,081,723.148
B-102	1,996,909.019	6,081,897.283
B-103	1,996,702.240	6,082,160.371
B-104	1,996,527.514	6,082,402.142
B-105	1,996,347.624	6,082,644.878
B-106	1,996,166.356	6,082,883.210
B-107	1,995,984.822	6,083,120.212
B-108	1,995,802.596	6,083,360.245
B-109	1,995,621.262	6,083,597.176
B-110	1,995,439.129	6,083,832.155
B-111	1,995,304.594	6,084,004.851
B-113	1,994,638.534	6,084,889.559
B-114	1,994,418.667	6,085,103.087
B-115	1,994,343.108	6,085,288.846
B-116	1,994,214.590	6,085,371.682
B-117	1,994,147.996	6,085,534.702
B-118	1,994,034.961	6,085,609.209
B-119	1,993,868.179	6,085,654.594
B-120	1,993,980.797	6,085,760.024
B-121	1,993,858.388	6,085,916.835
B-122	1,993,300.933	6,086,628.733
B-123	1,993,108.195	6,086,885.007
B-124	1,992,899.838	6,087,158.911
B-125	1,992,726.744	6,087,415.110
B-126	1,992,537.556	6,087,645.595
B-127	1,992,353.060	6,087,888.189
B-128	1,992,122.300	6,088,173.500
B-129	1,991,962.200	6,088,378.400
B-130	1,991,809.183	6,088,598.583
B-131	1,991,630.026	6,088,836.873
B-132	1,991,490.706	6,089,016.371
B-133	1,991,313.858	6,089,253.131
B-134	1,991,120.836	6,089,479.066
B-135	1,990,891.680	6,089,685.518
B-136	1,990,667.528	6,089,884.164
B-137	1,990,484.322	6,090,022.272

Coordinates are shown in feet, NAD 83 (Zone 3)

TABLE 2
Summary of Lead and pH Results - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Sample ID	Sample Depth (feet)	Total Lead (mg/kg)	WET Lead (mg/l)	TCLP Lead (mg/l)	pH
B-1 0'	0	34	---	---	---
B-1 1'	1	<5.0	---	---	8.7
B-1 2'	2	<5.0	---	---	---
B-2 0'	0	40	---	---	---
B-2 1'	1	4.0	---	---	---
B-2 2'	2	2.8	---	---	---
B-3 0'	0	360	40	---	---
B-3 1'	1	25	---	---	---
B-3 2'	2	110	15	---	---
B-4 0'	0	130	8.0	---	---
B-4 1'	1	19	---	---	---
B-4 2'	2	92	1.8	---	---
B-5 0'	0	540	22	---	---
B-5 1'	1	390	18	---	---
B-5 2'	2	5.4	---	---	---
B-6 0'	0	290	11	---	---
B-6 1'	1	1,100	---	0.47	7.6
B-6 2'	2	220	2.3	---	---
B-7 0'	0	730	---	<0.25	---
B-7 1'	1	100	0.39	---	7.3
B-7 2'	2	280	14	---	---
B-7 4'	4	12	---	---	---
B-7 6'	6	3.7	---	---	---
B-8 0'	0	840	---	<0.25	---
B-8 1'	1	450	24	---	---
B-8 2'	2	560	6.1	---	---
B-9 0'	0	610	---	---	---
B-9 1'	1	470	19	---	7.7
B-9 2'	2	15	---	---	---
B-10 0'	0	680	---	<0.25	---
B-10 1'	1	56	1.2	---	---
B-10 2'	2	7.7	---	---	---
B-11 0'	0	1,100	---	0.51	---
B-11 1'	1	120	7.6	---	---
B-11 2'	2	21	---	---	---
B-12 0'	0	500	28	---	---
B-12 1'	1	320	12	---	7.8
B-12 2'	2	100	1.8	---	---
B-13 0'	0	15	---	---	---
B-13 1'	1	7.0	---	---	---
B-13 2'	2	50	---	---	---

TABLE 2
Summary of Lead and pH Results - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Sample ID	Sample Depth (feet)	Total Lead (mg/kg)	WET Lead (mg/l)	TCLP Lead (mg/l)	pH
B-14 0'	0	33	---	---	---
B-14 1'	1	12	---	---	7.8
B-14 2'	2	8.1	---	---	---
B-15 0'	0	170	5.6	---	---
B-15 1'	1	11	---	---	8.1
B-15 2'	2	4.1	---	---	---
B-16 0'	0	28	---	---	---
B-16 1'	1	11	---	---	---
B-16 2'	2	<5.0	---	---	---
B-17 0'	0	110	3.7	---	---
B-17 1'	1	120	8.7	---	---
B-17 2'	2	7.4	---	---	---
B-17 6'	6	5.5	---	---	---
B-17 12'	12	8.3	---	---	---
B-17 18'	18	6.8	---	---	---
B-18 0'	0	23	---	---	---
B-18 1'	1	6.6	---	---	---
B-18 2'	2	4.4	---	---	---
B-19 0'	0	190	10	---	---
B-19 1'	1	57	<0.25	---	---
B-19 2'	2	26	---	---	---
B-19 6'	6	7.4	---	---	---
B-19 12'	12	4.9	---	---	---
B-19 18'	18	4.9	---	---	---
B-20 0'	0	16	---	---	---
B-20 1'	1	10	---	---	8.1
B-20 2'	2	<5.0	---	---	---
B-21 0'	0	4.2	---	---	---
B-21 1'	1	18	---	---	---
B-21 2'	2	4.2	---	---	---
B-22 0'	0	55	4.5	---	---
B-22 1'	1	17	---	---	---
B-22 2'	2	6.4	---	---	---
B-23 0'	0	32	---	---	---
B-23 1'	1	4.1	---	---	8.3
B-23 2'	2	3.6	---	---	---
B-24 0'	0	26	---	---	---
B-24 1'	1	100	18	---	---
B-24 2'	2	7.2	---	---	---
B-25 0'	0	74	1.1	---	---
B-25 1'	1	2.8	---	---	---

TABLE 2
Summary of Lead and pH Results - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Sample ID	Sample Depth (feet)	Total Lead (mg/kg)	WET Lead (mg/l)	TCLP Lead (mg/l)	pH
B-25 2'	2	5.3	---	---	---
B-26 0'	0	450	7.5	---	---
B-26 1'	1	23	---	---	7.4
B-26 2'	2	12	---	---	---
B-27 0'	0	1,200	---	0.55	---
B-27 1'	1	15	---	---	---
B-27 2'	2	<5.0	---	---	---
B-28 0'	0	5,300	---	4.6	---
B-28 1'	1	150	6.3	---	---
B-28 2'	2	9.3	---	---	---
B-29 0'	0	270	4.7	---	---
B-29 1'	1	110	5.9	---	8.1
B-29 2'	2	31	---	---	---
B-30 0'	0	590	25	---	---
B-30 1'	1	63	1.9	---	---
B-30 2'	2	35	---	---	---
B-31 0'	0	100	71	---	---
B-31 1'	1	130	13	---	---
B-31 2'	2	9.6	---	---	---
B-32 0'	0	35	---	---	---
B-32 1'	1	140	13	---	7.7
B-32 2'	2	89	9.5	---	---
B-33 0'	0	50	---	---	---
B-33 1'	1	25	---	---	---
B-33 2'	2	8.7	---	---	---
B-34 0'	0	18	---	---	---
B-34 1'	1	110	<0.25	---	---
B-34 2'	2	7.2	---	---	---
B-35 0'	0	99	4.1	---	---
B-35 1'	1	560	29	---	7.3
B-35 2'	2	8.7	---	---	---
B-36 0'	0	23	---	---	---
B-36 1'	1	1,400	---	6.2	---
B-36 2'	2	5.1	---	---	---
B-37 0'	0	32	---	---	---
B-37 1'	1	360	4.3	---	---
B-37 2'	2	7.6	---	---	---
B-38 0'	0	30	---	---	---
B-38 1'	1	9.3	---	---	8.6
B-38 2'	2	22	---	---	---

TABLE 2
Summary of Lead and pH Results - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Sample ID	Sample Depth (feet)	Total Lead (mg/kg)	WET Lead (mg/l)	TCLP Lead (mg/l)	pH
B-39 0'	0	39	---	---	---
B-39 1'	1	990	---	0.30	---
B-39 2'	2	12	---	---	---
B-40 0'	0	16	---	---	---
B-40 1'	1	180	5.8	---	---
B-40 2'	2	12	---	---	---
B-41 0'	0	130	8.3	---	---
B-41 1'	1	290	0.70	---	8.3
B-41 2'	2	<5.0	---	---	---
B-42 0'	0	<5.0	---	---	---
B-42 1'	1	6.7	---	---	---
B-42 2'	2	6.4	---	---	---
B-43 0'	0	4,600	---	3.9	---
B-43 1'	1	8.6	---	---	---
B-43 2'	2	7.5	---	---	---
B-44 0'	0	910	---	0.68	---
B-44 1'	1	43	---	---	---
B-44 2'	2	<5.0	---	---	---
B-45 0'	0	17	---	---	---
B-45 1'	1	36	---	---	---
B-45 2'	2	12	---	---	---
B-46 0'	0	79	5.9	---	---
B-46 1'	1	34	---	---	---
B-46 2'	2	12	---	---	---
B-47 0'	0	390	16	---	---
B-47 1'	1	140	5.9	---	---
B-47 2'	2	<5.0	---	---	---
B-48 0'	0	200	4.0	---	---
B-48 1'	1	1,200	---	0.49	7.2
B-48 2'	2	49	---	---	---
B-49 0'	0	23	---	---	---
B-49 1'	1	8.0	---	---	---
B-49 2'	2	6.1	---	---	---
B-50 0'	0	49	---	---	---
B-50 1'	1	42	---	---	---
B-50 2'	2	14	---	---	---
B-51 0'	0	59	3.4	---	---
B-51 1'	1	37	---	---	8.2
B-51 2'	2	<5.0	---	---	---

TABLE 2
Summary of Lead and pH Results - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Sample ID	Sample Depth (feet)	Total Lead (mg/kg)	WET Lead (mg/l)	TCLP Lead (mg/l)	pH
B-52 0'	0	210	17	---	---
B-52 1'	1	470	0.51	---	---
B-52 2'	2	1.0	---	---	---
B-53 0'	0	27	---	---	---
B-53 1'	1	53	1.2	---	---
B-53 2'	2	51	0.93	---	---
B-54 0'	0	37	---	---	
B-54 1'	1	16	---	---	8.1
B-54 2'	2	12	---	---	---
B-55 0'	0	19	---	---	---
B-55 1'	1	57	10	---	---
B-55 2'	2	<5.0	---	---	---
B-56 0'	0	21	---	---	---
B-56 1'	1	1,100	---	0.77	---
B-56 2'	2	9.7	---	---	---
B-57 0'	0	310	11	---	---
B-57 1'	1	11	---	---	---
B-57 2'	2	<5.0	---	---	---
B-58 0'	0	260	19	---	---
B-58 1'	1	6.9	---	---	---
B-58 2'	2	10	---	---	---
B-59 0'	0	40	---	---	---
B-59 1'	1	5.3	---	---	8.3
B-59 2'	2	7.3	---	---	---
B-60 0'	0	39	---	---	---
B-60 1'	1	46	---	---	7.9
B-60 2'	2	6.5	---	---	---
B-60 4'	4	6.1	---	---	---
B-60 6'	6	6.3	---	---	---
B-61 0'	0	2,000	---	2.3	---
B-61 1'	1	33	---	---	---
B-61 2'	2	10	---	---	---
B-62 0'	0	260	12	---	---
B-62 1'	1	1,600	---	5.6	---
B-62 2'	2	23	---	---	---
B-63 0'	0	85	3.0	---	8.0
B-63 1'	1	4,100	---	5.6	8.1
B-63 2'	2	11	---	---	7.9
B-64 0'	0	78	6.1	---	---
B-64 1'	1	6.8	---	---	---
B-64 2'	2	7.9	---	---	---

TABLE 2
Summary of Lead and pH Results - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Sample ID	Sample Depth (feet)	Total Lead (mg/kg)	WET Lead (mg/l)	TCLP Lead (mg/l)	pH
B-65 0'	0	1,000	---	0.38	---
B-65 1'	1	1,200	---	0.71	---
B-65 2'	2	830	---	0.87	---
B-66 0'	0	1,400	---	1.7	---
B-66 1'	1	180	9.5	---	8.0
B-66 2'	2	11		---	---
B-67 0'	0	440	25	---	---
B-67 1'	1	31	---	---	---
B-67 2'	2	3.5	---	---	---
B-68 0'	0	140	7.1	---	---
B-68 1'	1	26	---	---	---
B-68 2'	2	1,900	---	<0.25	---
B-69 0'	0	7.8	---	---	8.1
B-69 1'	1	1.5	---	---	8.5
B-69 2'	2	55	2.0	---	8.3
B-70 0'	0	130	11	---	---
B-70 1'	1	29	---	---	---
B-70 2'	2	8.3	---	---	---
B-71 0'	0	1,000	---	0.75	---
B-71 1'	1	470	20	---	---
B-71 2'	2	7.2	---	---	---
B-72 0'	0	1,400	---	0.33	7.2
B-72 1'	1	330	9.3	---	8.1
B-72 2'	2	<5.0	---	---	8.7
B-73 0'	0	160	19	---	---
B-73 1'	1	10	---	---	7.9
B-73 2'	2	<5.0	---	---	---
B-73 4'	4	5.0	---	---	---
B-73 6'	6	4.4	---	---	---
B-74 0'	0	120	8.5	---	---
B-74 1'	1	160	5.9	---	7.9
B-74 2'	2	5.3	---	---	---
B-74 4'	4	3.5	---	---	---
B-74 6'	6	4.4	---	---	---
B-75 0'	0	370	24	---	---
B-75 1'	1	87	2.1	---	8.0
B-75 2'	2	57	1.6	---	---
B-75 4'	4	3.8	---	---	---
B-75 6'	6	3.2	---	---	---
B-76 0'	0	130	13	---	---
B-76 1'	1	8.2	---	---	8.0

TABLE 2
Summary of Lead and pH Results - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Sample ID	Sample Depth (feet)	Total Lead (mg/kg)	WET Lead (mg/l)	TCLP Lead (mg/l)	pH
B-76 2'	2	3.3	---	---	---
B-76 4'	4	4.4	---	---	---
B-76 6'	6	6.8	---	---	---
B-77 0'	0	210	3.9	---	---
B-77 1'	1	210	3.4	---	8.1
B-77 2'	2	5.6	---	---	---
B-77 4'	4	3.4	---	---	---
B-77 6'	6	2.8	---	---	---
B-78 0'	0	17	---	---	---
B-78 1'	1	27	---	---	7.8
B-78 2'	2	4.1	---	---	---
B-78 4'	4	6.0	---	---	---
B-78 6'	6	7.5	---	---	---
B-79 0'	0	2,700	---	0.86	---
B-79 1'	1	25	---	---	---
B-79 2'	2	2.4	---	---	---
B-80 0'	0	130	9.6	---	---
B-80 1'	1	1,100	---	0.44	---
B-80 2'	2	5.2	---	---	---
B-81 0'	0	450	3.8	---	7.5
B-81 1'	1	14	---	---	7.9
B-81 2'	2	16	---	---	8.4
B-82 0'	0	10	---	---	---
B-82 1'	1	870	---	<0.25	---
B-82 2'	2	8.9	---	---	---
B-83 0'	0	72	3.8	---	---
B-83 1'	1	1,300	---	2.9	---
B-83 2	2	12	---	---	---
B-84 0'	0	470	15	---	---
B-84 1'	1	9.5	---	---	---
B-84 2'	2	8.0	---	---	---
B-84 6'	6	8.5	---	---	---
B-84 12'	12	6.5	---	---	---
B-84 18'	18	4.8	---	---	---
B-85 0	0	11	---	---	8.4
B-85 1'	1	37	---	---	7.7
B-85 2'	2	6.1	---	---	7.6
B-86 0'	0	490	25	---	---
B-86 1'	1	150	9.0	---	---
B-86 2'	2	7.0	---	---	---
B-87 0'	0	300	14	---	---
B-87 1'	1	42	---	---	---

TABLE 2
Summary of Lead and pH Results - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Sample ID	Sample Depth (feet)	Total Lead (mg/kg)	WET Lead (mg/l)	TCLP Lead (mg/l)	pH
B-87 2'	2	8.0	---	---	---
B-87 6'	6	5.8	---	---	---
B-87 12'	12	4.5	---	---	---
B-87 18'	18	4.0	---	---	---
B-88 0'	0	1,100	---	2.2	---
B-88 1'	1	140	8.9	---	---
B-88 2'	2	8.0	---	---	---
B-89 0'	0	100	6.6	---	---
B-89 1'	1	630	---	---	---
B-89 2'	2	8.0	---	---	---
B-90 0'	0	30	---	---	---
B-90 1'	1	65	1.4	---	---
B-90 2'	2	7.1	---	---	---
B-91 0'	0	480	37	---	---
B-91 1'	1	9.1	---	---	---
B-91 2'	2	7.9	---	---	---
B-92 0'	0	560	25	---	7.6
B-92 1'	1	83	2.5	---	8.3
B-92 2'	2	8.4	---	---	7.9
B-93 0'	0	530	19	---	---
B-93 1'	1	160	7.4	---	---
B-93 2'	2	18	---	---	---
B-94 0'	0	46	---	---	---
B-94 1'	1	5.7	---	---	---
B-94 2'	2	6.7	---	---	---
B-95 0'	0	980	---	0.65	---
B-95 1'	1	22	---	---	---
B-95 2'	2	10	---	---	---
B-96 0'	0	1,100	---	0.50	7.4
B-96 1'	1	280	29	---	8.0
B-96 2'	2	8.2	---	---	7.7
B-97 0'	0	140	11	---	---
B-97 1'	1	22	---	---	---
B-97 2'	2	6.9	---	---	---
B-98 0'	0	240	15	---	---
B-98 1'	1	65	1.4	---	---
B-98 2'	2	15	---	---	---
B-99 0'	0	810	---	0.80	---
B-99 1'	1	790	---	1.3	7.8
B-99 2'	2	820	---	0.79	---

TABLE 2
Summary of Lead and pH Results - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Sample ID	Sample Depth (feet)	Total Lead (mg/kg)	WET Lead (mg/l)	TCLP Lead (mg/l)	pH
B-100 0'	0	5,300	---	1.1	---
B-100 1'	1	83	2.8	---	---
B-100 2'	2	18	---	---	---
B-101 0'	0	27	---	---	---
B-101 1'	1	490	40	---	---
B-101 2'	2	190	5.3	---	---
B-102 0'	0	170	12	---	7.4
B-102 1'	1	21	---	---	8.3
B-102 2'	2	11	---	---	8.3
B-103 0'	0	880	---	0.40	---
B-103 1'	1	79	1.5	---	---
B-103 2'	2	6.6	---	---	---
B-104 0'	0	1,800	---	51	---
B-104 1'	1	15	---	---	---
B-104 2'	2	15	---	---	---
B-105 0'	0	98	65	---	7.6
B-105 1'	1	16	---	---	7.8
B-105 2'	2	8.3	---	---	7.5
B-106 0'	0	1,200	---	1.9	---
B-106 1'	1	13	---	---	---
B-106 2'	2	8.6	---	---	---
B-107 0'	0	1,200	---	2.6	---
B-107 1'	1	6.1	---	---	---
B-107 2'	2	5.7	---	---	---
B-108 0'	0	56	4.1	---	7.8
B-108 1'	1	7.5	---	---	8.5
B-108 2'	2	7.0	---	---	7.5
B-109 0'	0	350	18	---	---
B-109 1'	1	540	38	---	---
B-109 2'	2	13	---	---	---
B-110 0'	0	30	---	---	---
B-110 1'	1	13	---	---	---
B-110 2'	2	6.3	---	---	---
B-111 0'	0	<5.0	---	---	7.4
B-111 1'	1	120	1.4	---	7.8
B-111 2'	2	8.6	---	---	7.1
B-113 0'	0	580	48	---	---
B-113 1'	1	45	---	---	---
B-113 2'	2	8.1	---	---	---
B-114 0'	0	21	---	---	---

TABLE 2
Summary of Lead and pH Results - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Sample ID	Sample Depth (feet)	Total Lead (mg/kg)	WET Lead (mg/l)	TCLP Lead (mg/l)	pH
B-114 1'	1	8.5	---	---	7.7
B-114 2'	2	6.0	---	---	---
B-115 0'	0	43	---	---	---
B-115 1'	1	10	---	---	---
B-115 2'	2	6.4	---	---	---
B-116 0'	0	75	3.1	---	---
B-116 1'	1	93	3.3	---	---
B-116 2'	2	14	---	---	---
B-117 0'	0	1,500	---	<0.25	---
B-117 1'	1	9.6	---	---	7.0
B-117 2'	2	5.9	---	---	---
B-118 0'	0	98	4.3	---	---
B-118 1'	1	100	7.0	---	---
B-118 2'	2	8.7	---	---	---
B-119 0'	0	83	1.7	---	---
B-119 1'	1	96	3.5	---	---
B-119 2'	2	6.1	---	---	---
B-120 0'	0	33	---	---	---
B-120 1'	1	36	---	---	7.2
B-120 2'	2	<5.0	---	---	---
B-121 0'	0	270	23	---	---
B-121 1'	1	21	---	---	---
B-121 2'	2	11	---	---	---
B-122 0'	0	1,900	---	2.1	---
B-122 1'	1	250	7.9	---	---
B-122 2'	2	20	---	---	---
B-123 0'	0	23	---	---	7.6
B-123 1'	1	540	4.1	---	8.0
B-123 2'	2	8.0	---	---	7.8
B-124 0'	0	89	---	---	---
B-124 1'	1	8.1	13	---	---
B-124 2'	2	6.6	---	---	---
B-125 0'	0	350	34	---	---
B-125 1'	1	79	0.59	---	---
B-125 2'	2	6.7	---	---	---
B-126 0'	0	260	16	---	7.9
B-126 1'	1	600	---	---	8.0
B-126 2'	2	19	---	---	8.0
B-127 0'	0	680	---	2.2	---
B-127 1'	1	100	4.5	---	---

TABLE 2
Summary of Lead and pH Results - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Sample ID	Sample Depth (feet)	Total Lead (mg/kg)	WET Lead (mg/l)	TCLP Lead (mg/l)	pH
B-127 2'	2	12	---	---	---
B-128 0'	0	50	---	---	---
B-128 1'	1	<5.0	---	---	---
B-128 2'	2	7.2	---	---	---
B-129 0'	0	120	0.82	---	---
B-129 1'	1	5.5	---	---	---
B-129 2'	2	19	---	---	---
B-130 0'	0	15	---	---	---
B-130 1'	1	20	---	---	---
B-130 2'	2	<5.0	---	---	---
B-131 4'	4	5.5	---	---	---
B-131 6'	6	4.5	---	---	---
B-131 0'	0	35	---	---	8.2
B-131 1'	1	15	---	---	7.7
B-131 2'	2	10	---	---	7.6
B-132 0'	0	910	---	0.51	---
B-132 1'	1	180	15	---	---
B-132 2'	2	8.1	---	---	---
B-133 0'	0	1,900	---	5.2	---
B-133 1'	1	1,200	---	<0.25	---
B-133 2'	2	18	---	---	---
B-134 0'	0	140	61	---	8.1
B-134 1'	1	5.6	---	---	8.4
B-134 2'	2	20	---	---	8.1
B-135 0'	0	590	31	---	---
B-135 1'	1	170	14	---	---
B-135 2'	2	10	---	---	---
B-136 0'	0	12	---	---	---
B-136 1'	1	7.1	---	---	---
B-136 2'	2	4.0	---	---	---
B-137 0'	0	950	---	0.53	---
B-137 1'	1	420	22	---	---
B-137 2'	2	10	---	---	---

Notes:

mg/kg = Milligrams per kilogram
mg/l = Milligrams per liter
WET = Waste Extraction Test using citric acid as the extraction fluid
TCLP = Toxicity Characteristic Leaching Procedure
--- = Not analyzed
<5.0 = Analyte was not detected above the laboratory reporting limit

TABLE 3
Summary of CAM17 Metals Results - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Sample ID	Sample Depth (ft)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Mercury
B-2 0'	0	<2.0	<1.0	290	<1.0	1.0	130	20	26	40	<1.0	350	<1.0	<1.0	<1.0	23	87	0.14
B-2 1'	1	<2.0	<1.0	210	<1.0	<1.0	4.6	4.0	<2.0	4.0	<1.0	3.5	<1.0	<1.0	<1.0	27	1,600	<0.10
B-2 2'	2	<2.0	<1.0	220	<1.0	<1.0	4.1	3.8	<2.0	2.8	<1.0	1.5	<1.0	<1.0	<1.0	27	85	<0.10
B-7 0'	0	<2.0	2.0	160	<1.0	1.1	37	7.1	51	730	14	39	<1.0	<1.0	<1.0	36	150	0.19
B-7 1'	1	<2.0	<1.0	410	<1.0	<1.0	20	11	29	100	11	58	<1.0	<1.0	<1.0	24	60	0.21
B-7 2'	2	<2.0	2.1	140	<1.0	<1.0	35	6.2	34	280	14	31	<1.0	<1.0	<1.0	38	95	<0.10
B-7 4'	4	12	10	150	<1.0	1.2	37	17	32	12	<1.0	71	1.7	<1.0	<1.0	51	130	0.10
B-7 6'	6	5.9	2.3	110	<1.0	<1.0	32	7.0	24	8.3	<1.0	36	1.4	<1.0	<1.0	40	51	<0.10
B-8 0'	0	3.7	<1.0	200	<1.0	2.2	53	9.8	61	840	<1.0	57	<1.0	<1.0	<1.0	40	260	0.19
B-8 1'	1	2.6	<1.0	130	<1.0	1.7	50	9.2	42	450	<1.0	50	<1.0	<1.0	<1.0	37	160	0.12
B-8 2'	2	2.8	<1.0	140	<1.0	1.7	54	9.8	41	5.2	<1.0	62	<1.0	<1.0	<1.0	39	160	0.17
B-11 0'	0	3.5	<1.0	210	<1.0	2.7	51	8.2	120	1,100	1.2	66	<1.0	<1.0	<1.0	34	420	0.26
B-11 1'	1	<2.0	<1.0	120	<1.0	1.3	32	7.1	22	120	<1.0	39	<1.0	<1.0	<1.0	32	73	<0.10
B-11 2'	2	<2.0	<1.0	130	<1.0	1.0	35	7.2	19	21	<1.0	34	<1.0	<1.0	<1.0	34	45	<0.10
B-13 0'	0	<2.0	<1.0	130	<1.0	<1.0	14	8.5	39	15	15	17	<1.0	<1.0	<1.0	32	26	<0.10
B-13 1'	1	<2.0	1.9	160	<1.0	1.3	32	8.6	34	7.0	1.8	42	<1.0	<1.0	<1.0	35	59	<0.10
B-13 2'	2	<2.0	<1.0	96	<1.0	<1.0	22	5.3	12	50	<1.0	24	<1.0	<1.0	<1.0	22	90	1.6
B-15 0'	0	<2.0	<1.0	150	<1.0	1.3	42	9.0	36	170	<1.0	39	<1.0	<1.0	<1.0	43	110	<0.10
B-15 1'	1	<2.0	<1.0	150	<1.0	<1.0	27	8.5	18	11	<1.0	33	<1.0	<1.0	<1.0	28	64	0.79
B-15 2'	2	<2.0	<1.0	100	<1.0	<1.0	61	6.8	17	4.1	<1.0	48	<1.0	<1.0	<1.0	33	43	<0.10
B-17 0'	0	<2.0	<1.0	140	<1.0	<1.0	46	11	32	110	<1.0	43	<1.0	<1.0	<1.0	54	120	<0.10
B-17 1'	1	<2.0	<1.0	130	<1.0	1.1	46	12	33	120	<1.0	45	<1.0	<1.0	<1.0	56	880	0.37
B-17 2'	2	<2.0	4.4	190	<1.0	<1.0	37	8.4	24	7.4	<1.0	39	<1.0	<1.0	<1.0	41	60	<0.10
B-17 6'	0	<2.0	2.4	150	<1.0	<1.0	38	6.2	22	5.5	<1.0	34	<1.0	<1.0	<1.0	39	49	<0.10
B-17 12'	12	<2.0	7.6	150	<1.0	<1.0	33	6.9	24	8.3	<1.0	32	<1.0	<1.0	<1.0	49	58	<0.10

TABLE 3
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Santa Clara and San Mateo Counties, California

Sample ID	Sample Depth (ft)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Mercury
B-17 18'	18	<2.0	5.2	83	<1.0	<1.0	33	8.1	21	6.8	<1.0	38	<1.0	<1.0	<1.0	39	60	<0.10
B-18 0'	0	<2.0	<1.0	220	<1.0	1.2	35	7.8	38	23	<1.0	47	<1.0	<1.0	<1.0	38	110	<0.10
B-18 1'	1	<2.0	<1.0	160	<1.0	1.2	24	7.0	15	6.6	<1.0	28	<1.0	<1.0	<1.0	25	52	<0.10
B-18 2'	2	<2.0	<1.0	77	<1.0	<1.0	33	5.4	18	4.4	<1.0	32	<1.0	<1.0	<1.0	28	46	<0.10
B-19 0'	0	<2.0	<1.0	110	<1.0	1.0	44	13	35	190	<1.0	42	<1.0	<1.0	<1.0	68	92	<0.10
B-19 1'	1	<2.0	3.0	160	<1.0	<1.0	47	9.8	25	57	<1.0	47	<1.0	<1.0	<1.0	40	79	<0.10
B-19 2'	2	<2.0	3.8	130	<1.0	<1.0	28	7.1	19	26	<1.0	34	<1.0	<1.0	<1.0	32	53	0.22
B-19 6'	6	<2.0	4.7	180	<1.0	<1.0	37	8.7	23	7.4	<1.0	41	<1.0	<1.0	<1.0	44	56	0.12
B-19 12'	12	<2.0	<1.0	91	<1.0	1.9	32	5.7	19	4.9	<1.0	34	<1.0	<1.0	<1.0	27	53	<0.10
B-19 18'	18	<2.0	<1.0	56	<1.0	<1.0	34	5.5	20	4.9	<1.0	40	<1.0	<1.0	<1.0	33	44	<0.10
B-21 0'	0	2.5	<1.0	260	<1.0	<1.0	24	8.5	19	4.2	<1.0	37	<1.0	<1.0	<1.0	49	39	<0.10
B-21 1'	1	4.7	<1.0	130	<1.0	1.2	41	13	40	18	<1.0	27	<1.0	<1.0	<1.0	70	39	<0.10
B-21 2'	2	2.1	<1.0	130	<1.0	<1.0	29	6.9	10	4.2	<1.0	30	<1.0	<1.0	<1.0	28	35	<0.10
B-23 0'	0	2.3	<1.0	430	<1.0	1.5	53	12	28	32	<1.0	85	<1.0	<1.0	<1.0	47	54	<0.10
B-23 1'	1	7.0	<1.0	46	<1.0	1.6	40	18	31	4.1	<1.0	26	<1.0	<1.0	<1.0	110	46	<0.10
B-23 2'	2	<2.0	<1.0	130	<1.0	<1.0	29	6.5	12	3.6	<1.0	30	<1.0	<1.0	<1.0	29	37	<0.10
B-25 0'	0	<2.0	<1.0	150	<1.0	1.0	33	8.6	61	74	1.3	35	<1.0	<1.0	<1.0	59	990	<0.10
B-25 1'	1	<2.0	<1.0	55	<1.0	1.7	84	21	44	2.8	<1.0	39	<1.0	<1.0	<1.0	140	50	<0.10
B-25 2'	2	2.3	<1.0	110	<1.0	<1.0	31	6.2	13	5.3	<1.0	26	<1.0	<1.0	<1.0	32	36	<0.10
B-28 0'	0	<2.0	<1.0	200	<1.0	2.8	50	11	82	5,300	<1.0	51	<1.0	<1.0	<1.0	51	470	0.11
B-28 1'	1	<2.0	<1.0	130	<1.0	1.5	56	16	40	150	<1.0	39	<1.0	<1.0	<1.0	96	84	<0.10
B-28 2'	2	<2.0	<1.0	180	<1.0	1.1	46	8.6	25	9.3	<1.0	37	<1.0	<1.0	<1.0	49	1,200	<0.10
B-31 0'	0	<2.0	<1.0	130	<1.0	1.4	46	11	32	100	1.4	35	<1.0	<1.0	<1.0	68	75	0.16
B-31 1'	1	<2.0	<1.0	190	<1.0	1.2	40	11	32	130	1.1	39	<1.0	<1.0	<1.0	43	87	<0.10

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B-31 2'	2	<2.0	<1.0	180	<1.0	1.2	50	9.3	25	9.6	<1.0	41	<1.0	<1.0	<1.0	50	65	<0.10
B-32 0'	0	3.0	<1.0	320	<1.0	1.1	31	6.1	41	35	<1.0	33	<1.0	<1.0	<1.0	32	190	<0.10
B-32 1'	1	<2.0	<1.0	160	<1.0	1.2	38	8.5	25	140	<1.0	38	<1.0	<1.0	<1.0	39	110	<0.10
B-32 2'	2	2.0	<1.0	130	<1.0	1.3	39	9.4	25	89	<1.0	38	<1.0	<1.0	<1.0	43	85	<0.10
B-33 0'	0	<2.0	<1.0	370	<1.0	1.3	49	11	56	50	<1.0	61	<1.0	<1.0	<1.0	54	110	<0.10
B-33 1'	1	<2.0	1.3	190	<1.0	1.2	40	9.4	25	25	1.3	43	<1.0	<1.0	<1.0	39	64	<0.10
B-33 2'	2	<2.0	3.2	260	<1.0	1.4	50	10	27	8.7	<1.0	44	<1.0	<1.0	<1.0	54	77	<0.10
B-35 0'	0	<2.0	<1.0	320	<1.0	1.4	58	10	54	99	<1.0	69	<1.0	<1.0	<1.0	48	150	<0.10
B-35 1'	1	<2.0	<1.0	250	<1.0	1.7	42	11	41	560	1.4	45	<1.0	<1.0	<1.0	43	150	<0.10
B-35 2'	2	<2.0	2.4	190	<1.0	1.2	44	8.7	25	8.7	<1.0	39	<1.0	<1.0	<1.0	47	68	<0.10
B-37 0'	0	<2.0	<1.0	350	<1.0	1.5	50	13	67	32	1.7	74	<1.0	<1.0	<1.0	54	180	<0.10
B-37 1'	1	<2.0	<1.0	210	<1.0	1.3	41	9.0	30	360	2.3	39	<1.0	<1.0	<1.0	47	110	<0.10
B-37 2'	2	<2.0	1.6	190	<1.0	1.2	45	8.9	23	7.6	<1.0	42	<1.0	<1.0	<1.0	45	65	<0.10
B-39 0'	0	<2.0	<1.0	430	<1.0	1.8	68	16	67	39	2.2	91	<1.0	<1.0	<1.0	71	180	<0.10
B-39 1'	1	<2.0	<1.0	180	<1.0	1.9	90	15	48	990	1.0	150	<1.0	<1.0	<1.0	47	230	<0.10
B-39 2'	2	<2.0	<1.0	150	<1.0	<1.0	38	7.7	19	12	<1.0	36	<1.0	<1.0	<1.0	39	53	0.16
B-41 0'	0	<2.0	<1.0	470	<1.0	1.3	47	8.2	86	130	1.7	47	<1.0	<1.0	<1.0	37	170	<0.10
B-41 1'	1	<2.0	<1.0	86	<1.0	1.3	47	13	38	290	<1.0	70	<1.0	<1.0	<1.0	61	110	<0.10
B-41 2'	2	<2.0	<1.0	32	<1.0	1.4	37	22	44	6.4	<1.0	31	<1.0	<1.0	<1.0	97	80	<0.10
B-43 0'	0	<2.0	5.5	170	<1.0	3.5	52	9.8	96	4,600	<1.0	51	<1.0	<1.0	<1.0	37	2,300	0.18
B-43 1'	1	<2.0	<1.0	14	<1.0	1.6	47	17	60	8.6	<1.0	29	<1.0	<1.0	<1.0	88	60	<0.10
B-43 2'	2	<2.0	2.9	170	<1.0	1.1	30	8.1	21	12	<1.0	36	<1.0	<1.0	<1.0	29	61	<0.10
B-46 0'	0	<2.0	<1.0	76	<1.0	1.3	43	14	36	79	<1.0	29	<1.0	<1.0	<1.0	75	68	<0.10

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B-46 1'	1	<2.0	<1.0	140	<1.0	1.2	36	15	44	34	<1.0	32	<1.0	<1.0	<1.0	70	88	<0.10
B-46 2'	2	<2.0	1.4	150	<1.0	1.1	32	7.4	25	49	<1.0	34	<1.0	<1.0	<1.0	34	79	0.51
B-49 0'	0	<2.0	<1.0	130	<1.0	1.3	47	13	40	23	<1.0	38	<1.0	<1.0	<1.0	63	110	<0.10
B-49 1'	1	<2.0	3.0	170	<1.0	1.3	31	9.0	23	8.0	<1.0	37	<1.0	<1.0	<1.0	33	75	0.16
B-49 2'	2	<2.0	1.4	140	<1.0	<1.0	28	6.6	20	<5.0	<1.0	30	<1.0	<1.0	<1.0	30	66	<0.10
B-52 0'	0	<2.0	<1.0	290	<1.0	1.2	36	8.2	53	210	<1.0	41	<1.0	<1.0	<1.0	38	140	<0.10
B-52 1'	1	<2.0	<1.0	160	<1.0	1.3	55	14	46	470	2.2	45	<1.0	<1.0	<1.0	46	87	<0.10
B-52 2'	2	<2.0	<1.0	51	<1.0	<1.0	46	19	40	51	<1.0	31	<1.0	<1.0	<1.0	66	40	<0.10
B-54 0'	0	<2.0	<1.0	280	<1.0	1.5	48	12	52	37	<1.0	72	<1.0	<1.0	<1.0	69	140	<0.10
B-54 1'	1	<2.0	<1.0	210	<1.0	1.5	46	13	33	16	<1.0	51	<1.0	<1.0	<1.0	55	75	<0.10
B-54 2'	2	<2.0	4.1	250	<1.0	1.9	49	12	37	<5.0	<1.0	56	<1.0	<1.0	<1.0	51	110	<0.10
B-56 0'	0	<2.0	<1.0	440	<1.0	1.0	44	8.9	41	21	<1.0	74	<1.0	<1.0	<1.0	37	120	0.11
B-56 1'	1	<2.0	<1.0	160	<1.0	2.3	57	10	78	1,100	1.2	56	<1.0	<1.0	<1.0	46	220	0.13
B-56 2'	2	<2.0	2.4	180	<1.0	1.3	34	9.0	25	220	<1.0	41	<1.0	<1.0	<1.0	35	76	<0.10
B-60 0'	0	8.2	<1.0	190	<1.0	1.0	45	8.9	84	39	2.4	47	<1.0	<1.0	<1.0	49	230	<0.10
B-60 1'	1	8.0	2.3	130	<1.0	<1.0	32	8.8	22	46	<1.0	34	<1.0	<1.0	<1.0	39	52	<0.10
B-60 2'	2	7.7	3.8	130	<1.0	<1.0	27	6.7	16	6.5	<1.0	31	<1.0	<1.0	<1.0	29	47	<0.10
B-60 4'	4	8.6	4.3	150	<1.0	<1.0	28	7.0	19	6.1	<1.0	33	<1.0	<1.0	<1.0	30	56	<0.10
B-60 6'	6	8.8	4.6	160	<1.0	1.1	28	6.4	20	23	<1.0	31	<1.0	<1.0	<1.0	32	56	<0.10
B-63 0'	0	<2.0	<1.0	230	<1.0	1.3	43	7.9	51	85	<1.0	45	<1.0	<1.0	<1.0	40	170	<0.10
B-63 1'	1	<2.0	<1.0	160	<1.0	2.6	71	13	59	4,100	<1.0	67	<1.0	<1.0	<1.0	56	320	0.11
B-63 2'	2	<2.0	<1.0	140	<1.0	<1.0	30	6.7	15	7.9	<1.0	30	<1.0	<1.0	<1.0	31	47	<0.10
B-65 0'	0	4.4	<1.0	240	<1.0	2.5	66	9.8	130	1,000	1.9	67	<1.0	<1.0	<1.0	46	450	0.16
B-65 1'	1	4.3	<1.0	110	<1.0	1.8	58	14	56	1,200	<1.0	48	<1.0	<1.0	<1.0	61	230	0.10

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B-65 2'	2	4.1	<1.0	80	<1.0	1.7	54	18	49	11	<1.0	42	<1.0	<1.0	<1.0	73	120	0.10
B-67 0'	0	4.0	<1.0	160	<1.0	1.7	58	10	49	440	<1.0	47	<1.0	<1.0	<1.0	48	210	<0.10
B-67 1'	1	2.4	<1.0	81	<1.0	<1.0	39	12	32	31	<1.0	29	<1.0	<1.0	<1.0	50	42	0.34
B-67 2'	2	4.9	<1.0	23	<1.0	1.3	55	18	33	1,900	<1.0	35	<1.0	<1.0	<1.0	83	42	<0.10
B-69 0'	0	<2.0	<1.0	35	<1.0	<1.0	8.5	9.1	40	7.8	<1.0	12	<1.0	<1.0	<1.0	70	57	0.14
B-69 1'	1	<2.0	<1.0	64	<1.0	<1.0	12	12	41	1.5	<1.0	35	<1.0	<1.0	<1.0	71	38	<0.10
B-69 2'	2	<2.0	<1.0	66	<1.0	1.3	47	16	39	55	<1.0	36	<1.0	<1.0	<1.0	91	61	<0.10
B-71 0'	0	<2.0	<1.0	160	<1.0	2.5	68	11	68	1,000	<1.0	64	<1.0	<1.0	<1.0	46	260	0.14
B-71 1'	1	<2.0	<1.0	120	<1.0	1.9	61	14	43	470	<1.0	42	<1.0	<1.0	<1.0	74	100	0.18
B-71 2'	2	<2.0	<1.0	58	<1.0	1.6	45	20	36	<5.0	<1.0	30	<1.0	<1.0	<1.0	120	51	<0.10
B-73 0'	0	<2.0	1.3	150	<1.0	<1.0	34	8.0	55	160	13	37	<1.0	<1.0	<1.0	39	91	<0.10
B-73 1'	1	<2.0	1.7	150	<1.0	<1.0	37	7.6	22	10	14	38	<1.0	<1.0	<1.0	36	60	<0.10
B-73 2'	2	<2.0	<1.0	42	<1.0	<1.0	62	20	45	<5.0	21	37	<1.0	<1.0	<1.0	110	52	<0.10
B-73 4'	4	<2.0	5.0	260	<1.0	<1.0	31	8.8	24	5.0	14	29	<1.0	<1.0	<1.0	44	57	<0.10
B-73 6'	6	<2.0	<1.0	64	<1.0	<1.0	34	5.7	16	4.4	12	25	<1.0	<1.0	<1.0	30	55	<0.10
B-74 0'	0	<2.0	<1.0	130	<1.0	<1.0	30	8.5	27	120	13	40	<1.0	<1.0	<1.0	37	62	<0.10
B-74 1'	1	<2.0	<1.0	130	<1.0	<1.0	35	8.6	28	160	14	39	<1.0	<1.0	<1.0	40	75	<0.10
B-74 2'	2	<2.0	1.3	100	<1.0	<1.0	32	8.1	22	5.3	14	34	<1.0	<1.0	<1.0	39	61	<0.10
B-74 4'	4	<2.0	<1.0	68	<1.0	<1.0	27	4.8	16	3.5	11	26	<1.0	<1.0	<1.0	27	41	<0.10
B-74 6'	6	<2.0	1.9	140	<1.0	<1.0	30	9.0	29	4.4	14	45	<1.0	<1.0	<1.0	36	51	<0.10
B-75 0'	0	<2.0	<1.0	84	<1.0	<1.0	36	8.0	23	370	13	37	<1.0	<1.0	<1.0	42	58	<0.10
B-75 1'	1	<2.0	<1.0	57	<1.0	<1.0	52	12	27	87	15	35	<1.0	<1.0	<1.0	67	51	<0.10
B-75 2'	2	<2.0	<1.0	18	<1.0	<1.0	37	4.6	7.5	57	9.0	20	<1.0	<1.0	<1.0	41	45	<0.10
B-75 4'	4	<2.0	<1.0	62	<1.0	<1.0	36	5.2	20	3.8	14	30	<1.0	<1.0	<1.0	34	46	<0.10
B-75 6'	6	<2.0	<1.0	480	<1.0	<1.0	33	7.2	18	3.2	15	30	<1.0	<1.0	<1.0	41	43	<0.10

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B-76 0'	0	<2.0	<1.0	130	<1.0	<1.0	36	5.9	19	130	12	30	<1.0	<1.0	<1.0	35	55	<0.10
B-76 1'	1	<2.0	<1.0	97	<1.0	<1.0	31	6.1	16	8.2	11	27	<1.0	<1.0	<1.0	39	37	<0.10
B-76 2'	2	3.8	<1.0	43	<1.0	<1.0	29	8.1	17	3.3	<1.0	42	<1.0	<1.0	<1.0	34	30	<0.10
B-76 4'	4	3.5	1.9	200	<1.0	<1.0	28	4.1	15	4.4	<1.0	23	<1.0	<1.0	<1.0	31	37	<0.10
B-76 6'	6	5.9	2.7	86	<1.0	<1.0	33	7.6	21	6.8	<1.0	35	<1.0	<1.0	<1.0	44	63	<0.10
B-77 0'	0	5.0	<1.0	120	<1.0	<1.0	36	7.3	23	210	<1.0	32	<1.0	<1.0	<1.0	37	69	<0.10
B-77 1'	1	7.6	3.1	130	<1.0	<1.0	37	7.5	25	210	<1.0	34	<1.0	<1.0	<1.0	40	74	<0.10
B-77 2'	2	7.0	<1.0	85	<1.0	<1.0	34	6.9	17	5.6	<1.0	26	<1.0	<1.0	<1.0	31	51	<0.10
B-77 4'	4	<2.0	<1.0	110	<1.0	<1.0	28	6.2	18	3.4	10	24	<1.0	<1.0	<1.0	28	40	<0.10
B-77 6'	6	<2.0	1.5	100	<1.0	<1.0	25	4.8	15	2.8	10	27	<1.0	<1.0	<1.0	26	34	<0.10
B-78 0'	0	<2.0	<1.0	120	<1.0	<1.0	33	8.2	20	17	12	37	<1.0	<1.0	<1.0	33	47	<0.10
B-78 1'	1	<2.0	1.8	150	<1.0	<1.0	35	8.4	23	27	13	38	<1.0	<1.0	<1.0	35	55	0.15
B-78 2'	2	<2.0	<1.0	110	<1.0	<1.0	31	6.3	19	4.1	11	31	<1.0	<1.0	<1.0	31	37	<0.10
B-78 4'	4	<2.0	1.9	130	<1.0	<1.0	37	8.5	28	6.0	15	41	<1.0	<1.0	<1.0	37	60	<0.10
B-78 6'	6	<2.0	2.2	540	<1.0	<1.0	30	15	22	7.5	17	37	<1.0	<1.0	<1.0	37	58	<0.10
B-79 0'	0	5.0	<1.0	210	<1.0	2.4	55	8.5	77	2,700	1.7	46	<1.0	<1.0	<1.0	40	340	0.27
B-79 1'	1	2.2	<1.0	130	<1.0	1.2	38	7.7	21	25	<1.0	34	<1.0	<1.0	<1.0	41	52	<0.10
B-79 2'	2	7.6	<1.0	48	<1.0	1.9	70	23	47	2.4	<1.0	36	<1.0	<1.0	<1.0	120	47	<0.10
B-81 0'	0	<2.0	<1.0	160	<1.0	2.1	180	18	48	450	<1.0	210	<1.0	<1.0	<1.0	56	180	0.11
B-81 1'	1	<2.0	<1.0	86	<1.0	1.5	49	16	35	14	<1.0	34	<1.0	<1.0	<1.0	91	54	<0.10
B-81 2'	2	<2.0	<1.0	220	<1.0	1.5	49	15	30	8.9	<1.0	45	<1.0	<1.0	<1.0	72	56	<0.10
B-83 0'	0	<2.0	<1.0	370	<1.0	1.5	77	15	67	72	<1.0	93	<1.0	<1.0	<1.0	58	130	0.12
B-83 1'	1	<2.0	<1.0	110	<1.0	2.0	46	13	41	1,300	<1.0	50	<1.0	<1.0	<1.0	73	130	<0.10
B-83 2	2	<2.0	1.3	180	<1.0	1.2	44	8.6	22	12	<1.0	38	<1.0	<1.0	<1.0	45	61	<0.10

TABLE 3
Summary of CAM17 Metals Results - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Sample ID	Sample Depth (ft)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Mercury
B-84 0'	0	<2.0	2.1	150	<1.0	1.2	45	10	40	470	<1.0	42	<1.0	<1.0	<1.0	50	170	0.13
B-84 1'	1	<2.0	4.5	190	<1.0	<1.0	37	8.6	25	9.5	<1.0	39	<1.0	<1.0	<1.0	39	60	<0.10
B-84 2'	2	<2.0	4.3	180	<1.0	<1.0	37	8.4	24	8.0	<1.0	39	<1.0	<1.0	<1.0	42	58	<0.10
B-84 6'	6	<2.0	3.4	320	<1.0	<1.0	39	8.9	27	8.5	<1.0	41	<1.0	<1.0	<1.0	39	63	<0.10
B-84 12'	12	<2.0	4.7	89	<1.0	<1.0	28	7.3	18	6.5	<1.0	26	<1.0	<1.0	<1.0	35	49	<0.10
B-84 18'	18	<2.0	2.5	130	<1.0	<1.0	32	6.7	19	4.8	<1.0	31	<1.0	<1.0	<1.0	36	42	<0.10
B-86 0'	0	<2.0	<1.0	160	<1.0	1.7	69	12	51	490	<1.0	68	<1.0	<1.0	<1.0	53	180	0.20
B-86 1'	1	<2.0	<1.0	54	<1.0	1.6	57	21	44	150	<1.0	35	<1.0	<1.0	<1.0	100	59	0.64
B-86 2'	2	<2.0	2.3	170	<1.0	1.1	44	8.4	23	7.0	<1.0	38	<1.0	<1.0	<1.0	46	58	<0.10
B-87 0'	0	<2.0	2.7	150	<1.0	1.1	46	9.6	32	300	<1.0	40	<1.0	<1.0	<1.0	49	150	<0.10
B-87 1'	1	<2.0	3.7	190	<1.0	1.1	36	8.1	23	42	<1.0	36	<1.0	<1.0	<1.0	40	74	<0.10
B-87 12'	12	<2.0	1.1	100	<1.0	<1.0	33	5.7	17	4.5	<1.0	33	<1.0	<1.0	<1.0	27	53	<0.10
B-87 18'	18	<2.0	<1.0	88	<1.0	<1.0	31	4.5	15	4.0	<1.0	31	<1.0	<1.0	<1.0	26	45	<0.10
B-88 0'	0	<2.0	<1.0	150	<1.0	2.2	65	13	54	1,100	<1.0	55	<1.0	<1.0	<1.0	72	190	0.12
B-88 1'	1	<2.0	<1.0	75	<1.0	1.4	56	17	39	140	<1.0	36	<1.0	<1.0	<1.0	91	57	<0.10
B-88 2'	2	<2.0	2.4	250	<1.0	1.1	44	8.3	22	8.0	<1.0	37	<1.0	<1.0	<1.0	46	60	<0.10
B-90 0'	0	<2.0	<1.0	120	<1.0	1.3	50	11	28	30	<1.0	44	<1.0	<1.0	<1.0	58	51	0.19
B-90 1'	1	<2.0	<1.0	110	<1.0	1.6	52	14	35	65	<1.0	41	<1.0	<1.0	<1.0	76	62	<0.10
B-90 2'	2	<2.0	2.1	240	<1.0	1.3	49	9.2	23	7.1	<1.0	42	<1.0	<1.0	<1.0	49	59	<0.10
B-91 0'	0	<2.0	<1.0	84	<1.0	1.9	64	20	47	480	<1.0	41	<1.0	<1.0	<1.0	120	82	<0.10
B-91 1'	1	<2.0	1.4	150	<1.0	1.1	42	8.3	22	9.1	<1.0	35	<1.0	<1.0	<1.0	46	59	<0.10
B-91 2'	2	<2.0	1.6	210	<1.0	1.1	44	8.5	21	7.9	<1.0	38	<1.0	<1.0	<1.0	46	56	<0.10
B-93 0'	0	<2.0	<1.0	210	<1.0	1.7	45	11	49	530	<1.0	48	<1.0	<1.0	<1.0	57	140	0.14
B-93 1'	1	<2.0	<1.0	86	<1.0	1.3	51	17	40	160	<1.0	35	<1.0	<1.0	<1.0	85	65	<0.10
B-93 2'	2	<2.0	2.9	180	<1.0	1.2	43	11	26	18	<1.0	58	<1.0	<1.0	<1.0	46	77	0.10

TABLE 3
Summary of CAM17 Metals Results - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Sample ID	Sample Depth (ft)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Mercury
B-96 0'	0	<2.0	2.4	250	<1.0	2.2	54	13	57	1,100	<1.0	55	<1.0	<1.0	<1.0	61	260	0.12
B-96 1'	1	<2.0	<1.0	110	<1.0	1.3	51	11	34	280	<1.0	37	<1.0	<1.0	<1.0	58	81	0.22
B-96 2'	2	<2.0	2.4	170	<1.0	1.1	44	8.6	22	8.2	<1.0	38	<1.0	<1.0	<1.0	44	63	<0.10
B-99 0'	0	<2.0	<1.0	81	<1.0	1.6	51	17	48	810	<1.0	34	<1.0	<1.0	<1.0	83	230	<0.10
B-99 1'	1	<2.0	<1.0	61	<1.0	1.5	51	17	39	790	<1.0	30	<1.0	<1.0	<1.0	84	150	<0.10
B-99 2'	2	<2.0	<1.0	67	<1.0	1.5	46	16	40	820	<1.0	29	<1.0	<1.0	<1.0	81	150	<0.10
B-102 0'	0	<2.0	<1.0	170	<1.0	1.6	50	8.4	84	170	2.6	45	<1.0	<1.0	<1.0	45	350	<0.10
B-102 1'	1	<2.0	<1.0	46	<1.0	1.8	53	21	37	21	<1.0	34	<1.0	<1.0	<1.0	130	55	<0.10
B-102 2'	2	<2.0	<1.0	100	<1.0	1.5	65	18	38	11	<1.0	44	<1.0	<1.0	<1.0	88	58	<0.10
B-104 0'	0	<2.0	<1.0	64	<1.0	2.1	120	21	86	1,800	<1.0	57	<1.0	<1.0	<1.0	93	130	<0.10
B-104 1'	1	<2.0	1.9	140	<1.0	1.4	44	8.0	28	15	<1.0	37	<1.0	<1.0	<1.0	48	68	<0.10
B-104 2'	2	<2.0	2.9	250	<1.0	1.3	45	9.3	26	15	<1.0	40	<1.0	<1.0	<1.0	49	72	<0.10
B-106 0'	0	<2.0	<1.0	230	<1.0	1.6	56	13	67	1,200	<1.0	46	<1.0	<1.0	<1.0	67	160	<0.10
B-106 1'	1	<2.0	<1.0	100	<1.0	1.3	43	13	28	13	<1.0	32	<1.0	<1.0	<1.0	72	57	<0.10
B-106 2'	2	<2.0	<1.0	170	<1.0	1.2	47	9.2	22	8.6	<1.0	44	<1.0	<1.0	<1.0	47	65	0.14
B-108 0'	0	<2.0	<1.0	130	<1.0	1.1	36	9.1	30	56	<1.0	35	<1.0	<1.0	<1.0	50	65	<0.10
B-108 1'	1	<2.0	<1.0	110	<1.0	1.5	45	17	33	7.5	<1.0	36	<1.0	<1.0	<1.0	86	56	<0.10
B-108 2'	2	<2.0	1.4	180	<1.0	1.1	39	8.7	22	7.0	<1.0	39	<1.0	<1.0	<1.0	39	60	<0.10
B-110 0'	0	<2.0	<1.0	140	<1.0	1.3	40	10	26	30	<1.0	37	<1.0	<1.0	<1.0	51	66	<0.10
B-110 1'	1	<2.0	<1.0	100	<1.0	1.2	38	12	24	13	<1.0	36	<1.0	<1.0	<1.0	67	55	<0.10
B-110 2'	2	<2.0	1.3	150	<1.0	1.1	36	7.6	21	6.3	<1.0	35	<1.0	<1.0	<1.0	37	62	<0.10
B-113 0'	0	3.4	<1.0	140	<1.0	2.1	42	11	57	580	<1.0	40	<1.0	<1.0	<1.0	57	1,100	0.12
B-113 1'	1	<2.0	4.8	180	<1.0	1.2	33	6.9	26	45	<1.0	33	<1.0	<1.0	<1.0	33	130	0.11

TABLE 3
Summary of CAM17 Metals Results - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Sample ID	Sample Depth (ft)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Mercury
B-113 2'	2	<2.0	1.7	150	<1.0	1.0	31	6.8	19	8.1	<1.0	33	<1.0	<1.0	<1.0	33	60	<0.10
B-116 0'	0	2.0	<1.0	170	<1.0	1.3	36	8.6	34	75	<1.0	38	<1.0	<1.0	<1.0	38	150	<0.10
B-116 1'	1	<2.0	1.5	120	<1.0	1.2	30	7.1	25	93	<1.0	32	<1.0	<1.0	<1.0	31	140	<0.10
B-116 2'	2	<2.0	1.3	150	<1.0	1.0	29	7.0	19	14	<1.0	34	<1.0	<1.0	<1.0	30	60	<0.10
B-119 0'	0	<2.0	<1.0	140	<1.0	1.4	43	12	30	83	<1.0	47	<1.0	<1.0	<1.0	42	98	<0.10
B-119 1'	1	<2.0	<1.0	130	<1.0	1.2	36	10	24	96	<1.0	31	<1.0	<1.0	<1.0	56	88	<0.10
B-119 2'	2	<2.0	1.6	180	<1.0	1.0	33	7.3	18	6.1	<1.0	37	<1.0	<1.0	<1.0	33	57	<0.10
B-122 0'	0	<2.0	<1.0	160	<1.0	2.2	200	18	62	1,900	<1.0	290	<1.0	<1.0	<1.0	50	220	0.16
B-122 1'	1	<2.0	<1.0	170	<1.0	1.5	46	12	31	250	<1.0	44	<1.0	<1.0	<1.0	61	88	<0.10
B-122 2'	2	<2.0	<1.0	120	<1.0	1.4	42	15	28	20	<1.0	35	<1.0	<1.0	<1.0	78	57	<0.10
B-124 0'	0	<2.0	<1.0	280	<1.0	1.5	52	12	50	89	<1.0	64	<1.0	<1.0	<1.0	59	150	<0.10
B-124 1'	1	<2.0	<1.0	85	<1.0	1.3	41	14	28	8.1	<1.0	33	<1.0	<1.0	<1.0	79	64	<0.10
B-124 2'	2	<2.0	1.4	160	<1.0	1.1	37	7.7	20	6.6	<1.0	38	<1.0	<1.0	<1.0	36	59	<0.10
B-126 0'	0	<2.0	<1.0	110	<1.0	1.3	55	12	34	260	<1.0	54	<1.0	<1.0	<1.0	58	140	<0.10
B-126 1'	1	<2.0	6.2	110	<1.0	1.8	100	15	130	600	<1.0	110	<1.0	<1.0	<1.0	77	190	0.17
B-126 2'	2	<2.0	<1.0	140	<1.0	1.2	36	9.2	24	19	<1.0	36	<1.0	<1.0	<1.0	41	66	0.25
B-130 0'	0	<2.0	<1.0	60	<1.0	<1.0	16	4.4	10	15	<1.0	13	<1.0	<1.0	<1.0	24	24	<0.10
B-130 1'	1	<2.0	<1.0	89	<1.0	1.3	47	17	36	20	<1.0	34	<1.0	<1.0	<1.0	100	57	<0.10
B-130 2'	2	<2.0	<1.0	29	<1.0	<1.0	29	11	20	<5.0	<1.0	20	<1.0	<1.0	<1.0	69	28	<0.10
B-131 4'	4	7.7	4.7	150	<1.0	<1.0	26	6.8	16	5.5	<1.0	34	<1.0	<1.0	<1.0	27	55	<0.10
B-131 6'	6	6.7	3.2	130	<1.0	<1.0	27	7.5	13	4.5	<1.0	35	<1.0	<1.0	<1.0	26	41	<0.10
B-131 0'	0	<2.0	<1.0	150	<1.0	1.0	40	11	37	35	5.4	40	<1.0	<1.0	<1.0	48	62	<0.10
B-131 1'	1	<2.0	<1.0	150	<1.0	1.2	45	20	46	15	<1.0	38	<1.0	<1.0	<1.0	65	69	0.11
B-131 2'	2	<2.0	<1.0	140	<1.0	<1.0	27	5.9	17	10	<1.0	29	<1.0	<1.0	<1.0	27	53	<0.10

TABLE 3
Summary of CAM17 Metals Results - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Sample ID	Sample Depth (ft)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Mercury
B-132 0'	0	<2.0	<1.0	150	<1.0	1.6	45	10	44	910	2.5	42	<1.0	<1.0	<1.0	51	160	0.18
B-132 1'	1	<2.0	<1.0	61	<1.0	1.7	94	21	52	180	<1.0	43	<1.0	<1.0	<1.0	110	66	<0.10
B-132 2'	2	<2.0	1.0	150	<1.0	1.0	35	7.9	20	8.1	<1.0	35	<1.0	<1.0	<1.0	35	58	<0.10
B-134 0'	0	<2.0	<1.0	60	<1.0	2.0	72	22	46	140	<1.0	38	<1.0	<1.0	<1.0	120	140	<0.10
B-134 1'	1	<2.0	<1.0	40	<1.0	1.8	73	21	41	5.6	<1.0	34	<1.0	<1.0	<1.0	120	52	<0.10
B-134 2'	2	<2.0	<1.0	130	<1.0	1.2	38	11	27	20	<1.0	35	<1.0	<1.0	<1.0	46	62	<0.10
B-136 0'	0	<2.0	<1.0	92	<1.0	1.2	41	16	36	12	<1.0	35	<1.0	<1.0	<1.0	67	49	<0.10
B-136 1'	1	<2.0	<1.0	530	<1.0	<1.0	20	17	63	7.1	<1.0	44	<1.0	<1.0	<1.0	37	51	<0.10
B-136 2'	2	<2.0	<1.0	99	<1.0	1.1	53	12	26	4.0	<1.0	41	<1.0	<1.0	<1.0	62	39	<0.10
ESLs																		
Residential Land Use		6.3	0.39	750	4.0	1.7	750	40	230	200	40	150	10	20	1.3	16	600	1.3
Comm/Ind Land Use		40	16	1500	8.0	7.4	750	80	230	750	40	150	10	40	16	200	600	10
Construction Exposure		310	15	2,600	98	39	1,200,000	94	310,000	750	78	260	3,900	3,900	62	770	230,000	58

Notes:

Results are shown in milligrams per kilogram (mg/kg).

Values listed for chromium are for Chromium III, as there is no standard for total chromium.

< = Analyte was not detected above the laboratory reporting limit.

ESLs = Environmental Screening Levels, Tables A and K-3, SFRWQCB, Revised May 2008.

TABLE 4
Summary of Organics Results - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Sample ID	Sample Depth (ft)	TPHg (mg/kg)	TPHd (mg/kg)	TPHmo (mg/kg)	BTEX (ug/kg)	VOCs (ug/kg)
B-3 10'	10	<1.0	2.1	<1.0	ND	ND
B-5 10'	10	<1.0	1.7	<1.0	ND	ND
B-42 10'	10	<1.0	3.2	23	ND	ND
B-57 10'	10	<1.0	1.0	13	ND	ND
B-58 10'	10	<1.0	<1.0	12	ND	ND
B-61 10'	10	<1.0	<1.0	6.0	ND	ND
B-94 10'	10	<1.0	4.1	<1.0	ND	ND
B-128 10'	10	<1.0	<1.0	1.2	ND	ND
B-129 10'	10	<1.0	5.8	2.9	ND	ND
ESLs						
Residential		83	83	370	---	---
Commercial/Industrial		83	83	2,500	---	---
Construction Exposure		4,200	4,200	12,000	---	---

Notes:

mg/kg = milligrams per kilogram
TPHg = Total Petroleum Hydrocarbons as gasoline
TPHd = Total Petroleum Hydrocarbons as diesel
TPHmo = Total Petroleum Hydrocarbons as motor oil
--- = Not Analyzed or Not Applicable
< = Not detected above the stated laboratory reporting limit
ESLs = Environmental Screening Levels, Tables A and K-3, SFRWQCB, Revised May 2008.

ug/kg = microgram per kilogram
BTEX = Benzene, toluene, ethylbenzene, and xylenes
VOCs = Volatile organic compounds

TABLE 5
Summary of Grab-Groundwater Sample Results
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Sample ID	TPHg	TPHd	TPHmo	BTEX	Other VOCs
B-17	<0.050	<0.050	<0.050	ND	ND
B-19	<0.050	<0.050	<0.050	ND	ND
B-75	<0.050	<0.050	<0.062	ND	4-isopropyltoluene=0.82
B-84	<0.050	<0.050	<0.050	ND	ND
ESLs					
GW is current/potential source	100	100	100	---	---
GW not current/potential source	2,100	2,100	2,100	---	---
Surface Water - Freshwater	100	100	100	---	---
Surface Water - Marine	2,100	2,100	2,100	---	---
Surface Water - Estuarine	2,100	2,100	2,100	---	---

Notes:

Data are shown in units of micrograms per liter (µg/l).

TPHg = Total Petroleum Hydrocarbons as gasoline

TPHd = Total Petroleum Hydrocarbons as diesel

TPHmo = Total Petroleum Hydrocarbons as motor oil

--- = Not Analyzed or Not Applicable

<

ESLs = Environmental Screening Levels, Tables A, B, & F, SFRWQCB, Revised May 2008.

BTEX = Benzene, toluene, ethylbenzene, and xylenes

VOCs = Volatile organic compounds

TABLE 6a
Summary of Lead Statistical Analysis - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Highway 101 Southbound
Borings B1 to B67

TOTAL LEAD

	UCLs (mg/kg)	
	90% UCL	95% UCL
0 to 0.5 ft	551.7	588.5
1.0 to 1.5 ft	372.3	398.2
2.0 to 2.5 ft	62.9	69.7

EXCAVATION SCENARIOS

	Weighted Averages		
	90% UCL		95% UCL
Excavation Depth	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)	Total Lead (mg/kg)
0 to 1.0 ft	552	25	589
Underlying Soil (1.0 to 2.5 ft.)	*269*	*12*	*289*
0 to 2.0 ft	462	21	493
Underlying Soil (2.0 to 2.5 ft)	*63*	*2.9*	*70*
0 to 2.5 ft	382	18	409

Notes:

UCL = Upper Confidence Limit (90% UCL is applicable for waste classification; 95% UCL applicable for risk assessment)
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
Weighted average values are based upon calculated UCLs for each depth interval.
* = Soluble (WET) lead concentrations are predicted using slope of regression line, where y = predicted soluble (WET) lead and x = total lead.

Regression Line Slope: $y = 0.046 \quad x$

TABLE 6b
Summary of Lead Statistical Analysis - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Highway 101 Southbound excluding borings at Willow Road (B-26 to B-31)
and University Avenue (B-43 to B-52) Overcorssings
Borings B-1 to B-25, B-32 to B-42 and B-53 to B-67

TOTAL LEAD

	UCLs (mg/kg)	
	90% UCL	95% UCL
0 to 0.5 ft	329.3	349.9
1.0 to 1.5 ft	431.3	468.1
2.0 to 2.5 ft	79.2	85.8

EXCAVATION SCENARIOS

	Weighted Averages		
	90% UCL		95% UCL
Excavation Depth	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)	Total Lead (mg/kg)
0 to 1.0 ft	329	15	350
Underlying Soil (1.0 to 2.5 ft.)	*314*	*14*	*341*
0 to 2.0 ft	380	17	409
Underlying Soil (2.0 to 2.5 ft)	*79*	*3.6*	*86*
0 to 2.5 ft	320	15	344

Notes:

UCL = Upper Confidence Limit (90% UCL is applicable for waste classification; 95% UCL applicable for risk assessment)
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
Weighted average values are based upon calculated UCLs for each depth interval.
* = Soluble (WET) lead concentrations are predicted using slope of regression line, where y = predicted soluble (WET) lead and x = total lead.

Regression Line Slope: $y = 0.046 \quad x$

TABLE 6c
Summary of Lead Statistical Analysis - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Highway 101 Southbound excluding borings at Willow Road Overcorssing (B-26 to B-31)
Borings B-1 to B-25 and B-32 to B-67

TOTAL LEAD

	UCLs (mg/kg)	
	90% UCL	95% UCL
0 to 0.5 ft	431.8	463.9
1.0 to 1.5 ft	394.5	423.6
2.0 to 2.5 ft	68.3	72.9

EXCAVATION SCENARIOS

	Weighted Averages		
	90% UCL		95% UCL
Excavation Depth	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)	Total Lead (mg/kg)
0 to 1.0 ft	432	20	464
Underlying Soil (1.0 to 2.5 ft.)	*286*	*13*	*307*
0 to 2.0 ft	413	19	444
Underlying Soil (2.0 to 2.5 ft)	*68*	*3.1*	*73*
0 to 2.5 ft	344	16	370

Notes:

UCL = Upper Confidence Limit (90% UCL is applicable for waste classification; 95% UCL applicable for risk assessment)
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
Weighted average values are based upon calculated UCLs for each depth interval.
* = Soluble (WET) lead concentrations are predicted using slope of regression line, where y = predicted soluble (WET) lead and x = total lead.

Regression Line Slope: $y = 0.046 \quad x$

TABLE 6d
Summary of Lead Statistical Analysis - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Highway 101 Southbound at Willow Road Overcorssing
Borings B-26 to B-31

TOTAL LEAD

	UCLs (mg/kg)	
	90% UCL	95% UCL
0 to 0.5 ft	2,274	2,547
1.0 to 1.5 ft	108.8	116.3
2.0 to 2.5 ft	23.0	24.6

EXCAVATION SCENARIOS

	Weighted Averages		
	90% UCL		95% UCL
Excavation Depth	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)	Total Lead (mg/kg)
0 to 1.0 ft	2,274	105	2,547
Underlying Soil (1.0 to 2.5 ft.)	*80*	*3.7*	*86*
0 to 2.0 ft	1,191	55	1,332
Underlying Soil (2.0 to 2.5 ft)	*23*	*1.1*	*25*
0 to 2.5 ft	958	44	1,070

Notes:

UCL = Upper Confidence Limit (90% UCL is applicable for waste classification; 95% UCL applicable for risk assessment)
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
Weighted average values are based upon calculated UCLs for each depth interval.
* = Soluble (WET) lead concentrations are predicted using slope of regression line, where y = predicted soluble (WET) lead and x = total lead.

Regression Line Slope: $y = 0.046 \quad x$

TABLE 6e
Summary of Lead Statistical Analysis - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Highway 101 Southbound excluding borings at University Avenue Overcorssing (B-43 to B-52)
Borings B-1 to B-42 and B-53 to B-67

TOTAL LEAD

	UCLs (mg/kg)	
	90% UCL	95% UCL
0 to 0.5 ft	502	536.6
1.0 to 1.5 ft	392.3	426.8
2.0 to 2.5 ft	72.2	78.8

EXCAVATION SCENARIOS

	Weighted Averages		
	90% UCL		95% UCL
Excavation Depth	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)	Total Lead (mg/kg)
0 to 1.0 ft	502	23	537
Underlying Soil (1.0 to 2.5 ft.)	*286*	*13*	*311*
0 to 2.0 ft	447	21	482
Underlying Soil (2.0 to 2.5 ft)	*72*	*3.3*	*79*
0 to 2.5 ft	372	17	401

Notes:

UCL = Upper Confidence Limit (90% UCL is applicable for waste classification; 95% UCL applicable for risk assessment)
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
Weighted average values are based upon calculated UCLs for each depth interval.
* = Soluble (WET) lead concentrations are predicted using slope of regression line, where y = predicted soluble (WET) lead and x = total lead.

Regression Line Slope: $y = 0.046 \quad x$

TABLE 6f
Summary of Lead Statistical Analysis - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Highway 101 Southbound at University Avenue Overcorssing
Borings B-43 to B-52

TOTAL LEAD

	UCLs (mg/kg)	
	90% UCL	95% UCL
0 to 0.5 ft	1,202	1,374
1.0 to 1.5 ft	346.1	382.4
2.0 to 2.5 ft	16.2	18.0

EXCAVATION SCENARIOS

	Weighted Averages		
	90% UCL		95% UCL
Excavation Depth	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)	Total Lead (mg/kg)
0 to 1.0 ft	1,202	55	1,374
Underlying Soil (1.0 to 2.5 ft.)	*236*	*11*	*261*
0 to 2.0 ft	774	36	878
Underlying Soil (2.0 to 2.5 ft)	*16*	*0.74*	*18*
0 to 2.5 ft	622	29	706

Notes:

UCL = Upper Confidence Limit (90% UCL is applicable for waste classification; 95% UCL applicable for risk assessment)
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
Weighted average values are based upon calculated UCLs for each depth interval.
* = Soluble (WET) lead concentrations are predicted using slope of regression line.
where y = predicted soluble (WET) lead and x = total lead.

Regression Line Slope: $y = 0.046 \quad x$

TABLE 6g
Summary of Lead Statistical Analysis - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Highway 101 Northbound
Borings B68 to B137

TOTAL LEAD

	UCLs (mg/kg)	
	90% UCL	95% UCL
0 to 0.5 ft	649.7	683.5
1.0 to 1.5 ft	227.1	240.9
2.0 to 2.5 ft	70.8	78.2

EXCAVATION SCENARIOS

	Weighted Averages		
	90% UCL		95% UCL
Excavation Depth	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)	Total Lead (mg/kg)
0 to 1.0 ft	650	30	684
Underlying Soil (1.0 to 2.5 ft.)	*175*	*8.0*	*187*
0 to 2.0 ft	438	20	462
Underlying Soil (2.0 to 2.5 ft)	*71*	*3.3*	*78*
0 to 2.5 ft	365	17	385

Notes:

UCL = Upper Confidence Limit (90% UCL is applicable for waste classification; 95% UCL applicable for risk assessment)
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
Weighted average values are based upon calculated UCLs for each depth interval.
* = Soluble (WET) lead concentrations are predicted using slope of regression line, where y = predicted soluble (WET) lead and x = total lead.

Regression Line Slope: $y = 0.046 \quad x$

TABLE 6h
Summary of Lead Statistical Analysis - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Highway 101 Northbound excluding borings at Willow Road (B-98 to B-101)
and University Avenue (B-113 to B-121) Overcorssings
Borings B-68 to B-97, B-102 to B-111 and B-122 to B-137

TOTAL LEAD

	UCLs (mg/kg)	
	90% UCL	95% UCL
0 to 0.5 ft	585.4	615.2
1.0 to 1.5 ft	242.1	258.8
2.0 to 2.5 ft	87.3	101.1

EXCAVATION SCENARIOS

	Weighted Averages		
	90% UCL		95% UCL
Excavation Depth	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)	Total Lead (mg/kg)
0 to 1.0 ft	585	27	615
Underlying Soil (1.0 to 2.5 ft.)	*191*	*8.8*	*206*
0 to 2.0 ft	414	19	437
Underlying Soil (2.0 to 2.5 ft)	*87*	*4.0*	*101*
0 to 2.5 ft	348	16	370

Notes:

UCL = Upper Confidence Limit (90% UCL is applicable for waste classification; 95% UCL applicable for risk assessment)
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
Weighted average values are based upon calculated UCLs for each depth interval.
* = Soluble (WET) lead concentrations are predicted using slope of regression line, where y = predicted soluble (WET) lead and x = total lead.

Regression Line Slope: $y = 0.046 \quad x$

TABLE 6j
Summary of Lead Statistical Analysis - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Highway 101 Northbound at Willow Road Overcorssing
Borings B-98 to B-101

TOTAL LEAD

	Maximums (mg/kg)
0 to 0.5 ft	5,300
1.0 to 1.5 ft	790
2.0 to 2.5 ft	820

EXCAVATION SCENARIOS

	Weighted Averages	
	Maximum	
Excavation Depth	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)
0 to 1.0 ft	5,300	244
Underlying Soil (1.0 to 2.5 ft.)	*800*	*37*
0 to 2.0 ft	3,045	140
Underlying Soil (2.0 to 2.5 ft)	*820*	*38*
0 to 2.5 ft	2,600	120

Notes:

Maximum concentrations used because data set consists of four or less unique values.

mg/kg = milligrams per kilogram

mg/l = milligrams per liter

Weighted average values are based upon calculated UCLs for each depth interval.

* = Soluble (WET) lead concentrations are predicted using slope of regression line, where y = predicted soluble (WET) lead and x = total lead.

Regression Line Slope: $y = 0.046 \quad x$

TABLE 6k
Summary of Lead Statistical Analysis - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Highway 101 Northbound excluding borings at University Avenue Overcorssing (B-113 to B-121)
Borings B-68 to B111 and B-122 to B-137

TOTAL LEAD

	UCLs (mg/kg)	
	90% UCL	95% UCL
0 to 0.5 ft	699.6	742.7
1.0 to 1.5 ft	256.3	267
2.0 to 2.5 ft	101	114.5

EXCAVATION SCENARIOS

	Weighted Averages		
	90% UCL		95% UCL
Excavation Depth	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)	Total Lead (mg/kg)
0 to 1.0 ft	700	32	743
Underlying Soil (1.0 to 2.5 ft.)	*205*	*9.4*	*216*
0 to 2.0 ft	478	22	505
Underlying Soil (2.0 to 2.5 ft)	*101*	*4.6*	*115*
0 to 2.5 ft	403	19	427

Notes:

UCL = Upper Confidence Limit (90% UCL is applicable for waste classification; 95% UCL applicable for risk assessment)
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
Weighted average values are based upon calculated UCLs for each depth interval.
* = Soluble (WET) lead concentrations are predicted using slope of regression line, where y = predicted soluble (WET) lead and x = total lead.

Regression Line Slope: $y = 0.046 \quad x$

TABLE 6l
Summary of Lead Statistical Analysis - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Highway 101 Northbound at University Avenue Overcorssing
Borings B-113 to B-121

TOTAL LEAD

	UCLs (mg/kg)	
	90% UCL	95% UCL
0 to 0.5 ft	496.1	547.6
1.0 to 1.5 ft	62.3	66.7
2.0 to 2.5 ft	9.0	9.3

EXCAVATION SCENARIOS

	Weighted Averages		
	90% UCL		95% UCL
Excavation Depth	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)	Total Lead (mg/kg)
0 to 1.0 ft	496	23	548
Underlying Soil (1.0 to 2.5 ft.)	*45*	*2.0*	*48*
0 to 2.0 ft	279	13	307
Underlying Soil (2.0 to 2.5 ft)	*9.0*	*0.41*	*9.3*
0 to 2.5 ft	225	10	248

Notes:

UCL = Upper Confidence Limit (90% UCL is applicable for waste classification; 95% UCL applicable for risk assessment)
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
Weighted average values are based upon calculated UCLs for each depth interval.
* = Soluble (WET) lead concentrations are predicted using slope of regression line, where y = predicted soluble (WET) lead and x = total lead.

Regression Line Slope: $y = 0.046 \quad x$

TABLE 6m
Summary of Lead Statistical Analysis - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Highway 101 Southbound - Marsh Road to University Avenue
Borings B1 to B48

TOTAL LEAD

	UCLs (mg/kg)	
	90% UCL	95% UCL
0 to 0.5 ft	626.8	667.1
1.0 to 1.5 ft	257.1	275.3
2.0 to 2.5 ft	57.5	62.0

EXCAVATION SCENARIOS

	Weighted Averages		
	90% UCL		95% UCL
Excavation Depth	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)	Total Lead (mg/kg)
0 to 1.0 ft	627	29	667
Underlying Soil (1.0 to 2.5 ft.)	*191*	*8.8*	*204*
0 to 2.0 ft	442	20	471
Underlying Soil (2.0 to 2.5 ft)	*57*	*2.6*	*62*
0 to 2.5 ft	365	17	389

Notes:

UCL = Upper Confidence Limit (90% UCL is applicable for waste classification; 95% UCL applicable for risk assessment)
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
Weighted average values are based upon calculated UCLs for each depth interval.
* = Soluble (WET) lead concentrations are predicted using slope of regression line, where y = predicted soluble (WET) lead and x = total lead.

Regression Line Slope: $y = 0.046 \quad x$

TABLE 6n
Summary of Lead Statistical Analysis - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Highway 101 Southbound - University Avenue to Embarcadero
Borings B-49 to B-67

TOTAL LEAD

	UCLs (mg/kg)	
	90% UCL	95% UCL
0 to 0.5 ft	492.6	538.0
1.0 to 1.5 ft	760.3	839.5
2.0 to 2.5 ft	106	122.7

EXCAVATION SCENARIOS

	Weighted Averages		
	90% UCL		95% UCL
Excavation Depth	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)	Total Lead (mg/kg)
0 to 1.0 ft	493	23	538
Underlying Soil (1.0 to 2.5 ft.)	*542*	*25*	*601*
0 to 2.0 ft	626	29	689
Underlying Soil (2.0 to 2.5 ft)	*106*	*4.9*	*123*
0 to 2.5 ft	522	24	576

Notes:

UCL = Upper Confidence Limit (90% UCL is applicable for waste classification; 95% UCL applicable for risk assessment)
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
Weighted average values are based upon calculated UCLs for each depth interval.
* = Soluble (WET) lead concentrations are predicted using slope of regression line, where y = predicted soluble (WET) lead and x = total lead.

Regression Line Slope: $y = 0.046 \quad x$

TABLE 6o
Summary of Lead Statistical Analysis - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Highway 101 Northbound - Marsh Road to University Avenue
Borings B-68 to B-137

TOTAL LEAD

	UCLs (mg/kg)	
	90% UCL	95% UCL
0 to 0.5 ft	705.3	753
1.0 to 1.5 ft	236.3	252
2.0 to 2.5 ft	123.8	139.1

EXCAVATION SCENARIOS

	Weighted Averages		
	90% UCL		95% UCL
Excavation Depth	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)	Total Lead (mg/kg)
0 to 1.0 ft	705	32	753
Underlying Soil (1.0 to 2.5 ft.)	*199*	*9.1*	*214*
0 to 2.0 ft	471	22	503
Underlying Soil (2.0 to 2.5 ft)	*124*	*5.7*	*139*
0 to 2.5 ft	401	18	430

Notes:

UCL = Upper Confidence Limit (90% UCL is applicable for waste classification; 95% UCL applicable for risk assessment)
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
Weighted average values are based upon calculated UCLs for each depth interval.
* = Soluble (WET) lead concentrations are predicted using slope of regression line.
where y = predicted soluble (WET) lead and x = total lead.

Regression Line Slope: $y = 0.046 \quad x$

TABLE 6p
Summary of Lead Statistical Analysis - Soil
Highway 101 Auxiliary Lane Addition Project
Santa Clara and San Mateo Counties, California

Highway 101 Northbound - University Avenue to Embarcadero
Borings B-117 to B-137

TOTAL LEAD

	UCLs (mg/kg)	
	90% UCL	95% UCL
0 to 0.5 ft	648.1	690.9
1.0 to 1.5 ft	264.8	287.7
2.0 to 2.5 ft	11.8	12.3

EXCAVATION SCENARIOS

	Weighted Averages		
	90% UCL		95% UCL
Excavation Depth	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)	Total Lead (mg/kg)
0 to 1.0 ft	648	30	691
Underlying Soil (1.0 to 2.5 ft.)	*180*	*8.3*	*196*
0 to 2.0 ft	456	21	489
Underlying Soil (2.0 to 2.5 ft)	*12*	*0.54*	*12*
0 to 2.5 ft	368	17	394

Notes:

UCL = Upper Confidence Limit (90% UCL is applicable for waste classification; 95% UCL applicable for risk assessment)
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
Weighted average values are based upon calculated UCLs for each depth interval.
* = Soluble (WET) lead concentrations are predicted using slope of regression line, where y = predicted soluble (WET) lead and x = total lead.

Regression Line Slope: $y = 0.046 \quad x$

APPENDIX A

ORDINANCE: 04023

ENVIRONMENTAL HEALTH
SAN MATEO COUNTY

Protecting Our Health and Environment

PERMIT 09- 1469

P/E: **2010 MONITORING WELLS - INSTALLATION/DESTRUCTION**

FACILITY:
ADJ TO HWY 101, MENLO PARK

OWNER:
CALTRANS-DISTRICT 4
111 GRAND AVENUE, MS8C
OAKLAND

WP0007720
NO APN LISTED
AMOUNT PAID: 544.00

CONTRACTOR:
VIRONEX, INC

TERMS & CONDITIONS:

CONSTRUCT SOIL BORINGS (13)
CONSULTANT: GEOCON CONSULTANTS, INC
(JOHN LOVE)

DENO MILANO

ENVIRONMENTAL HEALTH SPECIALIST

DATE ISSUED: 8/19/2009

EXPIRATION DATE: 12/19/2009

THIS PERMIT IS NONTRANSFERABLE AND MUST BE POSTED ON-SITE IN A CONSPICUOUS PLACE

2009 SUBSURFACE DRILLING PERMIT APPLICATION

ENVIRONMENTAL HEALTH SERVICES DIVISION

SAN MATEO COUNTY ENVIRONMENTAL HEALTH

SAN MATEO COUNTY HEALTH DEPARTMENT
2000 ALAMEDA DE LAS PULGAS, SUITE 100, SAN MATEO CA 94403
VOICE (650) 372-6200 FAX (650) 627-8244

AUG 12 2009 RECEIVED

ALLOW FIVE (5) WORKING DAYS FOR PROCESSING PERMIT

Fees: $544 (env/wells) $340 (geo borings only)

DRILLING DATE & TIME MUST BE SCHEDULED WITH COUNTY STAFF AT LEAST THREE (3) WORKING DAYS IN ADVANCE

PURPOSE OF APPLICATION: ☐ GROUNDWATER MONITORING WELL INSTALLATION/DESTRUCTION ☐ CONSTRUCT SOIL BORINGS ☐ VAPOR WELL INSTALLATION/DESTRUCTION ☐ PERMIT EXTENSION OF PERMIT #MW ____

NO. OF WELLS ____ NO. OF BORINGS 13 WELL/BORING NAMES BGW-17(POC), BGW-19, BGW-84(POC), BGW-87(POC), B-3(GW), B-5(GW), B-42(GW), B-57(GW), B-58(GW), B-61(GW), B-94(GW), B-128(GW), B-129(GW)

PURPOSE OF DRILLING: ☒ ENVIRONMENTAL ☐ GEOTECHNICAL

REQUIRED BY: ☐ COUNTY GROUNDWATER PROTECTION PROGRAM ☐ RWQCB/DTSC/USEPA (Provide approval letter) ☒ OTHER (i.e. voluntary)

Site Name: Adj. to Hwy 101 Assessor's Parcel #: NA (one per permit)
Drilling Location Address: Hwy 101 between Marsh Rd + Embacadero Rd. City: Menlo Park
To Be Constructed In: ☒ Public Property ☐ Private Property ☐ Refuse ☐ Other ____
Maximum Proposed Depth Wells/Borings: 18 (feet) Drilling Method: Direct Push
Boring Diameter: 2" Casing Diameter: ____ Screen Interval: ____
Development Method: ____ (additional 72 hour staff notification required)
Destruction Method (6 gallons water max per 94 lb cement, up to 5% bentonite): ☐ Pressure grouting (provide well construction logs) ☐ Overdrilling

WELL/BORING OWNER: (WELL/BORING OWNER NAME OR CONTACT NAME SHOULD MATCH SIGNATURE)

Name: Caltrans - District 4 Contact Person: Ana Uribe
Address: 111 Grand Ave, MS 8C City, State, ZIP: Oakland, CA 94623
Telephone: (510) 286-4914 Email: ana_m_uribe@dot.ca.gov

It is my responsibility to notify the County of any known changes in the purpose of this well/boring from that which is indicated on this application. It is my responsibility to notify the County of any known damage to the well, and to maintain the well in good condition. (*Letter signed by well/boring owner/contact person, containing above language and attesting to knowledge of all permit requirements and conditions, may be substituted for signature on permit application.*)

Well/Boring Owner's/Contact Person's Signature Ana Maria Uribe **Date** 08/10/09

PROPERTY OWNER: (NAME AS APPEARS ON ASSESSOR'S ROLES SHOULD MATCH SIGNATURE)

Name: Caltrans - District 4 Contact Person: Ana Uribe
Address: 111 Grand Ave, MS 8C City, State, ZIP: Oakland, CA 94623
Telephone: (510) 286-4914 Email: ana_uribe@dot.ca.gov

I understand that a well/boring is being installed on my property. I agree to notify the County and Well Owner of any known damage to the well. (*Letter signed by property owner, containing above language, or encroachment permit may be substituted for signature on permit application.*)

Property Owner's Signature Ana Maria Uribe **Date** 08/10/09

Drilling Company: Vironex, Inc. Contact Person: John Angela Damanti
Address: 5292 Pacheco Blvd. C57 Drillers License #: 705927
City, State, ZIP: Pacheco, CA 94553 Telephone/Email: 925-521-1490

I certify that the well/boring will be constructed in compliance with the conditions of this permit (see reverse), the San Mateo County Ordinance, and the State Water Well Standards, and that the license listed above is considered current and active by the Contractors State License Board.

Driller's Signature See attached page **Date** ____

Consultant Company: Geocon Consultants, Inc Project Manager: John Love
Address: 6671 Brisa St. Telephone: (925) 371-5900
City, State, ZIP: Livermore, CA 94550 Email: love@geoconinc.com

I certify that this application is correct to the best of my knowledge. I certify the well/boring will be constructed/destroyed in compliance with the conditions of this permit (see reverse), the San Mateo County Ordinance, and the State Water Well Standards. I understand that I am responsible for General Conditions "D and E" of this permit. I certify if I indicated the purpose of drilling is geotechnical, then no one will use the boring to collect any samples for environmental analyses. (*Responsible Professional must be a California Professional Geologist or Civil Engineer.*)

Responsible Professional's Name (Please print legibly) John Love

Responsible Professional's Signature [signature] **Date** 8/10/09

California Professional Geologist (PG) No. 6315 **or Civil Engineer No.** ____

Please see additional pages of application for requirements, general permit conditions, instructions, and fees

Revised every January 1

 2009 SUBSURFACE DRILLING PERMIT APPLICATION

REQUIREMENTS:

An accurate & correct map of existing and proposed well/boring locations **must** be included with the permit application. The well/boring location map **must** include the following.

1. North arrow, existing & historic site features, wells, approximate property lines and any other pertinent existing & historic features and information.
2. Proposed well/boring locations to scale.

A work plan describing the drilling and construction/destruction methodology, at a minimum, is **required** by County Staff. Upon review of information on this application and the submitted work plan, and subject to approval noted below, a permit will be issued allowing well/boring owner, driller, and responsible professional (consultant) to perform the specified work. The permit is subject to both General and Special Conditions stated below. A copy of the approved Subsurface Drilling Permit **must** be available on site while work related to the permit is being performed. Drilling date and time **must** be scheduled with County staff at least three (3) working days in advance of field work. Drilling may begin at the notified date and time whether County staff is present or not.

GENERAL CONDITIONS:

A. Well and boring construction and destruction under this permit is subject to the Standards for the Construction of Wells in San Mateo County, County Groundwater Protection Program (GPP) Guidelines, Policies & Procedures, the State Water Well Standards, and any instructions by a Health Department representative.

B. Well/Boring Owner, Driller, and Responsible Professional assume responsibility for all activities and uses under the permit, including compliance with Workmen's Compensation Laws, and indemnify, defend and save the County of San Mateo, its' officers, agents and employees, free and harmless from any and all expense, cost, or liability in connection with or resulting from work or stopped-work associated with the permit, including, but not limited to, property damage, personal injury, wrongful death, and loss of income.

C. All borings **must** be properly destroyed (grouted/sealed) within 24 hours of drilling unless special conditions are approved in writing as part of this permit.

D. Analytical results of all soil and groundwater samples collected during the execution of drilling under this permit **must** be submitted to County GPP staff by the Responsible Professional within 60 days of sample collection. If contamination is discovered during drilling, verbal notification to County GPP by the Responsible Professional is **required** within 72 hours of discovery. Proper storage, labeling & disposal of investigation-derived residual wastes are the responsibility of the consultant unless stated otherwise contractually.

E. In addition to the County copy of the State DWR Form 188, boring logs and well construction details for all borings/wells except geotechnical borings, signed by a Responsible Professional, **must** be submitted to County GPP by the Responsible Professional within 60 days of drilling/construction/destruction. As-built locations/dimensions **must** be finalized in subsequent report of findings submitted to County GPP by the Responsible Professional within 60 days of drilling/construction/destruction.

F. Permit is valid only for the purpose specified herein. No change in construction procedure, as described on this permit application, in the associated workplan, or in the special conditions below, will be allowed except upon written permission from the County.

G. Permit is valid for one mobilization only and is automatically canceled if not exercised, or if an extension is not applied for and granted by County GPP, within 120 days of the original permit issuance date. Failure to notify staff of cancellation or delay in start time, at least one minute prior to notified start time, will result in the Consultant will be billed an Inspection Cancellation fee of $249 for 2009 if GPP staff attempted to perform an inspection.

H. Wells installed under this permit may not be used for domestic, municipal, commercial, or irrigation water supply.

I. All work plans and reports related to work performed under County oversight **must** conform to County GPP guidelines, Regional Water Quality Control Board guidelines, and State Water Well Standards.

J. Top-of-casing elevation of all wells **must** be surveyed to the nearest 0.01-foot relative to Mean Sea Level (NAVD88) and submitted to County GPP within 60 days of drilling, and to State GeoTracker as appropriate.

K. Latitude and longitude of all wells **must** be surveyed with sub-meter accuracy relative to NAD83 and submitted to County GPP within 60 days of drilling, and to State GeoTracker as appropriate.

L. Violation of any requirement or general or special permit condition may result in an order by GPP staff to cease work under this permit, correct the violation, and potentially re-permit the work as a new mobilization.

SPECIAL CONDITIONS:_____

Approved: _____ RO/SD# _____ Date: 8.13.09

Revised every January 1

APPENDIX B

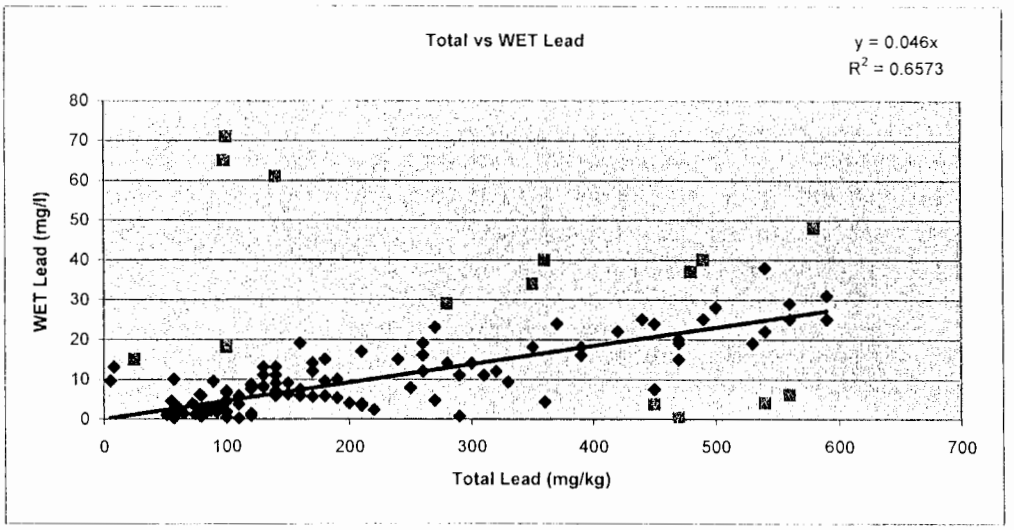
APPENDIX C

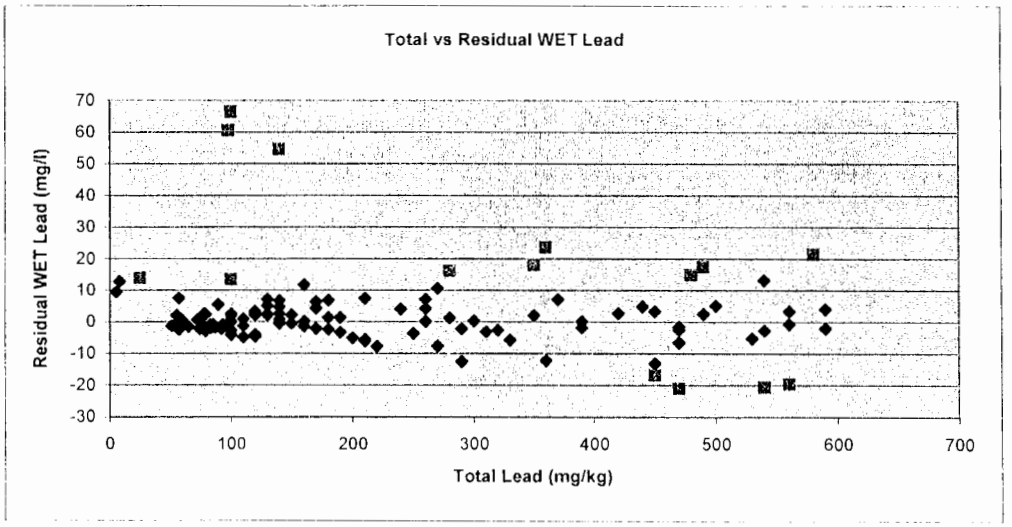
Sample ID	Sample Depth (feet)	Total Lead (mg/kg)	WET Lead (mg/l)	Residual WET Lead (mg/l)	Squared Residual WET Lead (mg/l)
B-93 1'	1	160	7.4	0.04	0.00
B-62 0'	0	260	12	0.04	0.00
B-5 1'	1	390	18	0.07	0.00
B-127 1'	1	100	4.5	-0.10	0.01
B-87 0'	0	300	14	0.20	0.04
B-118 0'	0	98	4.3	-0.21	0.04
B-116 0'	0	75	3.1	-0.35	0.12
B-35 0'	0	99	4.1	-0.45	0.20
B-83 0'	0	72	3.8	0.49	0.24
B-69 2'	2	55	2.0	-0.53	0.28
B-47 1'	1	140	5.9	-0.54	0.29
B-28 1'	1	150	6.3	-0.60	0.36
B-68 0'	0	140	7.1	0.66	0.44
B-51 0'	0	59	3.4	0.69	0.47
B-92 0'	0	560	25	-0.75	0.57
B-29 1'	1	110	5.9	0.84	0.71
B-63 0'	0	85	3.0	-0.91	0.83
B-119 1'	1	96	3.5	-0.91	0.84
B-116 1'	1	93	3.3	-0.98	0.95
B-30 1'	1	63	1.9	-1.00	0.99
B-100 1'	1	83	2.8	-1.02	1.03
B-75 2'	2	57	1.6	-1.02	1.04
B-7 2'	2	280	14	1.12	1.26
B-66 1'	1	180	9.5	1.22	1.49
B-53 1'	1	53	1.2	-1.24	1.53
B-19 0'	0	190	10	1.26	1.59
B-92 1'	1	83	2.5	-1.32	1.73
B-17 0'	0	110	3.7	-1.36	1.85
B-10 1'	1	56	1.2	-1.38	1.89
B-53 2'	2	51	0.93	-1.42	2.00
B-74 1'	1	160	5.9	-1.46	2.12
B-108 0'	0	56	4.1	1.52	2.33
B-90 1'	1	65	1.4	-1.59	2.53
B-98 1'	1	65	1.4	-1.59	2.53
B-71 1'	1	470	20	-1.61	2.60
B-75 1'	1	87	2.1	-1.90	3.61
B-109 0'	0	350	18	1.91	3.63
B-47 0'	0	390	16	-1.93	3.74
B-22 0'	0	55	4.5	1.97	3.88
B-89 0'	0	100	6.6	2.00	4.01
B-4 0'	0	130	8.0	2.02	4.09
B-11 1'	1	120	7.6	2.08	4.33
B-86 1'	1	150	9.0	2.10	4.42
B-119 0'	0	83	1.7	-2.12	4.48
B-30 0'	0	590	25	-2.13	4.54
B-103 1'	1	79	1.5	-2.13	4.55
B-15 0'	0	170	5.6	-2.22	4.92
B-46 0'	0	79	5.9	2.27	5.14
B-25 0'	0	74	1.1	-2.30	5.30
B-41 0'	0	130	8.3	2.32	5.39
B-6 0'	0	290	11	-2.34	5.46
B-118 1'	1	100	7.0	2.40	5.77
B-4 2'	2	92	1.8	-2.43	5.91
B-88 1'	1	140	8.9	2.46	6.06

Sample ID	Sample Depth (feet)	Total Lead (mg/kg)	WET Lead (mg/l)	Residual WET Lead (mg/l)	Squared Residual WET Lead (mg/l)
B-86 0'	0	490	25	2.47	6.09
B-40 1'	1	180	5.8	-2.48	6.14
B-19 1'	1	57	0.125	-2.50	6.23
B-64 0'	0	78	6.1	2.51	6.32
B-9 1'	1	470	19	-2.61	6.83
B-137 1'	1	420	22	2.69	7.21
B-12 1'	1	320	12	-2.72	7.37
B-12 2'	2	100	1.8	-2.80	7.83
B-5 0'	0	540	22	-2.83	8.02
B-74 0'	0	120	8.5	2.98	8.89
B-125 1'	1	79	0.59	-3.04	9.26
B-17 1'	1	120	8.7	3.18	10.12
B-35 1'	1	560	29	3.25	10.55
B-57 0'	0	310	11	-3.26	10.60
B-8 1'	1	450	24	3.31	10.93
B-101 2'	2	190	5.3	-3.44	11.81
B-122 1'	1	250	7.9	-3.60	12.93
B-135 0'	0	590	31	3.87	14.97
B-98 0'	0	240	15	3.96	15.71
B-126 0'	0	260	16	4.04	16.35
B-111 1'	1	120	1.4	-4.12	16.96
B-102 0'	0	170	12	4.18	17.49
B-7 1'	1	100	0.39	-4.21	17.71
B-97 0'	0	140	11	4.56	20.81
B-129 0'	0	120	0.82	-4.70	22.07
B-67 0'	0	440	25	4.77	22.72
B-34 1'	1	110	0.125	-4.93	24.34
B-12 0'	0	500	28	5.01	25.07
B-70 0'	0	130	11	5.02	25.22
B-48 0'	0	200	4.0	-5.20	27.01
B-93 0'	0	530	19	-5.37	28.86
B-32 2'	2	89	9.5	5.41	29.24
B-77 0'	0	210	3.9	-5.76	33.14
B-72 1'	1	330	9.3	-5.88	34.52
B-135 1'	1	170	14	6.18	38.22
B-77 1'	1	210	3.4	-6.26	39.15
B-32 1'	1	140	13	6.56	43.06
B-84 0'	0	470	15	-6.61	43.74
B-132 1'	1	180	15	6.72	45.19
B-75 0'	0	370	24	6.99	48.79
B-31 1'	1	130	13	7.02	49.31
B-76 0'	0	130	13	7.02	49.31
B-58 0'	0	260	19	7.04	49.61
B-52 0'	0	210	17	7.34	53.92
B-55 1'	1	57	10	7.38	54.45
B-29 0'	0	270	4.7	-7.72	59.54
B-6 2'	2	220	2.3	-7.82	61.10
B-80 2'	2	5.2	9.6	9.36	87.63
B-121 0'	0	270	23	10.58	112.02
B-73 0'	0	160	19	11.64	135.54
B-37 1'	1	360	4.3	-12.25	150.18
B-124 1'	1	8.1	13	12.63	159.45
B-41 1'	1	290	0.70	-12.64	159.66
B-109 1'	1	540	38	13.17	173.39
B-26 0'	0	450	7.5	-13.19	174.07

APPENDIX C

Sample ID	Sample Depth (feet)	Total Lead (mg/kg)	WET Lead (mg/l)	Residual WET Lead (mg/l)	Squared Residual WET Lead (mg/l)
Not Used					
B-24 1'	1	100	18	13.40	179.60
B-3 1'	1	25	15	13.85	191.83
B-91 0'	0	480	37	14.93	222.81
B-96 1'	1	280	29	16.12	259.98
B-81 0'	0	450	3.8	-16.89	285.39
B-101 1'	1	490	40	17.47	305.10
B-125 0'	0	350	34	17.91	320.59
B-8 2'	2	560	6.1	-19.65	386.20
B-123 1'	1	540	4.1	-20.73	429.83
B-52 1'	1	470	0.51	-21.10	445.35
B-113 0'	0	580	48	21.33	454.90
B-3 0'	0	360	40	23.45	549.68
B-134 0'	0	140	61	54.56	2977.01
B-105 0'	0	98	65	60.49	3659.45
B-31 0'	0	100	71	66.40	4409.15





APPENDIX C

NB-0	
Number of Valid Observations	69
Number of Distinct Observations	58
Minimum	2.5
Maximum	5300
Mean	525.7
Median	170
SD	813.6
Variance	661985
Coefficient of Variation	1.548
Skewness	3.538
Mean of log data	5.212
SD of log data	1.653
90% Standard Bootstrap UCL	649.7
95% Standard Bootstrap UCL	683.5

NB-1	
Number of Valid Observations	69
Number of Distinct Observations	58
Minimum	1.5
Maximum	1300
Mean	182.7
Median	45
SD	295.9
Variance	87546
Coefficient of Variation	1.62
Skewness	2.291
Mean of log data	3.968
SD of log data	1.687
90% Standard Bootstrap UCL	227.1
95% Standard Bootstrap UCL	240.9

NB-2	
Number of Valid Observations	89
Number of Distinct Observations	59
Minimum	2.4
Maximum	1900
Mean	41.53
Median	7.2
SD	217.9
Variance	47481
Coefficient of Variation	5.247
Skewness	7.742
Mean of log data	2.146
SD of log data	1.029
90% Standard Bootstrap UCL	70.8
95% Standard Bootstrap UCL	78.2

SB-0	
Number of Valid Observations	67
Number of Distinct Observations	59
Minimum	2.5
Maximum	5300
Mean	411.5
Median	85
SD	893.1
Variance	797654
Coefficient of Variation	2.171
Skewness	4.265
Mean of log data	4.714
SD of log data	1.64
90% Standard Bootstrap UCL	551.7
95% Standard Bootstrap UCL	588.5

SB-1	
Number of Valid Observations	67
Number of Distinct Observations	55
Minimum	2.5
Maximum	4100
Mean	275.5
Median	46
SD	605.5
Variance	366652
Coefficient of Variation	2.198
Skewness	4.37
Mean of log data	4.056
SD of log data	1.826
90% Standard Bootstrap UCL	372.3
95% Standard Bootstrap UCL	398.2

SB-2	
Number of Valid Observations	67
Number of Distinct Observations	48
Minimum	1
Maximum	830
Mean	43.82
Median	8.7
SD	126.4
Variance	15970
Coefficient of Variation	2.884
Skewness	4.954
Mean of log data	2.418
SD of log data	1.368
90% Standard Bootstrap UCL	62.89
95% Standard Bootstrap UCL	69.65

TCLP Pb	
Number of Valid Observations	44
Number of Distinct Observations	36
Minimum	0.125
Maximum	51
Mean	2.624
Median	0.76
SD	7.647
Variance	58.48
Coefficient of Variation	2.915
Skewness	6.159
Mean of log data	-0.0966
SD of log data	1.29
95% Standard Bootstrap UCL	4.512

APPENDIX C - Lead UCLs

NB-WR-X-0	
Number of Valid Observations	65
Number of Distinct Observations	54
Minimum	2.5
Maximum	2700
Mean	460
Median	160
SD	580
Variance	336390
Coefficient of Variation	1.261
Skewness	1.766
Mean of log data	5.163
SD of log data	1.622
90% Standard Bootstrap UCL	549.9
95% Standard Bootstrap UCL	577

SB-OCs-X-0	
Number of Valid Observations	51
Number of Distinct Observations	44
Minimum	2.5
Maximum	2000
Mean	257.3
Median	55
SD	405.3
Variance	164237
Coefficient of Variation	1.575
Skewness	2.476
Mean of log data	4.457
SD of log data	1.551
90% Standard Bootstrap UCL	329.3
95% Standard Bootstrap UCL	349.9

NB-WR-X-1	
Number of Valid Observations	65
Number of Distinct Observations	56
Minimum	1.5
Maximum	1300
Mean	171.9
Median	37
SD	292
Variance	85290
Coefficient of Variation	1.699
Skewness	2.488
Mean of log data	3.882
SD of log data	1.679
90% Standard Bootstrap UCL	219.5
95% Standard Bootstrap UCL	231.8

SB-OCs-X-1	
Number of Valid Observations	51
Number of Distinct Observations	43
Minimum	2.5
Maximum	4100
Mean	312.7
Median	53
SD	671.6
Variance	451048
Coefficient of Variation	2.147
Skewness	4.051
Mean of log data	4.05
SD of log data	1.962
90% Standard Bootstrap UCL	431.3
95% Standard Bootstrap UCL	468.1

NB-WR-X-2	
Number of Valid Observations	65
Number of Distinct Observations	42
Minimum	2.4
Maximum	1900
Mean	39.28
Median	8
SD	234.6
Variance	55030
Coefficient of Variation	5.971
Skewness	8.043
Mean of log data	2.188
SD of log data	0.912
90% Standard Bootstrap UCL	76.28
95% Standard Bootstrap UCL	86.62

SB_OCs-X-2	
Number of Valid Observations	51
Number of Distinct Observations	39
Minimum	2.5
Maximum	830
Mean	53.47
Median	8.1
SD	143.6
Variance	20626
Coefficient of Variation	2.686
Skewness	4.293
Mean of log data	2.53
SD of log data	1.434
90% Standard Bootstrap UCL	79.21
95% Standard Bootstrap UCL	85.83

NB-UA-X-0	
Number of Valid Observations	60
Number of Distinct Observations	50
Minimum	2.5
Maximum	5300
Mean	559.5
Median	225
SD	849.9
Variance	722309
Coefficient of Variation	1.519
Skewness	3.462
Mean of log data	5.279
SD of log data	1.688
90% Standard Bootstrap UCL	699.6
95% Standard Bootstrap UCL	742.7

NB-UA-0	
Number of Valid Observations	9
Number of Distinct Observations	9
Minimum	21
Maximum	1500
Mean	300.3
Median	83
SD	483.9
Variance	234125
Coefficient of Variation	1.611
Skewness	2.356
Mean of log data	4.766
SD of log data	1.4
90% Standard Bootstrap UCL	496.1
95% Standard Bootstrap UCL	547.6

NB-UA-X-1	
Number of Valid Observations	60
Number of Distinct Observations	52

NB-UA-1	
Number of Valid Observations	9
Number of Distinct Observations	9

Minimum	1.5
Maximum	1300
Mean	203.1
Median	65
SD	312.2
Variance	97442
Coefficient of Variation	1.537
Skewness	2.071
Mean of log data	4.049
SD of log data	1.756
90% Standard Bootstrap UCL	256.3
95% Standard Bootstrap UCL	267

Minimum	8.5
Maximum	100
Mean	46.57
Median	36
SD	39.33
Variance	1547
Coefficient of Variation	0.845
Skewness	0.531
Mean of log data	3.427
SD of log data	1.031
90% Standard Bootstrap UCL	62.33
95% Standard Bootstrap UCL	66.74

NB-UA-X-2	
Number of Valid Observations	60
Number of Distinct Observations	39
Minimum	2.4
Maximum	1900
Mean	58.8
Median	8.15
SD	264.4
Variance	69885
Coefficient of Variation	4.496
Skewness	6.338
Mean of log data	2.372
SD of log data	1.16
90% Standard Bootstrap UCL	101
95% Standard Bootstrap UCL	114.5

NB-UA-2	
Number of Valid Observations	9
Number of Distinct Observations	9
Minimum	2.5
Maximum	14
Mean	7.633
Median	6.4
SD	3.338
Variance	11.14
Coefficient of Variation	0.437
Skewness	0.636
Mean of log data	1.938
SD of log data	0.486
90% Standard Bootstrap UCL	8.984
95% Standard Bootstrap UCL	9.324

NB-OCs-X-0	
Number of Valid Observations	56
Number of Distinct Observations	46
Minimum	2.5
Maximum	2700
Mean	485.6
Median	190
SD	593.8
Variance	352541
Coefficient of Variation	1.223
Skewness	1.726
Mean of log data	5.226
SD of log data	1.657
90% Standard Bootstrap UCL	585.4
95% Standard Bootstrap UCL	615.2

SB-UA-0	
Number of Valid Observations	10
Number of Distinct Observations	10
Minimum	17
Maximum	4600
Mean	653.7
Median	139.5
SD	1413
Variance	1996000
Coefficient of Variation	2.161
Skewness	2.962
Mean of log data	5.017
SD of log data	1.728
90% Standard Bootstrap UCL	1202
95% Standard Bootstrap UCL	1374

NB-OCs-X-1	
Number of Valid Observations	56
Number of Distinct Observations	50
Minimum	1.5
Maximum	1300
Mean	192.1
Median	39.5
SD	309.9
Variance	96036
Coefficient of Variation	1.613
Skewness	2.247
Mean of log data	3.955
SD of log data	1.757
90% Standard Bootstrap UCL	242.1
95% Standard Bootstrap UCL	258.8

SB-UA-1	
Number of Valid Observations	10
Number of Distinct Observations	10
Minimum	8
Maximum	1200
Mean	201.9
Median	39.5
SD	377.2
Variance	142289
Coefficient of Variation	1.869
Skewness	2.528
Mean of log data	4.064
SD of log data	1.592
90% Standard Bootstrap UCL	346.1
95% Standard Bootstrap UCL	382.4

NB_OCs-X-2	
Number of Valid Observations	56
Number of Distinct Observations	37
Minimum	2.4
Maximum	1900
Mean	44.37

SB-UA-2	
Number of Valid Observations	10
Number of Distinct Observations	7
Minimum	1
Maximum	49
Mean	10.91

Median	8
SD	252.7
Variance	63843
Coefficient of Variation	5.694
Skewness	7.466
Mean of log data	2.228
SD of log data	0.96
90% Standard Bootstrap UCL	87.3
95% Standard Bootstrap UCL	101.1

SB-WR-X-0

Number of Valid Observations	61
Number of Distinct Observations	53
Minimum	2.5
Maximum	4600
Mean	322.3
Median	74
SD	676.9
Variance	458163
Coefficient of Variation	2.1
Skewness	4.705
Mean of log data	4.549
SD of log data	1.58
90% Standard Bootstrap UCL	431.8
95% Standard Bootstrap UCL	463.9

SB-WR-X-1

Number of Valid Observations	61
Number of Distinct Observations	50
Minimum	2.5
Maximum	4100
Mean	294.6
Median	43
SD	631.6
Variance	398930
Coefficient of Variation	2.144
Skewness	4.158
Mean of log data	4.052
SD of log data	1.895
90% Standard Bootstrap UCL	394.5
95% Standard Bootstrap UCL	423.6

SB-WR-X-2

Number of Valid Observations	61
Number of Distinct Observations	44
Minimum	1
Maximum	830
Mean	46.5
Median	7.9
SD	132.2
Variance	17471
Coefficient of Variation	2.843
Skewness	4.715
Mean of log data	2.412
SD of log data	1.407
90% Standard Bootstrap UCL	68.31
95% Standard Bootstrap UCL	72.91

SB-UA-X-0

Number of Valid Observations	57
Number of Distinct Observations	50
Minimum	2.5
Maximum	5300
Mean	369
Median	85
SD	779.1
Median	6.8
SD	14.17
Variance	200.9
Coefficient of Variation	1.299
Skewness	2.556
Mean of log data	1.807
SD of log data	1.138
90% Standard Bootstrap UCL	16.18
95% Standard Bootstrap UCL	17.96

NB-WR-0

Number of Valid Observations	4
Number of Distinct Observations	4
Minimum	27
Maximum	5300
Mean	1594

NB-WR-1

Number of Valid Observations	4
Number of Distinct Observations	4
Minimum	65
Maximum	790
Mean	357

NB-WR-2

Number of Valid Observations	4
Number of Distinct Observations	4
Minimum	15
Maximum	820
Mean	260.75

SB-WR-0

Number of Valid Observations	6
Number of Distinct Observations	6
Minimum	100
Maximum	5300
Mean	1318
Median	520
SD	1987
Variance	3947097
Coefficient of Variation	1.507
Skewness	2.262
Mean of log data	6.393
SD of log data	1.353
90% Standard Bootstrap UCL	2274
95% Standard Bootstrap UCL	2547

Variance	606989
Coefficient of Variation	2.112
Skewness	4.914
Mean of log data	4.661
SD of log data	1.634
90% Standard Bootstrap UCL	502
95% Standard Bootstrap UCL	536.6

SB-UA-X-1

Number of Valid Observations	57
Number of Distinct Observations	48
Minimum	2.5
Maximum	4100
Mean	288.4
Median	56
SD	638.8
Variance	408120
Coefficient of Variation	2.215
Skewness	4.297
Mean of log data	4.055
SD of log data	1.877
90% Standard Bootstrap UCL	392.3
95% Standard Bootstrap UCL	426.8

SB-WR-1

Number of Valid Observations	6
Number of Distinct Observations	6
Minimum	15
Maximum	150
Mean	81.83
Median	86.5
SD	56.64
Variance	3209
Coefficient of Variation	0.692
Skewness	-0.0957
Mean of log data	4.094
SD of log data	0.964
90% Standard Bootstrap UCL	108.8
95% Standard Bootstrap UCL	116.3

SB-UA-X-2

Number of Valid Observations	57
Number of Distinct Observations	43
Minimum	2.5
Maximum	830
Mean	49.59
Median	8.7
SD	136.2
Variance	18562
Coefficient of Variation	2.747
Skewness	4.556
Mean of log data	2.525
SD of log data	1.385
90% Standard Bootstrap UCL	72.17
95% Standard Bootstrap UCL	78.76

SB-WR-2

Number of Valid Observations	6
Number of Distinct Observations	6
Minimum	2.5
Maximum	35
Mean	16.57
Median	10.8
SD	13.18
Variance	173.6
Coefficient of Variation	0.795
Skewness	0.743
Mean of log data	2.48
SD of log data	0.961
90% Standard Bootstrap UCL	22.95
95% Standard Bootstrap UCL	24.61

NB-68-116-0

Number of Valid Observations	48
Number of Distinct Observations	42
Minimum	2.5
Maximum	5300
Mean	547.2
Median	190
SD	891.7
Variance	795178
Coefficient of Variation	1.63
Skewness	3.704
Mean of log data	5.231
SD of log data	1.69
90% Standard Bootstrap UCL	705.3
95% Standard Bootstrap UCL	753

SB-1-48-0

Number of Valid Observations	48
Number of Distinct Observations	44
Minimum	2.5
Maximum	5300
Mean	441.9
Median	99.5
SD	1002
Variance	1003417
Coefficient of Variation	2.267
Skewness	4.101
Mean of log data	4.701
SD of log data	1.714
90% Standard Bootstrap UCL	626.8
95% Standard Bootstrap UCL	667.1

NB-68-116-1

Number of Valid Observations	48
Number of Distinct Observations	42
Minimum	1.5
Maximum	1300
Mean	182
Median	43.5
SD	300.2
Variance	90099
Coefficient of Variation	1.649

SB-1-48-1

Number of Valid Observations	48
Number of Distinct Observations	42
Minimum	2.5
Maximum	1400
Mean	197
Median	56.5
SD	330.5
Variance	109249
Coefficient of Variation	1.678

Skewness	2.293
Mean of log data	3.979
SD of log data	1.65
90% Standard Bootstrap UCL	236.3
95% Standard Bootstrap UCL	252

Skewness	2.417
Mean of log data	3.994
SD of log data	1.744
90% Standard Bootstrap UCL	257.1
95% Standard Bootstrap UCL	275.3

NB-68-116-2	
Number of Valid Observations	48
Number of Distinct Observations	39
Minimum	2.4
Maximum	1900
Mean	70.44
Median	8
SD	295
Variance	87026
Coefficient of Variation	4.188
Skewness	5.653
Mean of log data	2.381
SD of log data	1.259
90% Standard Bootstrap UCL	123.8
95% Standard Bootstrap UCL	139.1

SB-1-48-2	
Number of Valid Observations	48
Number of Distinct Observations	35
Minimum	2.5
Maximum	560
Mean	39.88
Median	8.4
SD	93.76
Variance	8791
Coefficient of Variation	2.351
Skewness	4.307
Mean of log data	2.493
SD of log data	1.359
90% Standard Bootstrap UCL	57.45
95% Standard Bootstrap UCL	61.99

NB-117-137-0	
Number of Valid Observations	21
Number of Distinct Observations	20
Minimum	12
Maximum	1900
Mean	476.6
Median	140
SD	615.2
Variance	378435
Coefficient of Variation	1.291
Skewness	1.476
Mean of log data	5.167
SD of log data	1.605
90% Standard Bootstrap UCL	648.1
95% Standard Bootstrap UCL	690.9

SB-49-67-0	
Number of Valid Observations	19
Number of Distinct Observations	18
Minimum	19
Maximum	2000
Mean	334.6
Median	78
SD	544
Variance	295990
Coefficient of Variation	1.626
Skewness	2.254
Mean of log data	4.747
SD of log data	1.479
90% Standard Bootstrap UCL	492.6
95% Standard Bootstrap UCL	538

NB-117-137-1	
Number of Valid Observations	21
Number of Distinct Observations	20
Minimum	2.5
Maximum	1200
Mean	184.1
Median	79
SD	293.1
Variance	85920
Coefficient of Variation	1.592
Skewness	2.47
Mean of log data	3.943
SD of log data	1.808
90% Standard Bootstrap UCL	264.8
95% Standard Bootstrap UCL	287.7

SB-49-67-1	
Number of Valid Observations	19
Number of Distinct Observations	19
Minimum	5.3
Maximum	4100
Mean	473.8
Median	42
SD	1001
Variance	1001179
Coefficient of Variation	2.112
Skewness	3.009
Mean of log data	4.212
SD of log data	2.061
90% Standard Bootstrap UCL	760.3
95% Standard Bootstrap UCL	839.5

NB-117-137-2	
Number of Valid Observations	21
Number of Distinct Observations	16
Minimum	2.5
Maximum	20
Mean	10.25
Median	8.7
SD	5.7
Variance	32.49
Coefficient of Variation	0.556
Skewness	0.652
Mean of log data	2.165
SD of log data	0.614
90% Standard Bootstrap UCL	11.8
95% Standard Bootstrap UCL	12.29

SB-49-67-2	
Number of Valid Observations	19
Number of Distinct Observations	15
Minimum	1
Maximum	830
Mean	53.76
Median	9.7
SD	188.3
Variance	35456
Coefficient of Variation	3.502
Skewness	4.334
Mean of log data	2.227
SD of log data	1.408
90% Standard Bootstrap UCL	106
95% Standard Bootstrap UCL	122.7

PAVEMENT SELECTION REVIEW COMMITTEE CHECKLIST

Project Description and project elements:

The project proposes to widen US 101 to add auxiliary lanes in each direction from the Embarcadero Road Interchange (PM 52.2) in the City of Palo Alto in Santa Clara County to the Marsh Road interchange (PM 3.6) in the City of Menlo Park in San Mateo County. In addition to the auxiliary lanes, other major components of the project include:

- Replacement of the Ringwood Avenue Pedestrian Overcrossing (POC) to provide sufficient clearance for the proposed auxiliary lanes.
- Widening of the Hetch Hetchy Aqueduct Bridge.
- Realignment of existing off-ramps and on-ramps, widening of on-ramps to provide HOV bypass lane(s), and in conjunction with the modification of existing ramp metering.

The addition of auxiliary lanes will relieve congestion on mainline US 101 within the project limits. The proposed major funding source for the project is the Corridor Mobility Improvement Account (CMIA) Program. The San Mateo County Transportation Authority (SMCTA) will provide the Measure 'A' funds for construction capital and right of way (R/W) capital. Regional Transportation Improvement Plan (RTIP) will fund Project Report/Environmental Document (PA/ED), PS&E and R/W supports as well as construction capital. There are also Federal Earmark funds for R/W.

One build alternative for the project is being considered. The current 2007 construction estimate for the alternative is $61million, while the R/W cost is estimated to be $50,000. The estimated support cost for this project is $27 million in 2007 dollars. This project has been assigned the project development processing category "4B" because it does not require new R/W and does not substantially increase traffic capacity.

EA: 235610	Project Manager: Ron Moriguchi
Co/Rte: SCl/SM 101	Office: Design South
Project Engineer: Aijun Ding	Program: HB4C
Design Senior: Teblez Nemariam	PM Limits: SM-101 PM 0.0/3.6, SCl 101 PM 52.2/52.6

This project is at the following phase (please check one):

☐ PID (PSR, PSSR, etc.) ☒ PR ☐ PS&E ☐ OTHER

At present, we are preparing the Draft Project Report and the Draft Environmental Document.

What pavement types/structural sections does Materials propose?

Office of Engineering Services I recommends that the proposed outside widening be designed with a full depth.

The two following alternatives have been proposed for outside widening pavement and shoulders:

A. Auxiliary Lanes/Right Shoulders

From Embarcadero Road I/C to Marsh Road I/C (PM: SCl 52.2/52.6 and SM 0.0/3.6).
Design Factors: $TI_{40} = 14$ R-Value = 15 Required G.E = 3.81'

Alternative I	Thickness	G.E.
	0.10' OGFC*	N/A
	0.15' RHMA-G	0.25'
	0.55' HMA(A)	0.88'
	0.80' CTB(A)	1.34'
	1.40' AS(4)	1.38'
	3.0'	3.85'

Alternative II	Thickness	G.E.
	0.10' OGFC*	N/A
	0.15' RHMA-G	0.25'
	0.90' HMA(A)	1.71'
	1.00' ACB	1.87'
	2.15'	3.83'

* Note: For NB direction only, between PM 52.2/52.6 in Santa Clara County.

B. Ramps

Design Factors: $TI_{20} = 10$ R-Value = 15 Required G.E = 2.72'

Alternative I		
	0.15' RHMA-G	G.E = 0.26'
	0.40' MHA (A)	0.61'
	0.85' AB (3)	0.92'
	0.95' AS (4)	0.94'
	2.35'	2.73'

Alternative II		
	0.15' RHMA-G	G.E = 0.35'
	1.10' HMA (A)	2.54'
	1.25'	2.89'

☐ Entire project OR

☒ Part of the project

Pavement is only involved where widening is proposed.

Please provide information for all of the following items that apply to this project.

	Yes	No	Question
1.	☐	☒	Are you implementing an innovative strategy (e.g., cold foam AC, pre-cast concrete pavement, continuously reinforced pavement, etc)? The majority of the traveled-way and most of the shoulders are now overlaid with either HMA (A) or RHMA-G. The Office of Engr. Services I, Materials recommends that RHMA-G and HMA (A) structural sections be used as adding aux. lanes is small addition to existing roadway. Roadway within the project limits is newly overlaid in 2007.
2.	☐	☒	Has Rapid Rehab strategy been considered (e.g., weekend closures and lane replacements)? Work on this project consists of outside widening for lanes and shoulders. This work could be done by placing temporary railing (Type K). So Rapid Rehab strategy is not required.
3.	☒	☐	Are you using **RAC** in this project? Total quantity for RHMA (RAC)-G used in this project is 6,752 tons.
4.	☒	☐	Was Life Cycle Analysis performed? Based on the initial project data, HMA section provides less agency and user cost value compared to PCC section. See attached summary.
5.	☐	☒	Does existing pavement have a settlement problem?
6.	☒	☐	a) Is this project (or part of project) maintaining the grade profile? Maintaining grade profile only. b) If not, explain how the profile change affects the pavement strategy choice (cut v. fill):
7.	☒	☐	Will there be a new barrier? New barriers for Ringwood Ave. POC.
8.			Is the proposed structural section on cut or fill or both? Provide limits of both, if applicable. Mostly on cut. Will provide limits during PS&E phase.
9.	☐	☒	Are highly expansive basement soils present?
10.	☒	☐	Are as-builts (including structural section information regarding edge drains, under drains, lime treatment, permeable blanket, etc.) available? Existing edge drains are located approximately from south of the Henderson UP to Willow Road Interchange.
	☐	☐	If no, did you check map files and online? If yes, existing structural section was based on (check one): ☒ as-built ☐ actual boring

	Yes	No	Question
11.	☐	☒	Do the project limits have problems with groundwater (e.g., high water table, flow requirements, etc.)? Design contacted Area Superintendent and Hwy Maintenance Supervisor of the Foster City Maintenance Station. They said there is no ground water problem in the area. The soil has been pretty dry and there is no need for permeable fabrics. Therefore, Groundwater is not a concern to the rest of the project.
12.	☒	☐	Has the availability of pavement materials (i.e., long haul distances from plants) been considered? The RAC Plant is "Granite Rock" in Redwood City, about 7 miles away from the City of Menlo Park. If yes, how does material availability affect pavement type selection? N/A
13.	☐	☒	Will the existing pavement be rehabilitated? There will be no rehab on existing pavements as roadway was overlaid in 2007 for the project limits. What are the age and condition of the existing adjacent lanes? Recently overlaid in 2007.
14.			What is the type of pavement/structural section (corridor pavement type/structural section continuity) on upstream/downstream roadway? Explain if several: From SCL/SM County Line to Marsh Road I/C (PM 0.0/6.774) for the mainline (EA 0C9504): PCC grind and selected PCC slab replacement for existing slabs. remove 0.10' OGAC and overlay with 0.15' RAC-G. From SCL/SM County Line to Guadalupe River- (PM 52.6/40.2) for the mainline (EA 0C8904): PCC grind and selected PCC slab replacement for existing slabs. remove 0.10' OGAC and overlay with 0.15' RAC-G.
15.	☒ ☒	☐ ☐	Is TMP data (lane closure charts) available and was it considered? Will there be nighttime paving? If so, provide lane closure hours: Will provide in PS&E phase.

	Yes	No	Question
16.	☒	☐	Was field Maintenance input considered? Design met with Foster City Maintenance Station field people. Major concerns they have are: a). Wheel loads damage to PCC slab joints. b) How to achieve easy maintenance of the pump station is the major concern of the field people.
17.	☒	☐	Were climate conditions (extreme temperature, rainfall, etc.) considered? RHMA requires nighttime temperature above 55 deg F. The mean temperature above 55 deg F for both SCl & SM Counties is from March to November. Extreme temperature is anticipated affecting the pavement job.
18.			Which stage construction requirements (matching adjacent sections, temporary paving, etc.) were considered? Work on this project mostly consists of outside widening for lanes and shoulders. This work could be done by placing temporary railing (Type K).

	Yes	No	Question
19.	☒	☐	Is this a large-scale project? Explain all quantity take-off: The current total construction capital cost of this project is $83,607,000. Following are the relevant all quantity take off: Alternative 1: <u>1 - Earthwork</u> Roadway Excavation 73,360CY <u>2 - Pavement Structural Section</u> Open Grade Friction Concrete 364 Ton Rubberized Hot Mix Asphalt (G) 6,752 Ton Hot Mix Asphalt (A) 24,758Ton Cement-Treated Base (A) 17,784CY Aggregate Subbase (4) 31,121CY <u>3 - Specialty Items</u> Barriers and Guardrails 1,411 LF Alternative 2: <u>1 - Earthwork</u> Roadway Excavation 52,600CY <u>2 - Pavement Structural Section</u> Open Grade Friction Concrete 364 Ton Rubberized Hot Mix Asphalt (G) 6,752 Ton Hot Mix Asphalt (A) 40,514Ton Asphalt Concrete Base (ACB) 40,015Ton <u>3 - Specialty Items</u> Barriers and Guardrails 1,411 LF Cost of Structural Section plus Roadway Excavation Alternative 1: $ 9,257,000 Alternative 2: $11,597,000 Alternative 1 is cheaper than Alternative 2.

	Yes	No	Question
20.	☒	☐	Is there OGAC on the existing pavement? There is OGAC between PM 52.2/52.6 Northbound only from County Line to Embarcadero Road I/C.
21.	☒	☐	Was environmental impact considered? But there is no Environmental impact on the project.
22.			What is the proposed pavement design life? 40 years for mainline and 20 years for ramps.
23.			What is the final lane line configuration? From Embarcadero Rd. I/C to Marsh Rd. I/C the lane configuration is as follow: Five 12-ft lanes, 10 ft right shoulders. Most of median shoulders of the project are non-standard varies from 2 ft to 8 ft. <u>At the San Francisquito Creek Bridge:</u> Southbound: 11-ft for the no.1 lane, 4-12 ft lanes 2 ft non-standard median and right shoulders. Northbound: Five 12-ft lanes, 10 ft right shoulder and 3 ft median shoulder. <u>At Henderson Underpass:</u> Southbound/Northbound: 5- 11 ft lanes on southbound directions. Three inside lane-11 ft and 2 outside lane-12 ft on northbound direction. 2 ft non-standard median and right shoulders
24.	☒	☐	Are there vertical clearance issues? Non-standard vertical clearances (15'-1") for the existing Henderson UP.
25.			What is the traffic index? TI_{40}=14 for auxiliary lane/right shoulder, TI_{20}=10 for ramps.
26.	☒	☐	Are existing retrofit edge drains present? (No existing underdrains)
27.	☒	☐	Will shoulders be used as detours? Median shoulders and mainline have the same pavement section and will be used for detour.

	Yes	No	Question
28.	☐	☒	Is there settlement at bridge approaches?
	☐	☒	Are bridge approach slabs being replaced? Does such replacement include shoulders? Consulted with structures maintenance representative on _____.
29.	☒	☐	Is there a minimum standard (2% or 1.5%) cross-slope? 2% and varies.
30.			Provide the pavement condition report. See attached pavement condition report.
31	☐	☒	Other factors?

RECOMMENDATION:

Reviewed and discussed by Pavement Selection Review Committee on

___Please see below.____
(Date)

Committee's comments:

From February 14, 2008 Meeting:

1. Committee recommended to consider structural section with Lean Cement Base (LCB) layer instead of CTB layer and asked design team to do cost comparison for the alternatives.

2. Committee is concerned about pavement damaged due to striping lanes.

3. Committee is concerned about wheel load path on joints between slabs for permanently shifting traffic lanes toward the median barrier.

4. Committee ask design to look into using high barriers instead of using retaining walls or use steep slope to minimize cut.

5. Committee asked design to coordinate the installation of standby generator project with the relocation of the pump station.

6. Committee has asked team for further review of this project on March 13, 2008.

Responses:

1. Cost comparison was done for the recommended alternatives. Alternative 3 with LCB layer costs $11.6M (including roadway excavation) and Alternate 1 with CTB layer cost $9.2M (including roadway excavation).
Material Recommendations for LCB are as follows:

Alternative 3:

Design Factor: TI40 = 14 R-Value = 15 Require G.E. = 3.81'

Thickness	G.E.
0.10 OGFC*	N/A
0.15 RHMA-G	0.25'
0.55 HMA (A)	0.88'
0.75 LCB	1.40'
1.40 AS (4)	1.38'
2.95'	3.91'

* Note: for NB direction only, between PM 52.2/52.6 in SCl County.

2. According to the recent CAPM project (04-0C9504), the current pavement has marked with Type 13 markers on the mainline and yellow and white thermoplastic traffic stripe for the median and right shoulder respectively. Therefore, removing those existing Type 13 markers will not damage the RHMA-G or OGFC pavement as well. But sandblasting will be required in order to remove thermoplastic traffic stripe and diamond markers from the existing pavement.

3. For the aux. lanes project, there would be areas where the wheel loads apply to slab joints. Near the project limit, along US 101, from Broadway to Third Ave. the existing PCC wheel loads damage slab joints. Based on Maintenance's input, when slab joints are taking wheel loads, spalling, potholes corner breaks occur.

4. There is no need to construct the retaining walls since the Henderson Underpass will not be replaced and the pump station will not be relocated as well.

5. The Minor A project to install additional pump PS&E is in December 2008 and construction begin in Mid – 2009. Maintenance needs this generator to provide additional power for the pump to prevent flooding. Since the pump station will not be relocated that Minor A project can go ahead and start installing additional pump without any subsequent delay.

6. The second pavement selection review is scheduled on 3-13-2008.

Committee's comments:

From March 13, 2008 Meeting: -

1. Committee recommended doing Life Cycle Cost Analysis.

2. Committee also recommended for considering AC overlay on both side of the roadway in order to minimize scars on the pavement from existing stripe removal.

3. Committee is still concerned about wheel load path on joints between slabs for permanently shifting traffic lanes toward the median barrier. And if that certainly happens then recommended RAC thin overlay where it will not be possible to replace PCC pavements.

4. Committee has asked team to check the barrier height if need to do AC overlay.

5. Committee recommends distributing the final checklist before the DPR submittal.

Responses: -

1. Life Cycle Cost Analysis has been done according to committee's recommendation and the summary is attached with this checklist.

2. Yes, AC overlay will be considered only if it prevails that the lane shift will impose severe mark on the pavement (both for Rubberized and Open Graded Asphalt Concrete) and the existing barriers freeboard allows overlying as well. But still any damage on the pavement will be fixed. An additional fund of $7.0M is allocated to the project in order to perform overlay and/or replacement of the damaged PCC slabs.

3. The existing PCC pavements on northbound direction have an offset between the existing lane lines and PCC longitudinal joints within that stretch. Based on current observation pavement condition is good on that location. On the other hand, on southbound PCC pavements, the existing lane marking (or striping) falls on the PCC joints. When proposed lane shift towards the median barrier in several location of the southbound freeway, the joints will mostly fall on the middle of the proposed lane and few sections will have will wheel load path on the joints which is the same as the existing offsetting situation on the northbound direction. These issues have been discussed with Materials Division. Considering present condition on northbound direction, they recommend that variable offset will not affect the pavement serviceability especially for lane no 1 and 2. Therefore any additional amount of offset will not impact the pavement condition for all lanes on both directions. Any damaged PCC pavement will be fixed from the allocated fund.

4. Materials recommended a maximum of 0.25' overlay on southbound direction.

5. The final Checklist was submitted on March 26th, 2008 and approved on April 10, 2008.

Final Selection:

A cost comparison was done for the recommended alternatives. Alternative 1 is cheaper than Alternative 2 and 3. Design recommends choosing Alternative 1 because existing structure section of the road is of similar material and this alternative is cheaper than the other two alternatives. Life cycle cost analysis has been done based on the initial project data and it shows that the HMA section (Alternative 1) provides less agency and user cost value compare to PCC section for 40-years pavement design life. PCC section was provided from Materials division. See attached summary.

For all committee's concern on the pavement, an additional fund of $7.0M is allocated to the project for the pavement rehab.

Project Engineer

Aijun Ding
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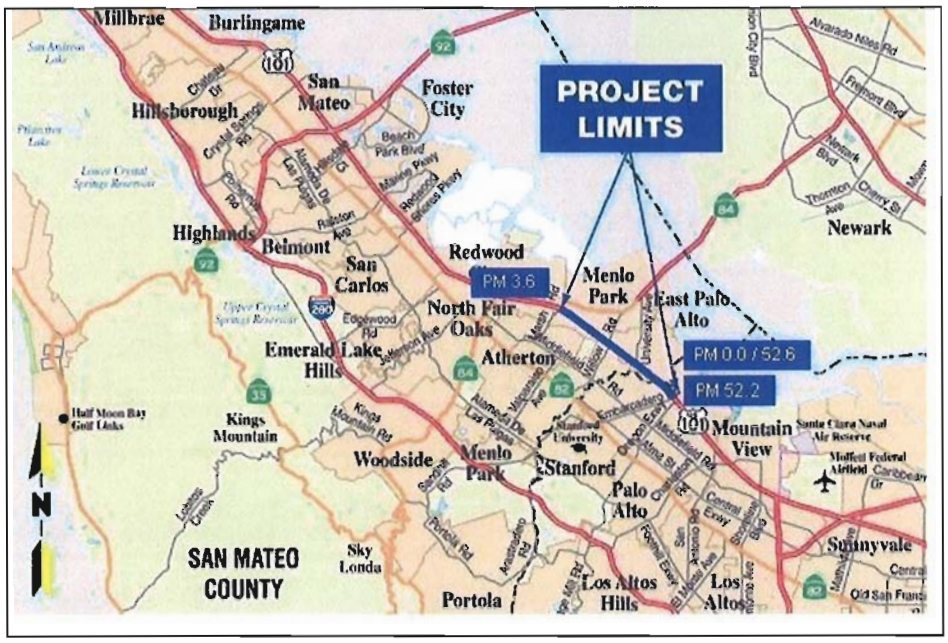
04-SCl-101, PM 52.2/52.6
04-SM-101, PM 0.0/3.6
04-243-235610
HB4C PROGRAM

PROJECT REPORT



ON US 101 BETWEEN
THE EMBARCADERO ROAD INTERCHANGE
AND THE MARSH ROAD INTERCHANGE

I have reviewed the right of way information contained in this Project Report and the R/W Data Sheet attached hereto, and find the data to be complete, current, and accurate:

for _____
R. A MACPHERSON, DEPUTY DISTRICT DIRECTOR - RIGHT OF WAY

APPROVAL RECOMMENDED: _____
KEYHAN MOGHBEL, OFFICE CHIEF
DESIGN PENINSULA

APPROVAL RECOMMENDED: _____
RON MORIGUCHI, PROJECT MANAGER

APPROVED _____ 10/1/08
HELENA "LENKA" CULIK-CARO DATE
DEPUTY DISTRICT DIRECTOR - DESIGN

Conditionally approved: pending PCR and CAP approval.

04-SCl-101, PM 52.2/52.6
04-SM-101, PM 0.0/3.6
04-243-235610
HB4C PROGRAM

This Draft Project Report has been prepared under the direction of the following registered civil engineer. The registered civil engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.

AIJUN DING
REGISTERED CIVIL ENGINEER

9/30/2008
DATE

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1. INTRODUCTION

The project proposes to add auxiliary lanes in both directions of US 101, from the Embarcadero Road Interchange (PM 52.2) in the City of Palo Alto in Santa Clara County to the Marsh Road interchange (PM 3.6) in the City of Menlo Park in San Mateo County. In addition to the auxiliary lanes, other major components of the project include:

- Replacement of the Ringwood Avenue Pedestrian Over-crossing (POC) to provide sufficient clearances for the proposed auxiliary lanes.
- Widening of the Hetch Hetchy Aqueduct Bridge.
- Realignment of existing off-ramps and on-ramps, widening of on-ramps within the existing soundwalls, modification of existing ramp metering system and install Intelligent Transportation System (ITS) equipment.

The addition of auxiliary lanes will relieve congestion on mainline US 101 within the project limits. There are three major funding sources for the project. The Corridor Mobility Improvement Account (CMIA) Program will fund construction capital and support. The San Mateo County Transportation Authority (SMCTA) will provide the Measure 'A' funds for construction and right of way (R/W) capital. Regional Transportation Improvement Plan (RTIP) will fund Project Report/Environmental Document (PA&ED), Plans, Specifications and Estimate (PS&E) and R/W support as well as construction capital. There are also Federal Earmark funds for R/W.

The proposed project has only one Preferred Build Alternative under consideration. The total escalated cost in 2012 for the alternative is $82.0 million for the capital cost, and $24.5 million for the support cost. This project has been assigned the project development Category "4B" because it does not require new R/W and does not substantially increase traffic capacity.

A Draft Project Report (DPR) was approved on March 28, 2008 to authorize the release of the Draft Initial Study with proposed Negative Declaration/Environmental Assessment. DPR scope was consistent with CMIA .

2. RECOMMENDATION

It is recommended that this project be approved using the preferred Build Alternative, and that the project proceed to the design phase. Various local agencies in the area of the project have been consulted in the development of the preferred alternative. Their views have been considered, and they are in general accordance with the plan as presented.

3. BACKGROUND

- **Project History**

The recent influx and expansion of high technology companies and the concomitant boom in housing development along the US 101 corridor and in the South Bay has resulted in more

commuters on the already congested mainline and ramps. A significant number of these commuters are now traveling from the East and South Bays where housing is more affordable. This increased commuter traffic has created gridlock on the highway during commute hours. In addition, this portion of US 101 has experienced many types of collisions that are typical of four lane highways. Rear-end, sideswipe and hit-object accidents occur frequently and sometimes cause partial highway and/or ramp closures.

On June 7, 1988, voters in San Mateo County passed a ½ cent sales tax measure, known as San Mateo County Transportation Expenditure Plan (TEP) - Measure 'A', to fund highway and commuter rail projects within the county. The San Mateo TEP - Measure 'A' calls for adding auxiliary lanes, upgrading interchanges, and implementing safety enhancements on US 101 from the Santa Clara /San Mateo County line in the south to the San Mateo/San Francisco County line in the north.

In response to the passage of Measure 'A', Caltrans prepared several Project Study Reports (PSRs) to address the need for auxiliary lanes along US 101. On March 15, 1991, Caltrans approved the PSR for the segment of US 101 from the Santa Clara /San Mateo County line to Marsh Road. Because of tremendous growth in traffic volumes and changed traffic flow patterns in the corridor, the PSR was rewritten and approved by Caltrans on September 29, 2004.

On May 5, 2007, the California Transportation Commission (CTC) adopted this project under the CMIA Program. The proposed project to widen US 101 and construct auxiliary lanes had been given the highest priority by the SMCTA in its "1988 Transportation Improvement Plan." The difference between the current project description and the Project Study Report (PSR), CMIA application, and the DPR project description are as follows:

- In the PSR, it was proposed that the new Ringwood Avenue POC structure be constructed at the same location, which would require additional right of way for new helical access ramps to meet current American with Disabilities Act (ADA) design standards. In the current proposal, the POC will be constructed close to the existing structure. The existing end spans crossing over Pierce Road on the east side and Van Buren Road on the west side of the frontage roads, and the helical ramps will be eliminated. The new access ramps will be constructed as straight-line structures with ADA standard slopes along the existing divider space between the freeway and the frontage roads and will not require additional right of way. However, there will be some minimal encroachment on frontage roads. Any additional right of way on the frontage roads will be conveyed from the City of Menlo Park to the State at no cost.

- In the PSR, it was proposed that the centerline of the freeway at San Francisquito Creek Bridge be shifted to the east to provide an auxiliary lane in both directions. In the current proposal, instead of shifting the centerline to the east, nonstandard lanes and shoulder width will be established in each direction to provide the auxiliary lanes. The bridge will be replaced under a separate project that is programmed in the 2008 SHOPP. The Bridge Inspection Report dated September 29, 2005 indicated; the original San Francisquito Bridge No. 35-0013 constructed in 1931 should not be modified, but instead should be replaced.

- In CMIA application, the project description stated "The project would widen US 101 and add auxiliary lanes in each direction from the Marsh Road Interchange in San Mateo County to the Embarcadero Road interchange in Santa Clara County. This project lies with the Cities on Menlo Park, East Pal Alto and Palo Alto. In addition to adding auxiliary lanes, this project will widen/modify all the on ramps to the four interchange within the project limits. The project will reconstruct the Ringwood overcrossing and the Henderson underpass (UP) to accommodate the Auxiliary lanes and install ITS equipments".

- In the DPR, reconstruction of the Henderson UP structure (Bridge No. 35-0012) and relocation of the Henderson railroad Storm Water Pump Plant were originally included in the scope of this project and discussed in the report as an option to replace it if funding from locals become available.

- In the current proposal, replacement of Henderson UP is no longer included as part of this project due to funding constraints as well as proposal that this work is included as part of another future project associated with the Dumbarton Rail Corridor (DRC). This change in scope will not affect outcome of the project. The existing lanes would be striped to non-standard lane and shoulder widths to accommodate the auxiliary lanes in both directions.

- In the current project description, Willow interchange and Marsh Road interchange on ramps will not be widen or modified. The Willow Interchange on ramps will be reconstructed and will be included in the US 101/Willow Interchange (EA 235650) project. The SMCTA is currently preparing a Project Report/Environmental Document (PA&ED) for the reconstruction of the Interchange. The Marsh Road interchange was reconstructed in the US 101/Marsh Road interchange project in 1991. The project modified the onramp and reconstructed the interchange from full cloverleaf to a partial cloverleaf (Parclo).

- In the current proposal the entire US 101 freeway in both directions within the project limits will be overlaid with either Rubberized Hot Mix Asphalt-Gap Graded (RHMA-G) or Open Graded Friction Course (OGFC).

- **Community Interaction**

Local agencies involved in this project's development do not consider the project controversial, and it is consistent with voter-approved Measure 'A' Expenditure Plan. There is no known opposition to the proposed project, and it has the support of local businesses, the San Mateo County/Redwood City Chamber of Commerce, and commuters who reside in the county.

A copy of the Draft Project Study Report (DPSR) was sent by SMCTA to the cities of East Palo Alto, Menlo Park, and Palo Alto in December 2002 and again in October 2003. The City of Palo Alto indicated to SMCTA that it did not have any comments on the December 2002 DPSR. In a letter dated January 30, 2003, the City of Menlo Park submitted its comments, which have been incorporated into the PSR.

The Department notified affected property owners and agencies for the replacement of the POC. Public meetings were held on November 5, 2007 and December 18, 2007 with the Bicycle

Commission and the City of Menlo Park respectively. The City of Menlo Park City Council addressed the replacement of the Ringwood Avenue POC structure as an agenda item on the Council's regular meeting. The City Council voted in favor of accepting the recommendation to replace the existing structure within close proximity to its current location. Also requested by the City Council, was for the Department to solicit input from the community in the design of the POC. This context sensitive design will provide improved safety and access for the users of the POC and the nearby residents.

- **Existing Facility**

US 101 was originally adopted on March 29, 1929. This segment of US 101 was constructed as a conventional four-lane highway in 1932 and upgraded to a six-lane freeway in 1958. In 1991, it was upgraded to an eight-lane facility when High Occupancy Vehicle (HOV) lanes were constructed in the median within the project limits. Included in the 1991 project were sound walls, median barriers, and asphalt concrete overlay of the original PCC pavement.

The existing roadway has four 12-foot wide lanes with standard 10-foot wide right shoulders in both directions. The existing left (median) shoulders are mostly non-standard width, varying between 6 and 18 feet.

There are four interchanges within the project study limit: Embarcadero Road (PM 52.17) of the south end of the project, University Avenue (PM 0.89), Willow Road (PM 1.87), and Marsh Road (PM 3.59) of the north end. Marsh Road serves as a link to the East Bay by way of the Bayfront Expressway (Route 84) and the Dumbarton Bridge. The US 101/Marsh Road interchange was reconstructed from full cloverleaf to a partial cloverleaf (Parclo) in 1999. Willow Road (Route 114) provides access to Menlo Park and connects to the Bayfront Expressway to the east. The SMCTA is currently preparing a Project Report/Environmental Document (PA&ED) for the reconstruction of the US 101/Willow Road interchange (EA 235650). The new interchange would provide HOV bypass lanes and CHP enforcement areas at the ramps. It is anticipated that the construction of this interchange will begin no earlier than 2014.

South of the Marsh Road interchange is the Henderson UP (Bridge No. 35-0012, PM 3.40) steel bridge that serves the Union Pacific Railroad. The existing facility is a two-span steel through-plate girder bridge approximately 240 feet long that carries the existing rail line over US 101. The bridge consists of two structures built one after the other to accommodate the changing width of US 101. The UP was constructed for a single track, but the abutments and girders were constructed to accommodate the addition of a future second parallel track. The vertical clearance below the girders is approximately 15 feet, which is less than the current minimum standard required for new structures over freeways. The profile of US 101 is depressed in this section, with a storm water pump station located on the north side of the bridge. The San Mateo County Transit District (SamTrans) purchased the Dumbarton Corridor in 1994 for future trans-bay commuter rail service. The Peninsula Corridor Joint Powers Board (JPB) agreed to operate the proposed commuter service. The Dumbarton Corridor is currently inactive, except for one company west of the Newark Junction that uses the rail freight service. South of the Henderson UP is the existing Ringwood Avenue Pedestrian Overcrossing (POC) (Bridge No. 35-0143, PM 2.57), connecting Menlo Park east of US 101 to Menlo Park west of US 101. The existing POC does not meet

current minimum vertical clearance standards or Americans with Disabilities Act (ADA) design standards.

Further south, is the Hetch Hetchy Aqueduct (Bridge No. 35-150M, PM 2.66), which spans and protects the two existing water lines (60 inches and 66 inches inner diameters) and future lines that serve the City/County of San Francisco and numerous cities in the Bay Area. The existing bridge was overlaid and upgraded to an eight-lane facility when HOV lanes and sound walls were constructed in 1991.

Lastly, the centerline of the San Francisquito Creek Bridge (SFCB) (Bridge No. 35-0013, SCl PM 52.6/SM PM 0.0) serves as the Santa Clara /San Mateo County line and the Embarcadero Road interchange is located 0.4 miles south of SFCB.

There are three frontage roads (East Bayshore Road, Pierce Road, and Commonwealth Drive) on the northbound side of US 101 within the project limits. East Bayshore Road extends from Embarcadero Road in the City of Palo Alto, to Willow Road in the City of Menlo Park, with a gap at the University Avenue interchange within the City of East Palo Alto. Pierce Road starts on the north side of the Willow Road interchange and extends to approximately ¼ mile south of the Henderson UP in the City of Menlo Park. The other frontage road, Commonwealth Drive, extends from north of the Henderson UP for approximately ¼ mile, ending prior to the US 101 northbound off-ramp to Marsh Road.

On the south side of US 101 within the project limits, the freeway is bound by two frontage roads. West Bayshore Road extends from the Embarcadero Road interchange to less than ½ mile south of the Willow Road interchange, with a gap at the University Avenue interchange; Van Buren Road extends from north of the Willow Road interchange to approximately ¼ mile south of the Henderson UP. A project to modify the US 101/University Avenue interchange was completed in the fall of 2000. Improvements to the State R/W included the modification and widening of the northbound off-ramp, a deceleration lane, and provisions for ramp metering on the northbound and southbound on-ramps. This project occurred in conjunction with retail development in East Palo Alto, east of the freeway. A later project modified the US 101 southbound loop off-ramp to accommodate both left (westbound to Palo Alto) and right (eastbound to East Palo Alto) movements, and also modified the southbound on-ramp to two lanes, providing a signalized intersection at University Avenue. This latter project was completed in April 2002.

4. NEED AND PURPOSE

A. Problem, Deficiencies, and Justification

This segment of US 101 runs along the San Francisco Peninsula, serving the cities of Menlo Park, Palo Alto, and East Palo Alto. It is heavily used throughout the day and is at full capacity during the morning and afternoon peak periods. US 101 along the Peninsula has seen a significant increase in traffic demand because of the influx and expansion of high technology companies and residential communities along the corridor and in the South Bay. Increased commuter traffic originating in the East and South Bays where housing is more affordable has aggravated the situation.

A traffic operation analysis for this section of US 101 dated October 2007 is documented in the report titled "Traffic Operation Analysis Report – Route 101 Auxiliary Lane Project".

- **Existing Freeway Traffic Conditions**

This section describes the 2007 weekday traffic conditions along northbound US 101 between San Antonio Road in Santa Clara County and Woodside Road in San Mateo County and southbound US 101 between Whipple Avenue in San Mateo County and San Antonio Road in Santa Clara County.

Northbound US 101 A.M. Peak Period

Northbound US 101 between the San Antonio Road on-ramp and the Embarcadero Road/Oregon Expressway off-ramp is a bottleneck. The queue from this bottleneck extends upstream and outside of the study limits. Recurring congestion during the weekday morning commute period last from 7:00 A.M. to 9:30 A.M. Between the Embarcadero Road/Oregon Expressway on-ramp and the Woodside Road off-ramp the freeway operates at or near capacity, however, no significant congestion develops. The travel time from the San Antonio Road on-ramp to the Woodside Road off-ramp is about 10.5 minutes. The maximum individual delay on the freeway within the study limits is approximately 3.7 minutes.

Southbound US 101 A.M. Peak Period

Southbound US 101 between the University Avenue on-ramp and the Embarcadero Road/Oregon Expressway off-ramp is a bottleneck. The queue from this bottleneck extends upstream approximately 5.2 miles to just beyond the Woodside Road off-ramp. There is also a bottleneck between the Willow Road loop on-ramp and loop off-ramp. However, the Willow Road bottleneck becomes a hidden bottleneck, once the queue from the downstream bottleneck extends through this bottleneck. Recurring congestion during the weekday morning commute period last between 7:15 and 10:00 A.M. The travel time from the Whipple Avenue on-ramp to the San Antonio Road off-ramp is about 21.9 minutes. The maximum individual delay on the freeway within the study limits is approximately 13.8 minutes.

Northbound US 101 P.M. Peak Period

Northbound US 101 between the San Antonio on-ramp and the Embarcadero Road/Oregon Expressway off-ramp is a bottleneck. The queue from this bottleneck extends upstream and outside of the study limits. This bottleneck meters the flow of traffic that reaches the downstream bottleneck between the Embarcadero Road/Oregon Expressway on-ramp and the lane add upstream of the University Avenue off-ramp. The queue from this bottleneck extends upstream approximately 0.6 miles to the Embarcadero Road/Oregon Expressway off-ramp. Recurring congestion during the weekday evening commute period last from 3:00 P.M. to 7:30 P.M. Between the University Avenue off-ramp and the Woodside Road off-ramp the freeway operates at free flow conditions. The travel time from the San Antonio Road on-ramp to the Woodside Road off-ramp is about 9.0 minutes. The maximum individual delay on the freeway within the study limits is approximately 2.2 minutes.

Southbound US 101 P.M. Peak Period

Southbound US 101 between the Embarcadero Road/Oregon Expressway on-ramp and the San Antonio Road off-ramp is a bottleneck. The queue from this bottleneck extends upstream approximately 5.3 miles to beyond the Marsh Road off-ramp. Recurring congestion during the weekday evening commute period last between 4:00 P.M. and 7:30 P.M. The travel time from the Whipple Avenue on-ramp to the San Antonio Road off-ramp is about 18.8 minutes. The maximum individual delay on the freeway within the study limits is approximately 10.7 minutes.

- **Expected Traffic Conditions**

This section presents the results of the traffic operational analysis along the US 101 corridor within the project study limits. Both the No-Build and Build alternatives were analyzed for northbound and southbound A.M. and P.M. peak hour traffic conditions for the future year 2035.

Table 1 summarizes the total freeway and ramp vehicle-hours (veh-hrs) of delay and delay savings for each alternative for the future year 2035.

TABLE 1
Freeway and Ramp Vehicle-Hours of Delay

Directions		Year 2035		
		No-Build (Veh.-Hrs)	**Build (Veh.-Hrs)**	**Delay Savings (Veh.-Hrs)**
AM	NB US 101	26	0	26
	SB US 101	1438	648	790
PM	NB US 101	1114	579	535
	SB US 101	632	296	336

Table 2 below summarizes the average individual travel times and delay in the mixed-flow lanes for Each alternative

TABLE 2
Average Individual Travel Time and Delay

Alternative		Year 2035	
		Travel Time (Minutes)	Delay* (Minutes)
NB	No-Build (AM)	12.8	0.4
	Build (AM)	12.6	0.2
	No-Build (PM)	22.9	10.5
	Build (PM)	20.0	7.6
SB	No-Build (AM)	22.8	12.1
	Build (AM)	18.2	7.5
	No-Build (PM)	16.0	5.3
	Build (PM)	12.7	2.0

*Based on free flow travel time at 65 mph.

- **Year 2035 Expected Freeway Operations – No-Build Alternative:**

Year 2035 expected freeway operations for the no-build alternative is described below.

Northbound US 101 A.M. Peak Hour

The operational analysis of the forecasted traffic volumes for this alternative indicates that no bottlenecks will develop on the northbound US 101 mainline within the study limits. However, the demand for the Embarcadero Road/Oregon Expressway off-ramp will exceed the capacity of this ramp causing congestion at this ramp. This queue would most likely be contained in the auxiliary lane. There will be 26 veh-hrs of delay caused by this off-ramp constraint. The northbound US 101 mainline would operate at free flow conditions with an average speed of 61 mph through this corridor, although, between the University Avenue on-ramp and the Willow Road off-ramp the freeway would operate at or near capacity.

Southbound US 101 A.M. Peak Hour

Southbound US 101 will continue to be congested during the A.M. peak hour due to the bottleneck between the University Avenue on-ramp and the Embarcadero Road/Oregon Expressway off-ramp. The queue from this bottleneck will extend upstream for a distance of approximately 7.5 miles. This queue will extend upstream of the Whipple Avenue on-ramp, which is outside the study limits. The average individual delay in the mixed-flow lanes caused by the congestion from this bottleneck will be about 12.1 minutes. This bottleneck will also, constrain the traffic entering the freeway at the University on-ramp and will cause queuing on this ramp. In addition, the constrained traffic flow at the following off-ramps will exceed the capacity of these ramps and cause congestion at these ramps, Embarcadero Road/Oregon Expressway off-ramp, Marsh Road off-ramp and Woodside Road off-ramp. There will be approximately 1272 veh-hrs of delay on southbound US 101 and 166 veh-hrs of delay on the University Avenue on-ramp. The average

speed through this corridor would be 31 mph.

Northbound US 101 P.M. Peak Hour

Northbound US 101 will continue to be congested during the P.M. peak hour due to the bottleneck between the Embarcadero Road/Oregon Expressway on-ramp and the lane add upstream of the University Avenue off-ramp. A queue will extend upstream from this bottleneck a distance of approximately 6.4 miles. The queue will extend upstream of the San Antonio Road on-ramp, which is outside the study limits. This bottleneck will constrain the traffic entering the freeway at the Embarcadero Road/Oregon Expressway on-ramp causing queuing on this ramp. In addition, a bottleneck will develop between the University Avenue on-ramp and the Willow Road off-ramp. The queue from this bottleneck will extend upstream for a distance of approximately 0.5 miles, just beyond the University Avenue off-ramp. This bottleneck will constrain the traffic entering the freeway at the University on-ramp and will cause queuing on this ramp. The average individual delay in the mixed-flow lanes caused by the congestion from these bottlenecks will be about 10.5 minutes. There will be approximately 888 veh-hrs of delay on northbound US 101, 164 veh-hrs of delay at the Embarcadero Road/Oregon Expressway on-ramp and 62 veh-hrs of delay at the University Avenue on-ramp. The average speed through this corridor would be 34 mph.

Southbound US 101 P.M. Peak Hour

Do to capacity constraints at the upstream end of the study limits there will be excess demand outside the study limits that will not reach the study area during the peak hour. This excess demand was not included in the freeway analysis. A bottleneck will develop under this alternative between the University Avenue on-ramp and the Embarcadero Road/Oregon Expressway off-ramp. The queue from this bottleneck will extend upstream a distance of 5.75 miles to just before the Whipple Avenue on-ramp. The average individual delay in the mixed-flow lanes caused by the congestion from this bottleneck will be about 5.3 minutes. This bottleneck will constrain the traffic entering the freeway at the University on-ramp and will cause queuing on this ramp. In addition, the constrained traffic flow at the Marsh Road off-ramp and the Woodside Road off-ramp will exceed the capacity of these ramps and cause congestion at these ramps. There will be approximately 608 veh-hrs of delay on southbound US 101and 24 veh-hrs of delay at the University Avenue on-ramp. The average speed through this corridor would be 43 mph.

- **Year 2035 Expected Freeway Operations – Build Alternative:**

Year 2035 expected freeway operation for the build alternative is described below:

Northbound US 101 A.M. Peak Hour

The operational analysis of the forecasted traffic volumes for this alternative indicates that no bottlenecks would develop within the study limits. The freeway would operate at free flow conditions with an average speed of 62 mph through this corridor.

Southbound US 101 A.M. Peak Hour

Southbound US 101 will continue to be congested during the A.M. peak hour due to the bottleneck between the University Avenue on-ramp and the Embarcadero Road/Oregon Expressway off-ramp. The queue will extend upstream a distance of approximately 6.4 miles. The queue will extend upstream of the Whipple Avenue on-ramp, which is outside of the study limits. The average individual delay in the mixed-flow lanes caused by the congestion from this bottleneck will be about 7.5 minutes. In addition, the constrained traffic flow to the following off-ramps will exceed the capacity of these ramps and cause congestion at these ramps; Embarcadero Road/Oregon Expressway off-ramp, Marsh Road off-ramp and Woodside Road off-ramp. There will be approximately 648 veh-hrs of delay on southbound US 101. The average speed through this corridor would be 38 mph.

Northbound US 101 P.M. Peak Hour

A bottleneck will develop between the Marsh Road loop on-ramp and Marsh Road diagonal on-ramp. A queue will extend upstream from this bottleneck a distance of approximately 8.9 miles. The queue will extend upstream of the San Antonio Road on-ramp, which is outside the study limits. The average individual delay in the mixed-flow lanes caused by the congestion from this bottleneck will be about 7.6 minutes. In addition, the demand for the HOV lane between the Marsh Road on-ramp and the Woodside Road off-ramp would exceed the capacity of this lane, causing congestion in the HOV lane. There will be approximately 569 veh-hrs of delay on northbound US 101 in the mixed-flow lanes and 10 veh-hrs of delay in the HOV lane. The average speed through this corridor would be 39 mph.

Southbound US 101 P.M. Peak Hour

Do to capacity constraints at the upstream end of the study limits there will be excess demand outside the study limits that will not reach the study area during the peak hour. This excess demand was not included in the freeway analysis. A bottleneck will develop between the Woodside Road on-ramp and off-ramp. A queue will extend upstream from this bottleneck a distance of approximately 0.4 miles, to beyond the Woodside Road off-ramp. The average individual delay in the mixed-flow lanes caused by the congestion from this bottleneck will be about 2.0 minutes. In addition, the constrained traffic flow to the Marsh Road off-ramp and the Woodside Road off-ramp will exceed the capacity of these ramps and cause congestion at these ramps. Downstream of the Marsh Road off-ramp, southbound US 101 mainline will operate at free flow conditions. There will be approximately 296 veh-hrs of delay on southbound US 101. The average speed through the corridor would be 55 mph.

The purpose of the project is to reduce traffic congestion, delay resulting from merge, and diverge operations, and to improve performance of the overall freeway system between the project limits. Additions of auxiliary lanes and introduction of ramp metering at ramps that are not currently metered would improve the operations of the freeway. In both the northbound and southbound directions, the overall vehicle hours of delay would be reduced significantly. The proposed project would also increase average travel speeds on the freeway mainline, which would result in

decreased travel times. The project is also expected to reduce merging conflicts and accident frequency.

B. Regional and System Planning

1) Identify System

US 101 is one of the region's major commute, freight and recreational routes. The US 101 corridor is of major significance to local and regional traffic as well as state to-and-through movement of people and goods between the route's southern and northern termini in Los Angeles and at the Oregon border. US101 is legislatively designed as part of the Interregional Road System and, as such, is specified as a Focus Route, or of the highest priority for improvements to facilitate interregional traffic.

US 101 links San Mateo County with County employment and recreational destinations and major employment locations in San Francisco and the South Bay. Significant regional increases in traffic demand are projected based on planned residential, industrial and commercial/recreational development in the area. The Route Concept Report finalized in March 1986 identifies a facility concept for this section of US 101 as an 8-lane freeway. A Transportation Corridor Concept Report, which replaced the earlier Route Concept Report, identifies an interim concept of 8-lane freeway with an additional 2-lane High Occupancy Vehicle facility.

2) State Planning

The 1998 Interregional Transportation Strategic Plan (ITSP) designates US 101 as a Focus Route, a term that is phrase-specific to this plan, and one that specifies a route that should be of the highest priority to completion to minimum facility standards in the 20-year period. Focus Routes serve as a system of high volume primary arteries to which lower volume and facility standard state highway routes can connect for purposes of longer interregional trips and access into statewide gateways. In addition, all Focus Routes are on the National Highway System. A recommended facility concept of 4 to 10 lanes freeway for US 101 through the San Francisco Bay Area to Cloverdale is included in the ITSP.

The Governor's Strategic Growth Plan (2006) calls for an infrastructure improvement program that includes a major transportation component (Go California). The SGP is based on the premise that investments in mobility throughout the system will yield significant improvements in congestion relief. It calls for transportation infrastructure improvements that are designed to decrease congestion, improve travel times and safety, while accommodating growth in the economy and population.

The Strategic Growth Plan was supported by the passage of the transportation bond Proposition 1B in the November 2006 election. The CMIA was developed as part of Proposition 1B and includes funding for a single project in this corridor. This project, to construct Auxiliary Lanes on US 101 from Embarcadero Road Interchange to Marsh Road Interchange, is funded through this transportation bond.

On March 15, 2007, the CTC adopted Resolution CMIA-P-0607-02. In section 2.12 and 2.13 of this resolution, the CTC resolved that "...the commission expects Caltrans and regional agencies to preserve the mobility gains of urban corridor capacity improvements over time that will be described in Corridor System Management Plans (CSMPs),"A CSMP is a transportation planning document that will study the facility based on comprehensive performance assessments and evaluations. The strategies are phased and included both operational and more traditional long-range capital expansion strategies. The strategies take into account transit usage, projections and interactions with arterial network and connection to State Highway. Each CSMP presents an analysis of existing and future traffic conditions and proposes traffic management strategies and capital improvements to maintain and enhance mobility within each corridor.

Caltrans is preparing a long range-planning document identified as the Corridor Plan (CP) previously known as a Transportation Corridor Concept Report (TCCR) that will establish planning concepts for all state highways through the year 2030. The CP will specify existing mass transit, the local arterial road system, and the deployment of Intelligent Transportation Systems (ITS) as integral to corridor concept development. The CP for US 101 is currently under development. It is anticipated that this document will be completed within three years.
Caltrans' 2008 State Transportation Improvement Program (STIP) lists the following improvement for the project area:

- Reconstruct Interchange at Willow Road/US101 in Menlo Park.

Caltrans' 2008 State Highway Operation and Protection Program (SHOPP) lists the following improvement for the project area:

- Install ramp metering on US 101 in San Mateo County from near the city of Palo Alto to the Santa Clara County line.

3) Regional Planning

Metropolitan Transportation Commission (MTC) functions as both the regional transportation-planning agency (a state designation) and for federal purposes, as the region's Metropolitan Planning Organization (MPO). As such, it is responsible for regularly updating the Regional Transportation Plan (RTP), a comprehensive blueprint for the development of mass transit, highway, airport, seaport, railroad, bicycle and pedestrian facilities. The Commission also screens requests from local agencies for state and federal grants for transportation projects to determine project compatibility with the RTP. MTC plays a major role in building regional consensus among the region's transit systems. State and federal laws have given MTC an important role in financing Bay Area transportation improvements.

The MTC's 2004 Regional Transportation Plan (T2030), approved in February 2005, lists programmed and planned projects, including the US 101 Corridor, for a 25-year planning horizon. T2030 (Page 104) indicates the system efficiency reference number for US 101 northbound and southbound auxiliary lanes from Marsh Road to Santa Clara County Line is 21608 and the total project cost is $91.2M in 2004 dollars.

4) Local Planning

The SMCTA is the Congestion Management Agency for San Mateo County and is responsible for setting transportation investment priorities. In 1988, the voters approved Measure A, San Mateo County's half-cent transportation sales tax and lead to production of the current 2004 Transportation Expenditure Plan (TEP). This measure has provided the County with a resource to meet its multi-faceted transportation challenges during the past 16 years. As stated in the 2004 TEP, the measure ends in 2008 and its extension is critical with respect to the County's ability to continue meeting its growing transportation needs. Voters approved an extension to Measure A in 2004 to continue the half-cent transportation sale tax until 2033.

The projects listed by the SMCTA 2004 TEP that are near or within the project limits are as follows:

- US 101 Mid-County Improvements
- Reconstruct US 101/Broadway I/c
- Modify US 101/Peninsula Ave I/c
- Highway 101 South Improvements
- Reconstruct 101/Woodside Road I/C
- US 101 between SR 84 and Santa Clara County Line
- Operation Improvement on US/101 from Hilldal to SR 92

C. Traffic

- **Current and Forecasted Traffic**

The following traffic volumes apply to the segment of US 101 between Embarcadero Road and Marsh Road. Traffic volumes for 2007 and projected Year 2035 Annual Average Daily Traffic (AADT) and peak hour volumes are summarized on Table 3 below.

TABLE 3
TRAFFIC DATA

	Current (Year 2007) AVERAGE DAILY TRAFFIC*		DESIGN YEAR 2035 PEAK HOUR**			
Location	**Peak Hour**	**Annual ADT**	**Build**		**No Build**	
			AM	**PM**	**AM**	**PM**
Embarcadero Rd to University Ave	14,100	210,000	17,969	19,482	17,035	18,871
University Ave to Willow Rd	13,900	208,000	17,369	19,703	16,495	19,063
Willow Rd to Marsh Rd	13,400	200,000	15,394	19,005	14,716	18,412

*Source: Caltrans 2007 Traffic Volumes on State Highways for both directions.
**Source: Planning/Advance Planning-Project Forecasting Modeling for both directions.

The Traffic demand on US 101 is expected to increase from the existing AADT of approximately 200,000 to a projected demand of 325,000 vehicles per day by the year 2035. However, this volume cannot be sustained on the existing highway geometrics.

- **Accident Rates**

A three-year Traffic Accident Surveillance and Analysis System (TASAS) study for the period between December 1, 2004 and November 30, 2007 was made for the project vicinity. The accident data was obtained from Caltrans Records. Table 4 shows the TASAS Accident Summary for the freeway section. The accident rate shows that the actual accident rate within the project limits is lower than the average accident rates.

TABLE 4
FREEWAY ACCIDENT SUMMARY

Location (PM)	Number of Accidents	Actual Accident Rates*			Average Accident Rates**		
		Fat	Fat+I	Total	Fat	Fat+I	Total
SCl-101-52.30 to SM-101-3.6	772	0.005	0.26	0.92	0.005	0.34	1.07

* from Traffic Department,
** per million vehicles miles

Fat = fatal
Fat+I = fatal plus injury.

Table 5 shows Accident Statistics with a detailed breakdown for the freeway section. The accident data was obtained from Caltrans Records. 676 or 87.6% of the 772 accidents involved multiple vehicles. These accidents happened primarily on weekdays where almost 60% of the collisions occurred during the morning and evening peak periods. The statistics show that rear-end, sideswipe and hitting objects comprise the majority of accidents. The construction of the auxiliary lanes will reduce the number of rear-end accidents due to improvements in merging conflicts within the project limits.

TABLE 5
FREEWAY ACCIDENT STATISTICS

Accidents fall into following Categories		
Type of Collision	**Number**	**Percentage**
Rear End	483	62.6
Sideswipe	145	18.8
Hit Object	104	13.5
Overturn	15	1.9
Broadside	15	1.9
Head-on	6	0.8
Others	1	0.1
Not stated	3	0.4
TOTAL	**772**	**100%**

Table 6 shows the TASAS Accident Summary for the ramp section. A three-year Traffic Accident Surveillance and Analysis System (TASAS) study for the period between December 1, 2004 and November 30, 2007 was made for the project vicinity. The data on Table 5 shows that the actual accident rates are lower than the average accident rates except for the northbound from eastbound Embarcadero on ramp, northbound from westbound Embarcadero on ramp and southbound from northbound University on ramp. These three ramps have higher accident rates than the average accident rates and majority of the accidents were rear-end collisions.

TABLE 6
RAMP ACCIDENT SUMMARY

Locations On US 101 (PM)	Number of Accidents	Actual Accident Rates**			Average Accident Rates**		
Segment		Fat	Fat+I	Total	Fat	Fat+I	Total
NB On from EB Embarcadero	7	.000	.64	1.49	.001	.24	.70
NB On from WB Embarcadero	2	.000	.00	0.96	.003	.22	.60
SB On from University	1	.000	.000	.06	.002	.08	.25
SB On from NB University	11	.000	.00	1.97	.003	.22	.60
SB On from University Ave Ext	3	.000	.00	.30	.002	.20	.60
NB On from NB University	3	.000	.23	.34	.001	.24	.70
NB On from SB University	1	.000	.00	.18	.002	.20	.60
NB On from University	2	.000	.07	.14	.002	.08	.25

* from Traffic Department
** per million vehicles

Fat = Fatal
Fat + I = Fatal plus Injury.

Table 7 below shows Accident Statistics with a detailed breakdown for the ramp areas. A total of 138 accidents occurred within project limits during the three-year period from December 1, 2004 to November 30, 2007. The statistics show that rear-end, hitting object, sideswipe and broadside comprise the majority of accidents. The proposed auxiliary lane project may help to reduce the number of accidents occurring in the ramp areas, as the majority of the accidents were rear-ends due to traffic congestion during weekdays.

TABLE 7
RAMP ACCIDENT STATISTICS*

Accidents fall into following Categories		
Type of Collision	Number	Percentages
Rear End	67	48.6
Hit Object	31	22.5
Sideswipe	14	10.1
Broadside	16	11.6
Overturn	4	2.9
Head-on	4	2.9
Others	2	1.4
TOTAL	138	100%

- **Safety Index**

No improvement category can fit in the safety index program since this project is an operational project.

5. ALTERNATIVES

A. Viable Alternatives

Two alternatives are being considered for this project: the "no-build" alternative and the "build" alternative, both of which are briefly described below.

Build Alternative (The Preferred Alternative)

This Build Alternative would widen the freeway on the outside from the Embarcadero Road interchange to the Santa Clara/San Mateo County line and from the County line to the Marsh Road interchange to accommodate the addition of auxiliary lanes in both directions between the existing sound-walls (See Attachment B).

Proposed Engineering Features

- **Replacement of Ringwood Avenue POC (Br No. 35-0143)**

It is proposed to completely replace the existing Ringwood Avenue POC (PM 2.57), which spans US 101 in the City of Menlo Park. The existing POC will not accommodate widening of the freeway and meet neither the ADA requirement nor the minimum vertical clearance requirement of 18 ft-6 inches in the Highway Design Manual (HDM) Sixth Edition. The existing POC structure, spiral ramps and end spans crossing over the frontage road will be eliminated. The new POC

structure will be constructed close to the existing structure to serve the current and future needs of the community. The existing POC will be used throughout the construction phase of the project, thereby eliminating the need to provide a temporary POC during construction. Demolition of the existing POC structure will have to take place after construction of the new structure. Trees near existing sound-walls along the new POC structure's access ramps will need to be removed. The existing overhead lines located outside the existing State R/W along the frontage road will need to be relocated. The new access ramps will be constructed between the freeway and the frontage roads and will encroach on frontage roads (See Attachment H). Any additional R/W on the frontage road will be conveyed to the State at no cost under Section 83. The new bridge access ramps will meet current ADA design standards; provide standard vertical clearance over US 101 and will provide sufficient lighting. Design of the ramps will be done in coordination with the City of Menlo Park.

The new structure will be maintained by the City of Menlo Park under a Freeway Maintenance Agreement with the State. The existing Maintenance Agreement between the City of Menlo Park and State will be updated during the design phase.

- **Widening of Hetch Hetchy Aqueduct Bridge (Br No. 35-0150M)**

The existing Hetch Hetchy Aqueduct Bridge (PM 2.66), which spans and protects the two existing water lines (60 inches and 66 inches) and future water lines, needs to be widened to accommodate the auxiliary lanes in both the northbound and southbound directions (See Attachment H). Since the existing sound walls and median barrier will not be relocated, the widening is therefore constrained by the available width between them, which measures slightly more than 74 feet from the edge of the sound wall safety barrier to the edge of the median barrier. The existing bridge consists of an 8-feet inside shoulder, four 12-feet traffic lanes, and a 10-feet outside shoulder in both the northbound and southbound directions. To accommodate the added auxiliary lanes within the given space, this project proposes to provide a 4-feet inside shoulder, five 12-feet traffic lanes, and a 10-feet outside shoulder in each direction.

- **Re-striping of San Francisquito Creek Bridge (Br No. 35-0013)**

The existing San Francisquito Creek Bridge (SFCB) will not be widened but will be re-striped to accommodate the new auxiliary lanes in both the northbound and southbound directions. The existing SFCB has four 12-feet wide standard lanes and standard left and right shoulders on the northbound side. On the southbound side, the existing bridge has four 12- feet wide standard lanes and left and right shoulder widths are 7 feet and 8 feet respectively. To accommodate the added auxiliary lanes, this project proposes to provide a width of 11 feet for lane number one, 12 feet for the other 4 lanes, and 2 feet for the left and right shoulder in the southbound direction. On the northbound side, it proposes to provide five 12-feet wide lanes, 10 feet for the right shoulder and 3 feet for the left shoulder.

- **Non-Standard Mandatory Features**

A Fact Sheet for Exception to Mandatory Design Standards for non-standard left shoulders was approved on October 21, 2003. Portions of US 101 with existing non-standard left shoulders that

do not have existing sound-walls will be maintained in their current configuration. Portions of US 101 with either standard or non-standard left shoulders that have existing sound-walls will have left shoulders narrowed to avoid sound wall relocations. In general, the proposed non-standard left shoulder widths are as follows:

Between the Embarcadero Road interchange and the University Avenue interchange in the northbound direction, the existing 10-feet left shoulder will be narrowed to 3 feet wide on the SFCB, and the existing 7-feet left shoulder from just north of the bridge to the University Avenue interchange will be narrowed to 4 feet wide. Within the University Avenue interchange, the left shoulder will be widened to 8 feet wide to provide horizontal clearance at the over-crossing structure columns. In the southbound direction, the left shoulder will also be 8 feet wide through the University Avenue interchange, and then the existing 7 feet wide left shoulder will narrow to 4 feet wide between the interchange and the SFCB. At the bridge, it will be further narrowed to 2 feet. After the bridge, it will be widened to meet the existing 7-feet left shoulder that continues to the south.

Between the University Avenue interchange and the Willow Road interchange in the northbound direction, the existing 7 feet wide left shoulder will be narrowed to 4 feet-6 inches. In the southbound direction, the existing 7-feet left shoulder will be narrowed to 5 feet. Between the Willow Road interchange and the Marsh Road interchange in the northbound direction, the existing left shoulder, which varies between 5 feet and 17 feet, will be narrowed to 4 feet from just north of the Willow Road interchange to just south of the Henderson UP. From north of Henderson UP to the Marsh Road interchange, a standard 10-feet left shoulder will be provided. In the southbound direction, a standard 10 feet wide left shoulder will also be provided between the Marsh Road interchange to north of the Henderson UP. From just south of the Henderson UP to just north of the Willow Road interchange, the existing left shoulder width, which varies between 5 feet and 10 feet, will be narrowed to 4 feet.

A Fact Sheet for Exception to Mandatory Design Standards was approved on April 4, 2008 for SFCB southbound side and at the Henderson UP. The existing SFCB has four 12 feet wide standard lanes in both directions of US 101. On the northbound side, the widths of the left and right shoulders are standard. On the southbound side, the left and right shoulder widths are nonstandard, 7 feet and 8 feet wide respectively. The southbound roadway will be re-striped: the number one lane will have a non-standard width of 11 feet while the width of the remaining four lanes will be standard. The left and right shoulders will have a non-standard width of 2 feet.

At Henderson UP, on the northbound side, the existing roadway has four 12 feet wide standard lanes and 10 feet standard right shoulder. On the southbound, the existing roadway has four 12 feet wide standard lanes and non-standard 9 feet and 1 inch right shoulder. The existing left shoulder varies from 10 feet to 4 feet on the northbound and from 10 feet to 2 feet on the southbound side. The proposed lane widths in the northbound will be 11 feet each for the 3 inside lanes and 12 feet each for the two outside lanes. In the southbound direction, the proposed five lanes will be 11 feet wide. The proposed left and right shoulders will have a non-standard width of 2 feet. The Mandatory Design Exceptions for the San Francsquito Creek Bridge and the Henderson UP are summarized in the table below:

Mandatory Design Exceptions

Design Exception and HDM Index	Location	Feature Description
Non-Standard Lanes Index 301.1	PM SM 0.007 to PM SCl 52.539 and PM 3.008 to PM 3.084	The standard lane width is 12 feet, but at this location, the proposed lane width for lane is 11 feet.
Non-Standard Shoulder Index 302.1	PM SM 0.057 to PM SCl 52.474 and PM 3.008 to PM 3.084	The proposed shoulder width is 2 feet, but the standard shoulder width on the freeway is 10 feet.
Non-Standard Shoulder Index 309.1 (3)	PM SM 0.057 to PM SCl 52.474 and PM 3.008 to PM 3.084	The proposed shoulder width is 2 feet, but the standard horizontal clearance for auxiliary lanes should be equal to the standard shoulder width, which is 10 feet.
Non-Standard Vertical Clearance Index 309.2 (1)	PM 2.570	The existing vertical clearance is 15 feet and 1 inch, but the standard vertical clearance for major structures – freeways and expressways shall be 16 feet and 6 inches.

Second Supplemental Fact Sheet for Exception to Mandatory Design Standards for non-standard shoulder was approved on September 17, 2008 for the University Avenue southbound diagonal on ramp. The existing University Avenue southbound diagonal on-ramp has two 12 feet wide standard lanes. The existing right shoulder has non-standard shoulder varies from 0 feet to 8 feet wide and the existing left shoulder is 4 feet wide. The existing horizontal alignment has non-standard curvature of 274 feet radius and non-standard sight distance of 193 feet. This project proposes to widen the right shoulder to non-standard 5 feet wide.

- **Interim Features**

The proposed non-standard lane widths as well as the left and right shoulder widths at the SFCB are to be used temporarily. The SFC Bridge will be replaced under a separate project that is programmed in the 2008 SHOPP.

- **High Occupancy Vehicle (HOV) (Bus and Carpool) Lanes**

Existing HOV lanes within the project will remain, and no new HOV lanes are proposed. The 2002 HOV Master Plan states that the congested US101 corridor would benefit from new HOV lanes south of Millbrae, so that a continual HOV lane would run from there to Santa Clara County. However, the Master Plan acknowledges that adding HOV lanes in this corridor would represent a difficult design challenge and, therefore, lists it as a Priority II improvement unless a lane can be taken for HOVs because of the planned addition of auxiliary lanes. Priority II projects are recommended for inclusion in a future Regional Transportation Plan (RTP) only if new funding sources beyond those currently assumed in the RTP can be identified for the improvements.

San Mateo County's Countrywide Transportation Plan 2010 states that Travel Demand Forecasting Model showed that converting existing auxiliary lanes to HOV lanes would increase congestion considerably. The model also showed that converting mixed flow lanes to HOV lanes would also increase congestion considerably. The Countrywide Transportation Plan 2010 prohibits the conversion of existing multi-flow, existing, and planned auxiliary lanes to HOV lanes.

- **Traffic Operation Systems/Ramp Metering**

The addition of auxiliary lanes, ramp metering and Traffic Operations System (TOS) elements will help relieve some of the present traffic congestion and reduce merging difficulties within the project limits.

Conduits, crossovers to TOS cabinets and junction boxes will be installed throughout the length of the project for future fiber optic communication. The sound wall barrier will be modified to accommodate the relocation of control cabinets and electrical junction boxes. A New Changeable Message Sign on Southbound 101, south of University Ave I/C will be installed.

This project modifies existing ramp metering for the southbound US 101/University Avenue Diagonal on-ramp, northbound US 101/University Avenue Collector on-ramp, and installs new ramp metering for the northbound US 101/Embarcadero Road-Oregon Express Collector on-ramp, but does not provide an HOV preferential lane for these on-ramps. The Fact Sheet Exceptions to Ramp Metering Policy was approved on September 17, 2008 for these ramps.

Ramp metering equipment on the freeway and on-ramps at Willow Road Interchange are currently being installed under an encroachment permit project in San Mateo County for US 101 provided by SMCTA.

All existing and operational TOS/Ramp metering elements will be kept operational through the construction phase. Any TOS/Ramp Metering elements that may be affected by this project must be relocated, modified, or fully replaced as necessary.

- **Maintenance Vehicle Pullout (MVP) Areas**

MVPs will be provided along ramps and US 101 within the project limits to maintain and service both ramp metering and landscaping equipment, as well as to help disabled vehicles. Four MVPs

will be added to the project. The exact locations for the proposed MVPs will be determined during the design phase.

- **Park-and-Ride Facilities**

There are four primary transit operators in San Mateo and Santa Clara Counties: BART, Caltrain, Samtrans and VTA. Currently, all four are in the process of modifying or expanding services and infrastructure to improve coordination with other operators and to attract new riders.

No park-and-ride facilities exist within the project limits, nor are new ones planned.

- **Utility and Other Owner Involvement**

Utilities in the area include Pacific Gas and Electric (PG&E) lines, AT&T telephone lines, City sewer lines, City water lines, Comcast, RCN-Astound, fiber optics, Sprint, and more. All utility companies including San Mateo County Public Works, Santa Clara County Public Works, and affected City utilities will be notified of the auxiliary lanes project, and will be coordinated with as it progresses.

Numerous overhead and underground utilities transversely cross US 101 within the project limits. All utilities that conflict with the widening or other construction activities within the corridor as listed in Part VII of the Right of Way Data Sheet will be relocated. The utility investigations for this project identified existing utilities that will either remain or be relocated. These utilities include electric transmission poles, telephone poles, anchor poles, underground gas transmission pipelines and underground fiber-optic cables.

The existing gas transmission pipelines (20-inches and 24-inches) adjacent to the existing sound-walls will not be impacted by improvements proposed under the project. Underground utilities that are very close to the area to be widened will be investigated through potholing during the design phase of the project and modified as required. Overhead utilities crossing the highway at less than a 60° angle will require an Exception to Caltrans' Encroachment Policy. It is not anticipated that any of these facilities will be relocated in conjunction with this project because all have been present for a long time and thus have prior rights over the highway. The liability and expense for relocating all utilities such as electrical poles, telephone poles and underground fiber-optic lines will be determined during the design phase of the project.

Owners must be notified and utility agreements finalized during the final design phase. Refer to Attachment E for the Right of Way Data Sheet.

The longitudinal encroachment exception for overhead lines crossing US 101 was approved on February 4, 2008 and summarized in the table below are all existing overhead utility requiring variance to Caltrans Encroachment Policy.

Existing Overhead Utilities Requiring Variance to Caltrans' Encroachment Policy

Utility	Owner	Location	Station NCL 1 Line	Description of Conflict	Proposed Changes
Electric Overhead 12 kV Line	PG&E	Pulgas Ave.	100+45	Cross US 101 at less than 60° angle	None
Electric Overhead 12 kV Line	PG&E	Clarke Ave.	118+70	Cross US 101 at less than 60° angle	None
Electric Overhead 12 kV & 4kV Lines	PG&E	Cooley Ave.	134+80	Cross US 101 at less than 60° angle	None
Electric Overhead 12 kV Line	PG&E	Henderson UP	254+60	Cross US 101 at less than 60° angle	None
Electric Overhead 2-12 kV Lines	PG&E	Henderson UP	256+00	Cross US 101 at less than 60° angle	None

- **Railroad Involvement**

Construction and Maintenance (C&M) Agreement with Railroad is not required since Henderson UP Bridge will not be affected by the construction of this auxiliary lane project.

- **Highway Replacement Planting**

The build alternative will affect the existing landscape along the corridor or within the interchange. All vegetation and trees between the edge of the shoulder and the right of way line that are in conflict with construction of auxiliary lanes and retaining walls will be removed. According to the Department's policy, any planting removed for highway construction shall be replaced. Highway planting is also required because this segment of US 101 is designated as a landscaped freeway. Removal of existing mature trees will require mitigation at a ratio to be determined during the PS&E phase within the project corridor. Approximately 8.6 acres of replacement plants and 7,000 yards of vines will be planted under a separate highway-planting contract within two years of highway construction. A three-year plant establishment period will be included in the replacement-landscaping contract. The CMIA Program, SMCTA - Measure 'A', Regional Transportation Improvement Plan (RTIP), and Federal earmark funds, will support the highway-planting project. Highway planting will be completed to the Department's design standards up to the maximum allowable cost per acre. Planting along the project limits will be compatible with

adjacent urban development and enhance the visual quality of the corridor. The planting design will include screening of undesirable views to and from the freeway. Where feasible, vines will be planted along sound-walls during the roadway construction phase to soften their appearance and deter graffiti. In areas with maintenance and/or safety issues, vines may be planted along the backside of walls. Trees, shrubs and ground cover will be selected for their drought tolerance and disease resistance. All highway-planting areas will be mulched to reduce weed growth, conserve moisture, and minimize maintenance operations. Automated irrigation, compatible with electric automatic irrigation systems currently utilized along this corridor, will be provided for the new planting. Highway planting will be irrigated with low volume irrigation sprinklers. Since over 15 acres of land are affected, water pollution control measures (Storm Water Pollution Prevention) will be required, with appropriate plans, specifications and funds.

Design for safety items, such as maintenance vehicle pullouts, walk gates, gore area paving and paving beneath guardrails, are included to conform to the Department's policies for vegetation management. Sound walls and retaining walls shall receive architectural treatment (to match existing treatments adjacent to the project area). These items are included in the project cost estimate. Landscape/Irrigation cost is estimated at $2.5 million dollars. As a result, this work will be done as a separate project.

- **Water Quality**

According to the project's Storm Water Data Report (SWDR), this project is located within the Santa Clara, Palo Alto hydrologic area 205.50 and within the South Bay, San Mateo Bayside hydrologic area 204.40 with a combined watershed of 251,000 acres. It is estimated that this highway-widening project will result in approximately 8.4 acres (3.4 hectares) of Disturbed Soil Area. The San Francisquito Creek is listed as a 303d sedimentation/siltation impaired water body. As a result, the Department must address the project's needs for both temporary and permanent construction site Best Management Practice (BMP) implementations that are designed to reduce the potential for sediment discharge into the Creek. The complete text for the project's SWDR is referenced in Attachment M of this report. Because the soil disturbance area for this project is greater than 1 acre (0.4 hectares), a Storm Water Pollution and Prevention Plan (SWPPP) will be developed as required by the Department's Project Planning and Design Guide (PPDG). In addition, SSPs will be developed to address the preparation of the project's SWPPP document and to outline the construction phase requirements for the project's SWPPP implementation. To comply with the conditions of the Caltrans National Pollutant Discharge Elimination System (NPDES) permit, and to address the temporary water quality impacts that may result from this project's construction activities, a Standard Special Provision (SSP) 07-345 will be included in the project's Plans, Specifications, and Estimate (PS&E) submittal. This SSP will address the preparation of the project's Storm Water Pollution Prevention Plan (SWPPP) document and the implementation of SWPPP during the project's construction. At the PS&E phase, the construction site water pollution control estimate should be segregated into separate bid items for the BMPs selected as appropriate for this specific project. The total cost to implement this project's Erosion Control measures is estimated to be 0.6% of the project's total roadway construction cost.

A. Storm Water BMPs

Through its Contractor(s), Caltrans will prepare a SWPPP that adequately addresses the project's construction stage storm water impacts and the post-construction stage storm water impacts. As a minimum, the SWPPP will detail how the contractor will manage storm water impacts that may occur during both the construction stage and post-construction stage of the project.

(1). Construction Stage Storm Water Impacts

Construction work activities will be scheduled in a manner that minimizes soil-disturbing work during the rainy season, which is defined as October 15 to April 15. Preservation of existing vegetation will be implemented to minimize the amount of pollutants that are transported in the project's storm water. Other construction site Best Management Practices (BMPs) will be implemented during construction activities to reduce the pollutants in the storm water discharges and to minimize erosion throughout construction.

Construction site BMPs may include:

- Soil Stabilization Practices: Hydroseeding, Soil Binders, Geotextile and Plastic Covers.
- Sediment Control Practices: Silt Fence, Check Dams, and Storm Drain Inlet Protection.
- Tracking Control: Stabilized Construction Entrances, Street Sweeping and Vacuuming.
- Non-Storm Water Management: Construction Site Dewatering, Vehicle and Equipment Operations (Fueling, Cleaning and Maintenance of vehicles will not be allowed on-site).
- Waste Management: Spill Prevention and Control, Solid and Hazardous Waste Management, Concrete Waste Management.

(2). Post-Construction Stage Storm Water Impacts

Post construction water quality measures will be addressed by utilizing Design Pollution Prevention BMPs and permanent treatment BMPs. Design Pollution Prevention BMPs are permanent measures designed to improve storm water quality by reducing erosion, stabilizing disturbed soil areas, and maximizing vegetated surfaces. Erosion control measures will be provided on all disturbed soil areas. Permanent impacts to the creeks will be mitigated both on-site and in other off-site locations that remain to be determined. Temporary Construction Site BMPs are applied during construction activities in order to control sedimentation, erosion and the discharge of other pollutants throughout construction. A Storm Water Data Report has been prepared and approved for the project. The project's SWDR is intended to be used as a tool that documents the project's compliance with Caltrans statewide NPDES permit and the Construction General Permit. . Reference information for the project's SWDR can be found in Attachment L. The complete text of the SWDR details information for the various filtration devices that will be considered for use on this project. Based on the proposed project scope and the resulting potential for water quality

impacts, this project is not exempt from incorporating Treatment BMPs. Treatment BMPs are permanent devices and facilities that treat storm water runoff. Caltrans approved Treatment BMPs are Biofiltration Strips/Swales, Infiltration Basins, Detention Basins, Traction Sand Traps, Dry Weather Flow Diversions, Media Filters, Gross Solids Removal Devices (GSRDs), Multi-Chamber Treatment Trains (MCTT), and Wet Basins. Those most feasible in the Bay Area are Biofiltration Strips/Swales, Infiltration Basins, Detention Basins, Media Filters and MCTT. The preliminary assessment of the area suggests the selected Treatments BMPs for this project will be biofiltration stripes/swales that are designed to treat runoff from the project site to the maximum extend practicable.

Drain inlet stenciling is required within cities, towns and communities with population of 10,000 or more, or within designated MS4 areas. Therefore, this project may be required to implement Drainage Inlet Stenciling as maintenance BMP in areas that are accessible to pedestrian and bicycle traffic.

B. Dewatering and Non-Storm Water Discharge Control

Preliminary test boring logs show that groundwater exists at a minimum of approximately 8-feet below the ground surface throughout the project site. Based on Section 6.3 of the Preliminary Geotechnical Report, dewatering activities may be required for management of groundwater that may be encountered during construction activities involving foundation work for the project's retaining walls and drainage system installation. A copy of the project's Preliminary Geotechnical Report has been included in Attachment K.

According to the State Water Resource Control Board, a Clean Water Act Section 401 Water Quality Certification is required to address and authorize any potential biological impacts that may be caused by a proposed construction project that involves work within waters of the U.S. or work within a channel, creek, or any other surface water body. As part of the project's Site Investigation, testing may be conducted in order to determine if any groundwater that may be encountered is contaminated. The results of this site investigation will determine if the Department will develop Contract Special Provisions for the handling and disposal of any groundwater that is encountered during the project's construction. The groundwater sampling results will need to be compared with the following sources of information in order to determine if the recovered groundwater is contaminated:

(1). California Maximum Contaminant Levels (MCLs) or action levels for drinking water.

(2). San Francisco Bay Water Quality Control Plan water quality objectives (WQOs) for surface water. A comparison of the sampling results to the parameters on tables 3-3, 3-4, 3-5 and 3-6 will be required. San Francisco Bay Water Quality Control Plan water quality objectives including these tables can be found at: http://www.waterboards.ca.gov/sanfranciscobay/basinplan/web/BP_CH3.html

(3). Cal/EPA Environmental Screening Levels (ESLs) in tables A, C and F for a Tier 1 Environmental Risk Assessment.

Depending upon the proposed method of disposal, in addition to the anticipated quantity and quality of the recovered groundwater, the Department may be required to obtain a project-specific Waste Discharge Requirement Permit that supports potential discharges that may be associated with this Project's construction activities. A final decision regarding the Department's need to apply for this additional Permit will be determined upon completion of the project's site investigation. If the retaining walls are constructed, then it is estimated that de-watering will occur for 3-6 months. Therefore, it is estimated that $60,000 is needed to cover the cost of potential de-watering activities.

- **Noise Barriers**

This project proposes no new sound walls. The Traffic Noise Study Report was done in October 2, 2007. It was concluded in the report that no new soundwalls would meet the feasibility criteria so no new soundwalls are recommended. A Noise Abatement Decision Report (NADR) is not required. Sound walls were constructed in 1991 along the edge of the freeway between Embarcadero Road and Marsh Road at six different locations within the project limit.

- **Non-motorized and Pedestrian Features**

The Ringwood Avenue POC is the only dedicated pedestrian facility across US 101 in the City of Menlo Park. This project proposes to maintain the non-motorized connection between east and west Menlo Park. The Ringwood POC serves as an important link to Hamilton Bike (Class III) Route, which, in turn, provides access to the Dumbarton Bridge bike path, Sun Microsystems, and the Bay Trail.

- **Needed Pavement Rehabilitation and Upgrading**

The entire US 101 freeway in both directions within the project limits will need to be overlaid with either Rubberized Hot Mix Asphalt-Gap Graded (RHMA-G) or Open Graded Friction Course (OGFC).

In the northbound direction, it is recommended to remove and replace the existing OGFC (PM 52.2/52.6) with 0.10 feet OGFC because of likely pavement damage caused by grinding out traffic striping and markers of the OGFC surface during stage construction. In the southbound lanes because of the new lane striping and due to adding an auxiliary lane, the existing Portland Cement Concrete (PCC) pavement longitudinal joints may be put too close to the wheel path, possibly causing premature slab failure. Therefore, it is recommended to overlay the existing southbound PCC slabs, HOV lane and median/outside shoulder (PM 0.0/3.6) with 0.15 feet RHMA-G.

A resurfacing project was just completed overlaying the pavement within the project limit from PM 0.0/10.9 in 2007. The project also repaired areas of severe pavement failure (dugouts) and sealed pavement cracks 0.24 inches and wider. The project also replaced shoulder backing, breakaway sections of Metal Beam Guard Rail (MBGR), and upgraded crash cushions to current Caltrans Standards.

For the Santa Clara portion of the project between PM 52.3/52.6, a resurfacing project has just been completed for both the Northbound and Southbound directions. Lanes have recently been overlaid with 0.10' OGAC, 0.10' RAC-G in the northbound direction and removed and replaced 0.15' RAC-G in the southbound HOV lane only.

For outside widening of pavement, shoulders and ramps, the following options are recommended:

Auxiliary Lane/Right Shoulders

Design Factors: TI40 = 14 R-Value = 15 Required G.E = 3.81'

Alternative I	Thickness	G.E.
	0.10' OGFC*	N/A
	0.15' RHMA-G	0.25'
	0.55' HMA-A	0.88'
	0.80' CTB (A)	1.34'
	1.40' AS (4)	1.38'
	3.00'	3.85'

Alternative II	Thickness	G.E.
	0.10' OGFC*	N/A
	0.15' RHMA-G	0.25'
	0.90' HMA(A)	1.71'
	1.00' ACB	1.87'
	2.15'	3.83'

*Note: For northbound direction only, between PM 52.3/52.6 in Santa Clara County.

Ramps

Design Factors: TI20 = 10 R-Value = 15 Required G.E = 2.72'

Alternative I	Thickness	G.E.
	0.15' RHMA-G	0.26'
	0.40' AC (A)	0.61'
	0.85' AB (3)	0.92'
	0.95' AS (4)	0.94'
	2.35'	2.73'

Alternative II	Thickness	G.E.
	0.15' RHMA-G	0.35'
	1.10' AC (A)	2.54'
	1.25'	2.89'

Pavement Selection Review Committee meetings were held on February 14, 2008 and March 13, 2008 to discuss the Pavement Selection Review Committee Checklist. Design performed a cost

comparison and Life Cycle Cost Analysis for both alternatives and recommended Alternative 1. The Committee approved Design's recommendation and the final checklist on April 10, 2008. See Attachment I and J for Materials Recommendation and Pavement Selection Review Committee Checklist respectively.

- **Cost Estimates**

The total escalated capital cost of the project in 2012 is 82,037,000 that include $73,994,000 for roadway, $7,982,000 for structures, and $61,000 for right of way costs. The escalated construction capital cost is based on 5% per year escalation factor to mid-year construction 2012, 15% contingencies and on a current bid prices (See Attachment D).

- **Right of Way Data**

The Right of Way Data Sheet for the preferred alternative is included as Attachment E. The Right of Way cost estimate, which includes utility relocation costs, is presented in the Right of Way Data Sheet.

No-Build Alternative

The no-build alternative considers project conditions if the proposed improvements are not constructed. The no-build alternative would not change the present roadway geometrics. This alternative is not feasible because instead of improving traffic operations, increased traffic would cause greater traffic congestion and increased risks to motorists. It would not meet the purpose and need of the project as stated in this report. Traffic congestion on the mainline would continue to deteriorate, and the problems with merging would persist within the limits of the project.

B. Rejected Alternatives

Alternative 2, stated in the Project Study Report approved on September 24, 2004 is withdrawn because, in order to provide standard left shoulder widths, it would require new right of way from adjacent frontage roads to accommodate the relocated sound-walls and widening of the freeway. This R/W adjacent to the State right of way would be conveyed from the cities (Menlo Park, East Palo Alto and Palo Alto) to the State at no cost under Section 83. However, besides these additional necessary conveyances, the existing remainder of frontage road would require additional aerial easements from 87 adjacent property owners to accommodate relocated power lines. Moreover, an existing 24" gas transmission line along Van Buren Road behind the existing sound wall would have to be relocated on southbound 101 between Willow Road and Marsh Road, which would entail a major relocation effort since the line is a primary PG&E transmission line. In addition to right of way effects, there would be environmental impacts on Air/Noise and Biology due to required sound wall relocations.

6. CONSIDERATIONS REQUIRING DISCUSSION

A. Hazardous Waste

In October 2002, Geocon Consultants performed an Initial Site Assessment (ISA) for the US 101 Auxiliary Lane Project from the Embarcadero Road interchange in the city of Palo Alto in Santa Clara County to the Marsh Road interchange in the city of Menlo Park in San Mateo County. The findings of the revised ISA (dated January 2003) can be summarized as follows:

At the northern and southern terminus of the project corridor, properties adjacent to the project corridor are primarily commercial and light industrial land uses, including gasoline and diesel fuel stations, business parks, auto body shops, and communications and technology developers. The land area between the commercial/light industrial property uses to the north and south is primarily single-family and multiple-family residential developments, including parks, recreational facilities, churches, retail services, and retail malls.

Chlorinated solvents have affected groundwater within the project corridor, extending from Marsh Road to the Henderson UP (lots 33, 36, 42, 44, and 45). Proposed improvements may encounter the chlorinated solvent plume during the construction phase.

Groundwater impacted with petroleum hydrocarbons from the former Western Communications site (lot 16) exists within the area of the project improvements.

One other area that is potentially contaminated and might be encountered during the construction phase of the proposed improvements is near lot 24, Cavallino Collision Center, located at 1880 West Bayshore Road. Due to the proximity of this site to the project corridor, there is the potential that site-specific contaminants released to the environment might affect the auxiliary lane project.

Aerially Deposited Lead (ADL) usually exists along major freeway routes such as US 101 due to past emissions from vehicles powered by leaded gasoline. ADL is generally, found in the upper 0.6 meter of soil material within the unpaved shoulder or median areas.

Asbestos-containing materials might be found on existing structures constructed prior to 1980, and lead-based paint may likely be found on structures constructed prior to 1978.

In September 2002, Environmental Data Resources (EDR) conducted a search of environmental regulatory databases that covered a portion of the auxiliary project corridor. The search led to the following findings:

No properties located in the vicinity of the site are referenced on the United States Environmental Protection Agency's (EPA) National Priority List; Resource Conservation Recovery Act (RCRA) Corrective Actions and Violations; Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS); Treatment Storage and Disposal Facility; or Toxic Release Inventory listings. Only one site in the vicinity is present on the California Department of Toxic Substances Control (DTSC) State Equivalent CERCLIS (SCL) listing. This property is located at 119 Independence Drive, Menlo Park, and is occupied by Siebert Machine Corporation.

Thirty-one facilities in the vicinity of the project corridor are referenced on the California Leaking Underground Storage Tank (LUST), CORTESE (CAL EPA/Office of Emergency Information Hazardous Waste and Substance Site List), or Underground Storage Tank (UST) listings. No above ground storage tanks (ASTs) are listed.

No properties appear on the California Solid Waste Landfill (SWLF) listing.

Based on the extensive scope of work described in the approved PSR (September 2004) and the findings of the project's ISA, a detailed site investigation is necessary during the project's design phase for characterizing soil and water. Recommendations from the site investigation report will provide measures for the safe management of hazardous substances within this project's footprint.

Based on the test results for ADL-contaminated soil within the adjacent US 101 auxiliary lane project from Marsh Road to Ralston Avenue (EA 2357A4), ADL is likely to be present within the limits of this project. The ADL material encountered will most probably fall within the limits defined by the Department of Toxic Substances Control lead variance that allows the reuse of hazardous waste as fill material under specified engineering controls. This determination will be contingent on the results of the site investigation for this project.

Although, the geologic survey map did not show the presence of naturally occurring asbestos in the soil within the project footprint, an asbestos survey report is necessary. Most likely hazardous waste would be asbestos containing material and lead-based paint due to the replacement of the Ringwood Ave. POC and modification of Hetch Hetchy Aqueduct bridges; and the removal of thermoplastic yellow paint that was used for existing striping. The hazardous waste testing will be conducted and report will be prepared during PS&E phase. The estimated cost for the hazardous waste item is $6.0 million dollars and it is included in the project cost. (See Attachment D)

B. Value Analysis

A value Analysis (VA) Study was prepared by VMS, Inc. during the PSR stage and approved on June 10, 2004. VMS, Inc. was engaged to conduct another VA Study in January 2008 focusing on reducing the project cost estimate, for which, a Preliminary Value Analysis Study Report was provided for review on March 6, 2008. After completing the review, discussions and comment resolution, the final report was issued in June 2008, which contains the recommended alternative. The approved VA alternative avoids reconstructing the Henderson UP Railroad Bridge in association with the approval of the design exception pertaining to the non-standard lanes and shoulder for both northbound and southbound. This significantly improved project fundability, and results in a saving of $23.3 million of construction costs. The Fact Sheet Exception to Mandatory Design Standards for the non-standard lanes and shoulders was approved on April 4, 2008 for the underpass.

C. Resource Conservation

Existing asphalt concrete grindings, aggregate base and concrete debris removed from the project site may be reused as aggregates base, sub-base, or as shoulder backing, if found suitable. Existing

TOS elements, ramp metering equipment and cabinets removed from the project site may be either reused on the project, or, if suitable, recycled.

D. Right of Way Issues

1. Right of Way Required

There are no right of way acquisition requirements for Alternative No.1. Section 83 acquisitions from the City of Menlo Park would be required for the reconstruction of the Ringwood Avenue POC ramps onto the frontage roads of East and West Menlo Park. Letters and plans to the City of Menlo Park will carry out Section 83 transfers.

All utilities that conflict with the widening or other construction activities within the corridor, as listed in Part VII of the Right of Way Data Sheet in Attachment E, will be relocated. These utilities include electric transmission poles, telephone poles, anchor poles, underground gas transmission pipelines and underground fiber-optic cables.

2. Relocation Impact Studies

No residential or non-residential units would be required to relocate as a result of this project.
If required, a field review of the proposed project will be conducted to determine the potential impact on residential and non-residential units.

Because of this project, no owners, tenants, businesses or persons in possession of real property located near the project would qualify for relocation assistance benefits or entitlements under the Uniform Relocation Assistance and Real Property Act of 1970.

3. Airspace Lease Areas

No airspace lease areas are affected by this project.

E. Environmental Issues

The Negative Declaration/Finding of No Significant Impact (ND/FONSI) has been prepared in accordance with Caltrans' environmental procedures, as well as State and Federal environmental regulations. The attached ND/FONSI is the appropriate document for the proposed project and is included in Attachment F.

1. Cultural Resources

It is Caltrans' determination that this undertaking will have no potential to affect historic properties due to the nature of the proposed undertaking, and taking into account the results of a detailed review of project plans, a field inspection, a check of Caltrans maps and site record forms, and the highly disturbed quality of the area soils. Additionally, the type of work to be performed renders this project exempt from further review pursuant to Stipulation VII, a Screened Undertaking, under the January 2004 Programmatic Agreement Among the Federal Highway Administration, the

Advisory Council on Historic Preservation, the California State Historic Preservation Act, as it Pertains to the Administration of the Federal-Aid Highway Program in California.

2. Noise

In view of the existing sound-walls on both sides of US 101, no substantial increase of post project noise levels is anticipated at the adjacent residences.

The construction of the project, however, will generate some short-term noise. As the construction along the alignment consists of primarily adding a new auxiliary lane in each direction, noise would not occur for an extended period at any specific location. The possible exception would be at locations where structural construction, such as pile driving, is involved. In order to minimize the adverse effects of construction noise, mitigation measures to reduce these impacts to non-significant levels will be included as part of the project.

3. Threatened/Endangered Species

Database searches by District 4 biologists reveal that no protected species, environments that support them or special status habitats are present within the project limits.

4. Wetlands

Field surveys have found no evidence of US Army Corps of Engineers jurisdictional wetlands or US waters within the project limits.

F. Air Quality Conformity

The proposed project is in a federal maintenance area for carbon monoxide (CO) and a federal non-attainment area for ozone standards. The project will not exceed the National Ambient Air Quality standards (NAAQS) for CO. An assessment of CO impacts was made using the California CO protocol. Based on Caltrans' protocol, the project will not result in any new localized violations of the NAAQS for CO or increase the severity of any existing violations of the NAAQS. The project will have no significant impact on air quality or cause the area to exceed state or federal CO standards.

This project is contained in a conforming RTP (Transportation 2030 Plan) and Transportation Improvement Program (2007 TIP), and the design concept and scope have not changed from that shown in the RTP and TIP listings. The project therefore meets the regional tests for conformity with the State Implementation Plan (SIP).

Short-term air quality impacts during construction would be significant. Construction equipment and trucks emit hydrocarbons, oxides of nitrogen, carbon monoxide and particulates. Most pollutants will consist of wind-blown dust generated by excavation, grading, hauling and various other activities. The impacts from the above activities would vary from day to day as construction progresses. Feasible construction dust control measures will be implemented as part of the project to reduce construction impacts to a level that is less than significant.

G. Title VI Considerations

This project meets all requirements of the Title VI provision. The pedestrian walkway and over-crossing features will be constructed to meet current ADA standards.

7. OTHER CONSIDERATIONS AS APPROPRIATE

- **Public Hearing Process**

The Draft Initial Study with Proposed Negative Declaration for this project was circulated for public review on May 12, 2008. Copies of the draft Environmental Document were placed in public libraries in East Palo Alto, Palo Alto and Menlo Park. The Department also posted the Draft Environmental Document at its Internet website. The Department received comments during the public review. These comments are included in Attachment P of this report with their corresponding responses.

A Public Meeting was held on July 24, 2008. Caltrans, City/County Association of Government of San Mateo County (CCAG), SMCTA and City of Menlo Park hosted an Open House to provide information on the project. There were no formal comments received at the meeting.

- **Route Matters**

No new connections to US 101 are proposed within the project limits. Route adoptions are also not required as there is no deviation from the main alignment. No portion of the exiting facility will be superseded or abandoned because of this project.

- **Permits**

This project is located within a water sensitive area and is subject to the conditions of the following permits:

> State Water Resource Control Board (SWRCB) Order No. 99-06-DWQ and National Pollutant Discharge Elimination System (NPDES) Permit No. CAS000003 ("Permit"). This is a Caltrans specific construction permit.
>
> State Water Resource Control Board (SWRCB) Order No. 99-08-DWQ and NPDES Permit No. CAS000002 ("General Permit"). This permit is available for general use on any construction activity that is conducted within California.

In addition, pursuant to the California Water Code the Department may also be required to obtain a Waste Discharge Requirement permit for the disposal of groundwater that may be encountered during the project's construction activity. It is essential that the Department adhere to the compliance requirements of the previously mentioned permits. The project's Permits shall be used to ensure the Department has addressed all temporary and permanent water quality impacts resulting from the construction activities in this project. The Standard Special Provisions will also outline the requirements for the project's De-watering and Discharge Plan.

The Department must also comply with any permit requirements that may be established by the California Department of Fish and Game (CDFG) or the U.S. Army Corps of Engineers (ACOE). However, it is not expected that any permits from these Agencies will be required for this project.

(a) Mitigation Proposal

During the project's approval phase, alternative efforts will need to focus on avoiding and minimizing impacts to waters of the State and to any wetlands within the project limits. Depending on the extent of impacts to the water of the State, the San Francisco Regional Water Quality Control Board (Board) may require the Department obtain a project-specific Waste Discharge Requirements Permit.

A mitigation proposal will be needed for unavoidable impacts, and the Board requires mitigation as follows:

- Permanent impacts to wetlands: 3:1 ratio (area mitigated: area affected) for created wetlands, 2:1 ratio for restored and enhanced wetlands.
- Temporary impacts to wetlands: 1:1 mitigation to restore to preconstruction conditions.
- Permanent impacts to streambed: 1:1 linear feet of creation, and 3:1 linear feet of enhancement (frequently on-site or adjacent to project site); and some amount of upland/watershed preservation.
- Permanent impacts to riparian area 1:1 replacement in-kind with native vegetation.
- Temporary impacts to streambed or riparian area 1:1 mitigation to restore to preconstruction conditions.

- **Cooperative Agreements**

For the proposed project, the Department is the lead and implementing agency responsible for the PA/ED, PS&E, R/W and Construction phases. This PR is not the authorizing document. A Cooperative Agreements Report (CAR) will be prepared to transfer funds to the Department for R/W acquisition and construction of the project. These agreements will be negotiated during the design phase of the project.

- **Other Agreements**

Any existing Maintenance Agreement between the Department and local agencies will be updated. A Maintenance Agreement will be fully executed prior to start of construction.

- **Involvement with Navigable Water**

The San Francisquito Creek falls within the project limits but it is not classified as a Navigable Waterway.

- **Transportation Management Plan**

A Transportation Management Plan (TMP) will be required for this project. The TMP is a specialized program tailored to prevent and mitigate the impacts of the construction project by applying a variety of techniques including Motorist Information, Incident Management, Construction Strategies and Public Awareness Strategies. The major objectives of the TMP are to maintain efficient and safe movement of vehicles through the construction zone; and provide intensive public awareness of potential impacts on US 101 and nearest streets.

The TMP for the project will be developed and refined during the final design phases, and supported by detailed traffic studies to evaluate traffic operations. The need for lane and freeway closures during off-peak hours or at night, or short-term detour routes will be identified. The TMP will include press releases to notify and inform motorists, businesses, community groups, local entities, emergency services, and politicians of upcoming closures or detours. Various TMP elements such as Portable Changeable Message Signs and the CHP Construction Zone Enhanced Enforcement Program (COZEEP) would be utilized to alleviate or minimize delays to the traveling public. Text of the TMP Report prepared for this project is included as Attachment O in this report.

- **Stage Construction**

Multiple construction staging, lane and ramp closures, and temporary detours will be required to construct the project. The construction on US 101 will require three stages. In Stage 1, construction of the median piers and foundation for the Ringwood Avenue POC will be carried out, and the traffic will move to the outside lanes within existing travel ways. At the same time outside both piers and foundation for the POC will be constructed along the frontage roads. Stage 2 will involve outside widening. New pavement for auxiliary lanes and full structural section shoulders on both southbound and northbound directions will be constructed in this stage including Hetch Hetchy Aqueduct widening. During this stage, traffic will be moved to the inside lanes. Stage 3 will involve overlaying the entire width of the freeway.

- **Accommodation of Oversized Loads**

All US 101 structures and ramps covered by this report will have the minimum horizontal and vertical clearances that can accommodate oversized loads.

- **Graffiti Control**

San Mateo and Santa Clara Counties have been identified as graffiti-prone areas. However, currently there is little or no graffiti on sound walls, overcrossings, structures and signs along US 101 within the project limits. Vines will be part of the plan to control graffiti in areas that landscaping is feasible. In areas where landscaping cannot be implemented due to right of way constraints or maintenance requirements, graffiti removal efforts will be made based upon practices specified in the Caltrans Maintenance Manual.

8. PROGRAMMING

This project is programmed in the 2006 State Transportation Improvement Program (STIP) and was adopted by the CMIA on May 5, 2007. The current total programmed funds for the project is $111,389,000. The total project cost estimate escalated from year 2008 to 2012 with a 5% escalation factor for each year is $106,565,000 including $24,528,000 for support cost. The project Programming data is as follows:

A. Programming

Project Phase	Cost (in $1000)
PA&ED	$5,200
PS&E	$8,525
R/W Support	$496
Con. Support	$10,527
R/W	$4,910
Construction	$81,731
Total:	$111,389

B. Funding

Funding Source	Cost (in $1000)
STIP-RIP	$5,200
CMIA	$60,000
RTIP	$9,021
Local	$35,368
Federal Earmark	$1,800
Grand Total	$111,389

9. MILESTONE

The proposed schedule for the project is summarized below:

Begin Project Report/Environmental Document (PA&ED)	March 2007
Circulate Draft Environmental Document (DED)	March 2008
Approve PA&ED	October 2008
District PS&E	August 2010
Right of Way Certification (R/W Cert)	November 2010
Ready to List (RTL)	December 2010
Advertise (ADV)	February 2011
Begin Construction	April 2011
Complete Construction	November 2013

10. REVIEWS

Mike Thomas, the Headquarters Design Coordinator, and JD Bamfield, the Headquarters Design Reviewer, have reviewed this project on September 16, 2008. Their comments have been incorporated in the final Project Report.

The Federal Highway Administration (FHWA) has also reviewed the Draft Project Report and final Project Report. In its letter to Caltrans dated April 11, 2008, FHWA indicated that it does not have any comments, but it is aware of the inclusion of Federal Earmark funds for Right of Way. FHWA however, does not designate this project as a High Profile Project. Therefore, its stewardship/oversight would be limited to those items in the Project Responsibilities List, which are required under "Delegated projects-NHS/Non-NHS." This list may be found in Appendix B of the new joint FHWA and Caltrans Stewardship and Oversight Agreement (Stewardship/Oversight), which were signed on September 4, 2007.

As this project continues through project development, Caltrans will continue to evaluate it against the High Profile Project (HPP) criteria laid out in the Stewardship and Oversight Agreement. If the evaluation reveals that the project has changed to meet one of the HPP criteria, Caltrans and FHWA will jointly decide if the project should be changed to HPP status.

Constructability reviews was carried out in September 1, 2008 and their comments have been incorporated into the Project Report. Juliana Gum, the Program Advisor has also reviewed this report and has no comment.

11. PROJECT PERSONNEL

Questions regarding this project report may be directed to:

Ron Moriguchi Regional Project Manager, Project Management South	(510) 286-5073
Keyhan Moghbel Office Chief, Design South – Peninsula	(510) 286-7189
Teblez Nemariam District Branch Chief, Design South-Peninsula	(510) 286-4891
Aijun Ding Project Engineer, Design South-Peninsula	(510) 286-7201
Ed Pang Senior Environmental Planner- Environmental Planning.	(510) 286-5609
Christopher Wilson Senior Transportation Engineer - Environmental Engineering.	(510) 286-5647
Katie Yim Senior Transportation Engineer-Traffic	(510) 286-4578
Allison Paich Supervising R/W Agent, Planning & Management-Project Coordination	(510) 286-5476

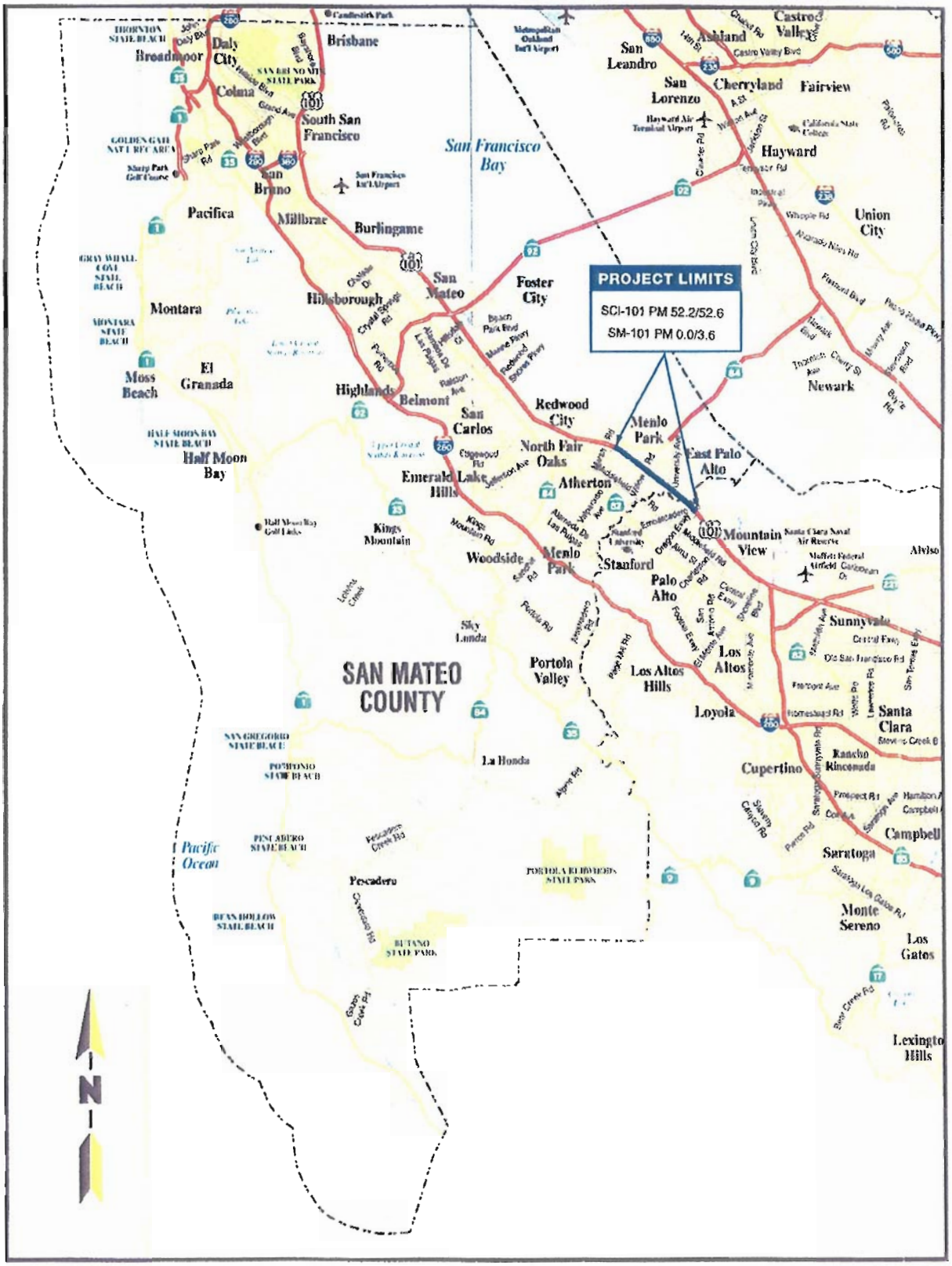
12. LIST OF ATTACHMENTS

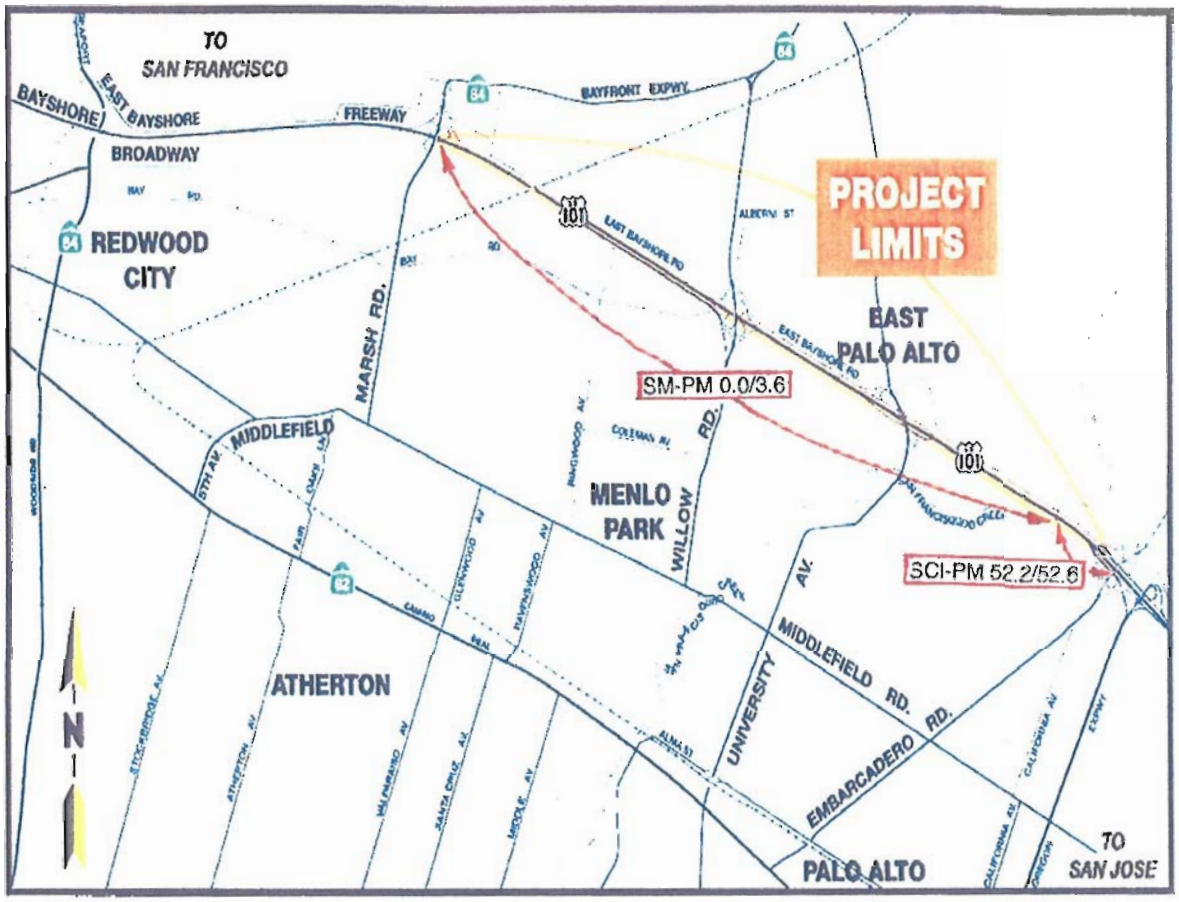
A. Project Location Map and Vicinity Map
B. Layout Plans
C. Typical Cross Sections
D. Project Cost Estimates
E. Right of Way Data Sheet
F. Negative Declaration/FONSI Approvals
G. Traffic Analysis Flow Charts
H. Structure Advance Planning Studies
   Ringwood Ave Pedestrian OC
   Hetch Hetchy Aqueduct
I. Materials Recommendations
J. Pavement Selection Committee Checklist
K. Preliminary Geotechnical Report Signature Page
L. Location Hydraulic Study
M Storm Water Data Report (SWDR) Approval Sheet
N. Risk Management Plan
O. Transportation Management Plan (TMP) Data Sheet
P. Public Comments and Responses
Q. CMIA Application

ATTACHMENT A

LOCATION/VICINITY MAP

PROJECT LOCATION MAP





VICINITY MAP

ATTACHMENT B

LAYOUT PLANS

NOTES: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM/SCL	101	SM PM 0.0/3.6 SCL PM 52.2/52.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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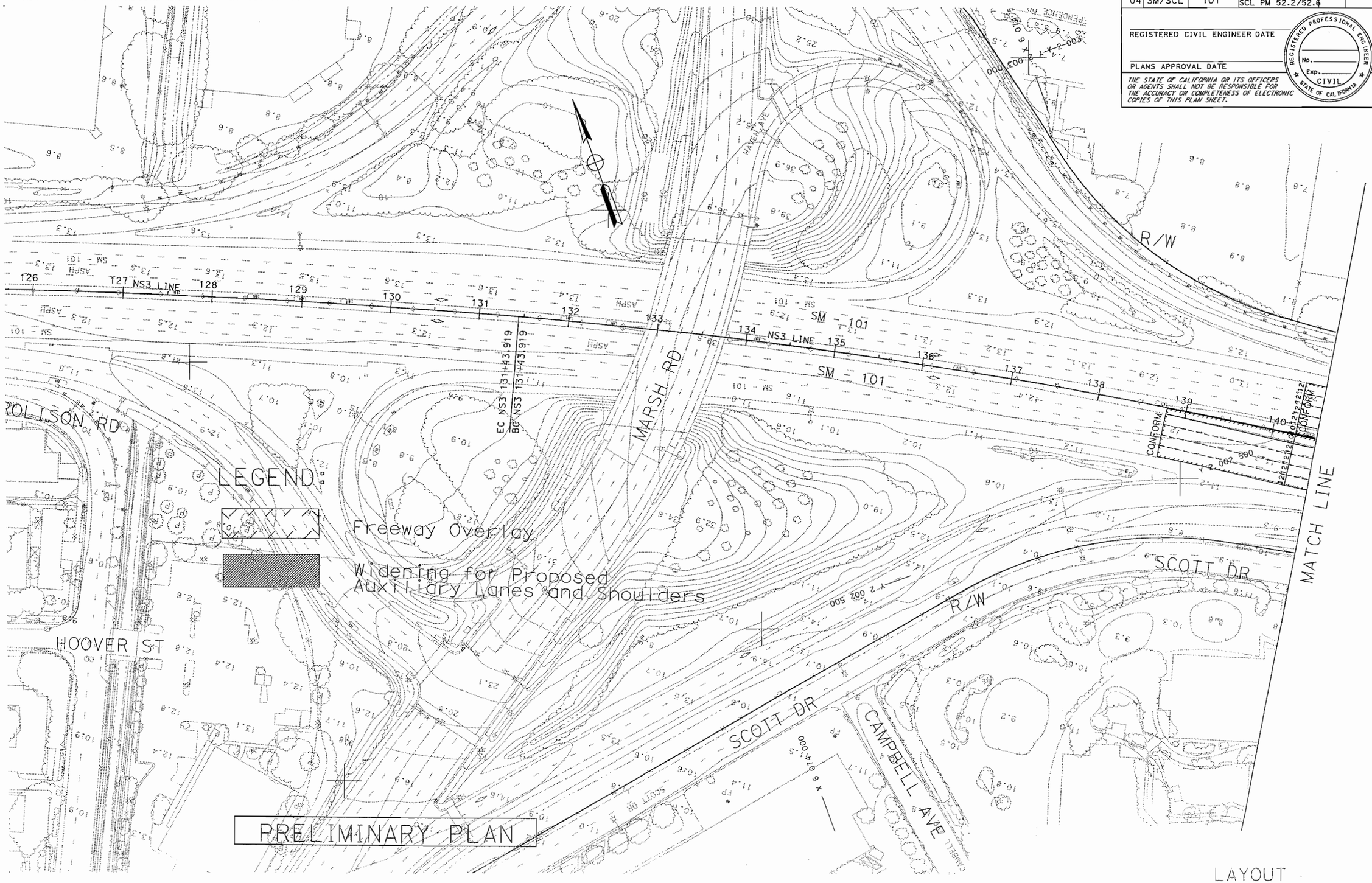

LAYOUT

Scale 1"=50'

L-1

REVISED BY | DATE REVISED

CALCULATED-DESIGNED BY | CHECKED BY

FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

LAST REVISION 00-00-00 | DATE PLOTTED => 16-SEP-2008 | TIME PLOTTED => 10:09

BORDER LAST REVISED 3/1/2007 | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | USERNAME => s117086 | DGN FILE => 37561ge01.dgn | CU 00000 | EA 000000

NOTES: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM/SCL	101	SM PM 0.0/3.6 SCL PM 52.2/52.6		

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REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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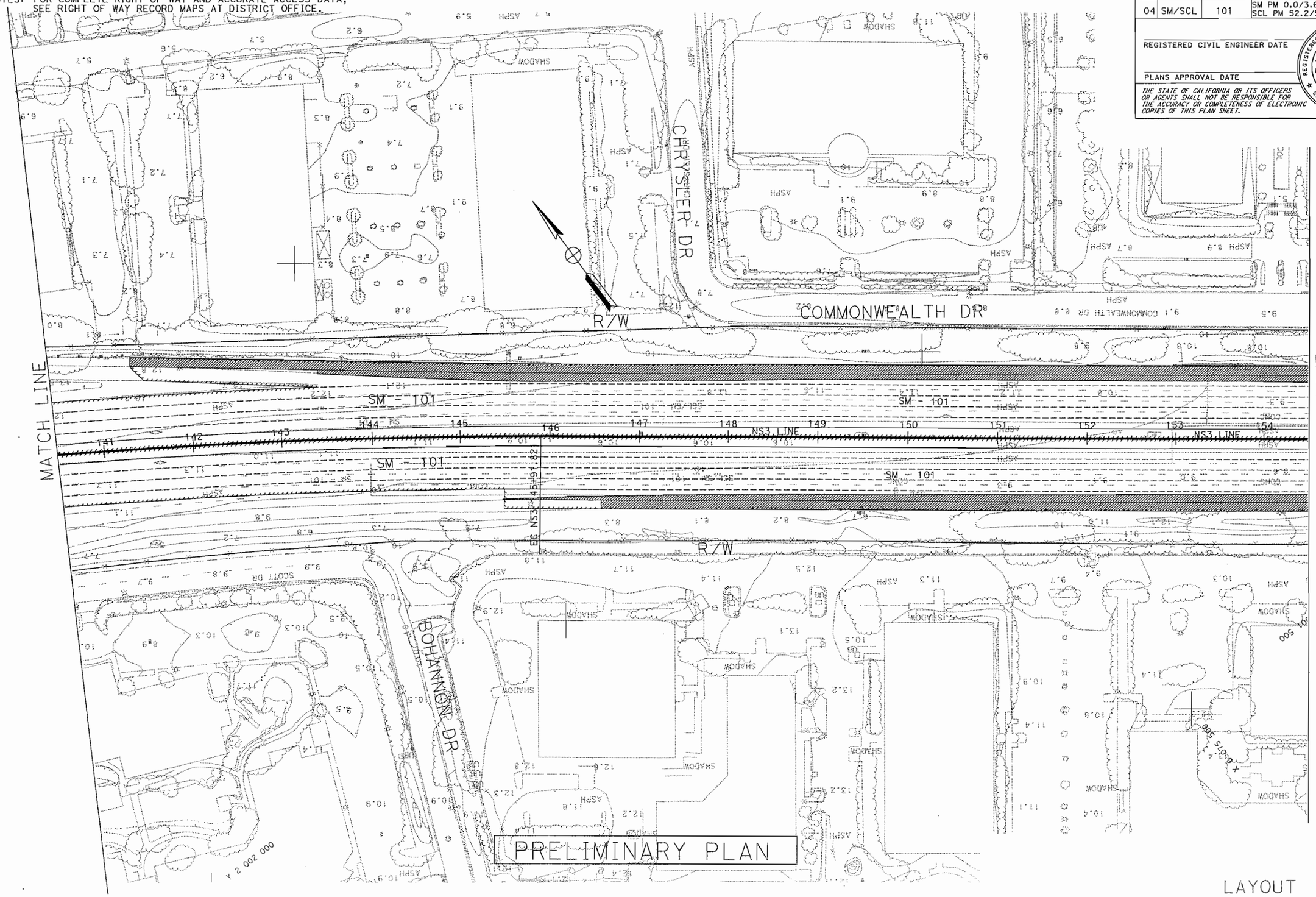


LAYOUT
Scale 1"=50'

L-2

REVISED BY | DATE REVISED

CALCULATED-DESIGNED BY | CHECKED BY

FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

LAST REVISION 00-00-00 | DATE PLOTTED => 16-SEP-2008 | TIME PLOTTED => 10:07

NOTES: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

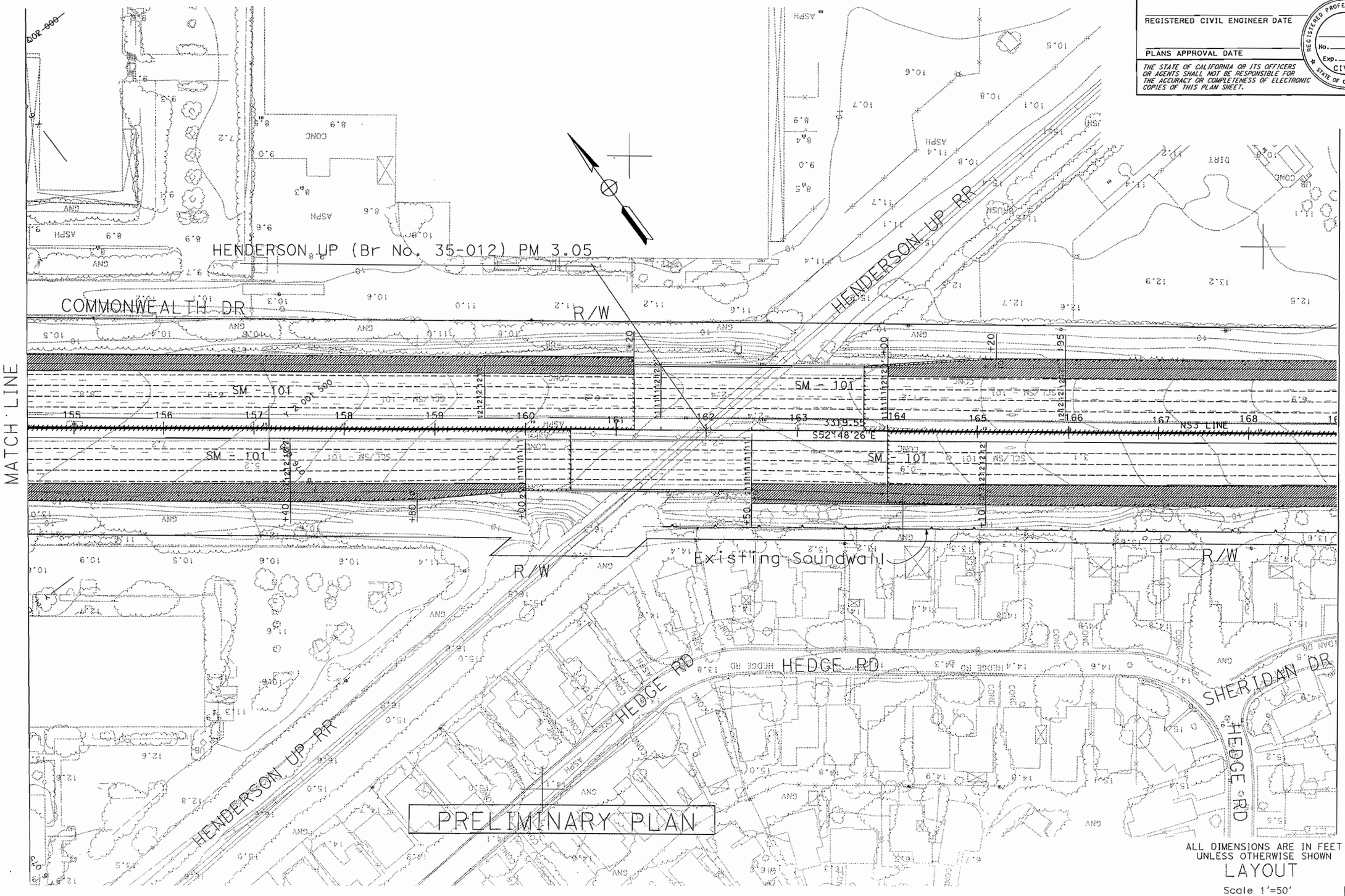
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM/SCL	101	SM PM 0.0/3.6 SCL PM 52.2/52.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.



ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

LAYOUT

Scale 1'=50'

L-3

REVISED BY | DATE REVISED

CALCULATED-DESIGNED BY | CHECKED BY

FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

LAST REVISION 00-00-00 | DATE PLOTTED => 16-SEP-2008 | TIME PLOTTED => 10:11

BORDER LAST REVISED 7/1/2007 | RELATIVE BORDER SCALE 0 1 2 3 | USERNAME => s117086 | DGN FILE => 235615A03.dgn | CU 00000 | EA 000000

NOTES: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

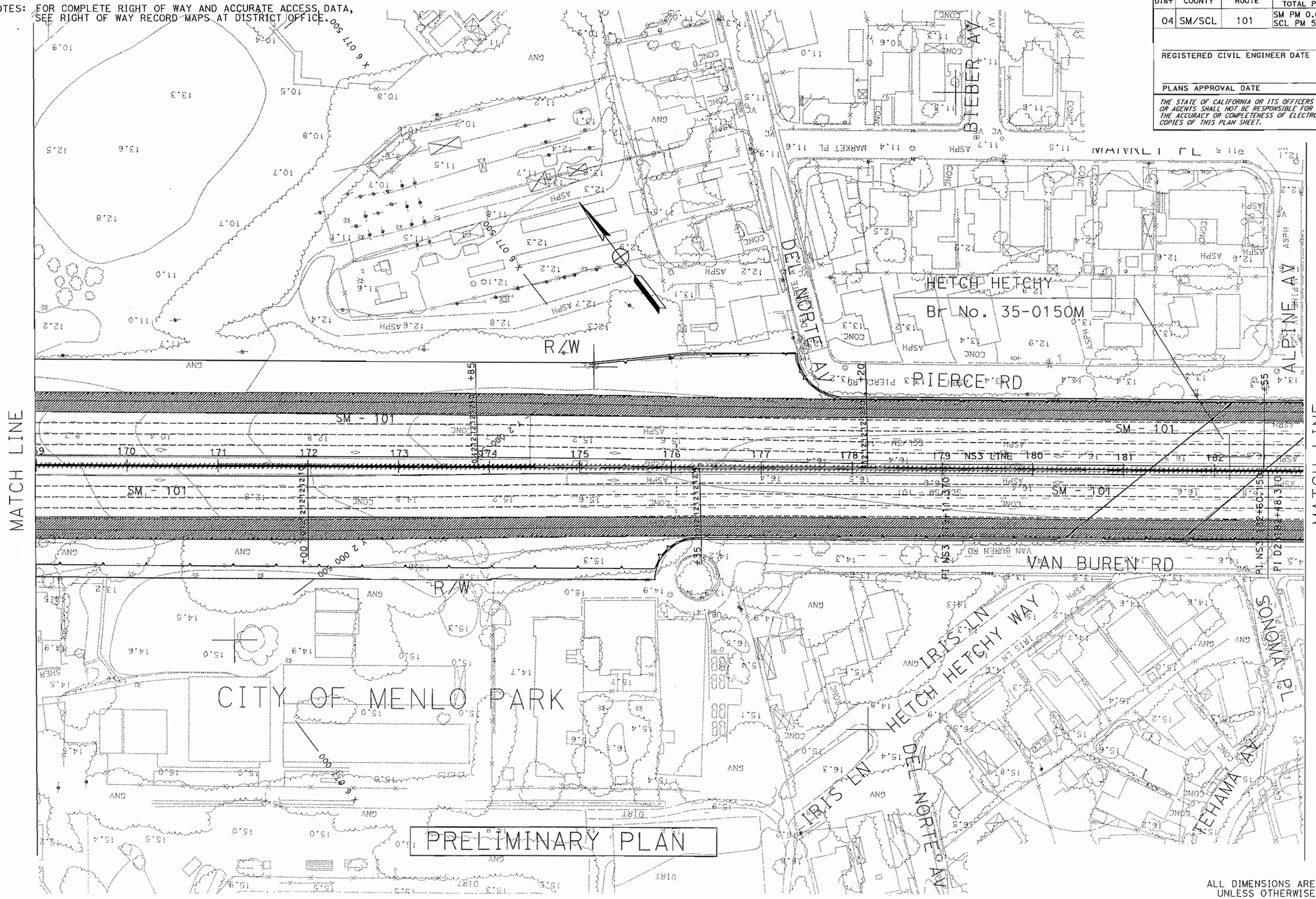
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM/SCL	101	SM PM 0.0/3.6 SCL PM 52.2/52.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.



ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

LAYOUT

Scale: 1"=50'

L-4

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISED BY

DATE REVISED

LAST REVISION 00-00-00

DATE PLOTTED => 16-SEP-2008

TIME PLOTTED => 10:13

BORDER LAST REVISED 3/1/2007

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s117086

DGN FILE => 23561eq04.dgn

CU 00000

EA 000000

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM/SCL	101	SM PM 0.0/3.6 SCL PM 52.2/52.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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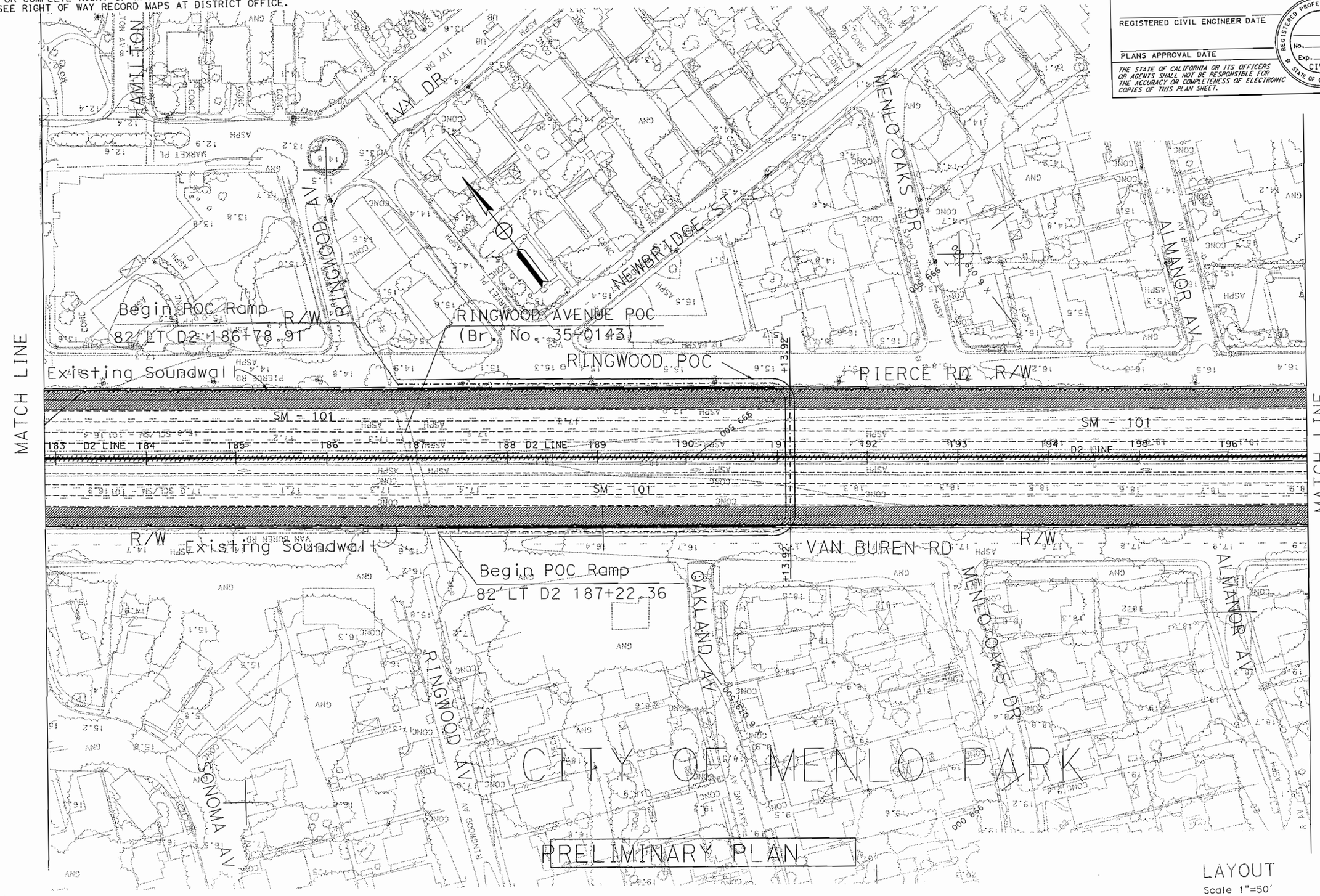
NOTES: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.



LAYOUT
Scale 1"=50'

L-5

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY

CHECKED BY

FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

LAST REVISION 00-00-00 | DATE PLOTTED => 16-SEP-2006 | TIME PLOTTED => 10:14

USERNAME => s117086 | CU 00000 | EA 000000

RELATIVE BORDER SCALE 0 1 2 3

NOTES: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

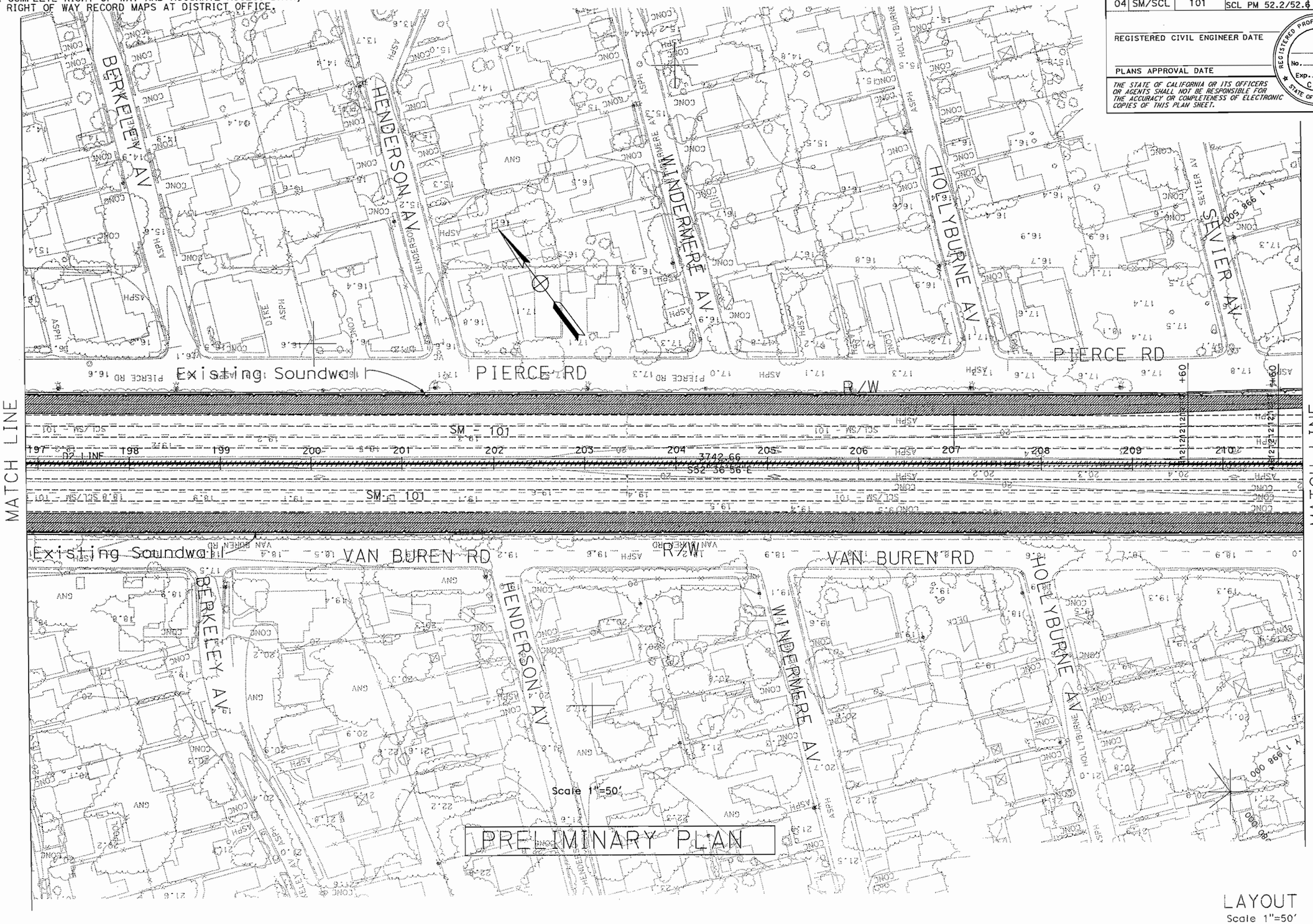
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM/SCL	101	SM PM 0.0/3.6 SCL PM 52.2/52.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.



LAYOUT
Scale 1"=50'

L-6

REVISED BY | DATE REVISED

CALCULATED-DESIGNED BY | CHECKED BY

FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

LAST REVISION 00-00-00 | DATE PLOTTED => 16-SEP-2008 | TIME PLOTTED => 10:16

BORDER LAST REVISED 3/1/2007 | RELATIVE BORDER SCALE IN INCHES 0 1 2 3 | USERNAME => s117086 | DGN FILE => 23661ap06.dgn | CU 00000 | EA 000000

NOTES: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

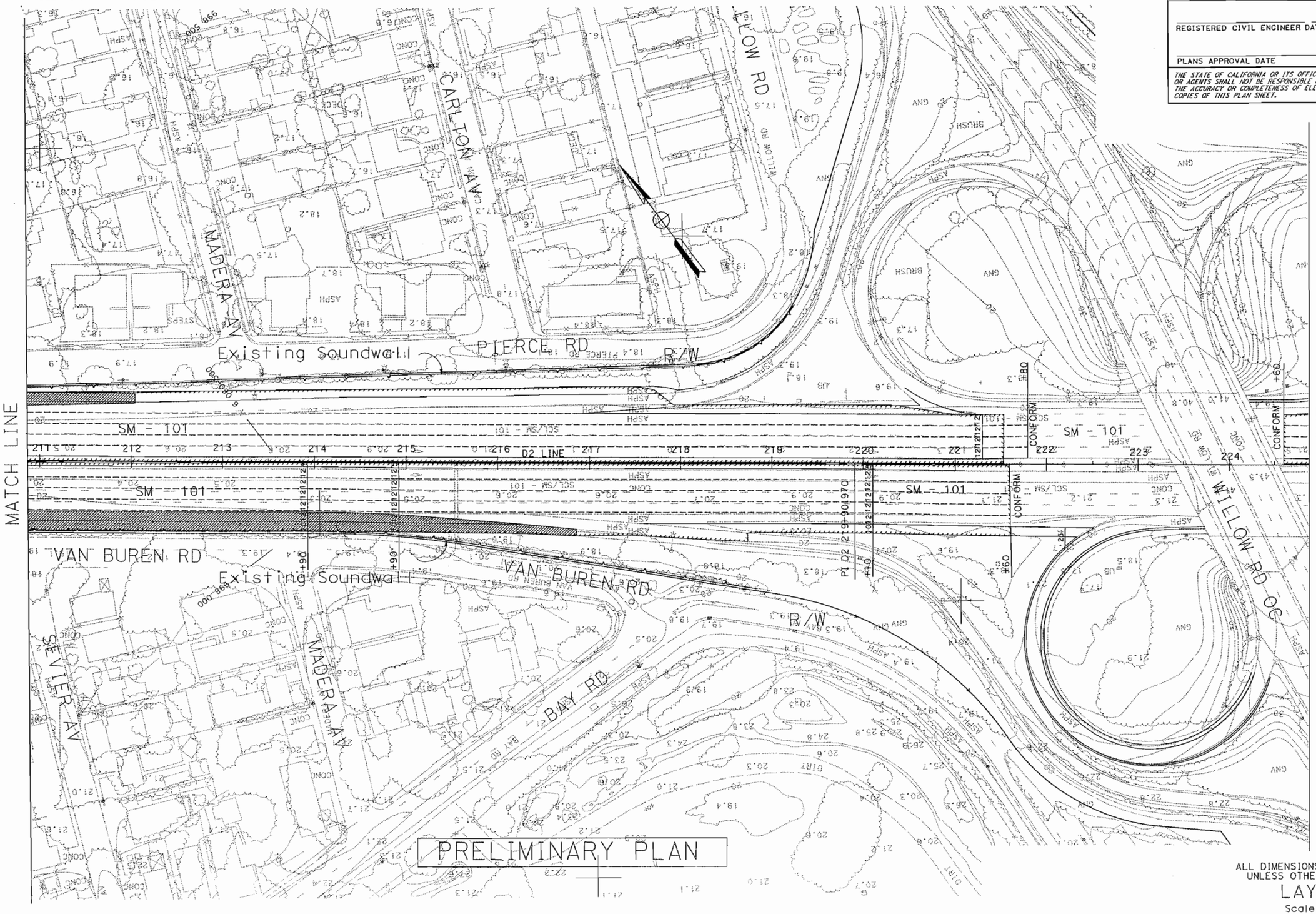
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM/SCL	101	SM PM 0.0/3.6 SCL PM 52.2/52.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.



ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

LAYOUT

Scale 1"=50'

L-7

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISED BY

DATE REVISED

LAST REVISION 00-00-00

DATE PLOTTED => 16-SEP-2008

TIME PLOTTED => 10:18

RELATIVE BORDER SCALE 0 1 2 3

USERNAME => s117086

CU 00000

EA 000000

NOTES: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

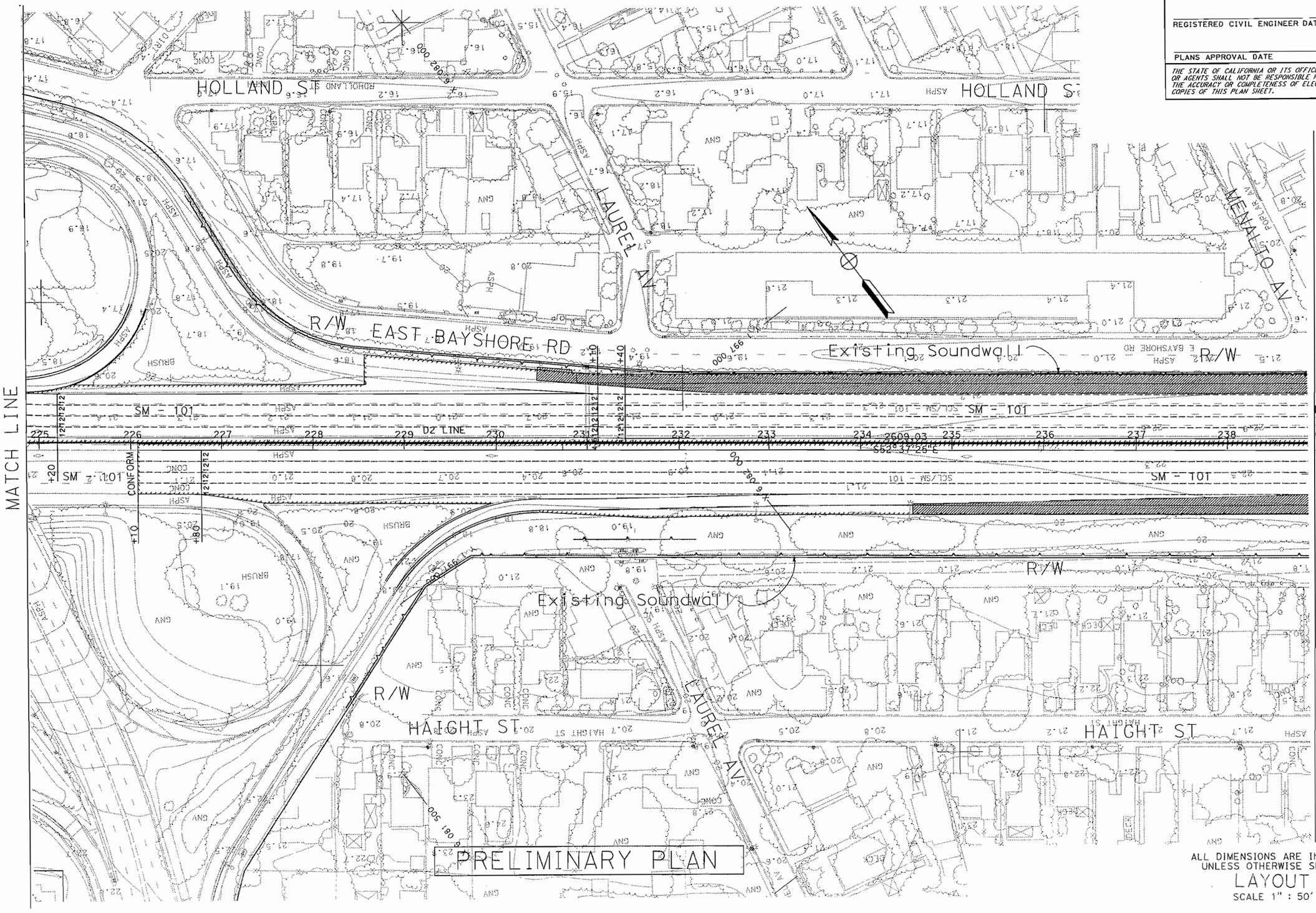
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM/SCL	101	SM PM 0.0/3.6 SCL PM 52.2/52.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.



ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

LAYOUT

SCALE 1" : 50'

L-8

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISED BY

DATE REVISED

LAST REVISION 00-00-00

DATE PLOTTED => 16-SEP-2008

TIME PLOTTED => 10:20

BORDER LAST REVISED 3/1/2007

RELATIVE BORDER SCALE 0 1 2 3

USERNAME => s117086

CU 00000

EA 000000

NOTES: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

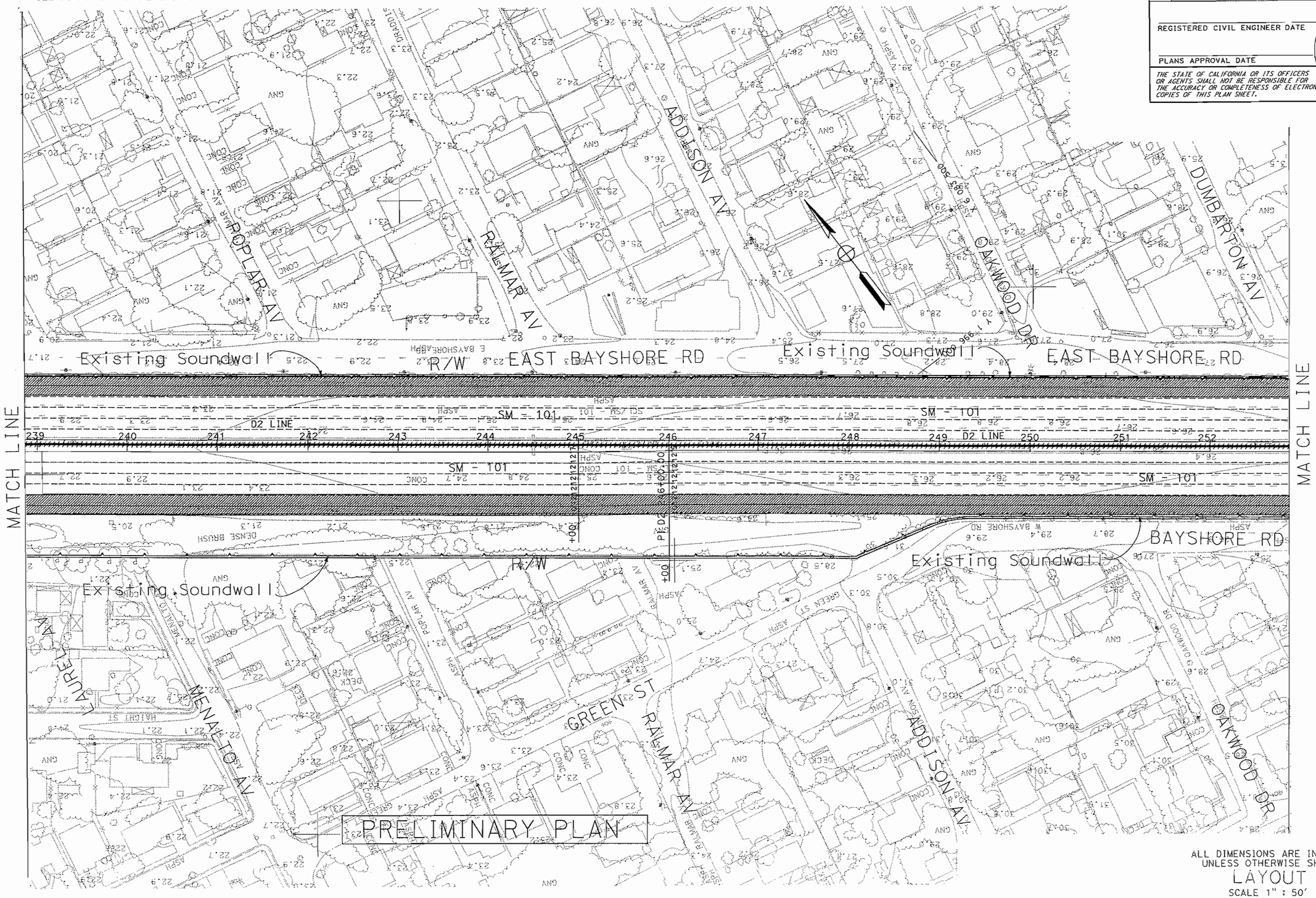
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM/SCL	101	SM PM 0.0/3.6 SCL PM 52.2/52.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.



ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

LAYOUT

SCALE 1" : 50'

L-9

REVISED BY | DATE REVISED

CALCULATED-DESIGNED BY | CHECKED BY

FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

LAST REVISION 00-00-00 | DATE PLOTTED => 16-SEP-2008 | TIME PLOTTED => 10:22

RELATIVE BORDER SCALE 0 1 2 3 | USERNAME => s117086 | CU 00000 | EA 000000

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM/SCL	101	SM PM 0.0/3.6 SCL PM 52.2/52.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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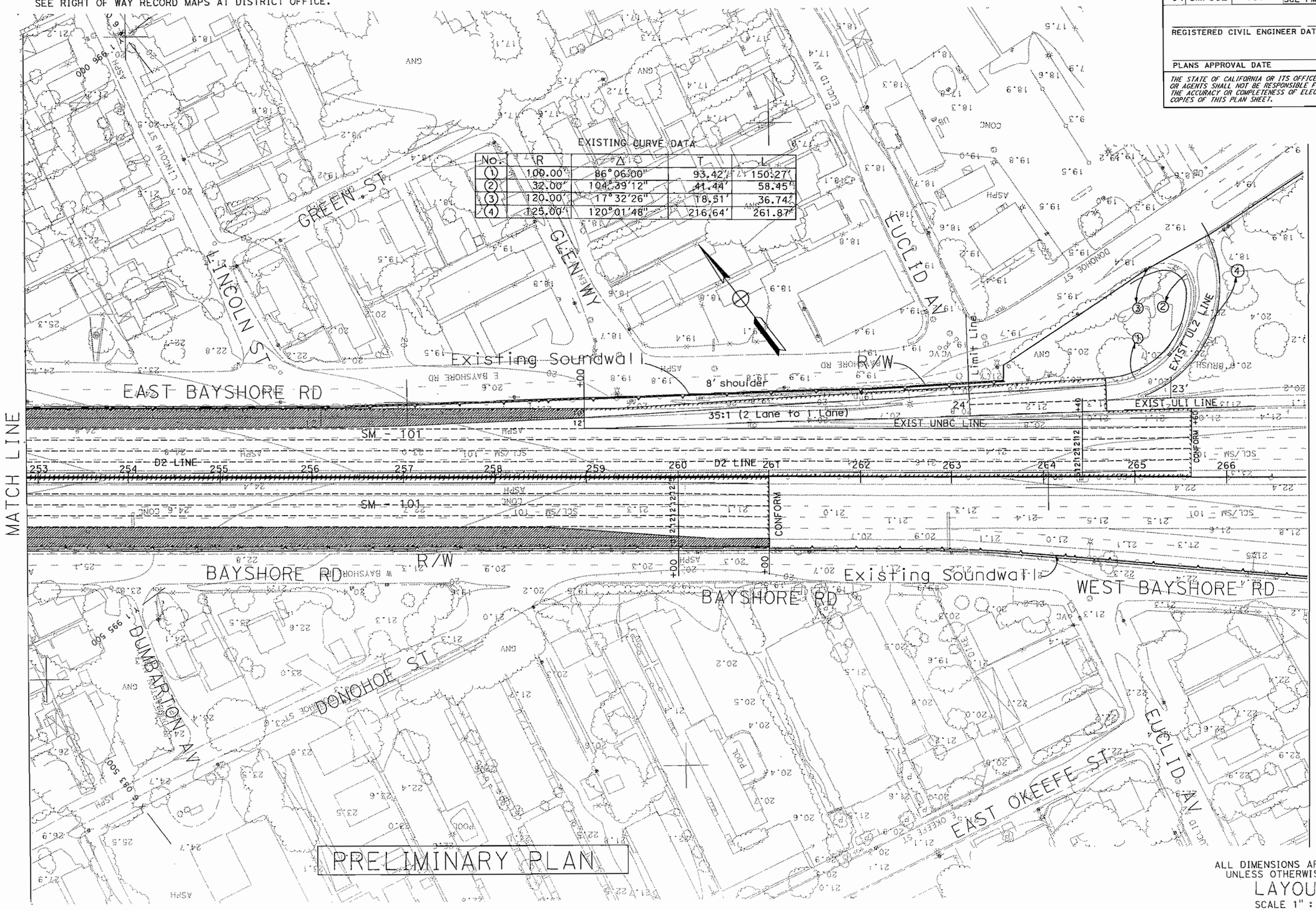
NOTES: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

EXISTING CURVE DATA

No.	R	Δ	T	L
1	100.00'	86°06'00"	93.42'	150.27'
2	32.00'	104°39'12"	41.44'	58.45'
3	120.00'	17°32'26"	18.51'	36.74'
4	125.00'	120°01'48"	216.64'	261.87'



ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

LAYOUT

SCALE 1" : 50'

L-10

REVISED BY | DATE REVISED

CALCULATED-DESIGNED BY | CHECKED BY

FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

LAST REVISION 00-00-00 | DATE PLOTTED => 16-SEP-2008 | TIME PLOTTED => 10:27

BORDER LAST REVISED 3/1/2007 | RELATIVE BORDER SCALE IN INCHES 0 1 2 3 | USERNAME => s117086 | CU 00000 | EA 000000

NOTES: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM/SCL	101	SM PM 0.0/3.6 SCL PM 52.2/52.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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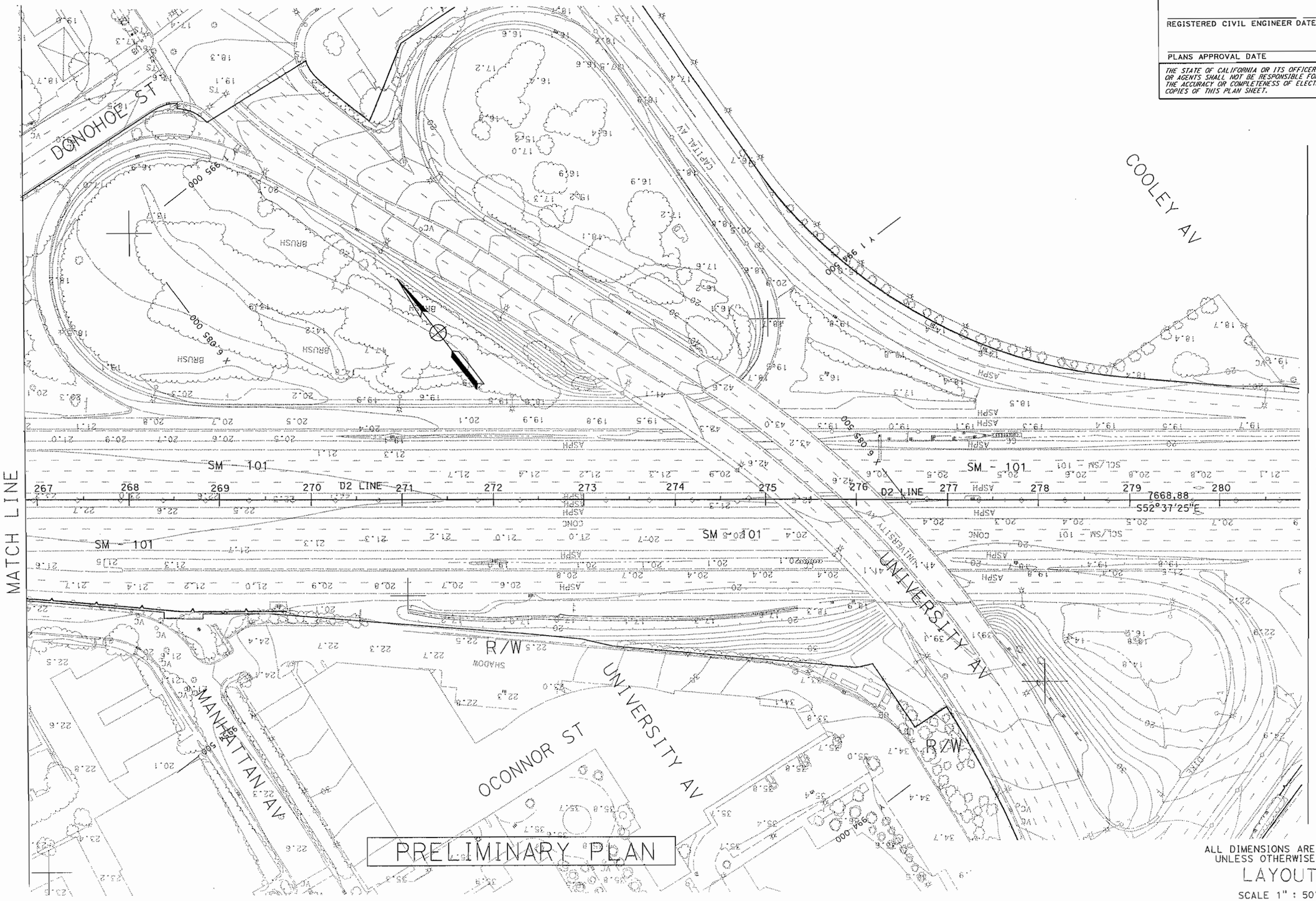

ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

LAYOUT

SCALE 1" : 50'

L-11

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISED BY

DATE REVISED

LAST REVISION 00-00-00

DATE PLOTTED => 15-SEP-2008

TIME PLOTTED => 17:06

BORDER LAST REVISED 3/1/2007

RELATIVE BORDER SCALE 0 1 2 3

USERNAME => s117086

CU 00000

EA 000000

NOTES: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM/SCL	101	SM PM 0.0/3.6 SCL PM 52.2/52.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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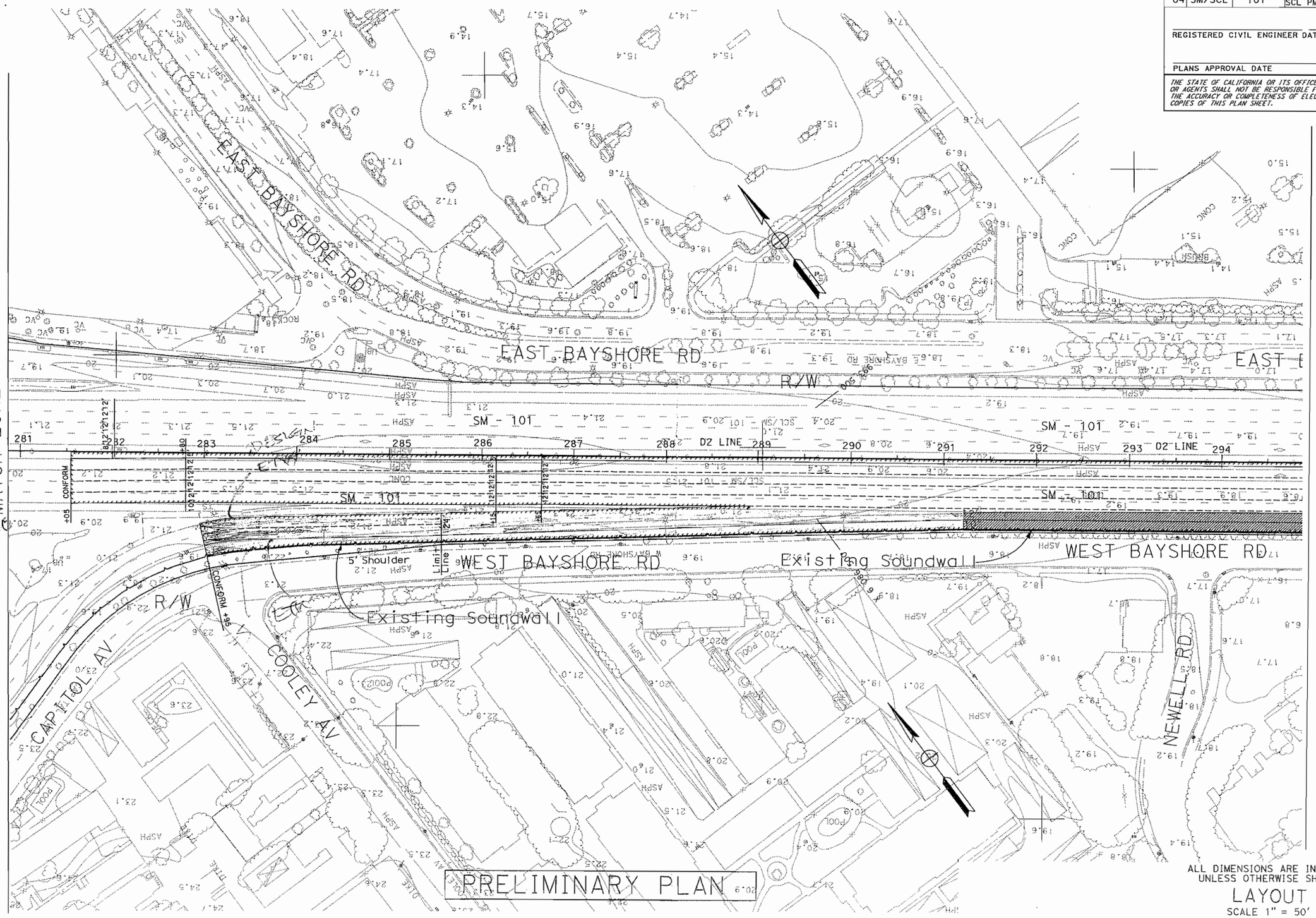


ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

LAYOUT

SCALE 1" = 50'

L-12

REVISED BY | DATE REVISED

CALCULATED-DESIGNED BY | CHECKED BY

FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

LAST REVISION | DATE PLOTTED => 16-SEP-2008 | 00-00-00 | TIME PLOTTED => 10:29

BORDER LAST REVISED 3/1/2007 | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | USERNAME => s117086 | DGN FILE => 23561ea12.dgn | CU 00000 | EA 000000

NOTES: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

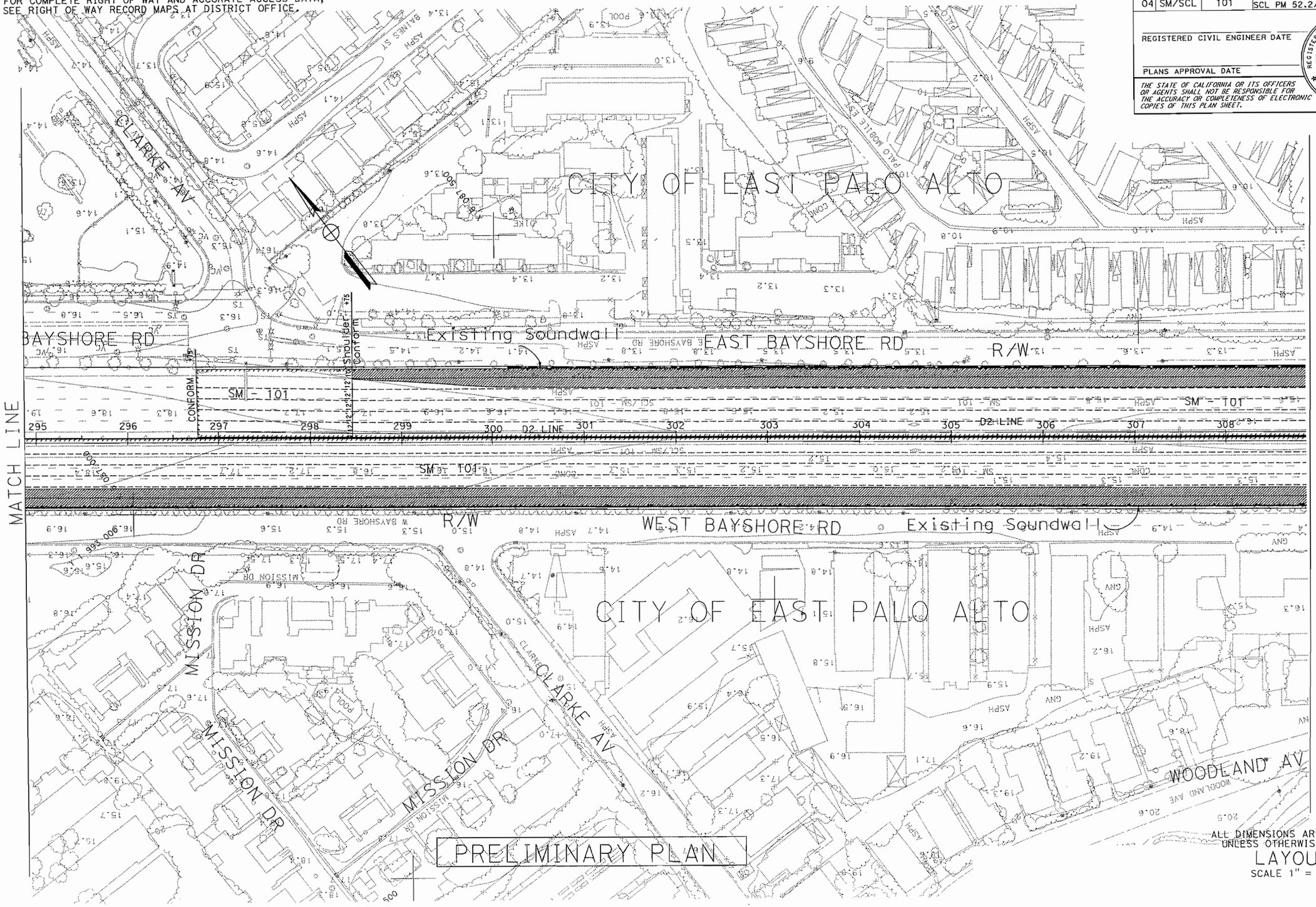
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM/SCL	101	SM PM 0.0/3.6 SCL PM 52.2/52.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.



ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

LAYOUT

SCALE 1" = 50'

L-13

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY

FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

LAST REVISION 00-00-00 | DATE PLOTTED => 16-SEP-2008 | TIME PLOTTED => 10:30

RELATIVE BORDER SCALE 0 1 2 3 | USERNAME => s117086 | CU 00000 | EA 000000

NOTES: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM/SCL	101	SM PM 0.0/3.6 SCL PM 52.2/52.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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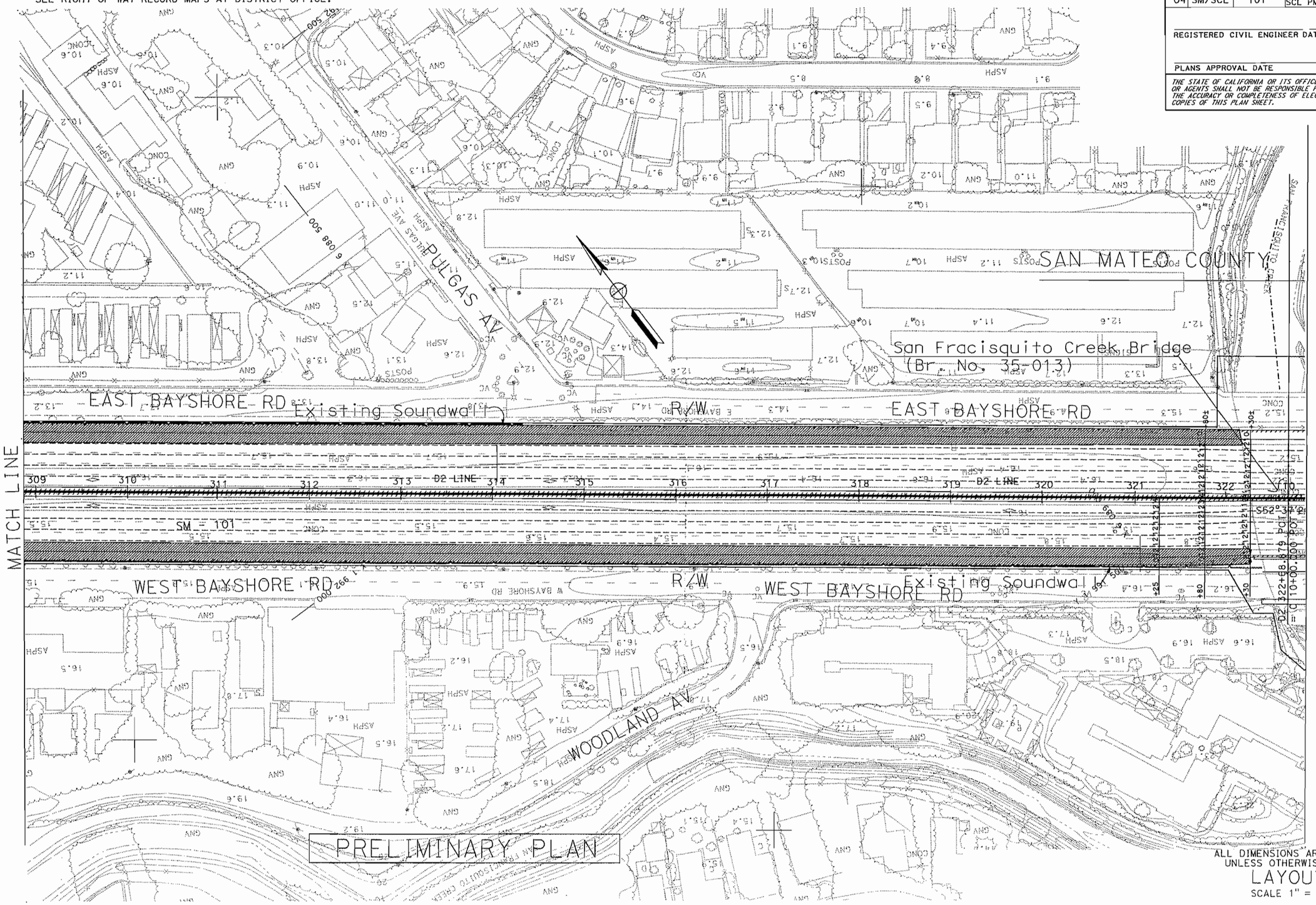

ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

LAYOUT

SCALE 1" = 50'

L-14

REVISED BY | DATE REVISED

CALCULATED-DESIGNED BY | CHECKED BY

FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

LAST REVISION 00-00-00 | DATE PLOTTED => 16-SEP-2008 | TIME PLOTTED => 10:32

NOTES: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM/SCL	101	SM PM 0.0/3.6 SCL PM 52.2/52.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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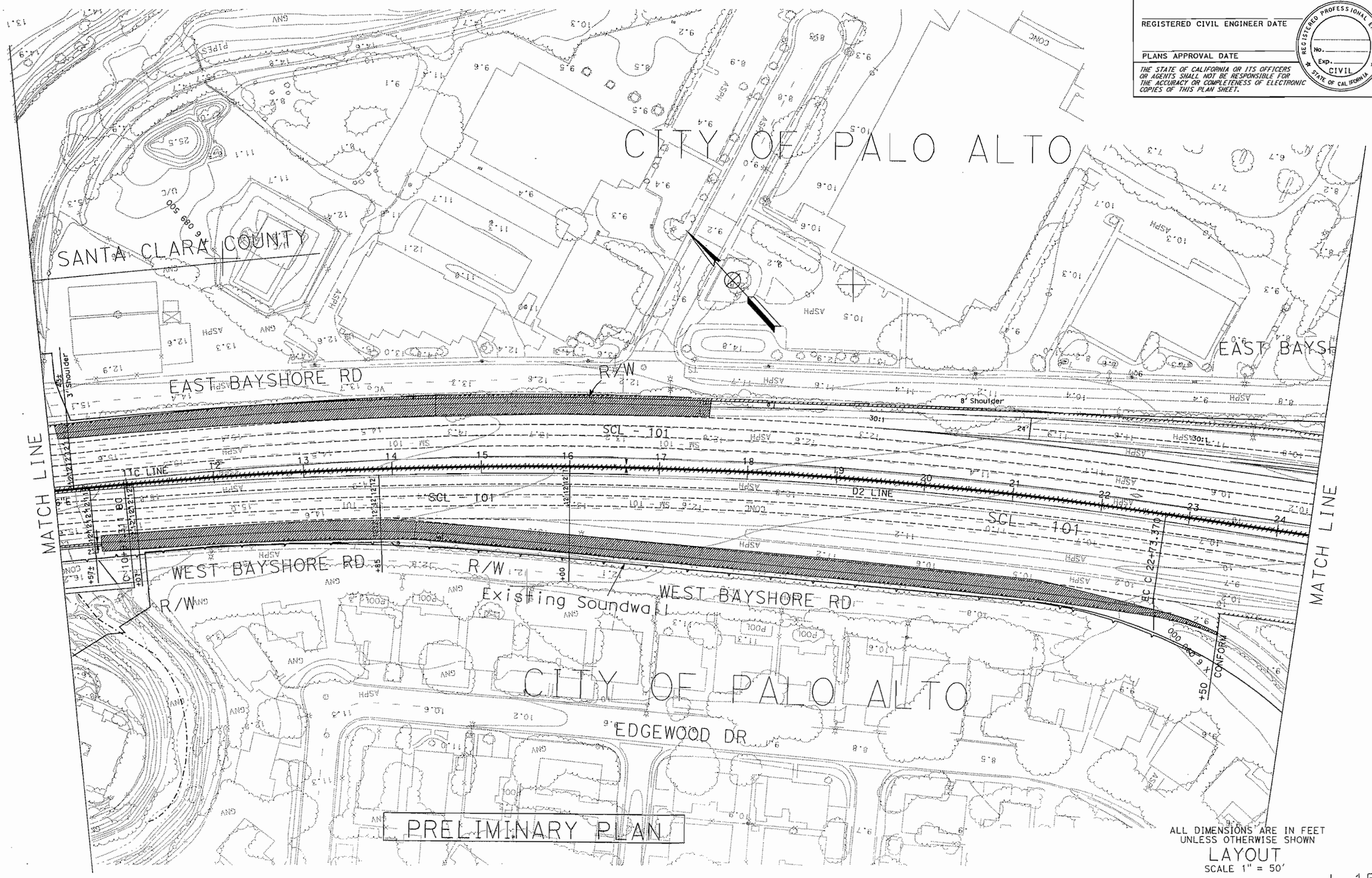

ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

LAYOUT

SCALE 1" = 50'

L-15

REVISED BY	DATE REVISED

CALCULATED-
DESIGNED BY

CHECKED BY

FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

LAST REVISION 00-00-00 | DATE PLOTTED => 16-SEP-2008 | TIME PLOTTED => 10:34

NOTES: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM/SCL	101	SM PM 0.0/3.6 SCL PM 52.2/52.6		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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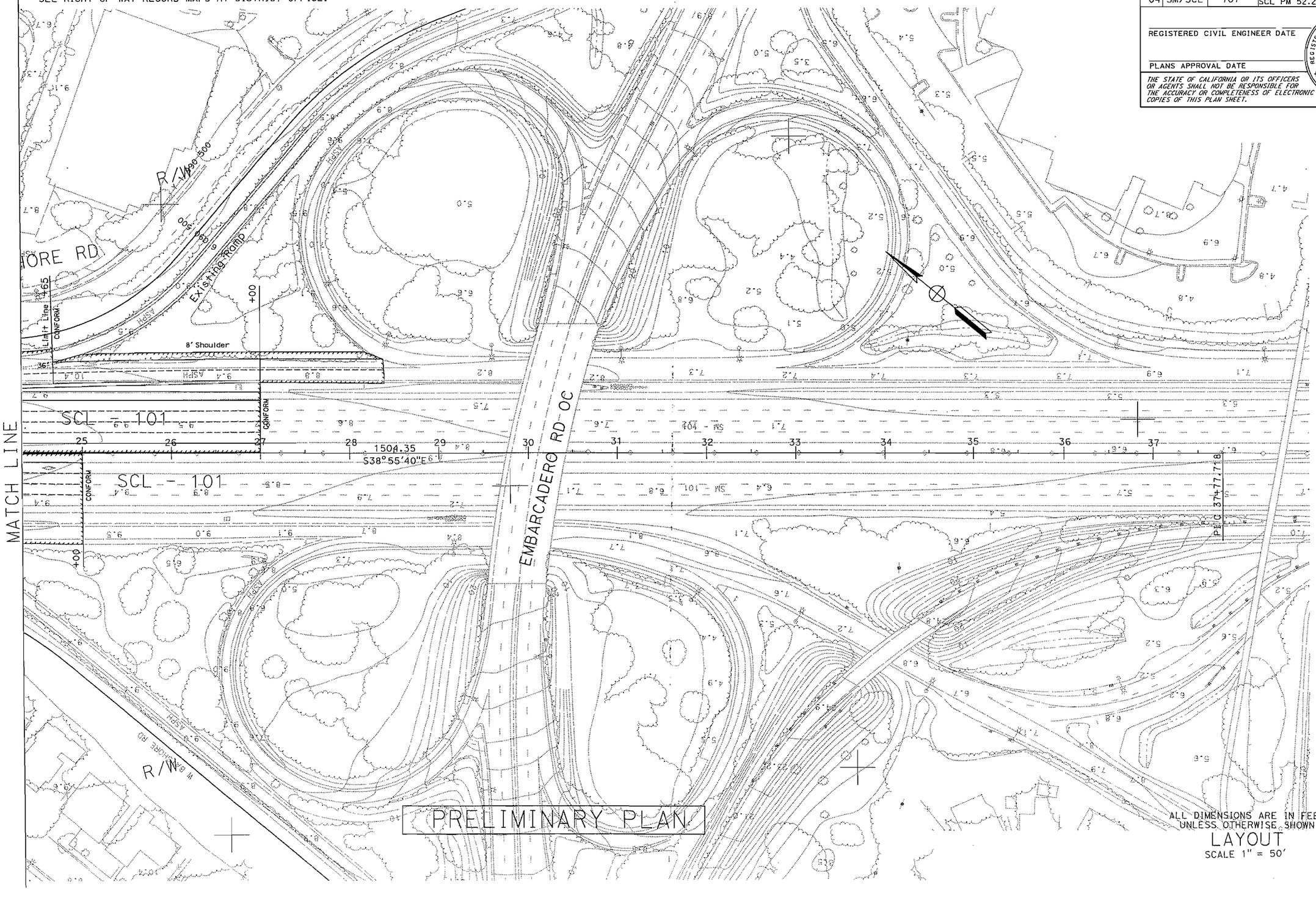

ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

LAYOUT

SCALE 1" = 50'

L-16

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY

CHECKED BY

FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

LAST REVISION 00-00-00

DATE PLOTTED => 16-SEP-2008
TIME PLOTTED => 10:35

BORDER LAST REVISED 3/1/2007

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s117086
DGN FILE => 235610016.dgn

CU 00000

EA 000000

ATTACHMENT C

TYPICAL CROSS SECTIONS

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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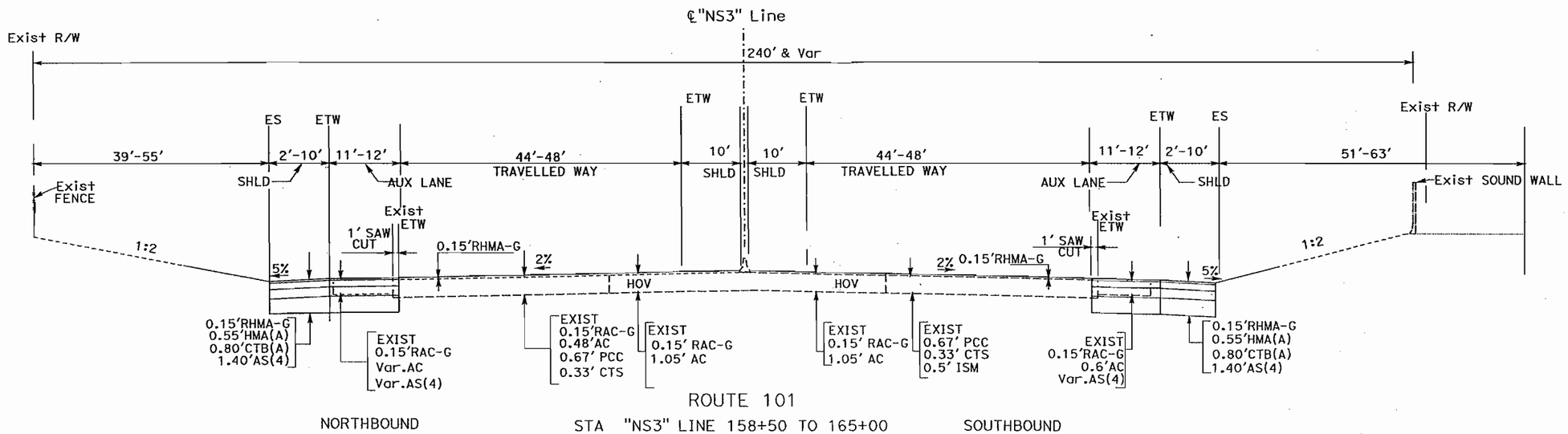
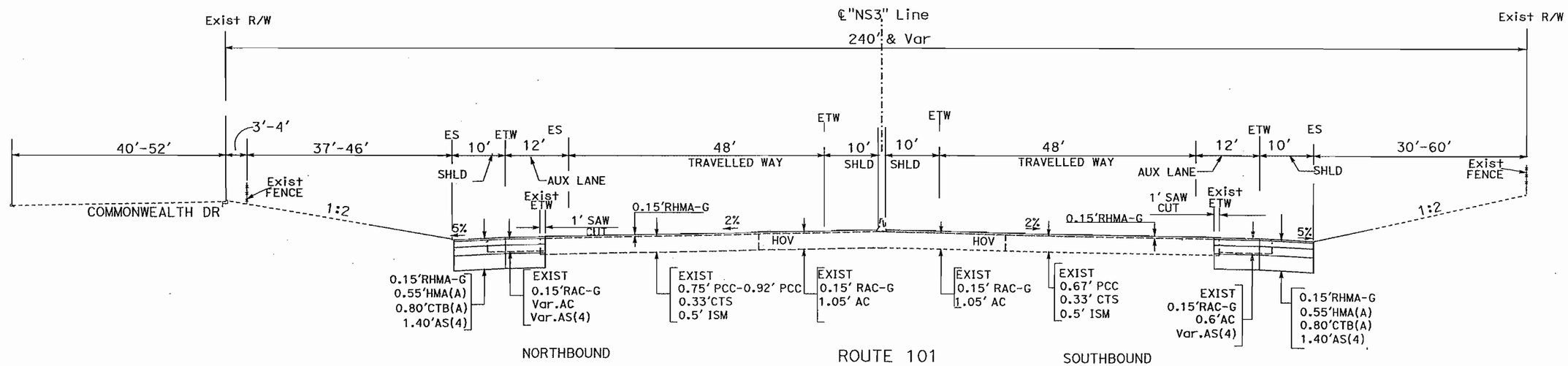
PRELIMINARY



ROUTE 101

NORTHBOUND STA "NS3" LINE 158+50 TO 165+00 SOUTHBOUND



NORTHBOUND ROUTE 101 SOUTHBOUND

STA "NS3" LINE 140+25 TO 158+50

PROPOSED TYPICAL CROSS SECTIONS

NO SCALE

NOTES:

1. EXISTING UTILITIES HAVE NOT BEEN PLOTTED ON THESE SECTIONS
2. DIMENSIONS SHOWN ARE SUBJECT TO TOLERANCE IN THE STANDARD SPECIFICATIONSPLOTTED ON THESE SECTIONS
3. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN.

X-1

DATE	REVISED BY	DATE REVISED

CALCULATED/DESIGNED BY | CHECKED BY

PROJECT ENGINEER

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

LAST REVISION 00-00-00 | DATE PLOTTED => 18-AUG-2008 | TIME PLOTTED => 09:04

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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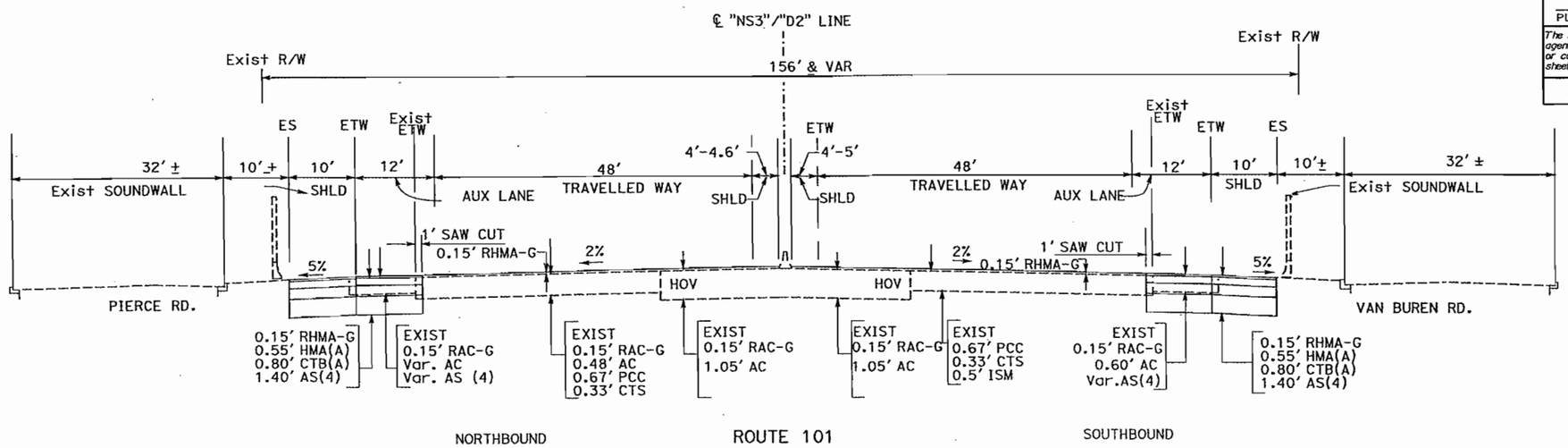
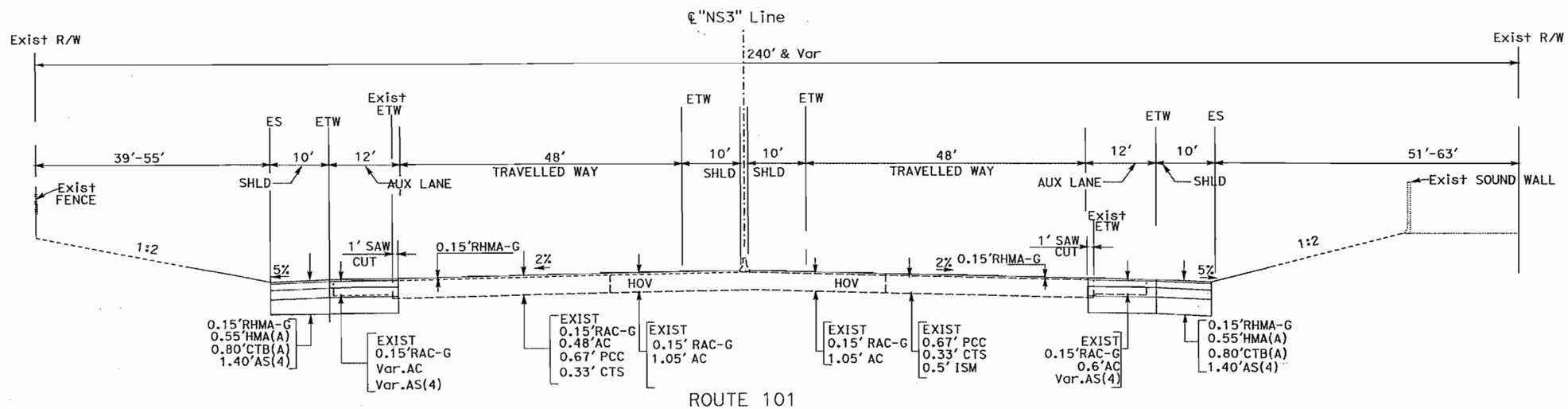
PRELIMINARY



NORTHBOUND ROUTE 101 SOUTHBOUND

STA "NS3" LINE 176+00 TO 182+60.15
STA "D2' LINE 182+48.31 TO 209+00



ROUTE 101

NORTHBOUND STA "NS3" LINE 165+00 TO 176+00 SOUTHBOUND

NOTES:
1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN
2. EXISTING UTILITIES HAVE NOT BEEN PLOTTED ON THESE SECTIONS
3. DIMENSIONS SHOWN ARE SUBJECT TO TOLERANCE IN THE STANDARD SPECIFICATIONS

PROPOSED TYPICAL CROSS SECTIONS

NO SCALE

X-2

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

PROJECT ENGINEER

CALCULATED/DESIGNED BY | CHECKED BY

DATE | REVISED BY | DATE REVISED

LAST REVISION 00-00-00 | DATE PLOTTED => 18-AUG-2008 | TIME PLOTTED => 09:05

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

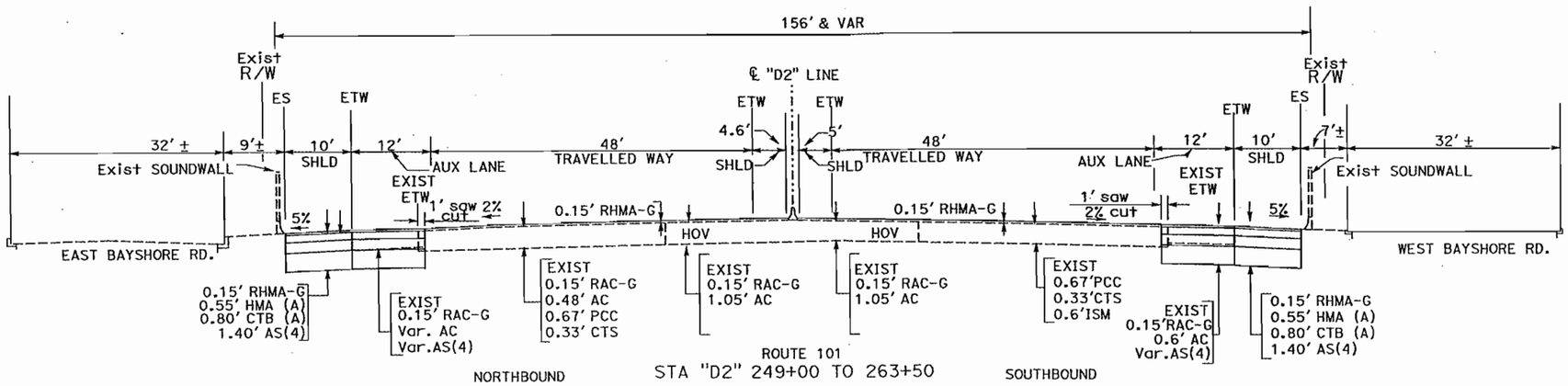
PLANS APPROVAL DATE

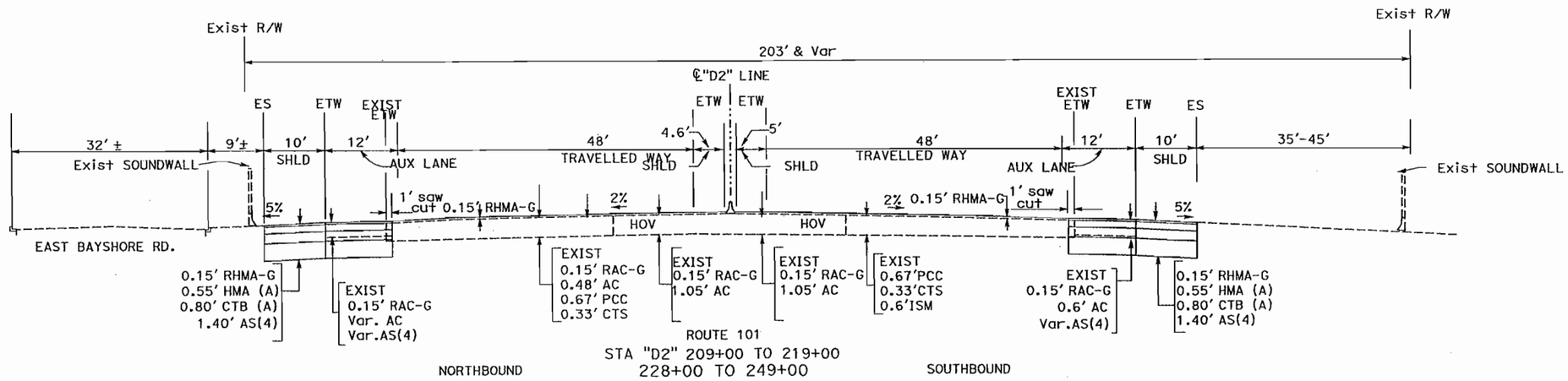
REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

To get to the Caltrans web site, go to: http://www.dot.ca.gov

PRELIMINARY





NOTES:

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3. DIMENSIONS SHOWN ARE SUBJECT TO TOLERANCE IN THE STANDARD SPECIFICATIONS

PROPOSED TYPICAL CROSS SECTIONS

NO SCALE

X-3

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

PROJECT ENGINEER | CALCULATED/DESIGNED BY | CHECKED BY | DATE REVISED BY | DATE REVISED

LAST REVISION 00-00-00 | DATE PLOTTED => 18-AUG-2008 | TIME PLOTTED => 09:05

RELATIVE BORDER SCALE 0 1 2 3 | USERNAME => s136511 | CU 00000 | EA 000000

PRELIMINARY

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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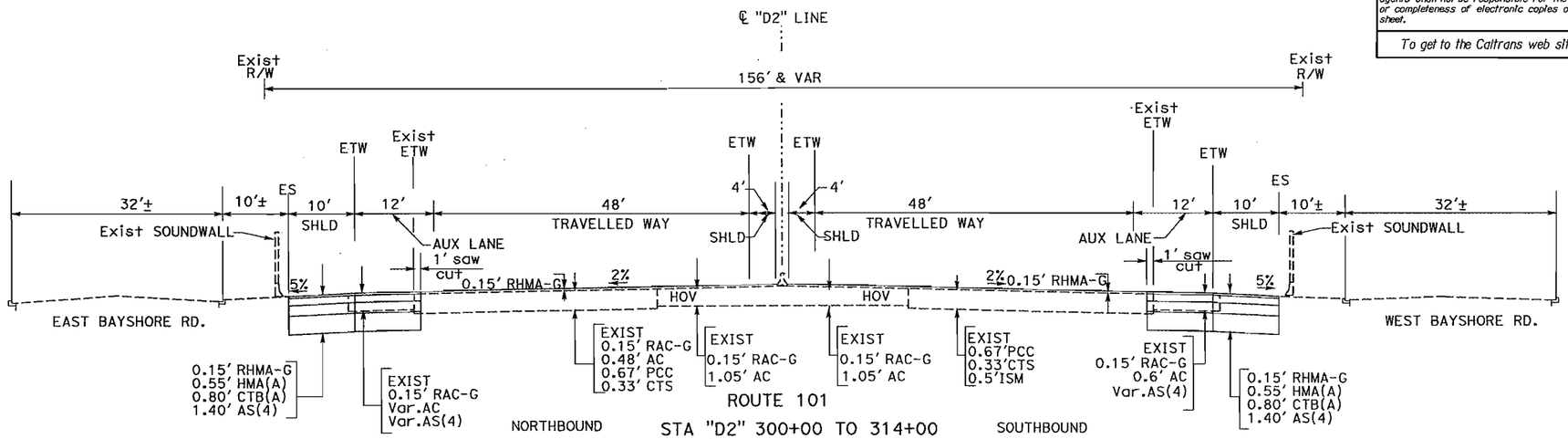

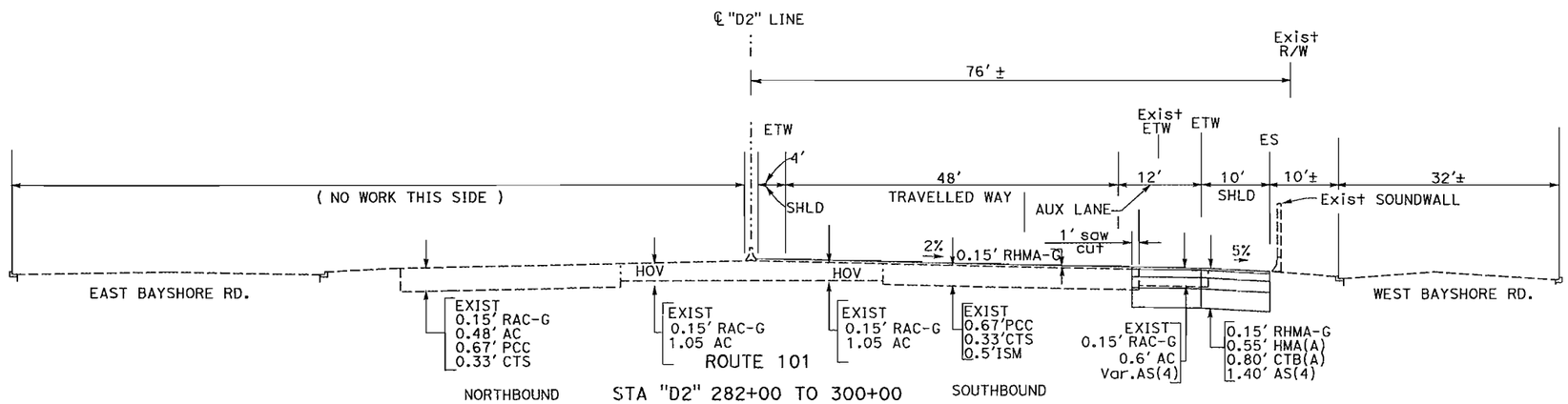

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2. EXISTING UTILITIES HAVE NOT BEEN PLOTTED ON THESE SECTIONS
3. DIMENSIONS SHOWN ARE SUBJECT TO TOLERANCE IN THE STANDARD SPECIFICATION

PROPOSED TYPICAL CROSS SECTIONS

NO SCALE

X-4

DATE	REVISED BY	DATE REVISED

CALCULATED/DESIGNED BY

CHECKED BY

PROJECT ENGINEER

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

LAST REVISION 00-00-00

DATE PLOTTED => 15-SEP-2008
TIME PLOTTED => 10:09

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s136511
DGN FILE => X-SECT_4_12-20-07.dgn

CU 00000

EA 000000

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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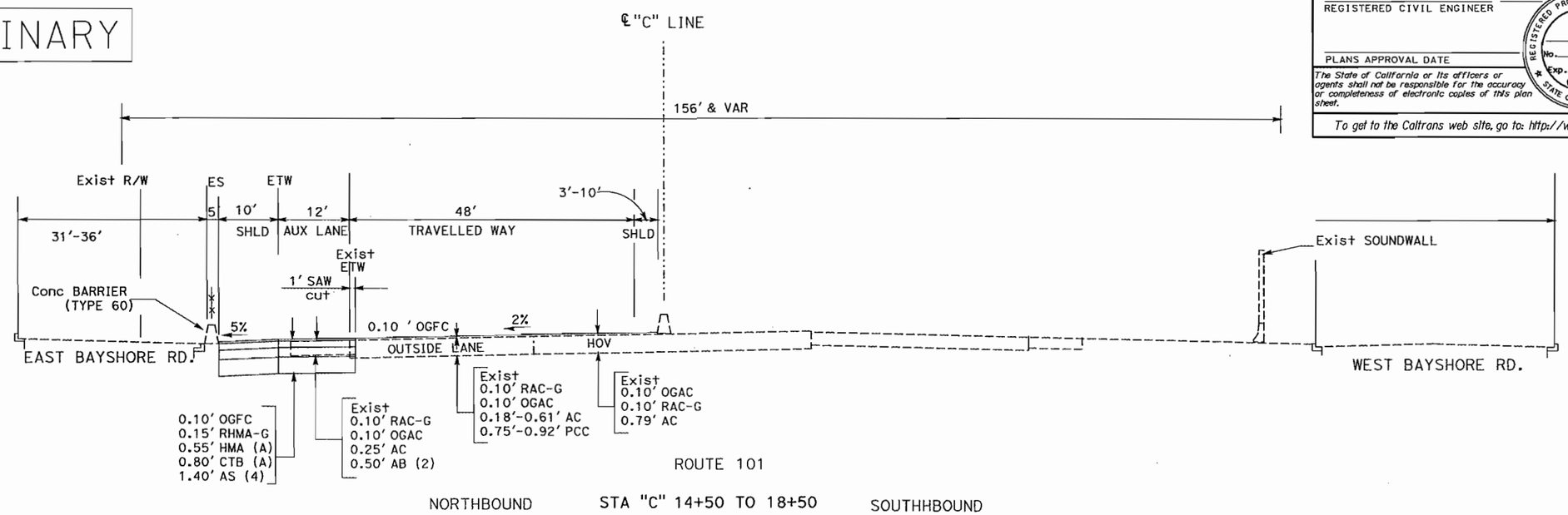
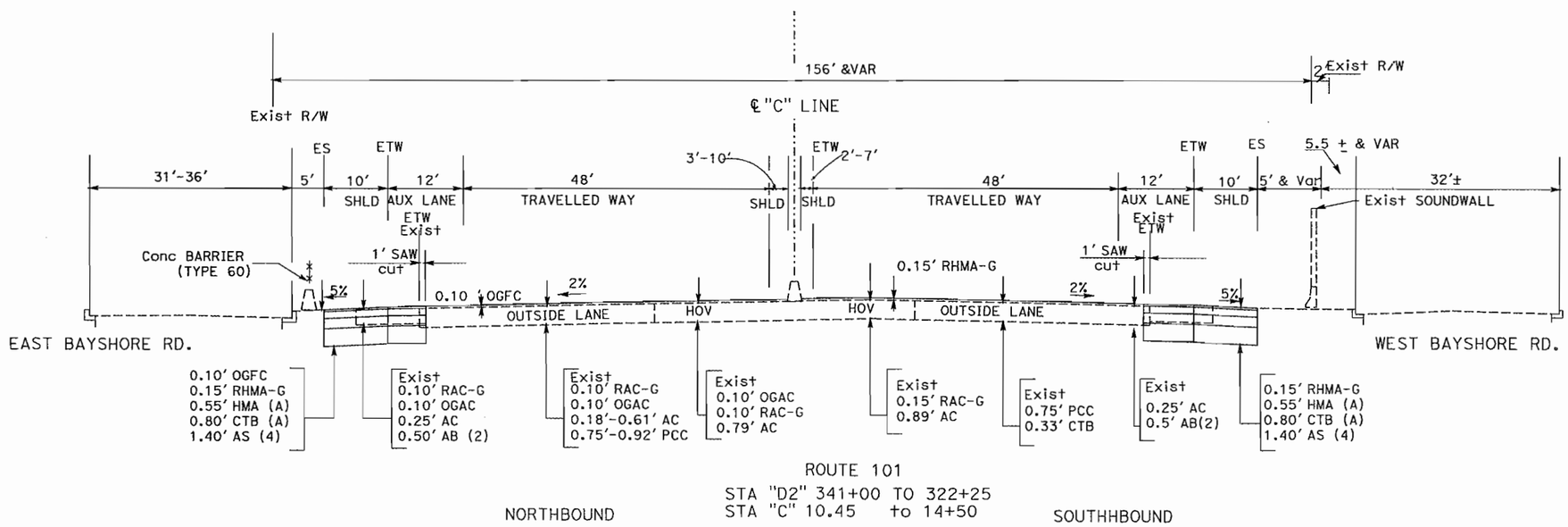
To get to the Caltrans web site, go to: http://www.dot.ca.gov

PRELIMINARY





NOTES:

1. ALL DIMENTIONS ARE IN FEET UNLESS OTHERWISE SHOWN.
2. EXISTING UTILITIES HAVE NOT BEEN PLOTTED ON THESE SECTIONS
3. DIMENSIONS SHOWN ARE SUBJECT TO TOLERANCE IN THE STANDARD SPECIFICATIONS

PROPOSED TYPICAL CROSS SECTIONS

NO SCALE

X-5

DATE	REVISED BY	DATE REVISED

CALCULATED/DESIGNED BY

CHECKED BY

PROJECT ENGINEER

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

LAST REVISION 00-00-00

DATE PLOTTED => 15-SEP-2008
TIME PLOTTED => 11:01

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s136511
DGN FILE => X-SECT_6_12-20-07.dgn

CU 00000

EA 000000

ATTACHMENT D

PROJECT COST ESTIMATES

COST ESTIMATE FOR PROJECT REPORT

District-County-Route: 04-SCL/SM-101
PM: SCL 52.2/52.6
SM 0.0/3.6
EA: 235610
Program Code: HB4C

PROJECT DESCRIPTION

Proposed Improvements: **Widen Route 101 to add auxiliary lanes in both directions from Embarcadero Road Interchange (I/C) to Marsh Road I/C**

Alternative: **Build Alternative - Non-standard left (median) shoulders**

Limits: **Embarcadero Road Interchange (I/C) to Marsh Road I/C**

SUMMARY OF PROJECT COST ESTIMATE

TOTAL ROADWAY ITEMS	$73,994,000	
TOTAL STRUCTURE ITEMS	$7,982,000	
SUBTOTAL CONSTRUCTION COSTS	$81,976,000	
TOTAL RIGHT OF WAY ITEMS	$61,000	
TOTAL PROJECT CAPITAL OUTLAY COSTS		**$82,037,000**

(Escalated to mid-construction year of 11/12 FY)

Reviewed by District Program Manager _____ (Signature)

Approved by Project Manager: _____ (Signature) 9/29/08 (Date)

District-County-Route: 04-SCL/SM-101
PM: SCL 52.2/52.6
SM 0.0/3.6
EA: 235610
Program Code: HB4C

I. ROADWAY ITEMS

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Section 1 - Earthwork					
Roadway Excavation	73,358	CY	$18	$1,320,444	
				$0	
Clearing & Grubbing	1	LS	$395,040	$395,040	
Develop Water Supply	1	LS	$109,396	$109,396	
				Subtotal Earthwork	$1,824,880
Section 2 - Pavement Structural Section					
Hot Mix Asphalt (A)	25,058	Ton	$80	$2,004,640	
Cement-Treated Base (A)	16,364	CY	$90	$1,472,760	
Aggregate Base (3)	2,389	CY	$45	$107,505	
Aggregate Subbase (4)	31,307	CY	$20	$626,140	
Rubberized AC (G)	6,752	Ton	$105	$708,960	
Pavement Overlay	1	LS	$7,000,000	$7,000,000	
Blanket & Edge Drains		LF		$0	
Open Graded Friction Course (OGFC)	375	Ton	$110	$41,250	
				Subtotal Pavement Structural Section	$11,961,255
Section 3 - Drainage					
Large Drainage Facilities		LS		$0	
Storm Drains					
Storm Drain Lift Station (Relocate)	1	EA	$0	$0	
Channel Improvements	1	LS	-	-	
Storm Drain Inlets	1	LS	$2,205,000	$2,205,000	
				Subtotal Drainage	$2,205,000

District-County-Route:	04-SCL/SM-10
PM:	SCL 52.2/52.6
	SM 0.0/3.6
EA:	235610
Program Code:	HB4C

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Section 4 - Specialty Items					
Sound Walls / Foundation		SQFT		$0	
Retaining Walls	2,736	CY	$680	$1,860,480	
Minor Con-Curb/Gutter/Sidewalk	722	CY	$32	$22,736	
Barriers and Guardrails	1,411	LF	$105	$148,129	
Spalled PCC Joint Repair	1	LS	$150,000	$150,000	
Resident Engineer Office Space	66	Mo	$9,724	$641,787	
Erosion Control	1	LS	-	-	
Non Storm Water Discharge	1	LS	-	-	
Landscaping/Irrigation	1	LS	$2,488,957	$2,488,957	
Dewatering	1	LS	$63,000	$63,000	
Water Pollution Control Measures	1	LS	$0	-	
Remove Sound Wall		LF		$0	
Environmental Mitigation	1	LS	-	-	
Hazardous Waste	1	LS	$6,000,000	$6,000,000	
Construction Site BMPs	1	LS	$1,172,400	$1,172,400	
Design Pollution Prevention BMPs	1	LS	$385,500	$385,500	
Permanent Treatment BMPs	1	LS	$968,800	$968,800	
				Subtotal Specialty Items	$13,901,790
Section 5 - Traffic Items					
TOS	1	LS	$3,465,000	$3,465,000	
Lighting	1	LS	$1,050,000	$1,050,000	
Traffic Signal Modifications		EA			
Ramp Meters	LS	EA	$745,520	$745,520	
Overhead Sign Structures	1	LS	$3,045,000	$3,045,000	
Roadside Signs	1	LS	$105,000	$105,000	
Traffic Delineation Items	207,021	LF	$1.05	$217,372	
Traffic Control System	1	LS	$1,185,000	$1,185,000	
Transportation Management Plan	1	LS	$210,000	$210,000	
Temporary Railing (Type K)	45,572	LF	$8	$364,576	
COZEEP	340	DAY	$2,100	$714,000	
				Subtotal Traffic Items	$11,101,468
				TOTAL SECTIONS 1 thru 5	$40,994,000

District-County-Route:	04-SCL/SM-101
PM:	SCL 52.2/52.6
	SM 0.0/3.6
EA:	235610
Program Code:	HB4C

				Unit Cost	Section Cost
Section 6 - Minor Items					
Subtotal Sections 1 thru 5	$40,994,000	X	10%	$4,099,400	
				TOTAL MINOR ITEMS	$4,099,000
Section 7 - Roadway Mobilization					
Subtotal Sections 1 thru 5	$40,994,000				
Minor Items	$4,099,000				
Sum	$45,093,000	X	10%	$4,509,300	
				TOTAL ROADWAY MOBILIZATION	$4,509,000
Section 8 - Roadway Additions					
Supplemental Work					
Subtotal Sections 1 thru 5	$40,994,000				
Minor Items	$4,099,000				
Sum	$45,093,000	X	10%	$4,509,300	
Contingencies					
Subtotal Sections 1 thru 5	$40,994,000				
Minor Items	$4,099,000				
Sum	$45,093,000	X	15%	$6,763,950	
				TOTAL ROADWAY ADDITIONS	$11,273,000
				TOTAL ROADWAY ITEMS (Subtotal Sections 1 - 8)	$60,875,000
(Used escalation factor of 5% per year)				TOTAL ESCALATED ROADWAY ITEMS	$73,994,000

Estimate Prepared By:

1

District-County-Route: 04-SCL/SM-101
PM: SCL 52.2/52.6
SM 0.0/3.6
EA: 235610
Program Code: HB4C

II. STRUCTURE ITEMS	Structure	Structure (1)	Structure (2)	Structure
Bridge Name		Hetch Hetchy	Ringwood POC	
Bridge No.		35-0150M	35-0143	
Structure Type		Concrete	Concrete	
Width (FT) - out to out		22.00	13.00	
Lengths (FT)		129	170	
Total Area (SF)		2,840	2,210	
Footing Type (pile/spread)		Pile	Pile	
Cost per SF				
Including:				
Mobilization: 10% &				
Contingency: 25%		$136,769	$1,095,372	
Ramp Structure		0	?	
Remove Bridge		$0	$1,320,000	
Total Cost - 2006 Dollars		$488,458	$5,467,861	
Total Cost - 2007 Dollars		$513,000	$5,741,000	

	SUBTOTAL STRUCTURE ITEMS (2007 Dollars)	$6,254,000
	SUBTOTAL STRUCTURE ITEMS (2008 Dollars)	$6,567,000
Railroad Related Costs	$0	
	SUBTOTAL RAILROAD ITEMS	$0
	TOTAL STRUCTURES PLUS RAILROAD ITEMS	$6,567,000
	TOTAL ESCALATED STRUCTURES ITEMS	$7,982,000
	(Used escalation factor of 5% per year)	

1

District-County-Route:	04-SCL/SM-101
PM:	SCL 52.2/52.6
	SM 0.0/3.6
EA:	235610
Program Code:	HB4C

III. RIGHT OF WAY ITEMS

		Year 2008	
A. Acquisition, including excess lands and damages to remainder(s) and Goodwill			
B. Utility Relocation (State/Local share)		$50,000	
C. Relocation Assistance			
D. Clearance/Demolition			
E. Title and Escrow Fees			

TOTAL RIGHT OF WAY ITEMS	$50,000
TOTAL ESCALATED RIGHT OF WAY ITEMS (Escalated to mid-construction year of 11/12 FY)	$61,000
Anticipated Date of Right of Way Certification (Date to which Values are Escalated)	Nov-10

F. Construction Contract Work

Brief Description of Work:

ATTACHMENT E

RIGHT OF WAY DATA SHEET

TO: Skip Sowko

Date January 28, 2008

Dist 04-SM -101
E.A. 235610
Project Description : POC

Attention : Teblez Nemariam
District Branch Chief
Design South - Peninsula

This request for: Update
Log # 5433

From: ENID LAU
Right of Way Resource Manager

Subject: Current Estimated Right of Way Costs

We have completed an estimate of the right of way costs for the above referenced project based on maps we received from you on January 10, 2008 and the following assumptions and limiting conditions.

[ ] 1. The mapping did not provide sufficient detail to determine the limits of the right of way required.

[ ] 2. The transportation facilities have not been sufficiently designed so our estimator could determine the damages to any of the remainder parcels affected by the project.

[ ] 3. Additional right of way requirements are anticipated, but are not defined due to the preliminary nature of the early design requirements.

[ ] 4. This estimate does not include $_____right of way costs previously incurred on the project, which may affect the total project right of way costs for programming purposes.

[ ] 5. We have determined there are no right of way functional involvements in the proposed project at this time, as designed.

Right of Way Lead Time will require a minimum of 14 months after we begin receiving final right of way requirements (PYPSCAN node No. 224), necessary environmental clearance has been obtained, and freeway agreements have been approved. From the date of receipt of final right of way requirements (PYPSCAN node No. 265), we will require a minimum of 11 months prior to the date of certification of the project. Shorter lead times will require either more right of way resources or an increased number of condemnation suits to be filed. Either of these actions may reflect adversely on the District's other programs or our public image generally.

Right of Way Resource Manager

Attachments:

[ ] Right of Way Data Sheet – Page One (always required)
[x] Right of Way Data Sheet – All Pages (required when interest in real property is being acquired)
[x] Utility Information Sheet
[x] Railroad Information Sheet

RIGHT OF WAY DATA SHEET

TO: Design South Peninsula

Date 1/15/08 D.S. # 5433

Dist 04 Co SM/SCl Rte 101 PM 0.0/3.6 52.2/52.6

ATTN: TEBLEZ NEMARIAN
District Branch Chief

EA 04-235610

Project Description: Route 101 Auxiliary Lane Widening from Embarcadero Rd. to Marsh Rd.

SUBJECT: Right of Way Data – Alternate No.

1. Right of Way Cost Estimate:

		Current Value (Future Use)	Escalation Rate	Escalated Value
A.	Acquisition, including Excess Lands, Damages, and Goodwill.	$ 0.00	%	$ 0.00
	Project Permit Fees			$ 0.00
	Grantor's Appraisal Costs	$ 0.00	%	$ 0.00
B.	Loss of Goodwill	$ 0.00	%	$ 0.00
C.	Utility Relocation (State Share)	$ 50,000.00	%	$ 50,000.00
D.	Relocation Assistance	$ 0.00	%	$ 0.00
E.	Clearance/Demolition	$ 0.00	%	$ 0.00
F.	Title and Escrow Fees	$ 0.00	%	$ 0.00
G.	Current Value (Future Use)	$ 0.00	%	$ 0.00
H.	TOTAL ESCALATED VALUE			$ 50,000.00
I.	Construction Contract Work	$ 0.00		

2. Anticipated Date of Right of Way Certification

3. Parcel Data:

Type		Dual/Appr	Utilities		RR Involvements	
X			U4-1		None	X
A	2		-2		C&M Agrmt	
B			-3		Svc Contract	
C			-4		Lic/RE/Clauses	
D			U5-7	3		
E	XXXX		-8		Misc R/W Work	
F	XXXX		-9		RAP Displ	0
					Clear Demo	0
Total	2				Const. Permits	0
					Condemnation	0

Areas: Right of Way _____ No. Excess Parcels _____ Excess _____

Enter PMCS Screens 1 / 28 / 08 by [illegible] updated to reflect LCT

Enter AGRE Screen (Railroad data only) ___ / ___ / ___ by _____

4. Are there any major items of construction contract work?
Yes ☐ No ☒ (If yes, explain)

5. Provide a general description of the right of way and excess lands required (zoning, use, major improvements, critical or sensitive parcels, etc.). No right of way required ☐

Two section 83 parcels are required for this project. One at each, the east and the west, touchdown of the Pedestrian Overcrossing at Ringwood.

6. Is there an effect on assessed valuation?
Yes ☐ Not Significant ☐ No ☒ (If yes, explain)

7. Are utility facilities or rights of way affected? Yes ☒ No ☐
(If yes, attach Utility Information Sheet Exhibit 01-01-05)

8. Are railroad facilities or rights of way affected? Yes ☐ No ☒
(If yes, attach Railroad Information Sheet Exhibit 01-01-06)

9. Were any previously unidentified sites with hazardous waste and/or material found?
Yes ☐ None evident ☒ (If yes, attach memorandum per Procedural Handbook Volume 1, Section 101.011)

10. Are RAP displacements required? Yes ☐ No ☒
(If yes, provide the following information)

No. of single family _____ No. of business/non profit _____

No. of multi-family _____ No. of farms _____

Based on Draft/Final Relocation Impact Statement/Study dated _____, it is anticipated that sufficient replacement housing (will/will not) be available without Last Resort Housing.

11. Are there material borrow and/or disposal sites required? Yes ☐ No ☒
(If yes, explain)

12. Are there potential relinquishments and/or abandonments? Yes ☐ No ☒
(If yes, explain)

13. Are there any existing and/or potential Airspace sites? Yes ☐ No ☒
(If yes, explain)

14. Indicate the anticipated Right of Way schedule and lead time requirements. (Discuss if District proposes less that PMCS lead time and/or if significant pressures for project advancement are anticipated.)

PYPSCAN lead time (from Regular R/W to project certification) 14 months

15. Is it anticipated that all Right of Way work be performed by CALTRANS staff?
Yes ☒ No ☐ (If no, discuss)

Assumptions and Limiting Conditions

- This data sheet was completed without a hazardous waste/materials report.
- Information on this data sheet was based on maps provided by Teblez Nemarian on November 21, 2007 and the memo dated January 10, 2008.

Evaluation Prepared By: Renata Frey

Right of Way:	Name	Renata Frey	Date	1/16/08
Railroad:	Name		Date	1-16-08
Utilities:	Name		Date	1.16.08

Recommended for Approval:

Right of Way Capital Cost Coordinator

I have personally reviewed this Right of Way Data Sheet and all supporting information. It is my opinion that the probable Highest and Best Use, estimated values, escalation rates, and assumptions are reasonable and proper subject to the limiting conditions set forth, and find this Data Sheet complete and current.

Chief, R/W Appraisal Services

1.23.08

Date

cc: Program Manager
Project Manager

UTILITY INFORMATION SHEET

1. Utility Owners located within project limits:

   PG&E – Gas and Electric
   SBC

2. Facilities potentially impacted by project (if known, include Owner(s) and facility type(s)):

3. Anticipated Workload:
   - X Utility Verification required
   - ____ Positive Identification
   - ____ Utility Relocation
   - ____ Other (Specify)

4. Additional information concerning anticipated utility involvements (include limiting conditions and a narrative addressing likelihood that conflicts will occur);

   ____ Involves possible relocation of electric transmission facilities
   (If X'd, Data sheet should be forwarded to environmental)

5. PMCS input information

U4-1	____	Owner Expense Involvements	U5-7	3	Verifications-without involvements
U4-2	____	State Expense Involvements *(Conventional, No Fed Aid)*	U5-8	____	Verifications-50% involvements
U4-3	____	State Expense Involvements *(Freeway, No Fed Aid)*	U5-9	____	Verifications resulting in involvements
U4-4	____	State Expense Involvements *(Conventional or Freeway, No Fed Aid)*			

NOTE: The sum of the U-4's must equal the sum of ½ of the U5-8's and all of the U5-9's.

ESTIMATED STATE SHARE OF COSTS $50,000.00

Prepared by: Nick Psiol

Right of Way Utility Coordinator

1-16-08
Date

ATTACHMENT F

Negative Declaration/FONSI Approvals

SCH# 2008052113
04-SM-101-PM 0.0/3.6
04-SCL-101-PM 52.3/52.6
235610

Addition of auxiliary lanes in each direction on US Route 101, from the Embarcadero Road interchange in the City of Palo Alto, County of Santa Clara, KP 84.2 (PM 52.3) to the Marsh Road interchange in the City of Menlo Park, County of San Mateo, KP 5.8 (PM 3.6).

INITIAL STUDY with Proposed Negative Declaration/ ENVIRONMENTAL ASSESSMENT

Submitted Pursuant to: (State) Division 13, California Public Resources Code
(Federal) 42 USC 4332(2)(C)

US DEPARTMENT OF TRANSPORTATION
Federal Highway Administration, and

THE STATE OF CALIFORNIA
Department of Transportation

2/29/08
Date of Approval

Melanie Brent
MELANIE BRENT, Chief
Office of Environmental Analysis
California Department of Transportation

3/27/08
Date of Approval

Nancy E. Bobb
for GENE FONG
Division Administrator
Federal Highway Administration

10-03-08A10:03 RCVD

FEDERAL HIGHWAY ADMINISTRATION
FINDING OF NO SIGNIFICANT IMPACT
FOR
Route 101 Auxiliary Lanes Project
San Mateo and Santa Clara Counties, California

The project would widen Route 101 to provide auxiliary lanes in both directions between the Embarcadero road Interchange in the City of Palo Alto, Santa Clara County, to the Marsh Road Interchange in the City of Menlo Park, San Mateo County.

The Federal Highway Administration (FHWA) has determined that this project will not have any significant impact on the human environment. This finding of no significant impact is based on the attached Environmental Assessment, which has been independently evaluated by the FHWA and determined to adequately and accurately discuss the environmental issues and impacts of the proposed project. It provides sufficient evidence and analysis for determining that an environmental impact statement is not required. The FHWA takes full responsibility for the accuracy, scope, and content of the environmental assessment.

10/1/2008
DATE

Karen A Bobo
For
Gene K. Fong
Division Administrator
Federal Highway Administration

NEGATIVE DECLARATION

Pursuant to: Division 13, Public Resources Code

Project Description

The California Department of Transportation (the Department) proposes to provide auxiliary lanes in both directions by widening Route 101 between the Embarcadero Road interchange in the City of Palo Alto, Santa Clara County, to the Marsh Road interchange in the City of Menlo Park, San Mateo County. In general, Route 101 would be widened on the outside to accommodate the addition of auxiliary lanes. The proposed project includes reconstruction of the Ringwood Avenue pedestrian overcrossing, extending the support foundation over the Hetch Hetchy aqueduct, widening of on- ramps to provide High Occupancy Vehicle (HOV) lanes, and installing and modifying existing ramp metering at on-ramps.

Determination

The Department has prepared an Initial Study for this project, and following public review, has determined from this study that the proposed project would not have a significant effect on the environment for the following reasons:

The proposed project would have no effect on air quality, land use, growth, housing, noise, public services, utilities and service systems, geological, agricultural or recreational resources.

In addition, the proposed project would have no significant effect on biological, cultural, hydrological, or visual resources.

Jennifer Pancaugelo for 9/16/08

JAMES B. RICHARDS — Date
Deputy District Director
District 4 Division of Environmental Planning and Engineering
California Department of Transportation

SUMMARY

The project proposes to provide auxiliary lanes in both directions by widening Route 101 between the Embarcadero Road interchange in the City of Palo Alto, Santa Clara County, to the Marsh Road interchange in the City of Menlo Park, San Mateo County. The proposed project includes reconstruction of the Ringwood Avenue pedestrian overcrossing, extending the support foundation over the Hetch Hetchy aqueduct, widening of on-ramps to provide High Occupancy Vehicle (HOV) lanes, and installing and modifying existing ramp metering at on-ramps.

This Negative Declaration/Finding of No Significant Impact represents the final environmental document. The Initial Study/Environmental Assessment (IS/EA) was approved in February 2008 and circulated for public review from May 12, 2008 to June 12, 2008. Changes to the previously circulated IS/EA reflect comments submitted during the public review period, project scope changes and editorial revisions to improve overall readability. Vertical lines in the right margin denote the major changes.

No significant impacts are anticipated for this project. Reconstruction of the Henderson Railroad overcrossing structure and relocation of the Henderson Railroad Storm Water Pump Plant, discussed in the previously circulated IS/EA, are no longer included in this project. Reconstruction of the Route 101 San Francisquito Creek Bridge is not part of this auxiliary lanes project and is proposed as a separate project.

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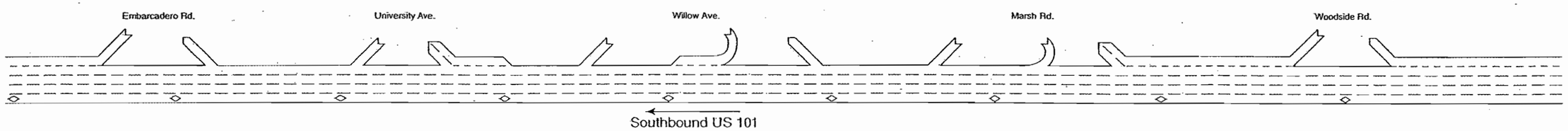
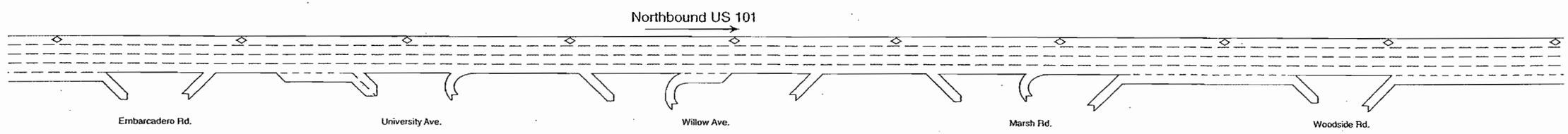
ATTACHMENT G

TRAFFIC ANALYSIS FLOW CHARTS

US 101 Auxiliary Lane Project

	Embarcadero Rd.					University Ave.					Willow Ave.							Marsh Rd.						Woodside Rd.			
		ON		OFF		ON		OFF			ON			Lp. ON		OFF		ON		Lp. ON		OFF		ON		OFF	
DISTANCE (miles)	1.48		0.53		0.85		0.37		0.10	0.58		0.07	0.08		0.09		1.50		0.16		0.08		1.40		0.52		0.90
NO. OF LANES	4 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	2	4 + 1 HOV	3 + 1 HOV	1	3 + 1 HOV	4 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	2	4 + 1 HOV	1	3 + 1 HOV	1	4 + 1 HOV
DEMAND (vph)	7612	1072	6540	1823	8363	1381	6982	643	7625	7625	816	6809	6809	739	6070	504	6574	547	6027	137	5890	2517	8407	1731	6676	1338	8014
CAPACITY (vph)	7530	1500	6600	1500	6300	1500	6600	3000	7230	6600	1500	6600	7440	1500	6600	1500	6600	1500	6600	1500	6600	2200	8510	1950	6600	1500	8100
FLOW RATE (vph)	5996	1072	4924	1353	6300	1050	5250	557	5807	5807	816	4991	4991	739	4252	500	4752	547	4205	137	4068	1971	6563	1731	4832	1305	6170
AVERAGE SPEED (mph)	63		64		52		17		19	25		16	13		12		17		16		15		26		29		43
BOTTLENECK LOCATION																											
MAX. QUEUE LENGTH																											
			Demand (SOV & HOV) exceeds capacity of off-ramp			Queuing on on-ramp															Demand (SOV & HOV) exceeds capacity of off-ramp				Demand (SOV & HOV) exceeds capacity of off-ramp		Queue extends upstream an additional 1.63 miles





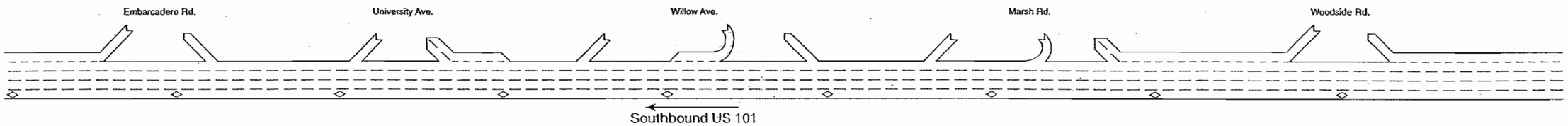
	Embarcadero Rd.					University Ave.					Willow Ave.							Marsh Rd.						Woodside Rd.			
		OFF		ON		OFF		ON			OFF		Lp. ON			ON		OFF		Lp. ON		ON		OFF		ON	
DISTANCE (miles)	1.34		0.61		0.64	0.31		0.40		0.62		0.08		0.08	0.07		1.45		0.13		0.15		1.43				
NO. OF LANES	4 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	4 + 1 HOV	2	3 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	1	4 + 1 HOV	3 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	1	4 + 1 HOV				
DEMAND (vph)	6970	1288	5682	570	6252	6252	884	5368	1137	6505	1067	5438	283	5721	5721	248	5969	987	4982	475	5457	1583	7040				
CAPACITY (vph)	7800	1500	6600	1550	6600	7650	3000	6600	1500	6600	1500	6600	1500	6930	6600	1500	6600	1500	6600	1500	6600	1750	8420				
FLOW RATE (vph)	6970	1245	5682	570	6252	6252	884	5368	1137	6505	1067	5438	283	5721	5721	248	5969	987	4982	475	5457	1583	7040				
AVERAGE SPEED (mph)	60		61		56	63		63		53		62		65	61		59		64		62		62				
BOTTLENECK LOCATION																											
MAX. QUEUE LENGTH																											
		Demand (SOV & HOV) exceeds capacity of off-ramp																									

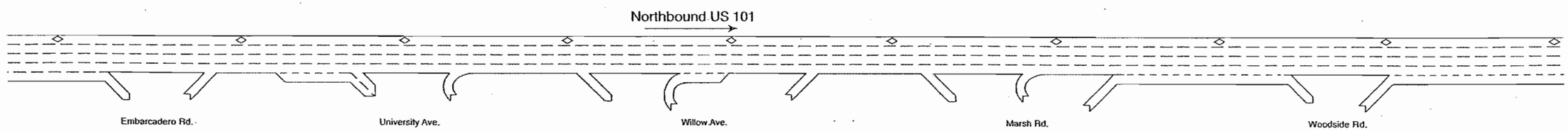
Figure A-5

Year 2035
No-Build Alternative
A.M. Peak Hour
Mixed-Flow Lane Analysis

US 101 Auxiliary Lane Project

		Embarcadero Rd.					University Ave.					Willow Ave.						Marsh Rd.						Woodside Rd.			
		ON		OFF		ON		OFF			ON			Lp. ON		OFF		ON		Lp. ON		OFF		ON		OFF	
DISTANCE (miles)	1.48		0.53		0.85		0.37		0.10	0.58		0.07	0.08		0.09		1.50		0.16		0.08		1.40		0.52		0.90
NO. OF LANES	4 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	2	4 + 1 HOV	3 + 1 HOV	1	3 + 1 HOV	4 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	2	4 + 1 HOV	1	3 + 1 HOV	1	4 + 1 HOV
DEMAND (vph)	7479	1390	6089	1332	7421	1097	6324	1353	7677	7677	485	7192	7192	561	6631	845	7476	703	6773	363	6410	2413	8823	1536	7287	1626	8913
CAPACITY (vph)	7940	1500	6600	1500	6300	1500	6600	3000	7970	6600	1500	6600	7240	1500	6600	1500	6600	1500	6600	1500	6600	2200	8330	1950	6600	1500	8100
FLOW RATE (vph)	6555	1390	5165	1135	6300	1050	5250	1167	6417	6417	485	5932	5932	561	5371	748	6119	703	5416	363	5053	1925	7281	1536	5745	1275	7223
AVERAGE SPEED (mph)	62		64		52		20		28	44		29	25		25		38		27		25		36		43		51
BOTTLENECK LOCATION																											This Bottleneck constrains the flow entering the study area
MAX. QUEUE LENGTH						Queuing on on-ramp															Demand (SOV & HOV) exceeds capacity of off-ramp					Demand (SOV & HOV) exceeds capacity of off-ramp	Queue extends 0.80 miles into this section	





		Embarcadero Rd.					University Ave.					Willow Ave.						Marsh Rd.						Woodside Rd.			
		OFF		ON			OFF		ON		OFF		Lp. ON			ON		OFF		Lp. ON		ON		OFF		ON	
DISTANCE (miles)	1.34		0.61		0.64	0.31		0.40		0.62		0.08		0.08	0.07		1.45		0.13		0.15		1.43				
NO. OF LANES	4 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	4 + 1 HOV	2	3 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	1	4 + 1 HOV	3 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	1	4 + 1 HOV				
DEMAND (vph)	8171	965	7206	1427	8633	8633	1486	7147	1384	8531	1174	7357	372	7729	7729	383	8112	808	7304	490	7794	946	8740				
CAPACITY (vph)	7350	1500	6600	1550	6600	7970	3000	6600	1500	6600	1500	6600	1500	7040	6600	1500	6600	1500	6600	1500	6600	1750	7700				
FLOW RATE (vph)	6368	868	5500	1100	6600	6476	1136	5940	1260	6600	912	5688	372	6060	6060	383	6443	644	5799	490	6289	946	7235				
AVERAGE SPEED (mph)	25		20		52	53		23		52		61		61	58		54		60		56		57				
BOTTLENECK LOCATION																											
MAX. QUEUE LENGTH		Queue extends upstream an additional 4.40 miles		Queuing on on-ramp		Queue extends 0.14 miles into this section			Queuing on on-ramp																		

Figure A-6

Year 2035
No-Build Alternative
P.M. Peak Hour
Mixed-Flow Lane Analysis

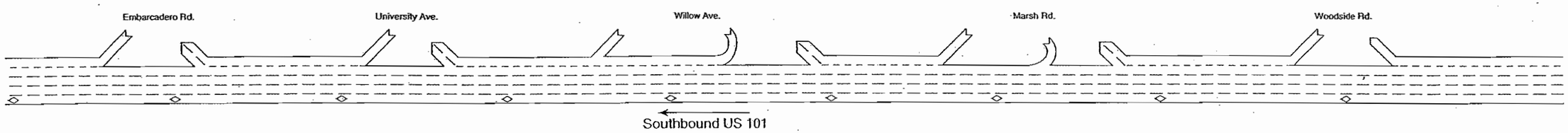
US 101 Auxiliary Lane Project

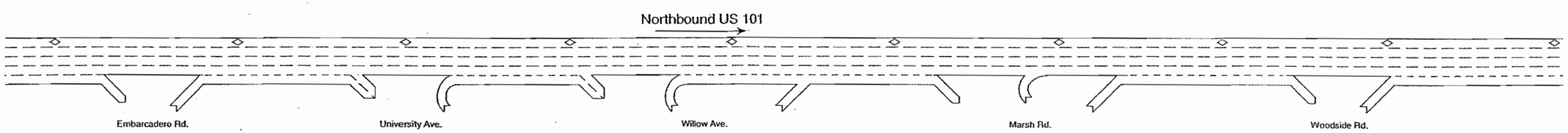
	Embarcadero Rd.					University Ave.				Willow Ave.						Marsh Rd.						Woodside Rd.			
		ON		OFF		ON		OFF		ON		Lp. ON		OFF		ON		Lp. ON		OFF		ON		OFF	
DISTANCE (miles)	1.48		0.53		0.85		0.37		0.68		0.15		0.09		1.50		0.16		0.08		1.40		0.52		0.90
NO. OF LANES	4 + 1 HOV	1	3 + 1 HOV	2	4 + 1 HOV	1	3 + 1 HOV	2	4 + 1 HOV	1	4 + 1 HOV	1	3 + 1 HOV	2	4 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	2	4 + 1 HOV	1	3 + 1 HOV	1	4 + 1 HOV
DEMAND (vph)	7613	1161	6452	2409	8861	1399	7462	704	8166	777	7389	943	6446	518	6964	599	6365	179	6186	2214	8400	1756	6644	1308	7952
CAPACITY (vph)	7630	1500	6600	3000	7800	1500	6600	3000	7320	1500	7670	1500	6600	3000	7180	1500	6600	1500	6600	2200	8540	1950	6600	1500	8100
FLOW RATE (vph)	6834	1161	5673	2127	7800	1399	6401	632	7033	777	6256	943	5313	516	5829	599	5230	179	5051	1972	7254	1756	5498	1305	6806
AVERAGE SPEED (mph)	59		61		52		32		33		19		19		22		25		24		33		38		51
BOTTLENECK LOCATION																									
MAX. QUEUE LENGTH																									

Demand (SOV & HOV) exceeds capacity of off-ramp

Demand (SOV & HOV) exceeds capacity of off-ramp

Queue extends upstream an additional 0.39 miles





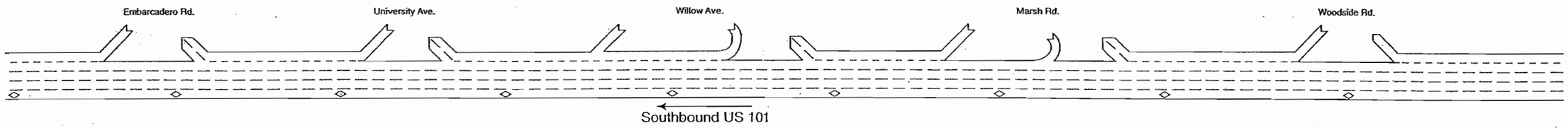
	Embarcadero Rd.					University Ave.				Willow Ave.						Marsh Rd.						Woodside Rd.			
		OFF		ON		OFF		ON		OFF		Lp. ON		ON		OFF		Lp. ON		ON		OFF		ON	
DISTANCE (miles)	1.34		0.61		0.95		0.40		0.62		0.08		0.15		1.45		0.13		0.15		1.43				
NO. OF LANES	4 + 1 HOV	1	3 + 1 HOV	1	4 + 1 HOV	2	3 + 1 HOV	1	4 + 1 HOV	2	3 + 1 HOV	1	4 + 1 HOV	1	4 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	1	4 + 1 HOV				
DEMAND (vph)	6958	1173	5785	800	6585	1040	5545	1189	6734	1171	5563	312	5875	288	6163	1047	5116	408	5524	1468	6992				
CAPACITY (vph)	7710	1500	6600	1950	7510	3000	6600	1500	7940	3000	6600	1500	6960	1500	7840	1500	6600	1500	6600	1750	8290				
FLOW RATE (vph)	6958	1173	5785	800	6585	1040	5545	1189	6734	1171	5563	312	5875	288	6163	1047	5116	408	5524	1468	6992				
AVERAGE SPEED (mph)	59		60		60		62		62		62		62		63		64		62		62				
BOTTLENECK LOCATION																									
MAX. QUEUE LENGTH																									

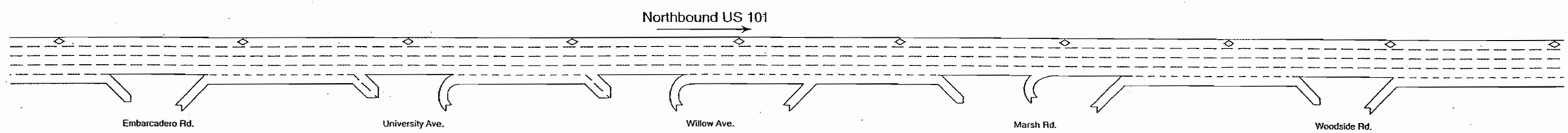
Figure A-7

Year 2035
Build Alternative
A.M. Peak Hour
Mixed-Flow Lane Analysis

US 101 Auxiliary Lane Project

	Embarcadero Rd.					University Ave.				Willow Ave.						Marsh Rd.						Woodside Rd.			
		ON		OFF		ON		OFF		ON		Lp. ON		OFF		ON		Lp. ON		OFF		ON		OFF	
DISTANCE (miles)	1.48		0.53		0.85		0.37		0.68		0.15		0.09		1.50		0.16		0.08		1.40		0.52		0.90
NO. OF LANES	4 + 1 HOV	1	3 + 1 HOV	2	4 + 1 HOV	1	3 + 1 HOV	2	4 + 1 HOV	1	4 + 1 HOV	1	3 + 1 HOV	2	4 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	2	4 + 1 HOV	1	3 + 1 HOV	1	4 + 1 HOV
DEMAND (vph)	7478	1334	6144	1342	7486	1115	6371	1443	7814	505	7309	572	6737	883	7620	753	6867	390	6477	2387	8864	1567	7297	1612	8909
CAPACITY (vph)	7870	1500	6600	3000	7570	1500	6600	3000	8180	1500	7250	1500	6600	3000	7470	1500	6600	1500	6600	2200	8369	1950	6600	1500	8100
FLOW RATE (vph)	7171	1334	5837	1277	7114	1115	5999	1360	7359	505	6854	572	6282	825	7107	753	6354	390	5964	1926	8167	1567	6600	1275	8065
AVERAGE SPEED (mph)	59		60		57		59		59		56		56		56		55		59		54		52		51
BOTTLENECK LOCATION																									This bottleneck constrains the flow entering the study area.
MAX. QUEUE LENGTH																			Demand (SOV & HOV) exceeds capacity of off-ramp				Demand (SOV & HOV) exceeds capacity of off-ramp	Queue extends 0.44 miles into this section	





	Embarcadero Rd.					University Ave.				Willow Ave.						Marsh Rd.						Woodside Rd.			
		OFF		ON		OFF		ON		OFF		Lp. ON		ON		OFF		Lp. ON		ON		OFF		ON	
DISTANCE (miles)	1.34		0.61		0.95		0.40		0.62		0.08		0.18		1.45		0.13		0.15		1.43				
NO. OF LANES	4 + 1 HOV	1	3 + 1 HOV	1	4 + 1 HOV	2	3 + 1 HOV	1	4 + 1 HOV	2	3 + 1 HOV	1	4 + 1 HOV	1	4 + 1 HOV	1	3 + 1 HOV	1	3 + 1 HOV	1	4 + 1 HOV				
DEMAND (vph)	8235	848	7387	1700	9087	1569	7518	1399	8917	1296	7621	377	7998	437	8435	922	7513	444	7957	778	8735				
CAPACITY (vph)	7210	1500	6600	1950	8260	3000	6600	1500	7910	3000	6600	1500	7040	1500	7570	1500	6600	1500	6600	1750	7510				
FLOW RATE (vph)	6370	743	5627	1700	7327	1415	5912	1399	7311	1156	6155	377	6532	437	6969	813	6156	444	6600	778	7378				
AVERAGE SPEED (mph)	45		36		34		33		34		36		35		30		27		52		54				
BOTTLENECK LOCATION																									
MAX. QUEUE LENGTH																									

Queue extends upstream an addition 3.12 miles

Figure A-8

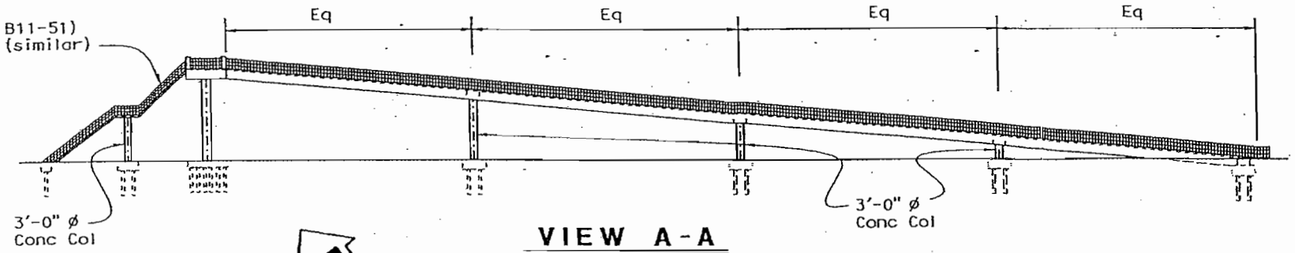
Year 2035
Build Alternative
P.M. Peak Hour
Mixed-Flow Lane Analysis

ATTACHMENT H

STRUCTURE ADVANCE PLANNING STUDIES

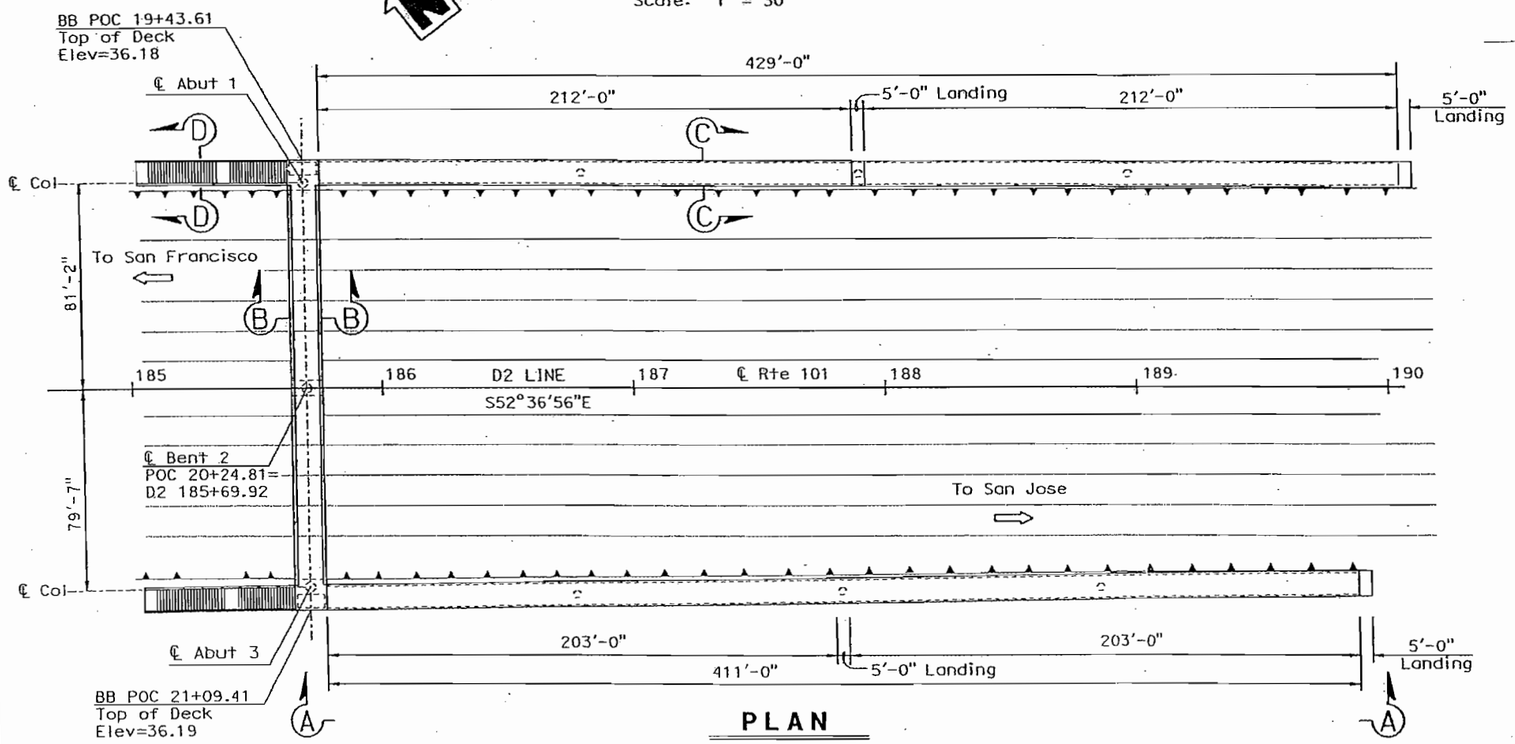
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - DIVISION OF STRUCTURES

DIST	COUNTY	ROUTE	POST MILE
04	SM	101	



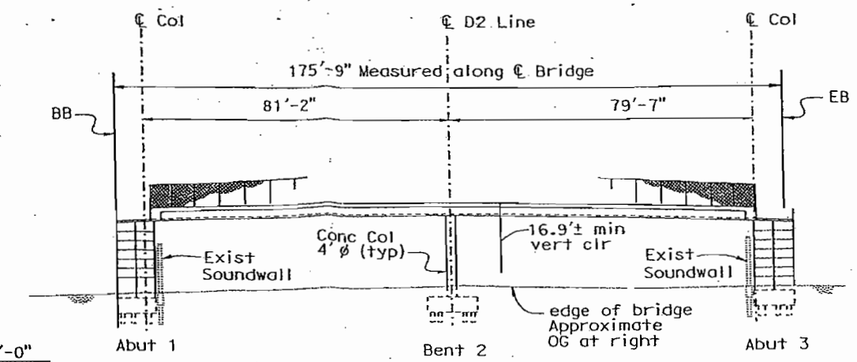
VIEW A-A

Scale: 1" = 30'



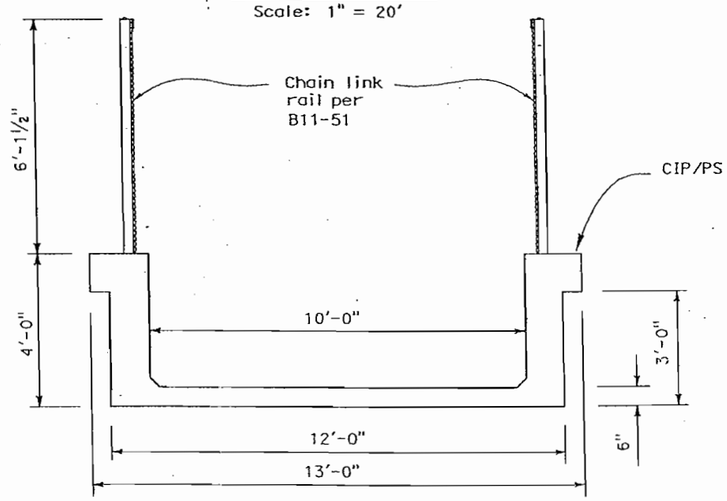
PLAN

Scale: 1" = 30'



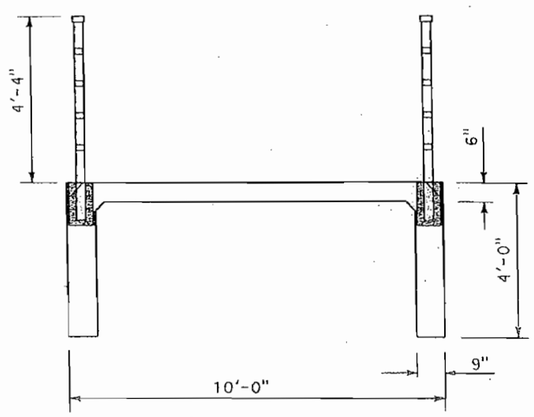
ELEVATION

Scale: 1" = 20'



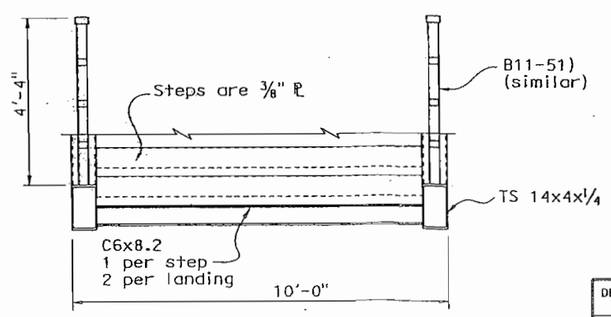
SECTION B-B

Scale: ½" = 1'



SECTION C-C

Scale: ½" = 1'



SECTION D-D

Scale: ½" = 1'

Remove Concrete	2,200 CY
Structure Excavation (Bridge)	162 CY
Structure Backfill (Bridge)	47 CY
Perviious Backfill Material	20 CY
CIDH Concrete Piling (Class 90)	3,120 LF
Structural Concrete (Bridge)	1,920 CY
Structural Concrete (Bridge Footing)	51 CY
Prestressing Steel	44,600 LB
Bar Reinforcing Steel (Bridge)	350,000 LB
Furnish Structural Steel (Stairs)	32,000 LB
Erect Structural Steel (Gal)	32,000 LB
Tubular Railing (Gal)	1,900 LF
Chain-Link Fence	306 LF

Date of Estimate		09/13/06
Structure depth	=	4'
Length	=	170'-0"
Width	=	13'-0"
Area	=	2,210 SF
Cost/M² including 10% Mobilization & 25% Contingency	=	1,095,372
Bridge Removal	=	1,320,000
Total Cost	=	5,467,861

DESIGNED BY	M. Omran	DATE	10-3-06
DRAWN BY	L. Ma	DATE	10-3-06
CHECKED BY	G. Jao	DATE	10-3-06
APPROVED		DATE	

STRUCTURE DESIGN SECTION 16

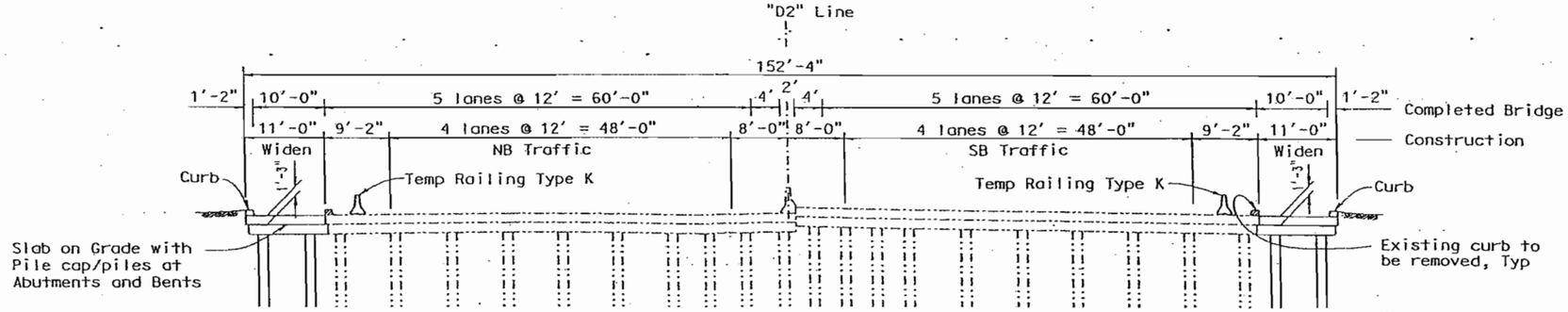
PLANNING STUDY

RINGWOOD AVE. PEDESTRIAN CROSSING REPLACEMENT

BRIDGE NO. 35-0143	CU
SCALE: As shown	EA 235610

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - DIVISION OF STRUCTURES

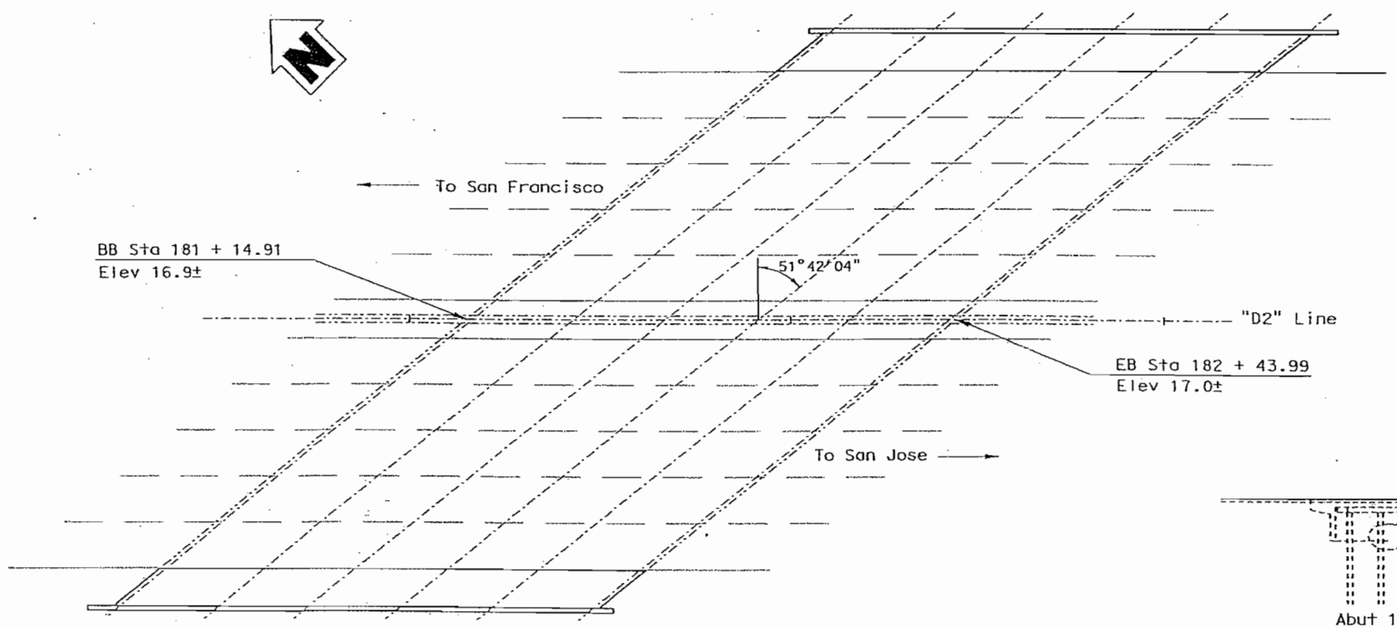
DIST.	COUNTY	ROUTE	POST MILE
04	SM	101	0.0



TYPICAL SECTION

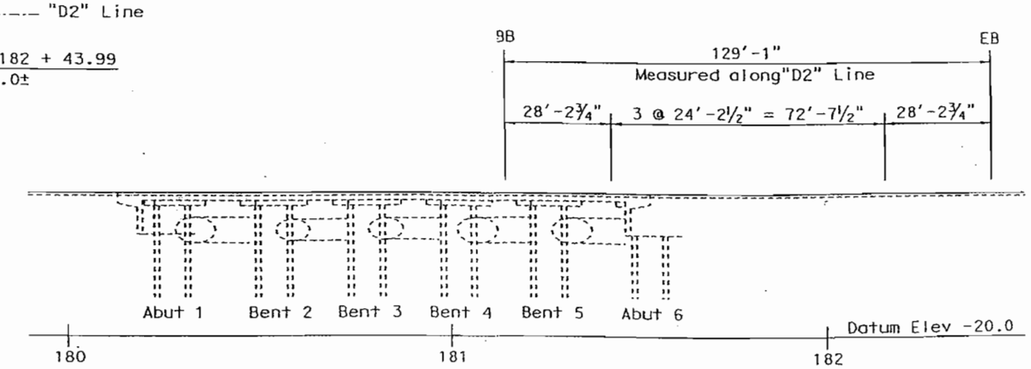
1" = 10'

DATE OF ESTIMATE		09-13-2006
BRIDGE REMOVAL	=	
STRUCTURE DEPTH	=	1'-3"
LENGTH	=	129'-1"
WIDTH	=	22'-0"
AREA	=	2,840 SF
COST/ □FT INCLUDING 10% MOBILIZATION & 25% CONTINGENCY	=	136,769
TOTAL COST	=	488,458



PLAN

1" = 20'



ELEVATION

1" = 20'

Notes:
1. All dimensions are in English unit unless noted otherwise.
2. Traffic control cost by District.

DESIGNED BY	R. M. Quitoriano	DATE	8-1-06
DRAWN BY	R. M. Quitoriano	DATE	8-1-06
CHECKED BY	H. A. Le	DATE	8-3-06
APPROVED		DATE	

STRUCTURE DESIGN SECTION 16

PLANNING STUDY

HETCH HETCHY AQUEDUCT (WIDEN)

BRIDGE NO. 35-0150M	CU 04
SCALE: AS SHOWN	EA 235610

ATTACHMENT I

MATERIALS RECOMMENDATIONS

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: TEBLEZ NEMARIAN
District Branch Chief
Office Design South-Peninsula

Date: July 2, 2008

File: 04-SM/SCL-101
PM 0.0/3.6 & 52.3/52.6
04-235610

Attention: Aijun Ding

From: RICK D'ONOFRIO, P.E.
Materials Design Engineer
Engineering Services I – Materials

REGISTERED PROFESSIONAL ENGINEER
RICHARD M. D'ONOFRIO
C 66054
EXP. 7/30/2010
CIVIL
STATE OF CALIFORNIA

Concurred by: RICHARD CHAN, P.E.
District Materials Engineer
District Branch Chief, Mat C

Subject: Pavement Selection Review Committee Comments

This memo addresses the following committee requests made at the April 2008 PRC meeting:

1. The entire 101 freeway in both directions within the project limits will now need to be overlaid with either Rubberized Hot Mix Asphalt-Gap Graded (RHMA-G) or Open Graded Friction Course (OGFC). This was felt necessary in the NB direction because of likely pavement damage caused by grinding out traffic striping and markers of the OGFC surface during staging construction; and in the SB lanes because the new lane striping, due to adding an auxiliary lane, may put the PCC longitudinal joints too close to the wheel path, possibly causing premature slab failure.
2. Design was requested to physically measure the SB median freeboard height and report results to the Materials group to help in their pavement thickness recommendation.

Recommendations

Southbound Lanes

The field observations from your group indicated that the majority of the SB roadway median between Marsh and Willow roads had freeboards in the 2-3" range and two areas (500' and 200' in length) had no freeboard at all. Additionally, the remainder of the SB median to the end of the project had 3" or more.

Generally, 0.35' (including Geosynthetic pavement interlayer (GPI)) of HMA is recommended for paving over PCC. However, given the fact that we are recommending RAC-G and the main concern is to reduce reflective cracking (rather than a structural concern), the thickness can be halved. The step faulting problem for the existing PCC slabs have been eliminated by profile grinding from the recently completed Contract (#04-OC9504-SM-101, PM 0.0/6.7). Therefore, for the SB direction, we recommend overlaying the existing PCC slabs as well as the HMA HOV

lane and median/outside shoulders with **0.15' RHMA-G.** In order to not reduce the existing bridge height clearance, we suggest not paving under the structure.

In the freeboard areas of the median that are less than the recommended 0.15' overlay, we recommend conforming from the edge of traveled way to the median.

Northbound Lanes
The existing pavement will, according to the current schedule, be over 5 years-old at time of construction. Also, the freeboard heights here also seem to be less than less 3" in many places as well. We therefore recommend to remove and replace with **0.10' RHMA-G**. The OGFC portion (PM 52.3/52.6) should be **removed and replaced with 0.10' OGFC**.

A ½" maximum grading is recommended for the RHMA-G and OGFC mixes, and a ¾" max grading is recommended for the HMA(A) mix. For RHMA-G use PG 64-16, for HMA(A) use PG 64-10 and for OGFC use PG 58-34 PM asphalt binder.

Dig-outs should performed after any OGFC (NB, PM 52.3/52.6) has been removed. The dig-outs, in all cases, should extend to the bottom of the AC layer or to a depth of 6", whichever is less. HMA should be placed (including PCC slabs) within areas of dig-outs to the existing grade. In those exposed areas, any existing transverse or longitudinal cracks wider than ¼" should be properly cleaned and sealed with emulsified crack sealant. The amount of crack sealant should be no more than required to fill the cracks. Any excess should be squeegeed off.

Please contact Rick D'Onofrio at 622-1776 if you have any questions.

c: Route File, Daily File
R. D'Onofrio/

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: TEBLEZ NEMARIAN
District Branch Chief
Office Design South-Peninsula

Date: February 6, 2008

File: 04-SM/SCL-101
PM 0.0/3.6 & 52.3/52.6
04-235610

Attention: Aijun Ding

From: RICK D'ONOFRIO, P.E.
Materials Design Engineer
Engineering Services I – Materials C

Concurred by: RICHARD CHAN, P.E.
District Materials Engineer
District Branch Chief, Mat C

REGISTERED PROFESSIONAL ENGINEER
RICHARD M. D'ONOFRIO
C 66054
EXP. 6-30-08
CIVIL
STATE OF CALIFORNIA

Subject: PR Review

This revises our January 25th memo based on further TI information we received from the Modeling and Traffic Forecasting group. Please note the upgraded TI value of 14 may be reduced later based on Headquarters review. The two structural sections have been modified using the lager 40-yr TI of 14 as follows:

Design Factors: $TI_{40} = 14$ R-Value = 15 Required G.E. = 3.81'

Alternative I	Thickness	G.E.
	0.10' OGFC*	N/A
	0.15' RHMA-G	0.25'
	0.55' HMA(A)	0.88'
	0.80' CTB(A)	1.34'
	1.40' AS(4)	1.38'
	3.00'	3.85'

Alternative II	Thickness	G.E.
	0.10' OGFC*	N/A
	0.15' RHMA-G	0.25'
	0.90' HMA(A)	1.71'
	1.00' ACB	1.87'
	2.15'	3.83'

* Note: For NB direction only, between PM 52.3/52.6 in Santa Clara County.

Please contact Rick D'Onofrio at 622-1776 if you have any questions.
c: Route File, Daily File
R. D'Onofrio/

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

DAILY FILE

Flex your power!
Be energy efficient!

To: TEBLEZ NEMARIAN
District Branch Chief
Office Design South-Peninsula

Date: July 17, 2007

File: 04-SM/SCL-101
PM 0.0/3.6 & 52.3/52.6
04-235610

Attention: Anand Garg

From: RICK D'ONOFRIO, P.E.
Materials Design Engineer
Engineering Services I – Materials C

Concurred by: RICHARD CHAN, P.E.
District Materials Engineer
District Branch Chief, Mat C

REGISTERED PROFESSIONAL ENGINEER
RICHARD M. D'ONOFRIO
C 66054
EXP. 6/30/08
CIVIL
STATE OF CALIFORNIA

Subject: PSR/PR Review

This memo is in response to your PSR/PR package to, among other things, widen ramps and Route 101 from the Embarcadero Road Interchange to the Marsh Road Interchange in order to accommodate additional auxiliary lanes in both directions. This PSR presents two alternatives. Alternative #1 would require some narrowing of the left (median) shoulder in order to fit the new auxiliary lane within the existing sound walls. Alternative #2 proposes a standard left (median) shoulder of 10' and the subsequent relocation of some existing sound walls.

EXISTING CONDITIONS

Route 101 is a 4-lane freeway (each direction) with predominantly AC paving with approximately 3.8 miles of either 3 or 4 lane PCC. A site trip was conducted in 2006 as well as several in June and July of 2007. Contract #04-0C8904 (PM 40.2/52.6) shows that for the SCL portion (PM 52.3/52.6) of this proposed project, the AC surfaces in both the Northbound and Southbound lanes have recently been overlaid with 0.10' OGAC/0.10' RAC-G in the NB direction and remove/replace 0.15' RAC-G in the SB HOV lane only. The existing structural sections are defined further below.

Regarding the SM portion, Contract # 04-0C9504 is currently in construction and has either ground the existing PCC slabs or cold-planed and paved the existing OGAC ramps and mainline with 0.15' RAC-G. The existing structural sections, including the new RAC-G surfacing, is summarized below:

TABLE 1

EXISTING STRUCTURAL SECTIONS: SM-101 (PM 0.0/3.6)			
NORTHBOUND		SOUTHBOUND	
PM	Pavement Type	PM	Pavement Type
0.0-2.8	45 mm RAC-G/ 147 mm AC/204 mm PCC/100 mm CTS	0.0-3.4	204 mm PCC/100 mm CTS/150 mm ISM
2.8-3.2	229-279 mm PCC 100 mm CTS/150 mm ISM	3.4-5.0	45 mm RAC-G/76 mm AC/204 mm PCC/101 mm CTS
3.2-5.0	45 mm RAC-G/107 mm AC/204 mm PCC/101 mm CTS/150 mm ISM	HOV – Lane No. 1 consists of 45 mm RAC-G/320 mm AC between PM 0.0/3.2	

TABLE 2

EXISTING SHOULDER SECTIONS: SM-101 (PM 0.0/3.6)			
NORTHBOUND			
PM	Inside Shoulder	PM	Outside Shoulder
0.0-3.2	45 mm RAC-G/122 mm AC(A)/213 mm ACB(A)	0.0-2.8 3.2-3.4	45 mm RAC-G /var. AC Leveling/var. AS(4)
3.3-5.0	45 mm RAC-G/122 mm AC(A)/213 mm ACB(A)	2.8-3.2	Existing PCC pavement over CTB
SOUTHBOUND			
0.0-3.2	45 mm RAC-G/122 mm AC/213 mm ACB	0.0-3.6	45 mm RAC-G/180 mm AC/var. AS(4)
3.2-5.0	45 mm RAC-G/122 mm AC(A)/213 mm ACB(A)		

As previously mentioned, the short section of **SCL 101 (PM 52.3/52.6)**, per Contract 04-0C8904, page X-2, shows the following:

Southbound Mainline:

HOV: 45 mm RAC-G/268 mm AC
Outside Lanes: 229 mm PCC/100 mm CTB
Outside Shoulders: 76 mm AC/152 mm AB(2)
Inside Shoulders: 45 mm RAC-G/107 mm AC(A)/213 mm ACB(A)

Northbound Mainline:

HOV: 30 mm OGAC-G/30 mm RAC-G/241 mm AC
Outside Lanes: 30 mm RAC-G/30 mm OGAC/52-186 mm AC/228-280 mm PCC
Outside Shoulders: 30 mm RAC-G/30 mm OGAC/76 mm AC/152 mm AB(2)
Inside Shoulders: 30 mm OGAC/30 mm RAC-G/30 mm OGAC/122 mm AC(A)/213 mm ACB(A)

Table 3, below, shows that all but one of the ramps for this proposed project have recently also been re-paved with 0.15' or 0.20' (45mm or 60 mm) RAC-G.

Ramps:

TABLE 3

#	Ramp Description	Existing Pavement Conditions
1	Embarcadero Rd NB diagonal on ramp	Newly paved, one lane. Remove/replace with 45 *or* 60 mm RAC-G
2	University Ave NB on ramp	Newly paved, one lane. Remove/replace with 45 mm RAC-G.
3	Willow Road NB loop on-ramp	Newly paved, one lane. Remove/replace with 45 mm RAC-G.
4	Willow Rd NB diagonal on ramp	Newly paved, one lane. Remove/replace with 45 mm RAC-G.
5	Marsh Rd SB diagonal on ramp	Newly paved, with additional diamond lane, 45 mm RAC-G
6	Willow Rd SB loop on ramp	Older, good condition, one lane
7	Willow Rd SB diagonal on ramp	Newly paved, one lane. Remove/replace with 45 mm RAC-G.
8	University Ave SB diagonal on ramp	1 lane newly paved, other lane older pavement. Remove/replace with 45 mm RAC-G.

RECOMMENDATIONS

PSR Alternative 1:

As mentioned above, Alternative #1 would require some narrowing of the left (median) shoulder in order to fit the new auxiliary lane within the existing sound walls. Therefore, some of the existing median would have to be used as a traveled way. The existing median sections are adequate for mainline traffic loading but the outside shoulders are not. Because most of the shoulders are now overlayed with either AC(A) or RAC-G, as well as the majority of the traveled-way, (including most of lane #1 of the PCC segment of roadway), only AC(A) and RAC-G structural sections will be considered.

Caltrans current policy regarding RAC-G placement is that it should not be put directly on base or sub-base materials. Therefore, the structural sections below will include a DGAC layer beneath the RAC-G. We have assumed the gravel factor (G_f) is the same for DGAC and RAC-G. Also, our preliminary weight estimate using 0.15' RAC-G shows the anticipated tonnage will easily exceed the minimum 5000-ton requirement. Finally, the Highway design manual does not encourage having AC(A) adjacent to RAC-G. Therefore, because new RAC-G is already on the traveled-way, the proposed new sections should include a RAG-G layer as well.

Because the mainline has just been overlaid, we do not recommend any overlay be placed there. The OGAC layer placed between PM 52.3/52.6 on the NB direction, though, will need to be removed and replaced due to staging construction. The auxiliary lane and right shoulders should have the following structural section:

I. Auxiliary Lane/Right Shoulders

Design Factors: $TI_{20} = 13$ $R_v = 15$ (Both our estimates) Required G.E. = 3.53'

Option 1

Thickness	G.E.
0.15' RAC-G	0.25'
0.50' AC(A)	0.82'
0.75' CTB(A)	1.26'
1.30' AS(4)	1.28'
2.70'	3.61'

Option 2 ("Full Depth " AC)

Thickness	G.E.
0.15' RAC-G	0.28'
0.75' AC(A)	1.38'
1.05 ACB'	1.96'
2.05'	3.62'

For the RAC-G material, we recommend a ½" max grading using a PG 64-16 binder. For the AC(A), a ¾" max coarse grading using a PG 64-10 binder is recommended.

PSR Alternative #2

This alternative proposes a standard left (median) shoulder of 3 meters. The existing median shoulder widths are in many cases less than that. Consequently, the entire lane striping would need to shift toward the right resulting in some of the #1 lane to be converted to shoulder. This would not require any structural changes. Therefore the above recommendations would still be valid for the auxiliary and right shoulders.

III. Ramps (*Both Alternatives*)

As stated earlier, 7 out of the 8 ramps listed in this project have just been overlaid with 45 or 60 mm RAC-G. Therefore, no additional paving of existing ramps where the new RAC-G is present is required. The two ramps, #6 and #8, with older existing AC, should remove and replace the AC with 0.15' RAC-G. For the widening or reconfiguring portions, we recommend the following structural sections:

Design Factors: $TI_{20} = 10$ (medium classification) $R_v = 15$ Req'd G.E. = 2.72'

Option 1

Thickness	G.E.
0.15' RAC-G	0.26'
0.40' AC(A)	0.61'
0.85' AB(3)	0.92'
0.95' AS(4)	0.94'
2.35'	2.73'

Option 2 ("Full Depth" AC)

Thickness	G.E.
0.15' RAC-G	0.35'
1.10' AC(A)	2.54'
1.25'	2.89'

We recommend the same gradings and binders used above.

Please contact Rick D'Onofrio at 622-1776 if you have any questions.

c: Route File, Daily File
R. D'Onofrio/

ATTACHMENT J

PAVEMENT SELECTION COMMITTEE CHECK LIST

PAVEMENT SELECTION REVIEW COMMITTEE CHECKLIST

Project Description and project elements:

The project proposes to widen US 101 to add auxiliary lanes in each direction from the Embarcadero Road Interchange (PM 52.2) in the City of Palo Alto in Santa Clara County to the Marsh Road interchange (PM 3.6) in the City of Menlo Park in San Mateo County. In addition to the auxiliary lanes, other major components of the project include:

- Replacement of the Ringwood Avenue Pedestrian Overcrossing (POC) to provide sufficient clearance for the proposed auxiliary lanes.
- Widening of the Hetch Hetchy Aqueduct Bridge.
- Realignment of existing off-ramps and on-ramps, widening of on-ramps to provide HOV bypass lane(s), and in conjunction with the modification of existing ramp metering.

The addition of auxiliary lanes will relieve congestion on mainline US 101 within the project limits. The proposed major funding source for the project is the Corridor Mobility Improvement Account (CMIA) Program. The San Mateo County Transportation Authority (SMCTA) will provide the Measure 'A' funds for construction capital and right of way (R/W) capital. Regional Transportation Improvement Plan (RTIP) will fund Project Report/Environmental Document (PA/ED), PS&E and R/W supports as well as construction capital. There are also Federal Earmark funds for R/W.

One build alternative for the project is being considered. The current 2007 construction estimate for the alternative is $61million, while the R/W cost is estimated to be $50,000. The estimated support cost for this project is $27 million in 2007 dollars. This project has been assigned the project development processing category "4B" because it does not require new R/W and does not substantially increase traffic capacity.

EA: 235610	Project Manager: Ron Moriguchi
Co/Rte: SCl/SM 101	Office: Design South
Project Engineer: Aijun Ding	Program: HB4C
Design Senior: Teblez Nemariam	PM Limits: SM-101 PM 0.0/3.6, SCl 101 PM 52.2/52.6

This project is at the following phase (please check one):

☐ PID (PSR, PSSR, etc.) ☒ PR ☐ PS&E ☐ OTHER

At present, we are preparing the Draft Project Report and the Draft Environmental Document.

What pavement types/structural sections does Materials propose?

Office of Engineering Services I recommends that the proposed outside widening be designed with a full depth.

The two following alternatives have been proposed for outside widening pavement and shoulders:

A. Auxiliary Lanes/Right Shoulders

From Embarcadero Road I/C to Marsh Road I/C (PM: SCl 52.2/52.6 and SM 0.0/3.6).
Design Factors: $TI_{40} = 14$ R-Value = 15 Required G.E = 3.81'

Alternative I	Thickness	G.E.
	0.10' OGFC*	N/A
	0.15' RHMA-G	0.25'
	0.55' HMA(A)	0.88'
	0.80' CTB(A)	1.34'
	1.40' AS(4)	1.38'
	3.0'	3.85'

Alternative II	Thickness	G.E.
	0.10' OGFC*	N/A
	0.15' RHMA-G	0.25'
	0.90' HMA(A)	1.71'
	1.00' ACB	1.87'
	2.15'	3.83'

* Note: For NB direction only, between PM 52.2/52.6 in Santa Clara County.

B. Ramps

Design Factors: $TI_{20} = 10$ R-Value = 15 Required G.E = 2.72'

Alternative I		
	0.15' RHMA-G	G.E = 0.26'
	0.40' MHA (A)	0.61'
	0.85' AB (3)	0.92'
	0.95' AS (4)	0.94'
	2.35'	2.73'

Alternative II		
	0.15' RHMA-G	G.E = 0.35'
	1.10' HMA (A)	2.54'
	1.25'	2.89'

☐ Entire project OR

☒ Part of the project

Pavement is only involved where widening is proposed.

Please provide information for all of the following items that apply to this project.

	Yes	No	Question
1.	☐	☒	Are you implementing an innovative strategy (e.g., cold foam AC, pre-cast concrete pavement, continuously reinforced pavement, etc)? The majority of the traveled-way and most of the shoulders are now overlaid with either HMA (A) or RHMA-G. The Office of Engr. Services I, Materials recommends that RHMA-G and HMA (A) structural sections be used as adding aux. lanes is small addition to existing roadway. Roadway within the project limits is newly overlaid in 2007.
2.	☐	☒	Has Rapid Rehab strategy been considered (e.g., weekend closures and lane replacements)? Work on this project consists of outside widening for lanes and shoulders. This work could be done by placing temporary railing (Type K). So Rapid Rehab strategy is not required.
3.	☒	☐	Are you using **RAC** in this project? Total quantity for RHMA (RAC)-G used in this project is 6,752 tons.
4.	☒	☐	Was Life Cycle Analysis performed? Based on the initial project data, HMA section provides less agency and user cost value compared to PCC section. See attached summary.
5.	☐	☒	Does existing pavement have a settlement problem?
6.	☒	☐	a) Is this project (or part of project) maintaining the grade profile? Maintaining grade profile only. b) If not, explain how the profile change affects the pavement strategy choice (cut v. fill):
7.	☒	☐	Will there be a new barrier? New barriers for Ringwood Ave. POC.
8.			Is the proposed structural section on cut or fill or both? Provide limits of both, if applicable. Mostly on cut. Will provide limits during PS&E phase.
9.	☐	☒	Are highly expansive basement soils present?
10.	☒	☐	Are as-builts (including structural section information regarding edge drains, under drains, lime treatment, permeable blanket, etc.) available? Existing edge drains are located approximately from south of the Henderson UP to Willow Road Interchange.
	☐	☐	If no, did you check map files and online? If yes, existing structural section was based on (check one): ☒ as-built ☐ actual boring

	Yes	No	Question
11.	☐	☒	Do the project limits have problems with groundwater (e.g., high water table, flow requirements, etc.)? Design contacted Area Superintendent and Hwy Maintenance Supervisor of the Foster City Maintenance Station. They said there is no ground water problem in the area. The soil has been pretty dry and there is no need for permeable fabrics. Therefore, Groundwater is not a concern to the rest of the project.
12.	☒	☐	Has the availability of pavement materials (i.e., long haul distances from plants) been considered? The RAC Plant is "Granite Rock" in Redwood City, about 7 miles away from the City of Menlo Park. If yes, how does material availability affect pavement type selection? N/A
13.	☐	☒	Will the existing pavement be rehabilitated? There will be no rehab on existing pavements as roadway was overlaid in 2007 for the project limits. What are the age and condition of the existing adjacent lanes? Recently overlaid in 2007.
14.			What is the type of pavement/structural section (corridor pavement type/structural section continuity) on upstream/downstream roadway? Explain if several: From SCL/SM County Line to Marsh Road I/C (PM 0.0/6.774) for the mainline (EA 0C9504): PCC grind and selected PCC slab replacement for existing slabs. remove 0.10' OGAC and overlay with 0.15' RAC-G. From SCL/SM County Line to Guadalupe River- (PM 52.6/40.2) for the mainline (EA 0C8904): PCC grind and selected PCC slab replacement for existing slabs. remove 0.10' OGAC and overlay with 0.15' RAC-G.
15.	☒ ☒	☐ ☐	Is TMP data (lane closure charts) available and was it considered? Will there be nighttime paving? If so, provide lane closure hours: Will provide in PS&E phase.

	Yes	No	Question
16.	☒	☐	Was field Maintenance input considered? Design met with Foster City Maintenance Station field people. Major concerns they have are: a). Wheel loads damage to PCC slab joints. b) How to achieve easy maintenance of the pump station is the major concern of the field people.
17.	☒	☐	Were climate conditions (extreme temperature, rainfall, etc.) considered? RHMA requires nighttime temperature above 55 deg F. The mean temperature above 55 deg F for both SCl & SM Counties is from March to November. Extreme temperature is anticipated affecting the pavement job.
18.			Which stage construction requirements (matching adjacent sections, temporary paving, etc.) were considered? Work on this project mostly consists of outside widening for lanes and shoulders. This work could be done by placing temporary railing (Type K).

	Yes	No	Question
19.	☒	☐	Is this a large-scale project? Explain all quantity take-off: The current total construction capital cost of this project is $83,607,000. Following are the relevant all quantity take off: Alternative 1: <u>1 - Earthwork</u> Roadway Excavation 73,360CY <u>2 - Pavement Structural Section</u> Open Grade Friction Concrete 364 Ton Rubberized Hot Mix Asphalt (G) 6,752 Ton Hot Mix Asphalt (A) 24,758Ton Cement-Treated Base (A) 17,784CY Aggregate Subbase (4) 31,121CY <u>3 - Specialty Items</u> Barriers and Guardrails 1,411 LF Alternative 2: <u>1 - Earthwork</u> Roadway Excavation 52,600CY <u>2 - Pavement Structural Section</u> Open Grade Friction Concrete 364 Ton Rubberized Hot Mix Asphalt (G) 6,752 Ton Hot Mix Asphalt (A) 40,514Ton Asphalt Concrete Base (ACB) 40,015Ton <u>3 - Specialty Items</u> Barriers and Guardrails 1,411 LF Cost of Structural Section plus Roadway Excavation Alternative 1: $ 9,257,000 Alternative 2: $11,597,000 Alternative 1 is cheaper than Alternative 2.

	Yes	No	Question
20.	☒	☐	Is there OGAC on the existing pavement? There is OGAC between PM 52.2/52.6 Northbound only from County Line to Embarcadero Road I/C.
21.	☒	☐	Was environmental impact considered? But there is no Environmental impact on the project.
22.			What is the proposed pavement design life? 40 years for mainline and 20 years for ramps.
23.			What is the final lane line configuration? From Embarcadero Rd. I/C to Marsh Rd. I/C the lane configuration is as follow: Five 12-ft lanes, 10 ft right shoulders. Most of median shoulders of the project are non-standard varies from 2 ft to 8 ft. <u>At the San Francisquito Creek Bridge:</u> Southbound: 11-ft for the no.1 lane, 4-12 ft lanes. 2 ft non-standard median and right shoulders. Northbound: Five 12-ft lanes, 10 ft right shoulder and 3 ft median shoulder. <u>At Henderson Underpass:</u> Southbound/Northbound: 5- 11 ft lanes on southbound directions. Three inside lane-11 ft and 2 outside lane-12 ft on northbound direction. 2 ft non-standard median and right shoulders
24.	☒	☐	Are there vertical clearance issues? Non-standard vertical clearances (15'-1'') for the existing Henderson UP.
25.			What is the traffic index? TI_{40}=14 for auxiliary lane/right shoulder, TI_{20}=10 for ramps.
26.	☒	☐	Are existing retrofit edge drains present? (No existing underdrains)
27.	☒	☐	Will shoulders be used as detours? Median shoulders and mainline have the same pavement section and will be used for detour.

	Yes	No	Question
28.	☐	☒	Is there settlement at bridge approaches?
	☐	☒	Are bridge approach slabs being replaced? Does such replacement include shoulders? Consulted with structures maintenance representative on _____.
29.	☒	☐	Is there a minimum standard (2% or 1.5%) cross-slope? 2% and varies.
30.			Provide the pavement condition report. See attached pavement condition report.
31	☐	☒	Other factors?

RECOMMENDATION:

Reviewed and discussed by Pavement Selection Review Committee on

Please see below.
(Date)

Committee's comments:

From February 14, 2008 Meeting:

1. Committee recommended to consider structural section with Lean Cement Base (LCB) layer instead of CTB layer and asked design team to do cost comparison for the alternatives.

2. Committee is concerned about pavement damaged due to striping lanes.

3. Committee is concerned about wheel load path on joints between slabs for permanently shifting traffic lanes toward the median barrier.

4. Committee ask design to look into using high barriers instead of using retaining walls or use steep slope to minimize cut.

5. Committee asked design to coordinate the installation of standby generator project with the relocation of the pump station.

6. Committee has asked team for further review of this project on March 13, 2008.

Responses:

1. Cost comparison was done for the recommended alternatives. Alternative 3 with LCB layer costs $11.6M (including roadway excavation) and Alternate 1 with CTB layer cost $9.2M (including roadway excavation).
Material Recommendations for LCB are as follows:

Alternative 3:

Design Factor: TI40 = 14 R-Value = 15 Require G.E. = 3.81'

Thickness	G.E.
0.10 OGFC*	N/A
0.15 RHMA-G	0.25'
0.55 HMA (A)	0.88'
0.75 LCB	1.40'
1.40 AS (4)	1.38'
2.95'	3.91'

* Note: for NB direction only, between PM 52.2/52.6 in SCl County.

2. According to the recent CAPM project (04-0C9504), the current pavement has marked with Type 13 markers on the mainline and yellow and white thermoplastic traffic stripe for the median and right shoulder respectively. Therefore, removing those existing Type 13 markers will not damage the RHMA-G or OGFC pavement as well. But sandblasting will be required in order to remove thermoplastic traffic stripe and diamond markers from the existing pavement.

3. For the aux. lanes project, there would be areas where the wheel loads apply to slab joints. Near the project limit, along US 101, from Broadway to Third Ave. the existing PCC wheel loads damage slab joints. Based on Maintenance's input, when slab joints are taking wheel loads, spalling, potholes corner breaks occur.

4. There is no need to construct the retaining walls since the Henderson Underpass will not be replaced and the pump station will not be relocated as well.

5. The Minor A project to install additional pump PS&E is in December 2008 and construction begin in Mid – 2009. Maintenance needs this generator to provide additional power for the pump to prevent flooding. Since the pump station will not be relocated that Minor A project can go ahead and start installing additional pump without any subsequent delay.

6. The second pavement selection review is scheduled on 3-13-2008.

Committee's comments:

From March 13, 2008 Meeting: -

1. Committee recommended doing Life Cycle Cost Analysis.

2. Committee also recommended for considering AC overlay on both side of the roadway in order to minimize scars on the pavement from existing stripe removal.

3. Committee is still concerned about wheel load path on joints between slabs for permanently shifting traffic lanes toward the median barrier. And if that certainly happens then recommended RAC thin overlay where it will not be possible to replace PCC pavements.

4. Committee has asked team to check the barrier height if need to do AC overlay.

5. Committee recommends distributing the final checklist before the DPR submittal.

Responses: -

1. Life Cycle Cost Analysis has been done according to committee's recommendation and the summary is attached with this checklist.

2. Yes, AC overlay will be considered only if it prevails that the lane shift will impose severe mark on the pavement (both for Rubberized and Open Graded Asphalt Concrete) and the existing barriers freeboard allows overlying as well. But still any damage on the pavement will be fixed. An additional fund of $7.0M is allocated to the project in order to perform overlay and/or replacement of the damaged PCC slabs.

3. The existing PCC pavements on northbound direction have an offset between the existing lane lines and PCC longitudinal joints within that stretch. Based on current observation pavement condition is good on that location. On the other hand, on southbound PCC pavements, the existing lane marking (or striping) falls on the PCC joints. When proposed lane shift towards the median barrier in several location of the southbound freeway, the joints will mostly fall on the middle of the proposed lane and few sections will have will wheel load path on the joints which is the same as the existing offsetting situation on the northbound direction. These issues have been discussed with Materials Division. Considering present condition on northbound direction, they recommend that variable offset will not affect the pavement serviceability especially for lane no 1 and 2. Therefore any additional amount of offset will not impact the pavement condition for all lanes on both directions. Any damaged PCC pavement will be fixed from the allocated fund.

4. Materials recommended a maximum of 0.25' overlay on southbound direction.

5. The final Checklist was submitted on March 26th, 2008 and approved on April 10, 2008.

Final Selection:

A cost comparison was done for the recommended alternatives. Alternative 1 is cheaper than Alternative 2 and 3. Design recommends choosing Alternative 1 because existing structure section of the road is of similar material and this alternative is cheaper than the other two alternatives. Life cycle cost analysis has been done based on the initial project data and it shows that the HMA section (Alternative 1) provides less agency and user cost value compare to PCC section for 40-years pavement design life. PCC section was provided from Materials division. See attached summary.

For all committee's concern on the pavement, an additional fund of $7.0M is allocated to the project for the pavement rehab.

Project Engineer

Aijun Ding
Print Name (ANAND GARG FOR)

Signature

Design Senior

Teblez Nemariam
Print Name

Signature

Committee concurrence:

for
Steve Whipple 4/10/08

Brian Kearney 4/10/08
Brian Kearney

04-10-08
John Hemiup

ATTACHMENT K

PRELIMINARY GEOTECHNICAL REPORT

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
Division of Engineering Services
Office of Geotechnical Design - West

PRELIMINARY GEOTECHNICAL REPORT

AUXILIARY LANES FROM EMBARCADERO ROAD TO MARSH ROAD

04 – SM-101 PM 0.0/3.6, SCL-101 PM 52.2/52.6
04 – 235610

REGISTERED GEOLOGIST
ANNA SOJOURNER
No. 7537
Exp. 12/31/2009
STATE OF CALIFORNIA

PREPARED BY:

ANNA SOJOURNER
Engineering Geologist
Geotechnical Design – West
Branch B

WORK SUPERVISED BY:

GRANT WILCOX
Branch Chief
Geotechnical Design - West
Branch B

JULY 2007

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   4.2 Topography and Drainage 2
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Log of Test Borings

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Figure 3 Liquefaction Susceptibility Map

1. INTRODUCTION

This report evaluates the potential geotechnical impacts of the proposal to add lanes on Highway 101 between Embarcadero Road and Marsh Road in Santa Clara and San Mateo Counties (Figure 1). There are currently two alternatives under consideration. It is our conclusion that there are no significant unmitigable geotechnical conditions for either alternative and the project can be constructed as proposed.

The purpose of this report is to document subsurface geotechnical conditions, provide analyses of anticipated site conditions as they pertain to the project, and to recommend design and construction criteria. Foundation reports for structures within the project limits will be provided under separate cover.

Field work and subsurface exploration, laboratory tests and analyses will be performed as part of the Geotechnical Design Report to evaluate wall design, groundwater, and to determine soil strengths and any geotechnical mitigation needed.

2. PERTINENT REPORTS AND INVESTIGATIONS

A search of Caltrans records indicates that there have been no major slipouts, landslides, or other geotechnical problems in the project area. Preliminary Geotechnical Reports for adjacent sections of the freeway were written by Parikh Consultants. Published references used in this study can be found at the end of the report.

3. DESCRIPTION OF PROJECT ALTERNATIVES AND EXISTING FACILITIES

The proposed project will widen the existing six-lane freeway corridor by one lane in each direction from the Embarcadero Road Interchange in Palo Alto (Santa Clara County) to the Marsh Road Interchange in Menlo Park (San Mateo County). The lanes will be added to the outside.

Both alternatives will require realignment of on-ramps and off-ramps to accommodate HOV and auxiliary lanes. Two bridges will be replaced, the Henderson Underpass Railroad Bridge (San Mateo PM 3.04) and the Ringwood Avenue Pedestrian Overcrossing (San Mateo PM 2.57). A stormwater lift station near the Henderson Underpass will need to be relocated. The new alignment crosses the Hetch Hetchy Aqueduct at San Mateo PM 2.66.

The San Francisquito Creek Bridge (San Mateo PM 0.0) will be replaced in a separate project.

3.1 Alternative 1

Alternative 1 would keep the existing soundwalls in place, and narrow the shoulders as needed to accommodate the additional lanes. At the Henderson Underpass, two retaining walls will be placed in the depressed section. The left wall lies along southbound Route 101 between PM 2.94 and 3.15, and has a maximum height of about 20 feet at PM 3.07. The right wall lies along northbound Route 101 between PM 3.02 and 3.04 and has a maximum height of 20 feet at approximately PM 3.03. Alternative 1 is the preferred alternative.

3.2 Alternative 2

Alternative 2 would move the existing soundwalls to keep standard shoulder widths throughout the corridor. Retaining walls would be required as described for Alternative 1. Alternative 2 would require right-of-way purchase, and the frontage road would have to be rebuilt.

4. PHYSICAL SETTING

4.1 Climate

The project site lies in East Palo Alto and Menlo Park, less than 2 miles west of the San Francisco Bay. The site has a Mediterranean climate, with moderate, wet winters, and warmer dry summers. Most rainfall occurs in Winter, from December to February. Low fog may occur, particularly in the Summer, but is less common here than at other Bay Area locations.

4.2 Topography and Drainage

The project lies on coalescing alluvial fans that drain the Coast Ranges to the west into the Bay. The project is mostly flat, with a depressed section at the Henderson Underpass (San Mateo PM 3.4). To the west, the hills of the Coast Ranges rise to approximately 1000 feet or higher.

San Francisquito Creek crosses the alignment at the San Mateo-Santa Clara County line.

4.3 Man-Made and Natural Features Of Engineering And Construction Significance

Bridges and overpasses will require widening to accommodate additional lanes. Soundwalls line the route and will require either narrower shoulders or will need to be moved.

The Ringwood Avenue Pedestrian Overcrossing and Henderson Underpass Railroad Structure will be replaced and lengthened. The Hetch Hetchy Bridge will be widened to accommodate the wider freeway. On-ramps will be widened at Embarcadero Road northbound, University Avenue, north- and southbound, Willow Avenue, north- and southbound, and Marsh Road southbound.

There is a stormwater lift station at the Henderson underpass that will require relocation to accommodate the widening of the freeway. The adequacy of the system to carry a 50-year storm will require study.

5. GEOLOGY

5.1 Regional

The site lies on the alluvial plain on the west side of southern San Francisco Bay, at the foot of the Coast Ranges. Alluvial fans and late Quaternary deposits coalesce in the plain. Numerous creeks and sloughs flow roughly from west to east and drain the hills into the bay.

The San Francisco Bay Area is highly seismically active, and several active faults lie within a few miles of the site.

5.2 Site

The freeway passes through Quaternary alluvium (Figure 2), including Holocene basin deposits and flood-plain deposits. Most of the native soil is unconsolidated sediments. Logs of Test Borings from several structures along the project area are included in Appendix 1. They generally show stiff clay with sand and silt.

The freeway lies on areas with moderate to high liquefaction susceptibility (Figure 3).

5.3 Soils

The project site soils are mapped by the Soils Conservation Service (Web Soil Survey) as Urban Fill, meaning that the native soils have been stripped or reworked in construction and are no longer mappable. Urban Fill soils may have widely different engineering properties, so testing would be required to determine the specific engineering properties of the site soils.

6. GEOTECHNICAL CONSIDERATIONS

6.1 Excavation Characteristics

The project site soils may vary, from very soft where disturbed to hard where consolidated or cemented alluvium is present. We have not performed site geologic mapping, but Quaternary alluvium is present all along the proposed alignment, and known to be several hundred feet thick in the South Bay. Hard rock is not expected to be encountered in construction. Studies for the Geotechnical Design Report will describe more specifically the excavation characteristics of materials in the project area.

6.2 Erosion

The area is mostly flat and erosion is not considered a problem along this alignment. District 4 Landscape Architecture should be consulted for erosion protection along any proposed new slopes.

6.3 Groundwater

Logs of Test Borings (Appendix 1) show groundwater at approximately 2 feet elevation throughout the project site. The roadway lies at approximately 10 to 20 feet elevation. Retaining walls may require construction dewatering.

6.4 Seismicity

The San Francisco Bay Area is highly seismically active, with numerous large regional faults. The San Andreas and Hayward Faults pass within a few miles of the site. Several major earthquakes were recorded in the last 150 years, all of which would have caused ground shaking at the site.

The USGS (2003) assigns a 62% probability that a major earthquake will occur on a fault in the Bay Area in the next 30 years (Working Group, 2003). A major

earthquake in the Bay Area could result in severe groundshaking at the project site and trigger secondary damage such as liquefaction or settlement.

No known active or potentially active faults cross the proposed alignment. Faults close to the project alignment are tabulated below, and the expected peak ground accelerations (PGA) are given. Distances were measured from the closest point along the proposed alignment to the fault using Jennings (1997). The Maximum Credible Earthquake (MCE) and Peak Ground Acceleration, in g, were derived from Mualchin (1996).

Table 1 Peak Ground Acceleration

Fault	Distance (km)	MCE	PGA (g)
San Andreas	12.5	8	0.48
Hayward	16.75	7½	0.33
Monte Vista	6.25	6½	0.35

The hazard is controlled by the San Andreas Fault.

6.4.1 Historical Seismicity

The site experienced strong ground shaking during the 1906 Great San Francisco Earthquake and during the 1989 Loma Prieta Earthquake. The site is likely to experience strong shaking in the future.

6.5 Liquefaction Susceptibility

Highway 101 passes through areas mapped as having a moderate to high liquefaction susceptibility (Figure 3; Knudsen, et al., 2000). Logs of Test Borings indicate that the groundwater table lies approximately 6 to 18 feet below ground level (Appendix 1). Detailed soil borings should be drilled for all structures and retaining walls to determine if liquefiable sediments are present.

6.6 Settlement

Soft sediments can settle under load. As part of geotechnical exploration of the site, borings can help determine the settlement potential. Settlement is not known to have occurred at this site previously.

6.7 Slope Stability

The area is mostly flat and natural slope stability should not be a concern.

7. POTENTIAL PROJECT IMPACTS ON MAN-MADE AND NATURAL FEATURES

The Hetch Hetchy aqueduct at San Mateo PM 1.76 and the Ringwood Avenue Pedestrian Overcrossing at San Mateo PM 2.57 will both be widened as part of this widening project. A pump station at the Henderson Underpass at San Mateo PM 3.4 will need to be moved. If Alternative 2 is selected, soundwalls may be moved.

8. HAZARDOUS WASTE IMPACT

An Initial Site Assessment has been completed for the project. There is a potential for aerially deposited lead contamination in the right-of-way, but the ADL materials may be used as fill material on site.

9. PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

9.1 Exploration and Investigations

Geotechnical Exploration is necessary to determine groundwater levels, soil types and strengths, and susceptibility to liquefaction or settlement. Several investigative methods should be used, including but not limited to: geologic mapping, soil borings, rock coring, cone penetrometry studies, and geophysical studies.

Vertical borings will be advanced where walls are proposed or where soil stability should be investigated. The borings will characterize the geologic materials at depth, determine the suitability of the sites, and provide input into wall design.

To characterize the subsurface at proposed wall locations, at least one boring is required per 200 lineal feet of wall, to a depth 2 to 2½ times the height of the wall. The left wall will require 6 vertical borings of 50 feet depth, and the right wall will require one boring, also 50 feet deep. In addition to Standard Penetration Tests (SPT) performed every 5 feet, pocket penetrometer readings should be taken on core samples as they are logged. Samples should be taken for moisture content and corrosion.

Two additional Cone Penetrometry (CPT) borings for the longer wall may be useful to find spoil type, strength, moisture content, and groundwater depth.

9.2 Dewatering

We are not aware of any areas that currently require dewatering or suffer settlement or other secondary effects of dewatering. The exploratory drilling for the Geotechnical Design Report will help characterize the site soils and determine the likelihood of settlement, and delineate any areas that will require dewatering during construction.

All walls proposed for the project should include dewatering features, such as horizontal drains or underdrains.

9.3 Corrosion

Corrosivity tests will be conducted as part of the Geotechnical Design Report.

10. REFERENCES

Brabb, E.E., Graymer, R.W., and Jones, D.L., 2000, Geologic Map and Database of the Palo Alto 30 x 60 Quadrangle, California, U.S. Department Of The Interior Miscellaneous Field Studies Map MF- 2332.

Jennings, C.W., 1994, Fault Activity Map of California and Adjacent Areas, Department of Conservation, State of California, Scale, 1: 750,000.

Knudsen, K.L., Sowers, J.M., Witter, R.C., Wentworth, C.M., and Helley, E.J., 2000, Preliminary maps of Quaternary deposits and liquefaction susceptibility, nine-county San Francisco Bay region, California: a digital database, U.S. Geological Survey Open-File Report 00-444

Mualchin, L., 1996, A technical report to accompany the Caltrans California seismic hazard map, Caltrans, 64 p.

Soil Conservation Service Web Soil Survey, http://websoilsurvey.nrcs.usda.gov/app/

Wagner, D.L., Bortugno, E.J., and McJunkin, R.D., 1990, Geologic Map of the San Francisco-San Jose Quadrangle, California Division of Mines and Geology, Scale 1: 250,000.

Working Group of California Earthquake Probabilities, 2003, Summary of Earthquake Probabilities in the San Francisco Bay Region: 2003 – 2032, USGS Open-File Report 03-214, 235 p.

FIGURES

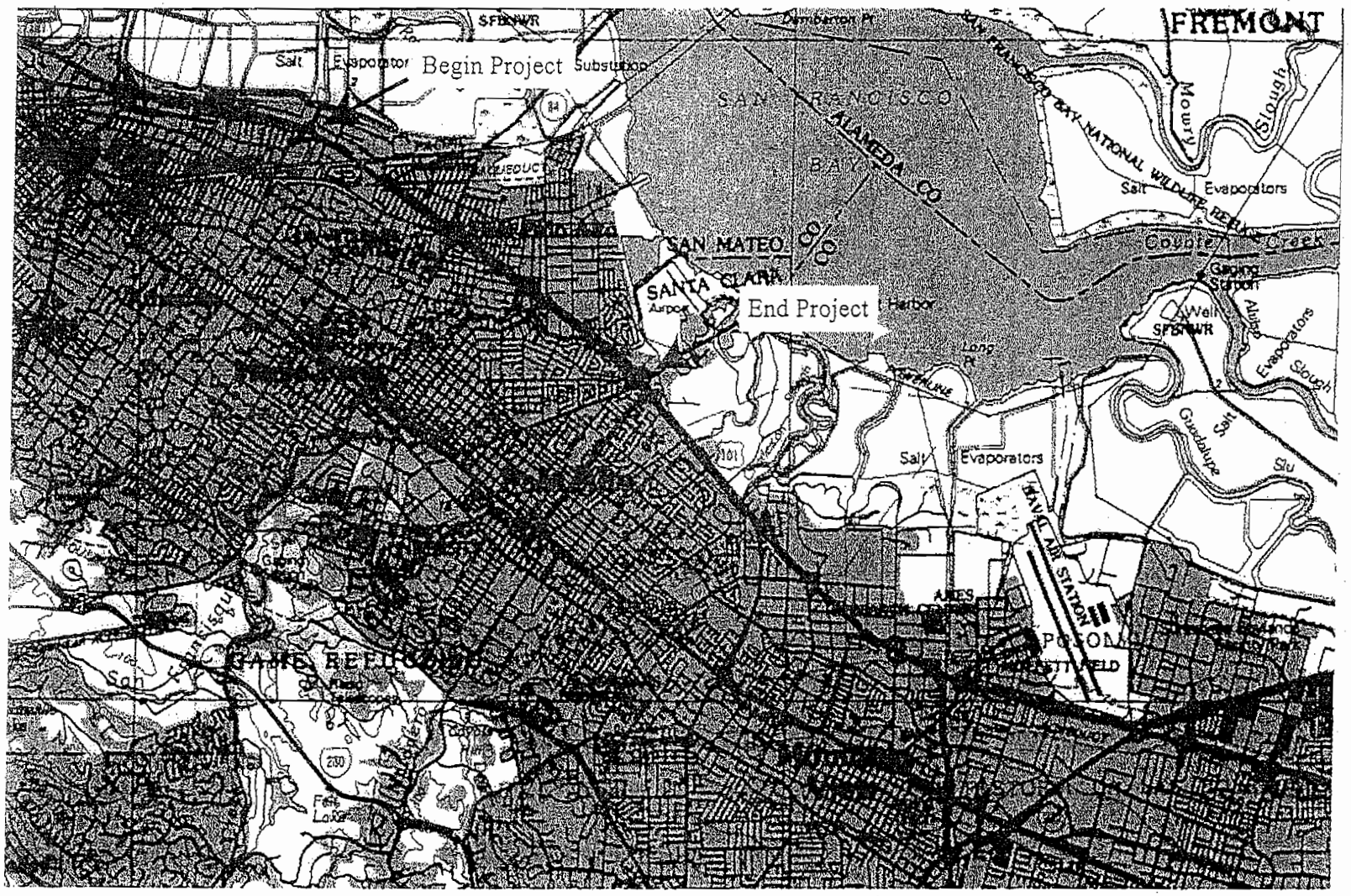
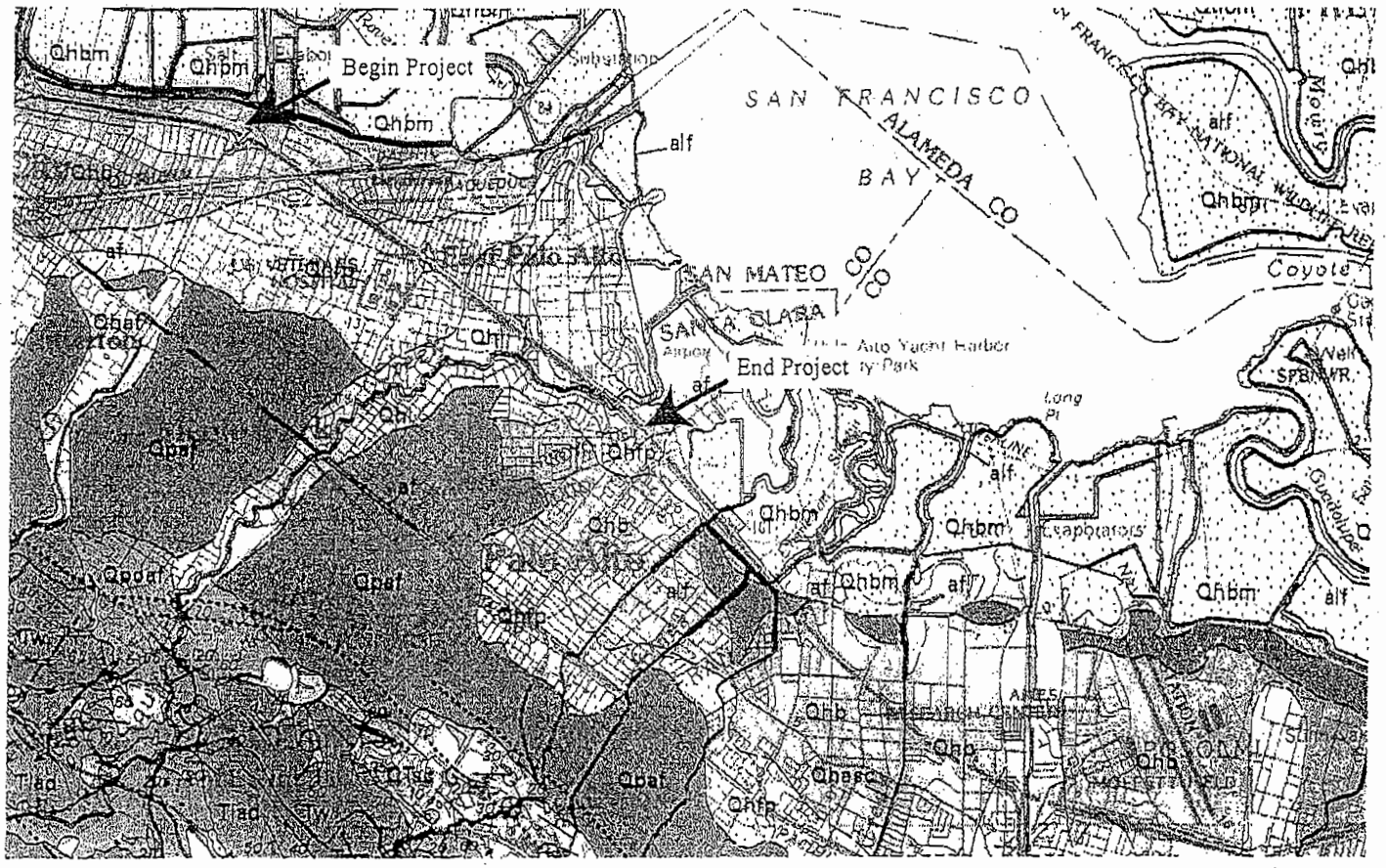


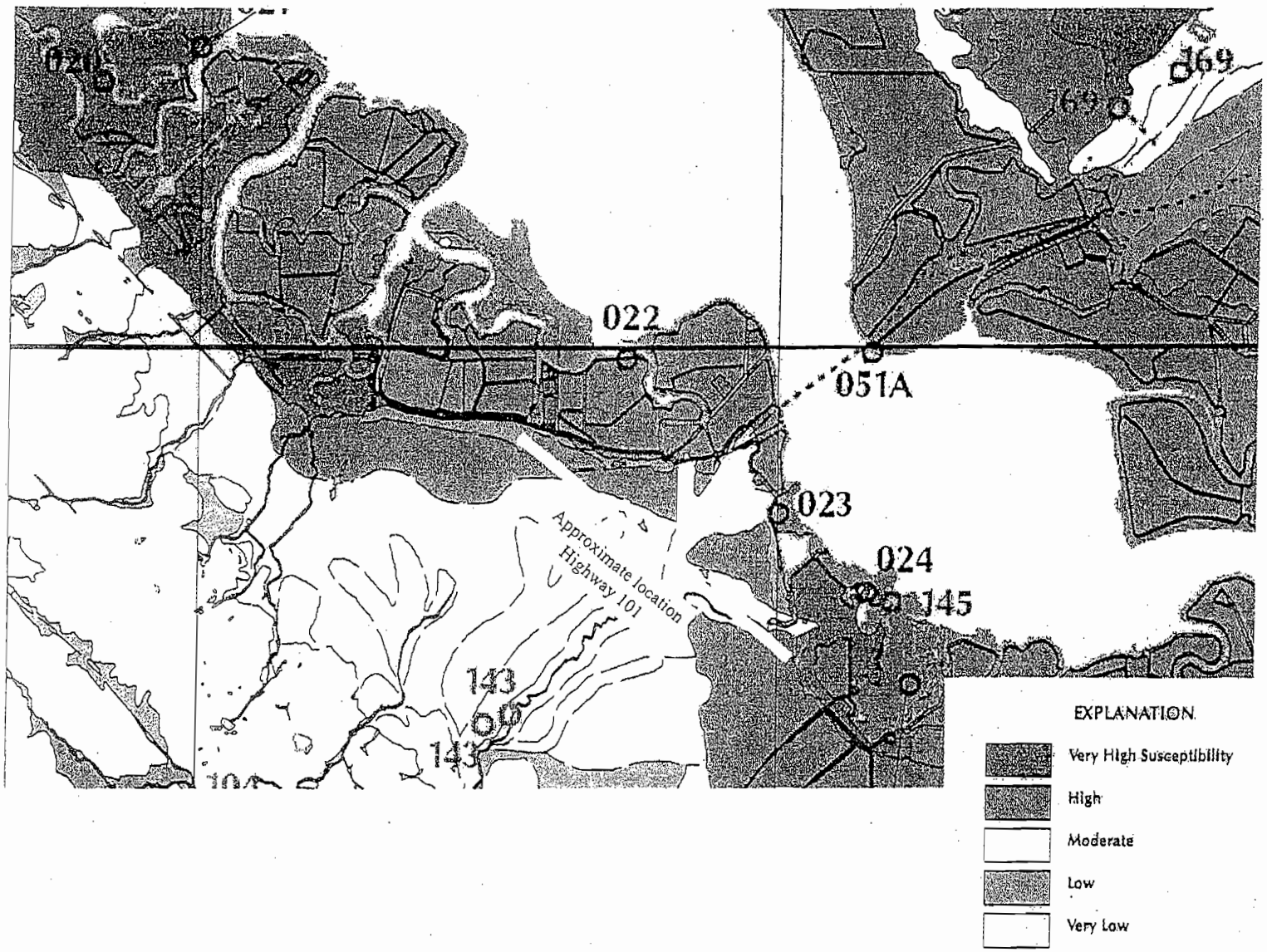
Figure 1	Location Map
SM 101 0.0-3.6 / SCL 101 52.2-52.6	
EA 04-235610	July, 2007



af Artificial Fill (Historic)
Qhb Basin Deposits (Holocene)
Qhfp Flood plain Deposits (Holocene)
Qhl Natural Leveee Deposits (Holocene)
Qpaf Alluvial Fan (Pleistocene)
Qhbm Bay Mud (Holocene)

Source: Brabb, E.E., Graymer, R.W., and Jones, D.L., 2000, Geologic Map and Database of the Palo Alto 30 x 60 Quadrangle, California, U.S. Department Of The Interior Miscellaneous Field Studies Map MF- 2332.

Figure 2	Geology Map
SM 101 0.0-3.6 / SCL 101 52.2-52.6	
EA 04-235610	July, 2007



Source: Knudsen, K.L., Sowers, J.M., Witter, R.C., Wentworth, C.M., and Helley, E.J., 2000, Preliminary maps of Quaternary deposits and liquefaction susceptibility, nine-county San Francisco Bay region, California: a digital database, U.S. Geological Survey Open-File Report 00-444

Figure 3 Liquefaction Susceptibility Map

SM 101 0.0-3.6 / SCL 101 52.2-52.6

EA 04-235610 July, 2007

APPENDIX ONE

LOGS OF TEST BORINGS

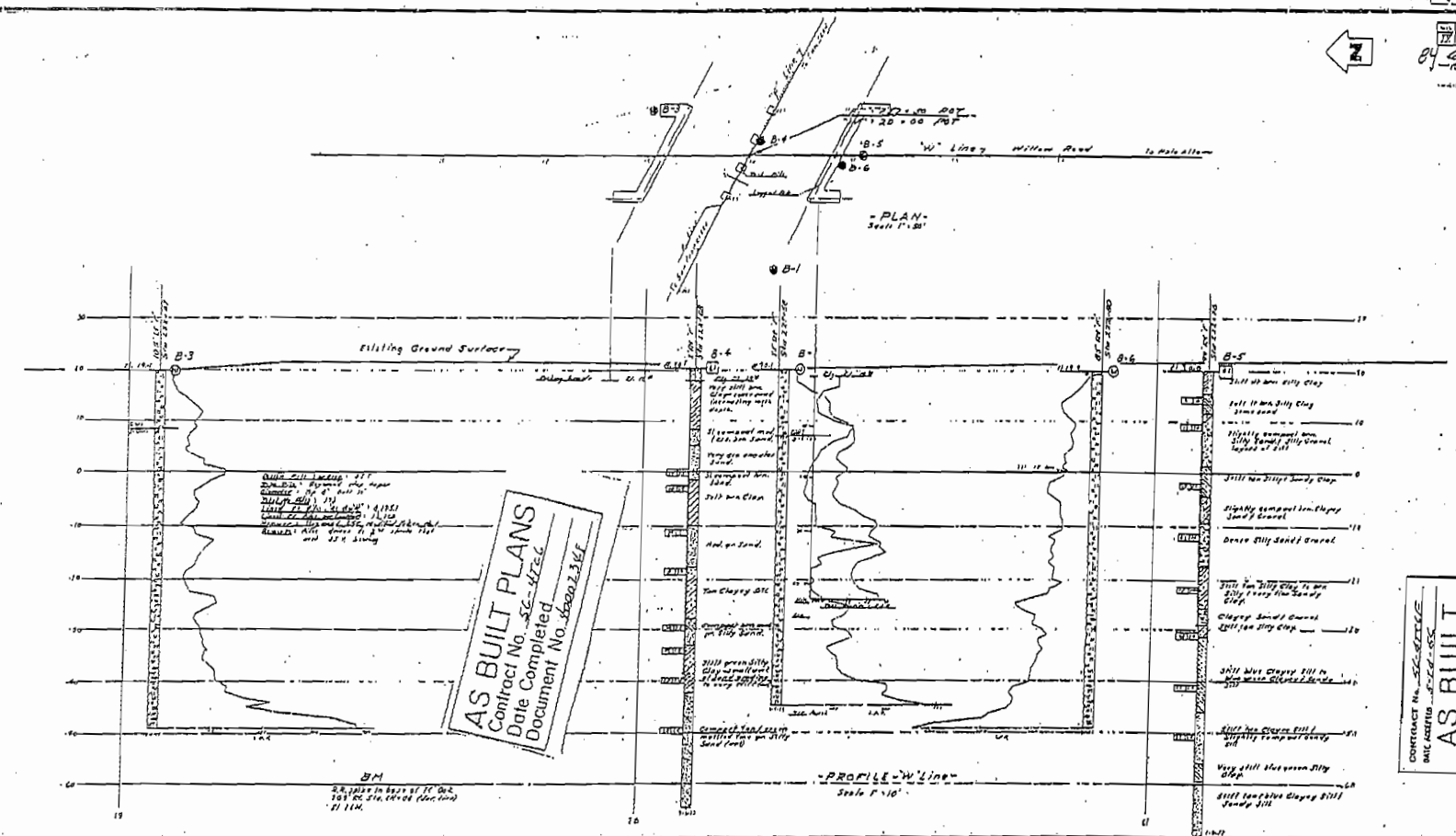
U-181 (26)

DISTRICT	STATE	TOTAL SHEETS
3	CAL.	

DATE	DRAWN	CHECKED
7/8	SM	JG

84

BRIDGE DEPARTMENT



Classification of Material Based on Standard Grade Size Limits

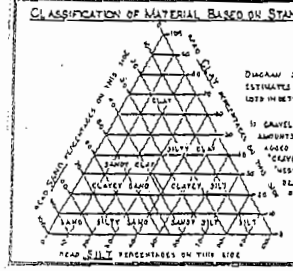


Diagram showing the basis for estimates of grade size distribution used in determination of class name.

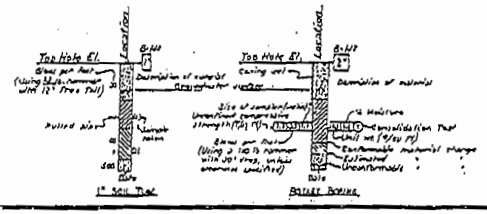
If gravel is present in appreciable amounts the term "gravelly" may be added to the class name, viz. "gravelly sand" the terms "coarse," "medium" and "fine" when used to describe gravel, sand and silt refer to standard grade size limits.

Legend of Earth Materials

- Gravel
- Sand
- Silt
- Clay
- Sandy Clay or Clayey Sand
- Sandy Silt or Silty Sand
- Silty Clay or Clayey Silt
- Peat and/or Organic Clay
- Fill or Other Material
- Igneous Rock
- Sedimentary Rock
- Metamorphic Rock

Legend of Boring Operations

- Plan of any boring
- Penetrometer
- 2½" Cone Penetrometer
- Sampler boring (SPT)
- Rotary boring (RCT)
- Auger boring (DAT)
- Jet boring
- Core boring
- Test pit



Notes

The contractor's attention is directed to Section 5, ap standard specifications and to the special provisions accompanyin Classification of earth material as shown on this shee field inspection and is not to be construed to imply mechani Penetrometer borings having a rate of penetration le per foot are driven with a 140 # Wilkinson-Terry air ham

State of California
Department of Public Works
Division of Highways

WILLOW RD. S

LOG OF TEST BORING

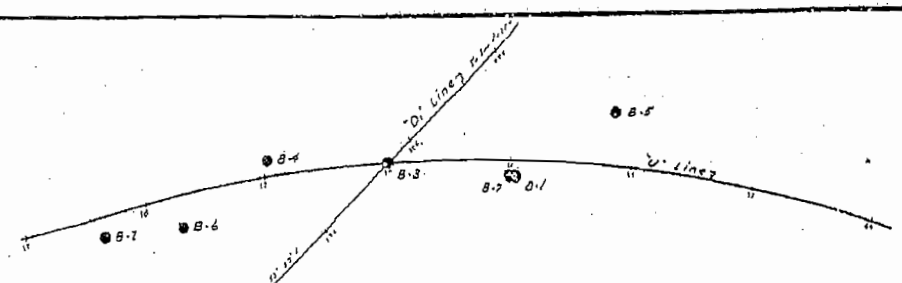
SCALE	BRIDGE	FILE
Horiz. 1" = 5'	35-84	E-35

2942 2

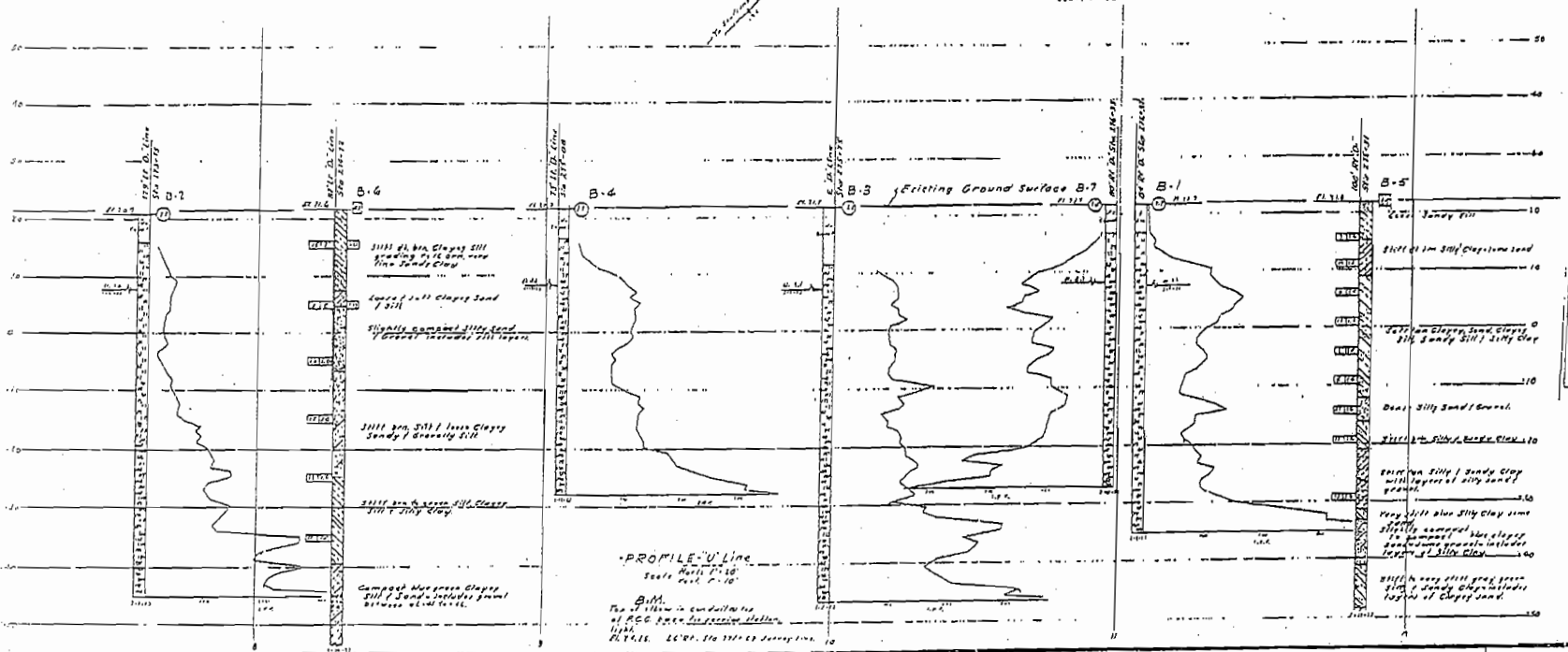
I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT DRAWN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE May 17 1984 SIGNATURE [illegible] TITLE [illegible]

BRIDGE DEPARTMENT



-PLAN-
Scale 1" = 50'



-PROFILE- "U" Line
Horiz. 1" = 20'
Scale Vert. 1" = 10'

B.M.
Top of Elev. in conduit line of RCC pipe in opening station light.
El. 9.16. 26'8" Sta 7+00 on Survey line.

AS BUILT
Contract No. 57
Date Completed
Document No. 4

CONTRACT
DATE ACCEPTED
AS
RESIDENT ENGI
REVISIONS BY

Classification of Material Based on Standard Grade Size Limits

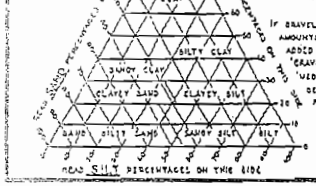


Diagram showing the basis for estimates of grade size distribution used in determination of class names.

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- Sedimentary Rock
- Metamorphic Rock

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- Plan of any boring
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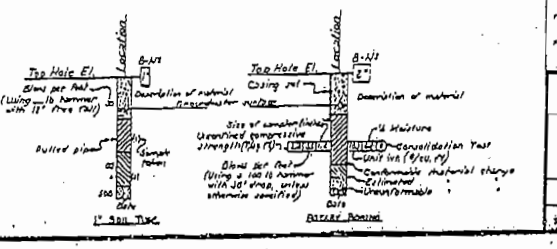
- 2½" Cone Penetrometer
- Sampler boring (PTT)
- Rotary boring (RCT)
- Auger boring (BAY)
- Jet boring
- Core boring
- Test pit



Notes

The contractor's attention is directed to standard specifications and to the special provisions. Classification of earth material as shown is field inspection and is not to be construed.

Penetrometer borings having a rate of per foot are driven with a wt 2 Wickersham

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

UNIVERSITY

LOG OF TEST

SCALE: Horiz. 1" = 20' Vert. 1" = 10' | BRIDGE 55-113 2/2 | FILE

84

55/5

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND SEALED ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION OF THE DIRECTOR OF PUBLIC WORKS.

DATE _____ SIGNATURE _____ TITLE _____

DIST.	COUNTY	ROUTE	POST MILES - TOTAL PROJECT	PROJECT No.	TOTAL PROJECT
04	SCL	101			

SINGLE COLUMN RETROFIT - PROJECT 42

ENGINEERING GEOLOGY BRANCH - TRANSPORTATION MATERIALS & RESEARCH

CERTIFIED ENGINEERING GEOLOGIST - PROJECT GEOLOGIST

RINGWOOD AVE POC

LOG OF TEST BORINGS

NOTE: THIS LOG OF TEST BORINGS IS AVAILABLE ON MICROFILM AT OFFICE OF STRUCTURES DESIGN SACRAMENTO, CALIFORNIA

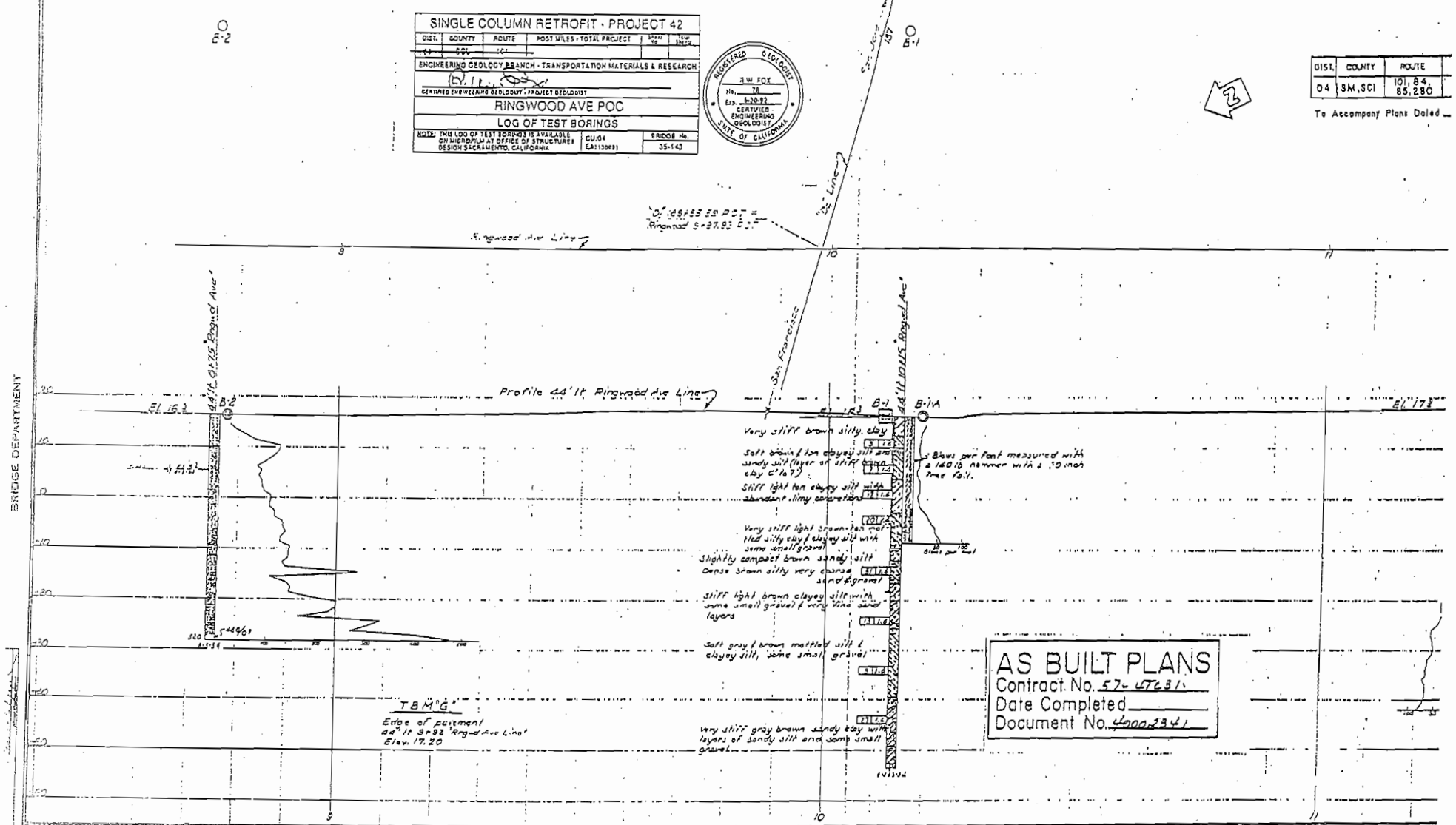
CU:04 EA:120091

BRIDGE No. 35-143

REGISTERED GEOLOGIST — B.W. FOX — No. 78 — Exp. 6-30-92 — CERTIFIED ENGINEERING GEOLOGIST — STATE OF CALIFORNIA

DIST.	COUNTY	ROUTE
04	SM, SCI	101, 84, 85, 280

To Accompany Plans Dated ___



AS BUILT PLANS
Contract No. 57-4T231
Date Completed ___
Document No. 4000234

Classification of Material Based on Standard Grade Size Limits

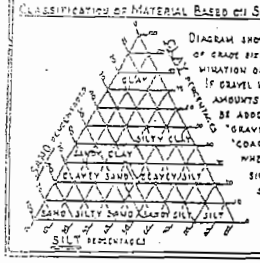


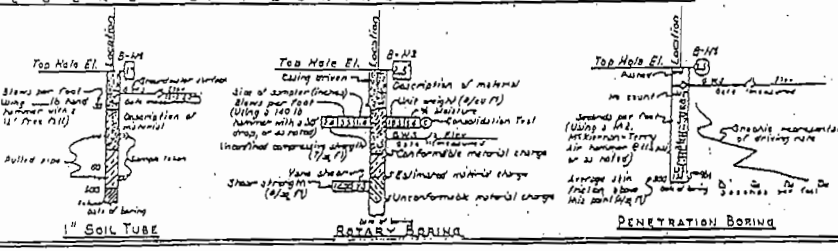
Diagram showing the basis for estimates of grade size distribution used in determination of class names. If gravel is present in appreciable amounts the term 'gravelly' may be added to the class name, viz. 'gravelly sand'. The terms 'coarse', 'medium' and 'fine' when used to describe sand, silt and gravel refer to standard grade size limits.

Legend of Earth Materials

- Gravel
- Sand
- Silt
- Clay
- Sandy Clay or Clayey Sand
- Sandy Silt or Silty Sand
- Silty Clay or Clayey Silt
- Peat and/or Organic Matter
- Fill Material
- Igneous Rock
- Sedimentary Rock
- Metamorphic Rock

Legend of Boring Operations

- Plug or Any Boring
- Penetrometer
- 2¼" Cone Penetrometer
- Sampler Boring (Dry)
- Rotary Boring (Wet)
- Auger Boring (Dry)
- Jet Boring
- Core Boring
- Test Pit



The contractor's attention is and to the Special Provisions c Classification of earth mate not to be construed to imply

RINGWOOD AVE

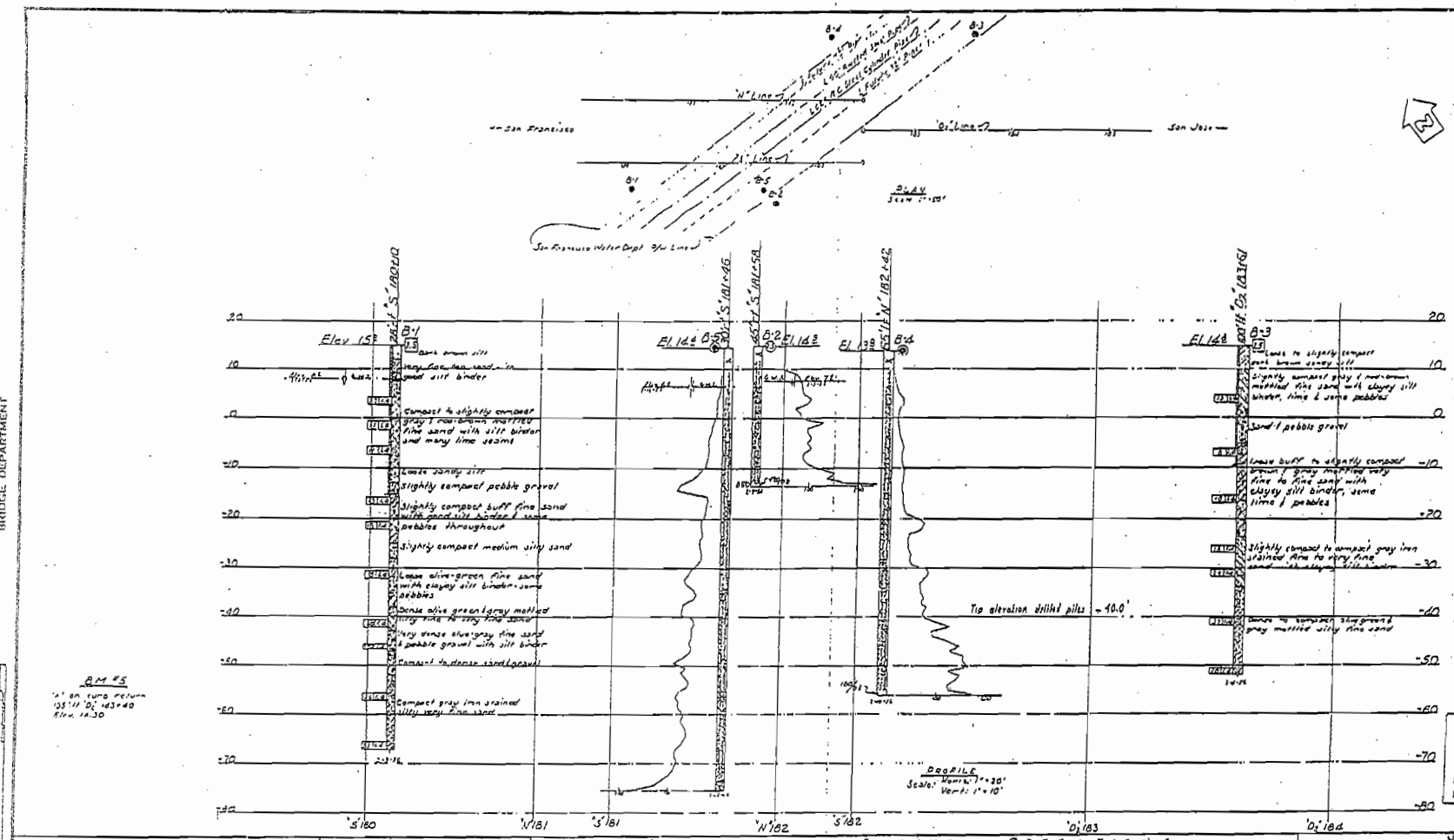
LOG

SCALE 1" = 10'

PREL DRAWING No. 2648

F-181 (29)

BRIDGE DEPARTMENT



AS BUILT PLANS
Contract No. 52-477
Date Completed
Document No.

CONTRACT No. 57-470
DATE ACCEPTED 6-26-
AS BUIL
RESIDENT ENGINEER F.W. Stran
REVISIONS BY

Classification of Material Based on Standard Grade Size Limits

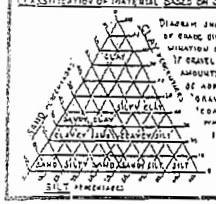


Diagram showing the basis for estimates of grade size distribution used in determination of class names. If gravel is present in appreciable amounts the term "gravelly" may be added to the class name, viz. "gravelly sand". The terms "coarse", "medium" and "fine" when used to describe sand, silt and gravel refer to standard grade size limits.

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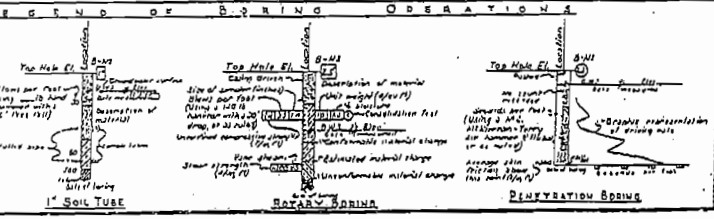
- Silty Clay or Clayey Silt
- Peat and Organic Matter
- Fill Material
- Igneous Rock
- Sedimentary Rock
- Metamorphic Rock

Legend of Boring Operations

- Plug or any method
- Penetrometer
- 2¼" Cone Penetrometer
- Sampler Series (SPT).
- Rotary Boring (WET)
- Auger Boring (DRY)
- Jet Boring
- Core Boring
- Test Pit.



Notes

The contractor's operation is directed by Section 2, Article (c) of the Standard and to the special provisions accompanying this set of plans.

Classification of earth material as shown on this sheet is based upon field inspection and not to be construed to imply mechanical analysis.

State of California
Department of Public Works
Division of Highways

Hetch Hetchy Aqueduct

Log of Test Borings

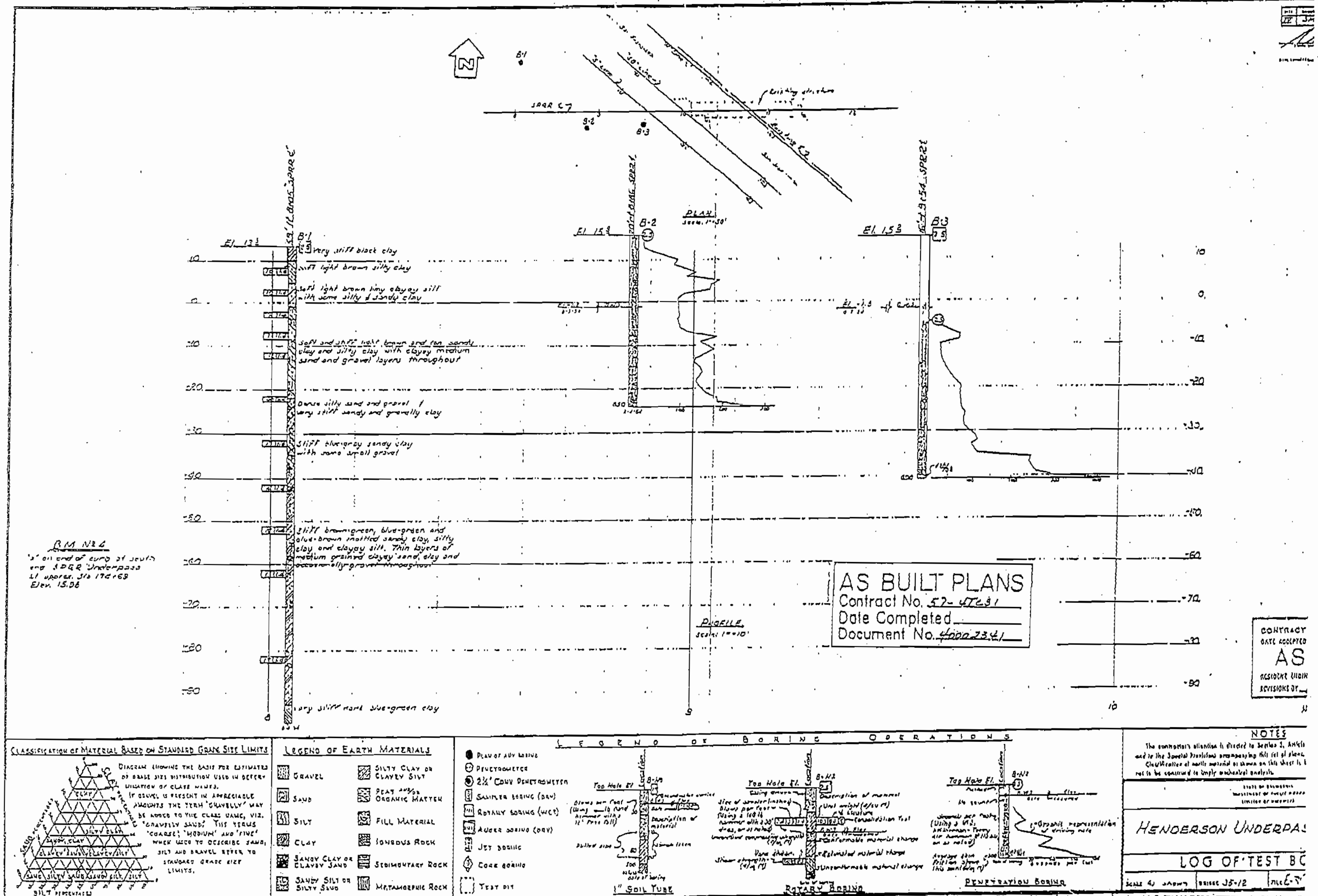
Scale As shown | Bridge 35-150 | File 2-30 | Drawing C-48

14834

I hereby certify that this is a true and accurate copy of the index sequence check made by direction and control, on this date in Sacramento, California, pursuant to implementation of the provisions of public notice.

Date ____ Signature ____ Title ____

F-18l (29)

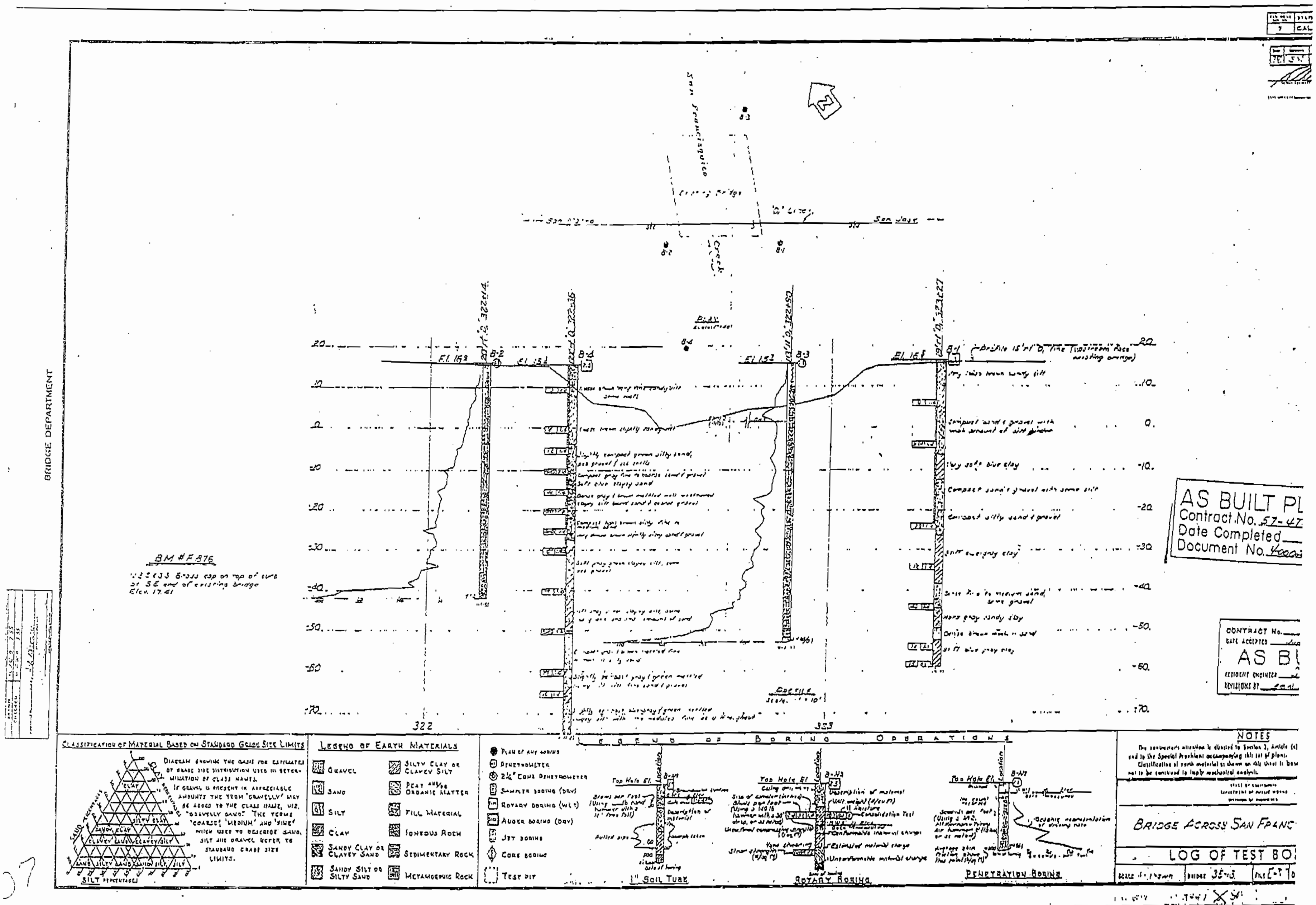


BRIDGE DEPARTMENT

PR-1519

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE ______ SIGNATURE ______ TITLE ______



I hereby certify that this is a true and accurate copy of the above document taken under my direction and control on this date in Sacramento, California pursuant to authorization by the Director of Public Works.

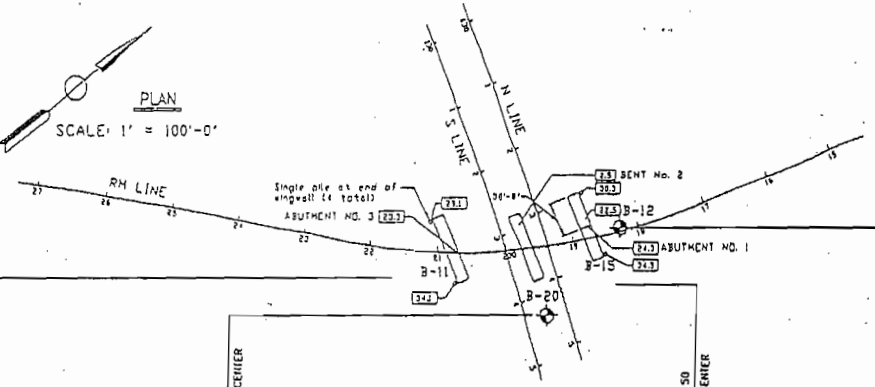
NO AS BUILT CHANGES
NO AS BUILT CHANGES

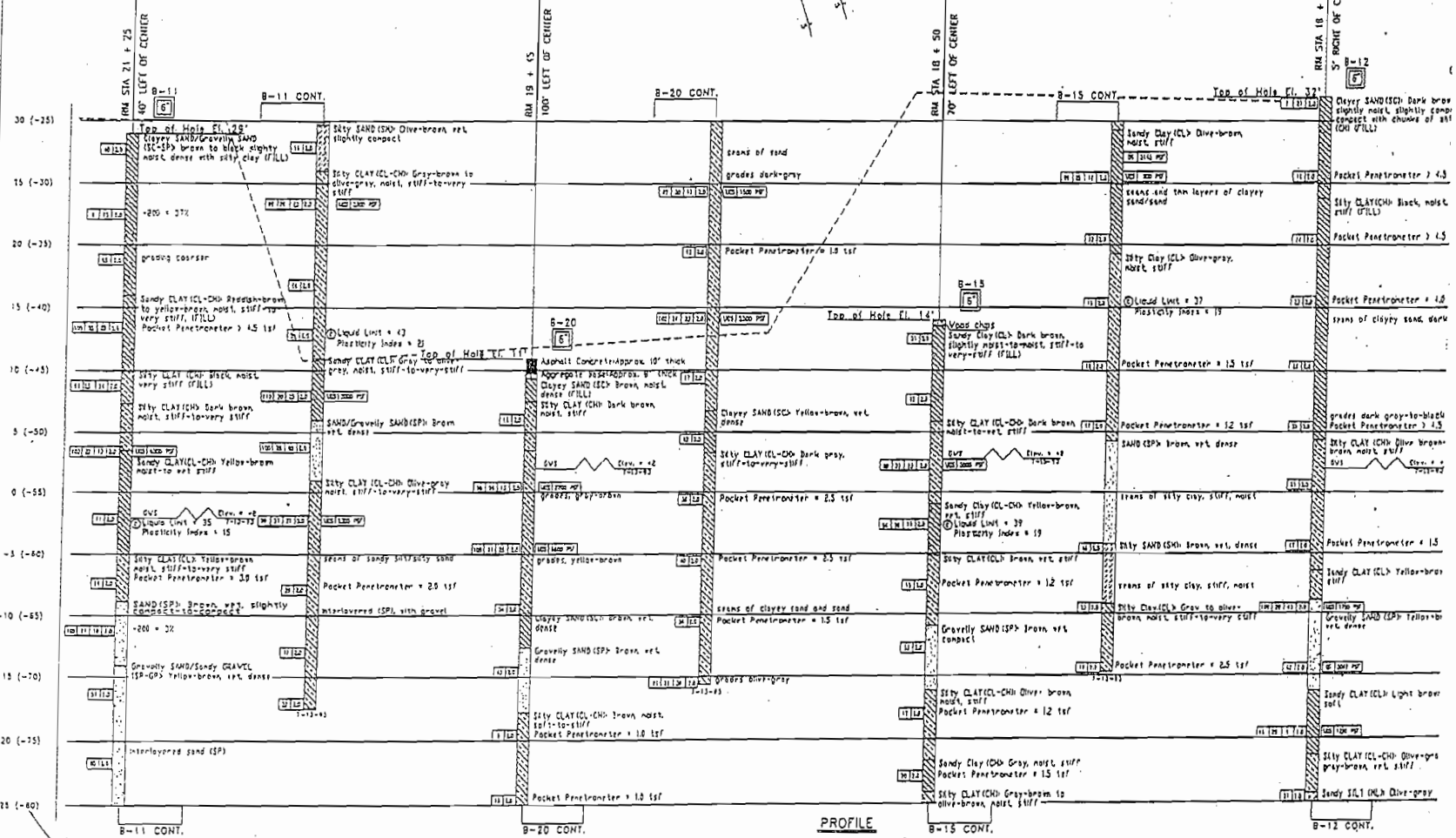
AS BUILT

CORRECTIONS BY _____
CONTRACT NO. 04-235664
DATE _____

NOTE:
TOP OF BORE HOLE ELEVATIONS REFERENCED TO BENCHMARK NO. AB-82, BRASS DISK SET IN THE MARSH ROAD OVERCROSS STA RM 17 + 18 ELEVATION 33.58.

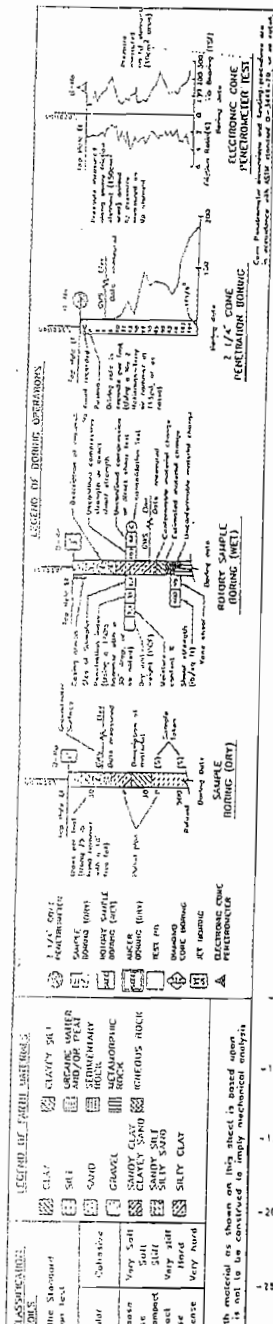
PLAN
SCALE: 1" = 100'-0"





( ) INDICATES CONTINUATION OF BORING ELEVATIONS TYP.

PROFILE
VERTICAL SCALE: 1" = 5'



NOTE:
Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis

DESIGN OVERSIGHT
1-28-05
SIGN BY DATE

DRAWN BY V. DONALDSON
CHECKED BY R. RICHARD
F. SCHVIDT
FIELD INVESTIGATOR
DATE _____

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PROJECT ENGINEER

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04217
EA 235661

BRIDGE NO. 35-0066
POST MILE 3.8

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 8/29/96

ROUTE 84/101 SE
LOG OF

REVISION DA

DIST COUNT
04 SM

REGISTERED

PLANS APP

SAN MATEO CO
1250 SAN C
SAN CARLOS,

KLEINFELDER
2150 OAKLAN
SAN JOSE, C

The State of C
shall not be r
completeness

F-181 (23)

BRIDGE DEPARTMENT

"A" Line

Marsh Road

Existing Ground Line

AS BUILT

No changes

AS BUILT PLANS
Contract No. 57-477631
Date Completed
Document No. 4000-2341

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SCALE LIMITS

LEGEND OF EARTH MATERIALS

LEGEND OF BORING OPERATIONS

NOTES

MARSH ROAD OVERCA

LOG OF TEST BORI

80

NOTE:
ADDITIONAL AS-BUILT FOUNDATION DATA MAY BE AVAILABLE AT THE OFFICE OF TRANSPORTATION MATERIALS AND RESEARCH 5900 FOLSOM BOULEVARD SACRAMENTO, CALIFORNIA 95819.

DESIGN		
DETAILS		
QUANTITIES		

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PROJECT ENGINEER

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04217
EA 235661

BRIDGE NO.	35-0066
POST MILE	3.6

ROUTE 84/101

AS-BUILT L

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION

ATTACHMENT L

LOCATION HYDRAULIC STUDY

Department of Transportation
District 4 - Oakland

04-SM-101, KP 0.0/5.8
04-SCL-101, KP 84.2/84.6
EA: 04-235610
Auxiliary Lanes

LOCATION HYDRAULIC STUDY

WRITTEN BY:

GENE X. ZHU

CONCURRED BY:

JOSEPH E. PETERSON

Floodplain Description

The San Francisquito Creek Watershed encompasses an area of 45 square miles and covers an area extending from Skyline Boulevard on the ridge of the Santa Cruz Mountains (on the crest of the San Andreas Fault line) to the San Francisco Bay. The main stream of San Francisquito Creek begins at the outlet of Searsville Lake Dam in the upper portion of the watershed and ends at San Francisco Bay, about 14 miles long. Tributary streams include West Union Creek, Bear Gulch Creek, Corte Madera Creek, Sausal Creek, and Los Trancos Creek. Downstream of the confluence with Los Trancos Creek, the creek forms the boundary between San Mateo and Santa Clara Counties, which is within the Santa Clara Valley Water District's Northwest Flood Control Zone and San Mateo County's San Francisquito Creek Flood Control Zone.

Elevations of the watershed range from sea level to about 2,200 feet above sea level in the Santa Cruz Mountains. However, the creek exists in the foothills above Stanford University for only a few miles before it flattens to a gentler slope as it crosses the valley floor. The upland portion of the watershed consists of low-density residential development and is characteristic of brushy woodlands; while the relatively flat valley floor has been extensively developed and is typical of most urbanized areas. This includes a wide variety of land uses and natural habitats including residential in five municipalities (Palo Alto, East Palo Alto, Menlo Park, Portola Valley, and Woodside), a major university (Stanford University), commercial shopping centers, open space preserves, grazing land, and a biological preserve. The majority of residential development and the majority of properties are within the base floodplain boundary determined by studies that began in 1995 sponsored by the Federal Emergency Management Agency (FEMA).

The fact that the San Francisquito Creek watershed begins in the Santa Cruz Mountains on the crest of the San Andreas Fault line, combined with the soil types and the presence of a dam in the center of the watershed, has significantly altered the sediment regime and therefore the creek's capacity for handling floodwaters. The reservoir behind the dam is over 80% filled with sediment. Flooding has begun to occur in residential areas above the dam. Severe bank erosion in the main stem channel, which runs through the highly urbanized area below the dam, threatens schools and public roads, as well as homes and businesses. The watershed has been listed as an "impaired water body" by the State Water Resources Control Board, due to sediment.

Historical Flooding

Three major transportation routes of the peninsula area (Highways 101 and 280 and CalTrain) run through the San Francisquito Creek Watershed and are potentially impacted by flooding. The reach of San Francisquito Creek below Route 280 flows through Stanford University and the cities of Palo Alto, Menlo Park, and East Palo Alto before it discharges to San Francisco Bay in the vicinity of Palo Alto Airport. This entire portion of the watershed is subject to flooding according to the latest FEMA Firm maps.

Highway 101 has been closed due to flooding several times over the years, affecting motorists from the entire bay area who utilize this major corridor.

According to the FEMA Study dated August 23, 1999 as well as a San Francisquito Creek Watershed Study done by Santa Clara Valley Water District in 2004, San Francisquito Creek has overflowed eleven times in the past 93 years. Most recently, in 1998, the record floodwaters, estimated at a peak flow of 7,100 cfs, exceeded the creek capacity and overtopped the creek banks. The floodwaters inundated more than 11,000 acres, flooded 1,100 homes, resulted in the evacuation of 500 people, and closed southbound Highway 101 for approximately 19 hours. A March 1999 report by the U.S. Army Corps of Engineers (Corps) documented $28 million in damages from the flood.

In December 1955, floodwaters overtopped San Francisquito Creek at two locations west of East Palo Alto in the adjacent City of Menlo Park. The floodwaters passed through the cities of East Palo Alto and Menlo Park and State Highway 101 at Laurel Avenue before flowing to northward and eastward towards San Francisco Bay, inundating a portion of East Palo Alto from Highway 101 northward past the corporate city limits near Alberni Street. Significant areas of Palo Alto were flooded, inundating about 1,200 acres of commercial and residential property and about 70 acres of agricultural land.

In April 1958, storms caused a levee failure downstream of Highway 101, flooding the Palo Alto Airport, the city landfill, and the golf course to a depth of nearly four feet. In 1982, the creek overflowed near Alpine Road, at University Avenue, and downstream of Highway 101, causing extensive damage to private and public property. Some flood discharges on records are as follows:

Month/Year of Flood Event	Flood Discharge (cfs)	Remark
December 1955	5,560	Recurrence interval of 25 years
April 1958	4,460	
January 1967	n/a	
January 1973	n/a	*
January 1982	5,220	
1995	3,320	
February 1998	7,100	$28 million in damages
2006	n/a	**

* Primarily caused by high tides in San Francisco Bay and concurrent with a 5-year storm.

** According to the District 4 Maintenance, the far right lane and shoulders for both NB and SB are affected by the 2006 floodwater. However, no official records are available.

Floodplains Assessment on Three Locations

Highway 101 was originally constructed as a conventional four-lane highway in 1932 and upgraded to a 6-lane freeway in 1958. It was upgraded again to an 8-lane freeway with an HOV lane in 1991. The current project starts at the Embarcadero Road Interchange

and continues north to the Marsh Road Interchange. This is a widening project that adds auxiliary lanes in each direction to enhance safety, improve traffic operation at interchanges and relieve congestion along Highway 101 within the project limits.

Approximately half of the proposed project area lies within the 100-year floodplain designated on the latest FEMA flood insurance rate maps (See Attachment A: Project Encroachment Map). There are three significant encroachments on the 100-year floodplain within the project limits: (1) the San Francisquito Creek Bridge; (2) areas south of Willow Road Interchange adjacent to the Laurel Avenue soundwall; and (3) Henderson Underpass (south of Marsh Road). Each area has been studied and discussed below:

(1) The San Francisquito Creek Bridge was initially constructed in 1932. In 1959, the bridge was widened to accommodate additional freeway lanes. The current San Francisquito Creek Bridge was originally designed to pass a maximum flow of 6,500 cfs. Sedimentation within the waterway area of the bridge would reduce this maximum capacity. Hydraulic modeling along San Francisquito Creek by Santa Clara Valley Water District (SCVWD) has determined that the capacity of both the upstream and downstream channel is less than the bridge itself.

The modeling by SCVWD mentioned above also re-evaluated the Q_{100} peak flows along San Francisquito Creek and determined this value to be 9,300 cfs at the bridge across Highway 101. This peak discharge assumes that future channel improvements are made and this flow can be delivered to the San Francisquito Creek Bridge at Highway 101 (Br. No. 35-0013). Caltrans Structures Hydraulics estimated that the existing bridge could pass this flow of 9,300 cfs but a backwater of 0.9 feet would occur at upstream face of the bridge. This backwater would extend for approximately 1000 feet upstream where it would eventually disappear. This water surface profile assumed that the waterway area was clear of debris and sediment.

Caltrans District 4 Hydraulics also studied the existing soundwall openings at the San Francisquito Creek Bridge. These openings are on the soundwall separating the West Bayshore frontage road and the southbound shoulder along Highway 101. The study concluded that the openings are required and they should not be modified to accommodate the auxiliary lane project.

(2) The staggered soundwall opening at Laurel Avenue near Willow Interchange was created in the 1990s after the initial soundwall and media barrier project to allow floodwaters to pass through State Right-of-Way during a flood event. Thrie beam barriers, in replacement of concrete barriers, were also installed at freeway median for the purpose of passing floodwaters. During the flood event in 1955, the floodwater overtopped San Francisco Creek banks traveling along the Laurel Avenue, then passing the highway to flood both upstream in the City of Menlo Park and downstream in the City of East Palo Alto. No similar flooding has been documented since then. There are two cross culverts at this location. One is a double 24" RCP in front of the soundwall opening while another is a single 24"

RCP located about 800' south. The maximum total discharge rate of these cross culverts is approximately 80 cfs. Near the soudnwall opening, there is an open area (approximately 1.4 acres) with considerable depression storage between the soundwall and roadway pavement. With light grading in the open area, the storage volume is approximately 2.5 acre-ft at elevation of 20.0 feet (NGVD 1929). Studies conducted by the District Hydraulics indicated that the capacity at the maximum storage volume of 4.5 acres-ft in this area up to elevation of 20.7 feet, with the water spread encroaching shoulders, southbound on/off ramps, number 3 and 4 lanes of travel way, would handle the peak flow of approximately 140 cfs. Based on the roadway profile and pavement elevations as shown on the base map, excessive flow would spill through the southbound roadway shoulder, number 3 and 4 lanes of traveled way northward to flood the Henderson Underpass before passing the media crown to flood freeway northbound.

(3) Highway 101 passes beneath the Union Pacific Railroad tracks through a portion of depressed roadway called the Henderson Underpass that is approximately 1.2 miles north of the Willow Road Interchange. This depressed freeway section is approximately 2,600 feet long with a drainage area of 13 acres that is completely within the base floodplain. The lowest elevation is about –3.0 feet (NGVD 1929) while the elevations are about 10.2 feet at the north end and 15.6 feet at the south end. Because of the depressed roadway, to collect pavement runoff, a pump plant with an underground storage box was designed using the critical design storm of 25-year event for a drainage area of 9.5 acres (Pump Plant Reported 09/17/1985). This existing pump plant will be replaced by a new one using the current design criteria of 50-year storm event for the drainage area of 13.0 acres. However, neither system is capable of handling potential floodwaters from San Francisquito Creek during extreme storm events. Even though the Henderson Underpass and its vicinities do not belong to the San Francisquito Creek Watershed, according to current roadway profiles and cross sections, the floodwaters coming from the soundwall opening at Laurel Avenue may flow northerly beyond the Willow Raod Intersection to flood the depressed freeway section. Caltrans cannot protect this section of Highway 101 from extreme flood events.

Summary

(1) The proposed project to construct auxiliary lanes will not result in significant adversely impacting the existing FEMA 100-year floodplain.

(2) Any future modification or replacement of the San Francisquito Creek Bridge should not reduce the current waterway area.

(3) The openings in the soundwalls at both Laurel Avenue and at the San Francisquito Creek Bridge that are designed to pass flood flows should not be altered as part of the auxiliary lane project.

(4) Portions of the proposed auxiliary lanes and existing freeway will be inundated during a 100-year flood event.

Attachments

A. Technical Information for Location Hydraulic Study.
B. Floodplain Evaluation Report Summary.
C. Project Base Floodplain Encroachment Map.
D. Memorandum from Structure Hydraulics and Hydrology to District 4, Hydraulics, March 11, 2005.
E. Transmittal Memorandum from Caltrans Headquarter Structures to District 4, Design West, June 20, 2001.
F. Email from District 4, Hydraulics, Joseph Peterson to District 4, Design West, August 5, 2002.
G. Memorandum for Project Report Review from District 4, Hydraulics to District 4, Design West, December 23, 2002.

References

A. San Francisquito CreekWatershed Study by Santa Clara Valley Water District (SCVWD), 2003.
B. San Francisquito Creek Coordinated Resource Management and Planning (CRMP) Reconnaissance Investigation Report of San Francisquito Creek, prepared by the CRMP Flood and Erosion Control Task Force, December 1997.
C. San Francisquito Creek Watershed Coordinated Resource Management and Planning (CRMP) Reconnaissance Investigation Report of San Francisquito Creek, prepared by the San Francisquito Creek Watershed CRMP Steering Committee, December 1998.
D. Flood Insurance Study by Federal Emergency Management Agency for City of East Palo Alto, California, San Mateo County, Revised August 23, 1999.

This Location Hydraulic Study has been prepared under my direction as the professional engineer in responsible charge of the work.

REGISTERED PROFESSIONAL ENGINEER
GENE ZHU
No. 64139
Exp. 9/30/08
CIVIL
STATE OF CALIFORNIA

REGISTERED CIVIL ENGINEER (SIGNATURE)

Date: 12/17/07

Attachments

A. Technical Information for Location Hydraulic Study.

TECHNICAL INFORMATION FOR LOCATION HYDRAULIC STUDY

Dist. 04 Co. San Mateo & Santa Clara Rte. 101 K.P. 0.00-5.8 & 84.2-84.6
EA 235610 Bridge No. 35-0013

Floodplain Description:
The San Francisquito Creek Watershed encompasses an area of 45 square miles and extends from the Santa Cruz Mountains to the San Francisco Bay. The creek flows through five municipalities (Palo Alto, East Palo Alto, Menlo Park, Portola Valley, and Woodside) and forms the boundary between two counties (Santa Clara and San Mateo). This region includes a wide variety of land uses and natural habitats including residential, a major university, commercial shopping centers, open space preserves, grazing land, and a biological preserve. The area is also home to a diversity of socio-economic ranges, new development, and historic beauty.

1. Description of Proposal (include any physical barriers i.e. concrete barriers, soundwalls, etc. and design elements to minimize floodplain impacts)
The Route 101 is to be widened by adding auxiliary lanes in each direction from the Embarcadero Road interchange to Marsh Road interchange. This project will enhance safety, improve traffic operation at interchanges and relieve some congestions on mainline Route 101 within the project limits. There is little or no impact on existing flood plain except an existing flooding issue between Willow Road and University Ave Interchanges.

2. ADT: Current 207,000 Projected 325,000 Year 2025

3. Hydraulic Data:
Base Flood Q_{100}= 7875 * ft^3 / s WSE_{100}= 21.5 ft
The flood of record, if greater than Q_{100}: Q=_____ ft^3 / s WSE=_____ ft
Overtopping flood Q= _____ ft^3 / s WSE= _____ ft
Are NFIP maps and studies available? Yes_____ No X

* According to 1998 Coordinated Resource Management and Planning Reconnaissance Report by SCVWD

	Yes	No
4. Is the highway location alternative within a regulatory floodway?	n/a	
5. Attach map with flood limits outlined showing all buildings or other improvements within the base floodplain.		
Potential Q_{100} backwater damages:		
A. Residences?	X	
B. Other Bldgs?	X	
C. Crops?	X	
D. Natural and beneficial Floodplain values?	X	
6. Type of Traffic:		
A. Emergency supply or evacuation route?	X	
B. Emergency vehicle access?	X	
C. Practicable detour available?	X	
D. School bus or mail route?	X	

7. Estimated duration of traffic interruption for 100-year event 10-20 hours.

8. Estimated value of Q_{100} flood damages (if any) - moderate risk level.

A.	Roadway	$ minimal
B.	Property	$ 155.49 Millions *
	Total	$ 156 Millions

* According to 1998 Coordinated Resource Management and Planning Reconnaissance Report by SCVWD

9. Assessment of Level of Risk

Low X Moderate ___ High ___

For High Risk projects, during design phase, additional Design Study Risk Analysis may be necessary to determine design alternative.

PREPARED BY:

12/17/07

Signature - Dist. Hydraulic Engineer Date
(Item numbers 3, 4, 5, 7, 9)

Is there any longitudinal encroachment, significant encroachment, or any support of incompatible Floodplain development? No X Yes ____

If yes, provide evaluation and discussion of practicability of alternatives in accordance with 23 CFR 650.113

Information developed to comply with the Federal requirement for the Location Hydraulic Study Shall be retained in the project files.

Signature - Dist. Project Engineer Date
(Item numbers 1, 2, 6, 8)

Attachments

B. Floodplain Evaluation Report Summary.

Floodplain Evaluation Report Summary

Dist. 04 Co. San Mateo & Santa Clara Rte. 101 K.P. 0.00-5.8 & 84.2-84.6
Project No. EA 04-235610 Bridge No. 35-0013

Floodplain Description
The San Francisquito Creek Watershed encompasses an area of 45 square miles and extends from the Santa Cruz Mountains to the San Francisco Bay. The creek flows through five municipalities (Palo Alto, East Palo Alto, Menlo Park, Portola Valley, and Woodside) and forms the boundary between two counties (Santa Clara and San Mateo). This region includes a wide variety of land uses and natural habitats including residential, a major university, commercial shopping centers, open space preserves, grazing land, and a biological preserve. The area is also home to a diversity of socio-economic ranges, new development, and historic beauty.

	Yes	No
1. Is the proposed action a longitudinal encroachment of the base floodplain?		X
2. Are the risks associated with the implementation of the proposed action significant?		X
3. Will the proposed action support probable incompatible floodplain development?		
4. Are there any significant impacts on natural and beneficial floodplain values?		
5. Routine construction procedures are required to minimize impacts on the floodplain. Are there any special mitigation measures necessary to minimize impacts or restore and preserve natural and beneficial floodplain values? If yes, explain.		X
6. Does the proposed action constitute a significant floodplain encroachment as defined in 23 CFR, Section 650.105(q).		X
7. Are Location Hydraulic Studies that document the above answers on file? If not explain.	X	

PREPARED BY: 12/17/07

Signature - Dist. Hydraulic Engineer — Date

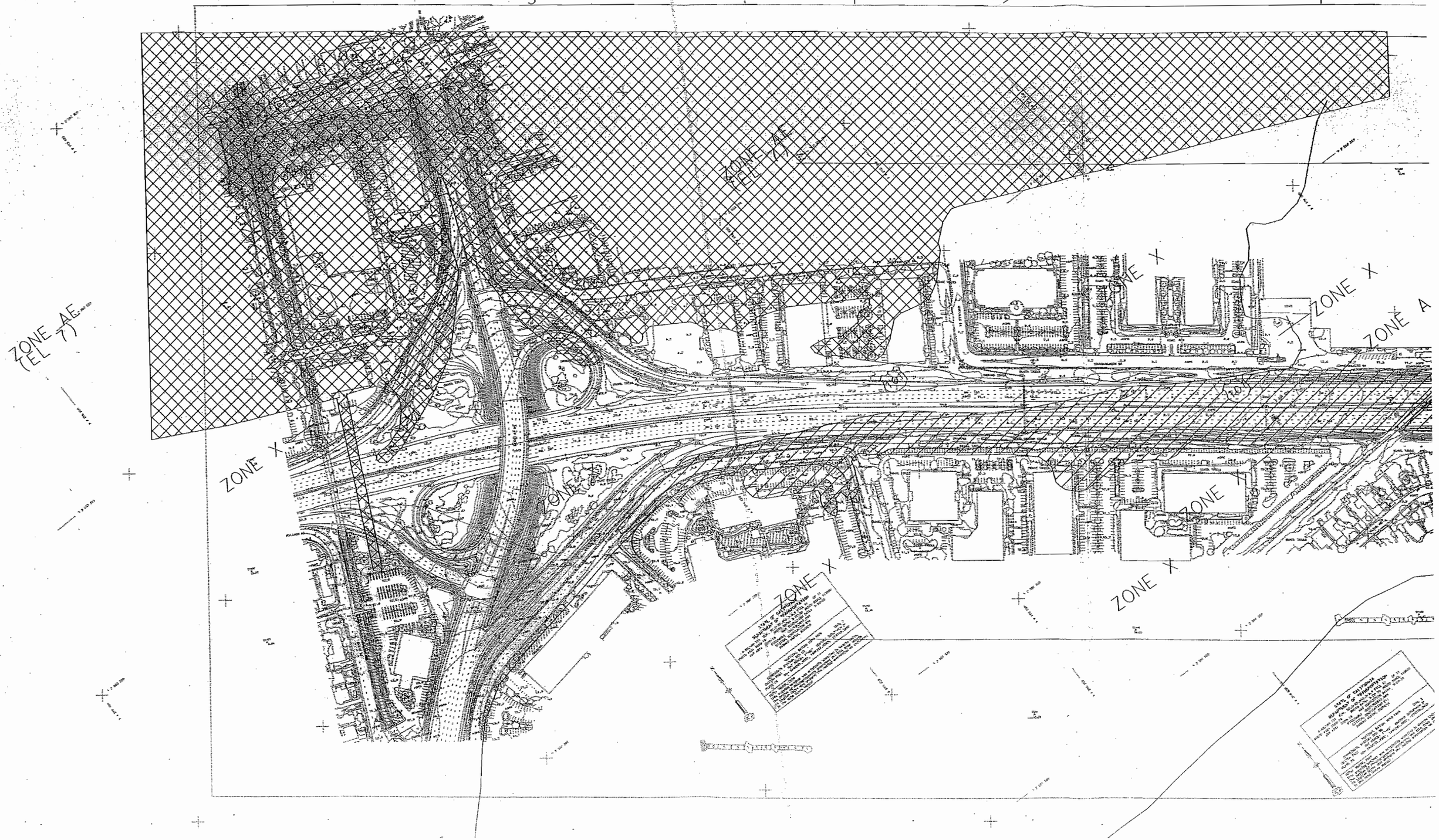
Signature - Dist. Environmental Branch Chief — Date

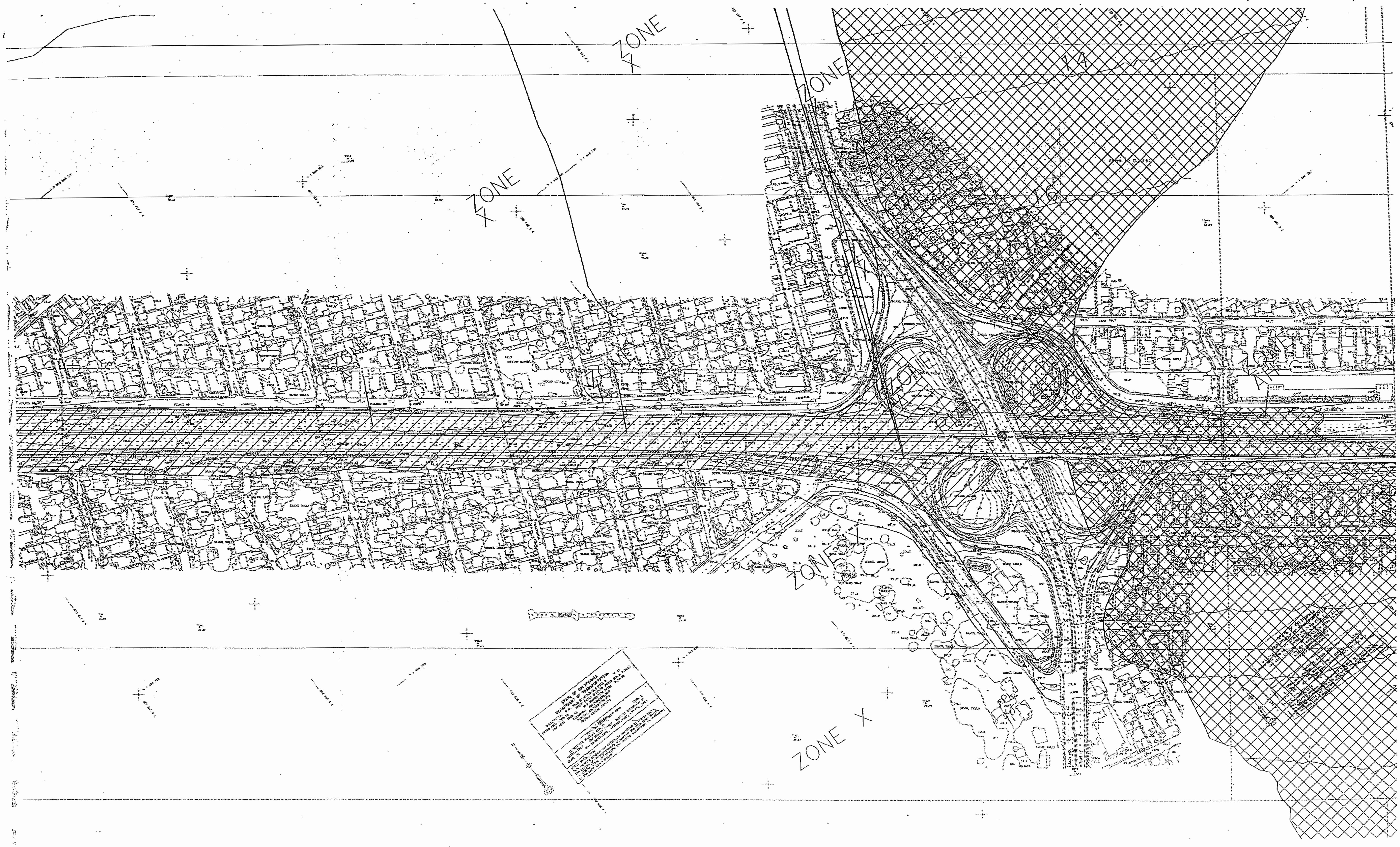
Signature - Dist. Project Engineer — Date

Attachments

C. Project Base Floodplain Encroachment Map.

Attachment C: Project Base Floodplain Encroachment Map

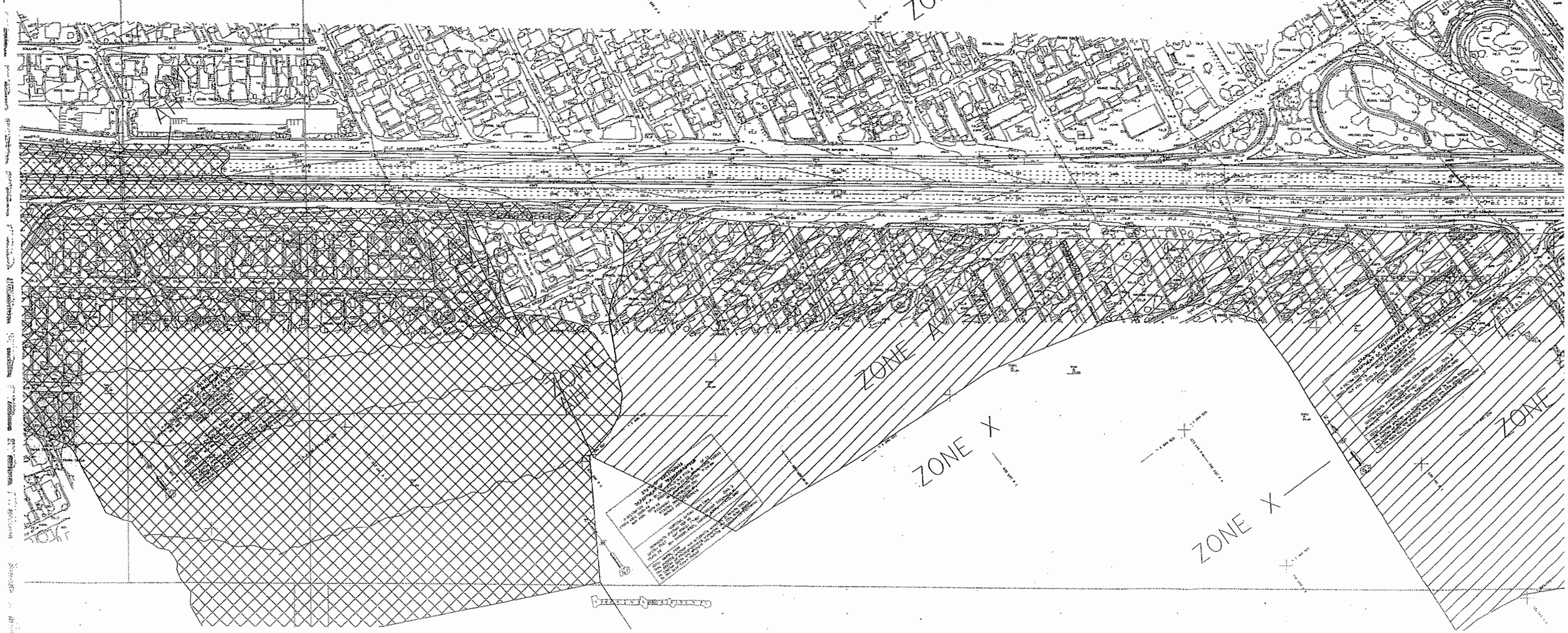


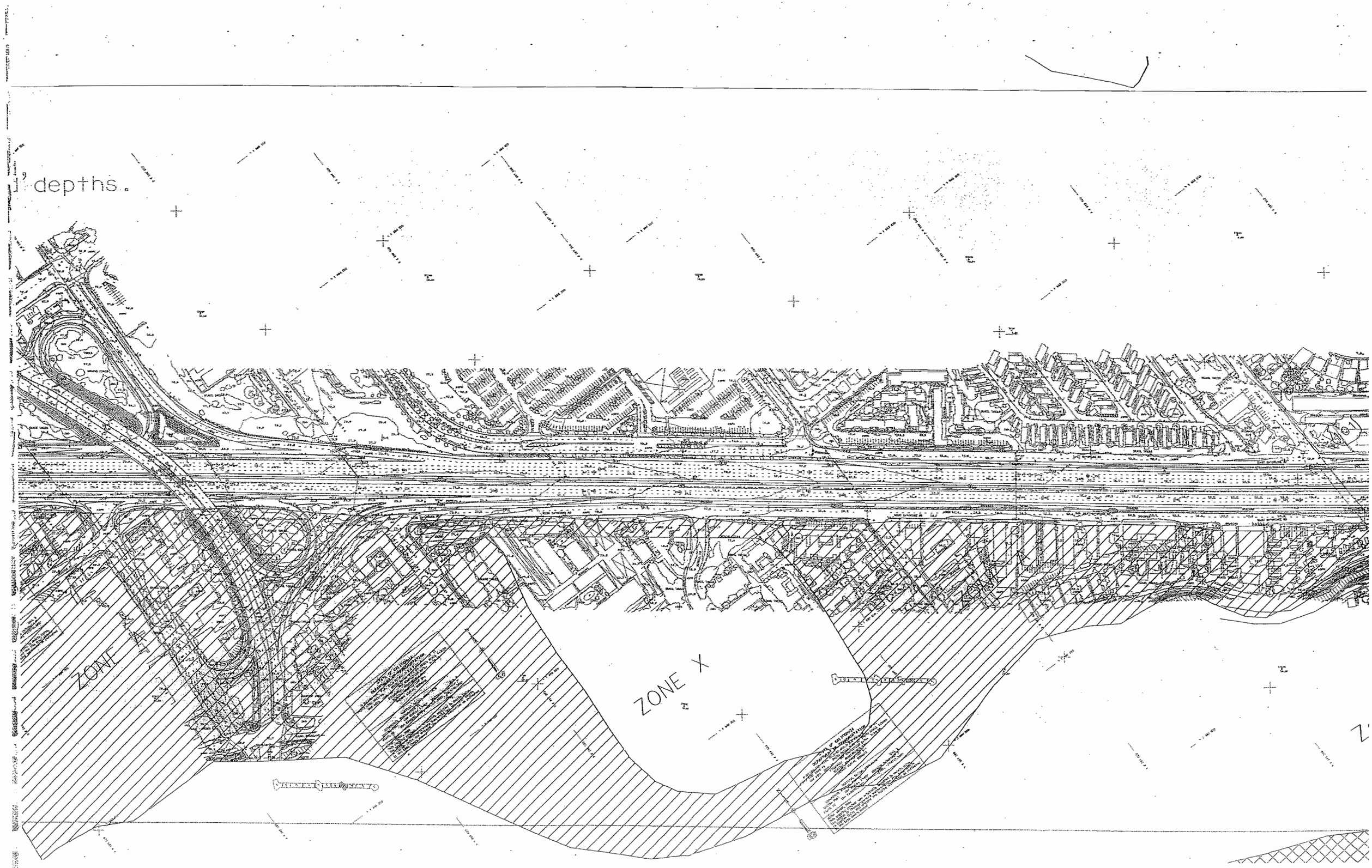

ZONE X

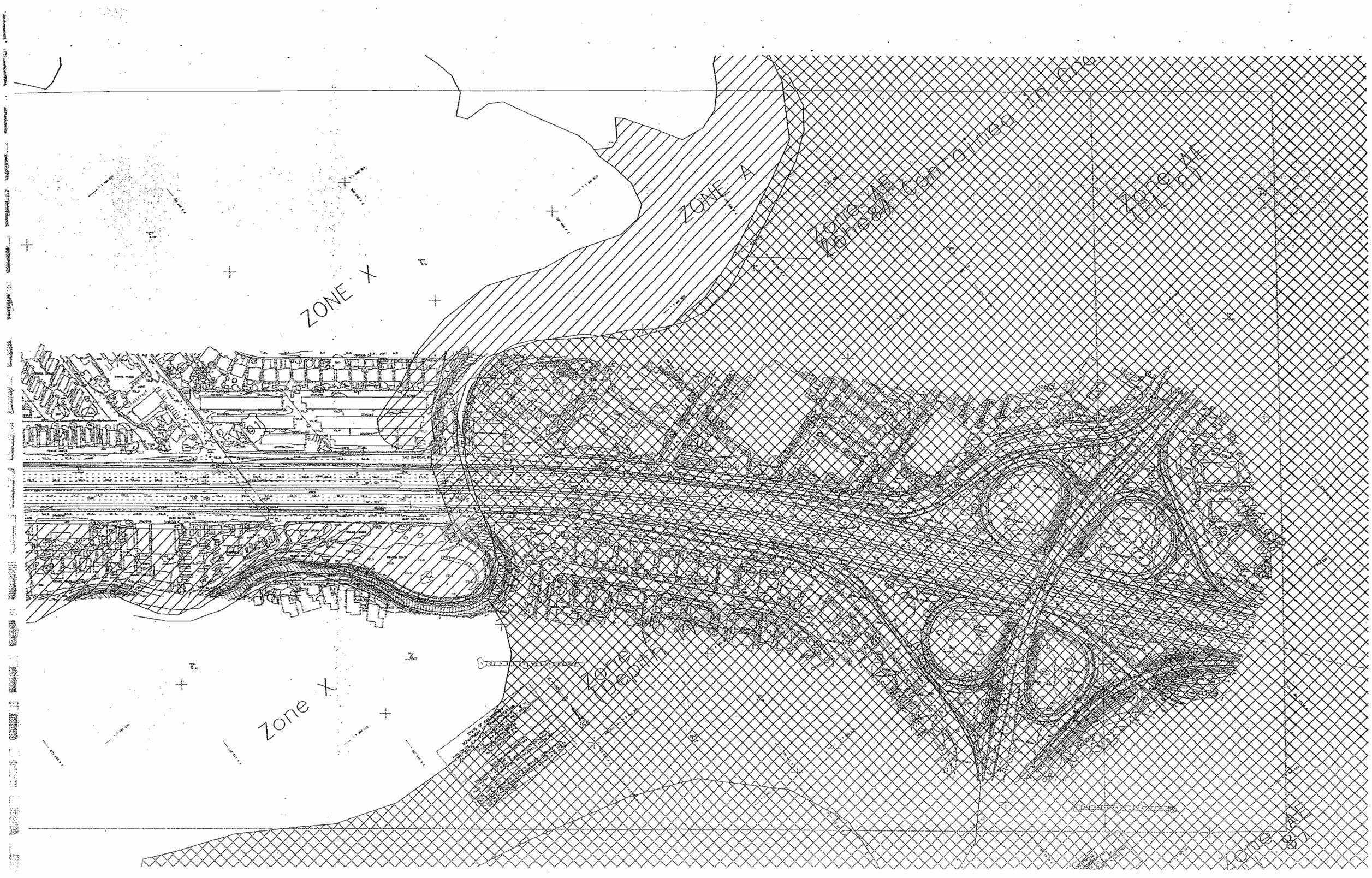
ZONE A: No base flood elevations determined.

ZONE AE, AH, AO, etc.: base flood elevations derterminned, varying from 1 to 3 feet of flood depths.

ZONE X: Areas of 500-year flood with average depths of less than 1 foot or with drainage areas less then 1 square mile, and areas protected by levees from 100-year flood.




depths.
ZONE
ZONE X
ZONE


ZONE A
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Attachments

D. Memorandum from Structure Hydraulics and Hydrology to District 4, Hydraulics, March 11, 2005.

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: JOSEPH PETERSON
District Office Chief
Engineering Services II - Hydraulics

Date: March 11, 2005
File: San Francisquito Crk
Br. No. 35-0013
04-SM-101-0.1
EA 2A160K

From: STEVE NG
Senior Hydraulic/Hydrology Engineer
Structure Hydraulics and Hydrology

Subject: San Francisquito Creek Bridge Hydraulic Results

Due to recent court decisions, the public entities that maintain bridges upstream of Route 101 are expected to correct existing localized flooding issues. Flows would increase at State Route 101, if the upstream bridges (Chaucer Street Bridge and Middlefield Road Bridge) are removed or their hydraulic capacities increased. In a memorandum dated July 29, 2004, you requested our office to determine if the San Francisquito Creek Bridge across Route 101 is adequate to pass proposed design flows.

Information was gathered through your contacts in order to analyze and report observations. Liang Xu from the Santa Clara Valley Water District (SCVWD) provided a preliminary model in HEC-RAS version 3.0. The cross-sections in the HEC-RAS model are composed of surveys, aerial surveys and a construction plan for San Francisquito Creek Levee Project. SCVWD last updated the model in February 2004, to incorporate levee improvements.

The levee improvement project consists of raising the existing levees and raising the existing floodwall elevations. The levee work ranges from approximately 4500 feet downstream of State Route 101 to approximately 1300 feet upstream of State Route 101. Structure Hydraulics does not know what level of protection the new levee elevations provide, but these new elevations are reported to be overtopped in a less than 50-year frequency event (Q50).

Liang Xu provided the 10-year and 100-year events to Structure Hydraulics on February 2, 2005. The 10-year frequency discharge is approximately 4900 cubic feet per second and the 100-year frequency discharge (Q100) is approximately 9300 cubic feet per second. This Q100 assumes future channel modifications are made and the 9300 cubic feet per second is conveyed to the bridge site route 101.

After careful review of the HEC-RAS model and minimal modifications, Structure Hydraulics has determined that the existing San Francisquito Creek Bridge (Br. No. 35-0013) is adequate to convey the Q100. The bridge will experience pressure flow and cause some minor backwater; therefore, all precautions should be taken in order to have the waterway area clear of obstructions and sediment deposit. The existing structure causes approximately 1000 feet of backwater. The backwater starts with approximately 0.9 feet just upstream of the bridge and converges to zero approximately 1000 feet upstream of the bridge.

If you have any further questions for Structure Hydraulics, please feel free to call me at 916-227-8018 or Genaro Doria at 916-227-9369.

C: File

Attachments

E. Transmittal Memorandum from Caltrans Headquarter Structures to District 4, Design West, June 20, 2001.

U.S. REC. DIST. 9 CENTERS

OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

TRANSMITTAL MEMORANDUM

STRUCTURES
Office of Special Funded Projects – MS12
1801 30TH Street – FMP I
Sacramento, CA 95816

TO: Caltrans	DATE: June 20, 2001
District 4, Design West - Peninsula	PROJECT DESCRIPTION: 04-SM-101-0.0/3.6 Henderson UP (Replace) + 2 Br. No. 35 0012
ATT'N: Duat Nguyen / Rasool Khamsehi	EA: 04-235610

FROM:
Tracy L. Bertram
(916) 445-7923

BY:

_ FC MAIL	_ OVERNIGHT MAIL	_ PP	_ UNDER SEPARATE COVER
_ UPS	_ MESSENGER	_ OTHER	X ROUTE SLIP

FOR:

_ APPROVAL	_ INFORMATION ONLY	_ REVIEWED-NO ADDITIONAL COMMENTS
_ YOUR USE	_ APPROVED AS SUBMITTED	X REVIEWED-SEE ADDITIONAL COMMENTS
_ AS REQUESTED	_ APPROVED AS NOTED	_ RETURN _____ CORRECTED PLANS
REVIEW AND COMMENT	_ RETURNED FOR CORRECTIONS	_ SIGN AND RETURN _____ COPIES

ENCLOSURES:

Supplemental Comments:

Please reference our memo of 06-19-01.

Regarding Henderson UP (Replace): the width dimensions shown for the new bridge seem to be in error. The overall width is shown as 11.680 meters. However, the sum of the half width dimensions is 6.610 meters. If the latter is the correct width, then the estimate shown of $4,350,000.00 is about double the correct amount. We understand that Mark Thomas & Co. is currently revising this APS. We will provide additional comments after reviewing the resubmittal.

Regarding San Francisquito Creek Bridge: Structure Maintenance indicates that the original San Francisquito Creek Bridge, Br. No. 35 0013 constructed in 1931, is in very poor condition. It should not be modified. If any modifications or widening are proposed, Structures strongly recommends that this bridge be replaced.
As built plans of this structure have been forwarded under separate cover.

Should there be any questions, please call.

cc: Po Chen, Mark Thomas & Co., Inc., San Jose [redacted]
File [redacted]

Attachments

F. Email from District 4, Hydraulics, Joseph Peterson to District 4, Design West, August 5, 2002.

Abolfazl Emadzadeh
08/12/02 11:16 AM

To: Tracy Bertram/HQ/Caltrans/CAGov
cc: Joseph Peterson/D04/Caltrans/CAGov@DOT, Abolfazl Emadzadeh/D04/Caltrans/CAGov@DOT, Michael Reyes/D04/Caltrans/CAGov@DOT
Subject: Re: 101 Aux Lanes to SC Co. line

Tracy what is your opinion on this? when you come to the District next time, lets all get together and talk about this

==========

Abby Emadzadeh
Project Manager
San Mateo 101 Corridor
(510) 286 - 4895 Phone
(510) 622 - 1781 Fax

---- Forwarded by Abolfazl Emadzadeh/D04/Caltrans/CAGov on 08/12/2002 11:13 AM ----

Duat Dinh Nguyen
08/05/2002 02:18 PM

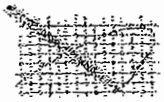
To: Tracy Bertram/HQ/Caltrans/CAGov@DOT
cc: Joseph Peterson/D04/Caltrans/CAGov@DOT, Abolfazl Emadzadeh/D04/Caltrans/CAGov@DOT, Michael Reyes/D04/Caltrans/CAGov@DOT, jcostantini@rc.mthomas.com, poppelm@samtrans.com
Subject: Re: 101 Aux Lanes to SC Co. line

Tracy,

So, according to Joe Peterson, the San Francisquito Creek Bridge replacement, if necessary, is not because of capacity deficiency. It's the Structure call.
Please review the lastest Bridge Structure Inspection and the consultant Bridge Evaluation Report and advise us. Thanks..

DDN.

---- Forwarded by Duat Dinh Nguyen/D04/Caltrans/CAGov on 08/05/2002 01:50 PM ----



Joseph Peterson
08/05/2002 12:46 PM

To: Duat Dinh Nguyen/D04/Caltrans/CAGov@DOT
cc:
Subject: Re: 101 Aux Lanes to SC Co. line

Duat, Hydraulics met with Santa Clara Valley Water District (Roy Weese), the City of Palo Alto (Joe Teresi) and the City of East Palo Alto to discuss their plans to restore the levee height downstream of Route 101 and reconstruct the floodwall just upstream of the San Francisquito Creek crossing at Route 101. Roy explained how future modeling would be required to determine an ultimate flow in this reach. However, he also stated that the San Francisquito Bridge crossing at Route 101 was not the bottleneck. He didn't see why this bridge would need to be replaced in the future due to capacity. The confusion lies in the statement regarding the 13-year return period. What actually happens is this: The bridges at both Chaucer Street and Middlefield Road restrict the amount of flow delivered to Caltran's bridge at Route 101. The flow which escapes the creek at these bridge locations never re-enters the creek. In summary, the bridge at Route 101 will not require modification or replacement to accomodate greater flows. Right now, the greatest event contained within the creek prior to overtopping is a 13-year storm. I agree that the San Francisquito Creek Bridge replacement is unnecessary based on hydraulic capacity. If the existing bridge is in disrepair and requires replacement, Tracy Bertram should make that call.

Attachments

G. Memorandum for Project Report Review from District 4, Hydraulics to District 4, Design West, December 23, 2002.

AB

State of California

Business, Transportation and Housing Agency

Memorandum

To: DUAT NGUYEN
DISTRICT BRANCH CHIEF
P/D PENINSULA

Date: Dec. 23, 2002

File: 04-SCL-101-KP 84.0/89.5
04-SM-101-KP0.0/3.6
EA 235610
Auxiliary Lanes

Attn: Michael Reyes

From: **DEPARTMENT OF TRANSPORTATION – DISTRICT 4**
Hydraulics

Subject: Project Report Review

The Hydraulics Branch has reviewed the Project Report for the above referenced project. Two main hydraulics issues have to be emphasized. The first one is the San Francisquito Creek Bridge.

As the report agreed with Caltrans, the existing bridge can not be widened. It is either untouched or replaced with a new bridge. The replacement of the bridge has to be approved by Caltrans headquarters' Division of Structures.

The second issue is the flooding along Route 101 between Willow Road and Menalto Avenue. Currently, surface runoff along Laurel Avenue drains through the staggered soundwall and onto a contoured area adjacent to the southbound lanes of Route 101. As the water ponds, it eventually encroaches onto the freeway and crosses the median through a section of thrie beam barrier. The report did not discuss this problem. Further hydraulic study is needed and drainage improvements are expected at this site to accommodate the proposed auxiliary lanes.

If you have any questions or comments, please call me at 510-286-6377 or Yaping Liu at 510-286-4875.

Joseph Peterson
District Branch Chief
Hydraulics Branch

cc: Hydraulics files

ATTACHMENT M

STORM WATER DATA REPORT (SWDR) APPROVAL SHEET

Long Form - Storm Water Data Report

Caltrans

Dist-County-Route: 04-SM-101, 04-SCL-101

Post Mile Limits: PM 0.0/3.6 in SM
PM 52.2/52.6 in SCL

Project Type: Highway Widening

EA: 235610

RU: 243

Program Identification: STIP

Phase: ☐PID ☒PA/ED ☐PS&E

Regional Water Quality Control Board(s): San Francisco Bay Region, RB-2

Is the project required to consider incorporating Treatment BMPs? ☒Yes ☐No

If yes, can Treatment BMPs be incorporated into the project? ☒Yes ☐No

If No, a Technical Data Report must be submitted to the RWQCB at least 30 days prior to Advertisement. List submittal date: _____

Total Disturbed Soil Area: 8.4 acres (3.4 hectares)

Estimated Construction Start Date: 04/01/2011 Construction Completion Date: 11/01/2013

Notification of Construction (NOC) Date to be submitted: 05/01/2010

Notification of ADL reuse (if Yes, provide date) ☒Yes Date: TBD ☐No

Separate Dewatering Permit (if Yes, permit number) ☒Yes Permit #: TBD ☐No

This Report has been prepared under the direction of the following Licensed Person. The Licensed Person attests to the technical information contained herein and the data upon which recommendations, conclusions, and decisions are based. Professional Engineer or Landscape Architect stamp required at PS&E.

AIJUN DING, *Registered Project Engineer* — Date: 12/17/2007

I have reviewed the storm water quality design issues and find this report to be complete, current, and accurate:

RONALD MORIGUCHI, *Project Manager* — Date: 12/21/07

Mong Nguyen for **ROBERT BRAGA**, *Designated Maintenance Representative* — Date: 12/21/07

DAVID YAM, *Designated Landscape Architect Representative* — Date: 12/27/07

REGISTERED PROFESSIONAL ENGINEER
AIJUN DING
No. C58899
Exp. 06/30/2009
CIVIL
STATE OF CALIFORNIA

STAMP
[Required for PS&E only]

for **KAMRAN NAKHJIRI**, *District/Regional SW Coordinator or Designee* — Date: 12/21/07

ATTACHMENT N

RISK MANAGEMENT PLAN

RISK REGISTER EA 23561_
RT 101 AUX. LANE BETWEEN EMBARCADERO RD AND MARSH RD

Priority	Draft Risk Register: Identification							Qualitative Analysis							Response Strategy			Monitoring and Control		
	Status	Id	Category of Risk	Date Phase Risk Identified Project Phase	Identified Risk (must be specific and measurable)	Additional Information	Risk Trigger	Probability		Impact: Type	Impact: Estimated Impact	Impact: Est. Impact x Probability	Impact: Evaluated Impact	Risk Matrix	Strategy	Response Options/Actions	WBS Tasks Affected	Task Owner / Function	Status Interval or Milestone Check	Changes and Comments: (List dates for all changes and entries made to this log)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
	Closed	1.1	TECHNICAL	Date 6/6/2007 Phase Id'd PA&ED Unit Risk Id'd By DESIGN Affected Phase PA&ED	Exception To Mandatory Design Standard Lane Widths San Francisquito Bridge	Existing bridge can accommodate the addition of auxiliary lanes. Approval of exception to mandatory design lane width is required which will be contingent upon implementation of a subsequent project which will replace the San Francisquito Bridge restoring the lane widths to mandatory design standards.	Addition of Auxiliary Lanes Existing San Francisquito Bridge	M	50%	Cost ($) Time (X) Scope (S) Quality (Q)	$6,900,000 CLICK TO GO TO REFERENCE CLICK TO GO TO REFERENCE	$3,450,000		Probability VH H M L VL; Impact VL L M H VH	Acceptance	Pursue Exception to Mandatory Design Standards This risk can also affects risk #:	WBS 180 Prepare and Approve Project Report and Final Environmental Document	TASK OWNER Tablez Nemariam 510-286-4897 FUNCTION Project Development	Monthly	Design Exception Approved. SFC Bridge Replacement included in 2008 SHOPP
	Active	1.3	TECHNICAL	Date 6/6/2007 Phase Id'd PA&ED Unit Risk Id'd By DESIGN Affected Phase PA&ED	Freeway Closure	Demolition of existing Ringwood Pedestrian Over-crossing (POC) and Henderson Under Pass (UP) structures may require full closure of the freeway requiring detours.	Demolition of Ringwood POC and Henderson UP Structure	VH	90%	Cost ($) Time (X) Scope (S) Quality (Q)	CLICK TO GO TO REFERENCE CLICK TO GO TO REFERENCE			Probability 0 H M L VL; Impact VL L M H VH	Mitigation	Include in TMP This risk can also affects risk #:	WBS 180 Prepare and Approve Project Report and Final Envionmental Document	TASK OWNER Tablez Nemariam 510-286-4897 FUNCTION Project Development	Transfer to PS&E	
	Closed	1.4	TECHNICAL	Date 6/6/2007 Phase Id'd PA&ED Unit Risk Id'd By DESIGN Affected Phase PA&ED	Transverse Crossing of Utilities at Freeways	There are numerous utilities that transversely cross Route 101 within project limits. Some of these utilities may require an exception to the Departments Encroachment Policy for crossing at less than 60 degrees.	Encroachment Policy	H	70%	Cost ($) Time (X) Scope (S) Quality (Q)	CLICK TO GO TO REFERENCE CLICK TO GO TO REFERENCE			Probability VH H M L VL; Impact VL L M H VH	Acceptance	Pursue Exception to Encroachment Policy This risk can also affects risk #:	WBS 180 Prepare and Approve Project Report and Final Envionmental Document	TASK OWNER Tablez Nemariam 510-286-4897 FUNCTION Project Development	Monthly	Approval of Encroachment Policy received
	Closed	1.5	TECHNICAL	Date 7/11/2007 Phase Id'd PA&ED Unit Risk Id'd By STRUCTURES Affected Phase PA&ED	Bridge Closure During Construction Henderson Underpass Structure	Trains are required to operate during freeway widening. Henderson Underpass Structure will therefore, be widened prior to freeway widening. Risk has occurred since interruption of train services is not permitted at any time including during time required to widen the bridge.	Inadequate Width of the Bridge Deck	H	70%	Cost ($) Time (X) Scope (S) Quality (Q)	CLICK TO GO TO REFERENCE CLICK TO GO TO REFERENCE			Probability VH H M L VL; Impact VL L M H VH	Acceptance	This risk can also affects risk #: 1.6, 1.7, 1.8, 1.10	WBS 190 Prepare Structure Site Plans	TASK OWNER Samad Hamoud 510-286-5790 FUNCTION Bridge Design Branch Chief	Monthly	Henderson RR Bridge Replacement removed from Project Scope
	Closed	1.6	TECHNICAL	Date 7/11/2007 Phase Id'd PA&ED Unit Risk Id'd By STRUCTURES Affected Phase PA&ED	Lead Paint Structural Steel Henderson Underpass Structure	Existing structural steel structure will be removed and replaced by a new structural steel structure. Portions of existing structure will be torched causing release of lead in the environment. This may cause environmental and health issues requiring a California EPA permit.	Lead Paint in Structural Steel	H	70%	Cost ($) Time (X) Scope (S) Quality (Q)	CLICK TO GO TO REFERENCE CLICK TO GO TO REFERENCE			Probability VH H M L VL; Impact VL L M H VH	Avoidance	This risk can also affects risk #: 1.5, 1.7, 1.10, 1.8	WBS 180 Prepare and Approve Project Report and Final Environmental Document	TASK OWNER Samad Hamoud 510-286-5790 FUNCTION Bridge Design Branch Chief	Monthly	Henderson RR Bridge Replacement removed from Project Scope
	Closed	1.7	TECHNICAL	Date 6/7/2007 Phase Id'd PA&ED Unit Risk Id'd By STRUCTURES Affected Phase PA&ED	Design Review Time Henderson Underpass Structure	Railroad companies in the past have taken unusually long time to complete review of documents resulting in impact to schedule.	Design Review Time	H	70%	Cost ($) Time (X) Scope (S) Quality (Q)	CLICK TO GO TO REFERENCE CLICK TO GO TO REFERENCE			Probability VH H M L VL; Impact VL L M H VH	Avoidance	This risk can also affects risk #: 1.5, 1.7, 1.10, 1.8	WBS 240 Prepare Draft Structures PS&E	TASK OWNER Samad Hamoud 510-286-5790 FUNCTION Bridge Design Branch Chief	Monthly	Henderson RR Bridge Replacement removed from Project Scope
	Active	1.8	TECHNICAL	Date 6/7/2007 Phase Id'd PA&ED Unit Risk Id'd By STRUCTURES Affected Phase PA&ED	Traffic Delays Ringwood Pedestrian Over-Crossing	False-work required to support the over-crossing structure may cause traffic delays during construction.	Impact of False Work on Traffic	M	50%	Cost ($) Time (X) Scope (S) Quality (Q)	CLICK TO GO TO REFERENCE CLICK TO GO TO REFERENCE			Probability VH H M L VL; Impact VL L M H VH	Avoidance	Review Alternatives to False work This risk can also affects risk #:	WBS 180 Prepare and Approve Project Report and Final Environmental Document	TASK OWNER Samad Hamoud 510-286-5790 FUNCTION Bridge Design Branch Chief	Transfer to PS&E Phase	Consider using Precast Bridge Segments
	Active	1.9	TECHNICAL	Date 10/10/2007 Phase Id'd PA&ED Unit Risk Id'd By STRUCTURES Affected Phase PA&ED	Widening of Hetch Hetchy Aqueduct	Proximity of proposed CIDH piles to the existing water lines under Hetch Hetchy Aqueduct may damage the large water pipes.	Highway widening requires bridge widening	L	30%	Cost ($) Time (X) Scope (S) Quality (Q)	CLICK TO GO TO REFERENCE CLICK TO GO TO REFERENCE			Probability VH H M L VL; Impact VL L M H VH	Avoidance	PS&E Phase This risk can also affects risk #:	WBS 180 Prepare and Approve Project Report and Final Environmental Document	TASK OWNER Tablez Nemariam 510-286-4897 FUNCTION Project Development	Transfer to PS&E Phase	
	Closed	1.10	TECHNICAL	Date 3/24/2008 Phase Id'd PA&ED Unit Risk Id'd By DESIGN Affected Phase PA&ED	Exception To Mandatory Design Standard Lane Widths Henderson UP Bridge	Existing bridge can accommodate the addition of auxiliary lanes. Approval of exception to mandatory design lane width is required. SMCTA has concurred with this action as it will be reconsidered as part of a future Dumbarton Rail Corridor project.	Addition of Auxiliary Lanes Existing Henderson UP Bridge	M	50%	Cost ($) Time (X) Scope (S) Quality (Q)	$41,900,000 CLICK TO GO TO REFERENCE CLICK TO GO TO REFERENCE	$20,950,000		Probability VH H M L VL; Impact VL L M H VH	Acceptance	Pursue getting Design Exceptions This risk can also affects risk #: 1.5, 1.6, 1.7, 1.8	WBS 180 Prepare and Approve Project Report and Final Environmental Document	TASK OWNER Tablez Nemariam 510-286-4897 FUNCTION Project Development	Monthly	Design Exceptions Approved
	Active	1.11	TECHNICAL	Date 3/24/2008 Phase Id'd PA&ED Unit Risk Id'd By DESIGN Affected Phase PA&ED	AC Overlay	Since the new lanes will need to shift, they will not line up with existing lane lines. If pavement is ruined during removal of existing striping, AC overlay may be required. If PCC pavement and AC pavement is in Lane #2, AC Overlay may be required.	Shifting Lane Lines	H	70%	Cost ($) Time (X) Scope (S) Quality (Q)	$5,000,000 CLICK TO GO TO REFERENCE CLICK TO GO TO REFERENCE	$3,500,000		Probability VH H M L VL; Impact VL L M H VH	Acceptance	Review Alternatives to Overlay This risk can also affects risk #:	WBS 180 Prepare and Approve Project Report and Final Environmental Document	TASK OWNER Tablez Nemariam 510-286-4897 FUNCTION Project Development	Transfer to PS&E	Value Analysis at PS&E

Draft Risk Register

Priority	Identification							Qualitative Analysis							Response Strategy			Monitoring and Control		
	Status	Id	Category of Risk	Date Phase Risk Identified Project Phase	Identified Risk (must be specific and measurable)	Additional Information	Risk Trigger	Probability		Impact: Type	Impact: Estimated Impact	Impact: Est. Impact x Probability	Impact: Evaluated Impact	Risk Matrix	Strategy	Response Options/Actions	WBS Tasks Affected	Task Owner / Function	Status Interval or Milestone Check	Changes and Comments: (List dates for all changes and entries made to this log)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
	Closed	3.1	ENVIRONMENTAL	Date 10/10/2007 Phase Id'd PA&ED Unit Risk Id'd By ENVIRONMENTAL Affected Phase PA&ED	New Air Quality Requirements May Impact Project Schedule	Traffic forecasts and congestion time durations on Route 101 caused by addition of auxiliary lanes, may impact the new air quality criteria as defined by 40 CFR 93. This may result in non acceptance by FHWA, causing impact to project schedule.	Risk is triggered by the new criteria	VL	10%	Cost ($) Time (X) Scope (S) Quality (Q)	CLICK TO GO TO REFERENCE CLICK TO GO TO REFERENCE			Probability VL L M H VH / Impact VL L M H VH	Mitigation	This risk can also affects risk #:	WBS 180 Prepare and Approve Project Report and Final Environmental Document	TASK OWNER Glenn Kinoshita (510) 286-5677 FUNCTION Env Planning	Monthly	Air Quality Study done No impact to schedule
	Active	3.2	ENVIRONMENTAL	Date 2/28/2008 Phase Id'd PA&ED Unit Risk Id'd By ENVIRONMENTAL Affected Phase PA&ED	Aerially Deposited Lead Removal and Disposal Costs May Be Excessive	Without field testing, assumptions need to be made as to the extent of aerially deposited lead that would need to be removed and disposed of.	Risk is triggered by the need to develop a cost estimate for the Project Report	M	50%	Cost ($) Time (X) Scope (S) Quality (Q)	$4,000,000 CLICK TO GO TO REFERENCE CLICK TO GO TO REFERENCE	$2,000,000		Probability VL L M H VH / Impact VL L M H VH	Mitigation	This risk can also affects risk #:	WBS 165 Perform Environmental Studies and Prepare Draft Environmental Document (DED)	TASK OWNER Chris Wilson (510) 286-5647 FUNCTION Env Engineering	Review estimate during PS&E phase, after physical testing and site investigation is performed.	Assumption used for the Draft PR is that the top 1' of excavated area is contaminated with ADL and would require disposal at a Class 1 facility. Cost estimated at $4M.
	Active	3.3	ENVIRONMENTAL	Date 6/6/2007 Phase Id'd PA&ED Unit Risk Id'd By DESIGN Affected Phase PA&ED	Removal of Existing Trees	New location of the pedestrian ramp requires removal of existing mature trees along the frontage road behind sound wall. City of Menlo Park has strong tree ordinance which may require public hearings to determine feasibility of trimming and removing existing trees if these trees are dedicated as heritage trees.	Most Preferred Location of Pedestrian Ramp.	H	70%	Cost ($) Time (X) Scope (S) Quality (Q)	CLICK TO GO TO REFERENCE CLICK TO GO TO REFERENCE			Probability VL L M H VH / Impact VL L M H VH	Mitigation	Tree Survey vs. POC Location This risk can also affects risk #:	WBS 180 Prepare and Approve Project Report and Final Environmental Document	TASK OWNER Tablez Nemariam 510-286-4897 FUNCTION Project Development	Transfer to PS&E	Changed Risk Category Technical to Environmental.
	Active	5.1	PROJECT MANAGEMENT	Date 5/9/2007 Phase Id'd PA&ED Unit Risk Id'd By PPM Affected Phase PA&ED	Project Split	Timeline of the Env. Process to replace the SFC Bridge is longer than the Roadway Work. This Impacts the overall Project Schedule. The San Francisquito Creek (SFC) Bridge will therefore, be separated from the Roadway Contract. Roadway Project will further split into smaller construction contracts for competitive bidding.	Splitting Project into smaller contracts will impact the Support Cost of the Project and will possibly impact the Schedule. Splitting may however overcome increase in Support Cost.	H	70%	Cost ($) Time (X) Scope (S) Quality (Q)	CLICK TO GO TO REFERENCE CLICK TO GO TO REFERENCE			Probability VL L M H VH / Impact VL L M H VH	Mitigation	Program Separate Project in SHOPP This risk can also affects risk #:		TASK OWNER Ron Moriguchi (510) 286-5073 FUNCTION Project Management	Transfer to PS&E	SFC Bridge Replacement Project was amended into the 2008 SHOPP. A separate PA&ED document will be done for the SFC Bridge.
	Closed	6.1	R/W	Date 5/9/2007 Phase Id'd PA&ED Unit Risk Id'd By RIGHT OF WAY Affected Phase PS&E	Approval of Policy Exception Utility Crossing	Numerous Utilities cross Rt 101 transversely at less than 60 degrees, requiring State approval of policy exception on Encroachment Permits. If not approved, relocations will be required adding to the cost of the Project. Design may also require additional ROW to relocate utilities. This could result in impacting both Cost and Schedule.	Existing Utilities Estimated ROW lead times are: 1. Utility relocations 18 months, 2. ROW Engineering (Appraisal Maps, Acquisition etc) 14 months. Utilities should therefore, be cleared early to avoid risk	M	50%	Cost ($) Time (X) Scope (S) Quality (Q)	CLICK TO GO TO REFERENCE CLICK TO GO TO REFERENCE			Probability VL L M H VH / Impact VL L M H VH	Acceptance	Pursue Exception to Encroachment Policy This risk can also affects risk #: 1.4	WBS 205 Obtain Permits, Agreements, and Route Adoptions	TASK OWNER Tina Allen (510)286-5492 FUNCTION ROW	Monthly	No Utility Relocation required
	Closed	6.2	R/W	Date 5/9/2007 Phase Id'd PA&ED Unit Risk Id'd By RIGHT OF WAY Affected Phase PA&ED	C & M Agreement W / Rail Road Company	Project interfaces with Cal train, where a freight train is operated by the UPRR and the Joint Powers Board. A Construction & Maintenance Agreement between the State and the Rail Road company is required to operate the facility.	C & M Agreement Estimated time required to reach an agreement with the Rail Road company is 20 months based on the PMCS data. This may be a cause of project schedule impact.	M	50%	Cost ($) Time (X) Scope (S) Quality (Q)	CLICK TO GO TO REFERENCE CLICK TO GO TO REFERENCE			Probability VL L M H VH / Impact VL L M H VH	Acceptance	This risk can also affects risk #: 1.10	WBS 205 Obtain Permits, Agreements, and Route Adoptions	TASK OWNER Tina Allen (510)286-5492 FUNCTION ROW	Monthly	No longer required
	Active	6.3	R/W	Date 6/6/2007 Phase Id'd PA&ED Unit Risk Id'd By RIGHT OF WAY Affected Phase CONSTRUCTION	Incomplete Survey Engineers File	Incomplete documentation of Survey Engineers Files may result in additional cost to project and cause delays to project activities.	Survey Engineers File State's experience on prior projects where project documentations were incomplete in the Survey Engineers File and/or the Resident Engineers File, have resulted in impacts to both cost and schedule of the project.	L	30%	Cost ($) Time (X) Scope (S) Quality (Q)	CLICK TO GO TO REFERENCE CLICK TO GO TO REFERENCE			Probability VL L M H VH / Impact VL L M H VH	Mitigation	Survey Files complete at this time This risk can also affects risk #:	WBS 220 Perform Right of Way Engineering	TASK OWNER Toni Scoralle (510)286-4968 FUNCTION ROW	Transfer to PS&E	Received new survey information for the University Avenue I/C.
				Date Phase Id'd Unit Risk Id'd By Affected Phase						Cost ($) Time (X) Scope (S) Quality (Q)	CLICK TO GO TO REFERENCE CLICK TO GO TO REFERENCE			Probability VL L M H VH / Impact VL L M H VH		This risk can also affects risk #:		TASK OWNER FUNCTION		
				Date Phase Id'd Unit Risk Id'd By Affected Phase						Cost ($) Time (X) Scope (S) Quality (Q)	CLICK TO GO TO REFERENCE CLICK TO GO TO REFERENCE			Probability VL L M H VH / Impact VL L M H VH		This risk can also affects risk #:		TASK OWNER FUNCTION		

ATTACHMENT O

TRANSPORTATION MANAGEMENT PLAN (TMP) DATA SHEET

TRANSPORTATION MANAGEMENT PLAN DATA SHEET
(Preliminary TMP Elements and Costs)

Co/Rte/PM: SM/SCL-101-SM 0.0/3.6 & SCL 52.3/52.6 EA 235610 Project Engineer Aijun Ding

Project Limit: On Route 101 in SM & SCL Counties between Embarcedero Rd I/C & March Rd I/C

Project Description: Add Aux.Lanes on Rt. 101 in both directions between Embarcedero Rd I/C and Marsh Rd I/C

1) Public Information

- X a. Brochures and Mailers $
- X b. Press Release $
- ☐ c. Paid Advertising $
- ☐ d. Public Information Center/Kiosk $
- ☐ e. Public Meeting/Speakers Bureau
- ☐ f. Telephone Hotline
- ☐ g. Internet, E-mail
- X h. Notification to impacted groups (i.e. bicycle users, pedestrians with disabilities, others…)
- ☐ i. Others $15,000.

2) Traveler Information Strategies

- ☐ a. Changeable Message Signs (Fixed) $
- X b. Changeable Message Signs (Portable)(Based on purchase of 6 signs) $180,000.
- X c. Ground Mounted Signs $5,000.
- ☐ d. Highway Advisory Radio $
- ☐ e. Caltrans Highway Information Network (CHIN)
- ☐ f. Detour maps (i.e. bicycle, vehicle, pedestrian...etc)
- ☐ g. Revised Transit Schedules/maps
- ☐ h. Bicycle community information
- ☐ i. Others _____ $

3) Incident Management

- X a. Construction Zone Enhanced Enforcement Program (COZEEP) $560,000.
- ☐ b. Freeway Service Patrol $
- ☐ c. Traffic Management Team
- ☐ d. Helicopter Surveillance $
- ☐ e. Traffic Surveillance Stations (Loop Detector and CCTV) $
- ☐ f. Others _____ $

TMP Data Sheet (cont.)

4) Construction Strategies

- X a. Lane Closure Chart
- ☐ b. Reversible Lanes
- ☐ c. Total Facility Closure
- ☐ d. Contra Flow
- ☐ e. Truck Traffic Restrictions $ _____
- ☐ f. Reduced Speed Zone $ _____
- ☐ g. Connector and Ramp Closures
- ☐ h. Incentive and Disincentive $ _____
- ☐ i. Moveable Barrier $ _____
- ☐ _____ _____
- X k. Others _____ $ _____

5) Demand Management

- ☐ a. HOV Lanes/Ramps (New or Convert) $ _____
- ☐ b. Park and Ride Lots $ _____
- ☐ c. Rideshare Incentives $ _____
- ☐ d. Variable Work Hours
- ☐ e. Telecommute
- ☐ f. Ramp Metering (Temporary Installation) $ _____
- ☐ g. Ramp Metering (Modify Existing) $ _____
- ☐ h. Others _____ $ _____

6) Alternative Route Strategies

- ☐ a. Add Capacity to Freeway Connector $ _____
- ☐ b. Street Improvement (widening, traffic signal... etc) $ _____
- ☐ c. Traffic Control Officers $ _____
- ☐ d. Parking Restrictions
- ☐ e. Others _____ $ _____

7) Other Strategies

- ☐ a. Application of New Technology $ _____
- ☐ e. Others _____ $ _____

TOTAL ESTIMATED COST OF TMP ELEMENTS = $ 760,000.

PREPARED BY H.Parekh DATE 05/17/07

APPROVAL RECOMMENDED BY Shein Lin DATE 05/17/07

ATTACHMENT P

PUBLIC COMMENTS AND RESPONSES

3.3.1 Bernardo Huerta, City of East Palo Alto

COMMENT	RESPONSE
As a participant of over eight years in matters pertaining to transportation for the city of East Palo Alto I am usually informed by agencies directly, as so are the other members of my Commission, on all matters pertaining to regional road improvements in or around East Palo Alto. As far as I have accessed, only one other resident knows about your Initial Study/Assessment, an individual in MTC's Minority Committee. Notice to City of East Palo Alto staff by your group has in no way reflected a(n) effort to fully disseminate this information to the residents or Commissions. The proof is neither Commissions of the City have been informed about this Initial Study/Assessment.	Copies of the Draft Environmental Document (DED) were hand delivered on May 12, 2008 to the city's administrative offices and public library. The Notice of Availability of the DED was also published on the same day in the *Palo Alto Daily News* and *San Mateo County Times.* The project is included and noted in several planning documents, including the (San Mateo) Countywide Congestion Management Program, and RTP (Regional Transportation Plan). The San Mateo County Transportation Authority (SMCTA) informed the city in a letter dated December 6, 2002 of the availability of the Project Study Report (PSR) for this project.
I did not find the document in the website in the notice placed in the community information billboard at City Hall. I went to the East Palo Alto Library, on May 29th, where this document is supposedly house(d) for public access. It took 30 minutes for the library staff to find your Initial Study/Assessment, which was found as unopened mail. It was handed to me from the envelope. No one had seen it.	The DED was posted to the Department's website and as noted above, hand delivered to the library's reference desk on May 12, 2008. We assume each staff understood this was information available to the public as indicated in the published notices.
As far claiming a successful campaign to disseminate this Initial Study/Assessment in the city most affected by this design, I say it is typical to sidestep this community to meet your group's needs. Please ask any resident if they are aware of your document.	The Notice of Availability of the DED was published in the *Palo Alto Daily News* and *San Mateo County Times* on June 12, 2008 and posted on the community billboard at the city's administrative offices.

COMMENT	RESPONSE
In this Initial Study/Assessment I did not see clear how this widening would reduce or increase the smog levels in East Palo Alto which are already high. As a Planning Commissioner for the City of East Palo Alto I did not find information related to economic benefits or opportunities that might affect for example zoning or traffic circulation. East Palo Alto has two connections from US101 to the Dumbarton Bridge, these connections and congestion relief were nebulous information leaving decision making on these factors just the same.	The purpose of this project is to relieve traffic congestion by improving traffic operation and efficiency on Route 101. The proposed project is not expected to result in air quality impacts and is exempt from regional and project level air quality conformity requirements under 40 CFR 93.126. All work will be within existing right of way and sound walls and therefore, should not affect economic opportunities for the city, local zoning or local traffic circulation.
I am for enhancing capacity for this section of US101 and others in areas, only these matters I have brought forth will be a concern to all East Palo Alto residents. These are significant impacts and unknowns in your Initial Study/Assessment that are not covered in an EIR and must be addressed before your group scopes for an EIR. Thank you.	The impacts associated with this project are determined not significant and do not warrant an Environmental Impact Report (EIR) under the California Environmental Quality Act (CEQA). An Initial Study/Negative Declaration is the correct level of environmental document under CEQA.

3.3.2 Charles Taylor, City of Menlo Park

COMMENT	RESPONSE
1. The new lanes of traffic will move closer to the residential properties along US 101. The additional noise and other impacts due to the closer proximity of the roadway need to be considered. The document does not provide information relative to this issue.	As concluded in the Department's *Traffic Noise Study Report*, the project does not result in significant increases in noise, even though traffic will be closer to residential properties.
2. The scope of this project includes several miles of heavy construction near residential areas. The construction impacts of the project have not been analyzed in the document. The project will take many months, if not years to complete. More specifically, the City of Menlo park would expect the environmental document to analyze the following potential impacts and provide mitigation for any identified impacts:	Overall construction impacts are temporary and not expected to be significant. Construction is scheduled from April 2011 to November 2013. Construction will occur within the existing right of way and the Route 101 sound walls except for the Ringwood Avenue pedestrian overcrossing. The duration of construction of this overcrossing is expected to be six months and a traffic management plan will be developed during the design phase to minimize traffic disruption.
a. Damage to City streets or other public infrastructure from heavy truck traffic or construction equipment. The City of Menlo Park has instituted a Building Construction Impact Fee, which should be included as part of the project.	Minimal damage is expected from the construction of the new auxiliary lanes. Heavy trucking and construction equipment will primarily use the highway for material transport and access. Material such as asphalt concrete, aggregate base and concrete will most likely be from Redwood City and the Route 84/Bayfront Expressway area. Construction of the pedestrian overcrossing may potentially affect local streets. However, any damage caused by construction activities will be monitored and recorded to ensure contractor correction after the work in the particular area is completed. Advance notification to cities affected by heavy hauling will be notified in advance to allow residents to be properly informed.
b. Impacts on emergency services access to homes and businesses where construction takes place on existing streets.	Most of the work will be confined to the existing freeway right of way except for construction of the new Ringwood pedestrian overcrossing. No roadway or driveway access points to homes and businesses are expected to be impacted and every effort will be made to maintain access to homes and businesses during construction.

COMMENT	RESPONSE
c. Impacts on local storm drains and receiving waters from the dirt and dust deposited on City streets. As well as additional dust and debris in the air.	A Storm Water Pollution and Prevention Plan (SWPPP) that adequately addresses the storm water impacts during the project construction stage will be prepared and will detail how the contractor will manage storm water impacts during construction. Feasible and appropriate construction dust and debris control measures will be implemented as part of the project to reduce construction impacts.
d. The security and safety hazards of open excavations particularly during night and weekend hours.	Construction area restrictions and use of safety measures such as barricades, temporary railing, lights, signs and other devices will be used to keep the public away from hazardous areas.
e. Construction noise from the project including construction hours of operation.	Construction noise will be a short-term impact and temporary. Nevertheless, the noise level from the construction operation will comply with all local sound control and noise level rules, regulations and ordinances.
f. Additional delay on the freeway due to construction activity and the impact on public streets in the area (i.e., delay on approaches to the freeway construction, public street impacts during overcrossing construction, etc.)	Every effort will be made to minimize delays to the traveling traffic. A traffic management plan will be developed for the sole purpose of minimizing delays and detour-related disruptions during construction. This will be developed during the final design phase.
operational. The details regarding the construction of the overcrossing need to be provided. Also the detailed design issues including visual impacts, location of ramps (adjacent to freeway or opposite side of frontage road), security, etc. need to be analyzed and information provided. Caltrans will need to submit plans for review and approval of the design and apply for necessary encroachment permits	

COMMENT	RESPONSE
4. The project will require large amounts of material to be hauled on and off the project site. A detailed plan and an analysis of any potential impacts and mitigation for this excavation and hauling work need to be included in the EIR. Any proposed truck routes through Menlo Park would require review and approval by the City of Menlo Park.	Any work requiring use of city streets to access the work zone will be coordinated with the city, including pre-approved truck routes. Notification of heavy hauling operations should be at least 7 days in advance to allow residents to be informed. In addition, there will be periods of one-way traffic control on city streets for work related to the construction of the pedestrian overcrossing.
5. The criteria for assessing the traffic impacts associated with the project should follow the City of Menlo Park criteria related to the impact or other applicable standard, whichever is more conservative.	Typically, for freeway mainline auxiliary lane projects, off-ramp terminal intersections are analyzed to determine if queues will extend back onto the freeway mainline. Other local intersections are usually not included in this analysis since they are impacted by additional factors beyond the freeway mainline operations. Therefore, these off-ramp intersections where analyzed independent of adjacent intersections and unconstrained forecasted demand volumes were used for the local street approaches to these intersections as a more conservative approach to this analysis. In reality, the future forecasted demand volumes would be constrained on University Ave., Donohoe St., and Marsh Rd. as these streets are currently congested during the PM peak hour. Since these local roadways are currently at capacity, they will not be able to accommodate additional future traffic demand for either the Build and the No Build scenarios. In reality, both the NB Route 101 off-ramp/Donohoe

COMMENT	RESPONSE
	St. and the SB Route 101 off-ramp/University Avenue intersections would be operating with similar LOS in 2035. In addition, if the auxiliary lanes are not constructed, the on-ramp merge will be constrained due to congestion at the merge segments on both northbound and southbound Route 101 for the 2035 No-Build alterative, during the PM peak hour. This will cause the on-ramp traffic to queue back into the local street system, exacerbating the congestion on the local streets. In the 2035 Build alternative, the auxiliary lanes allow the on-ramp demand volumes to enter the freeway without queuing back onto these ramps.
(Same comment from previous page.)	Using constrained demand volumes in the intersection analysis for the northbound Route 101 off-ramp/Marsh Road intersection would cause the 2035 No-Build and 2035 Build alternatives to operate similar at this intersection as Marsh Road is currently congested in the eastbound direction in the PM peak hour. The future forecasted demand volume would not be able to reach the northbound Route 101 off-ramp/Marsh Road intersection due to constrains on Marsh Road upstream and downstream of this intersection. Realistically, this latent demand would not materialize since eastbound Marsh Road is already at capacity.
6. The IS references the Location Hydraulic Study prepared in December 2007 by Caltrans and concludes that the proposed project "will not result in significantly or adversely impacting" the FEMA 100-year floodplain. However, the Location Hydraulic Study contains conflicting statements and conclusions, and does not adequately address conditions at the existing US 101 crossing over San Francisquito Creek. The City of Menlo Park concurs with the comments	This Auxiliary Lanes Project does not include replacement of San Francisquito Creek Bridge nor does it include any work within San Francisquito Creek and therefore does not address any risk of flooding or overflow issues of the Creek. The statement that the project "will not result in significantly or adversely impacting" the FEMA 100-year floodplain" applies to this Auxiliary Lanes Project and is correct. Addressing San Francisquito Creek will be included in the environmental

COMMENT	RESPONSE
and requests provided by the San Francisquito Creek Joint Powers Authority (SFCJPA) in their letter to you dated June 10, 2008. 7. The project does not address the overflow from San Francisquito Creek down Laurel Street to 101 where Caltrans placed a(n) opening in the soundwall to allow Creek overflow water across 101.	analysis for the San Francisquito Creek Bridge Replacement Project. The City's concurrence with the position of SFCJPA in its letter dated June 10, 2008 is acknowledged.
8. The IS identifies numerous oak and redwood trees within the Biological Study Area. The City of Menlo Park adopted a Heritage Tree Ordinance intended to preserve and protect the native oak, redwood and other trees species exceeding 15 inches in diameter. A detailed survey of heritage trees and mitigation and avoidance measures need to be included in the EIR. Proposed removal, pruning or any type of construction or excavation within an area ten times the diameter of any heritage tree would require review and approval by the City of Menlo Park.	The Department's detailed study of trees within the project limits did not identify any trees that met the criteria of the City's Heritage Tree Ordinance.

3.3.3 Julie Caporgno, City of Palo Alto

COMMENT	RESPONSE
1. Transportation standards of significance should be included in the technical Traffic Operations Analysis. As shown in Figure 5 on page 21, traffic operating conditions at each of the three study intersections is expected to deteriorate to LOS F, or experience a substantial increase in average delay with the project for intersections operating at LOS F. The deterioration from LOS E to LOS F with the addition of the project would trigger a potentially significant impact based on CMP as well as Palo Alto's standards of significance. On page 49, CEQA Checklist item XV. TRANSPORTATION/TRAFFIC items a and b are incorrect. Based on the findings presented in Figure 5, the project would result in increased congestion on roads and intersections and in an intersection exceeding a level of service standard. A "No Impact" determination cannot be made. 2. With the deterioration of operating conditions at the freeway off ramp intersections, a queuing analysis of potential spillback on local agency roadways and potentially to local intersections should be addressed. Based on the information provided in the Initial Study, a determination of impact significance cannot be made.	Typically, for freeway mainline auxiliary lane projects, off-ramp terminal intersections are analyzed to determine if queues will extend back onto the freeway mainline. Other local intersections are usually not included in this analysis since they are impacted by additional factors beyond the freeway mainline operations. Therefore, these off-ramp intersections where analyzed independent of adjacent intersections and unconstrained forecasted demand volumes were used for the local street approaches to these intersections as a more conservative approach to this analysis. In reality, the future forecasted demand volumes would be constrained on University Ave., Donohoe St., and Marsh Rd. as these streets are currently congested during the PM peak hour. Since these local roadways are currently at capacity, they will not be able to accommodate additional future traffic demand for either the Build and the No Build scenarios. In reality, both the NB Route 101 off-ramp/Donohoe St. and the SB Route 101 off-ramp/University Avenue intersections would be operating with similar LOS in 2035. In addition, if the auxiliary lanes are not constructed, the on-ramp merge will be constrained due to congestion at the merge segments on both northbound and southbound Route 101 for the 2035 No-Build alterative, during the PM peak hour. This will cause the on-ramp traffic to queue back into the local street system, exacerbating the congestion on the local streets. In the 2035 Build alternative, the auxiliary lanes allow the on-ramp demand volumes to enter the freeway without queuing back onto these ramps.

COMMENT	RESPONSE
	Using constrained demand volumes in the intersection analysis for the NB US 101 off-ramp/Marsh Road intersection would cause the 2035 No-Build and 2035 Build alternatives to operate similar at this intersection as Marsh Road is currently congested in the eastbound direction in the PM peak hour. The future forecasted demand volume would not be able to reach the NB US 101 off-ramp/Marsh Road intersection due to constrains on Marsh Road upstream and downstream of this intersection. Realistically, this latent demand would not materialize since eastbound Marsh Road is already at capacity.
(Same comment from previous page.)	As stated already, these intersections were analyzed independent of adjacent intersections and unconstrained forecasted demand volumes were used for the local street approaches to these off-ramp intersections. This was a more conservative approach to determine off-ramp queuing. Realistically, the future forecasted demand volumes would be constrained on University Ave., Donohoe St., and Marsh Rd. and the queuing would be similar for both the 2035 No-Build and 2035 Build Alternative. In addition, if the auxiliary lanes are not constructed, the merge to the University Ave. on-ramps will be constrained due to the conditions on both northbound and southbound US 101 for the 2035 No-Build alternative, during the PM peak hour. This will cause the on-ramp traffic to queue back into the local street system, exacerbating the congestion on the local streets.

COMMENT	RESPONSE
3. Without reviewing the Traffic Operational Analysis Report, it is unclear if a weaving analysis was conducted. If so, this should be included in the Initial Study with a comparison to the merge analysis of the existing configurations.	A weaving analysis was conducted and has been added to the document in Chapter 2 – Transportation & Traffic.
4. There also appears to be a project segmentation issue. The Initial Study states on page 10 that the San Francisquito Creek Bridge "will be demolished and replaced" but it further states that it will be completed as a separate project in order to eliminate consultation now with the United States Fish and Wildlife Service in order to meet the current project schedule. As a result, the Initial Study concludes that the project will have no visual impact at East Bayshore Road. The impacts from the demolition and reconstruction of the bridge need to be addressed in this Initial Study.	The project to demolish and replace San Francisquito Creek Bridge is a separate project from this Route 101 Auxiliary Lanes project. A separate environmental document is being prepared for the San Francisquito Creek Bridge Replacement Project. A mandate of The Corridor Mobility Improvement Account (CMIA) program indicates that the inclusion of a project in the program be based on a demonstration that the project can commence construction or implementation no later than December 31, 2012.
5. On page 14 – Relocations, it states that, "All work is anticipated to be within existing highway right of way. No relocations will be required." In several other locations, the Initial Study refers to the removal of trees and relocation of overhead lines located outside the existing State right of way. These two statements conflict with each other.	Construction of the auxiliary lanes will be within existing highway right of way and will not require relocation of any residential or commercial property. Construction of the new pedestrian overcrossing will require modification to some utilities not within existing right of way. The document has been revised to clarify the distinction between utility relocations and personal property relocations under the Uniform Relocation Assistance and Real Property Act.

3.3.4 Kevin Murray, San Francisquito Creek Joint Powers Authority

COMMENT	RESPONSE
Page 10: The document notes that the San Francisquito Creek Bridge will be demolished and replaced as a separate project, due to schedule constraints. The San Francisquito Creek Joint Powers Authority (SFCJPA) and its Member Agencies are currently planning a project to increase the hydraulic capacity under the U.S. 101, East Bayshore Rd., and West Bayshore Rd. crossings. If a separate project to demolish and replace the bridge due to aging and deterioration is initiated, Caltrans should coordinate directly with the SFCJPA on the planning and design of a bridge replacement project that would meet the primary goals of both agencies and leverage cost share opportunities available through various local, state and federal entities.	The Department will coordinate our bridge replacement project with the SFCJPA and their plan to increase hydraulic capacity of San Francisquito Creek.
Page 26: The environmental assessment narrative does not adequately describe the existing flood risk from San Francisquito Creek. The many conflicting statements contained in the December 2007 Caltrans Hydraulic Study are summarized in two statements in the environmental assessment: 1) half of the project area lies within a FEMA-designated floodplain, and 2) Portions of Highway 101 will be inundated during a 100-year flood event. The assessment should expressly acknowledge the hydraulic deficiency of the existing San Francisquito Creek Bridge and note SFCJPA's interest in modifying the capacity of the bridge and the willingness of Caltrans to coordinate with the SFCJPA during the planning and design of the separate bridge replacement project.	The scope of this Auxiliary Lanes Project does not include any work in, or any hydraulic modifications to San Francisquito Creek nor the demolition and reconstruction of the San Francisquito Creek Bridge and therefore does not address the existing flood risk. The hydraulic issues will be addressed in the San Francisquito Creek Bridge Replacement Project. As stated above, the Department will coordinate with the SFCJPA.

3.3.5 Glenn Roberts, City of Palo Alto

COMMENT	RESPONSE
1. The document states that the Highway 101/San Francisquito Creek bridge structure will not be modified as part of the proposed auxiliary lane project. It indicates, however, that Caltrans has initiated a separate project to demolish and replace this bridge due to its poor structural condition and substandard width. Caltrans staff assigned to implement the bridge replacement project should be made aware of the existence of the San Francisquito Creek Joint Powers Authority (JPA), a regional joint powers authority focused on the implementation of flood control improvements on San Francisquito Creek. The JPA is comprised of five member agencies: City of Palo Alto, City of Menlo Park, City of East Palo Alto, Santa Clara Valley Water District, and San Mateo County Flood Control District. The JPA is currently studying the option of increasing the hydraulic capacity of the San Francisquito Creek bridge as part of a comprehensive flood control project. Caltrans staff should coordinate directly with the JPA during the planning and design of the separate bridge replacement project in order to identify options for simultaneously increasing the roadway width and the hydraulic capacity of the bridge. The following is contact information for the JPA staff: Kevin Murray, Project Manager, San Francisquito Creek JPA, 3723 Haven Avenue, Suite 127, Menlo Park, CA 94025.	The Department is aware of the San Francisquito Creek Joint Powers Authority and acknowledges its role and responsibility and appreciates the detailed information regarding its organizational make-up and membership. We are also aware of its plan to increase hydraulic capacity of San Francisquito Creek and will coordinate with the SFCJPA on the planning and design of the bridge replacement project.

3.3.5 Glenn Roberts, City of Palo Alto

COMMENT	RESPONSE
The document states that the Highway 101/San Francisquito Creek bridge structure will not be modified as part of the proposed auxiliary lane project. It indicates, however, that Caltrans has initiated a separate project to demolish and replace this bridge due to its poor structural condition and substandard width. Caltrans staff assigned to implement the bridge replacement project should be made aware of the existence of the San Francisquito Creek Joint Powers Authority (JPA), a regional joint powers authority focused on the implementation of flood control improvements on San Francisquito Creek. The JPA is comprised of five member agencies: City of Palo Alto, City of Menlo Park, City of East Palo Alto, Santa Clara Valley Water District, and San Mateo County Flood Control District. The JPA is currently studying the option of increasing the hydraulic capacity of the San Francisquito Creek bridge as part of a comprehensive flood control project. Caltrans staff should coordinate directly with the JPA during the planning and design of the separate bridge replacement project in order to identify options for simultaneously increasing the roadway width and the hydraulic capacity of the bridge. The following is contact information for the JPA staff: Kevin Murray, Project Manager, San Francisquito Creek JPA, 3723 Haven Avenue, Suite 127, Menlo Park, CA 94025. (650) 474-2321. kmurray@menlopark.org www.cityofpaloalto.org/jpa	The Department is aware of the San Francisquito Creek Joint Powers Authority and acknowledges its role and responsibility and appreciates the detailed information regarding its organizational make-up and membership. We are also aware of its plan to increase hydraulic capacity of San Francisquito Creek and will coordinate with the SFCJPA on the planning and design of the bridge replacement project.

COMMENT	RESPONSE
2. The document does not adequately describe the existing flood risk from San Francisquito Creek and the hydraulic deficiency of the existing San Francisquito Creek bridge. The environmental assessment relies on a December 2007 Caltrans hydraulic study that incorrectly concludes that the existing bridge can pass the Q_{100} (one percent) peak flow of 9,300 cubic feet per second without overtopping. The document should be modified to expressly acknowledge the hydraulic deficiency of the existing San Francisquito Creek bridge, note the JPA's interest in increasing capacity of the bridge, and commit Caltrans to coordination with the JPA during the planning and design of the separate bridge replacement project.	The scope of this Auxiliary Lanes Project does not include any work in, or any hydraulic modifications to San Francisquito Creek nor the demolition and reconstruction of the San Francisquito Creek Bridge and therefore does not address the existing flood risk. The hydraulic issues will be addressed in the San Francisquito Creek Bridge Replacement Project. As stated previously, the Department will coordinate with the SFCJPA.

ATTACHMENT Q

CMIA APPLICATION

CORRIDOR MOBILITY IMPROVEMENT ACCOUNT
PROJECT SCOPE, COST, SCHEDULE, AND BENEFIT BASELINE DATA

County: San Mateo	**Route:** 101	**PPNO:** 0658B
Project Title: Widen US 101 and add auxiliary lanes from Marsh Rd to Embarcadero Rd.		

We acknowledge the scope, cost, schedule, and benefits as identified on the attached project fact and funding sheets are the baseline for project monitoring by the California Transportation Commission and its Corridor Mobility Improvement Account Project Delivery Council. We certify that funding sources cited are committed and expected to be available; the estimated costs represent full project funding, and the description of benefits is the best estimate possible.

5/11/07

Richard Napier — Date

Executive Director

City/County Association of Governments of San Mateo County

5/11/07

Steve Heminger — Date

Executive Director

Metropolitan Transporation Commission

5/17/07.

Will Kempton — Date

Director

California Department of Transportation

for Will 5/16/07

6/4/07

John F. Barna, Jr. — Date

Executive Director

California Transportation Commission

CORRIDOR MOBILITY IMPROVEMENT ACCOUNT

Project Fact Sheet

Lead Agency: Caltrans — **Fact Sheet Date: 05/05/07**

Contact Person	Ron Moriguchi		
Phone Number	(510) 286-5073	Fax Number	510-286-4897
Email Address	Ron_Moriguchi@dot.ca.gov		

Project Information:

County	Caltrans District	PPNO *	EA *	Region/MPO/ TIP ID*	Route / Corridor *	Post Mile Back *	Post Mile Ahead *
San Mateo	4	658B	235610	SM-030001	101	0	3.6

* NOTE: PPNO & EA assigned by Caltrans. Region/MPO/TIP ID assigned by RTPA/MPO. Route/Corridor & Post Mile Back/Ahead used for State Highway System.

Legislative Districts	Senate: 8, 11	Congressional: 14, 12
	Assembly: 21	
Implementing Agency (by component)	E&P (PA&ED): Caltrans	PS&E: Caltrans
	R/W: Caltrans	CON: Caltrans
Project Title	**US 101 auxiliary lanes from Marsh Rd to Embarcadero Rd.**	

Location - Project Limits - Description and Scope of Work (Provide a project location map on a separate sheet and attach to this form)
This project will widen US 101 to add auxiliary lanes in each direction from the Marsh Road interchange in San Mateo County to the Embarcadero Road interchange in Santa Clara County. This project lies within the Cities of Menlo Park, East Palo Alto, and Palo Alto. In addition to adding auxiliary lanes, this project will widen/modify all the on ramps to the four interchanges within the project limits. The project will reconstruct the Ringwood Pedestrian overcrossing and the Henderson underpass to accommodate the Aux lanes and install ITS Equipment.

Description of Major Project Benefits

Daily Vehicle Hours of Delay Saved	13,752 Hrs.
Daily Peak Hour Person-Minutes Saved	1,095,164 Min.

Other:

Corridor System Management Plan	Month/Year
Lead Agency: Caltrans	
Plan Adoption Date:	Dec-09
Plan Implementation Date:	Dec-09

Expected Source(s) of Additional Funding if the Current Funding Plan Proves Insufficient

Project Delivery Baseline (Milestones)		Month/Year
Begin Environmental Phase (PA&ED)		Mar-07
Draft Environmental Document Milestone	Document Type: IS/EA	Mar-08
Draft Project Report Milestone		Mar-08
End Environmental Phase (PA&ED Milestone)		Oct-08
Begin Design Phase		Oct-08
End Design Phase (Ready to List Milestone)		Dec-10
Begin Right-of-Way		Oct-08
End Right-of-Way (Right-of-way Certification Milestone)		Nov-10
Begin Construction Phase		Apr-11
End Construction Phase (Construction Contract Acceptance Milestone)		Nov-13
Begin Closeout Phase		Nov-13
End Closeout Phase (Closeout Report Milestone)		Nov-14

NOTE: The CTC Corridor Mobility Improvement Account (CMIA) Program Guidelines should have been read and understood prior to preparation of the CMIA Fact Sheet.
The CTC CMIA Guidelines and a template of this Project Fact Sheet are available at http://www.dot.ca.gov/hq/transprog/ and at http://www.catc.ca.gov/

CORRIDOR MOBILITY IMPROVEMENT ACCOUNT
Project Fact Sheet - Project Cost and Funding Plan
(dollars in thousands and escalated)
Shaded fields are automatically calculated. Please do not fill these fields.

				Date: 5-May-07
County	CT District	PPNO *	EA*	Region/MPO/TIP ID *
San Mateo	4	658B	235610	SM-030001
Project Title:	US 101 auxiliary lanes from Marsh Rd to Embarcadero Rd.			

* NOTE: PPNO and EA assigned by Caltrans. Region/MPO/TIP ID assigned by RTPA/MPO

Proposed Total Project Cost								
Component	Prior	07/08	08/09	09/10	10/11	11/12	12/13	Project Total
E&P (PA&ED)	0	5,200	0	0	0	0	0	5,200
PS&E	0	0	8,525	0	0	0	0	8,525
R/W SUP (CT) *	0	0	496	0	0	0	0	496
CON SUP (CT) *	0	0	0	0	10,527	0	0	10,527
R/W	0	0	0	4,910	0	0	0	4,910
CON	0	0	0	0	81,731	0	0	81,731
TOTAL	0	5,200	9,021	4,910	92,258	0	0	111,389

Corridor Management Improvement Account (CMIA) Program								
Component	Prior	07/08	08/09	09/10	10/11	11/12	12/13	Total
E&P (PA&ED)								0
PS&E								0
R/W SUP (CT) *								0
CON SUP (CT) *					10,527			10,527
R/W								0
CON					49,473			49,473
TOTAL	0	0	0	0	60,000	0	0	60,000

* NOTE: R/W SUP and CON SUP to be used only for projects implemented by Caltrans

Funding Source: RTIP - Existing								
Component	Prior	07/08	08/09	09/10	10/11	11/12	12/13	Total
E&P (PA&ED)		0						0
PS&E			8,525					8,525
R/W SUP (CT) *			496					496
CON SUP (CT) *								0
R/W				0				0
CON								0
TOTAL	0	0	9,021	0	0	0	0	9,021

Funding Source: Local								
Component	Prior	07/08	08/09	09/10	10/11	11/12	12/13	Total
E&P (PA&ED)								0
PS&E								0
R/W SUP (CT) *								0
CON SUP (CT) *								0
R/W				3,110				3,110
CON					32,258			32,258
TOTAL	0	0	0	3,110	32,258	0	0	35,368

Funding Source: Federal Earmark								
Component	Prior	07/08	08/09	09/10	10/11	11/12	12/13	Total
E&P (PA&ED)								0
PS&E								0
R/W SUP (CT) *								0
CON SUP (CT) *								0
R/W				1,800				1,800
CON								0
TOTAL	0	0	0	1,800	0	0	0	1,800

Shaded fields are automatically calculated. Please do not fill these fields.

CORRIDOR MOBILITY IMPROVEMENT ACCOUNT
Project Fact Sheet - Project Cost and Funding Plan
(dollars in thousands and escalated)
Shaded fields are automatically calculated. Please do not fill these fields.

				Date: 5-May-07
County	CT District	PPNO*	EA*	Region/MPO/TIP ID*
San Mateo	4	658B	235610	SM-030001
Project Title:	US 101 auxiliary lanes from Marsh Rd to Embarcadero Rd.			

* NOTE: PPNO and EA assigned by Caltrans. Region/MPO/TIP ID assigned by RTPA/MPO

Funding Source:	STIP-RIP Augmentation (New)							
Component	Prior	07/08	08/09	09/10	10/11	11/12	12/13	Total
E&P (PA&ED)		5,200						5,200
PS&E								0
R/W SUP (CT) *								0
CON SUP (CT) *								0
R/W								0
CON								0
TOTAL	0	5,200	0	0	0	0	0	5,200

Funding Source:								
Component	Prior	07/08	08/09	09/10	10/11	11/12	12/13	Total
E&P (PA&ED)								0
PS&E								0
R/W SUP (CT) *								0
CON SUP (CT) *								0
R/W								0
CON								0
TOTAL	0	0	0	0	0	0	0	0

Funding Source:								
Component	Prior	07/08	08/09	09/10	10/11	11/12	12/13	Total
E&P (PA&ED)								0
PS&E								0
R/W SUP (CT) *								0
CON SUP (CT) *								0
R/W								0
CON								0
TOTAL	0	0	0	0	0	0	0	0

Funding Source:								
Component	Prior	07/08	08/09	09/10	10/11	11/12	12/13	Total
E&P (PA&ED)								0
PS&E								0
R/W SUP (CT) *								0
CON SUP (CT) *								0
R/W								0
CON								0
TOTAL	0	0	0	0	0	0	0	0

Shaded fields are automatically calculated. Please do not fill these fields.

DEPARTMENT OF TRANSPORTATION
DIVISION OF RIGHT OF WAY
P. O. BOX 23440 – MS 11A
OAKLAND, CA 94623-0440
PHONE (510) 286-5470
FAX (510) 286-5379

Flex your power!
Be energy efficient!

April 13, 2010

4-SM-101 PM 0.9/3.6
E.A. 04-235631
Henderson Underpass
CPUC GO 88-B Application

Mr. Daren Gilbert, Supervisor
Rail Crossings Engineering Section
California Public Utilities Commission
515 L Street, Suite 1119
Sacramento, CA 95814

Dear Mr. Gilbert:

The State of California, Department of Transportation (Caltrans) requests authority under General Order (GO) No. 88-B to remove existing curb, gutter and sidewalk adjacent to the Henderson Avenue Underpass; owned by the Union Pacific Railroad Company located the city of Menlo Park in San Mateo County.

The information required by GO 88-B is given below:

Section 5.1

The Commission assigned crossing number is 001DAB-28.90-A, and the U.S. Department of Transportation assigned crossing number is 750016R.

Section 5.2

The project proposes to add auxiliary lanes in both directions of US 101, from the University Avenue interchange (PM 0.9) in the city of East Palo Alto in San Mateo County to the Marsh Road interchange (PM 3.6) in the city of Menlo Park in San Mateo County. In addition to the auxiliary lanes, other major components of the project includes: replacement of the Ringwood Avenue Pedestrian Overcrossing, widening of the Hetch Hetchy Aqueduct, constructing a retaining wall, realignment of existing on and offramps, modifications to the existing ramp metering system and the installation of Intelligent Transportation System (ITS) equipment.

The Henderson Underpass Bridge will not be replaced in this project; instead the existing lanes will be striped to non-standard lane and shoulder width to accommodate the auxiliary lanes in both directions. The proposed alterations around Henderson Underpass Bridge consist of: removing the existing sidewalk, curb and gutter. On the southbound side, a metal beam guardrail will be installed on the north end of the structure. A retaining wall will be constructed near the south end of the structure. On the northbound side, a metal beam guardrail will be attached on the south end of the structure. A concrete barrier with a chain link fence on the north side of the structure will also be constructed.

Section 5.3

The public will benefit from the improvements, as traffic safety will increase with the construction of an auxiliary lane. The addition of an auxiliary lane and introduction of ramp metering at ramps that are not currently metered would improve the operations of the freeway. In both the northbound and southbound directions the overall vehicle hours of delay would be reduced significantly. The proposed project would also increase average travel speeds on the freeway resulting in decreased travel time. The project is also expected to reduce merging conflicts and accident frequency.

Section 5.4

This location is grade separated.

Section 5.5

N/A

Section 5.6

See Exhibit A for plan layout and other design details.

Section 5.7

The railroad grade will be unchanged by this project.

Section 5.8

Caltrans has plan approval from both the Union Pacific Railroad Company and Caltrain (Please see attached copies of e-mails).

Section 5.9

Construction staging and traffic handling are prepared to accommodate the construction period traffic flow, maintain traffic safety and minimize traffic impact during construction. Construction staging and traffic handling will maintain the traffic safety within construction zones with adequate signage and will be in compliance with CALOSHA and OSHA. It will provide advance warning and clearly marked detours in case of roadway closures. It will also provide alternate travel routes and services in case of roadway closures including shuttle services for bicyclists and pedestrians to and from mitigated parking areas or other isolated facilities within the project limits as a result of construction activities. A Transportation Management Plan (TMP) has also been prepared to prevent and mitigate the impacts of the construction project by applying a variety of techniques including Motorist Information, Incident Management, Construction Strategies and Public Awareness Strategies.

Section 5.10

N/A

Section 5.11

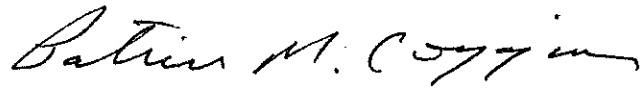
N/A

Section 5.12

A Negative Declaration based upon an Initial Study in accordance with CEQA and a Finding of No Significant Impact based upon an Environmental Assessment (Please see attached) in accordance with NEPA was signed by the California Department of Transportation and the Federal Highway Administration on October 1, 2008.

Should you have any questions please contact me at (510) 286-5470. Thank you for your assistance in this matter.

Sincerely,



PATRICK M. COGGINS
Senior Right of Way Agent
Right of Way Acquisition Services

Enclosures

Cc: Mahendra Patel, Senior Utilities Engineer,
California Public Utilities Commission, 505 Van Ness Avenue, San Francisco, CA 94102

Felix Ko, Utilities Engineer,
California Public Utilities Commission, 505 Van Ness Avenue, San Francisco, CA 94102

Kevin Boles, Construction Manager
Caltrain, 1250 San Carlos Avenue, San Carlos, CA 94070

James H. Smith, Manager, Industry & Public Projects,
Union Pacific Railroad, Co., 9451 Atkinson Street, Roseville, CA 95747

Bc: Matthew George
Dora Manuel
Teblez Nemariam

EXHIBIT A

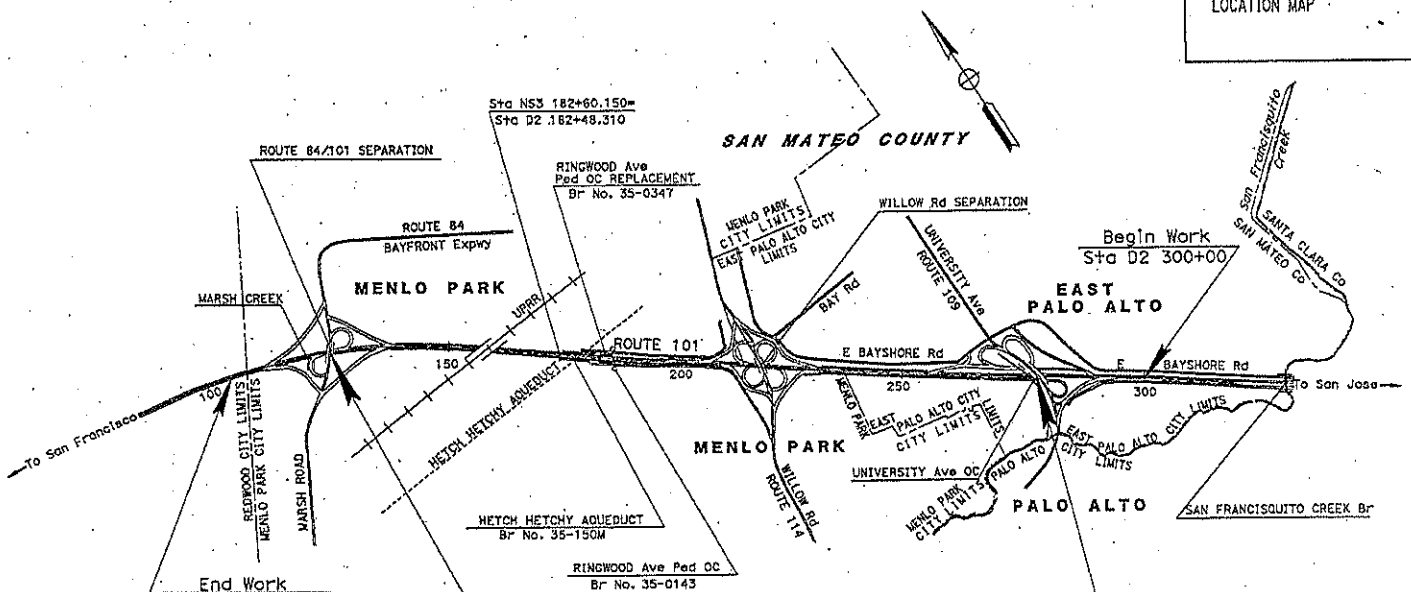
INDEX OF PLANS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION **Draft**

PROJECT PLANS FOR CONSTRUCTION ON
STATE HIGHWAY
IN SAN MATEO COUNTY
IN MENLO PARK AND EAST PALO ALTO
FROM UNIVERSITY AVENUE INTERCHANGE
TO MARSH ROAD INTERCHANGE

TO BE SUPPLEMENTED BY STANDARD PLANS DATED MAY 2006

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM.	101	0.9/3.6		



NO SCALE

PROJECT MANAGER RON MORTBURGH
DESIGN ENGINEER ATUN DING

PROJECT ENGINEER DATE
REGISTERED CIVIL ENGINEER

A. DING
C58659
Exp. 06-30-11
CIVIL
STATE OF CALIFORNIA

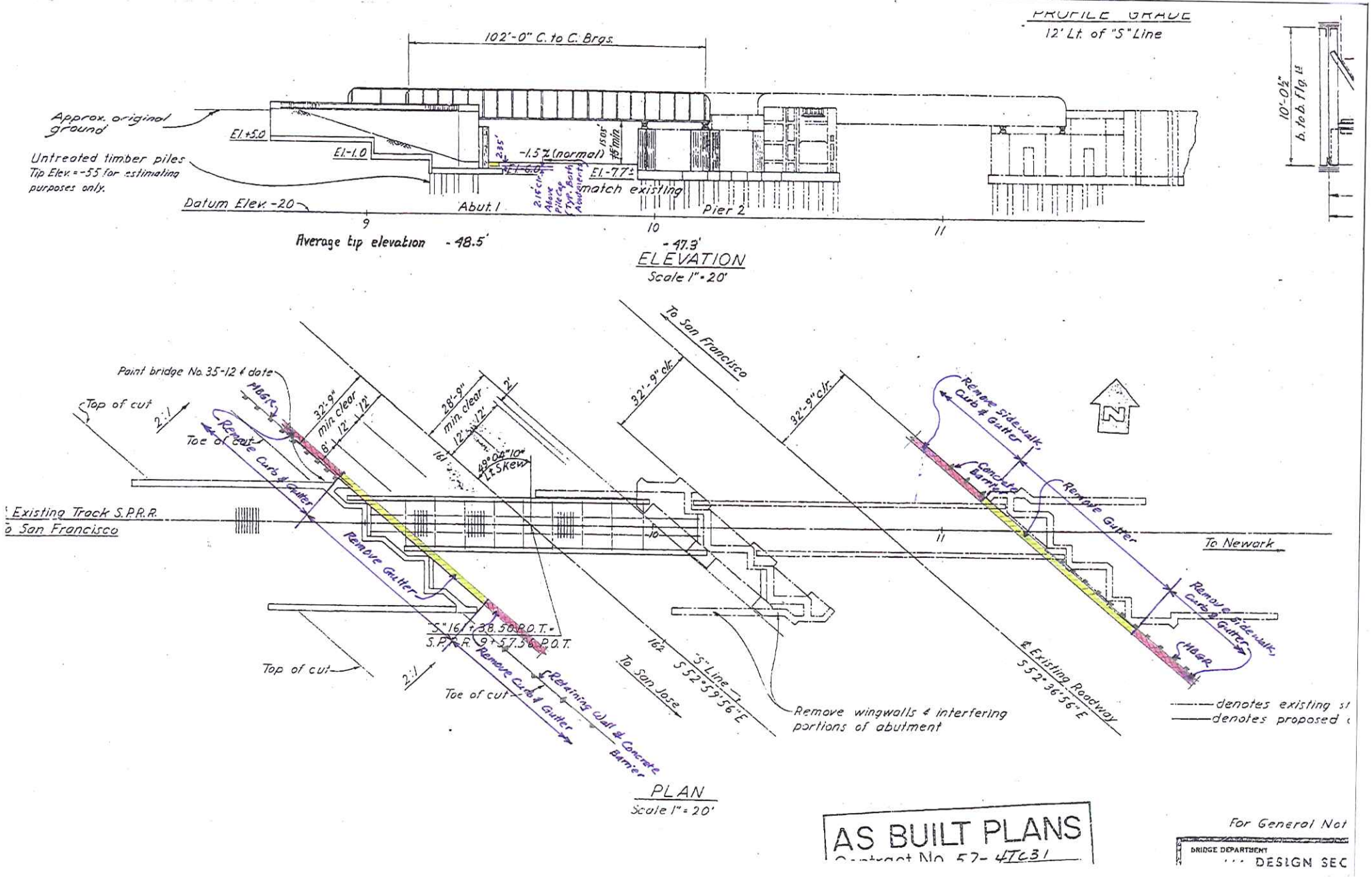
PLANS APPROVAL DATE
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

THE CONTRACTOR SHALL POSSESS THE CLASS (OR CLASSES) OF LICENSE AS SPECIFIED IN THE "NOTICE TO BIDDERS."

CONTRACT No. 04-235634

BORDER LAST REVISED 8/1/2008 | CALTRANS WEB SITE IS: HTTP//WWW.DOT.CA.GOV/ | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | USERNAME= | DGN FILE= | CU(s) 04243 | EA 235631

DATE PLOTTED => 13-MAR-2010
TIME PLOTTED => 12:55
03-10-10


PROFILE GRADE
12' Lt. of "S" Line
102'-0" C. to C. Brgs.
Approx. original ground
El. +5.0
El. -1.0
Untreated timber piles
Tip Elev. = -55 for estimating purposes only.
Datum Elev. -20
Abut. 1
-1.5% (normal)
El. -6.0
El. -7.7±
match existing
Pier 2
9
10
11
Average tip elevation -48.5'
-47.3'
ELEVATION
Scale 1" = 20'
10'-0½" b. to b. Flg. Lts
To San Francisco
Paint bridge No. 35-12 & date
Top of cut
Toe of cut
Remove Curb & Gutter
Remove Gutter
32'-9" min. clear
28'-9" min. clear
32'-9" clr.
49°04'10" Lt. Skew
Existing Track S.P.R.R.
To San Francisco
To Newark
"S" 161+38.50 P.O.T. = S.P.R.R. 9+57.56 P.O.T.
Retaining Wall & Concrete Barrier
To San Jose
"S" Line S 52°59'56" E
Remove wingwalls & intertering portions of abutment
℄ Existing Roadway S 52°36'56" E
Remove Sidewalk, Curb & Gutter
Concrete Barrier
denotes existing
denotes proposed
PLAN
Scale 1" = 20'
AS BUILT PLANS
Contract No. 57-4TC31
For General Not
BRIDGE DEPARTMENT
DESIGN SEC

SCH# 2008052113
04-SM-101-PM 0.0/3.6
04-SCL-101-PM 52.3/52.6
235610

Addition of auxiliary lanes in each direction on US Route 101, from the Embarcadero Road interchange in the City of Palo Alto, County of Santa Clara, KP 84.2 (PM 52.3) to the Marsh Road interchange in the City of Menlo Park, County of San Mateo, KP 5.8 (PM 3.6).

INITIAL STUDY with Proposed Negative Declaration/ ENVIRONMENTAL ASSESSMENT

Submitted Pursuant to: (State) Division 13, California Public Resources Code
(Federal) 42 USC 4332(2)(C)

US DEPARTMENT OF TRANSPORTATION
Federal Highway Administration, and

THE STATE OF CALIFORNIA
Department of Transportation

2/29/08
Date of Approval

Melanie Brent
MELANIE BRENT, Chief
Office of Environmental Analysis
California Department of Transportation

3/27/08
Date of Approval

Nancy E. Pfeifer
for GENE FONG
Division Administrator
Federal Highway Administration

"Boles, Kevin"
<bolesk@samtrans.com>
03/18/2010 09:16 AM

To 'Patrick Coggins' <patrick_coggins@dot.ca.gov>
cc "'fko@cpuc.ca.gov'" <fko@cpuc.ca.gov>
bcc
Subject RE: Henderson - CPUC GO 88-B

History: This message has been replied to and forwarded.

Patrick,

Caltrain concurs with and supports your project; our one condition is that Caltrans provide the crew performing the work with the exhibit you provided via e-mail on 3-9-10, to make them aware of the adjacent foundation interface, as well as workspace constraints.

Thanks,

Kevin Boles
Construction manager
Caltrain

-----Original Message-----
From: Patrick Coggins [mailto:patrick_coggins@dot.ca.gov]
Sent: Tuesday, March 02, 2010 1:42 PM
To: Boles, Kevin
Subject: Henderson - CPUC GO 88-B

Kevin,

As a follow-up to our recent on-site meeting at the Henderson Avenue underpass on January 27, 2010, Caltrans is requesting the San Mateo County Transit District (Caltrain) provide a written concurrence verifying that Caltrain has no objections to this project. This confirmation is needed for a CPUC GO 88-B Caltrans will need to submit pertaining to modifications related to the widening of US 101 in the city of Menlo Park.

The modifications for this project include: the removal of existing curb, gutter and sidewalk adjacent to the Henderson Avenue underpass. In addition, on the southbound side, a metal guardrail will be installed on the north end of the structure. A retaining wall will be constructed near the south end of the structure. On the northbound side, a metal beam guardrail will be attached on south end of the structure. A concrete barrier with a chain link fence will also be constructed on the north side of the structure.

Attached for reference are cross section plans and layout sheets.

Please don't hesitate to contact me if you have any questions.

Thanks.

(See attached file: 65%_PS&E_Typ_X-Sect._EA 235631.pdf)(See attached file: Layout_Upadte_1-21-10.pdf)

Patrick Coggins
Senior Right of Way Agent
R/W Acquisition Services
Caltrans
P.O. Box 23440, MS 11A
Oakland, CA 94623-0440
(510) 286-5470

JHSMITH2@up.com
04/05/2010 02:29 PM

To patrick_coggins@dot.ca.gov
cc
bcc
Subject SR 101/Henderson Underpass, Menlo Park, CA

Union Pacific has reviewed the preliminary plans for the proposed work on the Henderson Underpass and has found them to meet UPRR Grade Separation Guidelines.

Subsequent stages, up to and including the Final Signed and Stamped plans, of this project are subject to the review and approval of UPRR. Refer to "Joint BNSF Railway and UPRR Guidelines for Railroad Grade Separation Projects"

SR 101/Henderson Underpass
Menlo Park, CA
M.P. 28.90, Redwood Junction Industrial Lead
DOT No. 750 016R

James H. Smith
Union Pacific Railroad Co.
9451 Atkinson Street
Roseville, CA 95747
(916) 789-5152
jhsmith2@up.com
**

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**

STATE OF CALIFORNIA
PUBLIC UTILITIES COMMISSION
180 PROMANADE CIRCLE, SUITE 115
SACRAMENTO, CA 95834-2939

ARNOLD SCHWARZENEGGER, *Governor*

May 10, 2010

File Number: G.10-04-004

Patrick M. Coggins
Senior Right of Way Agent
Department of Transportation
PO Box 23440 – MS 11A
Oakland, CA 94623-0440

Re: General Order 88-B Request for Authority to Alter the Bayshore Boulevard / Highway 101 Grade Separated Highway-Rail Crossing, CPUC Crossing No. 001DAB-28.90-B, DOT No. 750016R in the City of Menlo Park, San Mateo County.

Dear Mr. Coggins:

This refers to your letter dated April 13, 2010 and received by us on April 14, 2010 requesting authorization pursuant to Commission General Order (GO) 88-B to alter a grade separated highway-rail crossing of the Union Pacific Railroad (UP) track in the city of Menlo Park (City), San Mateo County. The crossing is located at Bayshore Boulevard / Highway 101 and is identified as CPUC Crossing No. 001DAB-28.90-B, DOT No. 750016R.

Highway 101 is the primary highway on the peninsula, traveling from San Francisco south to San Jose. The crossing is currently a single track grade separated crossing with the roadway below the tracks. Highway 101 is an eight lane roadway with a short pedestrian sidewalk on the east side of the highway at the crossing.

The Department of Transportation's (Caltrans) project's goal is to reduce congestion in the area with the addition of new travel lanes and ramp metering at nearby freeway onramps. Caltrans will remove the existing pedestrian sidewalk as part of the project. The pedestrian walkway currently serves no purpose. The rail crossing structure will not be altered. Caltrans states in its GO 88-B request letter that "The public will benefit from the improvements, as traffic safety will increase with the construction of an auxiliary lane. The proposed project would also increase average travel speeds on the freeway resulting in decreased travel time. The project is also expected to reduce merging conflicts and accident frequency."

The proposed alterations as indicated in the request letter and/or shown in the attachments shall consist of:

- Restriping the existing travel lanes to allow for two additional auxiliary travel lanes, for a total of ten travel lanes.

- Removing the existing sidewalk, curb and gutter.
- Installation of metal beam guardrails in the northwest and southeast quadrants.
- Installation of a retaining wall in the southwest quadrant.
- Installation of a concrete barrier with a chain link fence in the northeast quadrant.

Staff has investigated the request by Caltrans, and finds it adequately addresses compliance and safety. As Caltrans, UP, and the Peninsula Corridor Joint Powers Board (JPB) are in agreement as to the design and apportionments of the cost under the provisions of GO 88-B, you may proceed with the improvements as described in your request letter and attachments, and summarized above.

Temporary traffic controls shall be provided in compliance with Section 8A.05, Temporary Traffic Control Zones, of the California Manual on Uniform Traffic Control Devices (CA MUTCD), published by the California Department of Transportation.

All parties shall comply with all applicable rules, including Commission General Orders and CA MUTCD.

This project is statutorily exempt from the requirements of the California Environment Quality Act of 1970, as amended [California Pubic Resources Code 21084].

This authorization shall expire if the above conditions are not complied with or if the work is not completed within two years of the date of this letter. Upon written request to this office, the time to complete the project may be extended. Any written request for a time extension must include concurrence letters by involved parties in support of the time extension. If an extension is requested, the Commission's Rail Crossings Engineering Section (RCES) may reevaluate the crossing prior to granting an extension.

Within 30 days after completion of this project, Caltrans shall notify RCES that the authorized work is completed, by submitting a completed Commission Standard Form G titled *Report of Changes at Highway Grade Crossings and Separations*. Form G requirements and forms can be obtained at the CPUC web site Form G page at http://www.cpuc.ca.gov/formg. This report may be submitted electronically to rces@cpuc.ca.gov as outlined on the web page.

If you have any questions, please contact Felix Ko at (415) 703-3722 or fko@cpuc.ca.gov.

Sincerely,

Daren Gilbert, Supervisor
Rail Crossings Engineering Section
Consumer Protection and Safety Division

C: Patrick Coggins
Senior Right of Way Agent
Department of Transportation
Division of Right of Way
PO Box 23440 – MS 11A
Oakland, CA 94623-0440

James Smith
Manager Industry & Public Projects
Union Pacific Railroad
9451 Atkinson St
Roseville, CA 95747

Kevin Boles
Construction Manager
PCJPB/Caltrain
1250 San Carlos Ave
San Carlos, CA 94070

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. JOHN PROKOP
District Office Engineer

Date: May 18, 2010

File: 04-SM-101 PM 0.9/3.6
E.A. 235632
Henderson UP

From: PATRICK M. COGGINS
Senior Right of Way Agent
Division of Right of Way, District 4

Subject: Railroad Clearance

The above referenced project is now ready to list as far as the California Public Utilities Commission, Caltrain and the Union Pacific Railroad are concerned. This clearance is subject to the vote of funds allocation by the California Transportation Commission (CTC).

The project is now clear for advertising.

The required railroad short clauses for insertion into the Contract Special Provisions are attached.

Attachment

c: Ron Moriguchi, District 4, Project Manager
Teblez Nemariam, District 4, Branch Chief
Allison Paich, District 4, R/W P & M
Sunnie Stanton, District 4, R/W P & M
Shella Orson, District 4, R/W P & M

U.S. ENVIRONMENTAL PROTECTION AGENCY

National Pollutant Discharge Elimination System (NPDES)

Rainfall Erosivity Factor Calculator for Small Construction Sites

Facility Information

Facility Name: EA235631 Add Auxiliary Lanes
Start Date: 12/01/2010
End Date: 02/01/2012
Latitude: 37.4803
Longitutde: -122.1750

Erosivity Index Calculator Results

AN EROSIVITY INDEX VALUE OF **59.29** HAS BEEN DETERMINED FOR THE CONST PERIOD OF **12/01/2010 - 02/01/2012**.

A rainfall erosivity factor of 5.0 or greater has been calculated for your site and period of construction. **You do not qualify for a waiver from NPDES permitting requirements**.

Start (

K Factor, Rock Free—San Mateo County, Eastern Part, and San Francisco County, California; and Santa Clara Area, California
(EA 235631, Palo Alto Auxiliary Lane Project)

122° 15' 3"

122° 7' 53"

37° 29' 24"

37° 29' 21"

37° 25' 36"

37° 25' 33"

122° 15' 5"

122° 7' 56"

Map Scale: 1:50,400 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

K Factor, Rock Free

K Factor, Rock Free— Summary by Map Unit — San Mateo County, Eastern Part, and San Francisco County, California				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
107	Botella loam, 0 to 5 percent slopes	.28	15.5	0.8%
108	Botella-Urban land complex, 0 to 5 percent slopes		466.1	24.8%
121	Orthents, cut and fill, 0 to 15 percent slopes		48.2	2.6%
123	Orthents, cut and fill-Urban land complex, 0 to 5 percent slopes		1.6	0.1%
131	Urban land		478.5	25.4%
132	Urban land-Orthents, cut and fill complex, 0 to 5 percent slopes		408.1	21.7%
Subtotals for Soil Survey Area			**1,418.0**	**75.3%**
Totals for Area of Interest			**1,882.7**	**100.0%**

Description

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kf (rock free)" indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Layer Options: Surface Layer

Sheet Flow Length (ft)	Average Watershed Slope (%)																		
	0.2	**0.5**	**1.0**	**2.0**	**3.0**	**4.0**	**5.0**	**6.0**	**8.0**	**10.0**	**12.0**	**14.0**	**16.0**	**20.0**	**25.0**	**30.0**	**40.0**	**50.0**	**60.0**
<3	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.35	0.36	0.38	0.39	0.41	0.45	0.48	0.53	0.58	0.63
6	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.37	0.41	0.45	0.49	0.56	0.64	0.72	0.85	0.97	1.07
9	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.38	0.45	0.51	0.56	0.67	0.80	0.91	1.13	1.31	1.47
12	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.39	0.47	0.55	0.62	0.76	0.93	1.08	1.37	1.62	1.84
15	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.40	0.49	0.58	0.67	0.84	1.04	1.24	1.59	1.91	2.19
25	0.05	0.07	0.10	0.16	0.21	0.26	0.31	0.36	0.45	0.57	0.71	0.85	0.98	1.24	1.56	1.86	2.41	2.91	3.36
50	0.05	0.08	0.13	0.21	0.30	0.38	0.46	0.54	0.70	0.91	1.15	1.40	1.64	2.10	2.67	3.22	4.24	5.16	5.97
75	0.05	0.08	0.14	0.25	0.36	0.47	0.58	0.69	0.91	1.20	1.54	1.87	2.21	2.86	3.67	4.44	5.89	7.20	8.37
100	0.05	0.09	0.15	0.28	0.41	0.55	0.68	0.82	1.10	1.46	1.88	2.31	2.73	3.57	4.59	5.58	7.44	9.13	10.63
150	0.05	0.09	0.17	0.33	0.50	0.68	0.86	1.05	1.43	1.92	2.51	3.09	3.68	4.85	6.30	7.70	10.35	12.75	14.89
200	0.06	0.10	0.18	0.37	0.57	0.79	1.02	1.25	1.72	2.34	3.07	3.81	4.56	6.04	7.88	9.67	13.07	16.16	18.92
250	0.06	0.10	0.19	0.40	0.64	0.89	1.16	1.43	1.99	2.72	3.60	4.48	5.37	7.16	9.38	11.55	15.67	19.42	22.78
300	0.06	0.10	0.20	0.43	0.69	0.98	1.28	1.60	2.24	3.09	4.09	5.11	6.15	8.23	10.81	13.35	18.17	22.57	26.51
400	0.06	0.11	0.22	0.48	0.80	1.14	1.51	1.90	2.70	3.75	5.01	6.30	7.60	10.24	13.53	16.77	22.95	28.60	33.67
600	0.06	0.12	0.24	0.56	0.96	1.42	1.91	2.43	3.52	4.95	6.67	8.45	10.26	13.94	18.57	23.14	31.89	39.95	47.18
800	0.06	0.12	0.26	0.63	1.10	1.65	2.25	2.89	4.24	6.03	8.17	10.40	12.69	17.35	23.24	29.07	40.29	50.63	59.93
1000	0.06	0.13	0.27	0.69	1.23	1.86	2.55	3.30	4.91	7.02	9.57	12.23	14.96	20.57	27.66	34.71	48.29	60.84	72.15

LS Factors for Construction Sites. *Table from Renard et. al., 1997.*

WINIDF 1.0 OUTPUT TABLE

4/23/2010

Input values: Lat.: 37.48 deg. Long.: 122.175 deg. Return Period: 25 yrs.

Selected Station(s)	Station ID	Elev.	Lat.	Long.	Dist.
		ft	deg.	deg.	miles
MENLO PARK USGS	E705530020	0	37.451	122.186	2.09

Output table (Intensities in inches/hour):

Dur.\RP	25-yr	2-yr	10-yr	25-yr	50-yr	100-yr	10000-yr
5-min	2.616	1.302	2.191	2.604	2.953	3.239	5.208
10-min	1.895	0.943	1.587	1.886	2.140	2.347	3.773
15-min	1.569	0.781	1.315	1.562	1.772	1.943	3.125
30-min	1.137	0.566	0.952	1.132	1.284	1.408	2.264
60-min	0.824	0.410	0.690	0.820	0.930	1.020	1.640
120-min	0.597	0.297	0.500	0.594	0.674	0.739	1.188
4-hr	0.432	0.215	0.362	0.430	0.488	0.535	0.861
8-hr	0.313	0.156	0.262	0.312	0.354	0.388	0.624
16-hr	0.227	0.113	0.190	0.226	0.256	0.281	0.452
24-hr	0.188	0.094	0.157	0.187	0.212	0.233	0.374

a = 0.8237 b = -0.4650 1.00 min

Rainfall Intensity for a 25-Yr, 24 hour event and 2-Yr, 1 hr Event