FOR CONTRACT NO.: 10-0W1404

# ADDITIONAL INFORMATION HANDOUT

## MATERIALS INFORMATION

FOUNDATION RECOMMENDATION (DATED JULY 30, 2014)

**ROUTE: 04, 10-SCl, Mer-152-R35.0/R35.2, R0.0/R2.4**

# Memorandum

*Serious drought.*
*Help Save Water!*

**To:** Allen Lao
Project Engineer
Design IV, Branch L – District 10

**Date:** July 30, 2014

**File:** 10-Mer-152
PM R0.0/R2.4
SCl-152
PM R35.0/R35.2
10-0W1400/
1012000042

**From:** DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5

**Subject:** Foundation Recommendation

## Introduction

This report is intended for use by the project design engineer, construction personnel, bidders and contractors. These recommendations are provided per memo "Request for Geotechnical Design Report (GDR)" dated October 25, 2013. This report documents subsurface geotechnical conditions and provides foundation recommendations pertaining to the proposed Changeable Message Sign (CMS) project.

The proposed CMS installation is part of a median barrier project being designed by District 10. The CMS will be constructed within a paved maintenance vehicle pullout (MVP). The CMS is a standard Model 500 with a single post foundation.

The proposed site for the sign is located on the right side of the eastbound lanes on State Route 152 in Santa Clara County at PM R35.08 known as Pacheco Pass. It is near the Santa Clara/Merced County line. See Location Map Plate No. 1 and Site Plan Plate No. 2 for reference.

## Pertinent Reports and Investigations

The investigation consisted of a review of the Project Study Report, field visits to perform a subsurface drilling auger borehole, corrosion test of soil samples and literature reviews that identify the climate, regional geomorphic and geologic features of the site.

## Physical Setting

Regional Geology

At the project site location, State Route 152 traverses a portion of the mountain range known as the Diablo Range. This range corresponds to the Central California Coast Ranges east of the Calaveras Fault. This geomorphic province is bordered to the east by the nearby Great Central Valley Province. To the west of the Central Coast Ranges is the Pacific Ocean.

Most of the Diablo Range are made of terranes that have accreted onto the margin of the adjacent tectonic plate originating from the Pacific Ocean. Terranes refer to fragments of crustal material

formed on, or broken off from, one tectonic plate and accreted to another plate. The zone between a terrane and the crust it attaches to is generally identifiable as a fault. Pacheco Pass is located near a series of faults that run parallel to the general trend of the Diablo Mountain Range.

Known active faults within a 15 miles (24 km) radius of the proposed site are tabulated below. Fault distances given are the shortest distance to the projection of the rupture plane at the ground surface. Note that these are not necessarily the shortest distance to the fault planes of rupture.

| Fault Name | Fault ID | Mmax | Fault Distance (miles) |
|---|---|---|---|
| Calaveras | 151 | 6.9 | 15 |
| Ortigalita (Cottonwood Arm) | 159 | 7 | 5 |
| Ortigalita (Los Banos Arm) | 166 | 7 | 3.5 |
| Quien Sabe | 173 | 6.4 | 12 |
| Great Valley (Quinto) | 160 | 6.8 | 12 |

Site Geology

Geology of the site was obtained from both the San Francisco-San Jose Quadrangle for California (1:250,000) and the Pacheco Pass Quadrangle (1:62,500) within the San Francisco-San Jose Quadrangle. The Pacheco Pass Quadrangle had been mapped and compiled by T.W. Dibblee. His work is an open file source report with geological mapping. It is available through the U.S. Geological Survey. This mapping indicates that the proposed site is located in older alluvial deposits of Quaternary geologic time period.

Climate

The Diablo Range lies about 10 to 50 miles inland from the Pacific Ocean. The approximate elevation of the proposed site is 1374 feet. Winters are mild with moderate rainfall. Summers are very dry and hot. To the west lie the Santa Lucia Range and the Santa Cruz Mountains. These block the incoming moisture such that the Diablo Range receives little precipitation. Climate data from nearby Hollister recorded normal annual precipitation of 14 inches.

Ground water

A search for available ground water data from the Water Data Library (Department of Water Resources) yielded no nearby results. The existence of the historical high ground water table is therefore not known. Ground water was not encountered during borehole exploration. Due to the site's climate and geomorphology, it is unlikely that the potential for high ground water table is present. Note that ground water conditions change over time and vary by location and conditions such as weather.

**Exploration**

Drilling and Sampling

A soil boring was performed approximately 1050 ft northeast of Dinosaur Point Road adjacent to State Route 152. The boring was 46 feet right of the eastbound edge of traveled way. Refer to the Appendix for the boring location as indicated on the Site Plan Plate No. 2.

The soil boring was advanced using a 6-inch diameter auger to a depth of 30 ft. Standard Penetration Tests (SPT) were attempted at 5-feet intervals. Borehole data obtained during the field investigation confirm the site is alluvial material.

Materials encountered during drilling operation consists of coarse-grained soil with fewer than 50% fines. For the first 25 feet of depth the ASTM Group Name designation is Silty Sand (SM) with Gravel. From 25 to 30 feet, the group designation is Gravel with Silt and Sand. Depth to bedrock is not known. At ten feet of depth and greater, recorded SPT blow counts are in excess of 50 blows.

Ground water was not encountered within the first 30 feet of the ground surface elevation during drilling.

See the Appendix for the Boring Record.

**Geotechnical Testing**

Corrosion Evaluation

Laboratory testing was performed for corrosion on samples of earth materials taken below the ground surface. These were taken to a depth of approximately 15 feet. Minimum resistivity obtained from testing was 2856 ohm-cm with a pH of 7.88. Chloride content and sulfate content were not reported. Based on these test values, foundation conditions were determined to be non-corrosive. Results of the corrosion evaluation are presented in the Appendix.

**Seismic Considerations**

Fault Rupture

The closest fault rupture trace at ground surface is the nearby Los Banos arm of the Ortigalita fault. This fault is a designated Alquist-Priolo (A-P) fault. Located approximately 3.5 miles from the proposed site, the fault is more than 1000 feet away.

Ground Motion

Nearby faulting is primarily of Holocene age. Holocene age indicates that faulting is considered to be active as defined by the State Mining and Geology Board.

Use of the Caltrans ARS Online Tool (version 2.3.06) indicates that the Great Valley 08 (Quinto) fault plane passes directly beneath the proposed site (Rjb=0). Based on deterministic spectrum analysis it is the controlling fault with a Maximum Magnitude (Mmax) of 6.8. The fault's ground rupture trace is approximately 12 miles from the site. The peak ground acceleration is estimated at 0.57g. Moderate to strong ground shaking may be expected at some time during the design life of the proposed CMS sign.

See the Appendix for Fault Map Plate No. 3 and ARS Curve Plate No.4 for reference.

**Geotechnical Evaluation**

Slope Instability:

The proposed site is generally flat terrain adjacent to mountainous topography. No global stability issues are anticipated.

Corrosive soil considerations:

Laboratory test results indicate that soil conditions for the site are non-corrosive.

Project Seismicity

Earthquake induced hazards can be categorized as primary and secondary seismic effects. Primary seismic effects such as ground rupture or surface deformation result from differential movement along a fault. Secondary seismic effects result from various soil responses to ground motion acceleration. These result from active nearby faults and can include the following: liquefaction of natural and man-made soil deposits, lateral spreading, differential compaction, and ground shaking.

Research data and historical case histories indicate that soil liquefaction generally occurs in saturated, loose granular soil (primarily fine to medium-grained, clean sand deposits) during or after strong seismic ground shaking. The alluvial deposit at the proposed site are both dense and unsaturated for the upper 30 feet of the borehole depth. Therefore, this site can be assessed as not susceptible to liquefaction. Lateral spreading as a result of liquefaction near the ground surface is also not considered to be a potential hazard.

The potential for differential compaction due to ground shaking is a possible hazard at this site. Several faults have been mapped within the local area. Due to the dense nature of the alluvial deposits present, however, compaction of soils due to ground shaking is considered low.

The effects of ground shaking on the CMS structure can be estimated from use of the peak ground acceleration data provided. See the previous section "Seismic Considerations" for these design criteria.

**Foundation Recommendation**

Office of Geotechnical Design North recommends the standard plan pile foundation for a Model 500 Changeable Message Sign. This model consists of a single cast-in-drilled-hole (CIDH) pile of 22 ft in length and 5 feet in diameter. This recommendation is based on the following findings:

Materials recorded at the site consists of dense coarse-grained cohesionless soil with fewer than 50% fines. Ground water at the site was not encountered within the borehole during the field investigation.

**Construction Considerations**

Ground water is not anticipated to be encountered during drilling operations. Wet soils at the ground surface may be expected during the winter season. In the event of localized groundwater and surface water during construction, especially during the rainy season, the contractor shall be prepared to construct the CIDH piles under these conditions.

Caving conditions may be present due to the presence of gravels. The contractor shall anticipate the possible caving condition and deal with it properly, including the use of temporary casing.

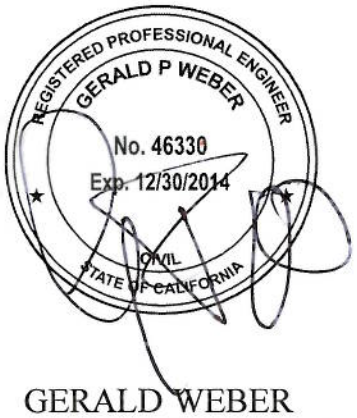
Note that once the pile installation is complete, the Standard Specifications and/or Special Provisions contain the specified time required before the CMS sign structure can be installed.

**Project Information**
"Project Information" discloses to bidders and contractors a list of pertinent information available for their inspection prior to bid opening.

*Data and information included in the Information Handout provided to the bidders and contractors are:*
Geotechnical Design Report for EA 10-0W1400, dated July 30, 2014.

If any unforeseen geologic conditions are encountered during excavation, this Office shall be contacted for additional recommendations. If any changes to the overhead sign structure are proposed during the final project design, the Office of Geotechnical Design – North should review those changes to determine if the foundation recommendation herein still applies.

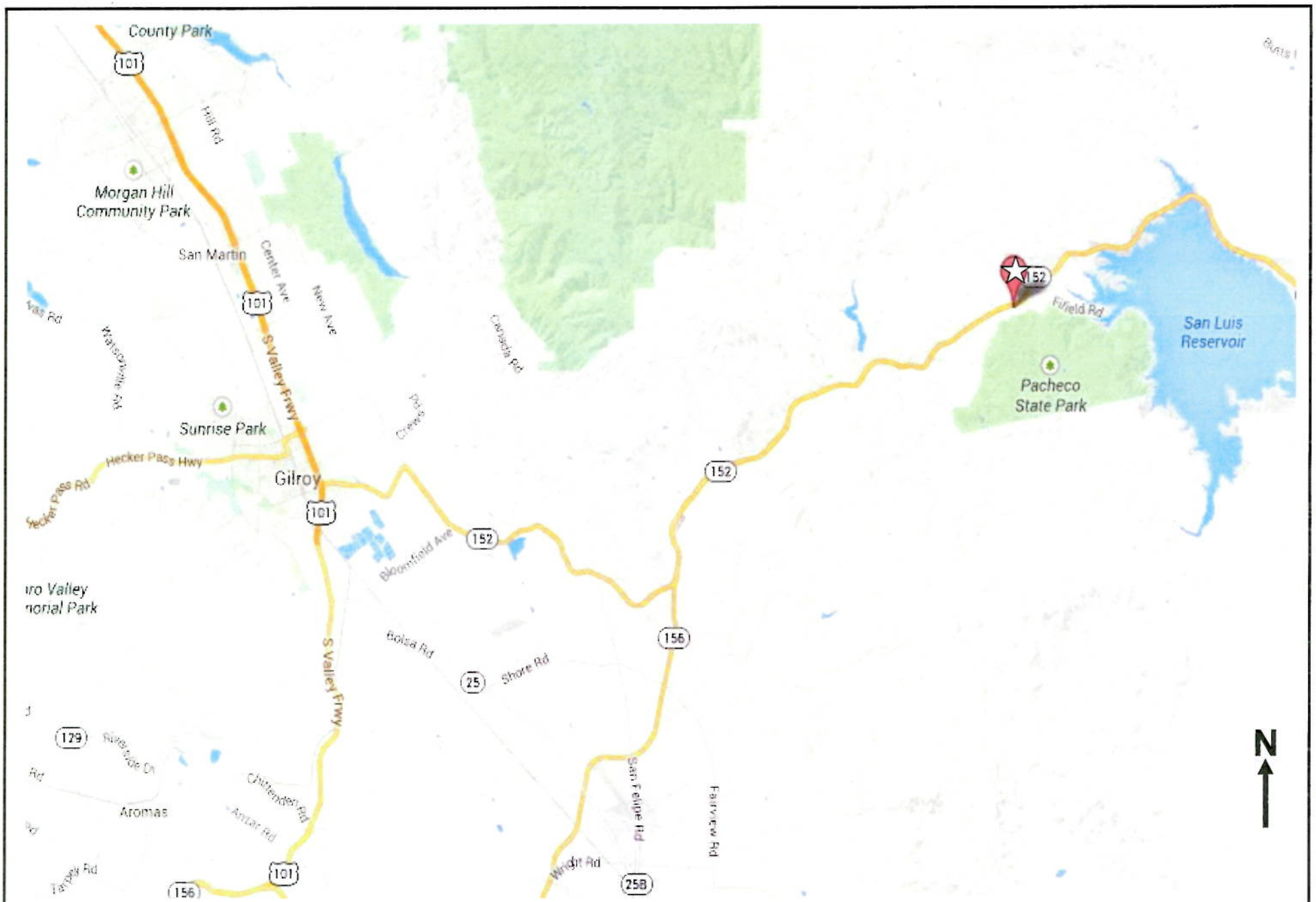
If you have any questions regarding the above recommendations, you may contact Gerald Weber at (916) 227-1055.



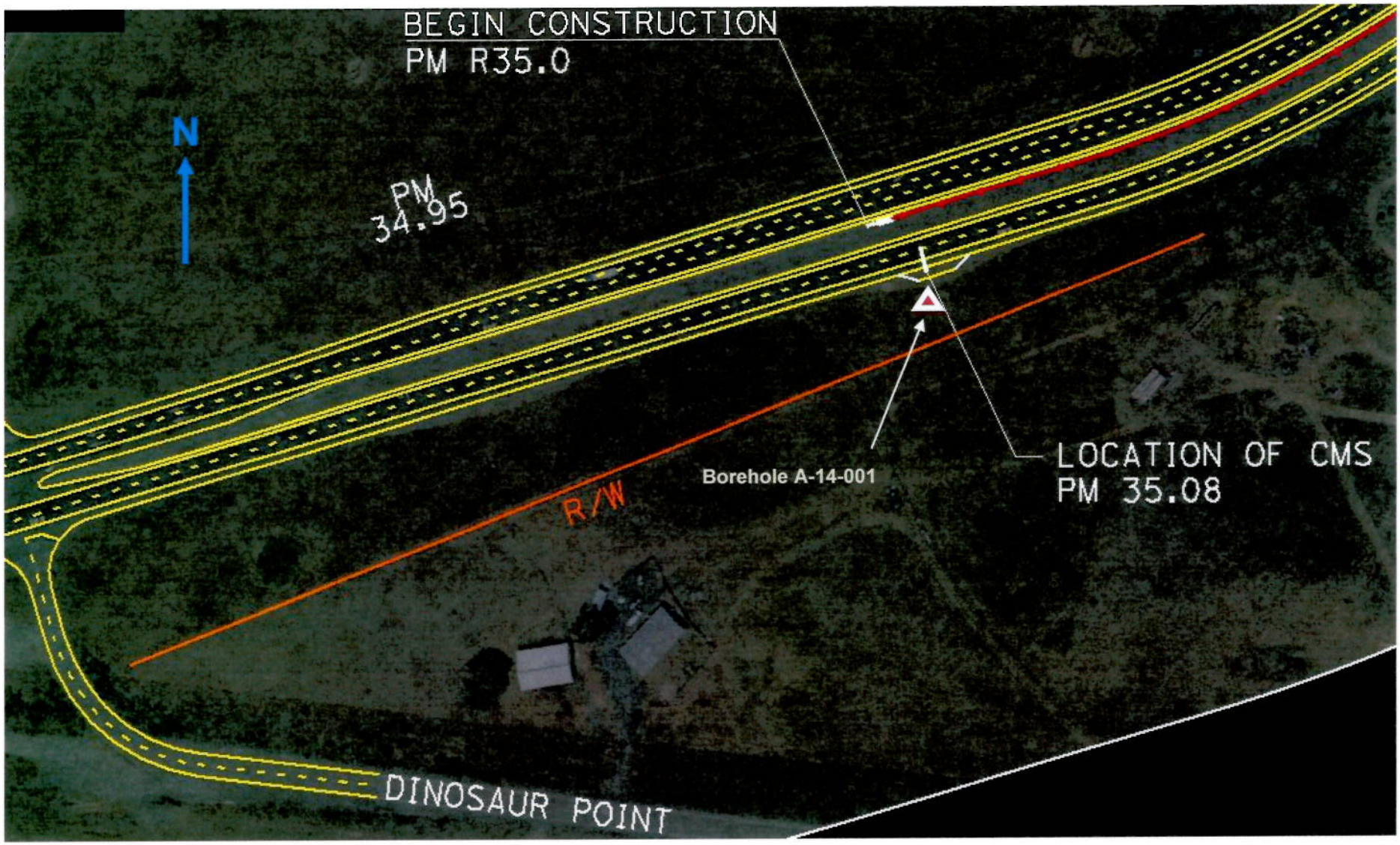

GERALD WEBER
Associate Transportation Engineer, PE
46330

Appendix I: Location Map - Plate No. 1
Site Plan - Plate No. 2
Fault Map - Plate No. 3
ARS Curve - Plate No. 4
Appendix II: Boring Record - A-14-001 dated 1/13/2014
Appendix III: Corrosion Test Summary Report - Soil dated 1/31/2014

C: Jes Pada (District Project Manager)
DES Project Coordination Engineer
Structure Construction RE Pending File
Scott Smith (District Environmental)
Dave Dhillon (D10-District Materials Engineer)
GEODOG




| | | | | |
|---|---|---|---|---|
| Caltrans | Division of Engineering Services<br>Geotechnical Services<br>Office of Geotechnical Design - North | EA: 10-0W1400<br>July 2014 | LOCATION MAP<br>04-SCl-152 PM 35.08 Pacheco Pass CMS | Plate No. 1 |



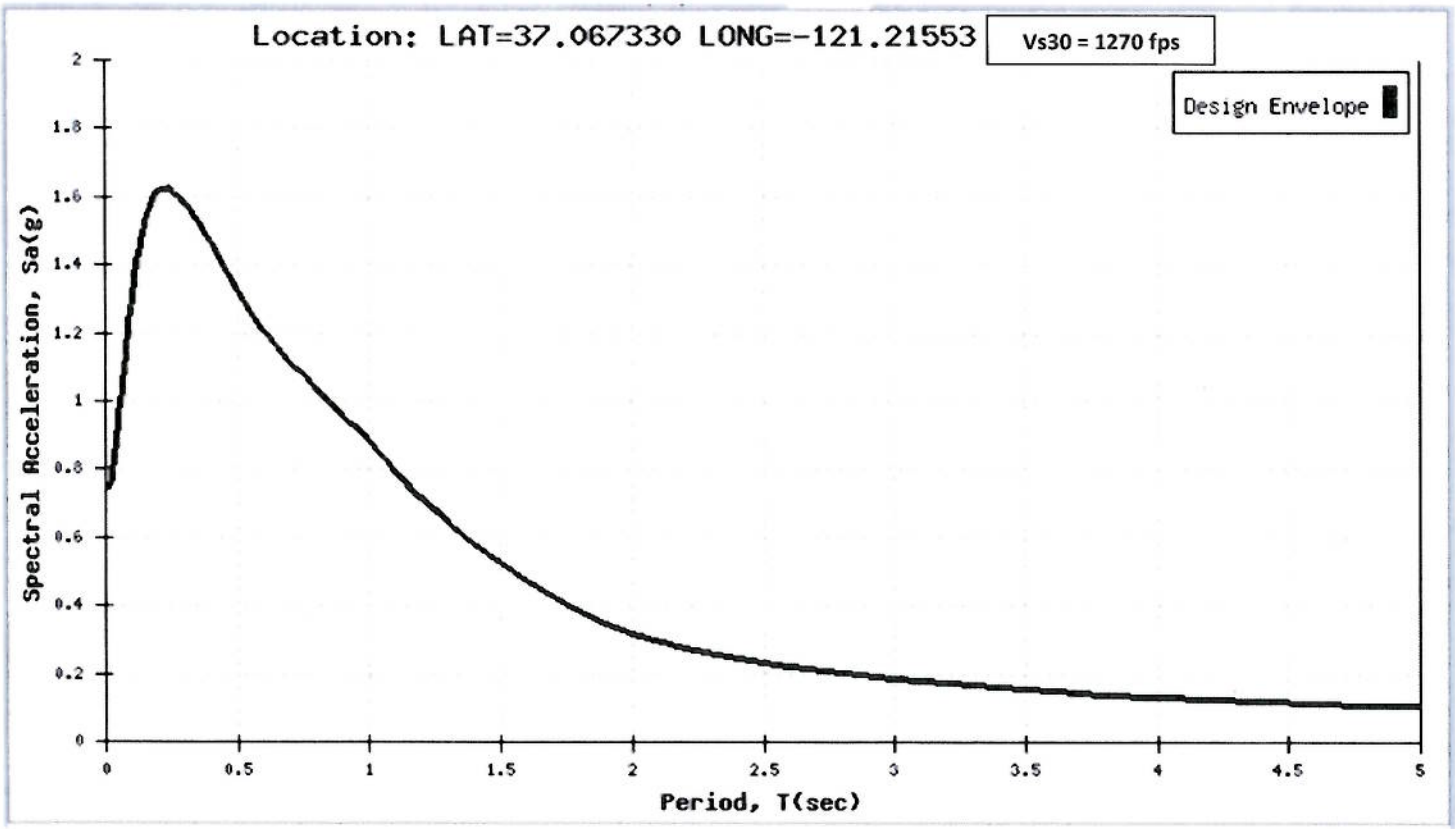

**NO SCALE**

| | | | |
|---|---|---|---|
| Caltrans | **CALTRANS**<br>**Division of Engineering Services**<br>**Geotechnical Services**<br>**Geotechnical Design - North** | **EA: 10-0W1400**<br>**EFIS: 1012000042**<br>**10-Mer-152 PM R0.0/R2.4**<br>**10-SCl-152 PM R35.0/R35.2** | **SITE PLAN**<br>**Plate No. 2** |


NO SCALE

| | | | |
|---|---|---|---|
| Caltrans | CALTRANS<br>Division of Engineering Services<br>Geotechnical Services<br>Geotechnical Design - North | EA: 10-0W1400<br>EFIS: 1012000042<br>10-Mer-152 PM R0.0/2.4<br>10-SCl-152 PM R35.0/35.2 | FAULT MAP<br>Plate No. 3 |

# Acceleration Response Spectrum




## Great Valley 08 (Quinto)

| | |
|---|---|
| Fault ID: | 160 |
| Maximum Magnitude (Mmax) | 6.8 |
| Fault Type: | Rev |
| Fault Dip: | 15 degrees |
| Dip Direction: | West |
| Bottom of Rupture Plane: | 3.7 miles |
| Top of Rupture Plane: | 0 miles |
| Rrup | 3.0 miles |
| Rjb: | 0 miles |
| Rx: | 11.7 miles |
| Fnorm: | 0 |
| Frev: | 1 |
| Vs30 | 1270 feet/sec |

**Probabilistic Model**
**USGS Seismic Hazard Map(2008) 975 Year Return Period**

| Period | SA (Base Spectrum) | Basin Factor | Near Fault Factor (Applied) | SA (Final Spectrum) |
|---|---|---|---|---|
| 0.01 | 0.570 | 1.000 | 1.000 | 0.570 |
| 0.05 | 0.899 | 1.000 | 1.000 | 0.899 |
| 0.1 | 1.094 | 1.000 | 1.000 | 1.094 |
| 0.15 | 1.216 | 1.000 | 1.000 | 1.216 |
| 0.2 | 1.311 | 1.000 | 1.000 | 1.311 |
| 0.25 | 1.262 | 1.000 | 1.000 | 1.262 |
| 0.3 | 1.223 | 1.000 | 1.000 | 1.223 |
| 0.4 | 1.078 | 1.000 | 1.000 | 1.078 |
| 0.5 | 0.977 | 1.000 | 1.000 | 0.977 |
| 0.6 | 0.857 | 1.000 | 1.040 | 0.891 |
| 0.7 | 0.767 | 1.000 | 1.080 | 0.828 |
| 0.85 | 0.648 | 1.000 | 1.140 | 0.739 |
| 1 | 0.555 | 1.000 | 1.200 | 0.666 |
| 1.2 | 0.454 | 1.000 | 1.200 | 0.545 |
| 1.5 | 0.355 | 1.000 | 1.200 | 0.426 |
| 2 | 0.258 | 1.000 | 1.200 | 0.310 |
| 3 | 0.157 | 1.000 | 1.200 | 0.188 |
| 4 | 0.110 | 1.000 | 1.200 | 0.132 |
| 5 | 0.088 | 1.000 | 1.200 | 0.105 |

Caltrans

CALTRANS
Division of Engineering Services
Geotechnical Services

EA: 10-0W1400
EFIS: 1012000042
10-SCL-152 PMR35.08

ARS CURVE

Plate No. 4

| LOGGED BY | BEGIN DATE | COMPLETION DATE | BOREHOLE LOCATION (Lat/Long or North/East and Datum) | HOLE ID |
|---|---|---|---|---|
| Chris Koepke | 1-13-14 | 1-13-14 | 37° 4' 2.3874" / 121° 12' 55.908" | A-14-001 |
| DRILLING CONTRACTOR | | | BOREHOLE LOCATION (Offset, Station, Line) | SURFACE ELEVATION |
| CalTrans | | | 46' Rt Sta ETW | 1374 ft |
| DRILLING METHOD | | | DRILL RIG | BOREHOLE DIAMETER |
| Auger | | | Acker MP8 C Number 0398 | 6 in |
| SAMPLER TYPE(S) AND SIZE(S) (ID) | | | SPT HAMMER TYPE | HAMMER EFFICIENCY, ERi |
| Auger cuttings bulk sample | | | Not recorded | 71% dated 4/26/13 |
| BOREHOLE BACKFILL AND COMPLETION | | | GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE) | TOTAL DEPTH OF BORING |
| Bentonite chip with 5 bags | | | Not Encountered / Not Encountered | 30.0 ft |

| ELEVATION (ft) | DEPTH (ft) | Material Graphics | DESCRIPTION | Sample Location | Sample Number | Blows per 6 in. | Blows per foot | Recovery (%) | RQD (%) | Moisture Content (%) | Dry Unit Weight (pcf) | Shear Strength (tsf) | Drilling Method | Casing Depth | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | | | | | | | | | | | | N60 = Nmeasured * (ERi /60%) equals Nmeasured * 1.18 where ERi is 71%, Particle size including cobbles and boulders per ASTM D 2488 and/or as detailed in Soil and Rock Logging, Classification, and Presentation Manual 2010 Edition. Soil description for consistency not required for non-cohesive soil. Corrosion Test Summary Report - Soil CR20140034/C704863 non corrosive ph=7.88 dated 1/31/2014. |
| | 1 | | SILTY SAND with GRAVEL (SM); grayish brown; slightly moist; 20% fine, subrounded GRAVEL ; nonplastic fines ; weak cementation; non cohesive; (FILL). | | | | | | | | | | | | |
| 1372.00 | 2 | | | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | | | |
| 1370.00 | 4 | | | | | | | | | | | | | | |
| | 5 | | SILTY SAND with GRAVEL (SM); very dense; grayish brown; slightly moist; 20% fine, subrounded GRAVEL ; nonplastic fines ; weak cementation; non cohesive; (NATIVE). | | | 22<br>43<br>44 | 87 | | | | | | | | N60 = Nmeasured * 1.18 or 87 * 1.18 = 102 |
| 1368.00 | 6 | | | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | | | |
| 1366.00 | 8 | | | | | | | | | | | | | | |
| | 9 | | | | | | | | | | | | | | |
| 1364.00 | 10 | | SILTY SAND with GRAVEL (SM); very dense; grayish brown; slightly moist; 20% fine, subrounded GRAVEL ; nonplastic fines ; weak cementation; non cohesive; (NATIVE). | | | refusal at 4" | | | | | | | | | N60 > 50 |
| | 11 | | | | | | | | | | | | | | |
| 1362.00 | 12 | | | | | | | | | | | | | | |
| | 13 | | | | | | | | | | | | | | |
| 1360.00 | 14 | | | | | | | | | | | | | | |
| | 15 | | SILTY SAND with GRAVEL (SM); very dense; grayish brown; slightly moist; 20% fine, subrounded GRAVEL ; nonplastic fines ; weak cementation; non cohesive; (NATIVE). | | | refusal at 4" | | | | | | | | | N60 > 50 |
| 1358.00 | 16 | | | | | | | | | | | | | | |
| | 17 | | | | | | | | | | | | | | |
| 1356.00 | 18 | | | | | | | | | | | | | | |
| | 19 | | | | | | | | | | | | | | |
| 1354.00 | 20 | | Poorly graded GRAVEL with SILT and SAND (GP-GM); very dense; grayish brown; slightly moist; 40% fine, subrounded GRAVEL ; nonplastic fines ; weak cementation; non cohesive; (NATIVE). | | | refusal at 3" | | | | | | | | | N60 > 50 |
| | 21 | | | | | | | | | | | | | | |
| 1352.00 | 22 | | | | | | | | | | | | | | |
| | 23 | | | | | | | | | | | | | | |
| 1350.00 | 24 | | | | | | | | | | | | | | |
| | 25 | | | | | | | | | | | | | | |

(continued)

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - North

| REPORT TITLE | | | | HOLE ID |
|---|---|---|---|---|
| BORING RECORD | | | | A-14-001 |
| DIST. | COUNTY | ROUTE | POSTMILE | PROJECT ID |
| 10 | SCL | 152 | R35.1 | 1012000042 |
| PROJECT OR BRIDGE NAME | | | | |
| SR 152 CMS at Pacheco Pass/Dinosaur Point Road | | | | |
| BRIDGE NUMBER | PREPARED BY | | DATE | SHEET |
| | G Weber | | 1-13-14 | 1 of 2 |

| ELEVATION (ft) | DEPTH (ft) | Material Graphics | DESCRIPTION | Sample Location | Sample Number | Blows per 6 in. | Blows per foot | Recovery (%) | RQD (%) | Moisture Content (%) | Dry Unit Weight (pcf) | Shear Strength (tsf) | Drilling Method | Casing Depth | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 25 | | Poorly graded GRAVEL with SILT and SAND (GP-GM); very dense; grayish brown; slightly moist; 50% fine, subrounded GRAVEL ; nonplastic fines ; weak cementation; non cohesive; (NATIVE). | | | refusal at 3" | | | | | | | | | N60 > 50 |
| 1348.00 | 26 | | | | | | | | | | | | | | |
| | 27 | | | | | | | | | | | | | | |
| 1346.00 | 28 | | | | | | | | | | | | | | |
| | 29 | | | | | | | | | | | | | | |
| 1344.00 | 30 | | Very dense.<br>Bottom of borehole at 30.0 ft bgs | | | refusal at 2" | | | | | | | | | N60 > 50 |
| | 31 | | | | | | | | | | | | | | |
| 1342.00 | 32 | | | | | | | | | | | | | | |
| | 33 | | | | | | | | | | | | | | |
| 1340.00 | 34 | | | | | | | | | | | | | | |
| | 35 | | | | | | | | | | | | | | |
| 1338.00 | 36 | | | | | | | | | | | | | | |
| | 37 | | | | | | | | | | | | | | |
| 1336.00 | 38 | | | | | | | | | | | | | | |
| | 39 | | | | | | | | | | | | | | |
| 1334.00 | 40 | | | | | | | | | | | | | | |
| | 41 | | | | | | | | | | | | | | |
| 1332.00 | 42 | | | | | | | | | | | | | | |
| | 43 | | | | | | | | | | | | | | |
| 1330.00 | 44 | | | | | | | | | | | | | | |
| | 45 | | | | | | | | | | | | | | |
| 1328.00 | 46 | | | | | | | | | | | | | | |
| | 47 | | | | | | | | | | | | | | |
| 1326.00 | 48 | | | | | | | | | | | | | | |
| | 49 | | | | | | | | | | | | | | |
| 1324.00 | 50 | | | | | | | | | | | | | | |
| | 51 | | | | | | | | | | | | | | |
| 1322.00 | 52 | | | | | | | | | | | | | | |
| | 53 | | | | | | | | | | | | | | |
| 1320.00 | 54 | | | | | | | | | | | | | | |
| | 55 | | | | | | | | | | | | | | |

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - North

| REPORT TITLE | | | | HOLE ID |
|---|---|---|---|---|
| **BORING RECORD** | | | | **A-14-001** |
| DIST. | COUNTY | ROUTE | POSTMILE | PROJECT ID |
| **10** | **SCL** | **152** | **R35.1** | **1012000042** |
| PROJECT OR BRIDGE NAME | | | | |
| **SR 152 CMS at Pacheco Pass/Dinosaur Point Road** | | | | |
| BRIDGE NUMBER | PREPARED BY | | DATE | SHEET |
| | **G Weber** | | **1-13-14** | **2 of 2** |

5 BR - STANDARD SR 152 PACHECO.GPJ CALTRANS LIBRARY (FEB 2013).GLB 8/1/14

## GROUP SYMBOLS AND NAMES

| Graphic / Symbol | Group Names |
|---|---|
| GW | Well-graded GRAVEL<br>Well-graded GRAVEL with SAND |
| GP | Poorly graded GRAVEL<br>Poorly graded GRAVEL with SAND |
| GW-GM | Well-graded GRAVEL with SILT<br>Well-graded GRAVEL with SILT and SAND |
| GW-GC | Well-graded GRAVEL with CLAY (or SILTY CLAY)<br>Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND) |
| GP-GM | Poorly graded GRAVEL with SILT<br>Poorly graded GRAVEL with SILT and SAND |
| GP-GC | Poorly graded GRAVEL with CLAY (or SILTY CLAY)<br>Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND) |
| GM | SILTY GRAVEL<br>SILTY GRAVEL with SAND |
| GC | CLAYEY GRAVEL<br>CLAYEY GRAVEL with SAND |
| GC-GM | SILTY, CLAYEY GRAVEL<br>SILTY, CLAYEY GRAVEL with SAND |
| SW | Well-graded SAND<br>Well-graded SAND with GRAVEL |
| SP | Poorly graded SAND<br>Poorly graded SAND with GRAVEL |
| SW-SM | Well-graded SAND with SILT<br>Well-graded SAND with SILT and GRAVEL |
| SW-SC | Well-graded SAND with CLAY (or SILTY CLAY)<br>Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL) |
| SP-SM | Poorly graded SAND with SILT<br>Poorly graded SAND with SILT and GRAVEL |
| SP-SC | Poorly graded SAND with CLAY (or SILTY CLAY)<br>Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL) |
| SM | SILTY SAND<br>SILTY SAND with GRAVEL |
| SC | CLAYEY SAND<br>CLAYEY SAND with GRAVEL |
| SC-SM | SILTY, CLAYEY SAND<br>SILTY, CLAYEY SAND with GRAVEL |
| PT | PEAT |
| | COBBLES<br>COBBLES and BOULDERS<br>BOULDERS |

| Graphic / Symbol | Group Names |
|---|---|
| CL | Lean CLAY<br>Lean CLAY with SAND<br>Lean CLAY with GRAVEL<br>SANDY lean CLAY<br>SANDY lean CLAY with GRAVEL<br>GRAVELLY lean CLAY<br>GRAVELLY lean CLAY with SAND |
| CL-ML | SILTY CLAY<br>SILTY CLAY with SAND<br>SILTY CLAY with GRAVEL<br>SANDY SILTY CLAY<br>SANDY SILTY CLAY with GRAVEL<br>GRAVELLY SILTY CLAY<br>GRAVELLY SILTY CLAY with SAND |
| ML | SILT<br>SILT with SAND<br>SILT with GRAVEL<br>SANDY SILT<br>SANDY SILT with GRAVEL<br>GRAVELLY SILT<br>GRAVELLY SILT with SAND |
| OL | ORGANIC lean CLAY<br>ORGANIC lean CLAY with SAND<br>ORGANIC lean CLAY with GRAVEL<br>SANDY ORGANIC lean CLAY<br>SANDY ORGANIC lean CLAY with GRAVEL<br>GRAVELLY ORGANIC lean CLAY<br>GRAVELLY ORGANIC lean CLAY with SAND |
| OL | ORGANIC SILT<br>ORGANIC SILT with SAND<br>ORGANIC SILT with GRAVEL<br>SANDY ORGANIC SILT<br>SANDY ORGANIC SILT with GRAVEL<br>GRAVELLY ORGANIC SILT<br>GRAVELLY ORGANIC SILT with SAND |
| CH | Fat CLAY<br>Fat CLAY with SAND<br>Fat CLAY with GRAVEL<br>SANDY fat CLAY<br>SANDY fat CLAY with GRAVEL<br>GRAVELLY fat CLAY<br>GRAVELLY fat CLAY with SAND |
| MH | Elastic SILT<br>Elastic SILT with SAND<br>Elastic SILT with GRAVEL<br>SANDY elastic SILT<br>SANDY elastic SILT with GRAVEL<br>GRAVELLY elastic SILT<br>GRAVELLY elastic SILT with SAND |
| OH | ORGANIC fat CLAY<br>ORGANIC fat CLAY with SAND<br>ORGANIC fat CLAY with GRAVEL<br>SANDY ORGANIC fat CLAY<br>SANDY ORGANIC fat CLAY with GRAVEL<br>GRAVELLY ORGANIC fat CLAY<br>GRAVELLY ORGANIC fat CLAY with SAND |
| OH | ORGANIC elastic SILT<br>ORGANIC elastic SILT with SAND<br>ORGANIC elastic SILT with GRAVEL<br>SANDY elastic ELASTIC SILT<br>SANDY ORGANIC elastic SILT with GRAVEL<br>GRAVELLY ORGANIC elastic SILT<br>GRAVELLY ORGANIC elastic SILT with SAND |
| OL/OH | ORGANIC SOIL<br>ORGANIC SOIL with SAND<br>ORGANIC SOIL with GRAVEL<br>SANDY ORGANIC SOIL<br>SANDY ORGANIC SOIL with GRAVEL<br>GRAVELLY ORGANIC SOIL<br>GRAVELLY ORGANIC SOIL with SAND |

## FIELD AND LABORATORY TESTS

| | |
|---|---|
| C | Consolidation (ASTM D 2435-04) |
| CL | Collapse Potential (ASTM D 5333-03) |
| CP | Compaction Curve (CTM 216 - 06) |
| CR | Corrosion, Sulfates, Chlorides (CTM 643 - 99; CTM 417 - 06; CTM 422 - 06) |
| CU | Consolidated Undrained Triaxial (ASTM D 4767-02) |
| DS | Direct Shear (ASTM D 3080-04) |
| EI | Expansion Index (ASTM D 4829-03) |
| M | Moisture Content (ASTM D 2216-05) |
| OC | Organic Content (ASTM D 2974-07) |
| P | Permeability (CTM 220 - 05) |
| PA | Particle Size Analysis (ASTM D 422-63 [2002]) |
| PI | Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89-02, AASHTO T 90-00) |
| PL | Point Load Index (ASTM D 5731-05) |
| PM | Pressure Meter |
| PP | Pocket Penetrometer |
| R | R-Value (CTM 301 - 00) |
| SE | Sand Equivalent (CTM 217 - 99) |
| SG | Specific Gravity (AASHTO T 100-06) |
| SL | Shrinkage Limit (ASTM D 427-04) |
| SW | Swell Potential (ASTM D 4546-03) |
| TV | Pocket Torvane |
| UC | Unconfined Compression - Soil (ASTM D 2166-06)<br>Unconfined Compression - Rock (ASTM D 2938-95) |
| UU | Unconsolidated Undrained Triaxial (ASTM D 2850-03) |
| UW | Unit Weight (ASTM D 4767-04) |
| VS | Vane Shear (AASHTO T 223-96 [2004]) |

## SAMPLER GRAPHIC SYMBOLS

- Standard Penetration Test (SPT)
- Standard California Sampler
- Modified California Sampler
- Shelby Tube
- Piston Sampler
- NX Rock Core
- HQ Rock Core
- Bulk Sample
- Other (see remarks)

## DRILLING METHOD SYMBOLS

- Auger Drilling
- Rotary Drilling
- Dynamic Cone or Hand Driven
- Diamond Core

## WATER LEVEL SYMBOLS

- First Water Level Reading (during drilling)
- Static Water Level Reading (short-term)
- Static Water Level Reading (long-term)

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - North

REPORT TITLE: **BORING RECORD LEGEND**

| DIST. | COUNTY | ROUTE | POSTMILE | EA |
|---|---|---|---|---|
| 10 | Santa Clara | 152 | R35.1 | 10-1012000042 |

PROJECT OR BRIDGE NAME: **SR 152 CMS at Pacheco Pass/Dinosaur Point Road**

| BRIDGE NUMBER | PREPARED BY | DATE | SHEET |
|---|---|---|---|
| | | | 1 of 2 |

## CONSISTENCY OF COHESIVE SOILS

| Descriptor | Unconfined Compressive Strength (tsf) | Pocket Penetrometer (tsf) | Torvane (tsf) | Field Approximation |
|---|---|---|---|---|
| Very Soft | < 0.25 | < 0.25 | < 0.12 | Easily penetrated several inches by fist |
| Soft | 0.25 - 0.50 | 0.25 - 0.50 | 0.12 - 0.25 | Easily penetrated several inches by thumb |
| Medium Stiff | 0.50 - 1.0 | 0.50 - 1.0 | 0.25 - 0.50 | Can be penetrated several inches by thumb with moderate effort |
| Stiff | 1.0 - 2.0 | 1.0 - 2.0 | 0.50 - 1.0 | Readily indented by thumb but penetrated only with great effort |
| Very Stiff | 2.0 - 4.0 | 2.0 - 4.0 | 1.0 - 2.0 | Readily indented by thumbnail |
| Hard | > 4.0 | > 4.0 | > 2.0 | Indented by thumbnail with difficulty |

## APPARENT DENSITY OF COHESIONLESS SOILS

| Descriptor | SPT $N_{60}$ - Value (blows / foot) |
|---|---|
| Very Loose | 0 - 4 |
| Loose | 5 - 10 |
| Medium Dense | 11 - 30 |
| Dense | 31 - 50 |
| Very Dense | > 50 |

## MOISTURE

| Descriptor | Criteria |
|---|---|
| Dry | Absence of moisture, dusty, dry to the touch |
| Moist | Damp but no visible water |
| Wet | Visible free water, usually soil is below water table |

## PERCENT OR PROPORTION OF SOILS

| Descriptor | Criteria |
|---|---|
| Trace | Particles are present but estimated to be less than 5% |
| Few | 5 to 10% |
| Little | 15 to 25% |
| Some | 30 to 45% |
| Mostly | 50 to 100% |

## SOIL PARTICLE SIZE

| Descriptor | | Size |
|---|---|---|
| Boulder | | > 12 inches |
| Cobble | | 3 to 12 inches |
| Gravel | Coarse | 3/4 inch to 3 inches |
| | Fine | No. 4 Sieve to 3/4 inch |
| Sand | Coarse | No. 10 Sieve to No. 4 Sieve |
| | Medium | No. 40 Sieve to No. 10 Sieve |
| | Fine | No. 200 Sieve to No. 40 Sieve |
| Silt and Clay | | Passing No. 200 Sieve |

## PLASTICITY OF FINE-GRAINED SOILS

| Descriptor | Criteria |
|---|---|
| Nonplastic | A 1/8-inch thread cannot be rolled at any water content. |
| Low | The thread can barely be rolled, and the lump cannot be formed when drier than the plastic limit. |
| Medium | The thread is easy to roll, and not much time is required to reach the plastic limit; it cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit. |
| High | It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit. |

## CEMENTATION

| Descriptor | Criteria |
|---|---|
| Weak | Crumbles or breaks with handling or little finger pressure. |
| Moderate | Crumbles or breaks with considerable finger pressure. |
| Strong | Will not crumble or break with finger pressure. |

NOTE: This legend sheet provides descriptors and associated criteria for required soil description components only. Refer to Caltrans Soil and Rock Logging, Classification, and Presentation Manual (July 2007), Section 2, for tables of additional soil description components and discussion of soil description and identification.

Results sent to: GERALD WEBER

Division of Engineering Services
Materials Engineering and Testing Services
Corrosion and Structural Concrete Field Investigation Branch

Report Date: 1/31/2014
Reported by Michael Mifkovic

# CORROSION TEST SUMMARY REPORT - SOIL

EA

EFIS: **1012000042**

Dist/Co/Rte/PM **04 / SCL /152/R / 35-35.2 PM**

| CORROSION LAB # | TL101 # | BORE # | DEPTH (FT) START | DEPTH (FT) END | MINIMUM RESISTIVITY[1] (ohm-cm) | pH[1] | CHLORIDE CONTENT[2] (ppm) | SULFATE CONTENT[3] (ppm) | IS SAMPLE CORROSIVE? |
|---|---|---|---|---|---|---|---|---|---|
| SOIL SAMPLE FROM: | | | | | | | | | |
| CR20140034† | C704863 | | 0 | 15 | 2856 | 7.88 | | | NO |
| †Comment: | FOR SIGN STRUCTURE | | | | | | | | |

This site is not corrosive to foundation elements (see note below).

Note: For Structural Elements, the Department considers a site corrosive if one or more of the following conditions exist: pH is 5.5 or less, chloride concentration is 500 ppm or greater, sulfate concentration is 2000 ppm or greater. Resistivity is not considered for Structural Elements. MSE backfill shall conform to the requirements of section 47-2.02C Structure Backfill in the 2010 Standard Specifications.

[1]CT 643, [2]CT 422, [3]CT 417