FOR CONTRACT NO.: 02-2E0004

INFORMATION HANDOUT

MATERIALS INFORMATION

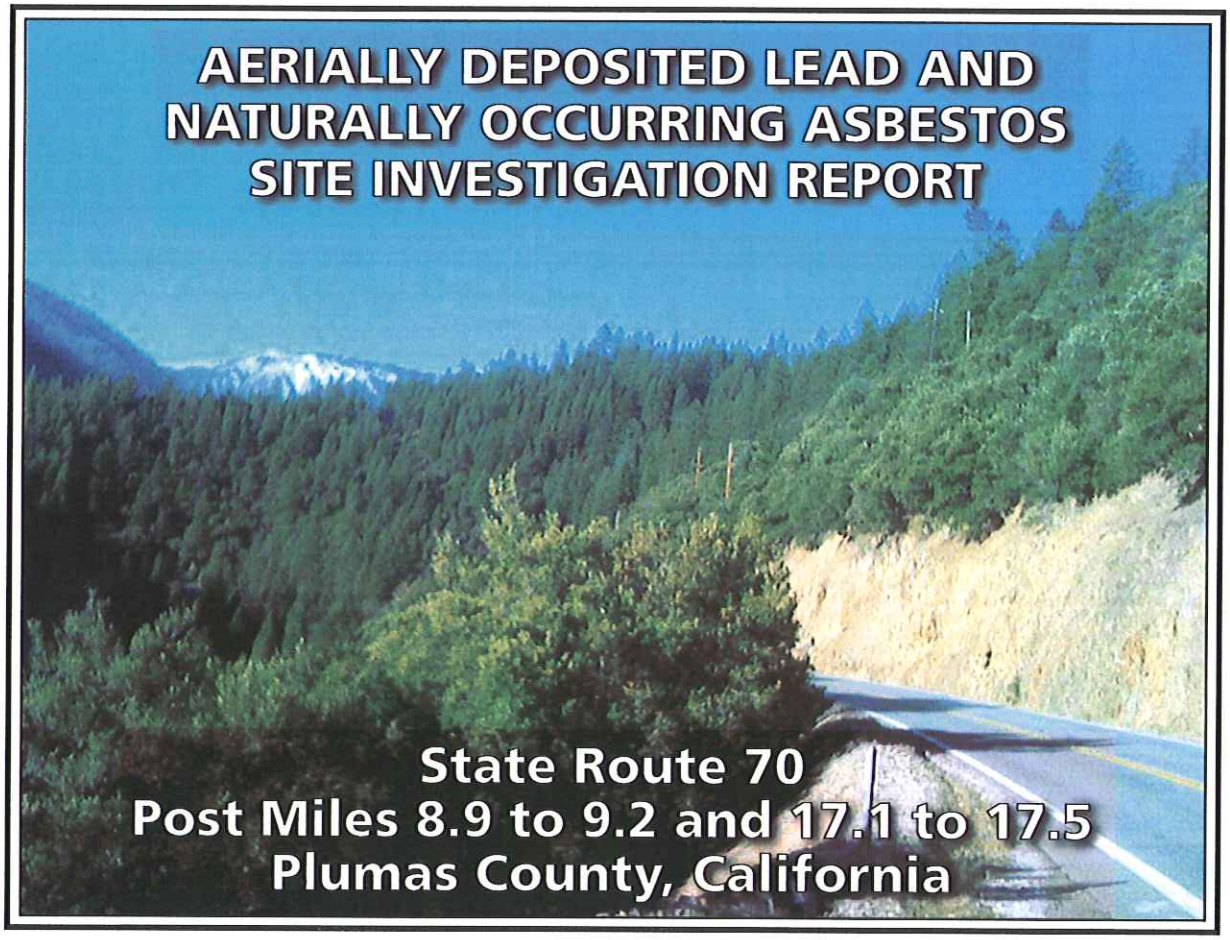
AERIALLY DEPOSITED LEAD AND NATURALLY OCCURRING ASBESTOS
SITE INVESTIGATION REPORT

GEOTECHNICAL DESIGN REPORT

OPTIONAL DISPOSAL SITES

ROUTE: 02-PLU-70-17.2/17.5

AERIALLY DEPOSITED LEAD AND NATURALLY OCCURRING ASBESTOS SITE INVESTIGATION REPORT



State Route 70
Post Miles 8.9 to 9.2 and 17.1 to 17.5
Plumas County, California

PREPARED FOR:

CALIFORNIA DEPARTMENT OF TRANSPORTATION – DISTRICT 3
ENVIRONMENTAL ENGINEERING OFFICE
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GEOCON

GEOCON PROJECT NO. S9300-06-108
TASK ORDER NO. 1087, EA NO. 02-2E0000

JANUARY 2010

GEOCON
CONSULTANTS, INC.
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. S9300-06-108
January 15, 2010

Ms. Alicia Beyer
California Department of Transportation – District 3
Environmental Engineering Office
P.O. Box 911
Marysville, California 95901

Subject: STATE ROUTE 70, POST MILES 8.9 TO 9.2 AND 17.1 TO 17.5
PLUMAS COUNTY, CALIFORNIA
CONTRACT NO. 03A1368, TASK ORDER NO. 108, EA 02-2E0000
AERIALLY DEPOSITED LEAD AND NATURALLY OCCURRING ASBESTOS SITE INVESTIGATION REPORT

Dear Ms. Beyer:

In accordance with California Department of Transportation (Caltrans) Contract No. 03A1368, Task Order No. 108, and Expense Authorization 02-2E0000, we have performed environmental engineering services at the project site. The site consists of Caltrans right-of-way along State Route 70 from Post Miles 8.9 to 9.2 and 17.1 to 17.5 in Plumas County, California. The accompanying report summarizes the services performed including the excavation of 27 direct-push borings and one hand-auger boring for the collection of soil samples for aerially deposited lead and naturally occurring asbestos (NOA) analysis, the collection of surface soil and rock samples for NOA analyses, and the collection of yellow paint stripe samples for lead analysis.

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.

Please contact us if you have any questions concerning the contents of this report or if we may be of further service.

Sincerely,

GEOCON CONSULTANTS, INC.

Rebecca L. Silva, REA
Project Manager

John E. Juhrend, PE, CEG
Principal

REGISTERED PROFESSIONAL ENGINEER
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(5 + 3CD) Addressee

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AERIALLY DEPOSITED LEAD AND NATURALLY OCCURRING ASBESTOS SITE INVESTIGATION REPORT

1.0 INTRODUCTION

This Aerially Deposited Lead (ADL) and Naturally Occurring Asbestos (NOA) Site Investigation Report was prepared under California Department of Transportation (Caltrans) Contract No. 03A1368, Task Order (TO) No. 108, and Expense Authorization (EA) 02-2E0000.

1.1 Project Description and Proposed Improvements

The project area consists of the Caltrans right-of-way from Post Mile (PM) 8.9 to 9.2 and PM 17.1 to 17.5 (the Site) in Plumas County, California. The approximate project location is depicted on the attached Vicinity Map, Figure 1. The Site and major roadway features are depicted on the Site Plans, Figures 2-1 and 2-2. Caltrans proposes to re-align the roadway and construct 8-foot-wide shoulders on SR-70. The project area also included a disposal area on the south side of SR-70 between PM 8.9 and 9.2 and a stockpiled soil area on the north side of SR-70 between PM 17.1 and 17.5.

1.2 General Objectives

Construction of planned roadway improvements along SR-70 will require the disturbance of soil and existing pavement at the Site. The purpose of the scope of services outlined in TO No. 108 was to evaluate the Site for potential impacts due to aerially deposited lead (ADL) from motor vehicle exhaust in the surface and near surface soils, to evaluate the Site for the presence of naturally occurring asbestos (NOA) and to evaluate the yellow paint stripe for lead content. The investigative results will be used by Caltrans to inform the construction contractor if ADL- or NOA-impacted soils are present within the project boundaries for construction worker health and safety and disposal purposes.

2.0 BACKGROUND

The Site is comprised of two-lane SR-70 between PM 8.9 and 9.2 and 17.1 and 17.5. Caltrans requested this site investigation to provide data regarding the presence of ADL and NOA within the proposed roadway improvement areas.

Regulatory criteria to classify a waste as "California hazardous" for handling and disposal purposes are contained in the California Code of Regulations (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.

2.1 Potential Lead Soil Impacts

Ongoing testing by Caltrans has indicated that ADL exists along major freeway routes due to emissions from vehicles powered by leaded gasoline.

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 may have 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 TTLC value for lead is 1,000 milligrams per kilogram (mg/kg). The STLC and TCLP values for lead are both 5.0 milligrams per liter (mg/l).

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 corrosivity. Waste that is classified as either California-hazardous or RCRA-hazardous requires management as a hazardous waste.

The Department of Toxic Substances Control (DTSC) regulates and interprets hazardous waste laws in California. DTSC generally considers excavated or transported materials that exhibit "hazardous waste" characteristics to be a "waste" requiring proper management, treatment and disposal. Soil that contains lead above hazardous waste thresholds and is left in-place would not be necessarily classified by DTSC as a "waste." The DTSC has provided site-specific determinations that "movement of wastes within an area of contamination does not constitute "land disposal" and, thus, does not trigger hazardous waste disposal requirements." Therefore, lead-impacted soil that is scarified in-place, moisture-conditioned, and recompacted during roadway improvement activities might not be considered a "waste." DTSC should be consulted to confirm waste classification. It is noted that in addition to DTSC regulations, health and safety requirements and other local agency requirements may also apply to the handling and disposal of lead-impacted soil.

2.2 Potential Lead-based Traffic Stripe Paint Impacts

Yellow traffic stripe paint utilized by Caltrans may contain lead. The potential presence of elevated lead requires sampling and analytical testing of the paint stripe materials to determine appropriate health and safety procedures and proper management and disposal practices. Disposal of removed traffic stripe paint materials is dependent on the method utilized to remove these materials (i.e. focused stripe removal vs. pavement grinding).

2.3 Naturally Occurring Asbestos

The California Air Resources Board (CARB) has mitigation practices for construction, grading, quarrying, and surface mining operations that may disturb natural occurrences of asbestos outlined in the Airborne Toxic Control Measure (ATCM) in Title 17 California Code of Regulations (CCR), Section 93105 (ATCM 93105). NOA potentially poses a health hazard when it becomes an airborne particulate. Maintenance and construction activities within the roadway corridor could disturb NOA-containing rock and soil where present, thereby potentially creating an airborne asbestos hazard. Mitigation practices can reduce the risk of exposure to asbestos-containing dust. The primary mitigation practice used for controlling exposure to potentially asbestos-containing dust is the implementation of engineering controls; primarily wetting the materials being disturbed. If engineering controls do not adequately control exposure to potentially asbestos-containing dust, the use of personal protective equipment including wearing approved high efficiency particulate air filter-equipped respirators is required during construction activities. Asbestos dust control methods similar to those in ATCM 93105 are outlined in Title 17 CCR, Section 93106 (ATCM 93106) governing the control of airborne asbestos resulting from the use of NOA-containing material for road surfacing applications. Using surfacing material with 0.25% or more asbestos material is not permitted, and wetting of the material or the application of a surface sealant is recommended to minimize disturbance of the asbestos material. Onsite reuse or disposal of NOA-containing materials is allowed by ATCMs 93106 and 93105 if it is covered with at least 0.25 foot of material that contains less than 0.25% asbestos.

3.0 SCOPE OF SERVICES

The scope of services requested by Caltrans in TO No. 108 included the collection of soil and rock samples for analysis to determine lead and asbestos content, the collection of three paint-chip samples to determine lead content, the performance of a geologic assessment of the Site to help determine whether potentially asbestos-bearing soil or rocks are present, and the preparation of this report.

3.1 Pre-field Activities

- Conducted a TO meeting on November 30, 2009, to discuss the TO scope of services. Caltrans Quality Assurance (QA) Manager Alicia Beyer and Geocon field manager Mike O'Brien attended the meeting. The purpose of the TO meeting was to identify and observe the project boundaries

and conditions and mark the project limits and proposed boring locations with white paint for Underground Service Alert (USA) notification.

- Prepared a *Health and Safety Plan* (HSP) dated December 2009, to provide guidelines on the use of personal protective equipment and the health and safety procedures implemented during the field activities.
- Reviewed existing geological maps of the Site and surrounding areas for information on the potential presence of geologic formations that may contain NOA.
- Provided 48-hour notification to USA prior to job site mobilization.
- Retained the services of Advanced Technologies Laboratories (ATL), a Caltrans-approved and California-certified analytical laboratory, to perform lead analyses of samples.
- Retained the services of EMSL Analytical Inc. (EMSL), a Caltrans-approved analytical laboratory, to perform asbestos analyses of samples.

3.2 Field Activities

A preliminary site reconnaissance was performed on November 30, 2009, by Mike O'Brien, at which time he collected various rock samples from slopes, stockpiles, and highway shoulders at the Site. The rock samples were later observed and evaluated at the Geocon office by Ian Stevenson and Mark Repking, California Professional Geologists (PG Nos. 8203 and 8569, respectively) with experience in the assessment of NOA.

The ADL and NOA survey was performed on December 4, 2009. Between PM 8.9 and 9.2, sixteen direct-push borings were advanced for the collection of ADL and/or NOA samples. One paint chip sample was also collected from the centerline yellow stripe. Between PM 17.1 and 17.5, twelve direct-push borings were advanced for the collection of ADL and/or NOA samples. Six NOA samples were collected from surface soils and two paint chip samples were collected from the centerline yellow stripe.

The ADL and NOA sample locations were selected in the field by the Geocon field supervisor. The locations of the samples were determined using a global positioning system (GPS) capable of providing a horizontal position with a minimum error of 3.3 feet. The approximate sample locations are depicted on Figures 2-1 and 2-2. Details of the field activities are presented in the following sections.

4.0 INVESTIGATIVE METHODS

4.1 ADL Investigation

PM 8.9 to 9.2

Ten direct-push borings (EB1 through EB5 and WB6 through WB10) were advanced to a depth up to 3 feet along the eastbound and westbound shoulder of SR-70 between PM 8.9 and 9.2 for the collection of 28 soil samples. Soil samples were collected at general depths of 0 to 1 foot, 1 to 2 feet and 2 to 3 feet. Refusal was encountered at approximately 2 feet in borings EB4 and WB8. Samples for asbestos analysis were collected from ADL borings WB7 through WB9. Sample locations are depicted on Figure 2-1. Soil samples obtained from the direct-push borings were collected in clear polyvinyl chloride (PVC) liners driven by the direct-push rig. After we collected a soil sample, the PVC was cut to separate the sample by depth, and each sample was transferred to individual Ziploc® re-sealable plastic bags. The soil samples were field homogenized and transported to the laboratory under chain-of-custody (COC) protocol.

PM 17.1 to 17.5

Eleven direct-push borings and one hand-auger boring were advanced to a depth of up to 3 feet along the eastbound and westbound shoulder of SR-70 between PM 17.1 and 17.5 for the collection of 35 soil samples. Boring EB-13 was excavated to a depth of 2 feet using a hand-auger. Soil samples were collected at general depths of 0 to 1 foot, 1 to 2 feet and 2 to 3 feet. Samples for asbestos analysis were also collected from seven of the ADL borings. Sample locations are depicted on Figure 2-2. Soil samples obtained from the direct-push borings were collected in clear PVC liners driven by the direct-push rig. After we collected a soil sample, the PVC was cut to separate the sample by depth and each sample was transferred to individual Ziploc® re-sealable plastic bags. Soil samples collected from hand-auger boring EB-13 were transferred directly from the hand-auger bucket to a Ziploc® re-sealable plastic bag. The soil samples were field homogenized and delivered to ATL under COC protocol.

4.2 NOA Investigation

PM 8.9 to 9.2

Nine samples for asbestos analysis were collected from six direct-push borings performed for NOA sampling (S1 through S6) and as split samples from three direct-push borings performed for ADL sampling (WB7 through WB9).

Borings S1 through S6 were performed to a depth of up to 3 feet in an area south of SR-70 that is used by Caltrans for the disposal of soil and rock debris. Samples for asbestos analysis were collected from the bottom foot of each boring. Borings WB7 through WB9 were performed to a depth up to 3 feet for ADL and NOA sampling along the westbound shoulder of SR-70. Samples for asbestos analysis were

collected as split samples from the bottom one foot of the ADL borings. Soil samples obtained from the direct-push borings were collected in clear PVC liners driven by the direct-push rig. After we collected a soil sample, the PVC was cut to separate the sample by depth and each sample was transferred to individual Ziploc® re-sealable plastic bags. The soil samples were field homogenized and delivered to EMSL under COC protocol. Sample locations are depicted on Figure 2-1.

PM 17.1 to 17.5

Thirteen samples for asbestos analysis were collected at three shoulder locations (S7 through S9), three stockpile locations (S10 through S12) and as split samples from seven direct-push borings performed in fill for ADL sampling (EB11, EB12, EB14, EB15 and WB16 through WB18) to a depth up to 3 feet. Shoulder and stockpile samples were collected as targeted surface samples of rock and soil materials. Samples collected from direct-push borings for ADL sampling were collected as splits from the bottom one foot of each boring. Soil samples obtained from the direct-push borings were collected in clear PVC liners driven by the direct-push rig. After we collected a soil sample, the PVC was cut to separate the sample by depth and each sample was transferred to individual Ziploc® re-sealable plastic bags. The soil samples were field homogenized and delivered to EMSL under COC protocol. Sample locations are depicted on Figure 2-2.

4.3 Paint Chip Samples

We obtained three paint chip samples from the yellow stripe in the center of SR-70, one between PM 8.9 and 9.2 and two between PM 17.1 and 17.5. Paint chip samples were collected by removing the yellow paint stripe with a hammer and chisel. Samples were placed in Ziploc® re-sealable plastic bags and delivered to ATL under COC protocol.

4.4 Traffic Control

Full lane closure with a guided pilot car and flaggers was provided by Caltrans personnel.

4.5 Quality Assurance/Quality Control (QA/QC) Procedures

QA/QC procedures were performed during the field exploration activities. These procedures included noting the general soil type for each boring on the field logs, the decontamination of sampling equipment before each sample was collected, and providing COC documentation for each sample submitted to the laboratories. The soil sampling equipment was cleansed between each boring by washing the equipment with an Alconox® solution followed by a double rinse with deionized water. The decontamination water was discharged to the ground surface within the Caltrans right-of-way, away from the roadway and storm drain inlets.

4.6 Laboratory Analyses

Prior to submitting the samples to the laboratories, the COC documentation was reviewed for accuracy

and completeness. Reproductions of the laboratory reports and COC documentation are presented in Appendix A.

4.6.1 Lead Samples

Sixty-three soil samples and three paint chip samples were submitted to ATL for total lead analysis following the United States Environmental Protection Agency (EPA) Test Method 6010B. The analyses were performed under expedited five-day turn-around-time (TAT).

4.6.2 Naturally Occurring Asbestos Samples

Twenty-two NOA samples were submitted to EMSL for asbestos fiber analysis using polarized light microscopy (PLM) by CARB Method 435 (CARB 435) under standard 5-day TAT. The CARB 435 preparation includes milling the sample to a -200 mesh size which also homogenizes the sample. The analytical sensitivity of the PLM analysis was 0.25% by area.

Four of the samples submitted to EMSL were additionally analyzed for asbestos using transmission electron microscopy (TEM) by the CARB 435 method. The analytical sensitivity of the TEM analysis was 0.01% by weight.

4.6.3 Laboratory QA/QC Procedures

QA/QC procedures were performed by ATL as applicable for each method of analysis with specificity for each analyte listed in the test method's QA/QC. QA/QC measures for the total lead analyses 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 the spike made at ten times the reporting limit or at the analyte level.

5.0 FIELD OBSERVATIONS AND INVESTIGATIVE RESULTS

5.1 Site Geology

We reviewed the California Geological Survey's (CGS) *Geologic Map of the Chico Quadrangle* (Chico Sheet) (CGS 1992) and the *Geologic Map of the Westwood Quadrangle* (Westwood Sheet) (CGS 1960) prior to beginning the field work to gather information regarding the potential presence of NOA on the Site. The geologic materials depicted on the Chico Sheet on or adjacent to SR-70 between PM 8.9 and 9.2 are Mesozoic Granitic Rocks. The geologic materials depicted on the Westwood Sheet

on or adjacent to SR-70 between PM 17.1 and 17.5 are Paleozoic limestone. Ultramafic rocks are mapped approximately 1 mile east of the Site.

Mike O'Brien collected various rock samples from slopes, stockpiles, and highway shoulders during the task order meeting, and Mark Repking performed a NOA assessment of the lithology of outcrops visible within the Caltrans right-of-way during the field sampling activities. Geologic materials observed within Caltrans right-of-way between PM 8.9 and 9.2 consisted of granitic bedrock to the north and fill to the south. Visible fill materials observed south of SR-70 in the Caltrans disposal area consisted predominantly of sandy gravel comprised of slate and other metamorphic derived materials. Trace amounts of gravel to sand-sized ultramafic materials were observed scattered at the surface of the disposal area. The eastern edge of the disposal area was observed to be silty schist gravel. Soil samples collected along SR-70 between PM 8.9 and 9.2 consisted primarily of brown silty sands and poorly graded sands with gravel.

We observed fill between PM 17.1 and 17.5 along the eastbound shoulder, a Caltrans stockpile to the north of SR-70 and metamorphosed limestone and slate bedrock along the westbound shoulder. Fill materials along the eastbound shoulder and within the Caltrans stockpile were observed to contain gravel and boulders of slate, schist, partially metamorphosed limestone, serpentine and ultramafic rock. Soils samples collected along SR-70 between PM 17.1 and 17.5 consisted primarily of brown to dark brown silty fine sands with variable amounts of gravel and trace clay. Groundwater was not encountered during the site investigation.

5.2 ADL and Paint Stripe Analytical Results

Total lead was detected in 38 of the 63 soil samples analyzed at concentrations ranging from 5.1 to 61 mg/kg. Only one of the 63 soil samples had a reported total lead concentration greater than 50 mg/kg (ten times the STLC value for lead of 5.0 mg/l).

Total lead was detected in each of the three paint chip samples at concentrations ranging from 8.3 to 72 mg/kg. Only one of the paint chip samples had a reported total lead concentration greater than 50 mg/kg (ten times the STLC value for lead of 5.0 mg/l).

A summary of the soil and paint chip sample analytical results is presented on Tables 1 through 3. The laboratory report and COC documentation are presented in Appendix A.

5.3 NOA Results

PM 8.9 to 9.2

Eight of the nine soil samples analyzed between PM 8.9 and 9.2 were reported as non-detect for asbestos. One sample (S5-0) was reported to contain <0.25% chrysotile asbestos by PLM and 0.02% chrysotile asbestos by weight by TEM, below the CARB regulatory limit. A summary of analytical results for samples collected between PM 8.9 and 9.2 is presented on Table 4. The laboratory report and COC documentation are presented in Appendix A.

PM 17.1 to 17.5

Thirteen samples collected from shoulder, fill and stockpile materials were analyzed for asbestos using the PLM method. Three samples were additionally analyzed by the TEM method. Two of the ten samples analyzed from shoulder and fill materials were reported to contain chrysotile, anthophyllite and tremolite asbestos at or above the CARB regulatory limit of 0.25% by the PLM and/or TEM methods. Two of the samples analyzed for asbestos from the stockpile area were reported to contain chrysotile asbestos above 1% by the PLM method. The third sample from the stockpile area was reported to contain chrysotile asbestos at <0.25% by PLM and <0.01% by TEM. A summary of analytical results for samples collected between PM 17.1 and 17.5 is presented on Table 5. The laboratory report and COC documentation are presented in Appendix A.

5.4 Laboratory Quality Assurance/Quality Control

The ATL laboratory QA/QC report indicates acceptable percent recoveries for the matrix spike/matrix spike duplicates, surrogate recoveries and non-detect results for the method blanks. However, the relative percent differences (RPDs) for EPA Method 6010 were outside the RPD limit. The Case Narrative in the laboratory report states "RPD for Duplicate (DUP) is outside criteria for samples 109049-62ADUP and 109049-066ADUP; however, the Laboratory Control Sample (LCS) validated the analytical batch." Based on this limited data review, no additional qualifications of the data are necessary, and the data are of sufficient quality for the purposes of this report.

5.5 Statistical Evaluation for Lead Detected in Soil Samples

The total lead data for the samples collected from the Site were separated into two sample populations for statistical evaluation as described below:

- Sample population 'A' consists of soil samples collected from borings EB1 through EB5 and WB6 through WB10 located along SR-70 between PM 8.9 and 9.2.
- Sample population 'B' consists of soil samples collected from borings EB11 through EB15 and WB16 through WB22 located along SR-70 between PM 17.1 and 17.5.

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 soluble lead concentrations exists that would allow the prediction of soluble 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.

5.5.1 Calculating the UCLs for the True 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 reporting limit was used in the UCL calculation. The bootstrap results are included in Appendix B. The calculated UCLs and statistical results are summarized in the table below:

Sample Population 'A' - SR-70 PM 8.9 to 9.2
(Borings EB1 through EB5 and WB6 through WB10)

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 to 1.0	15.4	16.7	10.9	2.5	32
1.0 to 2.0	8.2	8.7	6.3	2.5	14
2.0 to 3.0	5.4	5.8	3.8	2.5	13

Sample Population 'B' - SR-70 PM 17.1 to 17.5
(Borings EB11 through EB15 and WB16 through WB22)

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 to 1.0	22.3	23.8	17.4	2.5	49
1.0 to 2.0	21.8	23.5	15.4	2.5	61
2.0 to 3.0	8.3	8.8	6.8	2.5	18

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Aerially Deposited Lead

Soil materials excavated to the maximum sampling depth of 3 feet within the project boundaries would not be classified as a California hazardous waste since the calculated 90% and 95% total lead UCLs are less than 50 mg/kg. The reported total lead concentrations for the samples collected between PM 8.9 and 9.2 ranged from 7.3 to 32 mg/kg with an average total lead concentration of 7.2 mg/kg. The reported total lead concentrations for the samples collected between PM 17.1 and 17.5 ranged from 5.1 to 61 mg/kg with an average total lead concentration of 13.1 mg/kg. Consequently, the top 3 feet of excavated soil will not require special soil handling and disposal procedures based on lead content and can be reused onsite or disposed of offsite as non-hazardous soil. We calculated the average total lead concentrations by including the reported total lead concentrations and values equal to one-half of the reporting limit for samples in which total lead was not detected.

6.2 Traffic Stripe Paint

The yellow traffic stripe paint was sampled per Caltrans' request since it may be removed from the underlying asphalt concrete by grinding or sand blasting, which would create a paint waste stream. The analytical results of the traffic stripe paint will be used by Caltrans to provide contractors with preliminary analytical data of the traffic stripe paint. The traffic stripe paint was reported to contain lead at concentrations ranging from 8.3 to 72 mg/kg, significantly below the California hazardous waste threshold of 1,000 mg/kg.

6.3 Worker Protection

Per Caltrans' requirements, the contractor(s) should prepare a project-specific Lead Compliance Plan (CCR Title 8, Section 1532.1, the "Lead in Construction" standard) to minimize worker exposure to lead-impacted soil. 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 lead-impacted soil.

6.4 Naturally Occurring Asbestos

We collected 22 soil and rock samples for asbestos analysis between PM 8.9 and 9.2 and 17.1 and 17.5. Of these 22 samples, six were reported to contain asbestos, with four containing asbestos concentrations above the CARB regulatory limit of 0.25%.

PM 8.9 to 9.2

NOA was only detected (below the CARB regulatory limit of 0.25%) for one of the nine samples analyzed. Soil disturbing activities along SR-70 between PM 8.9 and 9.2 are not subject to asbestos dust control measures.

PM 17.1 to 17.5

Native bedrock materials on the slope north of SR-70 are composed of geologic materials that are not conducive to the formation of NOA. Soil disturbing activities in this area are not subject to asbestos dust control measures.

Fill and stockpile materials between PM 17.1 and 17.5 were reported to contain asbestos at concentrations greater than 0.25% for four of the thirteen samples analyzed. Each of the samples collected from the stockpile north of SR-70 was reported to contain chrysotile asbestos, with two of the samples reported to contain asbestos at greater than 1.0%. Soil disturbing activities involving fill and stockpile materials between PM 17.1 and 17.5 should comply with asbestos dust control measures as specified in ATCM 93105 and/or 93106.

Though asbestos was reported to be present at or above regulated levels in fill and stockpile materials, the asbestos content does not render these materials unsuitable for reuse within the Caltrans project boundaries. However, construction/maintenance activities involving these asbestos-containing materials may fall under regulatory jurisdiction of the California Division of the Occupational Safety and Health Administration (Cal-OSHA) under CCR Title 8 Section 5208. Mitigation measures during construction/maintenance activities should be utilized to minimize releases of NOA to air (dust control) and surface waters (stormwater discharge). If reused within the Caltrans right-of-way, the material from areas where asbestos was reported to be present at regulated levels can not be used in such a way as to fall under the definition of surfacing material as defined in CARB's Title 17, Section 93106. NOA-containing material must be covered by at least 0.25 foot of material that contains less than 0.25% NOA.

We recommend that fill materials from between PM 17.1 and 17.5 be stockpiled and re-analyzed for asbestos content prior to offsite disposal. If fill materials are not re-analyzed they should be handled as described for stockpile materials below.

We recommend that any excess soil or rock removed from the stockpile area between PM 17.1 and 17.5 be disposed of in a landfill because of the likelihood for asbestos to be present at or above regulated levels. If soil is disposed of offsite, the landfill facility or property owner must be notified that the soil contains levels of asbestos that exceed regulated levels. Soil containing NOA must be

transported in accordance with ATCM 93105, Section E(4)(F), *Control for Off-site Transport*, which states:

> *"No trucks are allowed to transport* (NOA-containing) *excavated material off-site unless:*
> 1. *Trucks are maintained such that no spillage can occur from holes or other openings in cargo compartments; and*
> 2. *Loads are adequately wetted and either:*
>   i. *Covered with tarps; or*
>   ii. *Loaded such that the material does not touch the front, back, or sides of the cargo compartment at any point less than six inches from the top and that no point of the load extends above the top of the cargo compartment."*

Under CARB's Title 17, Section 93105, offsite disposal of material containing asbestos at or above regulated levels requires asbestos content notification. Facility-specific landfill acceptance criteria should be determined for disposal of asbestos-containing soil materials.

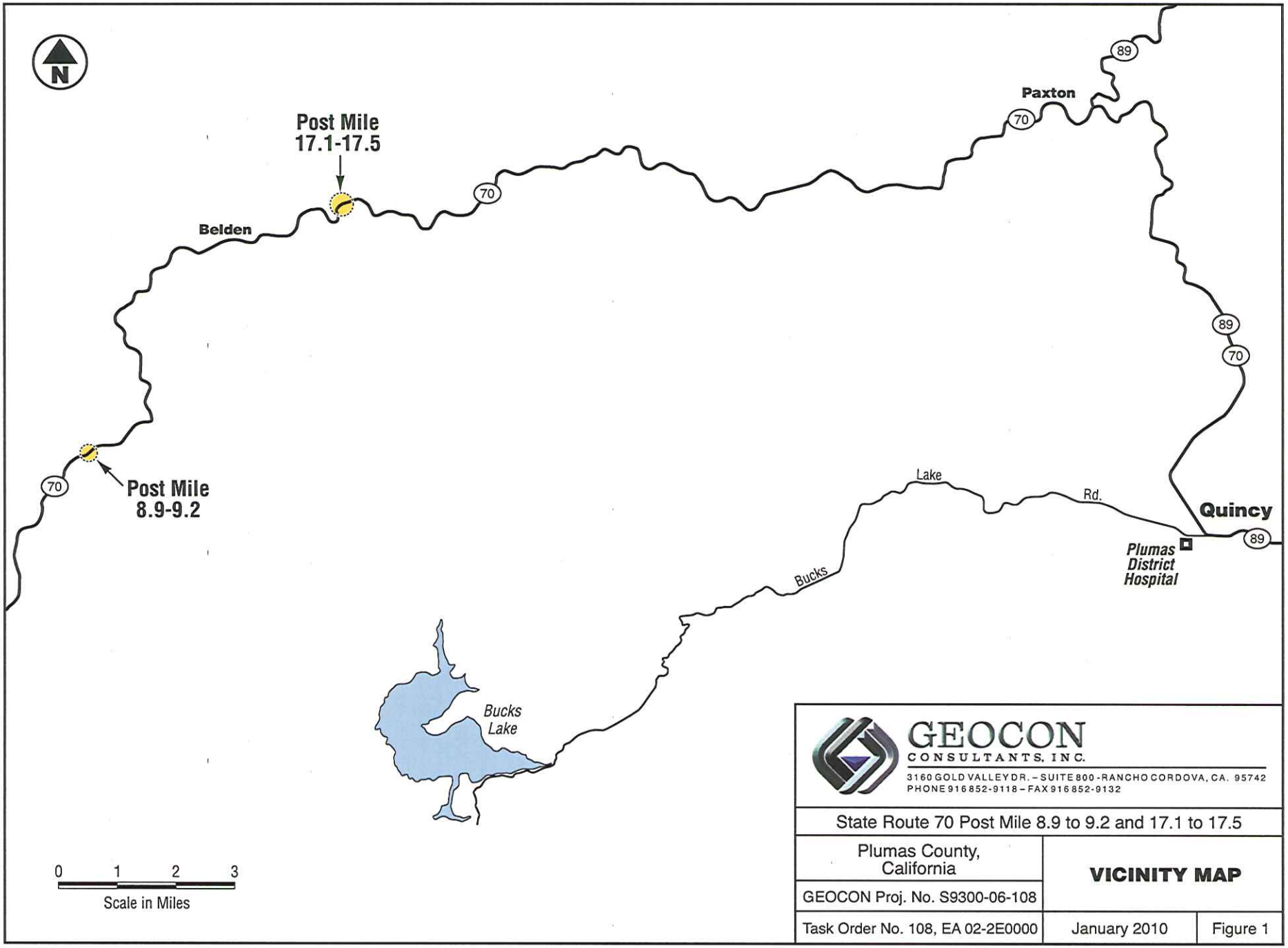
6.5 Asbestos Risk to Human Health

Currently, regulatory exposure limits and health hazard data are not available for NOA in soils. Federal regulations governing asbestos define it as the asbestiform variety of the amphibole minerals actinolite, amosite, anthophyllite, crocidolite, and tremolite, and the asbestiform variety of serpentine, chrysotile. Asbestos fibers occurring in industrial materials are considered by the National Institute for Occupational Safety and Health as potential occupational carcinogens. Prudence is recommended, therefore, in dealing with soils containing NOA. Engineering controls, such as wet methods for dust suppression, should be utilized to minimize aerial dispersion of NOA fibers in planned work areas during excavation and construction activities. Under Title 8 Section 5208 of the CCR, disturbance of asbestos-containing materials requires wet working methods and possible respiratory protection and air monitoring. The CARB has established protocols outlined in Title 17, Section 93105 for the implementation of worker health, safety and monitoring plans for excavation, grading and transport of NOA-containing soils. The excavation contractor should consult Title 17, Section 93105 and contact Cal-OSHA to establish the appropriate regulatory protocol and actions necessary for excavation and/or disturbance of asbestos-containing soils.

7.0 REPORT LIMITATIONS

This report has been prepared exclusively for Caltrans. The information contained herein is only valid as of the date of the report and will require an update to reflect additional information obtained.

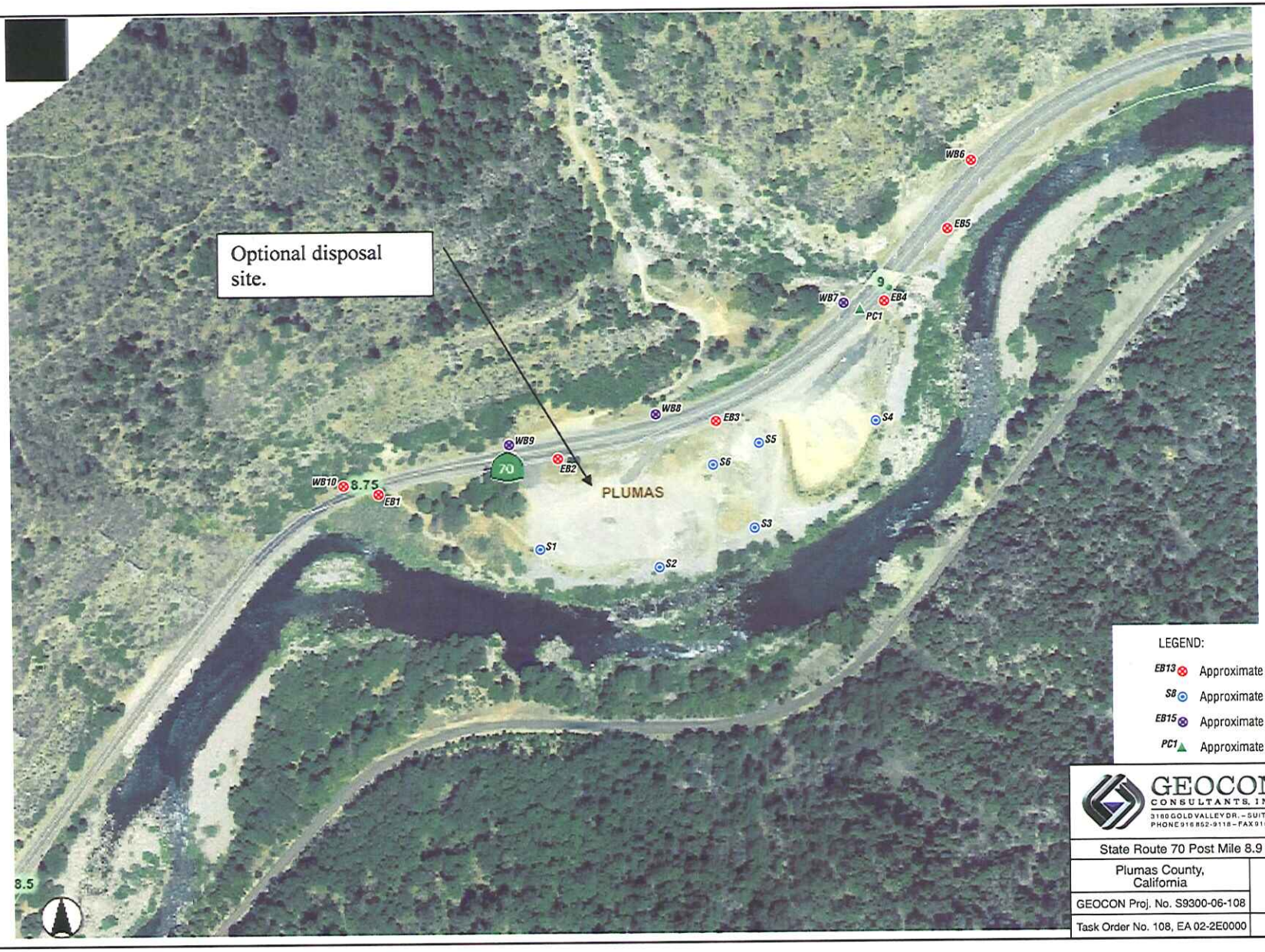
This report is not a comprehensive site characterization and should not be construed as such. The findings as presented in this report are predicated on the results of the limited sampling and laboratory testing performed. In addition, the information obtained is not intended to address potential impacts 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. We 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.



GEOCON
CONSULTANTS, INC.
3160 GOLD VALLEY DR. – SUITE 800 - RANCHO CORDOVA, CA. 95742
PHONE 916 852-9118 – FAX 916 852-9132

State Route 70 Post Mile 8.9 to 9.2 and 17.1 to 17.5

Plumas County, California	**VICINITY MAP**	
GEOCON Proj. No. S9300-06-108		
Task Order No. 108, EA 02-2E0000	January 2010	Figure 1



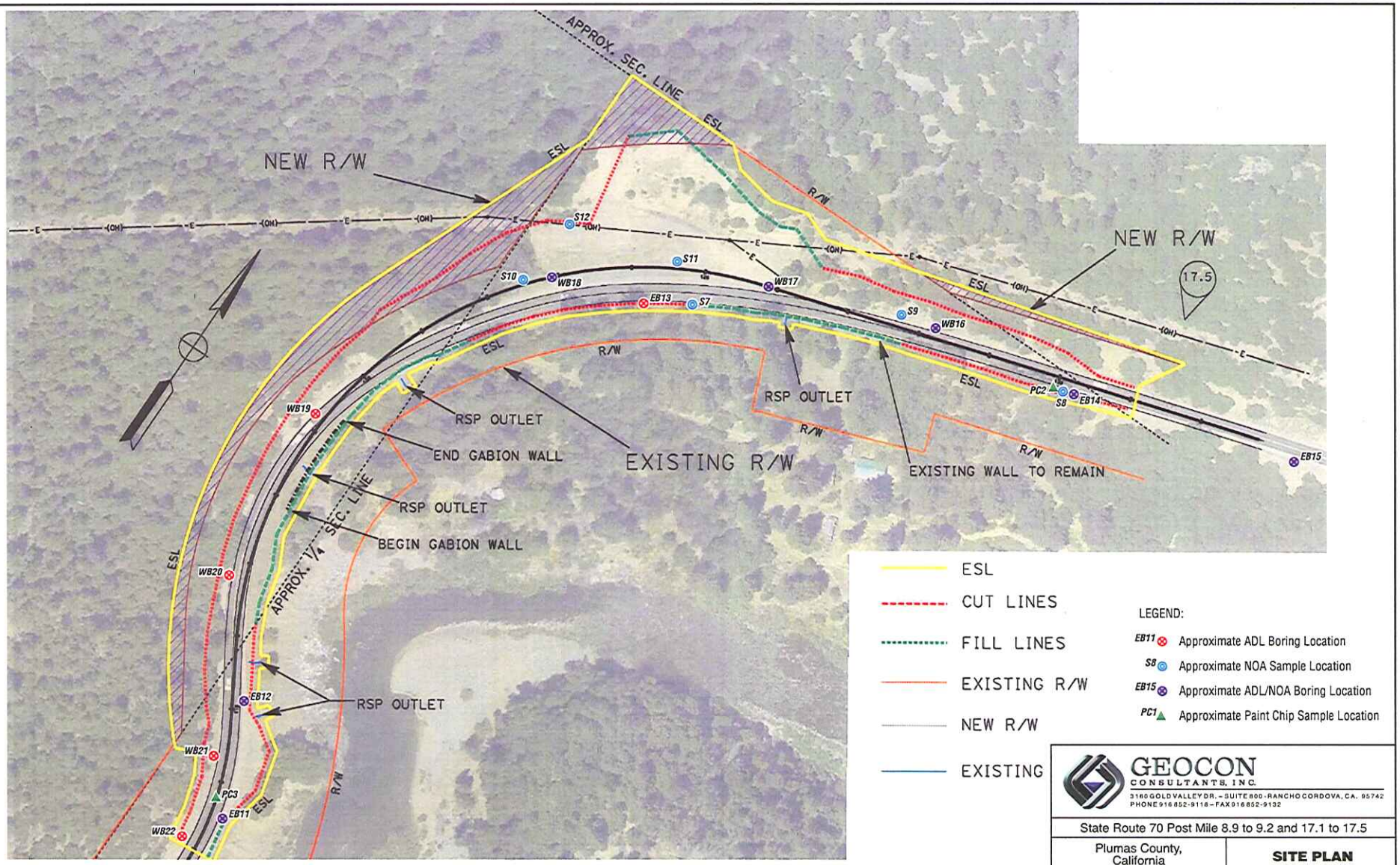
LEGEND:

- EB13 ⊗ Approximate ADL Boring Location
- S8 ⊙ Approximate NOA Boring Location
- EB15 ⊗ Approximate ADL/NOA Boring Location
- PC1 ▲ Approximate Paint Chip Sample Location

GEOCON CONSULTANTS, INC.
3160 GOLD VALLEY DR. - SUITE 800 - RANCHO CORDOVA, CA. 95742
PHONE 916 852-9118 - FAX 916 852-9132

State Route 70 Post Mile 8.9 to 9.2 and 17.1 to 17.5

Plumas County, California	**SITE PLAN PM 8.9 – 9.2**
GEOCON Proj. No. S9300-06-108	
Task Order No. 108, EA 02-2E0000	January 2010 — Figure 2-1



GEOCON CONSULTANTS, INC.
3160 GOLD VALLEY DR. – SUITE 800 – RANCHO CORDOVA, CA. 95742
PHONE 916 852-9118 – FAX 916 852-9132

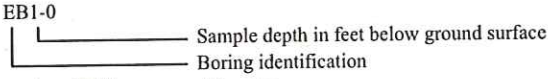
State Route 70 Post Mile 8.9 to 9.2 and 17.1 to 17.5

Plumas County, California	**SITE PLAN PM 17.1 – 17.5**	
GEOCON Proj. No. S9300-06-108		
Task Order No. 108, EA 02-2E0000	January 2010	Figure 2-2

TABLE 1
SUMMARY OF SOIL BORING COORDINATES AND LEAD ANALYTICAL RESULTS
HIGHWAY 70 POST MILE 8.9 to 9.2
PLUMAS COUNTY, CALIFORNIA

BORING ID	SAMPLE LOCATION	LATITUDE	LONGITUDE	TOTAL LEAD (mg/kg)
EB1-0	PM 8.9 to 9.2 Eastbound Shoulder	39.955175500	-121.296975353	30
EB1-1	PM 8.9 to 9.2 Eastbound Shoulder	39.955175500	-121.296975353	14
EB1-2	PM 8.9 to 9.2 Eastbound Shoulder	39.955175500	-121.296975353	<5.0
EB2-0	PM 8.9 to 9.2 Eastbound Shoulder	39.955395935	-121.295158339	<5.0
EB2-1	PM 8.9 to 9.2 Eastbound Shoulder	39.955395935	-121.295158339	<5.0
EB2-2	PM 8.9 to 9.2 Eastbound Shoulder	39.955395935	-121.295158339	13
EB3-0	PM 8.9 to 9.2 Eastbound Shoulder	39.956063667	-121.293586764	<5.0
EB3-1	PM 8.9 to 9.2 Eastbound Shoulder	39.956063667	-121.293586764	<5.0
EB3-2	PM 8.9 to 9.2 Eastbound Shoulder	39.956063667	-121.293586764	<5.0
EB4-0	PM 8.9 to 9.2 Eastbound Shoulder	39.957061085	-121.292453921	7.3
EB4-1	PM 8.9 to 9.2 Eastbound Shoulder	39.957061085	-121.292453921	<5.0
EB5-0	PM 8.9 to 9.2 Eastbound Shoulder	39.957701293	-121.291023362	9.0
EB5-1	PM 8.9 to 9.2 Eastbound Shoulder	39.957701293	-121.291023362	8.5
EB5-2	PM 8.9 to 9.2 Eastbound Shoulder	39.957701293	-121.291023362	<5.0
WB6-0	PM 8.9 to 9.2 Westbound Shoulder	39.957229170	-121.292533683	<5.0
WB6-1	PM 8.9 to 9.2 Westbound Shoulder	39.957229170	-121.292533683	13
WB6-2	PM 8.9 to 9.2 Westbound Shoulder	39.957229170	-121.292533683	<5.0
WB7-0	PM 8.9 to 9.2 Westbound Shoulder	39.956170357	-121.293796937	<5.0
WB7-1	PM 8.9 to 9.2 Westbound Shoulder	39.956170357	-121.293796937	<5.0
WB7-2	PM 8.9 to 9.2 Westbound Shoulder	39.956170357	-121.293796937	<5.0
WB8-0	PM 8.9 to 9.2 Westbound Shoulder	39.955552965	-121.295197262	<5.0
WB8-1	PM 8.9 to 9.2 Westbound Shoulder	39.955552965	-121.295197262	<5.0
WB9-0	PM 8.9 to 9.2 Westbound Shoulder	39.955415860	-121.296168936	32
WB9-1	PM 8.9 to 9.2 Westbound Shoulder	39.955415860	-121.296168936	12
WB9-2	PM 8.9 to 9.2 Westbound Shoulder	39.955415860	-121.296168936	<5.0
WB10-0	PM 8.9 to 9.2 Westbound Shoulder	39.955243834	-121.297166761	18
WB10-1	PM 8.9 to 9.2 Westbound Shoulder	39.955243834	-121.297166761	<5.0
WB10-2	PM 8.9 to 9.2 Westbound Shoulder	39.955243834	-121.297166761	<5.0

Notes:



mg/kg = Milligrams per kilogram
< = Less than laboratory reporting limits

TABLE 2
SUMMARY OF SOIL BORING COORDINATES AND LEAD ANALYTICAL RESULTS
HIGHWAY 70 POST MILE 17.1 to 17.5
PLUMAS COUNTY, CALIFORNIA

BORING ID	SAMPLE LOCATION	LATITUDE	LONGITUDE	TOTAL LEAD (mg/kg)
EB11-0	PM 17.1 to 17.5 Eastbound Shoulder	40.012333209	-121.216429590	9.6
EB11-1	PM 17.1 to 17.5 Eastbound Shoulder	40.012333209	-121.216429590	<5.0
EB11-2	PM 17.1 to 17.5 Eastbound Shoulder	40.012333209	-121.216429590	<5.0
EB12-0	PM 17.1 to 17.5 Eastbound Shoulder	40.013056742	-121.216643450	14
EB12-1	PM 17.1 to 17.5 Eastbound Shoulder	40.013056742	-121.216643450	6.5
EB12-2	PM 17.1 to 17.5 Eastbound Shoulder	40.013056742	-121.216643450	6.7
EB13-0	PM 17.1 to 17.5 Eastbound Shoulder	40.015300829	-121.215924182	<5.0
EB13-1	PM 17.1 to 17.5 Eastbound Shoulder	40.015300829	-121.215924182	**61**
EB14-0	PM 17.1 to 17.5 Eastbound Shoulder	40.015677037	-121.214757851	29
EB14-1	PM 17.1 to 17.5 Eastbound Shoulder	40.015677037	-121.214757851	7.5
EB14-2	PM 17.1 to 17.5 Eastbound Shoulder	40.015677037	-121.214757851	6.3
EB15-0	PM 17.1 to 17.5 Eastbound Shoulder	40.016007093	-121.213231933	15
EB15-1	PM 17.1 to 17.5 Eastbound Shoulder	40.016007093	-121.213231933	12
EB15-2	PM 17.1 to 17.5 Eastbound Shoulder	40.016007093	-121.213231933	18
WB16-0	PM 17.1 to 17.5 Westbound Shoulder	40.015670826	-121.215119063	49
WB16-1	PM 17.1 to 17.5 Westbound Shoulder	40.015670826	-121.215119063	25
WB16-2	PM 17.1 to 17.5 Westbound Shoulder	40.015670826	-121.215119063	9.3
WB17-0	PM 17.1 to 17.5 Westbound Shoulder	40.015504472	-121.215721007	12
WB17-1	PM 17.1 to 17.5 Westbound Shoulder	40.015504472	-121.215721007	9.0
WB17-2	PM 17.1 to 17.5 Westbound Shoulder	40.015504472	-121.215721007	<5.0
WB18-0	PM 17.1 to 17.5 Westbound Shoulder	40.015084745	-121.216510751	9.5
WB18-1	PM 17.1 to 17.5 Westbound Shoulder	40.015084745	-121.216510751	<5.0
WB18-2	PM 17.1 to 17.5 Westbound Shoulder	40.015084745	-121.216510751	5.1
WB19-0	PM 17.1 to 17.5 Westbound Shoulder	40.014175588	-121.217295283	38
WB19-1	PM 17.1 to 17.5 Westbound Shoulder	40.014175588	-121.217295283	7.9
WB19-2	PM 17.1 to 17.5 Westbound Shoulder	40.014175588	-121.217295283	<5.0
WB20-0	PM 17.1 to 17.5 Westbound Shoulder	NA	NA	13
WB20-1	PM 17.1 to 17.5 Westbound Shoulder	NA	NA	26
WB20-2	PM 17.1 to 17.5 Westbound Shoulder	NA	NA	9.5
WB21-0	PM 17.1 to 17.5 Westbound Shoulder	NA	NA	6.7
WB21-1	PM 17.1 to 17.5 Westbound Shoulder	NA	NA	9.0
WB21-2	PM 17.1 to 17.5 Westbound Shoulder	NA	NA	6.6
WB22-0	PM 17.1 to 17.5 Westbound Shoulder	40.012142313	-121.216659014	10
WB22-1	PM 17.1 to 17.5 Westbound Shoulder	40.012142313	-121.216659014	9.5
WB22-2	PM 17.1 to 17.5 Westbound Shoulder	40.012142313	-121.216659014	<5.0

Notes:

EB1-0
- Sample depth in feet below ground surface
- Boring identification

mg/kg = Milligrams per kilogram

< = Less than laboratory reporting limits

NA = Not available

Concentrations in bold type are greater than or equal to 50 mg/kg (ten times the STLC value for lead of 5.0 mg/l)

TABLE 3

SUMMARY OF TRAFFIC STRIPE PAINT SAMPLE ANALYTICAL RESULTS
HIGHWAY 70 POST MILE 8.9 to 9.2, 17.1 to 17.5
PLUMAS COUNTY, CALIFORNIA

SAMPLE ID	SAMPLE LOCATION	LATITUDE	LONGITUDE	TOTAL LEAD (mg/kg)
PC1	PM 8.9 to 9.2 Center Yellow Stripe	39.956098011	-121.293705763	**72**
PC2	PM 17.1 to 17.5 Center Yellow Stripe	40.015683005	-121.214871564	8.3
PC3	PM 17.1 to 17.5 Center Yellow Stripe	40.012187061	-121.216559628	12

Note:
mg/kg = Milligrams per kilogram

TABLE 4
SUMMARY OF ASBESTOS ANALYTICAL RESULTS
HIGHWAY 70 POST MILE 8.9 TO 9.2
PLUMAS COUNTY, CALIFORNIA

SAMPLE I.D.	SAMPLE TYPE	LOCATION SAMPLED	LATITUDE	LONGITUDE	ANALYTICAL METHOD	ASBESTOS %	ASBESTOS TYPE
S1-2	Stockpile	PM 8.9-9.2 Stockpile	39.954606693	-121.296164482	PLM	ND	ND
S2-2	Stockpile	PM 8.9-9.2 Stockpile	39.954606353	-121.295247498	PLM	ND	ND
S3-1	Stockpile	PM 8.9-9.2 Stockpile	39.954807521	-121.294329926	PLM	ND	ND
S4-2	Stockpile	PM 8.9-9.2 Stockpile	39.955664982	-121.293499121	PLM	ND	ND
S5-0	Stockpile	PM 8.9-9.2 Stockpile	39.955555753	-121.294026557	PLM/TEM	<0.25/0.02	Chrysotile
S6-2	Stockpile	PM 8.9-9.2 Stockpile	39.955476983	-121.294146551	PLM	ND	ND
WB7-2	Fill	PM 8.9-9.2 Westbound Shoulder	39.956170357	-121.293796937	PLM	ND	ND
WB8-1	Fill	PM 8.9-9.2 Westbound Shoulder	39.955552965	-121.295197262	PLM	ND	ND
WB9-2	Fill	PM 8.9-9.2 Westbound Shoulder	39.955415860	-121.296168936	PLM	ND	ND

Notes:

PLM = Polarized light microscopy
TEM = Transmission electron microscope
ND = None detected
<0.25 = Less than the laboratory reporting limit

TABLE 5
SUMMARY OF ASBESTOS ANALYTICAL RESULTS
HIGHWAY 70 POST MILE 17.1 TO 17.5
PLUMAS COUNTY, CALIFORNIA

SAMPLE I.D.	SAMPLE TYPE	LOCATION SAMPLED	LATITUDE	LONGITUDE	ANALYTICAL METHOD	ASBESTOS %	ASBESTOS TYPE
EB11-2	Fill	PM 17.1-17.5 Eastbound Shoulder	40.012333209	-121.216429590	PLM/TEM	<0.25/1.05	Chrysotile, Anthophyllite, Tremolite
EB12-2	Fill	PM 17.1-17.5 Eastbound Shoulder	40.013056742	-121.216643450	PLM	ND	ND
S7-0	Fill	PM 17.1-17.5 Westbound Slope Surface	40.015309363	-121.215911352	PLM	ND	ND
S8-0	Fill	PM 17.1-17.5 Eastbound Slope Surface	40.015650123	-121.214807423	PLM/TEM	0.25/0.41	Chrysotile
EB14-2	Fill	PM 17.1-17.5 Eastbound Shoulder	40.015677037	-121.214757851	PLM	ND	ND
EB15-2	Fill	PM 17.1-17.5 Eastbound Shoulder	40.016007093	-121.213231933	PLM	ND	ND
S9-0	Fill	PM 17.1-17.5 Eastbound Slope Stockpile	40.015686380	-121.215047117	PLM	ND	ND
WB16-2	Fill	PM 17.1-17.5 Westbound Shoulder	40.015670826	-121.215119063	PLM	ND	ND
WB17-2	Fill	PM 17.1-17.5 Westbound Shoulder	40.015504472	-121.215721007	PLM	ND	ND
WB18-2	Fill	PM 17.1-17.5 Westbound Shoulder	40.015084745	-121.216510751	PLM	ND	ND
S10-0	Stockpile	PM 17.1-17.5 Stockpile	40.015155371	-121.216517344	PLM	2.5	Chrysotile
S11-0	Stockpile	PM 17.1-17.5 Stockpile	40.015441546	-121.216220082	PLM	1.5	Chrysotile
S12-0	Stockpile	PM 17.1-17.5 Stockpile	40.015293593	-121.216509424	PLM/TEM	<0.25/<0.01	Chrysotile

Notes:

PLM = Polarized light microscopy
TEM = Transmission electron microscope
ND = None detected
<0.25 = Less than the laboratory reporting limit

APPENDIX A

December 16, 2009

Rebecca Silva
Geocon Consultants, Inc.
3160 Gold Valley Drive, Suite 800
Rancho Cordova, CA 95742

TEL: (916) 852-9118
FAX: (916) 852-9132

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

Workorder No.: 109049

RE: Plumas 70 Caribou Curve, S9300-06-108

Attention: Rebecca Silva

Enclosed are the results for sample(s) received on December 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,

Eddie F. Rodriguez
Laboratory Director

CLIENT: Geocon Consultants, Inc.
Project: Plumas 70 Caribou Curve, S9300-06-108
Lab Order: 109049

CASE NARRATIVE

Analytical Comments for Method 6010

RPD for Duplicate (DUP) is outside criteria for samples 109049-062ADUP and 109049-066ADUP; however, the Laboratory Control Sample (LCS) validated the analytical batch.

Advanced Technology Laboratories
3275 Walnut Avenue, Signal Hill, CA 90755 Tel: 562. 989.4045 Fax: 562.989.4040

Advanced Technology Laboratories

Date: 12/16/2009

ANALYTICAL RESULTS

LEAD BY ICP
EPA 6010B

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	109049
Project:	Plumas 70 Caribou Curve, S9300-06-108	**Date Received**	12/9/2009 10:16:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	RQ

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
109049-001A	EB1-0	30	mg/Kg	60430	5.0	1	12/4/2009	12/14/2009
109049-002A	EB1-1	14	mg/Kg	60430	5.0	1	12/4/2009	12/14/2009
109049-003A	EB1-2	ND	mg/Kg	60430	5.0	1	12/4/2009	12/14/2009
109049-004A	EB2-0	ND	mg/Kg	60430	5.0	1	12/4/2009	12/14/2009
109049-005A	EB2-1	ND	mg/Kg	60430	5.0	1	12/4/2009	12/14/2009
109049-006A	EB2-2	13	mg/Kg	60430	5.0	1	12/4/2009	12/14/2009
109049-007A	EB3-0	ND	mg/Kg	60430	5.0	1	12/4/2009	12/14/2009
109049-008A	EB3-1	ND	mg/Kg	60430	5.0	1	12/4/2009	12/14/2009
109049-009A	EB3-2	ND	mg/Kg	60430	5.0	1	12/4/2009	12/14/2009
109049-010A	EB4-0	7.3	mg/Kg	60430	5.0	1	12/4/2009	12/14/2009
109049-011A	EB4-1	ND	mg/Kg	60430	5.0	1	12/4/2009	12/14/2009
109049-012A	EB5-0	9.0	mg/Kg	60430	5.0	1	12/4/2009	12/14/2009
109049-013A	EB5-1	8.5	mg/Kg	60430	5.0	1	12/4/2009	12/14/2009
109049-014A	EB5-2	ND	mg/Kg	60430	5.0	1	12/4/2009	12/14/2009
109049-015A	WB6-0	ND	mg/Kg	60430	5.0	1	12/4/2009	12/14/2009
109049-016A	WB6-1	13	mg/Kg	60430	5.0	1	12/4/2009	12/14/2009
109049-017A	WB6-2	ND	mg/Kg	60430	5.0	1	12/4/2009	12/14/2009
109049-018A	WB7-0	ND	mg/Kg	60430	5.0	1	12/4/2009	12/14/2009

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

Date: 12/16/2009

ANALYTICAL RESULTS

LEAD BY ICP
EPA 6010B

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	109049
Project:	Plumas 70 Caribou Curve, S9300-06-108	**Date Received**	12/9/2009 10:16:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	RQ

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
109049-019A	WB7-1	ND	mg/Kg	60430	5.0	1	12/4/2009	12/14/2009
109049-020A	WB7-2	ND	mg/Kg	60430	5.0	1	12/4/2009	12/14/2009
109049-022A	WB8-0	ND	mg/Kg	60431	5.0	1	12/4/2009	12/14/2009
109049-023A	WB8-1	ND	mg/Kg	60431	5.0	1	12/4/2009	12/14/2009
109049-024A	WB9-0	32	mg/Kg	60431	5.0	1	12/4/2009	12/14/2009
109049-025A	WB9-1	12	mg/Kg	60431	5.0	1	12/4/2009	12/14/2009
109049-026A	WB9-2	ND	mg/Kg	60431	5.0	1	12/4/2009	12/14/2009
109049-027A	WB10-0	18	mg/Kg	60431	5.0	1	12/4/2009	12/14/2009
109049-028A	WB10-1	ND	mg/Kg	60431	5.0	1	12/4/2009	12/14/2009
109049-029A	WB10-2	ND	mg/Kg	60431	5.0	1	12/4/2009	12/14/2009
109049-030A	EB11-0	9.6	mg/Kg	60431	5.0	1	12/4/2009	12/14/2009
109049-031A	EB11-1	ND	mg/Kg	60431	5.0	1	12/4/2009	12/14/2009
109049-032A	EB11-2	ND	mg/Kg	60431	5.0	1	12/4/2009	12/14/2009
109049-033A	EB12-0	14	mg/Kg	60431	5.0	1	12/4/2009	12/14/2009
109049-034A	EB12-1	6.5	mg/Kg	60431	5.0	1	12/4/2009	12/14/2009
109049-035A	EB12-2	6.7	mg/Kg	60431	5.0	1	12/4/2009	12/14/2009
109049-036A	EB13-0	ND	mg/Kg	60431	5.0	1	12/4/2009	12/14/2009
109049-037A	EB13-1	61	mg/Kg	60431	5.0	1	12/4/2009	12/14/2009

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

Date: 12/16/2009

ANALYTICAL RESULTS

LEAD BY ICP
EPA 6010B

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	109049
Project:	Plumas 70 Caribou Curve, S9300-06-108	**Date Received**	12/9/2009 10:16:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	RQ

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
109049-038A	EB14-0	29	mg/Kg	60431	5.0	1	12/4/2009	12/14/2009
109049-039A	EB14-1	7.5	mg/Kg	60431	5.0	1	12/4/2009	12/14/2009
109049-040A	EB14-2	6.3	mg/Kg	60431	5.0	1	12/4/2009	12/14/2009
109049-042A	EB15-0	15	mg/Kg	60431	5.0	1	12/4/2009	12/14/2009
109049-043A	EB15-1	12	mg/Kg	60432	5.0	1	12/4/2009	12/14/2009
109049-044A	EB15-2	18	mg/Kg	60432	5.0	1	12/4/2009	12/14/2009
109049-045A	WB16-0	49	mg/Kg	60432	5.0	1	12/4/2009	12/14/2009
109049-046A	WB16-1	25	mg/Kg	60432	5.0	1	12/4/2009	12/14/2009
109049-047A	WB16-2	9.3	mg/Kg	60432	5.0	1	12/4/2009	12/14/2009
109049-048A	WB17-0	12	mg/Kg	60432	5.0	1	12/4/2009	12/14/2009
109049-049A	WB17-1	9.0	mg/Kg	60432	5.0	1	12/4/2009	12/14/2009
109049-050A	WB17-2	ND	mg/Kg	60432	5.0	1	12/4/2009	12/14/2009
109049-051A	WB18-0	9.5	mg/Kg	60432	5.0	1	12/4/2009	12/14/2009
109049-052A	WB18-1	ND	mg/Kg	60432	5.0	1	12/4/2009	12/14/2009
109049-053A	WB18-2	5.1	mg/Kg	60432	5.0	1	12/4/2009	12/14/2009
109049-054A	WB19-0	38	mg/Kg	60432	5.0	1	12/4/2009	12/14/2009
109049-055A	WB19-1	7.9	mg/Kg	60432	5.0	1	12/4/2009	12/14/2009
109049-056A	WB19-2	ND	mg/Kg	60432	5.0	1	12/4/2009	12/14/2009

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

Date: 12/16/2009

ANALYTICAL RESULTS

LEAD BY ICP
EPA 6010B

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	109049
Project:	Plumas 70 Caribou Curve, S9300-06-108	**Date Received**	12/9/2009 10:16:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	RQ

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
109049-057A	WB20-0	13	mg/Kg	60432	5.0	1	12/4/2009	12/14/2009
109049-058A	WB20-1	26	mg/Kg	60432	5.0	1	12/4/2009	12/14/2009
109049-059A	WB20-2	9.5	mg/Kg	60432	5.0	1	12/4/2009	12/14/2009
109049-060A	WB21-0	6.7	mg/Kg	60432	5.0	1	12/4/2009	12/14/2009
109049-061A	WB21-1	9.0	mg/Kg	60432	5.0	1	12/4/2009	12/14/2009
109049-062A	WB21-2	6.6	mg/Kg	60432	5.0	1	12/4/2009	12/14/2009
109049-063A	WB22-0	10	mg/Kg	60433	5.0	1	12/4/2009	12/14/2009
109049-064A	WB22-1	9.5	mg/Kg	60433	5.0	1	12/4/2009	12/14/2009
109049-065A	WB22-2	ND	mg/Kg	60433	5.0	1	12/4/2009	12/14/2009

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		

CLIENT: Geocon Consultants, Inc. **Lab Order:** 109049
Project: Plumas 70 Caribou Curve, S9300-06-108

Lab ID: 109049-021 **Collection Date:** 12/4/2009
Client Sample ID: PC1 **Matrix:** PAINT

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_091215A	QC Batch: 60465			PrepDate: 12/14/2009		Analyst: **CL**
Lead	72	1.0		mg/Kg	1	12/15/2009 10:57 AM

Lab ID: 109049-041 **Collection Date:** 12/4/2009
Client Sample ID: PC2 **Matrix:** PAINT

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_091215A	QC Batch: 60465			PrepDate: 12/14/2009		Analyst: **CL**
Lead	8.3	2.6		mg/Kg	1	12/15/2009 10:53 AM

Lab ID: 109049-066 **Collection Date:** 12/4/2009
Client Sample ID: PC3 **Matrix:** PAINT

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_091215A	QC Batch: 60465			PrepDate: 12/14/2009		Analyst: **CL**
Lead	12	2.0		mg/Kg	1	12/15/2009 10:19 AM

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

Results are wet unless otherwise specified

CLIENT: Geocon Consultants, Inc.
Work Order: 109049
Project: Plumas 70 Caribou Curve, S9300-06-108

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-60465**	SampType: **MBLK**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116041**
Client ID: **PBS**	Batch ID: **60465**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **12/15/2009**	SeqNo: **1841521**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.179	1.0									

Sample ID: **LCS-60465**	SampType: **LCS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116041**
Client ID: **LCSS**	Batch ID: **60465**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **12/15/2009**	SeqNo: **1841522**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	47.183	1.0	50.00	0.1787	94.0	80	120				

Sample ID: **109049-066ADUP**	SampType: **DUP**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116041**
Client ID: **PC3**	Batch ID: **60465**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **12/15/2009**	SeqNo: **1841526**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	49.269	2.0						11.51	124	20	R

Sample ID: **109049-066AMS**	SampType: **MS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116041**
Client ID: **PC3**	Batch ID: **60465**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **12/15/2009**	SeqNo: **1841527**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	223.684	2.0	250.0	11.51	84.9	33	120				

Sample ID: **109049-066AMSD**	SampType: **MSD**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116041**
Client ID: **PC3**	Batch ID: **60465**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **12/15/2009**	SeqNo: **1841528**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	216.916	2.0	250.0	11.51	82.2	33	120	223.7	3.07	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

CLIENT: Geocon Consultants, Inc.
Work Order: 109049
Project: Plumas 70 Caribou Curve, S9300-06-108

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-60430A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116024**
Client ID: **PBS**	Batch ID: **60430**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **12/14/2009**	SeqNo: **1841218**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.010	5.0									

Sample ID: **LCS-60430**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116024**
Client ID: **LCSS**	Batch ID: **60430**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **12/14/2009**	SeqNo: **1841219**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	282.800	5.0	250.0	1.010	113	80	120				

Sample ID: **109049-010ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116024**
Client ID: **EB4-0**	Batch ID: **60430**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **12/14/2009**	SeqNo: **1841230**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.746	5.0						7.284	0	20	

Sample ID: **109049-010AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116024**
Client ID: **EB4-0**	Batch ID: **60430**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **12/14/2009**	SeqNo: **1841231**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	228.772	5.0	250.0	7.284	88.6	33	120				

Sample ID: **MB-60430B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116024**
Client ID: **PBS**	Batch ID: **60430**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **12/14/2009**	SeqNo: **1841232**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

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

CLIENT: Geocon Consultants, Inc.
Work Order: 109049
Project: Plumas 70 Caribou Curve, S9300-06-108

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **109049-020ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116024**
Client ID: **WB7-2**	Batch ID: **60430**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **12/14/2009**	SeqNo: **1841243**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.197	5.0						0.7100	0	20	

Sample ID: **109049-020AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116024**
Client ID: **WB7-2**	Batch ID: **60430**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **12/14/2009**	SeqNo: **1841244**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	218.747	5.0	250.0	0.7100	87.2	33	120				

Sample ID: **109049-020AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116024**
Client ID: **WB7-2**	Batch ID: **60430**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **12/14/2009**	SeqNo: **1841245**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	234.068	5.0	250.0	0.7100	93.3	33	120	218.7	6.77	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

CLIENT: Geocon Consultants, Inc.
Work Order: 109049
Project: Plumas 70 Caribou Curve, S9300-06-108

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-60431A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116025**
Client ID: **PBS**	Batch ID: **60431**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **12/14/2009**	SeqNo: **1841246**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-60431**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116025**
Client ID: **LCSS**	Batch ID: **60431**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **12/14/2009**	SeqNo: **1841247**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	288.604	5.0	250.0	0	115	80	120				

Sample ID: **109049-031ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116025**
Client ID: **EB11-1**	Batch ID: **60431**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **12/14/2009**	SeqNo: **1841258**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.358	5.0						0.3712	0	20	

Sample ID: **109049-031AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116025**
Client ID: **EB11-1**	Batch ID: **60431**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **12/14/2009**	SeqNo: **1841259**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	206.756	5.0	250.0	0.3712	82.6	33	120				

Sample ID: **MB-60431B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116025**
Client ID: **PBS**	Batch ID: **60431**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **12/14/2009**	SeqNo: **1841260**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

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

CLIENT: Geocon Consultants, Inc.
Work Order: 109049
Project: Plumas 70 Caribou Curve, S9300-06-108

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **109049-042ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116025**
Client ID: **EB15-0**	Batch ID: **60431**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **12/14/2009**	SeqNo: **1841271**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	14.351	5.0						15.39	6.96	20	

Sample ID: **109049-042AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116025**
Client ID: **EB15-0**	Batch ID: **60431**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **12/14/2009**	SeqNo: **1841272**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	243.027	5.0	250.0	15.39	91.1	33	120				

Sample ID: **109049-042AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116025**
Client ID: **EB15-0**	Batch ID: **60431**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **12/14/2009**	SeqNo: **1841273**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	228.611	5.0	250.0	15.39	85.3	33	120	243.0	6.11	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

CLIENT: Geocon Consultants, Inc.
Work Order: 109049
Project: Plumas 70 Caribou Curve, S9300-06-108

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: MB-60432A	SampType: MBLK	TestCode: 6010_SPB	Units: mg/Kg	Prep Date: 12/14/2009	RunNo: 116026
Client ID: PBS	Batch ID: 60432	TestNo: EPA 6010B	EPA 3050M	Analysis Date: 12/14/2009	SeqNo: 1841276

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: LCS-60432	SampType: LCS	TestCode: 6010_SPB	Units: mg/Kg	Prep Date: 12/14/2009	RunNo: 116026
Client ID: LCSS	Batch ID: 60432	TestNo: EPA 6010B	EPA 3050M	Analysis Date: 12/14/2009	SeqNo: 1841277

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	288.148	5.0	250.0	0	115	80	120				

Sample ID: 109049-052ADUP	SampType: DUP	TestCode: 6010_SPB	Units: mg/Kg	Prep Date: 12/14/2009	RunNo: 116026
Client ID: WB18-1	Batch ID: 60432	TestNo: EPA 6010B	EPA 3050M	Analysis Date: 12/14/2009	SeqNo: 1841288

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.342	5.0						4.847	0	20	

Sample ID: 109049-052AMS	SampType: MS	TestCode: 6010_SPB	Units: mg/Kg	Prep Date: 12/14/2009	RunNo: 116026
Client ID: WB18-1	Batch ID: 60432	TestNo: EPA 6010B	EPA 3050M	Analysis Date: 12/14/2009	SeqNo: 1841289

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	231.768	5.0	250.0	4.847	90.8	33	120				

Sample ID: MB-60432B	SampType: MBLK	TestCode: 6010_SPB	Units: mg/Kg	Prep Date: 12/14/2009	RunNo: 116026
Client ID: PBS	Batch ID: 60432	TestNo: EPA 6010B	EPA 3050M	Analysis Date: 12/14/2009	SeqNo: 1841290

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

- B Analyte detected in the associated Method Blank
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- DO Surrogate Diluted Out
- E Value above quantitation range
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- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: Geocon Consultants, Inc.
Work Order: 109049
Project: Plumas 70 Caribou Curve, S9300-06-108

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: 109049-062ADUP	SampType: DUP	TestCode: 6010_SPB	Units: mg/Kg	Prep Date: 12/14/2009	RunNo: 116026
Client ID: WB21-2	Batch ID: 60432	TestNo: EPA 6010B	EPA 3050M	Analysis Date: 12/14/2009	SeqNo: 1841301

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.047	5.0						6.557	31.9	20	R

Sample ID: 109049-062AMS	SampType: MS	TestCode: 6010_SPB	Units: mg/Kg	Prep Date: 12/14/2009	RunNo: 116026
Client ID: WB21-2	Batch ID: 60432	TestNo: EPA 6010B	EPA 3050M	Analysis Date: 12/14/2009	SeqNo: 1841302

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	183.356	5.0	250.0	6.557	70.7	33	120				

Sample ID: 109049-062AMSD	SampType: MSD	TestCode: 6010_SPB	Units: mg/Kg	Prep Date: 12/14/2009	RunNo: 116026
Client ID: WB21-2	Batch ID: 60432	TestNo: EPA 6010B	EPA 3050M	Analysis Date: 12/14/2009	SeqNo: 1841303

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	222.566	5.0	250.0	6.557	86.4	33	120	183.4	19.3	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

Advanced Technology Laboratories
3275 Walnut Avenue, Signal Hill, CA 90755 Tel: 562. 989.4045 Fax: 562.989.4040

CLIENT: Geocon Consultants, Inc.
Work Order: 109049
Project: Plumas 70 Caribou Curve, S9300-06-108

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-60433A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116027**
Client ID: **PBS**	Batch ID: **60433**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **12/14/2009**	SeqNo: **1841305**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-60433**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116027**
Client ID: **LCSS**	Batch ID: **60433**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **12/14/2009**	SeqNo: **1841306**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	277.556	5.0	250.0	0	111	80	120				

Sample ID: **109049-065ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116027**
Client ID: **WB22-2**	Batch ID: **60433**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **12/14/2009**	SeqNo: **1841310**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.567	5.0						3.919	0	20	

Sample ID: **109049-065AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116027**
Client ID: **WB22-2**	Batch ID: **60433**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **12/14/2009**	SeqNo: **1841311**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	230.668	5.0	250.0	3.919	90.7	33	120				

Sample ID: **109049-065AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **12/14/2009**	RunNo: **116027**
Client ID: **WB22-2**	Batch ID: **60433**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **12/14/2009**	SeqNo: **1841312**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	202.300	5.0	250.0	3.919	79.4	33	120	230.7	13.1	20	

Qualifiers:

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- 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

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

FOR LABORATORY USE ONLY

P.O. #:
Logged By: _____ Date: 12/10/09

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FedEx ☐ Other: GSO

Sample Condition Upon Receipt
1. CHILLED 9.8 Y ☐ N ☑ 4. SEALED Y ☐ N ☑
2. HEADSPACE (VOA) NA Y ☐ N ☐ 5. # OF SPLS MATCH COC Y ☑ N ☐
3. CONTAINER INTACT Y ☑ N ☐ 6. PRESERVED Y ☐ N ☑

Client: GEOCON Consultants, Inc
Attention: Rebecca Silva
Address: 3160 Gold Valley Drive, Suite 800
City: Rancho Cordova State: CA Zip Code: 95742
Tel: 916.852.9118
Fax: 916.852.9132

Project Name: Plumas 70 Caribou Curve
Project #: S9300-06-108
Sampler: (Printed Name) Julio Esquivel (Signature)

Relinquished by: (Signature and Printed Name) Julio Esquivel	Date: 12/8/09	Time: 1630	Received by: (Signature and Printed Name) GSO	Date: 12/8/09	Time: 1630
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date: 12/9/09	Time: 10:16
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: Rebecca Silva
Print Name Date
Signature

Send Report To:
Attn:
Co: SAME AS ABOVE
Addr:
City: State: Zip:

Bill To:
Attn:
Co: SAME AS ABOVE
Addr:
City: State: Zip:

Special Instructions/Comments:
Caltrans billing per contract 03A1368
*5-day TAT
Please copy Kari Cook on the results and EDF reports and include an excel file. Thank you. (cook@geoconinc.com)

Sample/Records - Archival & Disposal
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Storage Fees (applies when storage is requested):
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Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC: RTNE ☐ CT ☑ SWRCB ☐ Logcode _____ OTHER _____

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample Description: Sample ID / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / 8020 (BTEX)	8015M (TPHd and TPHmo)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	Gasoline Package	TOTAL LEAD (6010B)	pH	SVOCs (8270C)	SOIL	WATER	GROUND WATER	WASTEWATER	CARBON	TAT	Container(s) #	Container(s) Type	REMARKS
	109049-01	EB1-0	12/4/2009	0925											X			X						5 day	Brass	
	-2	EB1-1		931																						
	-3	EB1-2		932																						
	-4	EB2-0		922																						
	-5	EB2-1		923																						
	-6	EB2-2		924																						
	-7	EB3-0		930																						
	-8	EB3-1		931																						
	-9	EB3-2		932																						
	-10	EB4-0		938																						

- TAT starts 8AM the following day if samples received after 3 PM

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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=$Na_2S_2O_3$

CHAIN OF CUSTODY RECORD

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FOR LABORATORY USE ONLY

P.O. #: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FedEx ☐ Other: _____

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 ☐

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Attention: Rebecca Silva
Address: 3160 Gold Valley Drive, Suite 800
City: Rancho Cordova State: CA Zip Code: 95742
Tel: 916.852.9118
Fax: 916.852.9132

Project Name: Plumas 70 Caribou Curve
Project #: S9300-06-108
Sampler: (Printed Name) Julio Esquivel (Signature)

	Date	Time		Date	Time
Relinquished by: (Signature and Printed Name) Julio Esquivel	12/8/09	1630	Received by: (Signature and Printed Name) GSO	12/8/09	1630
Relinquished by: (Signature and Printed Name)			Received by: (Signature and Printed Name)		
Relinquished by: (Signature and Printed Name)			Received by: (Signature and Printed Name)		

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: Rebecca Silva
Print Name Date
Signature

Send Report To:
Attn: _____
Co: SAME AS ABOVE
Addr: _____
City: State: Zip:

Bill To:
Attn: _____
Co: SAME AS ABOVE
Addr: _____
City: State: Zip:

Special Instructions/Comments:
Caltrans billing per contract 03A1368

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	109044-11	EB4-1	12/4/2009	939										X				X						5 day	1	bag
	12	~~EB5~~ EB5-0		~~945~~																						
	13	EB5-1		946																						
	14	EB5-2		947																						
	15	WB6-0		1012																						
	16	WB6-1		1013																						
	17	WB6-2		1014																						
	18	WB7-0		1024																						
	19	WB7-1		1025																						
	20	WB7-2		1026																						

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FOR LABORATORY USE ONLY

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Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FedEx ☐ Other: _____

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3. CONTAINER INTACT Y ☐ N ☐ 6. PRESERVED Y ☐ N ☐

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Tel: 916.852.9118
Attention: Rebecca Silva
City: Rancho Cordova State: CA Zip Code: 95742
Fax: 916.852.9132

Project Name: Plumas 70 Caribou Curve
Project #: S9300-06-108
Sampler: (Printed Name) Julio Esquivel (Signature)

Relinquished by: (Signature and Printed Name) Julio Esquivel — Date: 12/8/09 Time: 1630
Received by: (Signature and Printed Name) GSO — Date: 12/8/09 Time: 1630
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: Rebecca Silva
Print Name Date
Signature

Send Report To:
Attn: _____
Co: SAME AS ABOVE
Addr: _____
City: State: Zip:

Bill To:
Attn: _____
Co: SAME AS ABOVE
Addr: _____
City: State: Zip:

Special Instructions/Comments:
Caltrans billing per contract 03A1368

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	1004047 21	PC1	12/4/2009	1035											X			X	Paint				5day	1	bagge
	22	WB8-0		1038																					
	23	WB8-1		1039																					
	24	WB9-0		1046																					
	25	WB9-1		1047																					
	26	WB9-2		1048																					
	27	WB10-0		1053																					
	28	WB10-1		1054																					
	29	WB10-2		1055																					
	30	EB11-0		[illegible]																					

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Client: GEOCON Consultants, Inc
Address: 3160 Gold Valley Drive, Suite 800
Tel: 916.852.9118
Attention: Rebecca Silva
City: Rancho Cordova State: CA Zip Code: 95742
Fax: 916.852.9132

Project Name: Plumas 70 Caribou Curve
Project #: S9300-06-108
Sampler: (Printed Name) Julio Esquivel (Signature)

Relinquished by: (Signature and Printed Name) Julio Esquivel Date: 12/8/09 Time: 1630
Received by: (Signature and Printed Name) GSO Date: 12/8/09 Time: 1630

Relinquished by: (Signature and Printed Name) Date: Time:
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I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: Rebecca Silva
Print Name Date
Signature

Send Report To:
Attn: _____
Co: SAME AS ABOVE
Addr: _____
City: State: Zip:

Bill To:
Attn: _____
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Special Instructions/Comments:
Caltrans billing per contract 03A1368

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PRESERVATION

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	109047-31	EB11-1	12/4/2009	1129											X			X						5day	1	bottle
	32	EB11-2		1130																						
	33	EB12-0		1152																						
	34	EB12-1		1153																						
	35	EB12-2		1154																						
	36	EB13-0		1215																						
	37	EB13-1		1216																						
	38	EB14-0		1226																						
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Project Name: Plumas 70 Caribou Curve
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Relinquished by: (Signature and Printed Name) Julio Esquivel — Date: 12/8/09 Time: 1630
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I hereby authorize ATL to perform the work indicated below:
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Send Report To:
Attn:
Co: SAME AS ABOVE
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	1047 - 41	PC2	12/4/2009	1239										X					PAINT				5 day	1	baggie	
	42	EB15-0		1246														X								
	43	EB15-1		1247																						
	44	EB15-2		1248																						
	45	WB16-0		1300																						
	46	WB16-1		1301																						
	47	WB16-2		1302																						
	48	WB17-0		1315																						
	49	WB17-1		1316																						
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Project Name:	Project #:	Sampler: (Printed Name)	(Signature)
Plumas 70 Caribou Curve	S9300-06-108	Julio Esquivel	

Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
Julio Esquivel	12/8/09	1630	GSO	12/8/09	1630
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:

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Print Name Date
Signature

Send Report To:
Attn: _____
Co: SAME AS ABOVE
Addr: _____
City: State: Zip:

Bill To:
Attn: _____
Co: SAME AS ABOVE
Addr: _____
City: State: Zip:

Special Instructions/Comments:
Caltrans billing per contract 03A1368

Please copy Kari Cook on the results and EDF reports and include an excel file. Thank you. (cook@geoconinc.com)

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 /ATL workorder /mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC: RTNE ☐ CT ☑ SWRCB ☐ Logcode _____ OTHER _____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample ID / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / 8020 (BTEX)	8015M (TPHd and TPHmo)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	Gasoline Package	TOTAL LEAD (6010B)	pH	SVOCs (8270C)	SOIL	WATER	GROUND WATER	WASTEWATER	CARBON	TAT	Container(s) #	Container(s) Type	REMARKS
	1006047-01	WB18-0	12/4/2009	1328										X				X						5 day	1	Brass	
	02	WB18-1		1329																						
	03	WB18-2		1330																						
	04	WB19-0		1342																						
	05	WB19-1		1343																						
	06	WB19-2		1344																						
	07	WB20-0		1354																						
	08	WB20-1		1355																						
	09	WB20-2		1356																						
	10	WB21-0		1403																						

- TAT starts 8AM the following day if samples received after 3 PM

TAT: A = Overnight ≤ 24 hrs 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=$Na_2S_2O_3$

CHAIN OF CUSTODY RECORD

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

FOR LABORATORY USE ONLY

P.O. #: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FedEx ☐ Other: _____

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: GEOCON Consultants, Inc
Address: 3160 Gold Valley Drive, Suite 800
Tel: 916.852.9118
Attention: Rebecca Silva
City: Rancho Cordova State: CA Zip Code: 95742
Fax: 916.852.9132

Project Name: Plumas 70 Caribou Curve
Project #: S9300-06-108
Sampler: (Printed Name) Julio Esquivel (Signature)

Relinquished by: (Signature and Printed Name) Julio Esquivel — Date: 12/8/09 Time: 1630
Received by: (Signature and Printed Name) GSO — Date: 12/8/09 Time: 1630

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: Rebecca Silva
Print Name Date
Signature

Send Report To:
Attn:
Co: SAME AS ABOVE
Addr:
City: State: Zip:

Bill To:
Attn:
Co: SAME AS ABOVE
Addr:
City: State: Zip:

Special Instructions/Comments:
Caltrans billing per contract 03A1368

Please copy Kari Cook on the results and EDF reports and include an excel file. Thank you. (cook@geoconinc.com)

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 /ATL workorder /mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC: RTNE ☐ CT ☑ SWRCB ☐ Logcode _____ OTHER _____

ITEM	LAB USE ONLY Batch #: / Lab No.	Sample Description: Sample ID / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / 8020 (BTEX)	8015M (TPHd and TPHmo)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	Gasoline Package	TOTAL LEAD (6010B)	pH	SVOCs (8270C)	SOIL	WATER	GROUND WATER	WASTEWATER	CARBON	TAT	Container(s) #	Container(s) Type	REMARKS
	64047-64	WB21-1	12/4/2009	1434										X				X					5day	1	bress	
	-65	WB21-2		1425																						
	63	WB22-0		1425																						
	64	WB22-1		1426																						
	65	WB22-2		1427																						
	-66	AC3	✓	1430															HOLD							

- TAT starts 8AM the following day if samples received after 3 PM

TAT: A = Overnight ≤ 24 hrs; 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 $T=Na_2S_2O_3$

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: **Ian Stevenson**
Geocon Consultants
3160 Gold Valley Drive
Suite 800
Rancho Cordova, CA 95742

Fax: (916) 852-9132 Phone: (916) 852-9118
Project: **Plumas 70 / S9300-06-108**

Customer ID: GECN80
Customer PO: S9300-06-108
Received: 12/09/09 11:00 AM
EMSL Order: 090909842

EMSL Proj: S9300-06-**
Analysis Date: 12/13/2009

Test Report: PLM Analysis of Bulk Samples for Asbestos via EPA 600/R-93/116 Method with CARB 435 Prep (Milling) Level A for 0.25% Target Analytical Sensitivity

			Non-Asbestos		Asbestos
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type
S1-2 *090909842-0001*	12/4/09 0750 PM 8.90	Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
S2-2 *090909842-0002*	12/4/09 0800 PM 8.93	Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
S3-1 *090909842-0003*	12/4/09 0810 PM 8.96	Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
S4-2 *090909842-0004*	12/4/09 0820 PM 9.0	Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
S5-0 *090909842-0005*	12/4/09 0830 NOA Box east	Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**<0.25% Chrysotile**
S6-2 *090909842-0006*	12/4/09 0845 NOA Box west	Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
WB7-2 *090909842-0007*	12/4/09 1026	Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
WB8-1 *090909842-0008*	12/4/09 1039	Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
WB9-2 *090909842-0009*	12/4/09 1048	Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**

Analyst(s)
Grant Mays (22)

Baojia Ke, Laboratory Manager
or other approved signatory

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: **Ian Stevenson**
Geocon Consultants
3160 Gold Valley Drive
Suite 800
Rancho Cordova, CA 95742

Fax: (916) 852-9132 Phone: (916) 852-9118
Project: **Plumas 70 / S9300-06-108**

Customer ID: GECN80
Customer PO: S9300-06-108
Received: 12/09/09 11:00 AM
EMSL Order: 090909842

EMSL Proj: S9300-06-**
Analysis Date: 12/13/2009

Test Report: PLM Analysis of Bulk Samples for Asbestos via EPA 600/R-93/116 Method with CARB 435 Prep (Milling) Level A for 0.25% Target Analytical Sensitivity

			Non-Asbestos		Asbestos
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type
EB11-2 *090909842-0010*	12/4/09 1130	Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**<0.25% Chrysotile**
EB12-2 *090909842-0011*	12/4/09 1154	Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
S7-0 *090909842-0012*	12/4/09 1210	Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
S8-0 *090909842-0013*	12/4/09 1225	Brown Non-Fibrous Homogeneous		99.75% Non-fibrous (other)	**0.25% Chrysotile**
EB15-2 *090909842-0014*	12/14/09 1248	Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
S9-0 *090909842-0015*	PM-17.48 12/4/09 1300	Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
WB16-2 *090909842-0016*	12/4/09 1302	Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
WB17-2 *090909842-0017*	12/4/09 1317	Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
WB18-2 *090909842-0018*	12/4/09 1330	Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**

Analyst(s)
Grant Mays (22)

Baojia Ke, Laboratory Manager
or other approved signatory

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: **Ian Stevenson**
Geocon Consultants
3160 Gold Valley Drive
Suite 800
Rancho Cordova, CA 95742

Fax: (916) 852-9132 Phone: (916) 852-9118
Project: **Plumas 70 / S9300-06-108**

Customer ID: GECN80
Customer PO: S9300-06-108
Received: 12/09/09 11:00 AM
EMSL Order: 090909842

EMSL Proj: S9300-06-**
Analysis Date: 12/13/2009

Test Report: PLM Analysis of Bulk Samples for Asbestos via EPA 600/R-93/116 Method with CARB 435 Prep (Milling) Level A for 0.25% Target Analytical Sensitivity

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
S10-0 *090909842-0019*	12/4/09 1338	Brown Non-Fibrous Homogeneous		97.50% Non-fibrous (other)	**2.50% Chrysotile**
S11-0 *090909842-0020*	12/4/09 1435	Brown Non-Fibrous Homogeneous		98.50% Non-fibrous (other)	**1.50% Chrysotile**
S12-0 *090909842-0021*	12/14/09 1440	Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**<0.25% Chrysotile**
EB14-2 *090909842-0022*	12/14/09 1230	Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**

Analyst(s)
Grant Mays (22)

Baojia Ke, Laboratory Manager
or other approved signatory

THIS IS THE LAST PAGE OF THE REPORT.

EMSL Analytical, Inc.

2235 Polvorosa Drive, Suite 230, San Leandro, CA 94577 • (510) 895-3675 • sanleandrolab@emsl.com

EMSL ANALYTICAL, INC.

Client:	Geocon Consultants 3160 Gold Valley Drive Suite 800 Rancho Cordova, CA 95742	**EMSL Reference:**	**090909842**
Attention:	Ian Stevenson	**Date Received:**	12/09/09
Fax:	(916) 852-9132 Phone: (916) 852-9118	**Date Analyzed:**	12/21/09
Project:	Plumas 70 / S9300-06-108	**Date Reported**	12/21/09

Asbestos Analysis of Soil Samples via Modified EPA 600/R-93/116 Method Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with CARB 435 Prep (Milling) Level C for 0.01% Target Analytical Sensitivity

Client Sample ID	*EMSL Sample ID*	*Asbestos Type(s)*	*# of Asbestos Structures Detected*	*Analytical Sensitivity %*	*Asbestos Weight %*	*Comments*
S5-0	090909842-0005	Chrysotile	3	0.01	0.02	
EB11-2	090909842-0010	Chrysotile Anthophyllite Tremolite	21 14 16	0.01	1.05	1.05 is a total asbestos weight %
S8-0	090909842-0013	Chrysotile	61	0.01	0.41	
S12-0	090909842-0021	None Detected	None Detected	0.01	<0.01	

Analysts
Ken Dunbar
Rui Cindy Geng

Approved EMSL Signatory

EMSL maintains liability limited to cost of analysis. This method requires the laboratory to analyze the sample until the first fiber found compromises 5% of the total mass. Due to the size and mass of different asbestos fibers, the analytical sensitivity will vary between samples and may prevent the laboratory from achieving the target sensitivity on all samples. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL is not responsible for sample collection activities or analytical method limitations. Interpretation and use of results are the responsibility of the client.

090909842

Chain of Custody

Asbestos Lab Services

EMSL Analytical, Inc.
Suite 230
2235 Polvorosa Ave
San Leandro,
CA 94577
Phone: (510) 895-3675 (888) 455-3675
Fax: (510) 895-3680
http://www.emsl.com

Please print all information legibly.

Company:	Geocon Consultants Inc.	***Bill To:***	Geocon Consultants Inc.
Address1:	3160 Gold Valley Drive	*Address1:*	3160 Gold Valley Drive
Address2:	Suite 800	*Address2:*	Suite 800
City, State:	Rancho Cordova, CA	*City, State:*	Rancho Cordova, CA
Zip/Post Code:	95742	*Zip/Post Code:*	95742
Country:		*Country:*	
Contact Name:	Ian Stevenson	***Attn:***	Ian Stevenson
Phone:	916-852-9118	*Phone:*	916-852-9118
Fax:	916-852-9132	*Fax:*	916-852-9132
Email:	stevenson@geoconinc.com	*Email:*	stevenson@geoconinc.com
EMSL Rep:		***P.O. Number:***	
Project Name/Number:	Plumas 70 / 5300 CC -108		

MATRIX			TURNAROUND			
☐ Air	☒ Soil	☐ Micro-Vac	☐ 3 Hours	☐ 6 Hours	☐ Same Day or 12 Hours*	☐ 24 Hours (1 day)
☐ Bulk	☐ Drinking Water		☐ 48 Hours (2 days)	☐ 72 Hours (3 days)	☐ 96 Hours (4 days)	☒ 120 Hours (5 days)
☐ Wipe	☐ Wastewater		☐ 144+ hours (6-10 days)			

TEM AIR, 3 hours, 6 hours, Please call ahead to schedule. There is a premium charge for 3-hour tat, please call 1-800-220-3675 for price prior to sending samples. You will be asked to sign an authorization form for this service.

***12 hours (must arrive by 11:00a.m. Mon -Fri.), Please Refer to Price Quote**

PCM - Air
- ☐ NIOSH 7400(A) Issue 2: August 1994
- ☐ OSHA w/TWA
- ☐ Other:

PLM - Bulk
- ☐ EPA 600/R-93/116
- ☐ EPA Point Count
- ☐ NY Stratified Point Count
- ☐ PLM NOB (Gravimetric) NYS 198.1
- ☐ NIOSH 9002:
- ☐ EMSL Standard Addition:

SEM Air or Bulk
- ☐ Qualitative
- ☐ Quantitative

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

TEM BULK
- ☐ Drop Mount (Qualitative)
- ☐ Chatfield SOP - 1988-02
- ☐ TEM NOB (Gravimetric) NYS 198.4
- ☐ EMSL Standard Addition:

PLM Soil
- ☐ EPA Protocol Qualitative
- ☐ EPA Protocol Quantitative
- ☐ EMSL MSD 9000 Method fibers/gram

TEM WATER
- ☐ EPA 100.1
- ☐ EPA 100.2
- ☐ NYS 198.2

TEM Microvac/Wipe
- ☐ ASTM D 5755-95 (quantative method)
- ☐ Wipe Qualitative

XRD
- ☐ Asbestos
- ☐ Silica NIOSH 7500

OTHER
- ☒ CARB 435

See page 2 for level

Received at EMSL Analytical, Inc.
San Leandro, CA (888) 455-3675
By
Date

090909842

Chain of Custody

Asbestos Lab Services

EMSL Analytical, Inc.
Suite 230
2235 Polvorosa Ave
San Leandro,
CA 94577
Phone: (510) 895-3675 (888) 455-3675
Fax: (510) 895-3680
http://www.emsl.com

Please print all information legibly.

Client Sample # (s) S1-2 - EB14-2 **Total Samples #:** 22

Relinquished: [illegible] **Date:** 12/8/09 **Time:** 0916

Received: GSO UPS **Date:** 12/8/09 **Time:** 1630

Relinquished: _____ **Date:** _____ **Time:** ~~1100~~

Received: Alancraig **Date:** 12/9/09 **Time:** 0945 UPS

Level A

SAMPLE NUMBER	SAMPLE DESCRIPTION/LOCATION	VOLUME (if applicable)
S1-2	12/4/09 0750 PM 5.90	
S2-2	12/4/09 0800 PM 5.78	
S3-1	12/4/09 0810 PM 5.96	
S4-2	12/4/09 0820 PM 9.0	
S5-0	12/4/09 0830 NO4 Box East	
S6-2	12/4/09 0815 NO4 Box West	
WB7-2	12/4/09 1026	
WB8-1	12/4/09 1039	
WB9-2	12/4/09 1048	
EB11-2	12/4/09 1130	
EB12-2	12/4/09 1154	
S7-0	12/4/09 1210	
S8-0	12/4/09 1225	
EB15-2	12/14/09 1244	

090909842

Chain of Custody

Asbestos Lab Services

EMSL Analytical, Inc.
Suite 230
2235 Polvorosa Ave
San Leandro,
CA 94577
Phone: (510) 895-3675 (888) 455-3675
Fax: (510) 895-3680
http://www.emsl.com

Please print all information legibly.

Client Sample # (s)_____ - _____ Total Samples #:_____

Relinquished:_____ Date:_____ Time:_____

Received: A Lanzarotta Date: 11/9/09 Time: 1100 PS

Relinquished:_____ Date:_____ Time:_____

Received:_____ Date:_____ Time:_____

Level A

SAMPLE NUMBER	SAMPLE DESCRIPTION/LOCATION	VOLUME (if applicable)
59-0	PM-17.48 12/4/09 1300	
WB16-2	12/4/09 1302	
WB17-2	12/4/09 1317	
WB18-2	12/4/09 1330	
510-0	12/4/09 1338	
511-0	12/4/09 1435	
512-0	12/14/09 1440	
EB14-2	12/14/09 1230	

APPENDIX B

DESCRIPTION OF DATA SET

Project Name:	Highway 70 Post Mile 8.9 to 9.2
Project No.:	S9300-06-108
Sample Interval:	0.0 to 1.0 ft

DATA SET STATISTICS

Number of Valid Samples	10
Number of Distinct Samples	6
Minimum	2.5
Maximum	32
Mean	10.88
Median	4.9
Standard Deviation	11.68948245
Variance	136.644
Coefficient of Variation	1.074400961
Skewness	1.197896989
Mean of log data	1.852385763
Standard Deviation of log data	1.085140622
90% Non-parametric UCLs	
Standard Bootstrap UCL	15.36434984
95% Non-parametric UCLs	
Standard Bootstrap UCL	16.66217967

DESCRIPTION OF DATA SET

Project Name:	Highway 70 Post Mile 8.9 to 9.2
Project No.:	S9300-06-108
Sample Interval:	1.0 to 2.0 ft

DATA SET STATISTICS

Number of Valid Samples	10
Number of Distinct Samples	5
Minimum	2.5
Maximum	14
Mean	6.25
Median	2.5
Standard Deviation	5.034602
Variance	25.347222
Coefficient of Variation	0.805536
Skewness	0.716276
Mean of log data	1.532672
Standard Deviation of log data	0.805876
90% Non-parametric UCLs	
Standard Bootstrap UCL	8.180985594
95% Non-parametric UCLs	
Standard Bootstrap UCL	8.745960762

DESCRIPTION OF DATA SET

Project Name:	Highway 70 Post Mile 8.9 to 9.2
Project No.:	S9300-06-108
Sample Interval:	2.0 to 3.0 ft

DATA SET STATISTICS

Number of Valid Samples	8
Number of Distinct Samples	2
Minimum	2.5
Maximum	13
Mean	3.8125
Median	2.5
Standard Deviation	3.712311
Variance	13.781250
Coefficient of Variation	0.973721
Skewness	2.828427
Mean of log data	1.122373
Standard Deviation of log data	0.582889
90% Non-parametric UCLs	
Standard Bootstrap UCL	5.399944185
95% Non-parametric UCLs	
Standard Bootstrap UCL	5.798669208

DESCRIPTION OF DATA SET

Project Name:	Highway 70 Post Mile 17.1 to 17.5
Project No.:	S9300-06-108
Sample Interval:	0.0 to 1.0 ft

DATA SET STATISTICS

Number of Valid Samples	12
Number of Distinct Samples	12
Minimum	2.5
Maximum	49
Mean	17.35833333
Median	12.5
Standard Deviation	13.94081375
Variance	194.3462879
Coefficient of Variation	0.803119371
Skewness	1.446421922
Mean of log data	2.577308673
Standard Deviation of log data	0.797838685
90% Non-parametric UCLs	
Standard Bootstrap UCL	22.31883298
95% Non-parametric UCLs	
Standard Bootstrap UCL	23.76970162

DESCRIPTION OF DATA SET

Project Name:	Highway 70 Post Mile 17.1 to 17.5
Project No.:	S9300-06-108
Sample Interval:	1.0 to 2.0 ft

DATA SET STATISTICS

Number of Valid Samples	11
Number of Distinct Samples	9
Minimum	2.5
Maximum	61
Mean	15.35454545
Median	9
Standard Deviation	17.052939
Variance	290.802727
Coefficient of Variation	1.110612
Skewness	2.238239
Mean of log data	2.295759
Standard Deviation of log data	0.961507
90% Non-parametric UCLs	
Standard Bootstrap UCL	21.83464717
95% Non-parametric UCLs	
Standard Bootstrap UCL	23.4763648

DESCRIPTION OF DATA SET

Project Name:	Highway 70 Post Mile 17.1 to 17.5
Project No.:	S9300-06-108
Sample Interval:	2.0 to 3.0 ft

DATA SET STATISTICS

Number of Valid Samples	12
Number of Distinct Samples	8
Minimum	2.5
Maximum	18
Mean	6.75
Median	6.45
Standard Deviation	4.506460
Variance	20.308182
Coefficient of Variation	0.667624
Skewness	1.395080
Mean of log data	1.712258
Standard Deviation of log data	0.664786
90% Non-parametric UCLs	
Standard Bootstrap UCL	8.309203494
95% Non-parametric UCLs	
Standard Bootstrap UCL	8.800490083

M e m o r a n d u m

Flex your power!
Be energy efficient!

To: MR. AL TRUJILLO
District 2 Safety Team Project Engineer

Attn: Mr. Justin Borders
Transportation Engineer

Date: June 22, 2010

File: 02-PLU-70 PM 17.2/17.5
EA 02-2E0001
Caribou Curves Safety Project

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

Subject: Geotechnical Design Report

1. Introduction

Per your request, we are providing a geotechnical design report for the Caribou Curves Safety Project on State Highway 70 from PM 17.2 to 17.5 in Plumas County, California. Specific geotechnical aspects of this project that are addressed in this report include assessment and recommendations for slope cuts, slope stability, rockfall, rockfall catchment, rockfall attenuation system design, earthwork and excavation characteristics, and gabion wall recommendations. Plate 1 presents a vicinity map showing the location of the project. Plate 2 presents an aerial view of the project site with the locations of natural and man-made features, proposed slope cuts, and the proposed gabion wall indicated.

2. Description of Project Alternatives and Existing Facilities

At the time of our investigation Highway 70 in the project area consisted of a 2-lane roadway with two pullouts (one for the westbound lane near the east end of the project, and another for the eastbound lane at the west end of the project), no paved shoulders, and unpaved catchment ditches varying in width from 0 to 12 feet (ft) sloping away from the road at slope ratios between 4:1 and 6:1 (H:V). The project safety objectives include the creation of paved shoulders up to 8 ft in width, the creation of larger and continuous clear recovery zones (that include unpaved rock catchment slopes), and the substantial enlargement of the radius of the tight turn central to the project. The attainment of these safety objectives faces several geotechnical obstacles consisting primarily of steep rock slopes of varying rock quality that are capped with varying thicknesses of colluvium

bordering the westbound side of the highway, and moderately steep fill slopes bordering the eastbound side of the highway that, in the area of the tight turn, toe out near the outer bend of the Feather River, leaving little to no room for fill expansion. Proposed geotechnical solutions to these obstacles include substantial cut slopes in rock with slope ratios ranging from 0.05:1 to 0.5:1, cut slopes in colluvium with slope ratios of 1:1, gabion walls with buried heights up to 12 ft, 12-foot wide unpaved rock catchment at the base of cut slopes, and a rockfall attenuator system designed to stop, and drop into catchment, rock that presently rolls/bounces down an established rock chute.

The alignment and geotechnical solutions addressed in this report are the result of several iterations between the District 2 Safety Design Team and Mr. Scott Lewis with the Office of Geotechnical Design North (OGDN). The goal of this iterative process was to find a new alignment that addressed the present roadway safety shortcomings with economically (i.e., within the project budget) and geotechnically feasible solutions, while minimizing geological and geotechnical risks any such solutions might pose to construction, maintenance, and the overall long-term success of the project. The resultant alignment and the geotechnical recommendations presented in this report are not without risks, most notably risks that might possibly manifest themselves in syn- and post-construction slope sloughing or failure. While rockfall is expected to increase as a result of cuts proposed within this report, adequate catchment and a rockfall attenuator system has been put into the design to satisfactorily mitigate this expected increase.

3. Pertinent Reports and Investigations

This report includes a review of Caltrans, state, federal, and private publications. A search on the Caltrans intranet Document Retrieval System (DRS) site and the Bridge Inspection Records Information System (BIRIS) site yielded no As-Built or LOTB information pertinent to this project.

Caltrans literature reviewed pertaining to seismic issues includes *the California Seismic Hazard Map with technical report* (Mualchin, 1996), *Peak Acceleration from Maximum Credible Earthquakes in California* (Mualchin and Jones, 1992), *Caltrans Fault Database* (Merriam, 2009), and the internal Caltrans website for calculating acceleration response spectra (ARS) curves at http://10.160.173.178/shake2/shake_index2.php.

Geologic literature reviewed include the *Fault Activity Map of California and Adjacent Areas* (Jennings, 1994), the *Geologic Map of the Chico Quadrangle, California* (Saucedo and Wagner, 1992), the *Map Showing Recency of Faulting, Chico Quadrangle, California* (Saucedo, 1992), the *Geologic History of the Feather River Country, California* (Durrell, 1988), the *Stratigraphy, Structure, Petrology, and Regional Correlations of Metamorphosed Upper Paleozoic Volcanic Rocks in Portions of Plumas,*

Sierra, and Nevada Counties, California (D'Allura, 1977), and *Geology of the Pulga and Bucks Lake Quadrangles, Butte and Plumas Counties, California* (Hiatenan, 1973).

Soil information was obtained from the NRCS's (Natural Resources Conservation Service) website at http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

4. Physical Setting

The physical setting of the project and the surrounding area was reviewed to provide information on climate, topography, drainage, and man-made and natural features that might aid in design and construction. The project is located in the Feather River Canyon along the north side of the river on State Highway 70 at an elevation ranging from about 2300 ft (bottom of present fills) to about 2475 ft (top of cuts) above mean sea level.

The following is a discussion of the above review:

4.1. Climate

Climate information was obtained from the Western Regional Climate Data Center (http://www.wrcc.dri.edu/). Because there are no available recording stations in the immediate proximity of the project three recording stations (Caribou Powerhouse, Bucks Creek Powerhouse, and Greenville Ranger Station) were used in combination in an effort to produce the best estimate of actual weather conditions at the project location. The average annual precipitation at the site is estimated to be 40 inches (in.) with the vast majority of the precipitation occurring between late October and mid-April and the snowfall occurring primarily between December and February. The average annual maximum temperature is estimated to be 66 degrees (F) with the hottest month being July with an average temperature estimate of 89 degrees. The average annual minimum temperature is estimated to be 32 degrees with December demonstrating the coldest monthly minimum estimate of 21 degrees.

4.2. Topography

The present highway climbs gradually but steadily through the project from about 2360 ft above sea level at the project's western end to about 2462 ft at its eastern end. The roadway is notched into the south-facing slope of the Feather River Canyon. Above the road the slopes are moderate to steep throughout the project, with the exception of a roughly 350-foot long area near the eastern end of the project where the slopes recess into a flat disposal area. Below the road, the slopes are mostly fill, with slope ratios being at least 1.5:1. These slopes toe in at or near the river at the western and middle portion of the project, while they toe in to a

small floodplain above the river in the eastern end of the project. Plate 3 shows a topographic map of the project area and the nearby vicinity.

4.3. Man-made and Natural Features of Engineering and Construction Significance

Man-made features that may potentially have an impact on the project, or be impacted by the project, include drainage inlets and culverts, a private driveway, a private residence between the highway and the river, and an existing power line running basically east-west along the northern edge of the of the project area. The close proximity of the Feather River, particularly in the vicinity of the tight turn central to this project, may also impact this project, as it will prevent the horizontal enlargement of the fill in this area

4.4. Regional Geology and Seismicity

The project area is located within the Sierra Nevada Geologic Province. The Sierra Nevada is a block of the earth's crust about 400 miles long and about 90 miles wide that has been uplifted and tilted westward along a major fault system that marks its eastern limit (Durrell, 1988). This block is made up of 3 distinctly different groups of rocks. The oldest of these are sedimentary and volcanic rocks that were deposited on the ocean floor from the Late Ordovician Period (about 450 million years ago) to the close of the Jurassic Period (about 145 million years ago) and then later metamorphosed and deformed to varying degrees while being accreted to the continent where they can now be seen in their present position along the western edge of the province. These rocks are widely exposed along State Route 70 in the Feather River Canyon. The second group of rocks of this province are the massive granitic rocks that cooled and crystallized at some depth below the earth's surface from the Late Jurassic Period (about 135 million years ago) to the end of the Cretaceous Period (about 65 million years ago) before rising into their present position at the surface. These rocks are also heavily exposed along State Route 70 in the Feather River Canyon. The third group of rocks in this province is composed of the more recent sedimentary rocks derived from the first group and the volcanic rocks derived from the tops of the magma chambers that formed the second group. These rocks are scattered about in smaller pockets throughout the province and can also be observed along State Route 70 in the Feather River Canyon.

Within the general region of the project area the geology consists of rocks from all three rock groups. The oldest group is represented by metasedimentary and metavolcanic rocks of both the Calveras and Franklin Formations of Late Paleozoic age (400 to 260 million years ago). Also included with this oldest group is a slice of

accreted oceanic plate, ultramafic peridotite, which has been altered in places to serpentinite. The second group of rocks is represented by the granitic rocks of the Bucks Lake Pluton of Jurassic and Cretaceous age (205 to 65 million years ago). The third group of rocks is represented by glacial debris, lake deposits, and fluvial/alluvial gravel deposits, all of Quaternary (2 million years and younger) to Holocene (12,000 years to recent) age.

In the general region of the project area the older rocks have been highly folded. Foliation dips are steep to vertical. Bedding dips vary depending upon their location relative to the Bucks Lake Granitic Pluton to the southwest. The granitic pluton basically shoved these older rocks aside and uplifted them as it rose, leaving these beds striking more or less parallel to the local pluton boundary and the dips either away or towards the pluton.

We reviewed the Caltrans California Seismic Hazard Map (Mualchin, 1996; revisions, 2007) its accompanying technical report, the Caltrans Fault Database (Merriam, 2009), and the Caltrans online Seismic ARS (Acceleration Response Spectra) website. The nearest faults are the northern tips of the Rich Bar Fault and the Melones Fault, both of which were previously considered active but, as of 2007, are no longer considered to be. The nearest active fault, based on the most recent Caltrans 2007 database, is the Butt Creek Fault, a right-lateral strike-slip fault with a maximum credible earthquake (MCE) magnitude of 6.8.

4.5. Asbestos

Geologic units mapped (Hiatenan, 1973) in the project area are metachert and phyllite, units not known to harbor naturally occurring asbestos (NOA) deposits. According to the map contained within the report referenced by the State of California Air Resources Board (California Dept of Conservation, 2000), the project site is not mapped as an area likely to contain naturally occurring asbestos.

Two areas within the project location were observed to contain serpentine rock that was placed there by maintenance forces and construction forces (during construction of the present highway). The disposal area north of the road near the eastern end of the project has been a repository for slide material for many years and was observed to hold significant amounts of serpentine rock. The fills below the roadway in the middle and western end of the project also were observed to contain serpentine rock. These deposits may contain asbestos. These areas are roughly delineated on the aerial photo shown on Plate 2.

5. Exploration

5.1 Drilling and Sampling

No drilling was performed for this report due to a need to keep project support costs down (the risks of this were explained to design and management) and the near complete revamping of the project alignment relatively late in the project schedule, a change that prevented any drilling in the cut slopes due to the lack of time needed for obtaining permits and environmental clearance.

Soil was excavated with a geologists shovel in the area of a proposed gabion wall to submit to the lab for corrosion testing. Soil was excavated with a geologist's shovel in several other locations for on-site examination and field identification of the soil.

5.2. Geologic Mapping

A geologic map of the project area and neighboring terrain taken from Hiatenan (1973) is shown in Plate 4. Geologic mapping for the project was performed using Hiatenan's map and a Caltrans aerial DHIPP photo as base maps. This mapping consisted primarily of reconnaissance along the road, atop the present cut slopes, further up hill from these slopes, and across the present embankment fills below the roadway. Objectives of the mapping effort included verification of the geologic map, rock type and mineral identification, collection of structural data (strike and dip of bedding, joints, foliations, fractures, folds, and fold axial planes; joint spacing, roughness, infilling, & frequency), and rock quality information (apparent hardness, induration, fracture density, weathering).

Information regarding rockfall was also collected, including indicators of frequency, presence of rockfall chutes, maximum rock diameter, maximum rolling distance, steepest rolling slope ratio, and size and effectiveness of present rockfall catchment.

Soil descriptions were estimated in the field for soils present, including the colluvium. Erosional susceptibility was evaluated.

Information regarding both surface and ground water was sought during the reconnaissance, as well as the presence/non-presence of potential seeps.

5.3. Geophysical Studies

Two seismic refraction lines, located by OGDN, were shot in the areas of proposed slope cuts by the Caltrans Geology and Geophysics Group. The field data was

processed and arrival times picked by this Group using Viewseis, a commercially available computer program. Travel time curves were interpreted by this Group using the Generalized Reciprocal Method of Refraction Interpretation. The resultant time-distance, velocity-distance, and velocity-depth models produced for each of these lines are shown in Plates 5 (seismic line 1) and 6 (seismic line 2). These plates were taken from the report issued by the Group (Caltrans, December 30, 2009).

The locations of these lines are shown on Plate 2. Seismic Line 1 is located with 0.0 situated at about station 128+75 and line position 225 ft situated at about station 126+50. Seismic line 2 is located with line position 0.0 ft situated at station 122+75 and line position 290 ft situated at about 119+85.

6. Geotechnical Testing

A single soil sample was submitted to the D02 materials lab for corrosion testing. No other geotechnical testing was performed for this report.

7. Geotechnical Conditions

7.1 Site Geology

7.1.1 Lithology

There are primarily two rock units and colluvial overburden in the project area. The first rock unit is a very thickly-bedded to mostly massive metachert (quartzite) that varies from hard to extremely hard, and varies from slightly weathered to fresh. It is observed at the very western end of the project from about station 115+10 (at the road) to the western end of the project and beyond, where it forms vertical to near-vertical cut slopes over 100 ft high.

The second rock unit is a muscovite-biotite (according to Hiatenan, 1973) phyllite, which is variously exposed upslope of the roadway. The exposures begin at its contact with the metachert at about station 115+10 and continue, with some hiatuses of soil, to the eastern end of the project. The largest break in the exposures is the disposal area from about station 123+00 to station 126+50. The mineralogy is fine-grained and not discernible by hand lens, so Hiatenan's mineralogical description could not be verified.

The phyllite varies from very thinly-bedded to massive.

The phyllite grades from highly weathered to moderately weathered to fresh. Weathering at the surface where the slope is uncut varies from high to moderate to slight. At scattered locations between stations 120+00 and 123+00 it is obscured by a sandy clay with gravel. This material appears to be highly weathered colluvial material derived from the phyllite. Weathering at the surface, where the slope was cut for the present roadway, varies from slight to fresh near the roadway. Further upslope, about midway to the top of the proposed cuts, the rock appears to be moderately weathered, where exposed. Unexposed phyllite deeper inside the slope (in the general vicinity of the proposed new cut slope surfaces) is thought to be fresh and hard at the road level. This fresh hard rock quality continues above the road level to a height that varies between about 25 and 40 ft, depending upon the station. This rock then appears to transition into mostly moderately weathered phyllite or colluvium derived from highly weathered phyllite.

The phyllite varies from slightly to intensely silicified, with the rocks in the western portion of the project appearing to be generally more silicified than those to the east. The presence and distribution of this silicification is likely best explained by the phyllite's relative structural-stratigraphic juxtaposition to the metachert during regional metamorphism. This silicification interpretation is based on a combination of hand lens observations of the infillings of the discontinuities, rock hammer blows, and seismic refraction results.

The overburden atop the phyllite consists of colluvium and organic soil derived from the phyllite. It is considered to be fairly recent in origin and not very well consolidated. This colluvium generally varies from a gravel with silty sand to a gravel with sandy clay. In the area of the proposed slope cuts, the overburden colluvium appears to vary between about 2 and 8 ft in thickness, with the average thickness probably lying somewhere around 5 ft.

The colluvium that comprises the slope behind the disposal site between stations 123+00 and 126+50 is mostly a silty sand with gravel that is moderately consolidated and is interpreted to be of a different origin than the colluvium atop the proposed slope cuts.

7.1.2 Structure

Both lithological units display some structure and relict stratigraphy, though, in the metachert, structural features are scarce and stratigraphic features almost entirely erased by metamorphism.

In contrast to the metachert, the phyllite demonstrates scattered to local relict bedding, periodic and localized foliation, localized fractures, and local smaller scale folding (warping) within the project area. Large-scale folds occur rhythmically in the region (Hiatenan, 1973), but are not observed in the phyllite within the scale of the project area. Foliations from these large-scale folds, however, are common. According to Hiatenan's (1973) map these foliations are roughly vertical to steeply dipping with strikes between 319° and 328°. Mapping by OGDN found the foliations to be similarly vertical to steeply dipping, but with a significantly wider range of strike orientations than Hiatenan's, with azimuths varying between 287° and 330°. While Hiatenan's foliation orientations align tightly with the known structural grain of the Nevadan Orogeny, a tectonic event that is well-documented as having left its imprint in the ancient Sierran rocks during mid-Jurassic time (about 170 million years ago), the field measurements taken by OGDN may be the result of localized forces (and consequent folding and foliation) induced by the rising emplacement of the nearby Buck's Lake Pluton. It is also possible that these planar features are actually tight fractures, not foliations as interpreted by Mr. Lewis of OGDN, that have been created by the intersection of foliations and relict bedding, or some other cause. Their true structural nature, however, is fairly irrelevant to the kinematic analysis and stability of the slope, while their presence and orientation as structural discontinuities, which has been recorded by OGDN, is completely relevant. These 'foliation' discontinuities are observed typically in clusters, and are spaced from one-quarter in. to roughly one foot apart within these groupings. No infilling is observed within these discontinuities. They are almost always closed, with the exception of a few locations where they have widths up to one half in. It is believed that these openings are strictly the result of being exposed at a cut surface where localized movement and unloading can and has occurred. These discontinuities generally have slightly rough surfaces, while second-order asperities (larger scale) are mildly undulating to planar.

Relict bedding is locally fairly distinct where observed. Dips measured on the bedding within the project area demonstrated various orientations from 50° in a general southwest direction to vertical to 80˚ in a general northeast direction. Strike azimuths varied from about 285° to 338°. Bedding discontinuities are almost always tight. As mentioned in section 7.1.1 above, bedding spacing (thickness) varies from thinly bedded to massive.

Due to the presence of significant foliation and relict bedding discontinuities, both of which strike within the azimuth range of 285° to 338°, the structure, texture, strength, and seismic velocity characteristics of the phyllite are likely significantly anisotropic. Additional discussion of phyllite structure is presented in the section

below (7.2) as it pertains to slope stability.

7.1.3 Seismic Structure

The seismic structure of the phyllite is assumed to be substantially anisotropic due to the structural discontinuities. The two seismic lines discussed in section 5.3 were shot in the phyllite at an orientation roughly perpendicular to the general strike of the structural discontinuities, resulting in compressional (p-wave) velocity measurements thought to represent the minimum, or at least the near minimum velocities for the material. This was intentional since the minimum, or near minimum, velocities are desired for rippability and general rock strength assessment.

The upper portion of the phyllite beneath the seismic lines, which varies by station in thickness from about 10 to 24 ft, has an average observed compressional wave (p-wave) velocity of about 3000 ft/second (ft/s) in its anisotropically slow direction. This velocity is atypically slow for phyllite, but is best (though not perfectly) explained as a combination of weathering and anisotropy. This upper phyllite portion is believed to have a moderately higher average seismic velocity parallel to the strike of the structure (which is generally perpendicular to the slopes), but seismic data to prove such an hypothesis was not obtained in this direction due to steepness, rough topography, conditions requiring traffic control (that run up support costs and create additional logistical problems), and time limitations. The possibility also exists that this low velocity material is not composed of phyllite in some locations, but rather is made up of clay deposits, a scenario that is further discussed in section 8.1.1 below on cut slopes.

Below this slower material the phyllite is harder and apparently (not observed by touch or sight; sampled only by refracted seismic waves) less weathered. This material continues downward to below the road grade. Seismic velocities of this lower phyllite portion are about 8500 ft/s west of the disposal site and about 5500 ft/s east of the disposal site. Again, these velocities are considered to be generally minimal values due to the structurally based anisotropy of the rocks. The distinct velocity difference between the western and eastern slopes is thought to result primarily from the difference in the amount of silicification of the rocks.

7.2 Slope Stability

Present soil slopes are considered only moderately stable within the project area. A portion of the soil overburden upslope of the road roughly between stations 116+00 and 116+70 has slid in the past and been removed. The remaining soil column

further upslope, which has a slope ratio at or slightly steeper than 1:1, are considered to be sitting in place with a factor of safety estimated to be near unity. The cause of the instability is the fairly planar relict bedding of the phyllite bedrock, upon which the remaining overburden column still rests. This feature dips roughly towards the roadway about 50˚. Other soil and colluvial slopes within the project area, which are also moderately steep but do not sit atop such deleteriously oriented planar rock, are considered to be slightly more stable. These slopes do exhibit some scattered 'pistol-butted' tree trunks (curved slightly at the base), which indicates that some gradual creep takes place within the uppermost 3 to 5 ft of soil.

Present rock slopes within the project area are considered stable. These slopes, mostly cut slopes, have slope ratios ranging from about 0.05:1 to about 1:1. The steepest slopes (0.05:1) are found in the western end of the project. These steep slopes are over 100 ft high immediately west of the project, where they continue into the project to about station 115+10. These near-vertical cut slopes are all located in the metachert.

The remainder (majority) of the rock slopes within the project is in the phyllite. These have slope ratios varying from about 0.25:1 to 1:1, with significant portions of most of these slopes being steeper than 0.5:1. Although significant structural discontinuities (relict bedding, foliation, joints) exist in these slopes, as was discussed in the previous section (7.1.2), these discontinuities are predominantly oriented with their strike directions roughly perpendicular to the roadway direction, and, consequently, to the general strike of the cut slope faces. While the discontinuity dips are steep, they are generally oriented away from the cut face, with dip azimuths typically somewhere between 90˚ and 130˚ from the dip azimuth of the slope face. These characteristics grant some stability to these steep slopes, despite the presence of structural discontinuities.

Small localized planar, wedge, and toppling failures have occurred and may occur in the phyllite cut slopes due to the significant presence of smaller structural discontinuities and the range of orientations that they exhibit. These failures, however, are limited in size to minor rockfall episodes by the fairly limited contiguousness of the structural discontinuities involved in these orientations and by the fact that the orientations of the more contiguous discontinuities, though plentiful, do not align with the slope faces in such a way as to create large scale slope instability.

7.3 Water

7.3.1 Surface Water

Throughout the eastern two-thirds of the project surface water flows predominantly from a generally north to south direction, while through the western third of the project it flows predominantly from west to east, in both cases basically from the upper slopes down towards the river, which is, on average, about 100 ft below the road. Water that encounters the roadway and its accompanying ditches flows from the east end of the project towards the west end, being diverted along the way through several of the DI's, culverts, and downdrains that are present within the project area. Water captured and diverted by these installations then continues flowing down slope towards the river. Water that flows on the highway surface generally has a component of flow direction towards the river due to the super elevation of the road through most of the project.

A private driveway that enters the highway from below the roadway at about station 120+00 has undergone episodes of surface water inundation caused when high amounts of surface water flowing in the paved ditch on the south side of the highway carry debris that plugs the ditch and/or the DI just to the west of the driveway. When this occurs the water quickly builds up enough depth and tops the dike, sending a high flow down the driveway. This flow rapidly induces a significant amount of erosion in the private driveway a short distance below the roadway where the pavement gives way to an unpaved surface. Design should consider this problem when redesigning the roadway geometrics and surface flow paths. Plate 2 presents an aerial photo of the site with the location of this driveway shown.

7.3.2 Erosion

Erosion of the present slopes is not considered to be very significant. The rock faces, which compose a substantial amount of the exposed slope faces within the project area, are essentially non-erosive. The colluvium that covers the tops of the rock slopes has been fairly consolidated with time, while the angular to subangular shape of its highly gravelly constituents adds an internal stability that resists erosion caused by most rainfall. In addition, the thin organic bearing soil formed in the top of the colluvium is moderately protected by vegetation and surface duff and litter, which gives it considerable resistance to rainfall induced erosion. No significant concentrations of surface runoff appear to occur on these slopes that would instigate erosion of the organic soil and colluvium. The steepened cuts in the colluvium that exist between stations 123+00 and 126+00 behind the disposal

site demonstrate good resistance to erosive processes despite being bare (without soil or litter cover).

7.3.2 Groundwater

Groundwater has a minor to negligible impact upon the rocky terrain within the project area, but does exert some influence on the overburden colluvium and soil where it exists in a perched or unconfined state. Groundwater travelling atop the bedrock and within the unconfined aquifers created by the overburden material likely contributes to some surface creep of this overburden material. During extended periods of high precipitation this effect could be substantial enough to cause localized instability, sloughing, and slope failure.

7.4 Project Site Seismicity

Based on the Caltrans online ARS (Acceleration Response Spectra) Website at http://10.160.173.178/shake2/shake_index2.php and Mualchin's map (see regional seismicity discussion in section 4.4) the design peak bedrock acceleration (PBA) at the site is 0.247 g and the peak ground acceleration is 0.281 g. Based on Caltrans Seismic Design Criteria, Appendix B (2006) soil conditions within the project area are classified as soil profile types A, B, and D, with the majority of the site being classified as soil profile type B.

8. Geotechnical Analysis and Design

8.1. Cuts and Excavations

8.1.1 Cut Slopes

OGDN recommends very steep to vertical cuts in the metachert slopes located in the western portion of the project from about station 115+10 to the western terminus of the project. Slope ratios should not be flatter than 0.1:1. This ratio (or steeper up to vertical) conserves space, reduces cut volume, and reduces the width of rockfall catchment necessary at the base of the slope.

OGDN recommends 0.25:1 slope ratios for the phyllite cut slopes, which comprise the remaining, and major, portion of the project's cuts slopes. In some areas where the cuts involve significant amounts of overburden material atop the phyllite bedrock, an upper cut recommendation of 1:1 applies. In areas where this overburden is minimal or absent, the entire slope should be cut at 0.25:1.

Table 1 below lists cut slope recommendations by station interval with brief descriptions of material and risks involved.

OGDN recommendations for the phyllite cut slopes above station 120+00 require some background explanation on some issues these slopes have and the discussions with design and the project engineer regarding them. Due to the steep topography (typically about 1:1 or greater) present above the current cut slopes, cuts flatter than the recommended 0.25:1 (such as 0.5:1 or 0.75:1) significantly increase the cut heights (as the cut chases the catch point far up the slope), thereby necessitating even greater rockfall catchment widths (as explained below in the rockfall section (8.1.5) below), which, in turn, requires pushing the slopes back horizontally, which, again in turn, requires even greater cut heights that then increase catchment widths and excavation quantities even further. With these trade-offs in mind, OGDN initially gave verbal recommendations to design for some phyllite cut slopes with three different slope ratios for each cut cross-section, these being 1:1 (top of cut slope), 0.75:1 (upper middle of slope), and 0.25:1 (lower part of cut slope). This recommendation was based on the tripartite levels of material strength indicated in the seismic depth sections and rock observations for these particular areas, with the slowest material (colluvium roughly at 1200 ft/s) being cut at 1:1, the intermediate velocity material (moderate to highly weathered phyllite at an average of 3000 ft/s) being cut at 0.75:1, and the fastest material (slightly weathered to unweathered phyllite at a velocity between about 5000 ft/s and 8800 ft/s) being cut at 0.25:1. This recommendation was considered to be moderately conservative by OGDN. These slope design recommendations were further complicated by the fact that the transition locations on the cross-sections between the different slope ratios changed from station to station by as much as 12 ft, based on the seismic data. OGDN was aware of the difficulties created for both designers and construction forces in building these station-varying, tripartite cut slopes, but after discussions with design and management, considered it more important to avoid the significantly large excavation quantities and large disturbed upslope surface areas that would be created by single, or even double, slope ratio cut slopes, which would drive the cut catch point a significant distance upslope. A 1:1 slope ratio was imperative at the top, because the unconsolidated colluvium would be almost certain to fail at anything much steeper. To cut the entire slope at 1:1 for the sake of uniformity, however, would result in tremendous increases in excavation quantities and significant right-of-way purchases, since the cut catch point would migrate several hundred ft upslope. Performing the upper 1:1 cut and then cutting the remaining lower slope at a slope ratio of 0.75:1 would suit the intermediate velocity material regardless if it were found to be clay or phyllite, but such a slope ratio would not fully utilize the

higher strength of the high velocity material present at the lower portions of the cut sections that can hold a 0.25:1 cut face while supporting 20 to 30 ft of overburden. Such a cut slope would increase the excavation quantities substantially beyond that of a multi-ratio cut slope. Examples of dual-slope ratio and tripartite slope ratio cut slopes for station 121+00 are shown in Plate 7.

The uncertain nature of the intermediate velocity material, as briefly mentioned in section 7.1.3 above (seismic structure), presented an additional problem in determining the best cut slope recommendation. While fairly uniform in seismic velocity, this material appeared to be composed of moderately weathered phyllite in some locations (where the rock was exposed in outcrop) and possibly clay (with subangular sand and gravel as was observed) material in others (where no rock outcrops were present). If those upper portions of the slopes containing this intermediate velocity material are composed primarily of clay, then slope ratios of 0.75:1 would be the steepest slope ratio that could be recommended, based on the nature of the material and the observed performance of these portions of the present slopes. If this material, however, is truly composed primarily of rock (with clay covering in some areas), albeit moderately weathered, then slope ratios of 0.75:1, while performing fine, would underutilize the likely capacity of this material to stand steeper. This underutilization would lead to greater excavation quantities and wider rockfall catchment needs (as explained in the rockfall section (8.1.5) below. Given its location near the upper portion of the cut slopes (not having to support significant material above) this material, if rock, would likely support steeper slopes of 0.25:1, based on its observed performance. Though these steeper slope ratios would almost certainly create more rockfall quantity, the decrease in rockfall runout (and therefore, required catchment width) created by this steepening (as discussed in the rockfall section (8.1.5) below), would more than offset the increase in quantity.

A compromise for the phyllite slopes east of station 120+00 that carries some risk was reached with the design team and project engineer that hopefully represents an optimum balance between stability concerns, rockfall creation, rockfall mitigation, increasing or reducing excavation quantities, increasing or eliminating the need for additional right-of-way, and the risks of slope failure with different cut slope ratio scenarios. This compromise involves a dual-slope ratio cut slope design with a slightly thicker section cut at 1:1 overlying a 0.25:1 section that then extends to the bottom of the slope. The thickness of the 1:1 cut portion is increased up to the limit where the upslope catch point begins to run up the slope excessively. This results in the uppermost reaches of the moderately weathered phyllite, together with the overburden, being cut at 1:1. The 0.25:1 portion of the cut section extends up from the strong relatively unweathered phyllite into the

lower portion of the moderately weathered phyllite. It is this steep (0.25:1) portion of the moderately weathered phyllite (or sandy gravelly clay?), a portion that varies from about 5 to 12 ft in vertical thickness, that represents the risk involved in this design and which carries with it the possibility of some slope failure in these sections. Plate 7 shows a typical cross-section of this dual-slope ratio cut slope (the orange line). Should failures occur during construction in these cut slope sections, it may become necessary to modify the cut design to either the tripartite design discussed above or to a dual slope ratio design that incorporates the stable 0.25:1 portion of the lower cut slope with a modified flatter upper slope ratio between 0.75:1 and 1:1.

TABLE 1. CUT SLOPE RECOMMENDATIONS

STATION BEGIN	STATION END	UPPER SLOPE RATIO	LOWER SLOPE RATIO	UPPER/ LOWER BREAK*	MAX CUT HEIGHT*	MATERIAL	RISKS
113+45	115+10	<0.1:1	< 0.1:1	na	40	metachert	Very low
115+10	116+00	0.25:1	0.25:1	na	25	colluvium/soil over phyllite	moderately low-possible plane failure; some possible colluvium sloughing
116+00	116+70	0.25:1	0.25:1	na	25	phyllite	moderately low-possible plane failure
116+70	118+00	0.25:1	0.25:1	na	25	phyllite	Low
118+00	118+50	0.25:1	0.25:1	na	25	phyllite	Low
118+50	119+00	0.25:1	0.25:1	na	32	phyllite	Low
119+00	119+40	0.25:1	0.25:1	na	35	phyllite	Low
119+40	120+00	1:10	0.25:1	30 to 40	55	colluvium/soil over phyllite	low to moderately low-some possible colluvium sloughing
120+00	122+25	1:10	0.25:1	30 to 40	55	colluvium/soil over phyllite	moderate to uncertain: mid to upper portion of 0.25:1 slope (up to 15 ft of face) may fail requiring recutting with flatter slope ratio
126+25	126+75	1:10	0.5:1	20 to 30	35	colluvium/soil over phyllite	low-some possible colluvium sloughing
126+75	130+00	1:10	0.25:1	25 to 40	50	colluvium/soil over phyllite	Low
130+00	131+75	0.25:1	0.25:1	na	30	phyllite	Low

*Upper/Lower Break is the distance above bottom of slope where break occurs between the two different slope ratios. All measurements (Upper/Lower Break & Max Cut Height) in feet.

Cut slopes approximately between station 116+00 and 116+70, which occur in the phyllite, present the only purely structural geology based risk of the project. As was briefly explained above in the structural geology section (7.1.2), this area may present a potential for planar failure of the phyllite. To avoid risk, cuts would need to be flatter than 1:1, which, based on the proposed widening, would result in cuts catching the original ground at, or nearly at, the ridge several hundred ft upslope. Such cuts would not only add greatly to excavation quantities, but would also denude substantial amounts of forest cover. Steep 0.25:1 cuts, however, would impinge negligibly on forest or vegetation and add little to excavation quantities. Based on an examination of the exposed phyllite in this area and its close proximity to the metachert that seems to indicate that at least a moderate amount of silicification of the phyllite and its structural discontinuities has occurred, OGDN believes that the risk of planar failure along structural or bedding discontinuities is likely fairly low. Therefore, our Office recommends 0.25:1 cut slopes in this location.

8.1.2 Rippability

Rippability descriptions presented here are based on seismic refraction velocities (P-wave compressional velocities), field observations of rock hardness and geologic structure, and geologic interpretations of the subsurface conditions extrapolated from this information.

Roughly 20% of the planned excavation material is considered unrippable by Caltrans standards and marginally rippable by Caterpillar standards of performance, as defined in this section. Roughly 10% more of the planned excavation material is considered either moderately difficult or difficult to rip by Caltrans Standards of performance. Caltrans standards are based on unpublished Caltrans data for a Caterpillar D9 series bulldozer with a single-tooth ripper. These standards consider material velocities below 3445 ft/s to be easily ripped, velocities between 3445 and 4921 ft/s to be moderately difficult to rip, velocities between 4921 and 6562 ft/s to be difficult to rip, and velocities greater than 6562 ft/s to be unrippable. Caterpillar rippability estimates for a D10 bulldozer with a single-tooth #10-ripper considers phyllite material with velocities below about 8000 ft/s to be rippable, phyllite material with velocities between 8000 and 10,000 ft/s to be marginally rippable, and phyllite with velocities above 10,000 ft/s to be unrippable (Caterpillar, 1982). It should be noted that, as discussed in the previous section 7.1.3 on seismic structure, even the higher seismic velocities likely represent the anisotropically slower velocity for the material.

The overburden material situated atop the phyllite and metachert bedrock, which is composed of colluvium and a thin veneer of topsoil, has an average velocity slightly above 1000 ft/s and is considered easily rippable.

The metachert, which composes the relatively small amount of proposed slope cuts between the western end of the project and roughly station 115+10, was not evaluated seismically, because there was no easy or simple way to lay out a refraction line that would properly sample the rock to be cut. However, surface examination of the geology and structure led to the fairly strong belief that it is unrippable (except for a few cracked flakes) by both Caltrans and Caterpillar standards.

The phyllite, which comprises the vast majority of the proposed rock excavation, varies in rippability from easily ripped to unrippable (Caltrans standards) or marginally rippable (Caterpillar standards). This variation depends upon two main factors- its degree of weathering and the amount of silicification it has undergone during metamorphism. The degree of weathering is mostly a function of the rock's distance from the exposed slope surface and its vertical depth from the surface. Silicification is greater west of the disposal site, likely due to its closer proximity to the metachert.

Phyllite located immediately below the overburden colluvial soil near the top of the proposed cuts and at the immediate surface on the mid-to-upper reaches of the proposed cut slopes has an average velocity slightly above 3000 ft/s, which is considered rippable by Caterpillar standards. This velocity also indicates easy rippability according to Caltrans standards, though it is approaching the velocity (3445 ft/s) considered to be moderately difficult to rip. This velocity unit varies in thickness from 4 to 24 ft. Its significant slowness is thought to be due to a combination of moderate weathering and seismic anisotropy, since the refraction line was shot generally perpendicular to the structure.

The weathered phyllite grades into relatively unweathered phyllite and the seismic velocities increase up to about 5400 ft/s east of the disposal site and about 8600 ft/s west of the disposal site. This velocity difference is interpreted to be the result of the silicification of the western phyllite, as discussed before. The 5400 ft/s material is considered to be difficult to rip by Caltrans standards, while Caterpillar standards consider it rippable. The 8600 ft/s material is considered unrippable by Caltrans standards, while Caterpillar standards consider it to be marginally rippable, as mentioned above.

The unrippable (Caltrans) or marginally rippable (Caterpillar) material comprises the majority of the proposed excavation from the western project limit to about station 115+10. The remainder of the material deemed unrippable/marginally rippable will be encountered between stations 117+00 and 122+50.

8.1.3 Excavation and Blasting

Though excavation method is not dictated by Caltrans, blasting is not allowed on this project. Material deemed unrippable may be excavated by alternate methods that may include, but are not limited to, chemical expanding agents, or large hoe-ram hammers. OGDN does not make any recommendations on the relative efficacies of these methods, leaving the evaluation, judgment, and eventual decision regarding excavation method to the contractor.

8.1.4 Grading factor

With the bulk of the earthwork excavation for this project occurring in phyllitic rock, and with a smaller component occurring in rocky and gravelly colluvium, the earthwork grading factor is estimated to be between 1.03 and 1.05.

8.1.5 Rockfall

Information, analysis, and recommendations regarding rockfall are based on evidence gathered in the field, on personal communication with the maintenance supervisor, Ms. Kathy Coots (January, 2010), on kinematic analyses performed with structural geology data obtained in the field, on analyses performed with the CRSP rockfall simulation software (Jones, et. al, 2000), on published empirical data and charts (Pierson & others, 2001), and on discussions between members of the Caltrans Rockfall Committee. Existing rockfall catchment within the project area, which varies from about 4 ft to 12 ft, is fairly effective at protecting the travelled way for the slopes that presently exist (Catchment is defined here as the ditch and/or unpaved shoulder space outside of the edge of pavement that can catch rockfall). The 12-foot wide catchment present through the western third of the project is necessary to capture the rockfall shed from the fairly higher rock faces. Below the remaining slopes of the project, where rockfall occurs to a slightly lesser extent and from a generally lower height than the western third of the project, the smaller catchment ditches presently in place perform moderately well at containing most, though not all, of the rock. The most significant exception occurs at about station 119+60 where a rockfall chute periodically launches rock onto the highway.

The steep 0.25:1 cuts proposed in the rock slopes are likely to increase the amount of rock shed from the cut faces. In addition to this rockfall, the 1:1 cuts in the colluvial overburden is likely going to produce some raveling during construction, and for the first few years following construction, prior to sufficient establishment of new vegetation.

As mentioned previously when discussing cut slopes (section 8.1.1.), the final design recommendations for cut slope ratios and rockfall catchment widths and slopes were considerably interdependent. While kinematic analysis indicates that, due to structural features, the 0.25:1 cut slopes will produce slightly more rockfall material than flatter slopes, rockfall analyses performed with CRSP (Colorado Rockfall Simulation Program) and published empirical data (Pierson et. al., 2001) indicate that rockfall from the steeper 0.25:1 cut slopes will generally require less catchment for similar slope heights. This is basically because more rocks will fall straight to the ground and incur less, and lower impact, collisions with the slope face. In addition, the semi-flat and subangular shape that is likely to form the majority of rockfall material from these slopes is not highly conducive to large runout (the rolling of the rock after hitting the ground). Therefore, even for the highest cut slopes (55 ft) recommended in this report, OGDN recommends creating a 12-foot wide rockfall catchment ditch at the base of all cut slopes to mitigate rockfall. These ditches should slope towards the cut slopes with a minimum ratio of 6:1 (4:1 is preferred but this typically does not conform to federal highway standards). These ditches are not to be confused with paved shoulders, since catchment must remain unpaved to be even moderately effective. This 12-foot recommended catchment width assumes that an additional 8-foot paved shoulder will be constructed between the catchment and the traveled way, as per discussions with design. This additional paved shoulder section will compliment the catchment by adding some additional runout distance (the distance that rock rolls away from the slope after falling) to the catchment, though not nearly the equivalent of 8 ft of unpaved catchment, since rock generally rolls further on pavement than soil. This shoulder width was factored into the discussions with design regarding slope heights, slope ratios, rockfall, and catchment width, and was incorporated by OGDN into the analyses and design of the catchment, which was performed stochastically to contain and stop 90% of falling and rolling rocks before they reached the travelled way.

Catchment ditches should be covered with a veneer of soil or gravel to soften rock impacts.

The lip of the rockfall chute centered at about station 119+60 mentioned above will be closer to the edge of pavement following the proposed cuts and roadway

design, despite the 12-foot catchment. In order to mitigate this rockfall hazard OGDN recommends the installation of a hybrid style rockfall attenuation system that will halt the horizontal progress of rocks descending the chute at the chute lip with a cable mesh suspended across the chute's edge. These rocks are then dropped between the cut slope and the same cable mesh draping the rock cut slope until the rocks fall safely into the catchment below. The design and details of this system were put together by OGDN and the Caltrans Rockfall Committee and then incorporated by District 2 Design into the project plan sheets. Specifications for this system are presented in Appendix A-1. Copies of the plan sheets for this system are presented in Appendix A-2.

8.1.5 Erosion

Erosion is not expected to become a significant issue in this project. Cuts proposed for this project will mostly result in bare rock being exposed, which is not expected to create any significant erosion problems. A small portion of the cuts will occur in loose colluvial material, which, due to its gravelly nature, will only be mildly prone to erosion, a condition that should be stabilized by vegetation after a season or two.

8.2 Fills

Fills within the project area are located primarily above the road and are mainly for the purpose of balancing the cut and fill earthwork budget of the project. Only a small amount of fill material is proposed for the subgrade in the central portion of the project while no actual embankments are planned. This subgrade fill has a maximum height of only a few ft, is fairly localized in extent, and is intended only to raise the grade where geometrics dictate their presence. The only significant fill proposed for this project will fill the northern portion of the disposal site area between about stations 122+25 and 126+25. Provided that the material used to construct the fills (or any additional fills on slopes that design or construction may consider later) is taken from cuts within the project, we recommend that fills be no steeper than 1.5:1. Should material be taken from outside the project (unlikely) we recommend that these fills be no steeper than 2:1 unless OGDN is consulted in advance to examine the material and provide steeper recommendations. All material excavated from the project will be suitable geotechnically (NOA issues are not considered here) for constructing fills. We do not recommend the use of sliver fills, as sliver fills typically fail within several years. The new fills should be keyed and benched in accordance with Section 19 of the Standard Specifications. We recommend 90 percent relative compaction (CT test 216) for the main fill and 95 percent relative compaction for the subgrade fill. In addition, we caution that slopes

should be properly compacted to the outer face. Often, the outer face does not receive adequate compaction effort. This usually results in surface slumping of the fill materials. Exercise engineering judgment in placing large boulders to assure stability and proper compaction. Strip all loose and unsuitable material at new side-hill fill areas as specified by section 19-2.02 of the standard specifications. New fills should be keyed into the slope a minimum of 6 ft.

8.3 Gabion Wall

8.3.1 Wall Type Selection

Following discussions between design and OGDN, several factors combined to make the gabion wall the selected choice for widening the top of the slope so that shoulders and recovery room could be added to the present roadway between stations 118+02 and 119+33. These factors include the steepness of the slope beneath the wall, the sandy to cobbled nature of the fill material at the location, the relatively low wall height, the small potential for some small post-construction movement of the slope beneath the wall foundation, the relative costs of a gabion wall versus most other wall types for this situation, and the availability of rock.

8.3.2 Wall Analysis and Design

Based on preliminary cross-sections proposed by the District 2 safety design team the gabion wall is approximately 131 ft long, extending from about station 118+02 to 119+33. It is located on the inside of a curve at the top of a fairly steep (1.35:1, H:V) slope. It has been proposed with a stepped back face (see Plate 8) and has been analyzed and designed herein as such. Its height above original ground varies slightly along its length, with a maximum height of about 8 ft above original ground.

External stability analyses for sliding, overturning, eccentricity, and bearing capacity were performed to determine feasible preliminary wall dimensions. A static surcharge to account for live traffic in the analyses was added corresponding to 2 ft of soil at 120 lb/ft^3. External stability analyses were conducted using the tables, figures and procedures described in FHWA manuals titled “Earth Retaining Structures” (1999), and “Shallow Foundations” (2001), and the United States Navy Manual (NAVFAC, 1986). Gabion basket configurations analyzed include 4 boxes by 4 boxes (12 ft high by 12 ft wide), 4 boxes by 3.5 boxes (12 ft by 10.5 ft wide), and 4 boxes by 3 boxes (12 ft high by 9 ft wide). Acceptable FOS values were based on standard geotechnical practice (Munfakh, et al., 1999; NAVFAC, 1986). The minimum acceptable factor of safety (FOS) against sliding, against

overturning, for bearing capacity, for static global stability, and for pseudostatic global stability were 1.5, 2.0, 2.5, 1.3, and 1.1, respectively. Maximum acceptable eccentricity values were less than 0.166. Parameter values were chosen to give a moderate amount of conservatism to the analysis. In addition, the analysis was performed assuming no batter (tilt). In reality, however, this wall should be built with a minimum 10:1 (H:V) back (6°) batter, which will significantly increase the FOS against sliding and overturning.

The most economical basket configuration that passed all FOS and eccentricity criteria for a 12 foot high wall (includes the portion of the wall buried beneath original ground) was a 4 box by 3 box configuration. This entails 1 box on top of 2 boxes on top of 3 boxes on top of 3 boxes, as shown in Plate 8.

8.3.3 Drainage

Details of the gabion wall heel drain are shown in Plate 8.

Type B RSP fabric (Standard Specifications Section 88-1.04) should be placed atop the gabions from the top front of the uppermost basket to the heel of the wall. At the heel the fabric should be wrapped around a drainage pipe installed at the heel of the gabion wall. 1 ½ wraps are recommended. An 8 in. perforated plastic pipe is recommended for the drainage. An additional piece of fabric shall be wrapped around this drain section that will encompass a small volume of permeable material. This drainage should run the entire length of the gabion wall, with flow moving from East to west due to the gradient in the road. The outlet may empty onto the present slope provided it is in a rocky section (which most of this slope is). Otherwise, the drainage path should be fortified with rock.

8.3.4 Gabion Wall Settlement

Settlement beneath the gabion wall will be less than 0.25 in., and will essentially be instantaneous during construction due to the granular and cohesionless nature of the founding soil.

8.3.5 Corrosion

Corrosion testing consisted of tests on one representative sample collected from the surface of the slope beneath the future gabion wall. As per the Caltrans protocol explained earlier in section 6 the samples were only tested for resistivity and pH, since the resistivity was 8400 ohm-cm and pH was 6.9. These measurements indicate this sample is non-corrosive, and, by extrapolation and

geological judgment, the remainder of the native environment beneath the future gabion wall is also considered non-corrosive with respect to the gabion wall. However, corrosive salts are applied to the roadway in this area in the winter to combat freezing, thereby creating a corrosion risk. Consequently, we recommend that the design engineer design the roadway edge with this in mind and prevent roadway run-off from spilling down into the gabion baskets. OGDN recommends that the surface outside of the AC dike and guardrail be covered with AC all the way to the edge of the gabion baskets and a small dike be installed to achieve this.

Typically gabion baskets are galvanized to give them a general protection against corrosion and rust, which may occur with the significant moisture and rainfall in this area. Such galvanization is recommended. The highly visible shiny metallic appearance of galvanized wire may be disagreeable to some personnel, the public, and some external permitting agencies. Although such galvanization typically fades in luster and dulls within a few years, there are several methods to reduce the visibility of the wire at the general time of construction. Colorization is the most typical, with electrostatic powder coating or the application of a poly-vinyl chloride (PVC) coating being the most typical. Our Office recommends black color for either of these two approaches, as it has proven to be the most effective color for reducing visibility to passing motorists. Rust coated wire may also be used to reduce visibility, whereby the pre-oxidized rust coating acts to protect against further rust.

8.3.6 Gabion Basket and Infill Material

Gabion construction should meet, as a minimum, the details specified in Standard Plans 1999 D100A and D100B (Gabion basket details). The Caltrans Standard Special Provisions (SSP's) for gabions (SSP #72-305) should be modified appropriately and incorporated by the designer and the Office Engineer on the contractor/Caltrans contracts. For contract compliance testing of gabion materials, the published values and tables in the SSP's may be used to guide the acceptance or rejection of gabion materials. Construction inspectors should refer to the standard plans and SSP's to assure proper construction of the gabions, especially the method of making basket-to-basket joints. Acceptable joints are described in the SSP's and clarified in the notes on standard plan sheet D100B.

Infill material must be sound, durable, and well graded with a max size of 12 in. and a minimum size equal to twice the size of the openings. The preferred size range is 6 to 12 in.

8.3.7 Excavation and Site Preparation

A temporary backslope excavation of 1:1 is recommended. If, during construction, anything steeper is required in order to allow sufficient space for traffic flow, we recommend that the engineer contact OGDN, who will send a representative to examine the situation and determine if a steeper backslope can be safely excavated.

Although the excavation and foundation preparation for the gabion is expected to occur totally in fill, this was not verified by drilling or seismic sounding. The decision not to drill was made by design and project management in an effort to reduce support costs. This decision was based on a verbal opinion by OGDN that the wall would likely be founded upon rocky fill. This opinion was founded strictly on surface observations, not drilling, so our Office does not preclude the possibility that the wall may possibly be founded at least partially on phyllite bedrock.

The preparation of the founding surface for the gabion wall will require the creation of a fairly uniform and level surface. The bottom of the founding excavation is likely to be sandy gravel with silt with some cobbles and possibly a few boulders. The excavation bottom must be leveled to a fairly even surface. Should boulders bulge or protrude above the foundation level they should only be removed if their removal will not impact the stability of the outer slope face. Removal of the protruding portion of the boulder can probably best be done by an excavator-mounted hoe-ram. Should bedrock be encountered, it should be leveled so no significant protrusions exist that would stress the basket wire and stability. The gabions can accommodate some small asperities on the founding base, but an effort should be made to provide a moderately regular surface so that the gabion mesh will not suffer excessive localized stresses that would cause the baskets to fatigue prematurely or undergo any excessive settlement. Small irregularities will be smoothed over by the recommended placement, leveling, and compaction (to 95 percent according to standard Specifications Sec 19 and 26) of class 2 aggregate base over the native founding ground. The foundation surface should tilt back into the slope at an angle at least equal to the recommended gabion basket batter of 10:1 (H:V) or 6°.

9. Construction Considerations

9.1 Construction Advisories

The potential for rockfall beneath slope cuts during their construction and sloughing/sliding of the colluvial overburden during construction exists and should not be ignored by the contractor or Resident Engineer (R.E.). Scaling prior to and/or during work, if deemed necessary, should be performed.

Proposed cuts between stations 115+10 and 116+70 present a moderately low, but not negligible, chance of planar failure occurring along rock discontinuities. Should this occur it will likely manifest itself first by tension cracks upslope of the cut face. Should any such cracks occur OGDN recommends that the R.E. contact our Office immediately to assess the situation and provide recommendations to remedy or mitigate the problem.

Proposed 0.25:1 cuts between stations 120+00 and 122+25 present a moderate chance of failure locally within the upper portions of the planned cuts that exist below the 1:1 portions of the cuts, should the material within these upper portions prove to be more claylike than phyllite. Should this occur the initiation failure will likely manifest itself both by tension cracks upslope of the cut face and within the upper colluvium portion, as well as bulges or failures in the face itself. Our Office recommends that an OGDN representative be present during the initiation of the steeper portions of the cuts within these station limits to allow immediate assessment of the material to determine if flatter cuts will be needed.

9.2 Construction Monitoring

OGDN recommends that the slopes be visually monitored on at least a daily basis upslope of the cut lines for the station intervals discussed in section 9.1. The purpose of this monitoring is twofold: to protect workers below and to be alerted as soon as possible to developing conditions that may require slope design adjustments. Monitoring instrumentation is not considered necessary, feasible, or appropriate.

9.3 Hazardous Waste Considerations

Serpentine was observed within two locations within the project area, as discussed in section 4.5. Some of this material occurs in the present fill where the gabion wall is proposed for construction, thereby necessitating its excavation here for the base and toe of the wall. As well as the geometrically-required minimum 3-foot

horizontal distance between the front of the base of wall and the slope. The other location where serpentine was observed is the disposal site, which is also the location where the fill is going to be placed. We recommend placing any serpentine material excavated from either of these serpentine-bearing locations deep inside the fill proposed for construction at the disposal site, which is located approximately between stations 122+80 and 126+00. Additional details and specific environmental recommendations regarding this potentially asbestos-bearing material should be obtained from the Caltrans Office of Environmental Engineering-North Region.

Construction considerations for any other potentially hazardous waste within the project area should be obtained from the Caltrans Office of Environmental Engineering-North Region.

9.4 Differing or Problematic Site Conditions

Should differing or problematic geotechnical site conditions arise during any part of the construction we strongly recommend promptly contacting OGDN. This recommendation pertains to any possible problematic or differing site conditions that might occur, but is particularly salient to raveling, sloughing, or larger scale failures of the cut slopes. Should such problems arise they may require flattening and extending the top of the cuts further up the slope.

10. Recommendations and Specifications

10.1. Cut Slopes

10.1.1 Cut Slope Design

Cut slope ratios between 0.05:1 and 0.25:1 are recommended for the rock portion of the cuts, while cut slope ratios of 1:1 are recommended for those portions of the cut slopes that occur either in colluvial overburden or in the top, intensely weathered zones of the phyllite bedrock. Cut slope ratios of 0.05:1 are recommended for those portions of the rock cut slopes that occur in the metachert, which comprise only a small portion of the project cuts and are located at the western end of the project. Cut slopes are discussed in more detail in section 8.1.1. Table 1 presents a tabulation of cut slope recommendations.

10.1.2 Cut Slope Excavation

Approximately 15% of the rock material is considered unrippable as defined by Caltrans Standards (section 8.1.2) or marginally rippable as defined by Caterpillar standards (section 8.1.2).

Blasting shall not be allowed (section 8.1.3).

OGDN recommends cutting all trees situated within 5 ft outside of the excavation limits of the cut slopes. Stumps from these trees should be left in place. These stumps should be no higher than 24" and no lower than 10" above the nearby ground. This recommendation is intended to proactively remove trees that may lever the soil and rock atop the cut slope edge under the load of wind forces and possibly fall after construction is finished. In addition, the slope stabilization provided by the tree roots is retained by leaving the stumps in place.

10.2 Rockfall Mitigation

Recommendations regarding rockfall mitigation involve a rockfall attenuator system (RAS) and rockfall catchment. The RAS is designed to stop rocks exiting a rock chute that currently exists, the negative effects of which will be made worse by the proposed slope cuts, should no RAS be installed. The catchment refers to the unpaved area between the edge of pavement and the toe of the cut slope. Both of these mitigation elements are discussed in section 8.1.5.

Specifications for the RAS are provided in Appendix A-1. Design details were provided to the project's design team, resulting in the final construction plans that are presented in Appendix A-2.

Order of Work. Work on the RAS installation should begin on the slope no sooner than 5 days after the completion of slope cutting between stations 118+00 and 122+00. The construction R.E. should notify OGDN prior to the completion of this slope cutting to allow OGDN time to schedule a site visit to inspect the cut slopes and to stake the precise locations of the RAS post and cable foundations during this 5 day window. OGDN recommends that a letter be placed in the R.E. file by the project engineer to alert the R.E. to this recommendation.

10.4 Embankment and Fill Design

The proposed fills should be constructed with slope ratios of 1.5:1 or flatter, based on the performance of existing embankments and the nature of the cut material from

which these fills will be built. Both the rock and colluvial material excavated for the proposed widening will be suitable for constructing the proposed embankments.

We do not recommend the use of sliver fills if placed on a slope steeper than 6:1. Sliver fills typically fail within several years. Any fills steeper than 6:1 should be keyed and benched in accordance with Section 19 of the Standard Specifications. We recommend a minimum of 90 percent relative compaction (CTM 216) for the fills not directly beneath the road subgrade, and a minimum of 95 percent relative compaction for those directly beneath the subgrade. In addition, we caution that slopes should be properly compacted to the outer face. Often, the outer face does not receive adequate compaction effort. This usually results in surface slumping of the fill materials. Exercise engineering judgment in placing large boulders to assure stability and proper compaction. Strip all loose and unsuitable material at new side-hill fill areas as specified by section 19-2.02 of the standard specifications. New fills (steeper than 6:1) should be keyed into the slope a minimum of 6 ft.

10.5 Drains

We recommend not placing drain outlets in new locations on the slopes below the roadway, unless these outlets discharge water onto rocky areas or properly designed energy dissipaters that prevent erosion and sufficiently disperse the water.

This completes the scope of services requested at this time. If you have any questions or comments, please call Mr. Lewis at (530) 225-3516.

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Associate Engineering Geologist
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OGDN Files
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District 2 Office Engineer
District Construction RE Pending File (Justin Borders-Project Engineer)
Byron Berger - District Materials Engineer

Attachments

1. Plate 1. Vicinity Map
2. Plate 2. Aerial Photo of Project Area
3. Plate 3. Topographic Map of Project Area
4. Plate 4. Geologic Map
5. Plate 5. Seismic Refraction Line 1
6. Plate 6. Seismic Refraction Line 2
7. Plate 7. Cut Slope Cross-Sections
8. Plate 8. Gabion Wall Design and Drainage

Appendices.

A-1. Rockfall Attenuation System nSSP's

A-2. Rockfall Attenuation System Plan Sheets

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APPENDIX A-1

10-1.__ ROCKFALL ATTENUATOR SYSTEM

GENERAL

Summary

Rockfall attenuator system shall consist of furnishing, transporting and constructing a rockfall attenuator system as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

Cable mesh shall be secured longitudinally at the top of the slope with anchor assemblies and an infrastructure capable of supporting the system, as shown on the plans or as directed by the Engineer.

Definitions

cable mesh A uniform drapery blanket consisting of cable net and chain link fabric fastened together as described here in these specifications to form a dual-ply mesh.

ground anchor 3/4 inch steel cables anchored into the ground to provide support for the system

Submittals

At least 15 days prior to beginning any work on the rockfall attenuator system, submit to the Engineer for approval the manufacturer's information for all materials and parts used in the rockfall attenuator system.

Upon receipt of a submittal, the Engineer reviews the submittal within 5 business days. Upon notification that the submittal is incomplete, re-submit a completed submittal within 3 business days. The Engineer reviews re-submittals within 5 business days.

Provide the Engineer with a Certificate of Compliance from the manufacturer in accordance with the provisions of Section 6-1.07 “Certificate of Compliance” of the Standards.

MATERIALS

Protect rockfall attenuator system hardware from corrosion by galvanization in conformance with Section 75-1.05, “Galvanizing”, of the Standard Specifications or other metal-to-metal bonding material. Rockfall attenuator system materials must comply with the following requirements:

1. Structural steel components, including ground anchors and clamps, must conform to the requirements in ASTM Designation: A 36.
2. Bolts, nuts, and washers must comply with ASTM Designation A 325.
3. Cables and chain link fabric must be galvanized in conformance with the requirements of Federal Specification RR-W-410D.

Coloring for the support columns (posts) must be achieved by electrostatically applied, powder coating according to the manufacturer’s recommendationsor or painting as specified in Section 59-2 "Painting Structural Steel" of the Standard Specifications.

Coloring for the cables must be achieved by coating with polyvinyl chloride (0.381 millimeters minimum film thickness) or powder coating. The color of the coating shall be black and shall be approved by the Engineer prior to installation.

The cable clamps binding the cables or the cross clips binding the intersecting cables of the cable net must not penetrate or tear the polyvinyl chloride coating. Re-coat any tears in the polyvinyl chloride coating in the field with polyvinyl chloride.

For cable loop to cable loop connections, use a thimble in a cable loop as shown on the plans.

Cable Nets

Cable nets shall meet the following minimum requirements:

Property	Value
Minimum Weight per Unit Area	0.52 pounds per square foot

Cable nets must form:

1) a uniform square pattern that shall be woven with a minimum 5/16 inch diameter cable with the major axis of any opening not to exceed 12 inches and the area of square opening, approximately 12 inches by 12 inches, not to exceed 144 square inches, or
2) a diamond shape pattern that shall be woven with a minimum 5/16 inch diameter cable with the major axis of any opening not to exceed 10 inches and the minor opening not to exceed 10 inches, with the area of opening not to exceed 100 square inches.

Obtain cable net from one of the following manufacturers or submit manufacturer's specifications for an alternate product for prequalification and approval.

Supplier	Address	Phone Number
GEOBRUGG	1500 Glendale Ave, Sparks, Nevada,89431	(775) 626-7474
Chama Valley Productions, LLC	287 Maple Street, P.O. Box 280, Chama, New Mexico 87520	505) 756-1032
ROTEC International, LLC	P.O. Box 31536, Santa Fe, New Mexico 87594-1536	(505) 753-6586
Janod	Financial Plaza Building, 1135 Terminal Way, Suite 106, Reno Nevada, 89502	(866) 466-7223
Maccaferri	3650 Seaport Blvd, West Sacramento, CA 95691	(800) 328-5805

There shall be no discontinuity in the cable nets.

The color of the cable net shall be black (using polyvinyl chloride coating or electrostatically applied powder coating) and must be approved by the Engineer prior to installation.

Chain Link Fabric

Chain link fabric must conform to Section 80-4.01B "Fabric" of the Standard Specifications. The wire used in the manufacture of the fabric shall be 11-gage and polyvinyl chloride coated (15 mils minimum film thickness) or powder coated. The color of coating shall be black and shall be approved by the Engineer prior to installation.

Ground Anchors

Ground anchors must have a minimum allowable design load of 10 tons. Above ground level ground anchor must be ¾-inch diameter steel cable.

Concrete and Mortar for Post Foundation

Concrete for post foundation must conform to the Section 90-10, "Minor Concrete," of the Standard Specifications. The Contractor shall cure the concrete at a minimum temperature of 50 °F for a period of 72 hours and at a minimum temperature of 32 °F for an additional period of 72 hours. At the option of the Contractor concrete may be cured in accordance with Section 90-7.01B, "Curing Compound Method", of the Standard Specifications.

Mortar for post foundation must conform to Section 55-3.19 "Bearings and Anchorages" of the Standard Specifications.

Grout

Grout for ground anchors must conform to the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications. California Test 541 will not be required nor will the grout be required to pass through the screen with a 1.8 mm maximum clear opening prior to being introduced into the grout pump. Fine aggregate may be added to the grout mixture of portland cement and water in holes 4 inches in diameter or greater, but only to the extent that the cement content of the grout is not less than 31 pounds per cubic foot of grout. Fine aggregate, if used, shall conform to the provisions in Section 90-2, " Materials," and Section 90-3, "Aggregate Grading," of the Standard Specifications.

CONSTRUCTION

Site Preparation

Slope and foundation material descriptions are provided in the Geotechnical Design Report, which is available as specified in "Supplemental Project Information" of these special provisions.

Vegetation shall be pruned cleared and grubbed only within the rockfall attenuator system erection zone.

Prior to installation of the rockfall attenuator system, loose and unstable rocks within the erection zone shall be scaled to the extent deemed necessary by the Engineer and to the satisfaction of the Engineer. Material scaled from the slope shall become the property of the Contractor and shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 of the Standard Specifications.

The excavation and drilling work by the Contractor for the ground anchors shall be in accordance with these specifications and as shown on the plans. The Contractor shall uniformly spread excess excavated material around the vicinity of the rockfall attenuator system.

INSTALLATION

The rockfall attenuator system shall be installed in accordance with the requirements as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

Cable Mesh

Cable net and chain link fabric must be fastened together prior to placing the cable mesh onto the infrastructure. Fastening must be done in such a way on a level and fairly smooth surface so as to create a uniform dual-ply drapery blanket that is then referred to as the cable mesh.

Tie wires or connectors used to fasten the chain link fabric to the cable nets, to create a cable mesh panel, must be galvanized and equal to or greater than the strength of the chain link fabric. Spacing of the tie wires or connectors used to fasten the chain link fabric to the cable nets must be every 12 inches in the horizontal and vertical direction. The cable net and chain link fabric shall be flush against one another, with gaps not to exceed 2 inches. The chain link fabric side of the cable mesh shall be placed against the slope.

Cable mesh panels shall be connected to the top support cable by weaving a 5/16" cable through each opening in the cable net portion of the mesh and around the top support rope, or by using a shackle through each opening in the cable net. Adajcent cable mesh panels are attached to each other by weaving a 5/16" cable through each opening in the cable net portion of each mesh, or by attaching a shackle through each opening in the cable nets.

Ground Anchors

Install ground anchors in drilled or hand dug holes at the spacing and locations shown on the plans or as directed by the Engineer. The distance from centerline to centerline of the ground anchors shall be within 1 foot of the determined location. The ground anchors must extend at least 6 feet below the ground surface with a minimum hole diameter of 2-1/2 inches. Support the cable or bar in the center of the drilled hole with centralizers at maximum spacing of 2 feet.

Provide drilling equipment capable of penetrating the material as described on the plans.

Encase the full length of the ground anchors below ground in grout as shown on the plans. Prior to pouring the grout in the drilled hole, moisten the subgrade to a minimum depth of 2 inches from the soil concrete interface and remove all loose soil or rocks from the hole.

TESTING

Proof test all ground anchors to 1.1 times the allowable design load, in accordance with the these special provisions. Ground anchors reaching the failure point before reaching the allowable design load must be replaced and re-tested at the Contractor's expense.

Perform testing against a temporary yoke or load frame. No part of the yoke or load frame shall bear within 3 feet of the ground anchor.

Conduct pullout test all ground anchor in the presence of the Engineer. A pullout test consists of incrementally loading the ground anchor assembly to the maximum test load or failure point, whichever occurs first. Failure point shall be the point where the movement of the ground anchor continues without an increase in the load or when the ground anchor has displaced 2 inches. The failure load corresponding to the failure point shall be recorded as part of the test data.

During the load test, monitor and record displacement of the ground anchors relative to a stable reference point which is founded a minimum distance of 3 feet from the ground anchor and test load reaction points.

Conduct pullout test by measuring the test load applied to the ground anchor and the ground anchor end movement at each load.

Measure applied test loads with either a calibrated pressure gage or a load cell. Measure and record movements of the end of the ground anchor during the load tests.

The pressure gage must have an accurately reading dial at least 6 inches in diameter and each jack and its gage must be calibrated as a unit with the cylinder extension in the approximate position that it will be at final jacking force, and must be accompanied by a certified calibration chart. The gauge must have been calibrated within one year prior to use on the project.

Unloaded the ground anchor only after completion of the test.

MEASUREMENT AND PAYMENT

Rockfall attenuator system will be measured by the square foot. The quantity to be paid for will be calculated on the basis of the dimensions of the area of the completed mesh.

The contract price paid per square foot for rockfall attenuator system shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing rockfall attenuator system complete in place, including rock scaling, ground anchor testing, galvanizing, powder coating, or coating with polyvinyl chloride, as shown on the plans, as specified in these special provisions and as directed by the Engineer.

Full compensation for preserving, removing or pruning vegetation (beyond normal clearing and grubbing) shall be considered as included in the contract price paid per square foot for rockfall attenuator system and no separate payment will be made therefor.

No adjustment in compensation will be made for any increase or decrease in the quantities of rockfall attenuator, regardless of the reason for the increase or decrease. The provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications shall not apply to the item of rockfall attenuator.

APPENDIX A-2

ROCKFALL ATTENUATOR SYSTEM PLAN SHEETS

1. **SHEET C-1**
2. **SHEET C-2**
3. **SHEET C-3**

NOTES:

1. GROUND ANCHOR AND POST FOUNDATION LOCATIONS TO BE DETERMINED IN THE FIELD BY THE ENGINEER.

2. LATERAL SUPPORT CABLES, UPSLOPE SUPPORT CABLES AND TOP SUPPORT CABLE TO BE SEPARATE INDEPENDENT CABLES.

3. FINAL CABLE MESH DIMENSIONS TO BE DETERMINED BY THE ENGINEER AFTER SLOPE EXCAVATION.

ABBREVIATIONS

CPACP COLD PLANE ASPHALT CONCRETE PAVEMENT

LEGEND

- PLACE HMA (Misc AREA)
- ROCKFALL ATTENUATOR SYSTEM
- CPACP
- POST FOUNDATION LOCATION/NUMBER
- LATERAL GROUND ANCHOR
- UPSLOPE GROUND ANCHOR

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
02	Plu	70	17.2/17.5		

Justin W Borders 06-14-10
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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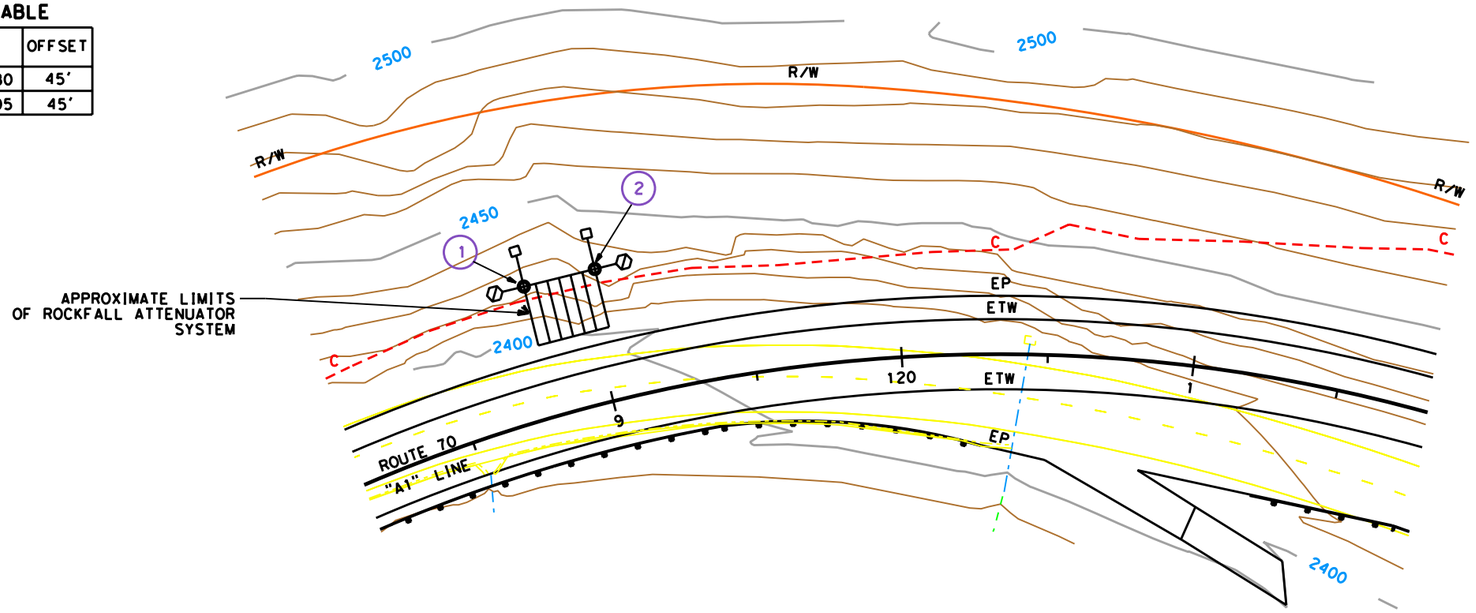
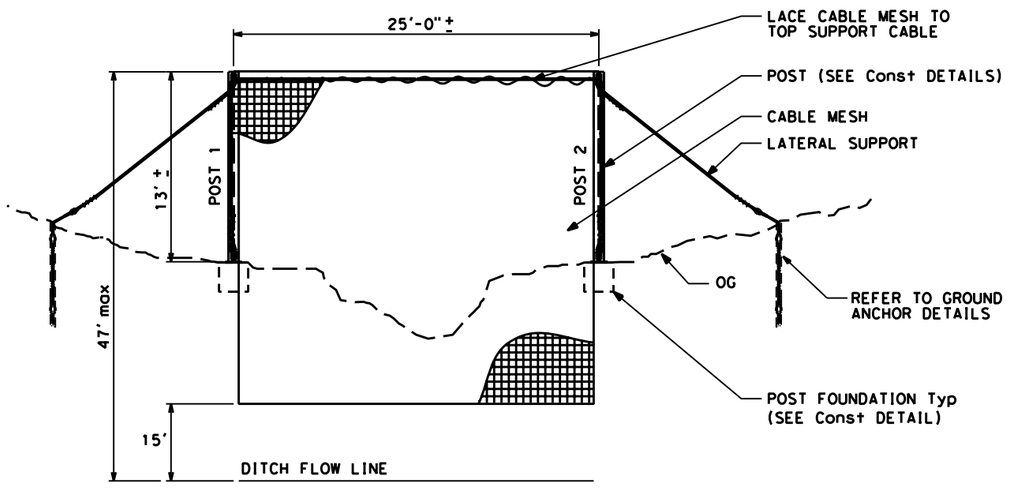
REGISTERED PROFESSIONAL ENGINEER — JUSTIN W. BORDERS — No. C65918 — Exp. 6-30-12 — CIVIL — STATE OF CALIFORNIA

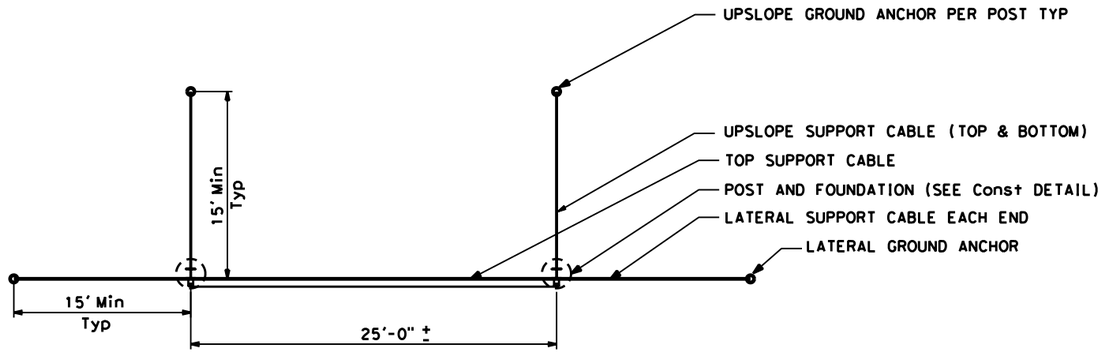
STATION TABLE

⊛	STATION	OFFSET
1	"A1" 118+80	45'
2	"A1" 119+05	45'





ELEVATION



PLAN

ROCKFALL ATTENUATOR SYSTEM

"A1" 118+80 TO "A1" 119+05

CONSTRUCTION DETAILS

NO SCALE

C-1

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REVISED BY | DATE REVISED

WILLIAM LEHMAN | JUSTIN BORDERS

CALCULATED-DESIGNED BY | CHECKED BY

FUNCTIONAL SUPERVISOR: AL TRUJILLO

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — DESIGN

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02	Plu	70	17.2/17.5		

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PLANS APPROVAL DATE

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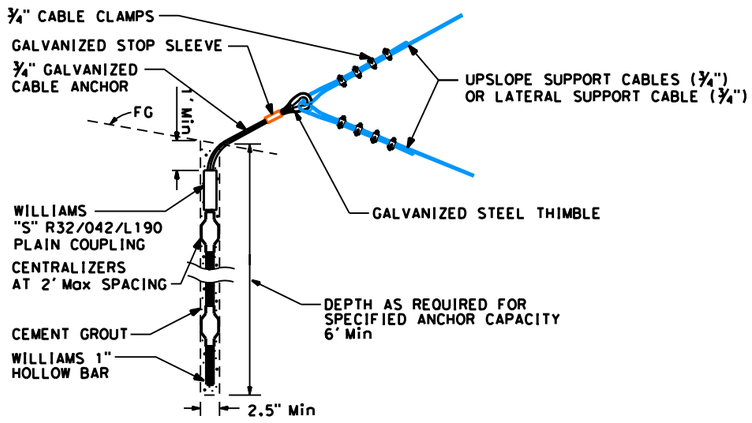
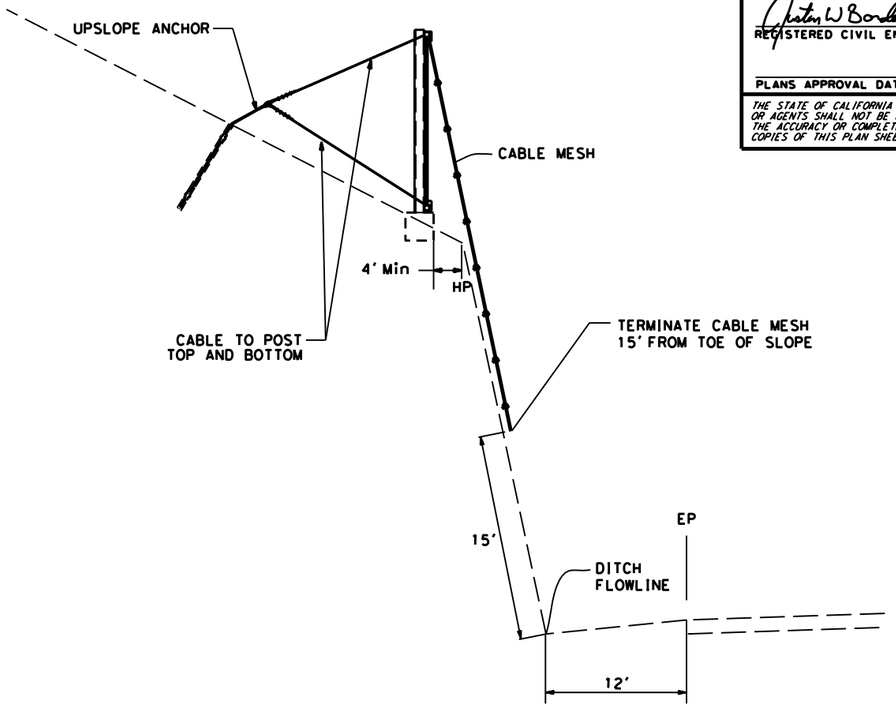
NOTES:

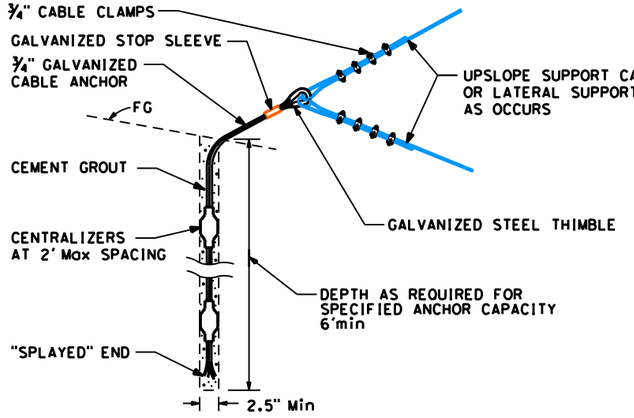
1. EXACT LOCATION OF ANCHORS TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
2. DESIGN LOAD OF ANCHORS SHALL BE 10 TONS.



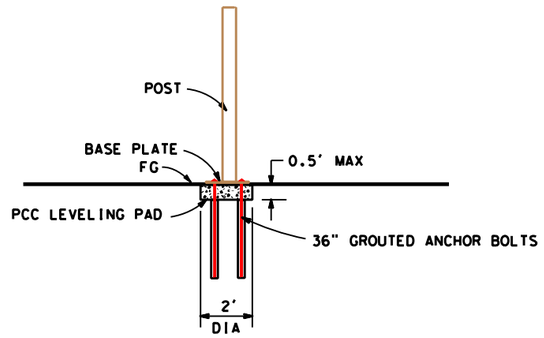
ALTERNATE B
GROUND ANCHOR
(HOLLOW BAR ANCHOR)



CABLE MESH PLACEMENT



ALTERNATE A
GROUND ANCHOR
(CABLE ANCHOR)



ROCK-POST FOUNDATION DETAIL

ROCKFALL ATTENUATOR SYSTEM

CONSTRUCTION DETAILS
NO SCALE

C-2

STATE OF CALIFORNIA -- DEPARTMENT OF TRANSPORTATION	WILLIAM LEHMAN	CALCULATED-DESIGNED BY	REVISED BY
DESIGN	JUSTIN BORDERS	CHECKED BY	DATE REVISED
FUNCTIONAL SUPERVISOR: AL TRUJILLO			

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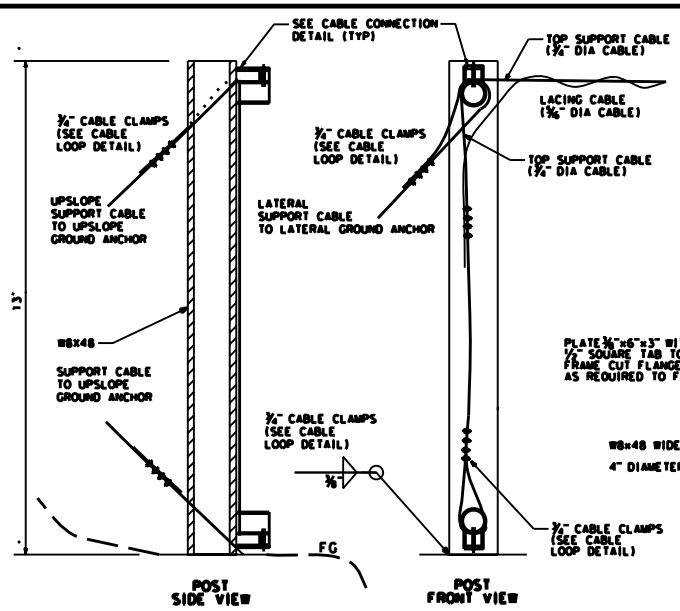
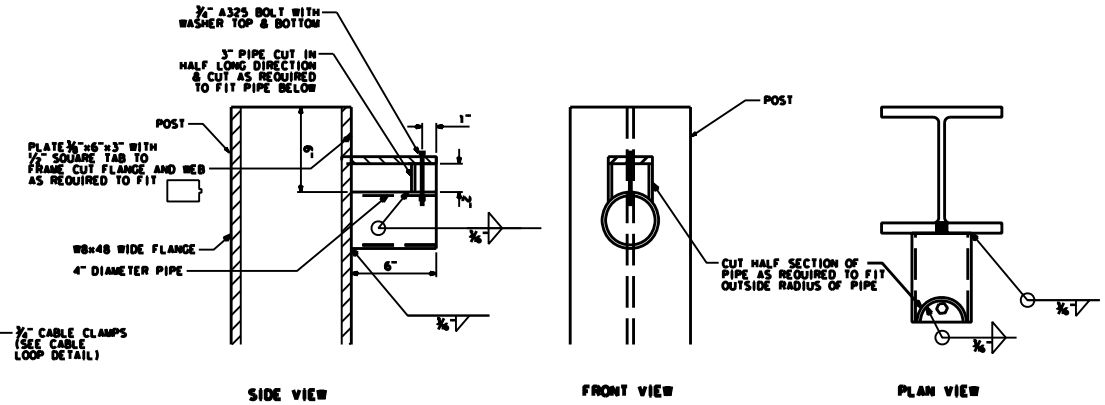


POST CONNECTION DETAILS

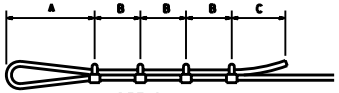


TOP AND BOTTOM CABLE CONNECTION DETAIL

CABLE

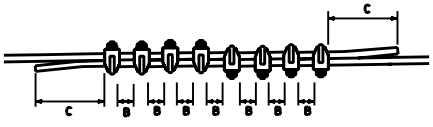
CABLE DIAMETER	CABLE CLAMP SIZE	CABLE CLIP QUANTITY		A	B	C	TORQUE REQUIRED
INCHES		AA	BB	INCHES			FT-LBS
⅜	⅜	3	6	5	5	5	30
½	½	4	8	7	7	7	65
⅝	⅝	4	8	9	9	9	95
¾	¾	5	10	11	11	11	130
CABLE TO POST CONNECTION							
¾	¾	5	10	46	11	11	130

NOTE: MANUFACTURER SPECIFICATIONS OVERRIDE



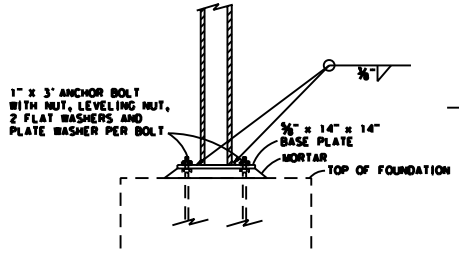
DETAIL "AA"

CABLE LOOP DETAIL

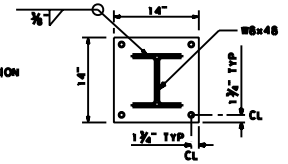


DETAIL "BB"

CABLE SPLICE DETAIL



POST & POST FOUNDATION



BASE PLATE

CONSTRUCTION DETAILS

NO SCALE

C-3

Dist	County	Route	Post Mile's Total Project	Sheet No.	Total Sheets
02	Plu	70	17.2/17.5		

REGISTERED CIVIL ENGINEER — DATE 06-14-10

PLANS APPROVAL DATE

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REGISTERED PROFESSIONAL ENGINEER — JUSTIN W. BORDERS — No. C69918 — Exp. 6-30-12 — Civil — STATE OF CALIFORNIA

REVISED BY	DATE REVISED
WILLIAM LEHMANN	JUSTIN BORDERS

CALCULATED-DESIGNED BY | CHECKED BY

FUNCTIONAL SUPERVISOR: AL VIRUILLO

DESIGN

STATE OF CALIFORNIA • Department of Transportation

REQUEST

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DGN FILE ⇒ REQUEST

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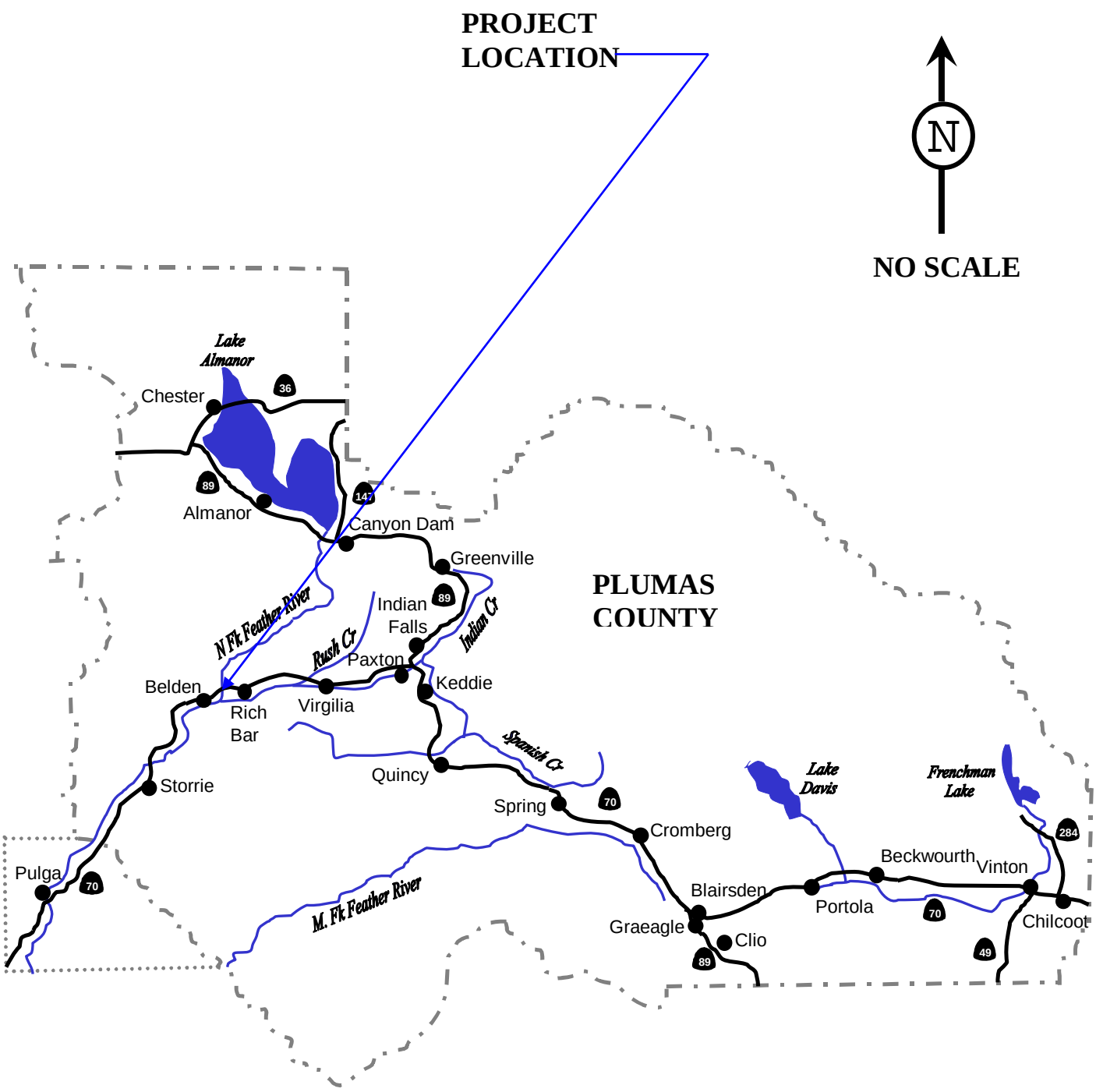

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Geotechnical Services
Office of Geotechnical Design-North

EA: 02-2E0001

Date: June 2010

VICINITY MAP

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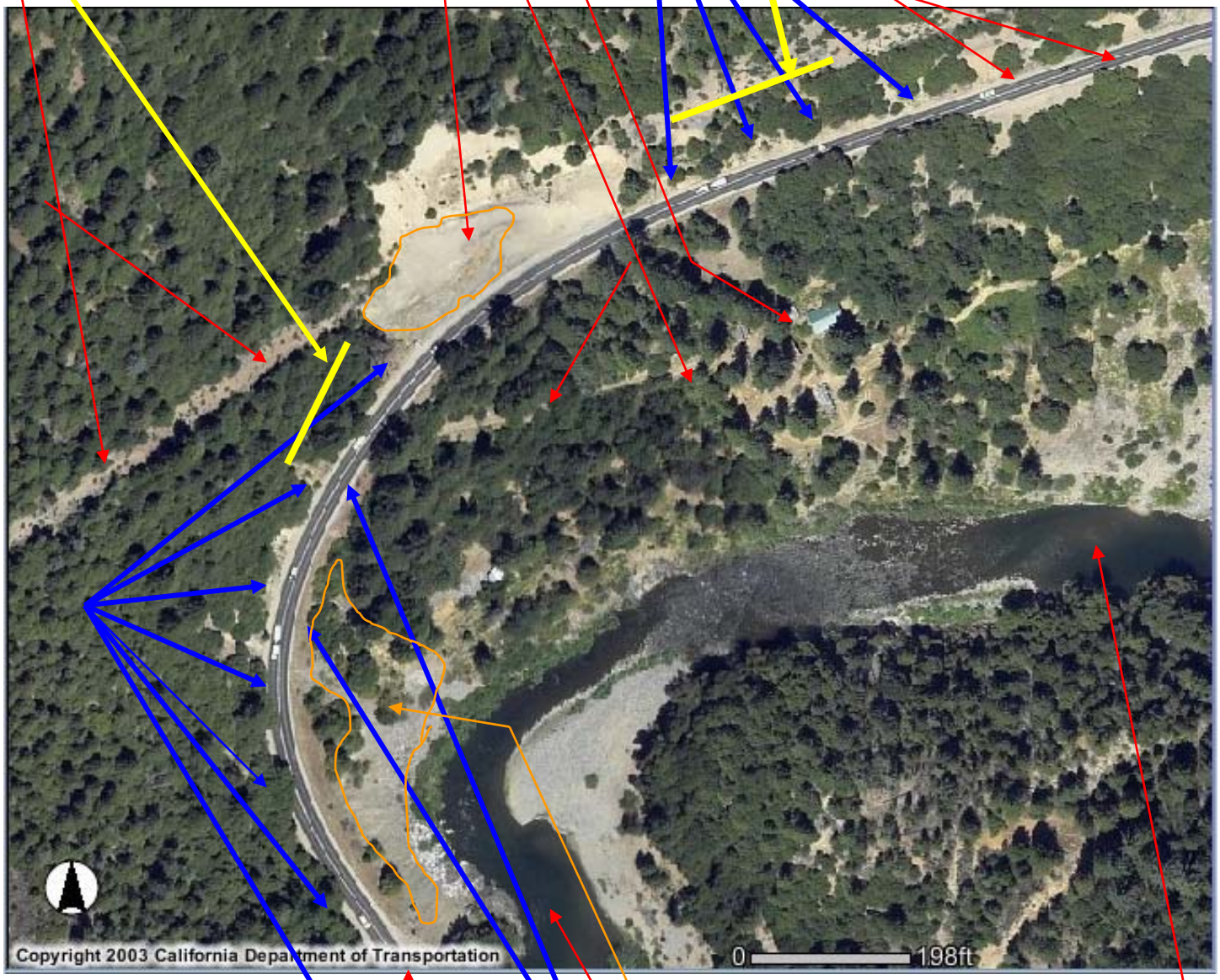
GEOTECHNICAL DESIGN REPORT

Plate No. 1



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Date: June 2010

AERIAL PHOTO OF PROJECT AREA

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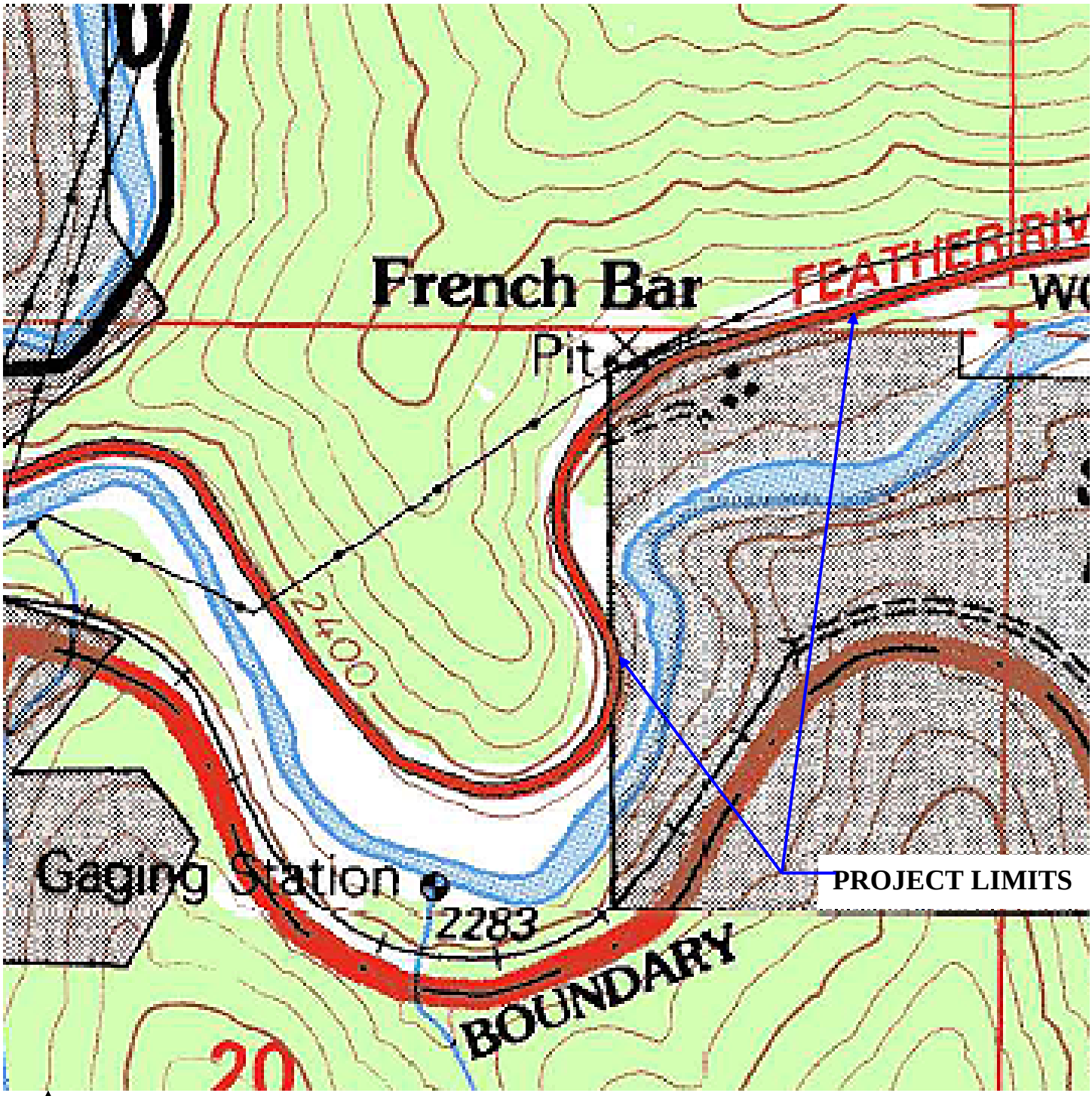
GEOTECHNICAL DESIGN REPORT

Plate No. 2



N

Approximate Scale

2400 feet

Base Map Reference: Caribou, CA Quadrangle, 7.5 minute series (topographic), 1:24,000, U.S. Geologic Survey, 1994. Compiled from aerial photos taken 1974; Revised from photos taken 1993.Contour interval 80 feet. National Geodetic Vertical Datum of 1929.

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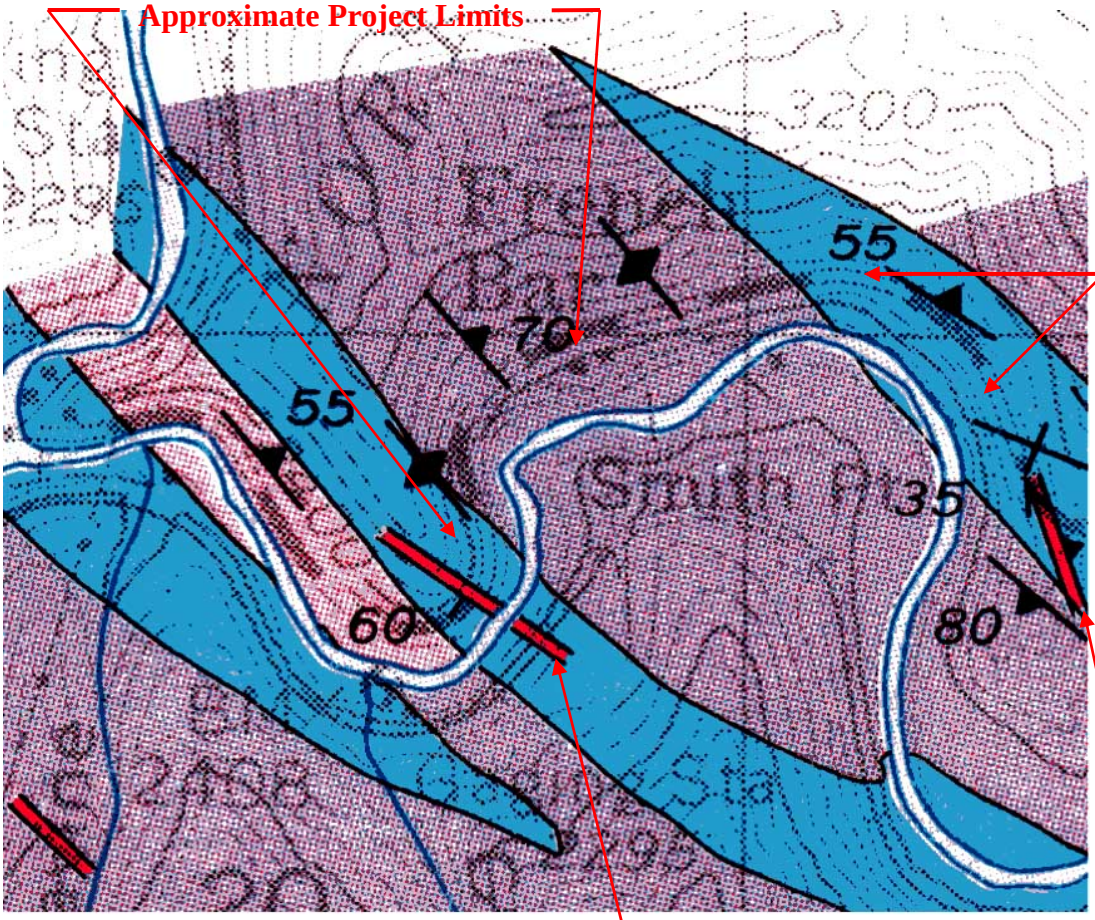
EA: 02-2E0001

Date: June 2010

TOPOGRAPHIC MAP

02-PLU-70 PM 17.2/17.5
GEOTECHNICAL DESIGN REPORT

Plate No. 3



N

Approximate Scale

2500 feet

(Geological map from Hiatanen, 1973)

STRUCTURAL LEGEND

70
Inclined — Vertical

Strike and dip of beds

65
Inclined — Vertical

Strike and dip of foliation

GEOLOGICAL UNITS

BLUE UNIT (CC) Metachert; thin-bedded dark to light gray or white quartzite with micaceous laminae

PURPLE UNIT (CS) Biotite-muscovite phyllite; fine grained brownish or dark gray biotite-quartz rock with varying amounts of muscovite, albite, and magnetite.

CALTRANS
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design-North

EA: 02-2E0001

Date: June 2010

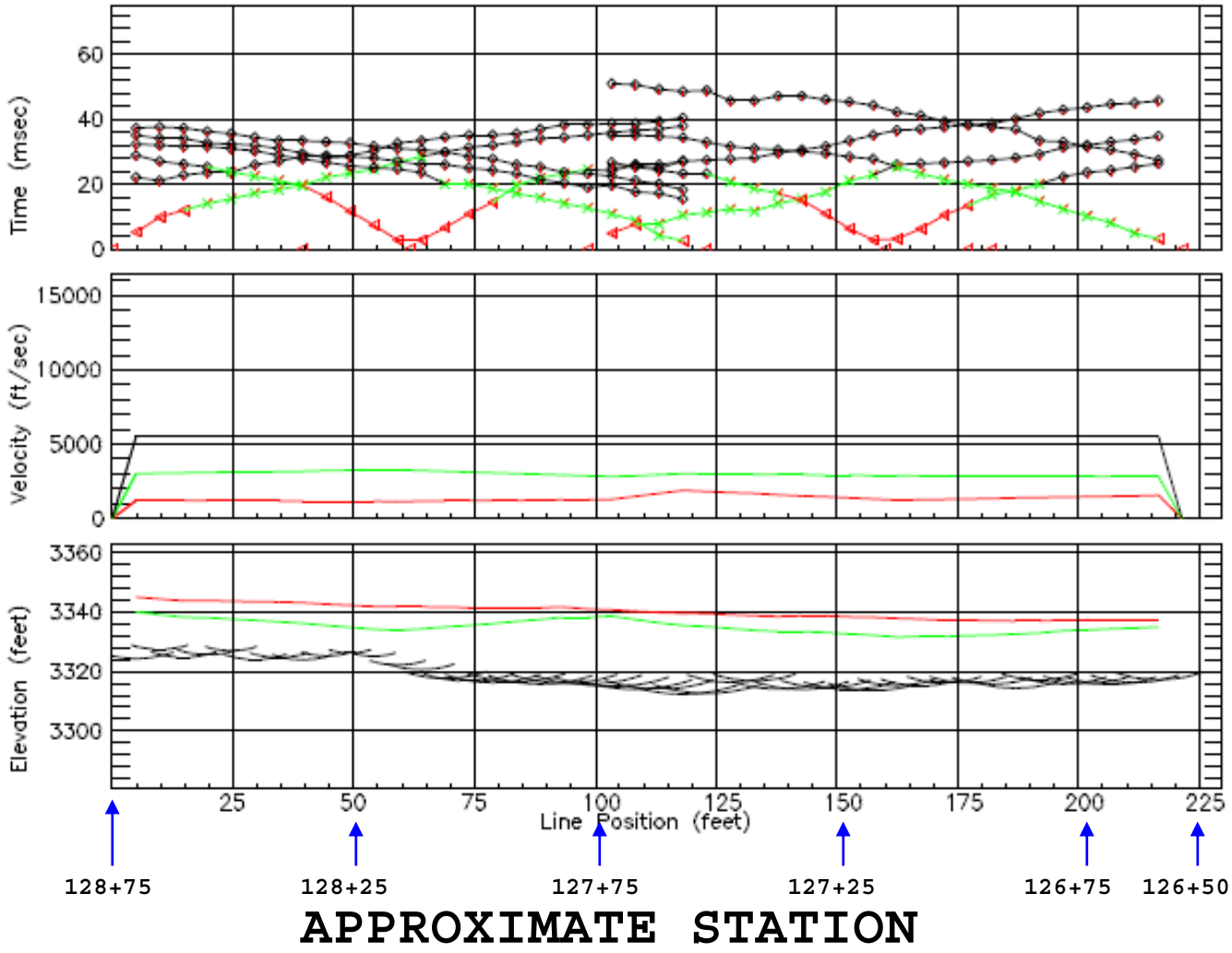
GEOLOGIC MAP

02-PLU-70 PM 17.2/17.5
GEOTECHNICAL DESIGN REPORT

Plate No. 4

East

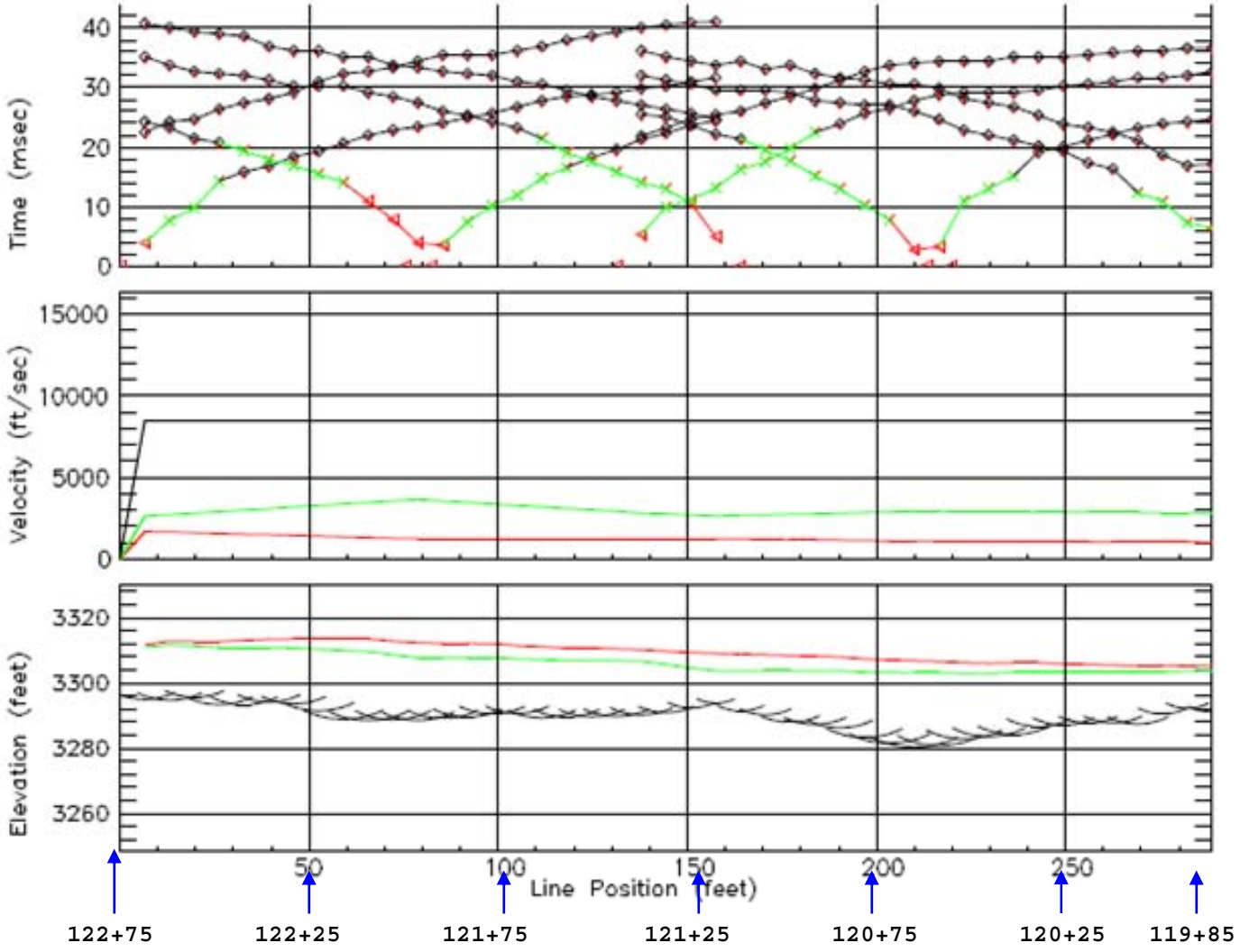
West



Seismic Refraction Line 1- Results. Travel-time curves (top), velocity model (middle), and depth section for seismic refraction line 1. The left side of the above displays is oriented approximately to the east with line position '0' being located at approximately station 128+75, about 110 feet north of present center line, while line position 225 feet is located at approximately station 126+50 about 80 feet north of the present center line. The approximate location of seismic line 1 is shown on Plate 2.

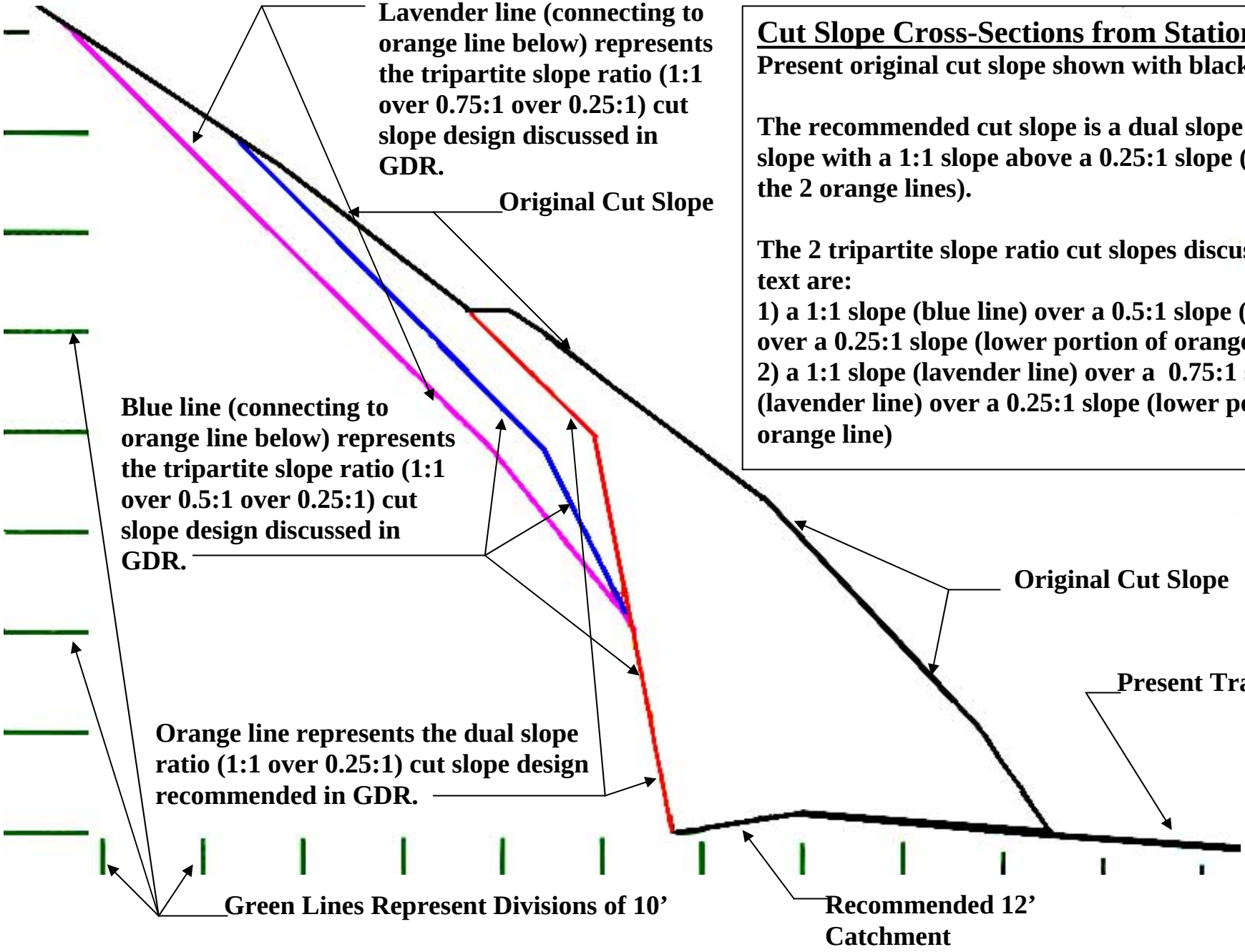
CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design-North	EA: 02-2E0001 Date: June 2010	**SEISMIC REFRACTION LINE 1**	
	02-PLU-70 PM 17.2/17.5 GEOTECHNICAL DESIGN REPORT		Plate No. 5

EAST **WEST**



Seismic Refraction Line 2- Results. Travel-time curves (top), velocity model (middle), and depth section for seismic refraction line 2. The left side of the above displays is oriented approximately to the east with line position '0' being located at approximately station 122+75, about 80 feet north of present center line, while line position 290 feet is located at approximately station 119+85 about 70 feet north of the present center line. The approximate location of seismic line 1 is shown on Plate 2.

CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design-North	EA: 02-2E0001 Date: June 2010	**SEISMIC REFRACTION LINE 2**
	02-PLU-70 PM 17.2/17.5 GEOTECHNICAL DESIGN REPORT	Plate No. 6



Cut Slope Cross-Sections from Station 121+00.

Present original cut slope shown with black line.

The recommended cut slope is a dual slope ratio cut slope with a 1:1 slope above a 0.25:1 slope (shown by the 2 orange lines).

The 2 tripartite slope ratio cut slopes discussed in the text are:
1) a 1:1 slope (blue line) over a 0.5:1 slope (blue line) over a 0.25:1 slope (lower portion of orange line) and
2) a 1:1 slope (lavender line) over a 0.75:1 slope (lavender line) over a 0.25:1 slope (lower portion of orange line)

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Office of Geotechnical Design-North

EA: 02-2E0001
Date: June 2010

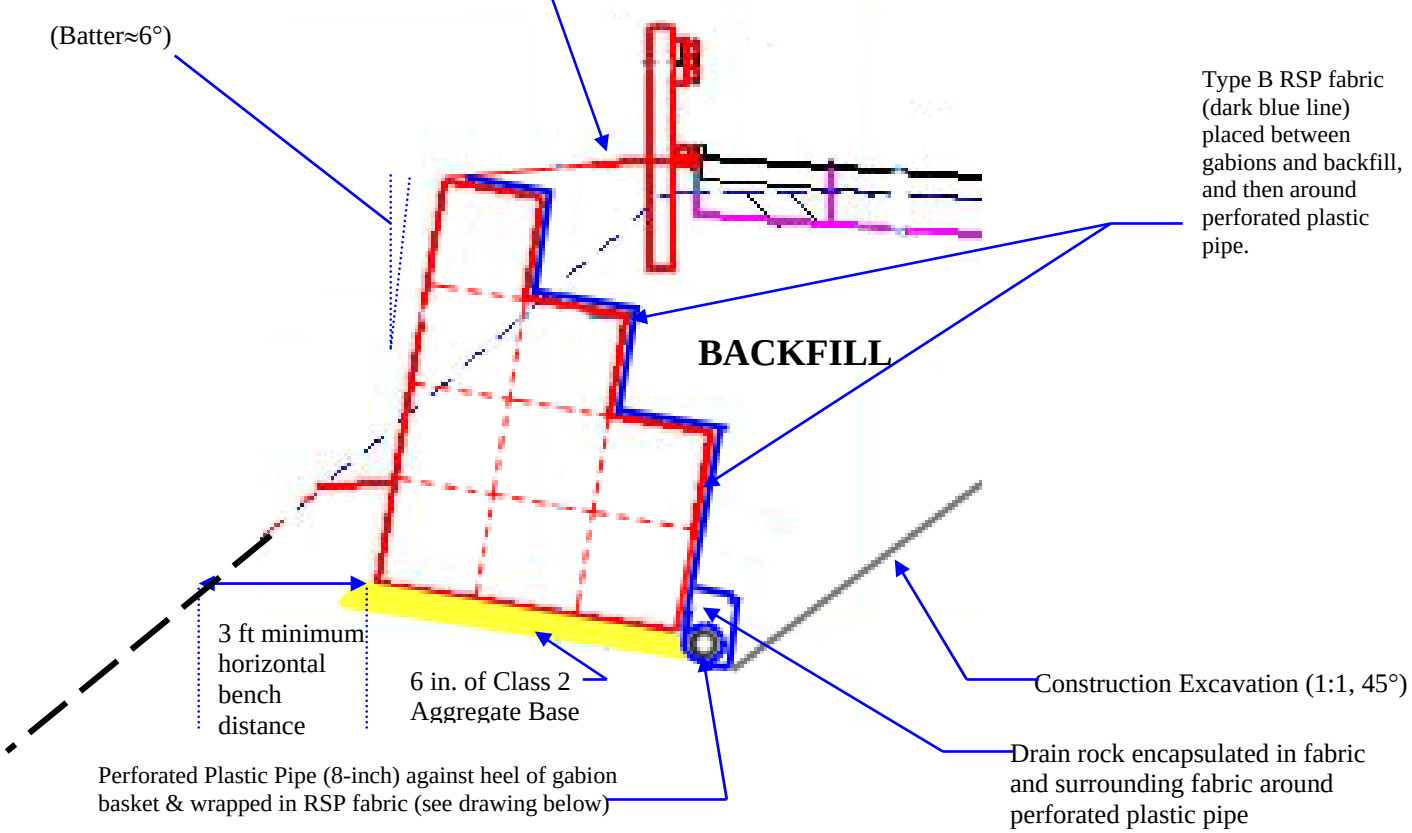
CUT SLOPE CROSS-SECTIONS

02-PLU-70 PM 17.2/17.5
GEOTECHNICAL DESIGN REPORT

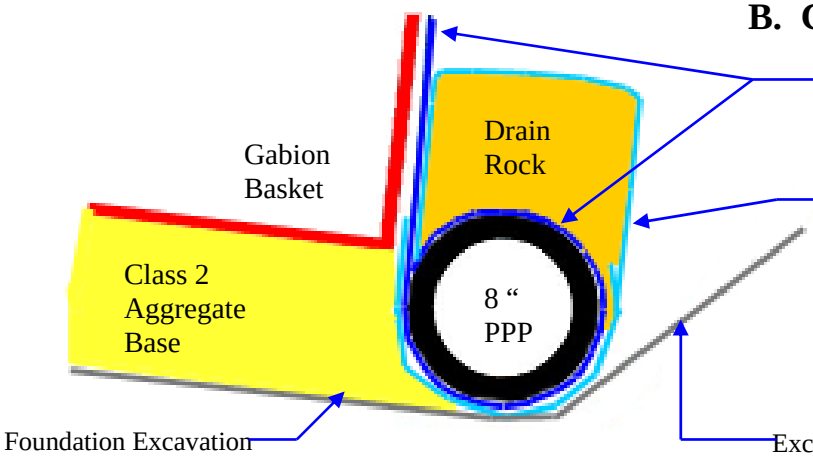
Plate No. 7

A. GABION DETAILS ON SLOPE

Gabion Basket Dimensions: 3 ft x 3 ft
Top: Length x 3 ft x 3 ft
Middle: Length x 3 ft x (3 ft x 2 baskets)
2 Bottom Rows: Length x 3 ft x (3 ft x 3 baskets)



B. GABION HEEL DRAIN DETAILS

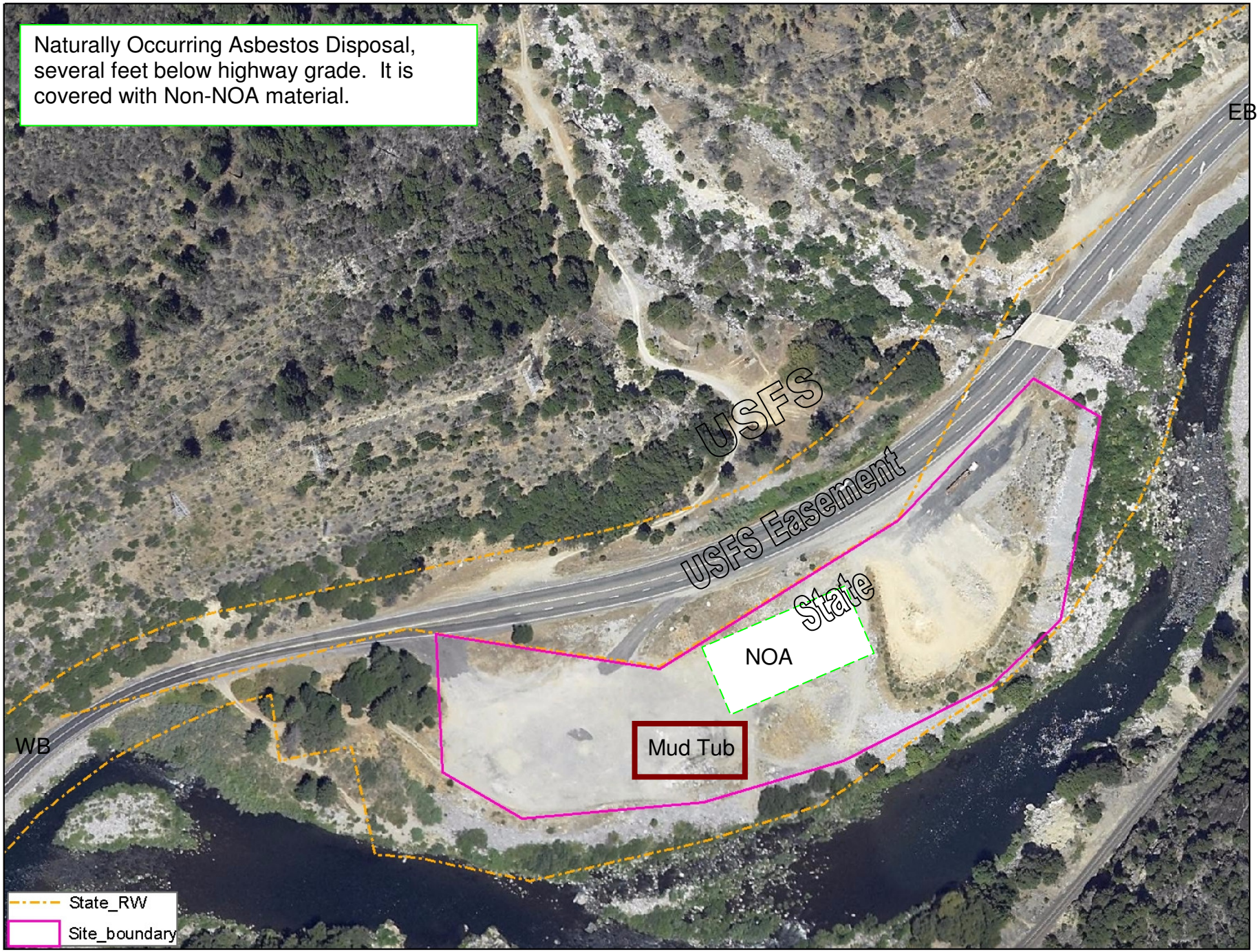


Type B RSP Fabric (in dark blue) between gabions and backfill continues down and wraps around pipe.

Type A or B RSP Fabric or filter fabric for underdrains (shown in light blue; Standard Specs Section 88) wraps between aggregate base and RSP fabric already around pipe. Fabric (light blue) then wraps around and encapsulates drain rock.

CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design-North	EA: 02-2E0001 Date: June 2010	**GABION DETAILS**
	02-PLU-70 PM 17.2/17.5 GEOTECHNICAL DESIGN REPORT	Plate No. 8

Disposal Site Plu-070-009.0 Chambers Creek



ia Department of Transportation

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
02	PLU	70	17.2/17.5		-

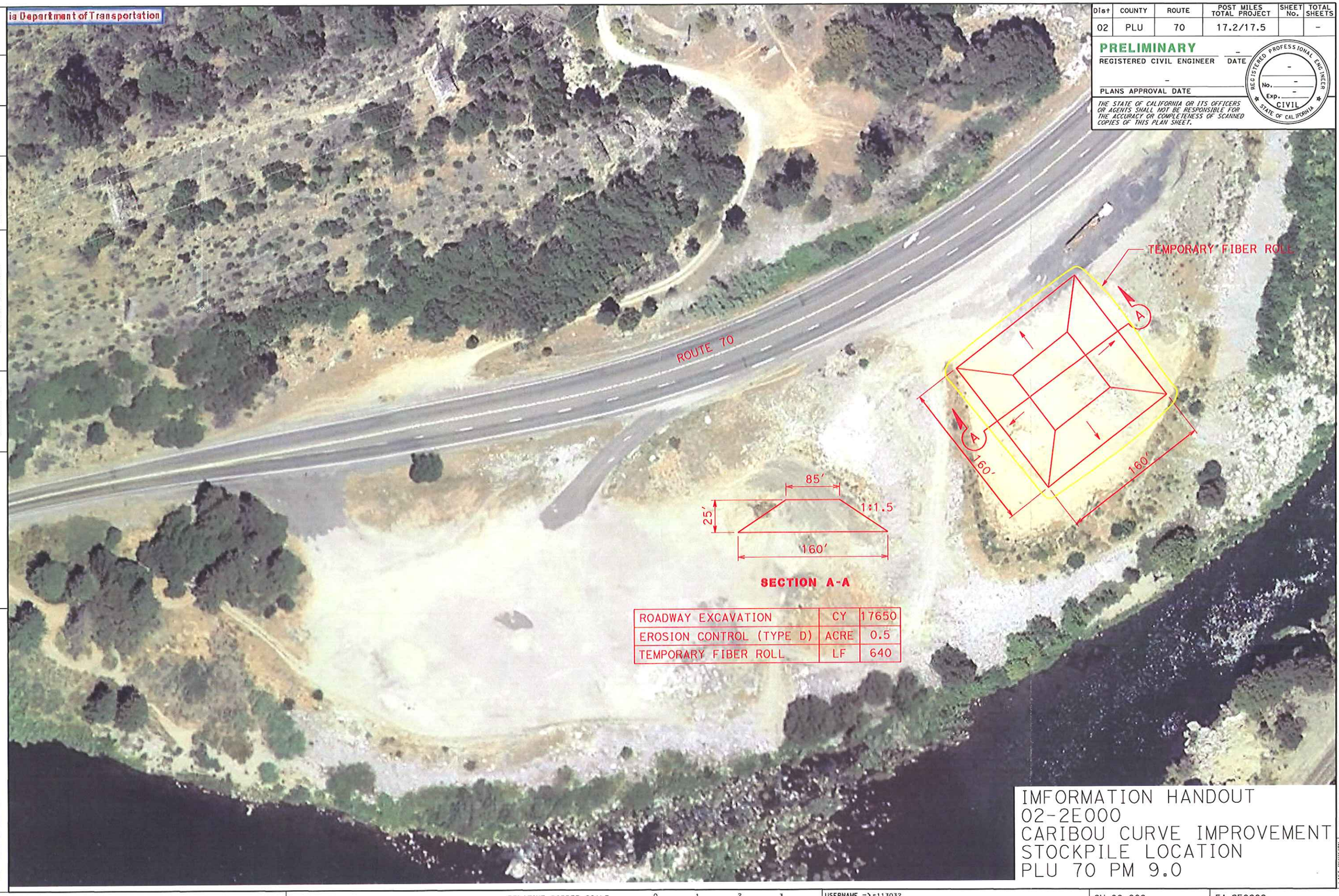
PRELIMINARY

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 SCANNED COPIES OF THIS PLAN SHEET.



SECTION A-A

ROADWAY EXCAVATION	CY	17650
EROSION CONTROL (TYPE D)	ACRE	0.5
TEMPORARY FIBER ROLL	LF	640

IMFORMATION HANDOUT
02-2E000
CARIBOU CURVE IMPROVEMENT
STOCKPILE LOCATION
PLU 70 PM 9.0

CALCULATED-DESIGNED BY	TERI ANDERSON	REVISED BY	
CHECKED BY	JUSTIN BORDERS	DATE REVISED	
FUNCTIONAL SUPERVISOR	AL TRUJILLO		

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans DESIGN

P:\proj2\02\2E000\design\Disposal Site\disp pm9.dgn

LAST REVISION 01-09-09 | DATE PLOTTED => 14-DEC-2009 | TIME PLOTTED => 16:13

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => s113032
DGN FILE => disp pm9.dgn

CU 00 000

EA 2E0000