FOR CONTRACT NO.: 04-153004

INFORMATION HANDOUT

MATERIALS INFORMATION

PRELIMINARY SITE INVESTIGATION REPORT
ALA-92 AND 880 TOS ALAMEDA COUNTY, CALIFORNIA

GEOTECHNICAL DESIGN REPORT

CalOSHA UNDERGROUND CLASSIFICATION #'S: C067-001-12T THRU C068-001-12T

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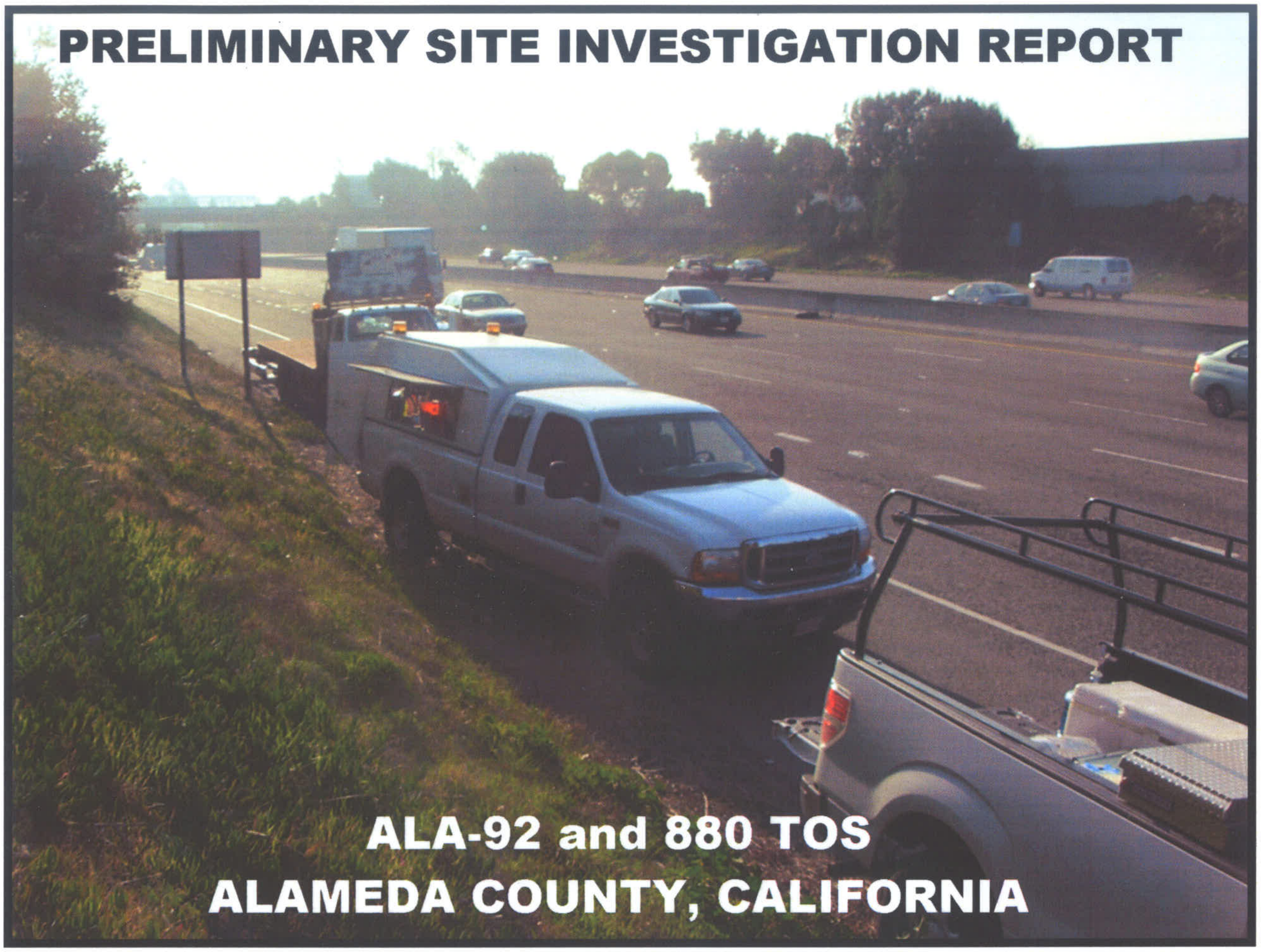

PRELIMINARY SITE INVESTIGATION REPORT

ALA-92 and 880 TOS
ALAMEDA COUNTY, CALIFORNIA

<u>*PREPARED FOR*</u>:
CALIFORNIA DEPARTMENT OF TRANSPORTATION
DISTRICT 4
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GEOCON PROJECT NO. E8560-06-31
CALTRANS EA 04-153001
CALTRANS PROJECT # 04-0002-0302-1

FEBRUARY 2012

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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.

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PRELIMINARY SITE INVESTIGATION REPORT

1.0 INTRODUCTION

This Preliminary Site Investigation Report for an area along State Routes 92 (SR-92) and 880 (SR-880) in Alameda County, California was prepared by Geocon Consultants, Inc. under California Department of Transportation (Caltrans) Contract No. 04A3578 and Task Order No. 31 (TO-31), EA 04-153001.

1.1 Project Description and Proposed Improvements

The project location consists of Caltrans right-of-way (ROW) on SR-880 shoulders, eastbound and westbound onramps to SR-92, and northbound and southbound onramps to SR-880 in the cities of Oakland, San Leandro, Hayward, Fremont, and Newark, California. Caltrans proposes to install and implement ramp metering and traffic operations systems along SR-92 and SR-880 from 0.3 mile west of Clawiter Road to 0.1 mile west of Calaroga Road Overcrossing (SR-92) and 0.2 mile south of State Route 84 to 0.3 mile north of the Bay Area Rapid Transit underpass (SR-880). The project includes eight existing non-metered onramps, of which five onramps will be widened to provide for High Occupancy Vehicle (HOV) preferential lanes, and two onramps will be widened to provide for mixed-flow lanes. Additionally, Changeable Message Signs (CMS) will be installed at two locations on the shoulder of SR-880 and maintenance vehicle pullouts (MVP) will be installed at various locations on SR-92 and SR-880. The project location is depicted on the attached Vicinity Map, Figure 1.

1.2 General Objectives

The purpose of the site investigation was to evaluate concentrations of California Assessment Manual 17 (CAM 17) metals, particularly aerially-deposited lead (ADL), total petroleum hydrocarbons as gasoline (TPHg), as diesel (TPHd), and as motor oil (TPHmo), polynuclear aromatic hydrocarbons (PAH), and pH in soil; and CAM 17 metals, TPHg/d/mo, benzene, toluene, ethylbenzene and xylenes (BTEX), methyl tert-butyl ether (MTBE), and PAH compounds in groundwater.

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

2.0 BACKGROUND

2.1 Hazardous Waste Determination Criteria

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

For waste containing metals, the waste is classified as California hazardous when: 1) the representative total metal content exceeds the respective Total Threshold Limit Concentration (TTLC); or 2) the representative soluble metal content exceeds the respective Soluble Threshold Limit Concentration (STLC) based on the standard Waste Extraction Test (WET). A waste has the potential of exceeding the STLC when the waste's total metal content is greater than or equal to ten times the respective STLC value since the WET uses a 1:10 dilution ratio. Hence, when a total metal is detected at a concentration greater than or equal to ten times the respective STLC, and assuming that 100 percent of the total metals are soluble, soluble metal analysis is required. A material is classified as RCRA hazardous, or Federal hazardous, when the representative soluble metal content exceeds the Federal regulatory level based on the Toxicity Characteristic Leaching Procedure (TCLP).

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

2.2 Environmental Screening Levels

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

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

3.0 SCOPE OF SERVICES

The scope of services performed under TO-31, EA 04-153001 included the following:

3.1 Pre-field Activities

- Prepared the *Preliminary Site Investigation Workplan* and *Health and Safety Plan*, dated December 9, 2011, and December 2011, respectively
- Retained the services of Advanced Technology Laboratories (ATL), a Caltrans-approved and California-certified analytical laboratory, to perform the chemical analyses of soil samples.
- Retained the services of D & M Traffic Services to provide traffic control during field operations.
- Notified Underground Service Alert (USA) at least 48 hours prior to field work.

3.2 Field Activities

The field investigation was performed on December 13 through 15, 2011, by Geocon staff. The following field activities were performed during the sampling efforts:

- Advanced 93 soil borings at the project location using hand-auger and direct-push techniques. The borings were advanced to a maximum depth of 10.5 feet.
- Collected 253 soil samples for total lead analysis.
- Collected 50 soil samples for selected analysis of CAM 17 metals.
- Collected 10 soil samples for TPHg analysis.
- Collected 77 soil samples for TPHd and TPHmo analyses.
- Collected 10 soil samples for BTEX and MTBE analyses.
- Collected 10 soil samples for VOC analysis.
- Collected 21 soil samples for pH analysis.
- Collected 2 soil samples for PAH analysis.
- Collected 2 groundwater samples for selected analysis of CAM 17 metals.
- Collected 2 groundwater samples for TPHg, TPHd, TPHmo, BTEX, MTBE, and VOCs analyses.
- Collected one groundwater sample for PAH analysis.
- Transported samples to California-certified environmental laboratories for analysis under standard chain-of-custody (COC) documentation.

4.0 INVESTIGATIVE METHODS

4.1 Sampling Procedures

Soil samples were collected from 93 boring locations identified by the Caltrans TO Manager. Geocon recorded the boring locations using Differential Global Positioning System (DGPS) equipment. Boring coordinates are presented on Table 1 and boring locations are shown on the Site Plan, Figures 2 through 2h.

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

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

4.2 Laboratory Analyses

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

The soil samples were analyzed as follows:

- 253 samples for total lead using Environmental Protection Agency (EPA) Test Method 6010B.
- 50 samples for CAM 17 metals according to Title 22 CCR, EPA Test Methods 6010B and 7471.
- 17 samples with total lead concentrations equal to or exceeding 50 mg/kg (i.e. equal to or exceeding ten times the STLC of 5.0 mg/l) were further analyzed for WET lead.
- 7 samples with WET lead concentrations exceeding the STLC of 5.0 mg/l were further analyzed for DI-WET and TCLP lead.
- 11 samples with total chromium concentrations equal to or exceeding 50 mg/kg (i.e. equal to or exceeding ten times the STLC of 5.0 mg/l) were further analyzed for WET chromium.
- 77 samples for TPHd and TPHmo using EPA Test Method 8015B.
- 10 samples for TPHg using EPA Test Method 8015B.

- 10 samples for BTEX and MTBE using EPA Test Method 8260.
- 10 samples for VOCs using EPA Test Method 8260.
- 2 samples for PAHs using EPA Test Method 8270.
- 21 samples for pH using EPA Test Method 9045C.

The groundwater samples were analyzed as follows:

- 2 samples for CAM 17 metals according to Title 22 CCR, EPA Test Methods 6010B and 7470.
- 2 samples for TPHg, TPHd and TPHmo using EPA Test Method 8015B.
- 2 samples for BTEX, MTBE, and VOCs using EPA Test Method 8260.
- 1 sample for PAHs using EPA Test Method 8270/SIM.

4.3 Laboratory QA/QC

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

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

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

5.0 INVESTIGATIVE RESULTS

5.1 Subsurface Conditions

Observations during field activities indicated that surface soil at the project location generally consists of fine-grained materials consisting of mostly sand and gravel near the soil surface, and denser fine-grained materials below approximately 1 foot bgs. Groundwater was encountered at depths of 9 and 10 feet in borings B7-CL-SS and B1-N3-SS, respectively.

5.2 Laboratory Analytical Results

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

Results for soil samples:

- The following metals were not detected above their respective laboratory reporting limits: beryllium, selenium, silver, and thallium.
- Total lead was reported at concentrations ranging from <1.0 to 200 mg/kg.
- WET lead was reported at concentrations ranging from 0.84 to 14 mg/l.
- DI-WET lead was not detected at or above the laboratory reporting limit of <0.5 mg/l.
- TCLP lead was not detected at or above the laboratory reporting limit of <0.5 mg/l.
- Total chromium was reported at concentrations ranging from 9.6 to 69 mg/kg.
- WET chromium was not detected at or above the laboratory reporting limit of 1.0 mg/l.
- Remaining CAM 17 metals were reported in the samples at total concentrations below ten times their respective STLCs.
- TPHg was not detected at or above the laboratory reporting limit of <1.0 mg/kg.
- TPHd was reported at concentrations of 1.1 to 1,200 mg/kg.
- TPHmo was reported at concentrations of 1.7 to 5,500 mg/kg.
- BTEX, MTBE, or VOCs were not detected in the samples at or above laboratory reporting limits.
- PAHs were detected at concentrations ranging from < 0.20 to 27 micrograms per kilogram (μg/kg).

Results for groundwater samples:

- The following metals were not detected above their respective laboratory reporting limits: beryllium, selenium, silver, and thallium.
- Remaining metals were reported at concentrations ranging from <0.005 to 1.4 mg/l.
- TPHg was not detected at or above the laboratory reporting limit of <0.05 mg/l.
- TPHd was reported at concentrations of <0.05 and 1.4 mg/l.
- TPHmo was reported at concentrations of <0.05 and 2.2 mg/l.
- BTEX, MTBE, or VOCs were not detected in the samples at or above laboratory reporting limits.
- The PAHs phenanthrene and naphthalene were detected at concentrations of 0.45 and 1.1 micrograms per liter (μg/l), respectively. Remaining PAHs were not detected at or above the laboratory reporting limits.

5.3 Laboratory Quality Assurance/Quality Control

We reviewed the QA/QC results provided with the laboratory analytical reports. The data indicate non-detect results for the method blanks at or above reporting limits. Dilution was necessary for several samples. The relative percent differences (RPD) for MS/MSD were outside of acceptance criteria for several quality control duplicate samples; therefore the calculation was based on raw values. The matrix spike recovery was outside of acceptance limits for three samples; however the analytical batch was validated by the control sample. The surrogate was diluted out for two samples. Surrogate recovery was above laboratory acceptance levels for one duplicate and two MSD samples. Remaining samples and internal laboratory QA/QC samples showed acceptable recoveries and relative percent differences (RPDs). Based on this limited data review, no additional qualifications of the soil data are necessary, and the data are of sufficient quality for the purposes of this report.

5.4 Statistical Evaluation for Lead Detected in Soil Samples

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

The lead data for the site were divided into 12 sample populations, which consisted of the following:

SB SR-880 Shoulder in Oakland (borings B1-CL-MVP to B6-CL-MVP and B7-CL-SS)

NB SR-880 Shoulder in San Leandro (boring B1-N3-SS)

Hesperian Blvd. Onramp to WB SR-92 – Left Shoulder (borings B1-HBR2 to B8-HBR2)

Hesperian Blvd. Onramp to WB SR-92 – Right Shoulder (borings B9-HBR2-CHP to B13-HBR2-CHP)

Industrial Blvd. Loop Ramp to EB SR-92 (borings B1-IBL1 to B10-IBL1)

Industrial Blvd. Onramp to WB SR-92 (borings B1-IBR1 to B12-IBR1)

Clawiter Rd. Loop Ramp to EB SR-92 (borings B1-CL1 to B11-CL1)

Clawiter Rd Loop Ramp to WB SR-92 (borings B1-CL2 to B8-CL2)

NB SR-880 Shoulder near Decoto Rd. Offramp (borings B11-DRL1-MVP to B16-DRL1-MVP)

Decoto Rd. Loop Ramp to NB SR-880 (borings B1-DRL1 to B10-DRL1)

Decoto Rd. Onramp to SB SR-880 – Left Shoulder (borings B1-DRR1 to B11-DRR1)

Decoto Rd. Onramp to SB SR-880 – Right Shoulder (borings B12-DRR1-CHP to B15-DRR1-CHP)

5.4.1 Calculating the UCLs for the Arithmetic Mean

The upper one-sided 90% and 95% UCLs of the arithmetic mean are defined as the values that, when calculated repeatedly for randomly drawn subsets of site data, equal or exceed the true mean 90% and 95% of the time, respectively. Statistical confidence limits are the classical tool for addressing uncertainties of a distribution mean. The UCLs of the arithmetic mean concentration are used as the mean concentrations because it is not possible to know the true mean due to the essentially infinite number of soil samples that could be collected from a site. The UCLs therefore account for uncertainties due to limited sampling data. As data become less limited at a site, uncertainties decrease, and the UCLs move closer to the true mean.

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

SB SR-880 Shoulder in Oakland (borings B1-CL-MVP to B6-CL-MVP and B7-CL-SS)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	43.6	45	38	26	53
1.0 to 1.5	49.9	53.2	37	2.1	71
5.0 to 5.5	NC	NC	NC	11	11
9.0 to 9.5	NC	NC	NC	42	42

NC – Not calculated due to insufficient data set

NB SR-880 Shoulder in San Leandro (boring B1-N3-SS)

SAMPLE INTERVAL (feet)	TOTAL LEAD (mg/kg)
5.0 to 5.5	3.5
10 to 10.5	3.0

Hesperian Blvd. Onramp to WB SR-92 – Left Shoulder (borings B1-HBR2 to B8-HBR2)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	13.5	14	11.5	7.3	22
1.5 to 2.0	9.44	9.89	7.9	4.9	16
2.6 to 3.1	7.18	7.39	6.54	5.0	9.1

Hesperian Blvd. Onramp to WB SR-92 – Right Shoulder (borings B9-HBR2-CHP to B13-HBR2-CHP)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	12.1	12.5	10.6	8.3	15
1.0 to 1.5	21.4	23	15.3	7.8	36

Industrial Blvd. Loop Ramp to EB SR-92 (borings B1-IBL1 to B10-IBL1)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	50.9	56.4	30.2	3.9	180
1.5 to 2.0	14.1	15.1	10.1	0.5	35
2.5 to 3.0	21.7	24.1	12.9	0.5	76

Industrial Blvd. Onramp to WB SR-92 (borings B1-IBR1 to B12-IBR1)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	91.6	97.7	72.6	17	180
1.5 to 2.0	31.1	34.3	20.7	4.1	100
2.3 to 2.8	27.1	29.2	18.5	2.0	66
5.0 to 5.5	NC	NC	NC	3.1	3.1
10 to 10.5	NC	NC	NC	7.5	7.5

NC – Not calculated due to insufficient data set

Clawiter Rd. Loop Ramp to EB SR-92 (borings B1-CL1 to B11-CL1)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	61.4	66.4	41.4	4.1	200
1.5 to 2.0	10.5	11.3	7.93	2.7	26
2.5 to 3.0	11.7	12.3	9.26	5.5	28

Clawiter Rd. Loop Ramp to WB SR-92 (borings B1-CL2 to B8-CL2)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	20.6	21.5	17.3	7.4	28
1.5 to 2.0	6.39	6.57	5.76	4.2	8.2
2.5 to 3.0	8.86	9.22	7.54	5.5	15

NB SR-880 Shoulder near Decoto Rd. Offramp (borings B11-DRL1-MVP to B16-DRL1-MVP)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	28.6	29.6	25.5	18	36
1.0 to 1.5	NC	NC	7.73	1.2	24

NC – Not calculated due to insufficient data set

Decoto Rd. Loop Ramp to NB SR-880 (borings B1-DRL1 to B10-DRL1)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	37.6	40	29.9	5.8	70
1.5 to 2.0	45	50	30.1	4.0	150
2.4 to 2.9	20.8	22	16.2	6.6	37

Decoto Rd. Onramp to SB SR-880 Left Shoulder (borings B1-DRR1 to B11-DRR1)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	13.1	13.6	11.1	3.6	19
1.5 to 2.0	7.01	7.21	6.39	4.7	10
2.4 to 2.9	9.13	9.41	8.08	5.5	15

Decoto Rd. Onramp to SB SR-880 Right Shoulder (borings B12-DRR1CHP to B15-DRR1-CHP)

SAMPLE INTERVAL (feet)	TOTAL LEAD 90% UCL (mg/kg)	TOTAL LEAD 95% UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	TOTAL LEAD MINIMUM (mg/kg)	TOTAL LEAD MAXIMUM (mg/kg)
0 to 0.5	NC	NC	16.2	8.8	26
1.0 to 1.5	NC	NC	24.5	8.1	34

NC – Not calculated due to insufficient data set

5.4.2 Correlation of Total and WET Lead

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

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 SR-92 data where total lead UCLs were greater than 50 mg/kg. This area contained 11 (x, y) data points (i.e., soil samples analyzed for both total lead [x] and WET lead [y]). The resulting *coefficient of determination* (r^2) equaled 0.7191, which yields a corresponding *correlation coefficient* (r) of 0.848. To achieve an acceptable correlation, the data point with the highest squared residual WET lead value was eliminated from the regression analysis.

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 $y = 0.0372(x)$, where x represents total lead concentrations and y represents predicted WET lead concentrations.

This equation was used to estimate the expected WET lead concentrations for the total lead UCLs for the SR92 data sets (see Section 5.4.1). Regression analysis results and a scatter plot diagram depicting the (x, y) data points along with the regression line are included in Appendix B. The predicted WET lead concentrations are summarized in Table 8a and 8b.

6.0 CONCLUSIONS

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

6.1 Lead in Soil

6.1.1 SB SR-880 Shoulder in Oakland

The highest total lead 90% UCL concentration of 49.9 mg/kg is less than the TTLC of 1,000 mg/kg and less than 50 mg/kg (i.e., less than ten times the STLC of 5 mg/l). Accordingly, excavated soil would be classified as non-hazardous based on lead content.

6.1.2 NB SR-880 Shoulder in San Leandro

The maximum total lead concentration of 3.5 mg/kg is less than the TTLC of 1,000 mg/kg and less than 50 mg/kg (i.e., less than ten times the STLC of 5 mg/l). Accordingly, excavated soil would be classified as non-hazardous based on lead content.

6.1.3 Hesperian Blvd. Onramp to WB SR-92 – Left Shoulder

The highest total lead 90% UCL concentration of 13.5 mg/kg is less than the TTLC of 1,000 mg/kg and less than 50 mg/kg (i.e., less than ten times the STLC of 5 mg/l). Accordingly, excavated soil would be classified as non-hazardous based on lead content.

6.1.4 Hesperian Blvd. Onramp to WB SR-92 – Right Shoulder

The highest total lead 90% UCL concentration of 21.4 mg/kg is less than the TTLC of 1,000 mg/kg and less than 50 mg/kg (i.e., less than ten times the STLC of 5 mg/l). Accordingly, excavated soil would be classified as non-hazardous based on lead content.

6.1.5 Industrial Blvd. Loop Ramp to EB SR-92

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

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 1.5 ft	50.9	1.9	56.4	Non-hazardous
Underlying soil (1.5 to 3.0 ft)	*16.6*	*0.6*	*18.1*	*Non-hazardous*
0 to 2.5 ft	36.2	1.3	39.9	Non-hazardous
Underlying soil (2.5 to 3.0 ft)	*21.7*	*0.8*	*24.1*	*Non-hazardous*
0 to 3.0 ft	33.8	1.3	37.3	Non-hazardous

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

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

6.1.6 Industrial Blvd. Onramp to WB SR-92

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

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 1.5 ft	91.6	3.4	97.7	Non-hazardous
Underlying soil (1.5 to 2.8 ft)	*29.8*	*1.1*	*32.6*	*Non-hazardous*
0 to 2.3 ft	67.4	2.5	72.3	Non-hazardous
Underlying soil (2.3 to 2.8 ft)	*27.1*	*1.0*	*29.2*	*Non-hazardous*
0 to 2.8 ft	60.7	2.3	65.2	Non-hazardous

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

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

6.1.7 Clawiter Rd. Loop Ramp to EB SR-92

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

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 1.5 ft	61.4	2.3	66.4	Non-hazardous
Underlying soil (1.5 to 3.0 ft)	*10.9*	*0.4*	*11.6*	*Non-hazardous*
0 to 2.5 ft	41.0	1.5	44.4	Non-hazardous
Underlying soil (2.5 to 3.0 ft)	*11.7*	*0.4*	*12.3*	*Non-hazardous*
0 to 3.0 ft	36.2	1.3	39.0	Non-hazardous

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

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

6.1.8 Clawiter Rd Loop Ramp to WB SR-92

The highest total lead 90% UCL concentration of 20.6 mg/kg is less than the TTLC of 1,000 mg/kg and less than 50 mg/kg (i.e., less than ten times the STLC of 5 mg/l). Accordingly, excavated soil would be classified as non-hazardous based on lead content.

6.1.9 NB SR-880 Shoulder near Decoto Rd Offramp

The highest total lead 90% UCL concentration of 28.6 mg/kg is less than the TTLC of 1,000 mg/kg and less than 50 mg/kg (i.e., less than ten times the STLC of 5 mg/l). Accordingly, excavated soil would be classified as non-hazardous based on lead content.

6.1.10 Decoto Rd. Loop Ramp to NB SR-880

The highest total lead 90% UCL concentration of 37.6 mg/kg is less than the TTLC of 1,000 mg/kg and less than 50 mg/kg (i.e., less than ten times the STLC of 5 mg/l). Accordingly, excavated soil would be classified as non-hazardous based on lead content.

6.1.11 Decoto Rd. Onramp to SB SR-880 – Left Shoulder

The highest total lead 90% UCL concentration of 13.1 mg/kg is less than the TTLC of 1,000 mg/kg and less than 50 mg/kg (i.e., less than ten times the STLC of 5 mg/l). Accordingly, excavated soil would be classified as non-hazardous based on lead content.

6.1.12 Decoto Rd. Onramp to SB SR-880 – Right Shoulder

The maximum total lead concentration of 34 mg/kg is less than the TTLC of 1,000 mg/kg and less than 50 mg/kg (i.e., less than ten times the STLC of 5 mg/l). Accordingly, excavated soil would be classified as non-hazardous based on lead content.

6.2 CAM 17 Metals in Soil

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

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

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

Metal	Mean	Maximum	Shallow Soil Residential ESL	Shallow Soil Commercial/ Industrial ESL	Worker Direct Exposure ESL	PUBLISHED BACKGROUND MEAN[1]	PUBLISHED BACKGROUND RANGE [1]
Arsenic	4.2	11	0.39	1.6	15	3.5	0.6 to 11.0
Lead	19.4	200	200	750	750	23.9	12.4-97.1
Mercury	0.4	1.3	1.3	10	58	0.26	0.05 to 0.90
Vanadium	40.2	100	16	200	770	112	39 to 288

Concentrations reported in mg/kg

1 Kearney Foundation of Soil Science, March 1996

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

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

Reported mercury concentrations in soil meet the shallow soil residential land use ESL and exceed the published background range, but are below the commercial/industrial and construction exposure ESLs.

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

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

6.3 Organic Compounds in Soil

TPHg, BTEX, MTBE, or VOCs were not detected at or above the laboratory reporting limits.

TPHd was reported at concentrations ranging from 1.1 to 1,200 mg/kg and has a calculated 95% UCL concentration of 135 mg/kg, above the residential and commercial/industrial land use ESLs of 83 mg/kg.

TPHmo was reported at concentrations ranging from 1.7 to 5,500 mg/kg and has a calculated 95% UCL of 706 mg/kg, above the residential land use ESL of 370 mg/kg.

PAHs were reported in the samples collected from B7-CL-SS-5 and B7-CL-SS-INT at concentrations ranging from < 5.0 to 27 μg/kg, below the ESLs for these compounds.

Organic compound results and corresponding ESL values are summarized in Tables 4 and 5.

6.4 CAM 17 Metals in Groundwater

Grab-groundwater samples were collected from borings B1-N3-SS and B7-CL-SS and analyzed for CAM 17 metals. Beryllium, molybdenum, selenium, silver and thallium were not detected at or above the laboratory reporting limits. Arsenic, barium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, vanadium and zinc were reported at concentrations exceeding one or more ESLs.

CAM 17 Metals results for the grab-groundwater sample and corresponding ESL values are summarized in Table 6.

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

6.5 Organic Compounds in Groundwater

Grab-groundwater samples were collected from borings B1-N3-SS and B7-CL-SS and analyzed for organic compounds. TPHg, BTEX, MTBE or VOCs were not detected at or above the laboratory reporting limits.

TPHd, TPHmo, or PAHs were not detected in the sample collected from boring B1-N3-SS.

TPHd was reported in the sample collected from boring B7-CL-SS at a concentration of 0.14 mg/l, above the ESLs for groundwater as a current/potential source for drinking water and the ESL for surface water for freshwater environments. TPHmo was reported in the sample at concentration of 0.22 mg/l. This concentration is above the ESLs for groundwater as a current/potential source of drinking water, groundwater not a potential source for drinking water, and surface waters for freshwater, marine, and estuarine environments. The PAHs phenanthrene and naphthalene were detected in the sample at concentrations of 0.45 and 1.1 µg/l, respectively. These concentrations are below the ESLs for these compounds.

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

6.6 Worker Protection

The contractor(s) should prepare a project-specific health and safety plan to prevent or minimize worker exposure to metals and organics in 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.

PROJECT LOCATION

N

0 1 2 3
Scale in Miles

GEOCON
CONSULTANTS, INC.

6671 BRISA STREET – LIVERMORE, CA 94550
PHONE 925.371.5900 – FAX 925.371.5915

ALA-92 and 880 TOS

Alameda County, California

VICINITY MAP

GEOCON Proj. No. E8560-06-31

Task Order No. 31

November 2011

Figure 1

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. NESTOR PEREZ
Senior Transportation Engineer
Design – Alameda II

Attention: N. Grgich

Date: October 6, 2011

File: 04-ALA-92 PM R4.35/R5.8
04-153000
Efis# 0400020302
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: Revised Geotechnical Design Report for Retaining Wall

This memo supersedes our previous geotechnical recommendations dated September 12, 2011 for the widening of the west bound on-ramp from Industrial Blvd to westbound Route 92 in the City of Hayward, Alameda County, California.

SCOPE OF WORK

We have performed a geotechnical investigation for the widening of the westbound on-ramp from Industrial Blvd to Route 92. The proposed widening of the on-ramp from one lane to two lanes is to accommodate the ramp metering project. The widening of the on-ramp will require the construction of a retaining wall along the north side of the on-ramp. The scope of work includes the following:

- Visual observations during our site visits on April 12, 2011 and May 19, 2011.
- Review of the Route 92 Widening Project As-built plans (Contract No. 04-045034).
- Subsurface exploration consisting of two Cone Penetration Test (CPT) soundings, advanced to depths of approximately 47 ft and 53 ft below the existing ground surface in May 2011.
- Engineering analyses and preparation of construction recommendations.

PROJECT SITE DESCRIPTION AND BACKGROUND

Site Description

The subject site is located along the north side of Route 92, west of Industrial Blvd, and east of the Mt. Eden Overhead. The on-ramp connects Industrial Blvd to westbound Route 92. The onramp starts from Industrial Blvd and climbs up approximately 25 ft up the man-made embankment (engineered fill) between the Industrial Blvd UC (33-0370) and the Mt. Eden OH (33-0092).

Site History

The current configuration of the west bound on-ramp from Industrial Blvd, and westbound Route 92 was completed in the early 2000's. The existing configuration of west bound Route 92 between the Mt. Eden OH and the Industrial Blvd OC was constructed under Caltrans contract 04-045034. To accommodate the widening of the Mt. Eden OH, the existing man-made embankment needed to be widened. A gabion wall with geogrid reinforcement was constructed using lightweight granular backfill. The existing gabion wall limits are from the Mt. Eden OH east to the end of the westbound on-ramp from Industrial Blvd. The proposed retaining wall used to widen the westbound on-ramp from Industrial Blvd will be a continuation of the existing gabion wall.

Site Observations

The existing slope on the north side of the embankment varies from 1.5 (H): 1 (V) to 2.5 (H): 1(V), and is vegetated with grass, shrubs, and small trees. The existing slope is stable and there are no signs of distress in the roadway. There is no structure located on or below the slope at the subject site.

SITE GEOLOGY AND SEISMICITY

Geology

The proposed project is located in an area entirely covered by alluvial terrace deposits of Holocene age. The alluvial terrace deposits are generally less than 3 feet thick and consist of rounded gravels in a clayey silty matrix.

Seismicity

The project lies in the seismically active San Francisco Bay area and is prone to strong ground shaking (Figure 4). Table No. 1 below lists the major faults in the region, their distance from the project site, maximum credible earthquake magnitudes, and peak bedrock accelerations anticipated at the site (Caltrans 2007 Fault Database).
(http://www.dot.ca.gov/hq/esc/earthquake_engineering/SDC_site/).

Table 1 Faults, Maximum Credible Earthquake Magnitudes, and Peak Bedrock Accelerations

FAULT	Distance (mi)*	Maximum Credible Earthquake Magnitude**	Maximum Peak Bedrock Acceleration
Silver Creek	4.2	7.1	0.35 g
Hayward	2.8	7.3	0.4 g
San Andreas	15.6	7.9	0.25 g

**Closest portion of the fault, measured in miles.*
*** Moment Magnitude.*

FIELD INVESTIGATION AND FINDINGS

Field Exploration

A subsurface investigation was conducted in May 2010, and consisted of two CPT soundings. The borehole locations are shown on the Log-Of-Test Borings (LOTB). Sounding CPT-11-001 was pushed to a depth of 47 feet. Sounding CPT-11-002 was pushed to a depth of 53 feet.

Laboratory Testing

No samples were collected for laboratory testing.

Subsurface Soil Conditions

The top 20 to 25 ft of material consists of engineered fill for the man-made embankment. The native material is located at depth deeper than 25 ft. The CPT results indicate from the surface to a depth of 25 ft (engineered embankment fill) consists of interbedded layers of dense sands and very stiff fines. A soft clay layer is indicated between the depths of 25 ft to 45 ft.

Groundwater Conditions

Groundwater was not measured in CPT-11-001 and CPT-11-002. Both CPT sounding holes collapsed at a depth of approximately 20 ft. As-built LOTBs indicate that groundwater was encountered at an elevation of 11ft. The elevations of CPT-11-001 and CPT-11-002 are 40 ft and 44 ft, respectfully.

GEOTECHNICAL RECOMMENDATIONS

Wall Type

The major geotechnical criteria for the proposed widening is to minimize the settlement of soft clay material located below the embankment fill. This was achieved for the previous widening project adjacent site by using a gabion wall with geogrid reinforcement and lightweight aggregate fill. The existing gabion basket wall is performing well, and shows no signs of distress. Therefore, we recommend continuing the existing gabion basket wall along the north side of the westbound on-ramp from Industrial Blvd to Route 92. We recommend using a gabion basket wall with geogrid reinforcement and a lightweight aggregate fill. The gabion baskets should be filled with lightweight rock.

Gabions are rectangular cages made of hexagonal woven steel wire mesh laced together and filled with stone. We recommend that the gabion cages have a height of 3 ft, width of 3 ft, and a length of 6 ft (See 2006 CT Standard Plan D100A and D100B). The following steps are suggested for the construction of the proposed gabion wall with geogrid and lightweight backfill. Please refer to Figure 1 in Appendix A for Typical Detail information.

- Excavate the existing embankment and/or foundation soils as shown on the attached typical cross section. To balance the added load, sub-excavate to a depth "S" which is half of the fill height "F" (see attached typical cross section).

- Where the bottom of the sub-excavation is within the existing fill, install a drainage system consisting of a four inch perforated plastic pipe and Class III Permeable Material (refer to Figure 5).

- Construct the front-stepped gabion wall. Each level of gabions should be assembled and filled with lightweight rock with a maximum unit weight of 68 lbs/ft^3.

- Backfill behind the gabions with a lightweight aggregate fill with a maximum saturated surface dry unit weight of 60 lbs/ft^3. The lightweight aggregate fill shall meet Caltrans' Non Standard Specification (NSSP).

- Geogrid reinforcement should be placed in between each gabion cage (1.5 ft minimum overlap) and extend into the lightweight fill for a minimum distance of 90% of the wall height ("H"). The geogrid reinforcement should have a Long Term Design Strength (LTDS) of 2,190 lb/ft (32 kN/m).

- Rock Slope Protection fabric Type B should be placed against the back of the gabion cages to prevent the loss of lightweight fill.

- A minimum 1 ft soil berm should be constructed at the base of the gabion wall (see Figure 1).

There are three typical wall sections for the gabion basket wall due to the height and slope of the existing embankment. The first typical wall section is from Station 15+53.26 to Station 20+20. The second typical wall section is from Station 20+20 to Station 22+10, and the third is from Station 22+10 to Station 22+30.03. The following requirements are specific to each typical wall section.

Station 15+53.26 to Station 20+20:

The gabion baskets will have a width of 3 ft and a height of 3 ft with a 1.5 ft set back. The width of the temporary back cut on the existing slope "EE" is half of the widening distance "EW" (EW/2= EE). Sub-excavate 2 ft below the first layer of gabions, and re-compact the material to 90% relative compaction. Please refer to Figure 2 in Appendix A.

Station 20+20 to Station 21+80:

The gabion baskets will have a width of 3 ft and a height of 3 ft with a 1.0 ft set back. The width of the temporary back cut on the existing slope "EE" is half of the widening distance "EW" (EW/2=EE). Please refer to Figure 3 in Appendix A.

Station 21+80 to Station 22+30.03:

The gabion baskets will have a width of 3 ft and a height of 3 ft with a 1.5 ft set back. The width of the temporary back cut on the existing slope "EE" is one quarter of the widening distance "EW" (EW/4=EE). Please refer to Figure 4 in appendix A.

CONSTRUCTION CONSIDERATIONS AND REQUIREMENTS

The following construction considerations and requirements should be included in the design and construction specifications for the proposed wall.

- The Gabion cages will need to backfilled with lightweight rock prior to the lightweight aggregate fill being placed. The lightweight fill material will be placed in accordance with the 2006 Caltrans Standard Specifications. Temporary cuts will not be steeper than 1 (V): 1 (H).

- The cut slope into the existing embankment shall be no steeper than 1V:1H.

- Include a copy of the Caltrans Special Provisions for the gabion cages with the PVC coating.

*   *   *   *   *

Should you have any questions, please call me at (510) 622-0104 or Mahmood Momenzadeh at (510) 286-5732.

Attachments:

c: TPokrywka, MMomenzadeh, GWilcox, RE Pending File, Archive.

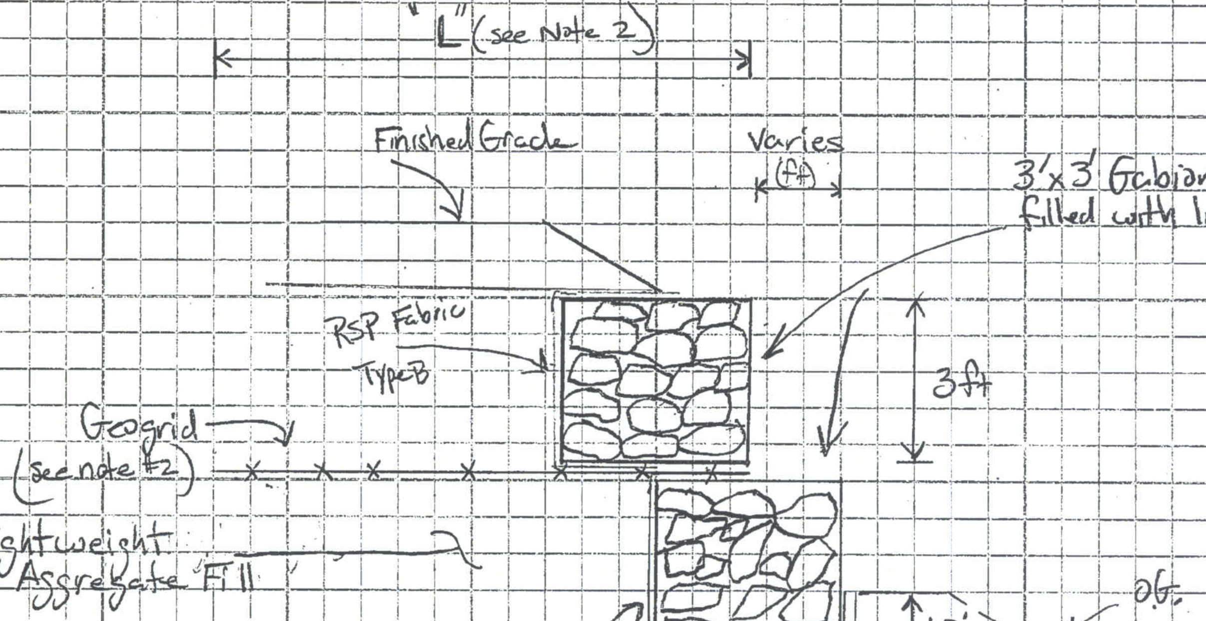
DNesbitt/mm

STATE OF CALIFORNIA -- DEPARTMENT OF TRANSPORTATION

QUANTITY CALCULATIONS

DC-CEM-4801 (OLD HC-52 REV. 11/92) 7541-3520-0

JOB STAMP	ITEM	FILE NO.	SHEET OF
	LOCATION	SEGREGATION YES ☐ NO ☐	
	CALC. BY	DATE	
	CHK. BY	DATE	



Notes:

1. Wrap RSP Fabric around gabion so that it completely covers portion of gabion in contact with Lightweight Aggregate Fill.
2. Geogrid length (L) equals 0.9 of wall height.

Figure 1. — Typical Detail

Not to Scale

POSTED BY DATE POSTED TO

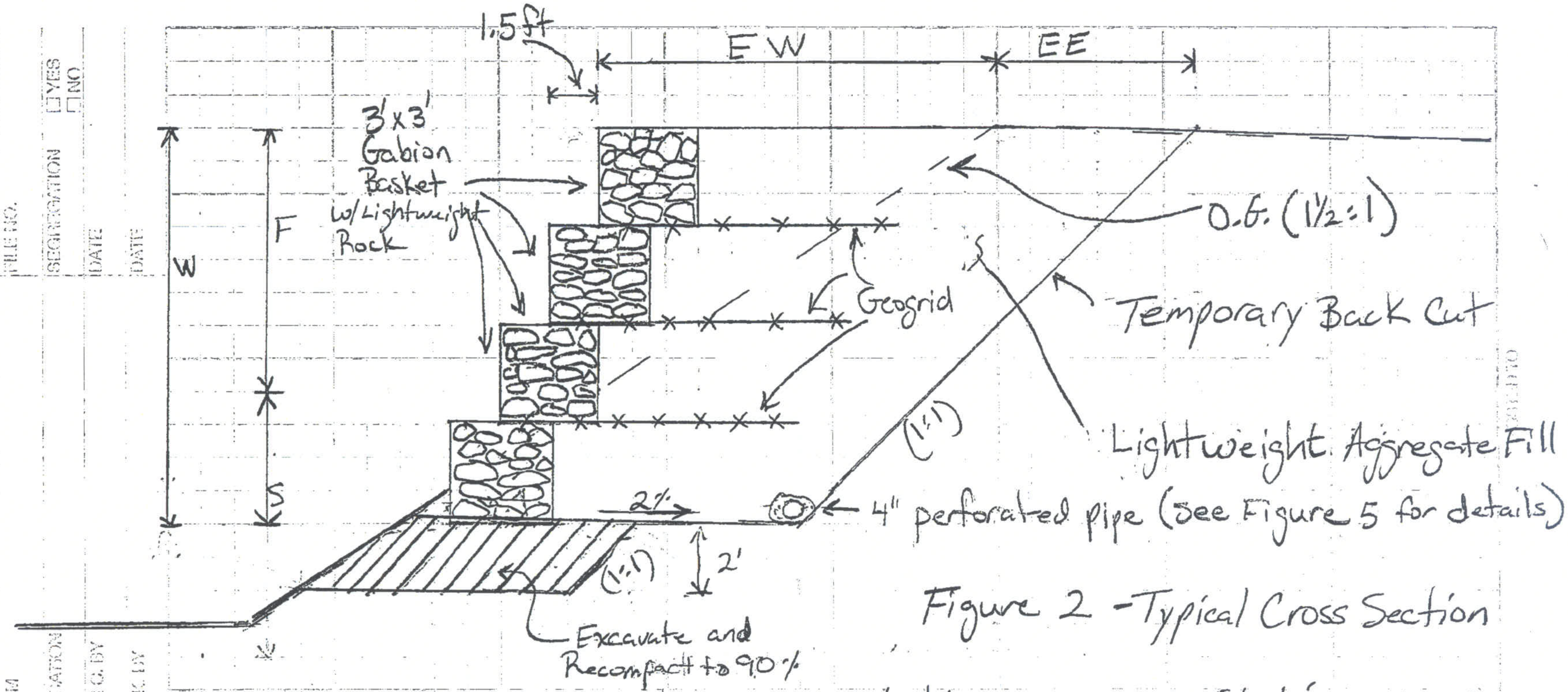


Figure 2 - Typical Cross Section

Station 15+53.26 to Station 20+20

W = Wall Height
F = Fill Height
S = Subexcavation Height

The Subexcavation Height equal 50% of Fill Height $(F)(0.5) = S$

E.W: Embankment Widening
EE: Embankment Excavation

$(EW)\cdot(0.5) = EE$

Not to Scale

STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION
QUANTITY CALCULATIONS
DC-CEM-3301 (OLD HC-32 REV. 11/82) 7541-3620-0

JOB STAMP	ITEM	LOCATION	CALC. BY	CHK BY	SHEET OF	FILE NO.	SEGREGATION ☐ YES ☐ NO	DATE	DATE

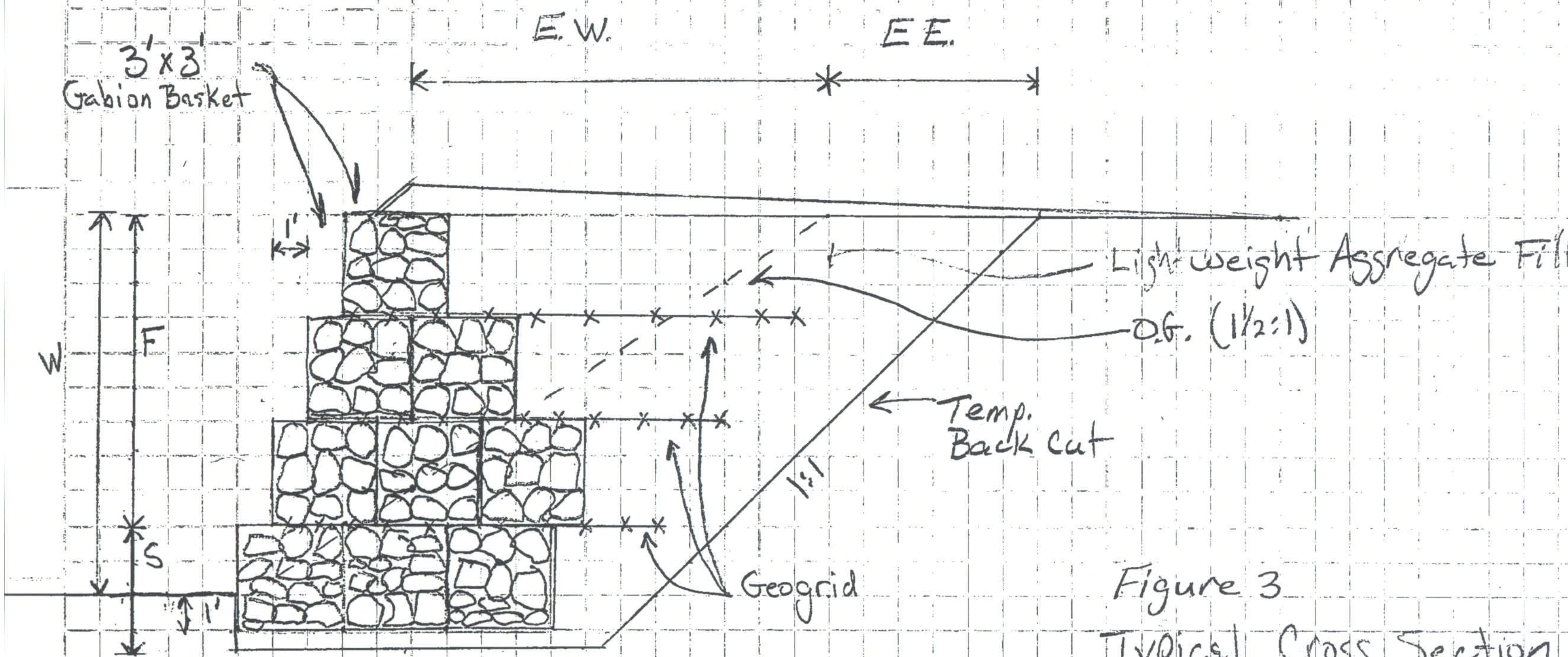


Figure 3
Typical Cross Section
Station 20+20 to Station 21+80

W = Wall Height
F = Fill Height
S = Subexcavation Height

E.W. = Embankment Widening
E.E. = Embankment Excavation

$(F)(0.5) = S$

$(EW)(0.5) = EE$

Not to Scale

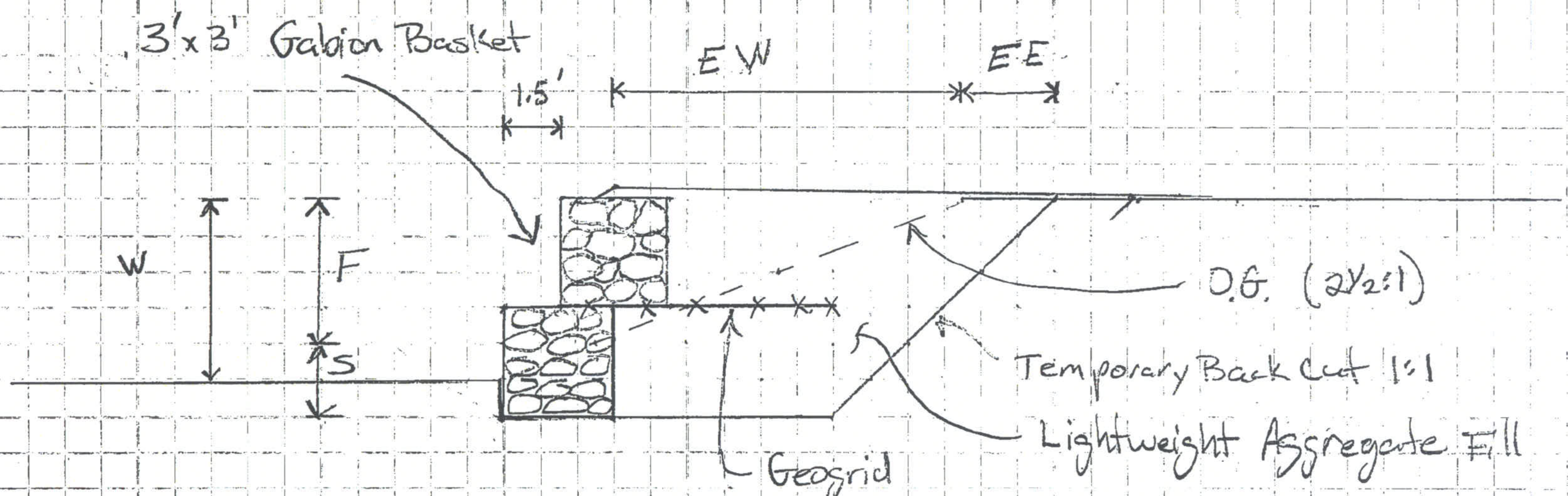


Figure 4 — Typical Cross Section

W - Wall Height
F - Fill Height
S - Subexcavation Height

Station 21+80 to Station 22+30.03

(F)(0.5) = S

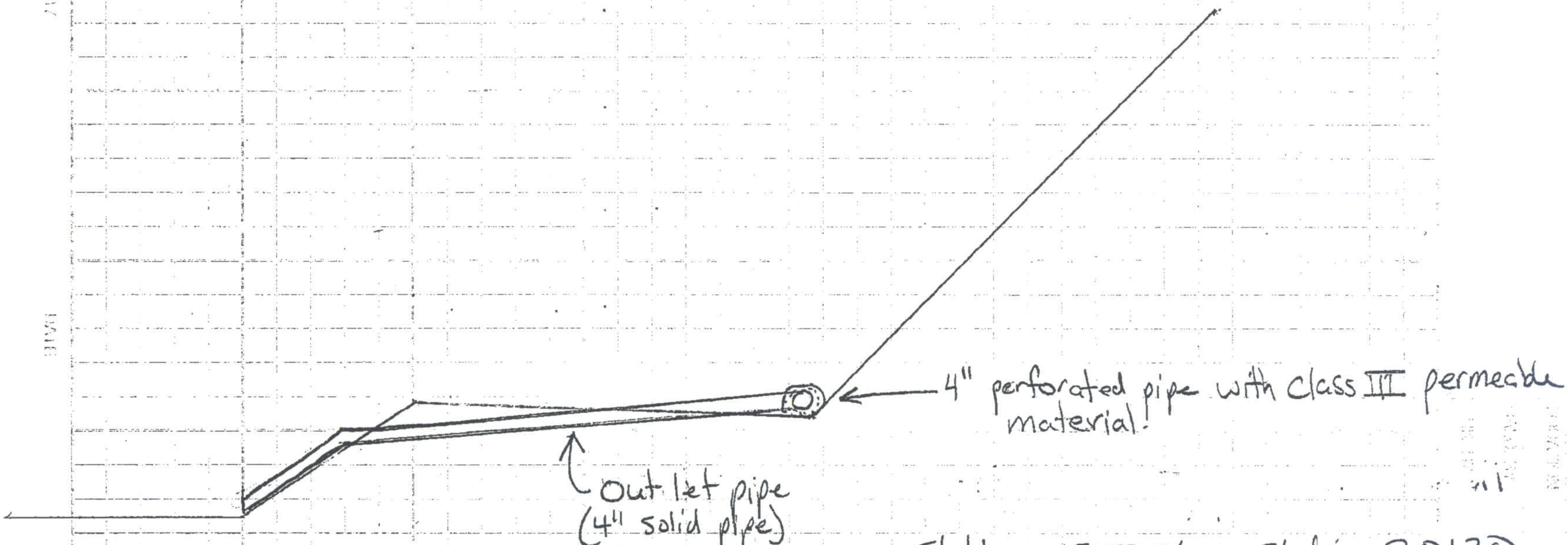
EW - Embankment Widening
EE - Embankment Excavation

(EW)(0.25) = EE

Not to Scale.

STATE OF CALIFORNIA · DEPARTMENT OF TRANSPORTATION

QUANTITY CALCULATIONS



Station 15+53.26 to Station 20+20

Note: Install outlet pipe every 100 ft.

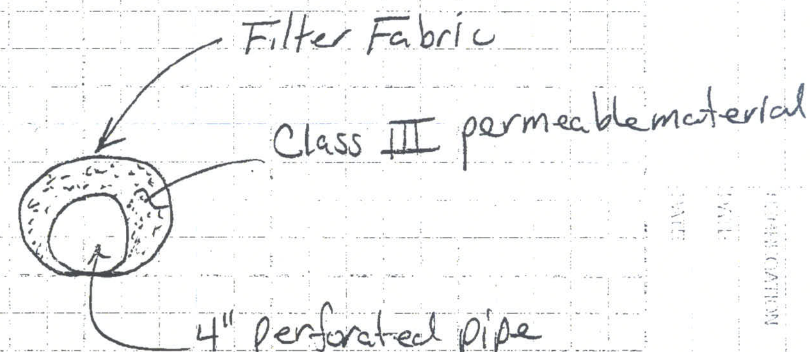


Figure 5 - Typical Drainage System

POSTED BY

DATE

POSTED TO

STATE OF CALIFORNIA EDMUND G. BROWN, JR., Governor

DEPARTMENT OF INDUSTRIAL RELATIONS
DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
MINING AND TUNNELING UNIT
2211 Park Towne Circle, Suite 2
Sacramento, California 95825

Telephone (916) 574-2540
FAX (916) 574-2542

November 18, 2011

Department of Transportation
PO Box 23660
Oakland, CA 94623

Attention: Grant Wilcox (via e-mail: grant_wilcox@dot.ca.gov)

Subject: Underground Classification #'s: C067-001-12T thru C068-001-12T

Ramp Metering and Traffic Operation System Project

Mr. Wilcox:

The information provided to this office relative to the above project has been reviewed. On the basis of this analysis, Underground Classification of "Potentially Gassy with Special Conditions" has been assigned to the shaft(s) identified on your submittal. Please retain the original Classification for your records and deliver a true and correct copy of the Classification to the shaft contractor(s) for posting at the job site.

When the contractor who will be performing the work is selected, please advise them to notify this office to determine if a mandated Prejob Conference with the Division is required prior to commencing any activity associated with drilling of the shaft(s).

Should you have another bore under construction that is not required to have an Underground Classification (i.e.: less than 30 inches in diameter), please contact the Mining and Tunneling Unit prior to any employee entry of such a space.

If you have any questions on this subject, please contact this office at your earliest convenience.

Sincerely,

Douglas Patterson
Senior Engineer

cc: R. Brockman
File

State of California

Department of Industrial Relations

DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
MINING AND TUNNELING UNIT

Underground Classification

C067-001-12T

DEPARTMENT OF TRANSPORTATION
NAME OF TUNNEL OR MINE AND COMPANY NAME

of PO Box 23660, Oakland, CA 94623
MAILING ADDRESS

at RAMP METERING AND TRAFFIC OPERATION SYSTEM PROJECT - SIGN 9
LOCATION

has been classified as ***POTENTIALLY GASSY with Special Conditions***
CLASSIFICATION

as required by the California Labor Code § 7955.

The Division shall be notified if sufficient quantities of flammable gas or vapors have been encountered underground. Classifications are based on the California Labor Code Part 9, Tunnel Safety Orders and Mine Safety Orders.

SPECIAL CONDITIONS

1. A Certified Gas Tester shall perform pre-entry and continuous monitoring of the underground environment to measure Oxygen and detect explosive, flammable, and toxic gasses whenever an employee is working in the underground environment.
2. Mechanical ventilation shall provide for continuous exhaust of fumes and air at any time an employee is working in the underground environment. The primary ventilation fans must be located outside of the underground environment and shall be reversible by a single switch near the fan location.
3. The Division shall be notified immediately if any **Flammable Gas** or **Petroleum Vapor** exceeds 5% of the Lower Explosive Limit.
4. All utilities that may be in conflict with the project shall be identified and physically located (potholed) prior to the start of project operations.

The 60-inch diameter by 25 feet deep drilled shaft located on the northbound shoulder of Interstate 880 approximately 670 feet northwest of the Williams Street Overcrossing, San Leandro, Alameda County.

This classification shall be conspicuously posted at the place of employment.

Date November 18, 2011

Douglas Patterson, Senior Engineer

State of California

Department of Industrial Relations

DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
MINING AND TUNNELING UNIT

Underground Classification

C068-001-12T

DEPARTMENT OF TRANSPORTATION
NAME OF TUNNEL OR MINE AND COMPANY NAME

of PO Box 23660, Oakland, CA 94623
MAILING ADDRESS

at RAMP METERING AND TRAFFIC OPERATION SYSTEM PROJECT - SIGN 10
LOCATION

has been classified as ***POTENTIALLY GASSY with Special Conditions***
CLASSIFICATION

as required by the California Labor Code § 7955.

The Division shall be notified if sufficient quantities of flammable gas or vapors have been encountered underground. Classifications are based on the California Labor Code Part 9, Tunnel Safety Orders and Mine Safety Orders.

SPECIAL CONDITIONS

1. A Certified Gas Tester shall perform pre-entry and continuous monitoring of the underground environment to measure Oxygen and detect explosive, flammable, and toxic gasses whenever an employee is working in the underground environment.
2. Mechanical ventilation shall provide for continuous exhaust of fumes and air at any time an employee is working in the underground environment. The primary ventilation fans must be located outside of the underground environment and shall be reversible by a single switch near the fan location.
3. The Division shall be notified immediately if any **Flammable Gas** or **Petroleum Vapor** exceeds 5% of the Lower Explosive Limit.
4. All utilities that may be in conflict with the project shall be identified and physically located (potholed) prior to the start of project operations.

The 60-inch diameter by 25 feet deep drilled shaft located on the southbound shoulder of Interstate 880 approximately 1,530 feet north of the 7th Street Undercrossing, Oakland, Alameda County.

This classification shall be conspicuously posted at the place of employment.

Date November 18, 2011

Douglas Patterson, Senior Engineer