US 50, Silva Valley Parkway Interchange, Phase 1 El Dorado County, California 03-ED-50 PM 1.07/R2.40 EA 03-1E2901

Prepared by:

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October 2012

Prepared for:

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Geotechnical • Construction Services • Forensics

File No. 556.2 October 29, 2012

Mr. Derek Minnema Mark Thomas & Co, Inc. 7300 Folsom Boulevard Sacramento, CA 95826-2622

Subject: GEOTECHNICAL DESIGN REPORT

US 50, Silva Valley Parkway Interchange 03-ED-50, PM 1.07/R2.40, EA 03-1E2901

El Dorado County, California

Dear Mr. Minnema:

Blackburn Consulting (BCI) is pleased to submit this Geotechnical Design Report for the US 50, Silva Valley Parkway Interchange Project in El Dorado County, California. BCI prepared this report in accordance with the April 7, 2010 agreement between BCI and Mark Thomas Company (MTCo). We submitted a draft Geotechnical Design Report in October 2010 and March 2012. This report includes modifications in response to comments on the draft reports and minor updates. Report comment and response are attached in Appendix E.

Thank you for the opportunity to be part of your design team. Please call if you have questions or require additional information.

Sincerely;

**BLACKBURN CONSULTING** 

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US 50, Silva Valley Parkway Interchange El Dorado County, California EA 03-1E2901, PM 1.07/R2.40 BCI File No. 556.2 October 29, 2012

"Approved as to impact on State facilities and conformance with applicable State standards and practices, and that technical oversight was performed as described in the California Department of Transportation A&E Consultant Services Manual."

Caltrans			
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Date			

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#### 1 INTRODUCTION

#### 1.1 Purpose

BCI prepared this Geotechnical Design Report (GDR) for use in design and construction of the US 50/Silva Valley Parkway Interchange project, located in El Dorado County, California. The project extends from Post-Mile (PM) 1.07 to R2.40 with the central portion of the project at PM R1.79 (38.658° latitude/121.054° longitude). Figure 1 shows the project location.

This Geotechnical Design Report is for Phase 1 roadway improvements. BCI completed a separate Materials Report for roadway improvements, and Foundation Reports for the Silva Valley Parkway Overcrossing, westbound off-ramp bridge at Carson Creek, and the westbound on-ramp and eastbound off-ramp undercrossings at the existing Silva Valley Parkway.

This report documents subsurface geotechnical conditions, provides analysis of the anticipated site conditions as they pertain to the project described herein, and recommends geotechnical design and construction criteria for the roadway portions of the project. This report also establishes a geotechnical "baseline" to assess the existence and scope of possible changed site conditions.

## 1.2 Scope of Services

To prepare this report, BCI:

- Discussed the proposed improvements with Mark Thomas & Company, Inc. (MTCo)
- Reviewed the Geometric Approval Drawings and preliminary cross sections provided by MTCo
- Observed the subsurface conditions in 39 borings and 31 test pits
- Conducted three seismic refraction surveys
- Performed laboratory tests on soil and rock samples obtained from the exploration
- Performed engineering analysis and calculations to develop our conclusions and recommendations

## 2 EXISTING FACILITIES AND PROPOSED IMPROVEMENTS

## 2.1 Existing Facilities

US 50 through El Dorado County, extending east-west, is a divided freeway, constructed in 1965 and widened in 2000/02. At the time of our field exploration (2010) HOV lanes were under construction at the median in both directions. When complete, there will be four lanes in the eastbound direction (2 mixed-flow, 1 HOV lane, and 1 truck-climbing lane) and three lanes in the westbound direction (2 mixed-flow and 1 HOV lane) through the project area.

Two existing interchanges bound the project area, El Dorado Hills Boulevard/Latrobe Road to the west at PM 0.86, and Bass Lake Road to the east at PM R3.23. The proposed Silva Valley Interchange is located at PM R1.79 (see Figure 1).

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Through the project site, US 50 has standard 12-ft wide lanes, 10-ft outside shoulders and a minimum of 10-ft wide inside shoulders (with HOV project completed, the shoulders range from 10 to 25-ft). On the mainline grade, east of the planned interchange, there is an eastbound truck-climbing lane on "Bass Lake Grade" to accommodate slow trucks. This truck-climbing lane terminates at the top of the grade just before the Bass Lake Road Interchange.

The existing Silva Valley Parkway is a north-south arterial that serves the El Dorado Hills community. Silva Valley Parkway currently crosses under US 50 (referred to as "Clarksville Undercrossing, Br. No. 25-0072), approximately 800 feet west of the new overcrossing, and is a 2-lane facility.

US 50 through the project site is established within various cut and fill sections. The fill slope gradients are typically about 1.5H:1V (horizontal:vertical) or flatter and vary in depth to a maximum of about 40 feet (at Carson Creek). Existing embankment fill includes rocky material (cobble and boulder size), likely derived from project cuts during original construction.

Cut-slopes along US 50 within the project typically expose variably weathered and fractured rock. The cuts are at gradients ranging from about 0.7H:1V to 1.5H:1V. Existing cut-slopes vary in height from a few feet to as much as 35 feet. As-Built plans (1965) indicate that underdrains (8-inch PMP) are present along the toe of most cut slopes.

Other than minor sloughing/erosion, we did not observe significant slope instability or erosion and the existing cut and fill slopes appear to have performed well since constructed.

#### 2.2 Proposed Improvements

El Dorado County proposes to construct a new Silva Valley Parkway Interchange on US 50 between El Dorado Hills Blvd/Latrobe Road Interchange and Bass Lake Road Interchange primarily east of the existing Clarksville Undercrossing (Br. No. 25-0072) at Silva Valley Parkway.

According to plans and documents provided by MTCo, the overall project (Phase 1 and 2) includes the following roadway improvements:

- Partial cloverleaf interchange with loop on-ramps in the northeast and southwest quadrants and diagonal on- and off-ramps in each direction of travel on the freeway
- Continuous auxiliary lanes between El Dorado Hills Boulevard and the Silva Valley Parkway Interchange connecting the on-ramps with off-ramps
- Auxiliary lane for the eastbound diagonal on-ramp
- Auxiliary lane for the westbound diagonal off-ramp
- An overcrossing with four lanes for through traffic on the new Silva Valley Parkway in addition to deceleration lanes for the loop on-ramps and turn pockets at the intersections
- Embankment fills and culverts (new and extended) for the auxiliary lanes, ramps, and new roadway
- Retaining walls at several locations for ramp and auxiliary lane construction
- Bike and pedestrian access beneath the freeway using the existing Silva Valley Parkway
- Tong Road, north of the freeway, will be relocated to the north to provide access to the parcels in the northeast quadrant

The project will be constructed in two phases. Phase 1 construction includes the majority of interchange improvements with the exception of the eastbound diagonal on-ramp (including the bridge at Carson Creek) and the westbound loop on-ramp (with associated retaining structures). These ramps/structures will be constructed in Phase 2, which is anticipated to begin construction sometime after 2020.

Figures 2A through 2K show the general interchange improvements, stationing and reference lines, and BCI's exploration/test locations. Following is a brief description of the Phase 1 components.

## 2.2.1 US 50 Auxiliary Lanes (Line "A2, A3L, and A3R")

The auxiliary lane improvements will extend along the mainline A2 Line (eastbound and westbound) from approximately Station 68+00 to 92+00 (MTCo, 2010 Layout), along the A3L Line from approximately Station 120+00 to 138+00, and along the A3R Line from approximately Station 112+00 to 128+00. In general, east and westbound auxiliary lane improvements will include a 12-ft wide lane, and a 10-ft wide paved shoulder. The total length of auxiliary lane is approximately 5,400 feet.

Both cut and embankment fill are necessary for auxiliary lane widening. Cuts will be primarily into existing cut slopes that expose hard rock and will have a final slope gradient of 1:1 (horizontal to vertical) or flatter. New embankment fill will be up to 15 feet in depth and will have a final slope gradient of 2:1 or flatter. Native materials derived from the project cuts, local borrow, and imported borrow will be used for construction of embankment fills. The project will require a significant quantity of import fill.

## 2.2.2 Silva Valley Parkway (Line "SVP")

The Silva Valley Parkway realignment will include a new overcrossing at US 50 that will have a total width of approximately 105-ft with four lanes for through traffic, deceleration lanes for the on-ramps, and turn pockets at the intersections. Beyond the overcrossing, the lanes will taper down to four through lanes with 4 to 10–ft wide paved shoulders and a 16-ft wide median until the transition to existing roadways. Most of Silva Valley Parkway will require embankment fill with some excavation near the intersection with realigned Tong Road (on the north side of US 50). Fill slopes will have a final gradient of 2:1 (horizontal to vertical) or flatter, and cuts into rock will be at a gradient of 1:1 or flatter.

## 2.2.3 Ramp Alignments (Lines "W1, W3, E1 and E2")

The new on/off ramps will vary in width from approximately 24 to 36-ft with an 8-ft and 4-ft wide paved shoulder and 3-ft wide unpaved shoulders. Ramps will generally require embankment fill with depths up to 15-ft. The westbound off-ramp ("W1") and eastbound loop on-ramp ("E2") will also require some excavation into the underlying rock. Fill slopes will have final gradient of 2:1 (horizontal to vertical) or flatter, and cuts into rock will be at a gradient of 1.5:1 or flatter.

## 2.2.4 Old Silva Valley Parkway Tie-in (Line "C1")

Old Silva Valley Parkway lies outside of Caltrans right-of-way (ROW) and will tie-in to the new Silva Valley Parkway with two through lanes on the north and south ends. A right turn pocket will be included at the south end. Embankment fill will be required for the south tie-in with depth of fill on the order of 3 to 5 feet. Fill slopes will be at a gradient of 2:1 (horizontal to vertical) or flatter.

## 2.2.5 Old White Rock Road Tie-in (Line "C2")

Old White Rock Road lies outside of Caltrans ROW and will tie-in to the new White Rock Road with two through lanes and a right turn pocket. The existing road at the east end of the tie-in is a narrow, concrete roadway. Excavation into the underlying rock, up to 7 feet deep, will be required for this portion of roadway. Cut slopes will be at a gradient of 1.5:1 (horizontal to vertical) or flatter.

## 2.2.6 Tong Road (Line "TR")

Tong Road lies outside of Caltrans ROW and will be realigned to the north of its current location. The new road will consist of two through lanes and shoulders (approximately 2 to 4-ft wide). A concrete arch culvert is planned at the crossing of Carson Creek. The road will require several feet of embankment fill for most of the length except at the west end where excavation into the underlying rock, up to 10-ft deep, will be required. Fill slopes will be at a gradient of 2:1 (horizontal to vertical) or flatter and cut slopes at a gradient of 1.5:1 or flatter.

#### 3 PERTINENT REPORTS AND INVESTIGATIONS

In preparing this GDR, we reviewed the following information pertinent to the project geology, geotechnical conditions, and existing facilities.

#### 3.1 Caltrans As-Built Plans

- As-built Plans: Construction on State Highway, In Sacramento County and El Dorado Counties between Folsom Junction and 2.2 miles east of Sacramento County Line, Contract No. 03-074024, Sheets 1/171 49/171, December, 1965.
- As-built Plans: Construction on State Highway, In El Dorado County between 2.1 miles east of Sacramento County Line and 1.3 miles east of Bass Lake Road, Contract No. 03-074054 and 03-074044, Sheets 1/69 29/69, September, 1966.
- As-built Plans: Construction on State Highway in El Dorado County from 1.0 km East of El Dorado Hills Blvd to East Placerville Rd Undercrossing, Contract No. 03-1A69U4, Sheets 1/112–40/112, November 15, 2000.

#### 3.2 Consultant Reports

- Blackburn Consulting, Foundation Report, Clarksville UC (Widen), Bridge No. 25-0072 L/R), El Dorado County, California, for Quincy Engineering, September 14, 2007.
- Blackburn Consulting, Geotechnical Design Report, US 50 Phase-1 HOV Lane CMIA Project, PM 0.0 to 2.9, El Dorado County, California, for Quincy Engineering, December 14, 2007.

#### 4 PHYSICAL SETTING

#### 4.1 Climate

The site is within the "Low Mountain" climate region as shown on the Caltrans Pavement Climate Regions map (October 2005). Table 1 presents monthly climatic data averages (1971-2000) recorded for Lehman Ranch (closest station with available data)<sup>1</sup>, located along Latrobe Road about eight miles south of US 50.

Data Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Avg. Total Precipitation (in)	4.03	3.24	3.21	1.81	0.47	0.26	0.38	0.41	0.61	1.92	3.70	3.13	23.16
Avg. Max. Temp. (F)	47.1	54.4	61.5	69.8	79.0	90.0	93.0	90.1	83.5	71.7	57.7	47.1	70.4
Avg. Min. Temp. (F)	21.3	25.5	31.1	36.9	45.3	54.2	62.0	61.1	52.9	40.1	28.7	21.0	40.0

**Table 1 - Climate Data** 

Based on the above data, over 80 percent of the total annual precipitation occurs between October and March. The data also indicates that significant periods of daily temperature above 50 degrees Fahrenheit (required for paving operations) are not likely from November through March. Although freezing temperatures will occur, the duration is not considered significant to geotechnical engineering aspects (pavement, foundations, etc.).

## 4.2 Topography and Drainage

Existing ground elevations in the project area range from a low of approximately 600 ft above mean sea level at the west end of the project, to a high of approximately 900 ft at the east end. Overall site topography is moderately to gently sloping to the west/southwest, but this has been modified by steep cuts and fills along US 50.

Drainage is generally to the west/southwest through creeks, ditches, and sheetflow. Roadway improvements along US 50 have modified the topography and drainage. Pre-existing drainages cross beneath US 50 in a southwesterly direction, including Carson Creek near "A3R&L" Line, Station 110+50 and Bucks Ravine Creek near "A2" Line, Station 93+00.

<sup>&</sup>lt;sup>1</sup> Western Regional Climate Center (WRCC) website (<a href="http://www.wrcc.dri.edu">http://www.wrcc.dri.edu</a>) from Blackburn Consulting (2007)

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At the project site, the majority of US 50 is cut into native soil and rock but there are significant fills where creek and drainage crossings occur. Some of the existing fill and cut slopes will be modified for the interchange improvements. We did not observe indications of existing embankment or cut slope instability.

Site vegetation consists of a moderate to thick cover of grass and weeds, with scattered clusters of trees (primarily within drainages).

# 4.3 Man-made and Natural Features of Engineering and Construction Significance Outside Caltrans Right-of-Way

There are no significant features of engineering or construction significance adjacent to the project other than existing roadway, parking lot pavement (for the nearby church), overhead and underground electric, and water lines. We do not expect the project improvements (ramp embankments, overcrossing, road widening, culverts, etc.) to have a significant geotechnical impact to the adjacent parcels.

## 4.4 Regional Geology

The project site is located within the foothills of the Sierra Nevada Geomorphic Province of California. The Sierra Nevada has a general northwest topographic/structural trend and is on the order of 430 miles long and 40 to 80 miles wide. The mountain ranges of the Sierra Nevada were created roughly 120 to 130 million years ago when sediments as thick as 30,000 feet along with volcanic rocks were buckled and warped resulting in a series of low mountain ranges. The roots of these mountain ranges were then intruded by granitic rock.

The Sierra Nevada was tilted upward along faulting at the eastern edge. In the higher elevations, much of the younger sedimentary material and older metamorphic rock has been eroded and exposes granitic rock. The older rocks that remain are metamorphosed and are exposed in the foothills of the Sierra Nevada.

Most of El Dorado County is underlain by Mesozoic-age metavolcanic and metasedimentary rocks. Metavolcanic rock occurs at relatively shallow depths throughout the project. The metamorphic rock structure is dominated by northwest trending foliation and northwest trending faults and fault zones that mark the boundaries of major rock types.

#### 4.5 Local Geology

Published geologic mapping by Wagner<sup>2</sup> and Busch<sup>3</sup> shows Jurassic-age metavolcanic rock at the project site. Our site review and preliminary subsurface work confirm the presence of shallow, metavolcanic rock. We show local site geology on Figure 3 (Geologic Map).

<sup>2</sup> Wagner, D.L. et al, "Geologic Map of the Sacramento Quadrangle, California", California Geological Survey, Map No. 1A, 1981, revised 1987.

<sup>&</sup>lt;sup>3</sup> Busch, "Generalized Geologic Map of El Dorado County, California", June, 2001, California Geological Survey, OFR 2000-03.

Rock structure in the area has a predominant foliation with a general strike of north, 35° to 45° west, and a steep dip of 70°-90° to the north. Rock is exposed intermittently on the slopes adjacent to the new interchange. We did not observe indications of slope instability on the natural slopes in the area.

The West Bear Mountains Fault is located approximately 4,000 feet west of the central portion of the project (near Latrobe Road) with a short splay mapped approximately 1,900 feet to the east (see Figure 3). The East Bear Mountains Fault (or Rescue section) is located approximately 7 miles east of the site. Faulting is not mapped through the site and we observed no indication of active faulting in the area.

Published mapping and site review does not indicate that the project is within an ultramafic rock area (typical host rock for asbestos minerals); however, ultramafic rock and faulting are mapped nearby and naturally occurring asbestos minerals can potentially occur in this area.

Geologic mapping by Churchill<sup>4</sup> shows an "area more likely to contain naturally occurring asbestos" (NOA) about one mile north of the Latrobe Road Undercrossing and also east of Bass Lake Road. The mapping shows the project area to be within an area "that probably does not contain asbestos." Churchill discusses the possibility of serpentine occurring in faults or within fault zones, which may contain chrysotile or tremolite/actinolite asbestos. Mapping by Bruyn<sup>5</sup>, shows a "Quarter Mile Buffer for More Likely to Contain Asbestos or Fault Line" within the western portion of the project (roughly extending to the overcrossing location).

## 4.6 Regional Seismicity

Our review of published geologic mapping and site review did not reveal the presence of Late Quaternary (displacement within the last 700,000 years) or younger faults within or adjacent to the project site.

The site does not lie within or adjacent to an Alquist–Priolo Earthquake Fault Zone for fault rupture hazard (Bryant and Hart, 2007)<sup>6</sup>, and no known active faults are mapped with the project area. Busch (2001) shows the main trace of the West Bear Mountains Fault crossing US 50 approximately 3,100 feet west of the existing Silva Valley Parkway and a north-south trending splay associated with this fault crossing US 50 approximately 1,200 feet to the west. Jennings (1994)<sup>7</sup> shows the West Bear Mountains Fault as Pre-Quaternary in age. The Caltrans Deterministic PGA Map (September 2007) does not consider this fault as an active seismic source and shows no active faults in the project area.

<sup>4</sup> Churchill, et al., 2000, "Areas More Likely to Contain Natural Occurrences of Asbestos in Western El Dorado County, California", California Geological Survey, OFR 2000-02

<sup>&</sup>lt;sup>5</sup> Bruyn, 2005, "Asbestos Review Areas, Western Slope, County of El Dorado, State of California", El Dorado County

 <sup>&</sup>lt;sup>6</sup> Fault Rupture Hazard Zones in California, Special Publication 42, Interim Revision; California Geological Survey
 <sup>7</sup> Fault Activity Map of California and Adjacent Areas, Geologic Map No. 6, California Division of Mines and Geology

The closest fault considered in ground motion analysis is the East Bear Mountains Fault (or Rescue section) located approximately 7 miles east of the overcrossing site. We consider the potential for fault rupture at the site to be low.

We show approximate fault locations on Figure 4, Seismic Hazard Map, which is a copy of a portion of the Caltrans Deterministic PGA Map (September 2007).

#### 5 EXPLORATION

## 5.1 Drilling, Trenching, and Sampling

To characterize subsurface conditions at the site, BCI observed the drilling, excavation, and sampling of 39 borings and 31 test pits in August and September 2010. Boring depths ranged from 1 ft (auger refusal) to 51 ft below the ground surface (bgs). We excavated the test pits to depths from 2.5 to 10 ft bgs.

We completed the borings and test pits for this Geotechnical Design Report, bridge Foundation Reports, and the Materials Report. We show all boring and test pit locations on Figures 2B through 2K (including logs for Phase 2 improvement locations) and boring and test pit logs, Foundation Report Log of Test Borings (LOTB's), and the Legend of Logs in Appendix A.

The location and depth of exploration points were determined by BCI based on 1) preliminary project geometrics, 2) site access, 3) anticipated soil conditions, 4) the presence of existing fill, and 5) the proposed structures.

Our drilling sub-consultants (PC Exploration and Taber Drilling) advanced the borings using a combination of solid augers, hollow-stem augers, and coring methods. Solid augers were about 4 inches in diameter, hollow-stem augers were approximately 7 inches in diameter, and the core bit was approximately 3.8 inches in diameter (HQ). BCI obtained relatively undisturbed soil samples at various intervals using a 3-inch O.D. Modified California sampler (MCS) equipped with 2.4 inch I.D. brass liners. The drillers used an automatic, 140 lb. hammer falling approximately 30 inches to drive the samplers. We drilled and sampled rock using HQ wire-line rock coring techniques.

We sealed the MCS liners with plastic caps. We placed continuous core samples in labeled core boxes. We also obtained bulk soil samples from auger cuttings and the backhoe bucket. During drilling, we performed field strength testing with a pocket penetrometer on select cohesive and/or cemented soil samples. We note the field tests on the logs.

Our excavation contractor (Monte Ricky and Burke Backhoe) excavated the test pits with a Caterpillar 430D, rubber-tire backhoe equipped with a 24-inch wide bucket. We obtained disturbed (driven, small and large bulk) soil samples at select depth intervals from some test pits. We used plastic caps to seal and label 6-inch brass tubes retrieved from the driven samples. We placed small bulk samples into plastic bags and large bulk samples into large cloth bags, and labeled each for laboratory identification.

We located borings and pits by taping and/or pacing from existing site features. We estimate elevations based on available topographic mapping. Boring and test pit locations are not surveyed. A BCI geologist or engineer logged the borings and retrieved samples for laboratory testing.

#### **5.2** Seismic Refraction Survey

We performed seismic refraction surveys at 3 locations within the interchange area, 1) near the south abutment of the Silva Valley Parkway Overcrossing, 2) along the eastbound auxiliary lane cut slope (near A2 Line, Station 80+40), and 3) along the westbound auxiliary lane cut slope (near A2 Line, Station 86+50).

Each line was 55 ft in length. We located the lines based on project plans and measuring from existing features. A BCI geologist led the field exercise and monitored data acquisition. We show the location of the seismic refraction survey lines on the Location Map (Figures 2C and 2E) and our interpreted seismic velocity profiles on the Seismic Profile sheets in Appendix C.

Each seismic refraction line consists of 5 shot points distributed along a collinear array of 12 geophones placed at 5-foot intervals. We use a multi-channel seismograph located at one end of the array to collect the data. We generate compressional wave energy (P-waves) at each shot point with multiple impacts of a 10-pound sledge hammer striking a steel plate on the ground surface. A Geode 24-Channel Seismograph was used to detect, digitize, and record the P-waves. We analyzed the acquired data with the computer program *SeisImager* by Geometrics, Inc.

We discuss seismic refraction results in the "Subsurface Soil and Rock Conditions" and "Rippability" sections of this report.

## 5.3 Geologic Mapping

BCI checked the mapped geologic conditions presented in the references during our fieldwork. Our site review and subsurface investigation confirms the presence of metavolcanic rock below a relatively thin veneer of soil throughout the project area. We also recorded rock structure exposed in our test pits, at highway cuts, and at rock outcrop throughout the site. The recorded rock structure is discussed further below.

## 5.4 Exploration Notes

We were able to excavate with a backhoe and auger drill to depths of 2.5 to 10 feet at most exploration locations within the site. Our test pits encountered practical refusal to the bucket excavator, generally within 6 feet of the surface. After exploration, we immediately backfilled the test pits with the excavated materials. Borings were also backfilled with soil cuttings and/or grout backfill where within roadways or where deeper cores were obtained.

#### **6 GEOTECHNICAL TESTING**

In addition to Standard Penetration Tests, field pocket penetrometer tests, and field resistivity tests, we completed the following laboratory tests on representative soil samples from exploratory borings and test pits:

- Moisture content (ASTM D2216) and unit weight (ASTM D2937)
- Plasticity Index (ASTM D4318)
- Sieve Analysis (ASTM D422)
- Direct shear (ASTM D3080)
- Unconfined Compression (ASTM D2166)
- Compaction (CTM 216)
- Resistance Value (CTM 301)
- Sulfate content (CTM 417), chloride content (CTM 422), pH (CTM 643) and resistivity testing (CTM 643)

We attach laboratory test results and a summary of results in Appendix B.

## 7 GEOTECHNICAL CONDITIONS

## 7.1 Site Geology

Based on our geologic reconnaissance and subsurface exploration, site geology is consistent with published geologic mapping and previous site exploration by others.

## 7.1.1 <u>Lithology</u>

The predominant rock-type throughout the project is metavolcanic rock, which is exposed extensively in cut slopes along the highway and road shoulders and at outcrop that occurs throughout the site. Rock outcrop and cut-slopes expose variably weathered and fractured metavolcanic rock. The rock weathering ranges from decomposed (i.e., effectively "soil-like") to intensely weathered, with areas of slightly weathered to fresh rock. Both rock fracture and weathering decrease with depth below the ground surface.

We did not observe serpentinite or other ultramafic rock types (a host rock for NOA), or significant bands of fibrous (asbestiform) minerals within rock outcrop, slope cuts, or in our borings and test pits. As discussed above, NOA mapping by others does not show the project within an ultramafic rock area.

#### 7.1.2 Rock Structure

Rock structure in the area has a predominant foliation generally with a strike of north, 35° to 45° west (but ranging from 20° to 60° west), and a steep dip of 70°-90° to the north. The rock has localized pervasive fracture and is also randomly fractured, generally by very short, stepped, blocky fractures. Fracture intensity varies with depth and is generally intense in the upper 10 to 15 feet and becomes moderate to slight below that depth. Fractures are generally tight to thin infilling and have a rough/wavy texture. We observed one narrow shear zone (approximately 2

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to 3 feet wide) at the eastbound shoulder near A2 Line Station 82+50. This shear zone appears associated with the West Bear Mountains Fault (considered to be Pre-Quaternary in age) and has a strike of north, 60° west and a steep dip of 75° southwest.

## 7.1.3 Natural and Built Slope Stability

Published mapping that we reviewed does not show landslide features within the project area. Natural slopes and highway cuts do not show signs of instability (e.g., significant rockfall or slope failure). We did not observe evidence of significant geologic hazards, including landsliding, settlement, very soft soils, severe erosion, springs, etc., during our site reconnaissance. We did not observe any areas of distress (such as slumps, distortion or severe erosion) within existing embankment fill slopes within the project interval.

#### 7.2 Subsurface Soil and Rock Conditions

#### 7.2.1 General Field Exploration

We completed our exploration points along the existing highway/roadways and in areas of the proposed interchange improvements, including the structure approaches, the ramp alignments, and culvert extensions. See Figures 2B through 2K for exploration locations.

## 7.2.2 <u>Exploration</u>

In the borings and test pits, we encountered two units significant to roadway elements:

- Unit 1: This unit consists of roadway fill that overlies the native soil and rock. The fill typically consists of what appears to be a locally derived mixture of soil and rock and is generally classified as silty/sandy gravel with boulders and cobbles. In general, Unit 1 is located at embankment fill locations for the existing highway/roads and at transitions to at-grade or cut areas. Fill also occurs at:
  - o the church facility located on the north side of Tong Road where it encroaches on the westbound diagonal off-ramp (approximately at W1 Line, Station 112+00 to 114+50)
  - o a pipeline/roadway drainage crossing on the planned alignment of new Silva Valley Parkway (approximately SVP Line, Station 180+75 to 182+00)
  - o dumped material on the new Silva Valley Parkway (approximately SVP Line, Station 180+25 to 180+75)
- Unit 2: This unit consists of native soil and rock. In general, the native soils are comprised of very stiff to hard, sandy silt/clay with gravel, and medium dense to dense silty, clayey gravel with sand and are on the order of 2 to 4 feet thick. The soils overlie variably weathered and fractured metamorphic rock, consistent with published geologic mapping. The upper portion of the rock unit is decomposed to moderately weathered, very intensely to intensely fractured, and soft (locally hard), and becomes generally less weathered and fractured and harder with depth. Unit 2 occurs throughout the site and underlies Unit 1.

Appendix A contains the boring and test pit logs that provide more specific soil and rock descriptions, blow count, and rock core data. For reference, we also include LOTB's for the proposed bridges at Silva Valley Parkway Overcrossing, Carson Creek ramp bridges, and Silva Valley Parkway ramp undercrossings.

## 7.2.3 Seismic Refraction Exploration

Our seismic refraction survey interpretations show that recorded velocities range from  $\pm 2,000$  to 6,000 feet per second (fps) in the upper 20 ft of the subsurface. Based on our subsurface explorations and previous experience, these velocities appear consistent with the fractured metavolcanic rock and weathering near the surface.

#### 7.3 Water

#### 7.3.1 Surface Water

At the time of our field work (July/August), we observed flowing water in Carson Creek and Bucks Ravine Creek (tributary to Carson Creek located west of existing Silva Valley Parkway). In general, surface water drainage along the highway and roadways is directed along ditches to storm drain facilities and eventually into Carson Creek. The creek crossing US 50 near A2 Line, Station 93+00 (Bucks Ravine Creek) appears to be partially blocked by beaver activity between the south side of US 50 and Joerger Cutoff Road.

#### 7.3.1.1 Scour

Drainages are underlain by hard rock that controls the rate of scour. At Carson Creek, hard rock is exposed in the creek bed on either side of the highway. We did not observe scour and/or significant erosion at the inlet or outlet of the US 50 box culvert at Carson Creek.

The small drainage (Bucks Ravine Creek) that crosses White Rock Road (near SVP Line 145+00) also has no significant scour that is visible (there is significant vegetative growth near highway and road crossings). Elevation survey by MTCo suggests some erosion (2 to 3 feet) in the stream channel downstream of the culvert outlet. At the crossing of the existing White Rock Road, rip—rap has been placed around the box culvert outlet.

#### 7.3.1.2 Erosion

We observed only minor (less than 4 inches deep) erosion rills and gullies in the existing embankment fills and cut slopes. This appears to occur where surface water concentrates above and flows over the slope. Unlined drainage ditches and swales along the perimeter and median of US 50 do not appear significantly eroded. One location, at the eastbound cut-slope near A2 Line, Station 83+00, has an eroded gully on the slope due to minor drainage that has been allowed to drain freely over the slope.

#### 7.3.2 Groundwater

We did not observe groundwater seepage at the surface in the project area, or within our test pits or augered borings, with the exception of perched groundwater at a depth of 8 to 9 feet (approximate elevation of 662 feet) located above weathered rock at Test Pits T-10-147 & 153 (near Bucks Ravine Creek on the north side of US 50, near A2 Line, Station 93+00).

During our subsurface exploration for the US 50 Clarksville UC (Br. No. 25-0072, median infill) project (BCI 2007), we encountered groundwater in the east abutment boring at an elevation of approximately 660 feet. Existing ground elevation at the proposed abutment locations is at approximately 670 to 690 feet.

In general, we expect that shallow groundwater and seepage can occur near the soil/rock interface (typical depths of approximately 3 to 6 feet below existing, natural grade), particularly during the winter months or extended periods of rainfall. Locally, seepage can also occur along zones of fractured or less weathered rock and daylight at the ground surface or within excavations. Groundwater and perched water levels can fluctuate due to changes in precipitation, water levels in local drainages, irrigation, pumping of wells, and other factors.

## 7.4 Project Site Seismicity

#### 7.4.1 Ground Motions

Based on Caltrans ARS Online (V1.0.4), the closest recognized Late Quaternary or younger fault is the Bear Mountains Fault Zone (Rescue Fault section, Caltrans Fault ID No. 83, Maximum Magnitude: 6.5) located  $\pm 7$  miles east of the site. For approximate fault locations, see Figure 4.

We used the Caltrans ARS Online (web-based tool) to calculate both deterministic and probabilistic acceleration response spectra for the site based on criteria provided in Appendix B of Caltrans Seismic Design Criteria (Revision Date:9/11/09).

The deterministic spectrum is determined as the average of median response spectra calculated using ground motion prediction equations developed under the "Next Generation Attenuation" (NGA) project. These equations are applied to all faults considered to have been active in the last 700,000 years (Late Quaternary age) and that are capable of producing a moment magnitude earthquake of 6.0 or greater.

The probabilistic spectrum is obtained from the USGS (2008) National Hazard Map for 5% probability of exceedance in 50 years. Caltrans design spectrum is based on the larger of the deterministic and probabilistic spectral values. Both the deterministic and probabilistic spectra account for soil effects through incorporation of the parameter Vs30, the average shear wave velocity in the upper 30 meters of the soil profile. For the project site, we assume a Site Class B/C with Vs30 equal to 760 meters per second (approximately 2,500 feet per second) based on the mapped ground conditions (underlain by shallow metamorphic rock).

The peak ground acceleration (PGA) at the site is approximately 0.2g based on Caltrans ARS Online and minimum deterministic levels of ground acceleration.

## 7.4.2 Ground Rupture

Our review of published geologic mapping and preliminary site review did not reveal the presence of Late Quaternary (displacement within the last 700,000 years) or younger faults within or immediately adjacent to the project site. The potential for ground rupture at the site is low.

## 7.4.3 Liquefaction

Liquefaction can occur when loose to medium dense, granular, saturated soils (generally within 50 ft of the surface) are subjected to ground shaking. Our subsurface investigation indicates that the site is underlain by shallow rock, which is not liquefiable.

#### 8 GEOTECHNICAL ANALYSIS AND DESIGN

#### 8.1 Cuts and Excavations

Significant cut slopes and excavations are anticipated for this project. Excavations of up to 25 feet are required for the eastbound diagonal off-ramp near the intersection with Silva Valley Parkway, and up to 15 feet for Tong Road near Silva Valley Parkway. Existing slopes along US 50, up to 35 feet in height, will be cut back approximately 10 to 15 feet (or more) to widen for auxiliary lanes. Based on the good condition/performance of existing cut slopes and the results of our field exploration, we expect the proposed slopes, cut into rock at a gradient of 1H:1V or flatter, to be stable.

Temporary slopes may be required for certain installations. Prepare all slopes and shore temporary excavations in accordance with current Cal OSHA requirements. Where the use of excavation sloping and/or shoring is required, a competent person must classify each soil deposit as Type A, Type B, or Type C in accordance with OSHA procedures. We expect most native soils to be classified as Type B, which requires a temporary slope gradient of 1:1 or flatter. Excavations in fill will require sloping or shoring for Type C soils.

## 8.1.1 Cut Slope Stability

Cuts will expose surficial soils and underlying rock. Surficial soils are relatively shallow (2 to 4 feet) and we expect them to have little impact on overall slope stability. Rock slope stability is commonly controlled by failure along discontinuities (planes of potential weakness) within the rock mass. To determine the potential for slope failures within the rock, we recorded pervasive discontinuities and used a computer program (Rockpack III) to evaluate the potential for failure.

Appendix D contains stereonets generated for each cut slope location. Stereonets show the orientation of cut slopes and discontinuities (Great Circles), and a critical zone where if dip vectors or intersecting planes occur within (or close to it) suggest a possibility of failure. For review, we use a conservative discontinuity phi angle of 32 degrees. Table 2 shows the discontinuity orientations that we measured at the location of proposed slopes and likely affects on the planned slope.

Table 2 - Rock Discontinuities and Stability

Table 2 - Rock Discontinuities and Stability									
General Location and Existing Condition	Proposed Cut Slope	Strike and Dip (degrees)*	Stability Condition						
Eastbound Auxiliary Lane, A2 Line, Station 77+00 to 89+00  Existing north-northwest facing slope at 0.7h:1v gradient, maximum height up to approximately 35 feet.	Existing slope to be cut back for widening, 10 to 15 feet, at flatter (1h:1v) gradient than existing.	Western End N35W, 65N fol N75W, 24S fr N60W, 75S sh N25E, 70N fr Eastern End N60W, 75S sh N25E, 70N fr N40W, 75N fol	Stable at proposed gradient of 1:1 and flatter. No significant planes or wedges out of slope.  Minor rockfall potential with rock diameter estimated at approximate max. = 10 inches, avg.= 4 inches.						
Silva Valley Parkway Overcrossing, South Abutment, A3R Line, Station 104+00 to 108+00  Existing north-northwest facing slope at 1.5h:1v gradient, maximum height up to approximately 25 feet.	Existing slope to be cut back for eastbound loop on- ramp at same gradient (1.5h:1v). Slope paving under bridge.	N19W, 88S fol N40W, 82N fol N63E, 70S fr N86W, 70S fr N30W, 85N fol N35W, 82N fol N48W, 84N fol	Stable at proposed gradient of 1.5h:1v and flatter. No significant planes or wedges out of slope.  Low potential for rockfall due to slope gradient and proposed paving.						
Westbound Auxiliary Lane, A3L Line, Station 126+00 to 134+00  Existing southwest facing slope at approximate 1.5h:1v and flatter gradient, maximum height up to approximately 25 feet.	Existing slope may be cut back approximately 8 feet at a gradient of 1:1 or flatter.	Eastern End N66E, 81S fr N37E, 88N fr N50W, 15S fr N60W, 17S fr N44W, 76N fol N34W, 87S fol N60W, 78N fol N70W, 9S fr Western End N34W, 87S fol N50W, 15S fr N60W, 16S, fr N55W, 64N fol	Stable at proposed gradient of up 1:1 or flatter. Some planes and minor wedge out of slope toward east end but at low angle (9 to 18 degrees) that is stable considering rough and tight fracture surfaces.  Minor rockfall potential particularly at west end. Review following completion of cut.						
Silva Overcrossing, North Abutment, A3L Line, Station 102+00 to 109+00 Existing south-southeast facing slope at 1.5h:1v gradient, maximum height up to approximately 30 feet.	Existing slope to remain as-is for Phase 1. Will be cut back for westbound loop onramp at same gradient (1.5:1) during Phase 2. Tie-back wall proposed for portion of slope in Phase 2. Slope paving under bridge.	N40W, 83N fol N35W, 76N fol N50E, 84S fr N60E, 16S fr N38W, 84N fol N63E, 70S fr N65W, 25S fr	Stable at existing gradient of approximately 1.5h:1v. Some possible minor wedges out of slope on semi-continuous fracture dipping shallow to the southwest but wedges plunge at a low angle (16 to 22 degrees) that is stable considering rough and tight fracture surfaces.  Low potential for rockfall due to slope gradient.						

**Table 2 - Rock Discontinuities and Stability (Continued)** 

General Location and Existing Condition	Proposed Cut Slope	Strike and Dip (degrees)*	Stability Condition
Westbound Auxiliary Lane, A2 Line, Station 85+00 to 90+00  Existing south-southeast facing slope at 1.5h:1v gradient, maximum height up to approximately 35 feet.	Existing slope to be cut back for widening, approximately 15 feet, at 1:1 gradient.	N50E, 24S fr N60W, 80N fol N60W, 88N fol N35E, 82S fr N60W, 12S fr N40E, 84S fr N55W, 88S fol	Stable at proposed gradient of 1:1 and flatter. Minor planes and possible wedges out of slope on semi-continuous, stepped fractures but planes and wedges are at a low angle (9 to 22 degrees) that are stable considering rough and tight fracture surfaces.  Minor rockfall potential with rock diameter approx. max. = 8 inches, avg.= 4-inches.

<sup>\*</sup>fr = fracture, fol = foliation, sh = shear

Existing cut-slopes appear grossly stable, with areas of minor erosion and sloughing within intensely weathered portions of rock. We expect that the proposed modified cut-slopes at gradients of 1H:1V (or flatter) will also be stable. However, a Certified Engineering Geologist should observe rock excavations to evaluate the potential need to flatten (or otherwise modify) rock slopes if adverse discontinuity conditions are exposed during construction. We recommend crown ditches and slope rounding at the top of cuts to reduce slope erosion.

For slopes steeper than 1.5H:1V, consider pedestrian and vehicle safety and provide adequate barriers. Steep cut slopes (1:1) may require rockfall protection (such as fencing or adequate catchment area) in areas subject to potential damage from rolling rock. Review cut slopes upon completion to evaluate rockfall potential, scaling requirements, and mitigation methods if necessary.

Based on the performance of existing cuts and the nature of the cut rock, it appears that rockfall potential is generally low for the proposed cuts. If rock catchment area at the base of slopes is insufficient, a rockfall attenuator fence will be necessary at slopes with a 1:1 gradient and in excess of 15 feet in height. Caltrans indicates that a simple chain link fence will be adequate for this purpose and recommends the fence be placed approximately 4 feet above the toe of slope and modified so that the bottom of the fence fabric is loose and extends below the posts. This fence type will attenuate minor rockfall but allow the rock to drop through for easier removal. Most cut slope locations have adequate setback (20+ft) from traveled way such that rockfall will not be an impact. BCI can provide additional fence detail if necessary based on the final slope/catchment area configuration and exposed slope conditions.

## 8.1.2 Rippability

Based on the subsurface conditions observed and tested, and our experience with similar conditions, we expect that typical, heavy-duty, excavator equipment is sufficient to excavate native soil and weathered rock to anticipated footing depths for the proposed retaining structures.

 $\geq$  7,000

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methods, with local blocks

rippable along natural discontinuities

Based on our review of cuts and the results of our seismic refraction survey, we present an estimate of material rippability in Table 3.

**Seismic Velocity Estimated Rippability Material Type** (feet per second, fps) Fill, colluvium and Rippable with heavy-duty  $\leq$  3,000 decomposed to intensely construction equipment weathered rock Intensely to moderately Rippable, with local resistant weathered rock, with local blocks that may require blasting or 3,000 to 7,000 less weathered blocks alternative excavation methods Blasting or alternative excavation

Slightly weathered to

fresh rock

**Table 3 - Rippability** 

Section 1-62 of the 2000 Caterpillar Performance Handbook (Edition 31) indicates rock with seismic velocities up to about 7,000 fps are rippable with a Caterpillar D9, and marginally rippable for seismic velocities between 7,000 and 9,000 fps. Based on our boring / test pit data and geologic reconnaissance, we expect the upper 10 to 15 feet of decomposed to moderately weathered rock will be rippable with a large dozer or excavator equipped with a single shank ripper.

We expect the following areas (shown on Figures 2B through 2K) will require controlled blasting or alternative excavation methods (e.g., splitting, chipping, pneumatic hammers, etc.) to facilitate excavation:

- Westbound auxiliary lane possible cut/wall excavation approximately between A3L Line, Stations 125+50 and 134+50
- Portions of the westbound auxiliary lane cut approximately between A2 Line, Stations 85+00 and 89+00, roughly below elevation 695 feet
- Portions of the eastbound on-ramp cuts at the slope between E2 Line, Stations 103+00 and 109+00, roughly below elevation 725 ft
- Isolated locations along the eastbound auxiliary lane cut between A2 Line, Stations 78+00 and 87+00
- Deeper excavations near the intersection of Silva Valley Parkway and the westbound off-ramp

Competent rock and large boulders may also be present at shallower depths at other locations within the project, which may require alternative excavation methods and/or localized controlled blasting.

Perform controlled blasting, if required and allowable, in accordance with Caltrans Standard Specifications (including Sections 7-1.10 and 19-2.03). The specifications and special provisions developed for blasting should address safety issues and avoidance of damage to existing pavement, utilities, structures and other natural and man-made features. To avoid damage to foundation rock, do not use blasting techniques to excavate rock within 100 feet (laterally) of abutment locations.

#### 8.1.3 Soil Moisture

In general, the moisture content of the upper soils ranges from 5 to 11 percent at the time of our field exploration. Unless grading work is completed shortly after the wet season, we expect the soil to be generally dry of optimum and require moisture conditioning particularly when mixed with the underlying rock. Over optimum moisture conditions can occur when soils are excavated in low lying areas at or adjacent to creeks.

## 8.1.4 Grading Factors

This project is expected to require significant import material. Based on data developed for this study, the majority of proposed cuts will be rippable to approximate depths of 15 to 20 feet. We estimate that the majority of this material will break down to dimension of less than 8 inches and be suitable to use in project fills. We expect that cuts below a depth of approximately 15 feet will encounter hard rock and generate mostly oversize material, particularly at the locations listed above as requiring blasting to facilitate excavation. Oversize material (greater than 8 inches in diameter) will require disposal outside the structural fill limits and should not be included in grading factors. Local, resistant blocks of hard rock that will not readily break down may also be encountered at other locations.

For the usable fill material, we estimate an overall earthwork factor (i.e. in-place volume/recompacted volume) ranging from 0.90 to 1.10 for materials placed at 90 to 95% relative compaction (per CTM 216). In consideration of material loss during transport and site work, potential for variability within the weathered/fractured rock, and unsuitable/oversize materials, we recommend a factor of 0.95 for purposes of construction bidding.

For oversize rock (generally expected to be excavated from depths greater than 15 feet) used as "slope protection" or stockpiled away from embankments, we estimate an earthwork factor on the order of 1.3 (bulking).

#### 8.2 Existing Embankment Fill

Embankment fill occurs along US 50 primarily at crossings of Carson Creek and Bucks Ravine Creek box culverts. We assume that existing fill located within US 50 right-of-way is "engineered fill" placed in accordance with Caltrans "Standard Specifications."

We observed other fill locations that we consider to be "non-structural fill" in the following areas:

- Westbound off-ramp, W1 Line Sta. 112+00 to 114+50
- Silva Valley Parkway, SVP Line Sta. 180+25 to 180+75 (dumped material)

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Remove existing fill at these locations to the elevation of original grade (native ground) and replace as engineered fill in accordance with the project specifications.

#### 8.3 Embankments

Construct embankments and place new fill in accordance with Caltrans Standard Specifications (including Section 19, "Earthwork"). Due to the presence of loose material at the toe of some slopes, we recommend excavation of a keyway (toe bench), 2 feet deep by 10 feet wide, into competent material and/or bedrock for the following locations:

- Westbound Shoulder, A2 Line, Sta. 70+00 to 76+00, and A3L Line, Sta. 135+00 to 137+50
- Eastbound Shoulder, A3R Line, Sta. 119+00 to 123+00, and 131+00 to 136+00
- Silva Valley Parkway, Southbound Shoulder, SVP Line Sta. 180+50 to 182+00

Where new fill is to be placed onto existing fill slopes or on natural slopes exceeding 5H:1V, fully bond into the existing slope by placing on discrete horizontal benches cut fully into the slope and below any loose/soft or otherwise unsuitable materials (per Section 19 of Caltrans Standard Specifications).

## 8.3.1 Embankment Material

Based on the proposed design (MTCo 2010), embankment fill is required for most widening and new roadways.

We expect that embankment fill will consist of rocky fill material generated from cut portions of the project, a potential borrow area in the northeast quadrant, and unidentified commercial material sources. On-site materials and material from the adjacent borrow area are suitable for use as embankment fill. Some clay soils are present above the weathered rock and will be restricted from use adjacent to retaining walls and at abutment walls as described in the Foundation Report and as controlled by the requirements for Structure Backfill. Imported material used within 4 feet of roadway subgrade elevation must have a minimum R-Value of 25.

Section 19-5 of Caltrans Standard Specifications provides compaction recommendations for placement of rocky fill.

#### 8.3.2 Slope Stability and Erosion Control

We expect that embankment slopes constructed at gradients of 2H:1V or flatter to be grossly stable when constructed with approved on-site and imported materials and when placed in accordance with the Caltrans Standard Specifications for Earthwork.

Based on the lack of observed subsurface water in roadway borings and test pits completed for this project, BCI does not anticipate a need for subdrainage at the base of new fill slopes. However, based on actual conditions exposed during construction (such as if local springs are exposed) subdrainage may be required.

Embankment slopes and areas disrupted by grading are susceptible to erosion from surface runoff. Control overside runoff with curbs, dikes, crown-ditches, down-drains, etc. Vegetate finished slopes to reduce erosion potential. We provide additional erosion control considerations (based on recommendations from Caltrans) below:

- 1. During construction, slopes shall be protected during the rainy season with the following measures:
  - a. Temporary rolled erosion control product (blanket) will be used to protect soil contact by rain drops.
  - b. Slopes longer than 15 feet shall require the use of temporary fiber rolls.
  - c. Soil not covered with a temporary blanket shall be stabilized by using Temporary Erosion Control (Poly Stabilizing Fiber Matrix) no seed required.
- 2. All finished slopes with exposed soil shall be left or placed into a roughened state by track walking or other means.
- 3. All finished slopes longer than 15 feet require fibers rolls (permanent installation).
- 4. Finished slopes steeper than 2H:1V shall be protected with an erosion control blanket (seed shall be placed beneath blanket prior to placement).
- 5. Finished slopes shall be sprayed with a Compost Blanket (Caltrans SSP, 2006 SSP No. 20-055). This measure shall also include a seed mix that contains natives to this region and that is conducive to establishing long term vegetation.
- 6. Placement of Compost Blanket shall occur as late into growing season as possible (approximately late September/early October) to minimize predation of erosion control seed species.

We expect on-site materials used for embankment fill to be very rocky. An amendment and/or overlay of suitable topsoil may be necessary for plant growth.

#### 8.3.3 <u>Settlement</u>

Provided new embankment material is compacted in accordance with the recommendations of this report and in accordance with Caltrans Standard Specifications, we do not expect significant settlement of embankment material.

At the overcrossing and ramp bridge approaches, the foundation soils consist predominantly of 2 to 3 ft of stiff silt and moderately dense gravels over weathered rock. Based on this, we expect insignificant compression of soil and rock beneath embankments. The potential for significant long-term settlement is low and a waiting period for settlement is not required.

## 8.4 Retaining Walls

#### 8.4.1 Retaining Wall 1

MTCo proposes a Type 1 (2010 Standard Plan) retaining wall along the eastbound diagonal off-ramp shoulder approximately between E1 Line, Station 91+15 to 92+54. See Figure 2D, attached, for the approximate retaining wall location.

The wall footing will be founded in native soil/weathered rock, retain new embankment fill with a slope gradient of about 2H:1V, and be setback from the edge of pavement a minimum of approximately 16 feet. Per Caltrans Standard Plans, Retaining Wall Type 1, use Case 2 (2H:1V sloping fill, variable live load surcharge) condition for wall design.

Based on the design plans by MTCo, wall height (H) will range from approximately 3'-4" to 21'-10". The following design information is provided in Revised Standard Plan (RSP) B3-1B:

	<u>Minimum</u>	<u>Maximum</u>
Design Wall Height, H	4'	22'
Foundation Width, W	6'	23'-6"
Service q' <sub>o</sub> , (effective width, B')	0.9 ksf (4.0 ft.)	3.0 ksf (22.3 ft.)
Strength q <sub>o</sub> , (effective width, B')	2.2 ksf (2.2 ft.)	4.8 ksf (20.7 ft.)
Extreme q <sub>o</sub> , (effective width, B')	3.4 ksf (2.3 ft.)	7.6 ksf (11.8 ft.)

Footings will be founded on undisturbed (native) materials below the existing embankment fill. Our subsurface investigation at this location (T-10-111 and A-10-158) generally encountered embankment fill overlying decomposed rock (hard clay) grading down to intensely to moderately weathered, moderately fractured, metavolcanic rock. Blowcounts (N-values) we obtained in the native materials are greater than 60 with a California Modified sampler and pocket penetrometer readings are greater than 9 ksf (4.5 tsf).

Maximum bearing stress for the Strength Limit state is up to 4.8 kips per square foot (ksf). Undisturbed, native materials (weathered rock) at this location will provide more than adequate foundation support for shallow spread footings with total settlement expected to be less than ½-inch. Use the following maximum base of footing elevations:

- West end, wall Station 0+34 to 0+80: 669 ft
- Wall Station 0+80 to 1+00: 667 ft
- Wall Station 1+00 to 1+20: 665 ft
- East end, wall Station 1+20 to 2+10: 663 ft

The footing may be stepped up at suitable intervals.

#### 8.4.2 Retaining Wall 2

MTCo proposes an MSE wall along the eastbound on-ramp shoulder approximately between E2 Line, Station 110+00 to 111+40. The wall will be founded in existing embankment fill and retain new embankment fill for ramp construction/widening. See Figure 2E, attached, for the retaining wall location.

MTCo indicates that total wall height (H1) will range from 14'-2" to 16'-8", and bearing stresses for the Strength condition will range from 3.93 ksf to 4.37 ksf. Loading Case 1 (level surface behind the wall face) applies. The following design information is provided in Bridge Design Aids (BDA) 3-8:

	<u>Minimum</u>	<u>Maximum</u>
Total Wall Height, H1	14'-2"	16'-8"
Total Width, BW	11'-6"	13'-6"
Service q, (effective width, B')	2.47 ksf (6.87 ft.)	2.80 ksf (8.58 ft.)
Strength q, (effective width, B')	3.93 ksf (6.92 ft.)	4.37 ksf (8.56 ft.)
Extreme q, (effective width, B')	3.35 ksf (5.08 ft.)	3.79 ksf (6.34 ft.)

The wall location is at an existing embankment fill with a slope gradient of approximately 1.5H:1V and a maximum fill height of approximately 45 feet. The fill was placed for the US 50 mainline across Carson Creek and a triple box culvert runs beneath the embankment at this point.

Our observations and subsurface investigation indicate that the fill at this location is composed of locally derived, rocky fill that consist primarily of sandy gravel with cobbles and boulders. Based on slope exposures, the lower portion of the fill appears to have a significant quantity of boulders while the upper portion appears to have a smaller quantity, which would be typical of material size grading during embankment construction.

The MSE wall is a suitable wall type for this location and the bearing capacity exceeds the strength limit loads of 3.93 and 4.37 ksf. Based on an assumed elastic modulus for the existing fill of 1,600 ksf (medium dense to dense sand/gravel), we expect total settlement to be less than <sup>3</sup>/<sub>4</sub>-inch. Analysis results are included in Appendix D.

We checked global stability with a simple 1.5H:1V fill slope, total wall height of 17 feet, vertical embedment of 3 feet into the embankment slope, and fill strength based on a phi angle of 38 degrees and cohesion of 100 psf. This analysis resulted in a Factor of Safety greater than 1.5 for static (Spencer Method) and 1.2 for pseudostatic using a seismic coefficient of 0.1 (based on ½ of the peak ground acceleration value for the site). Stability analysis results are included in Appendix D.

For wall design, maintain a minimum foundation setback (horizontal clearance) of 4 feet from the face of the slope and a minimum foundation embedment depth of 2.5 feet.

Overexcavate existing embankment fill for a depth of 2 feet below the full base of the wall and replace/recompact with Class 2 baserock to obtain a uniform base for wall construction. Design the MSE wall in accordance with Caltrans Standard Plans and BDA 3-8. Shoring will be required for construction unless adequate travel width is available for excavation sloping.

Consider increased load on the culvert below the wall from the addition of wall fill. The unit weight of fill at the wall location can be assumed as 120 pcf (structure backfill).

## 8.5 Culvert Foundation Support

#### 8.5.1 General Conditions

We list new culvert locations for local drainage in Table 4.

Silva Valley Parkway

Silva Valley Parkway

Silva Valley Parkway

Tong Road

Tong Road

General Location	Culvert Station Location*	Culvert Size/Type		
Eastbound Diagonal Off-Ramp	E1 Line, 93+40	6ft x 7ft Concrete Box (extension)		
Eastbound Loop On-Ramp	E2 Line, 102+00	18-inch APC		
Westbound Diagonal On-Ramp	W3 Line, 92+93	6ft x 7ft Concrete Box (extension)		
Westbound Diagonal On-Ramp	W3 Line, 100+30	24-inch APC		
Westbound Mainline	A3L Line, 122+80	24-inch CSP (extension)		
White Rock Road (realign)	C2 Line, 18+94	18-inch APC		
White Rock Road	SVP Line, 141+10	24-inch APC		
White Rock Road	SVP Line, 145+40	Quadruple 6ft x 6ft Concrete box		
White Rock Road	SVP Line, 148+80	24-inch APC		

SVP Line, 165+00

SVP Line, 176+80

SVP Line, 181+35

TR Line, 14+50

TR Line, 11+50

24-inch APC

36-inch APC

48-inch CSP

18-inch APC

Concrete Arch

**Table 4 - Planned Culvert Locations** 

Based on the current plans, we anticipate new culverts and culvert extensions will be constructed within stiff/dense surface soils and/or weathered rock. We expect that concrete structures (such as the box culvert extension and arch culvert at Tong Road) will be founded on weathered/hard rock and backfilled with local borrow material.

Shallow native soils, embankment fills (constructed in accordance with the Caltrans Standard Specifications for Earthwork), and the underlying rock are suitable for culvert placement when designed and placed in accordance with the Caltrans Highway Design Manual, Standard Plans, and Standard Specifications.

# 8.5.2 <u>Box Culvert at E1 Line, Station 93+34 and W3 Line, Station 92+93 (Bucks</u> Ravine Creek)

The area for the proposed box culvert extension at the eastbound diagonal off-ramp (Bucks Ravine Creek), E1 Line, Station 93+34 is currently submerged and inaccessible. Based on our probing adjacent to the drainage, rock exposure, and nearby test pits, we expect suitable foundation (firm weathered rock) approximately 2 feet below existing grade.

The area for the proposed box culvert extension at the westbound on-ramp (Bucks Ravine Creek), W3 Line, Station 92+93 is currently wet and inaccessible. Based on our probing adjacent to the drainage and nearby test pits, we expect suitable foundation (medium dense clayey gravel and/or firm weathered rock) within 2 feet below existing grade.

<sup>\*</sup> Approximate Line and Station from plans by MTCo APC = Alternative Pipe Culvert, CSP = Corrugated Steel Pipe

Due to the presence of soft surface soils, organics and variable shallow soils at either end of the culvert, we recommend that the existing ground surface be overexcavated to a minimum depth of 2 feet (below the existing ground surface) for the entire width of the box culvert and wing wall foundation area plus 2 feet on either side. Fill the overexcavation with Class 2 aggregate baserock compacted to a minimum of 95% relative compaction in accordance with the Caltrans Standard Specifications.

For the box culvert, MTCo indicates that the 2010 Standard Plan soil pressures do not apply (due to fill height) and that the applicable maximum soil pressures are 4.2 ksf and 5.4 ksf for Service and Strength I, respectively. With overexcavation and backfill with compacted baserock, adequate capacity is available.

## 8.5.3 Box Culvert at SVP Line, Station 145+40 (Bucks Ravine Creek)

At the White Rock Road crossing of Bucks Ravine, SVP Line, Station 145+40, where a quadruple 6ft x 6ft box culvert will be used, weathered rock is present at shallow depths and is exposed intermittently near the creek bed. Our test pits adjacent to this drainage encountered moderately hard rock at depths of 1 to 3.5 feet (approximate elevation 635 to 638 feet).

Preliminary plans show the culvert to be 180 feet long with a total width of approximately 28 feet. Invert elevation will be 635.05 feet at the downstream end and 635.50 feet at the upstream end. Wingwalls will be used at each end. We expect suitable foundation (weathered rock) for this culvert at the planned invert depth and allowable bearing in excess of 5 ksf is available.

## 8.5.4 Arch Culvert at TR Line, Station 11+50 (Carson Creek)

At the Tong Road crossing of Carson Creek, TR Line, Station 11+50, where an arch culvert is planned, hard rock is present at very shallow depths and is exposed intermittently in the creek bed. Our test pits adjacent to this drainage encountered hard rock at depths of 1 to 1.5 feet. We expect suitable foundation (hard rock) for this culvert at depths of approximately 2 feet below the current creek bottom and allowable bearing in excess of 10 ksf is available. Foundation excavation may encounter an irregular hard rock surface.

#### **8.6** Corrosion Investigation

We completed 10 corrosivity tests on representative soil/rock samples from our borings and test pits, and conducted 4 field resistivity tests. We summarize the test results in Table 5, below, and include the laboratory test reports in Appendix B.

, California October 29, 2012

Exploration/ Test Location ID	Sample No.	Sample Depth (feet)	pН	Resistivity (ohm-cm)	Chloride Content (ppm)	Sulfate Content (ppm)				
R-10-004	S2	5-6.5	7.1	1,420	17	68				
R-10-005	S1	0-1.5	5.6	3,220	14	36				
R-10-006	S1	0-1.5	5.3	6,970	14	0.2				
A-10-136	D1	2.0-5.0	7.4	2,060	24	65				
T-10-107	D1	0-1.5	5.7	5,630	15	0.4				
T-10-109	D1	0-2.5	6.1	3,220	14	0.8				
T-10-112	D1	0-2.0	5.8	4,290	11	< 0.1				
T-10-120	D1	4.0-5.0	7.6	2,250	13	8				
T-10-152	D1	2.0-3.0	6.4	960	29	3				
T-10-153	D1	3.0-5.0	7.0	1,290	29	11				
RS1*	D1	1.0-2.0	6.2	10,724						
RS2*	D1	1.0-2.0	6.3	6,128						
RS3*	D1	0 - 1.0	5.3	4,979						
D.C. 4sh	D.1	0.5.1.5	- 4	- o						

Table 5 - Corrosion Test Results (CTM 417, 422, 643)

Based on our testing and observations, we consider the site soils as generally non-corrosive. The maximum chloride and sulfate concentrations we obtained are 29 and 68 part per million (ppm), respectively. The soil pH ranged from 5.3 to 7.6 and the minimum resistivity ranged from 960 to 10,724 ohm-cm (most greater than 2,000 ohm-cm). In general, our tests indicate that the surface soils have a relatively low pH ranging from 5.3 to 6.1 and the underlying, weathered rock has a relatively neutral pH ranging from 7.1 to 7.6.

We expect that concrete structures (such as the box culvert extension and culvert at Tong Road) will be founded on weathered/hard rock and backfilled with local borrow material. Based on anticipated site conditions, our pH, sulfate and chloride testing, and Table 855.4 of the Caltrans Highway Design Manual (CHDM), cementious materials must comply with Section 90-2.01C of the Caltrans Standard Specifications. However, pH values can be in the range of 5.6 to 7.0; therefore, water content restriction does apply and a maximum water-to-cementious material ratio of 0.45 is applicable.

#### 9 MATERIAL SOURCES

We assume that fill material will include the proposed interchange cuts and the potential borrow area in the northeast quadrant. At this time, other import material sources are not identified but will be required. The geotechnical engineer of record must approve all other borrow sources prior to transportation and placement.

<sup>\*</sup>Field resistivity (4-pin) test location and location of soil sample obtained for pH testing

BCI anticipates material generated from cut slopes will be used for fill slopes. Structural fill material should conform to gradation requirements presented in Section 19 of Caltrans Standard Specifications. From a geotechnical standpoint, oversized rock generated from cut excavations can be placed outside of structural fill slopes, near the toe of fill embankments, or within other designated spoil areas.

Commercial sources are available nearby for asphalt, Portland Cement Concrete, aggregate base, aggregate subbase and permeable materials, as required for this project. BCI must approve import material prior to placement.

#### 10 CONSTRUCTION CONSIDERATIONS

#### 10.1 Construction Advisories

The contractor should verify existing utility line locations and conditions. Do not stockpile excavated material or imported borrow material in these areas.

## 10.1.1 Naturally Occurring Asbestos

While rock containing potentially significant quantities of NOA were not observed during our site exploration, rock containing NOA could occur within the project.

Considering that there is a potential for encountering NOA and that fill placed during road construction in the 1960's could contain NOA, BCI recommends preparation of an Asbestos Hazard Mitigation Plan in compliance with provisions of El Dorado County Air Quality Management District (EDCAQMD) Rule 223-2 and California Air Resources Board requirements, as applicable.

Visually monitor rock types exposed during construction for the potential presence of asbestos material. If construction activities expose NOA, comply with the applicable provisions of EDCAQMD Rule 223-2 and the State of California Asbestos Airborne Toxic Control Measure (ATCM), CCR Title 17, Section 93105, and perform earthwork in areas containing NOA in accordance with Section 19 of the 2010 Caltrans Standard Specifications and Section 19-910 of the Standard Special Provisions. In addition, prepare a worker health and safety program in accordance with all regulatory requirements, including CAL OSHA.

## 10.1.2 Perched Groundwater and Over-optimum Soil Moisture

Perched groundwater may be encountered during and shortly following the rainy season within shallow soils. If perched groundwater or surface water is encountered, sump pumps may be required to facilitate construction.

Excessively wet (over-optimum) soil conditions can make proper compaction difficult or impossible. Wet soil is commonly encountered during the winter and spring months, or in excavations where groundwater or perched groundwater is encountered.

In general, wet soil can be mitigated by:

- Discing the soil during prolonged periods of dry weather
- Overexcavating and replacement with drier material
- Lime/cement treatment or stabilization using aggregate and or stabilization fabric

If wet, unstable soil is encountered, BCI can observe the conditions and provide more specific mitigation recommendations.

## 10.1.3 Preparation of Existing Fill Locations

Clear and grub existing fill surfaces and bench into the fill slopes in accordance with the Caltrans Standard Specifications. The geotechnical engineer of record must approve fill surfaces prior to placement of embankment fill.

Where existing slopes are steeper than 5H:1V, bench new embankment fill into the existing slope in accordance with the Caltrans Standard Specifications for Earthwork (Section 19-6).

## 10.1.4 <u>Cut Slope Construction</u>

Unanticipated conditions that require mitigation work may be encountered during cut-slope excavation. The Engineer should be notified to review the site, evaluate the nature/extent of the conditions, and determine appropriate mitigation measures. Mitigation measures might include laying the slope back, removing weak rock or adverse dipping wedges, providing rockfall protection/catchment area, or combinations thereof.

We expect the following areas will require controlled blasting or alternative excavation methods (e.g., splitting, chipping, pneumatic hammers, etc.) to facilitate excavation:

- Westbound auxiliary lane cut approximately between A3L Line, Stations 125+50 and 134+50
- Portions of the westbound auxiliary lane cut approximately between A2 Line, Stations 85+00 and 89+00, roughly below elevation 695 feet
- Portions of the eastbound on-ramp cuts at the slope between E2 Line, Stations 103+00 and 109+00, roughly below elevation 725 ft
- Isolated locations along the eastbound auxiliary lane cut between A2 Line, Stations 78+00 and 87+00
- Deeper excavations near the intersection of Silva Valley Parkway and the westbound off-ramp

Competent rock and large boulders may also be present at shallower depths at other locations within the project, which may require alternative excavation methods and/or controlled localized blasting.

Where required, perform blasting in accordance with Sections 7-1.10 and 19-2.03 of Caltrans "Standard Specifications" and Section 19-4 of the Caltrans "Standard Special Provisions." To avoid damage to foundation rock, do not use blasting techniques to excavate rock within 100 feet (laterally) of abutment locations.

## 10.1.5 Removal of Loose Rock from Slopes

Excavation of slopes cut into rock will likely result in loose blocks and pieces of rock on the slope surface. Thoroughly scale all rock cut slopes following completion of the cut such that loose material is removed from the slope surface. Complete scaling either manually with hand tools or by a mechanical device designed to catch onto and pull loose rock and other debris from the slope.

#### 10.1.6 Existing Underdrains

Original construction as-built plans (1965) show that longitudinal underdrains were constructed at the toe of cut slopes. It appears that the drains consist of 8-inch perforated metal pipe. In the eastbound direction, from A2 Line, Station 75+75 to 88+50, the underdrain includes transverse segments plus an additional longitudinal line under the travel lanes. When shoulder area is excavated, avoid damage to the underdrains and maintain outlets. When feasible, confirm satisfactory condition and continuity of drain material.

We did not identify areas that will require additional drainage. However, review subgrade conditions exposed by the new cuts for groundwater seepage and the need for additional drainage.

#### **10.2** Construction Considerations that Influence Specifications

BCI anticipates the contractor will be required to prepare an Asbestos Compliance Plan in accordance with the Standard Special Provisions Update, and have personnel attend a safety training program in accordance with CCR, Title 8, Section 1529, (Asbestos), and Section 5192 (b)(4)(B), (Hazardous Waste Operations and Emergency Response). If encountered, NOA material left on-site must be covered with a minimum 1-foot layer of asbestos-free material.

#### 10.3 Construction Monitoring and Instrumentation

We do not expect geotechnical instrumentation will be necessary for this project. BCI should provide specific geotechnical review during construction of cut-slopes and excavation for foundations.

Visually monitor rock exposed during construction for the potential presence of NOA. If construction activities expose NOA, comply with the applicable provisions of EDCAQMD Rule 223-2 and the State of California Asbestos Airborne Toxic Control Measure (ATCM), CCR Title 17, Section 93105, and perform earthwork in areas containing NOA in accordance with Section 19 of the 2010 Standard Specifications and Section 19-910 of the Standard Special Provisions. In addition, prepare a worker health and safety program for excavations in areas with NOA in accordance with all regulatory requirements, including CAL OSHA.

#### 10.4 Hazardous Waste Considerations

BCI is not aware of any significant hazardous waste considerations for earthwork at the project location. BCI evaluated the potential for aerially deposited lead (ADL) impacts and presents the results under separate cover. Borrow locations must be reviewed for potential hazardous waste/materials considerations prior to use. Based on the local geologic conditions, NOA is not a significant issue at the site but should be considered as a potential impact.

## 10.5 Differing Site Conditions and GDR Limitations

We assume the soil and groundwater conditions encountered in our borings and test trenches are representative of the subsurface conditions across the site. Actual conditions between exploration points can be different. If differing site conditions are encountered, contact BCI immediately to provide additional recommendations.

BCI based this report on the observed site conditions and the referenced preliminary plans provided by MTCo. Use this report only for planning, design, and construction of the roadway portion of the project, as described herein.

Appendix A presents logs of borings and test pits. The lines designating the interface between soil types are approximate. The transition between material types may be abrupt or gradual. Our recommendations are based on the final logs, which represent our interpretation of the field logs, general knowledge of the site, and geological conditions.

Modern design and construction are complex, with many regulatory sources/restrictions, involved parties, construction alternatives, etc. It is common to experience changes and delays. The owner should set aside a reasonable contingency fund based on complexities and cost estimates to cover changes and delays.

BCI performed services in accordance with generally accepted geotechnical engineering principles and practices currently used in this area.

#### 11 GEOTECHNICAL RECOMMENDATIONS AND SPECIFICATIONS

In this section, we present our recommended geotechnical specifications, and special provisions to be used in design and construction of the roadway portions of the project. If designers have questions or problems with any of these recommendations, or, if conditions are found to be different during construction, contact BCI to determine if additional fieldwork, analysis, or recommendations are required.

Where referenced below, Standard Specifications and Standard Plans refer to the 2010 California Department of Transportation (Caltrans) Standard Specifications and Caltrans Standard Plans.

## 11.1 Earthwork

Perform earthwork in accordance with Section 19 of the Caltrans Standard Specifications; Structure Backfill must conform to Section 19-3 and Clearing and Grubbing must be performed as described and within the limits provided in Section 16. In addition, earthwork and structural backfill shall be performed in accordance with the following special provisions. If a conflict exists between the Caltrans Standard Specifications and special provisions below, the special provisions govern.

#### 11.1.1 Removal of Existing Fill and Slope Preparation

Due to the presence of loose material at the toe of some slopes, we recommend excavation of a keyway (toe bench), 2 feet deep by 10 feet wide, into competent material and/or bedrock for the following locations:

- Westbound Shoulder, A2 Line, Station 70+00 to 76+00, and A3L Line, Station 135+00 to 137+50
- Eastbound Shoulder, A3R Line, Station 119+00 to 123+00, and 131+00 to 136+00
- Silva Valley Parkway, Southbound Shoulder, SVP Line Station 180+50 to 182+00

BCI must approve the over-excavated fill areas prior to placement of embankment fill.

Existing fill/fill surfaces may contain large boulders which will require removal or will need to be broken down. Clear and grub existing fill surfaces and bench into the existing slopes in accordance with the Caltrans Standard Specifications. The Engineer must approve fill surfaces prior to placement of embankment fill.

## 11.1.2 Special Provision for Rocky Fill Compaction

For structural embankment fill construction with "rocky" fill material, use *only* Section 19-5.02, Part C; specifically, fill which exhibits a maximum of 25 percent by volume of material exceeding 0.67 feet (8 inches) in any dimension. Where embankment fills have greater than 30 percent retained on a ¾-inch sieve, place rocky fill in loose lifts no thicker than 1 foot prior to compaction. Moisture condition the matrix soil uniformly to at least 2 percent over the optimum moisture content (visual manual method) prior to compaction. Where 90 percent relative compaction is specified, compact each lift of rocky fill with a minimum of five passes of a Caterpillar (CAT) 825 padded drum compactor making overlapping passes until coverage is complete. Where 95 percent relative compaction is specified, compact each lift of rocky fill with a minimum of seven passes of a CAT 825 compactor making overlapping passes until coverage is complete.

Where trench backfill has greater than 30 percent retained on a ¾-inch sieve, place rocky trench backfill in loose lifts no thicker than 1 foot prior to compaction. Moisture condition the matrix soil uniformly to at least 2 percent over the optimum moisture content (visual manual method) prior to compaction. Where 90 percent relative compaction is specified, compact each lift of rocky backfill with a minimum of seven passes of a sheepsfoot wheel attached to CAT 235 or larger excavator. Where 95 percent relative compaction is specified, compact each lift of rocky backfill with a minimum of nine passes of a sheepsfoot wheel attached to CAT 235 or larger excavator.

Modify the performance specification as required by the project engineer based on actual equipment used and observed compaction results.

#### 11.1.3 Special Provision for Acceptable Fill and Borrow Material

On-site soil is suitable for use as fill for the project provided it is free of concentrations of organics, debris, and meets particle size requirements of the Standard Specifications and special provisions. Unsuitable materials include surface strippings, broken concrete, and other non-native material unearthed during general grading.

BCI File No. 556.2 October 29, 2012

Borrow material must have a minimum R-value of 25 (when used within 4 feet of roadway subgrade elevation), contain no significant concentrations of vegetation, debris, or asbestos containing rock, and meet the project particle size requirements in the special provisions above.

#### 12 RISK MANAGEMENT

Our experience and that of our profession clearly indicates that the risks of costly design, construction, and maintenance problems can be significantly lowered by retaining the geotechnical engineer of record to provide additional services during design and construction.

For this project, BCI should be retained to:

- Review and provide comments on the civil plans and specifications prior to construction.
- Monitor construction to check and document our report assumptions. At a minimum, BCI should monitor grading, trench backfill, culvert backfill, pavement subgrade and aggregate base compaction, and retaining wall foundation excavation.
- Review proposed borrow material for suitability.
- Update this report if design changes occur, 2 years or more lapse between this report and construction, and/or site conditions have changed.

If we are not retained to perform the above applicable services, we are not responsible for any other party's interpretation of our report, and subsequent addendums, letters, and discussions.

# Figures

Figure 1 - Vicinity Map

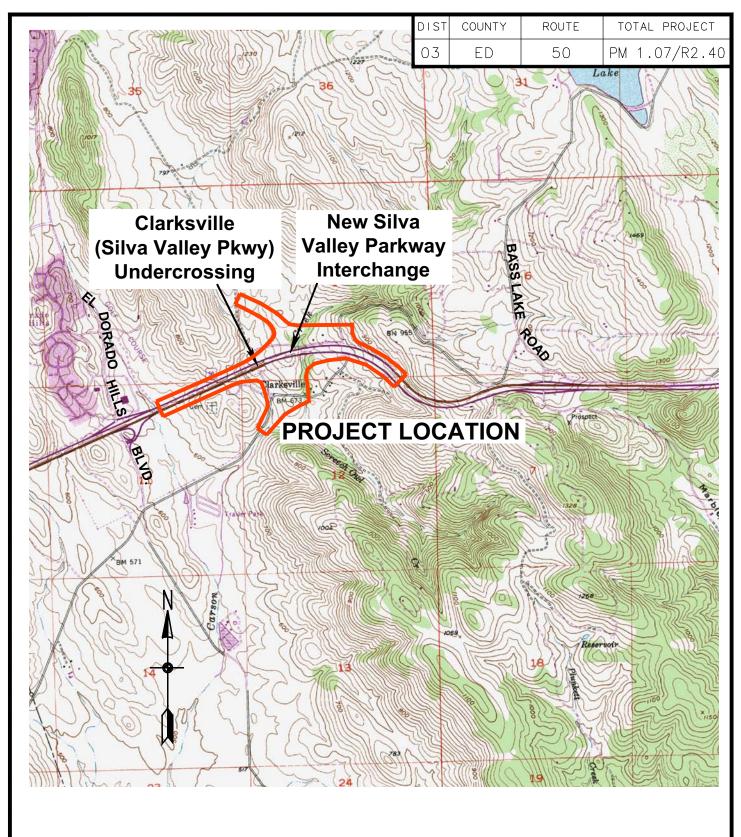
Figure 2 A - Project Map

Figure 2B through 2K - Location Maps

Figure 3 - Geologic Map

Figure 4 - Seismic Hazard Map





Source: MAPTECH Terrain Navigator Pro, v. 7.01, USGS topographic map, 7.5 minute quadrangle, 1:24000, Clarksville 1953 (revised 1980).



11521 Blocker Drive, Suite 110 Auburn,CA 95603 Phone: (530) 887-1494 Fax: (530) 887-1495 www.blackburnconsulting.com

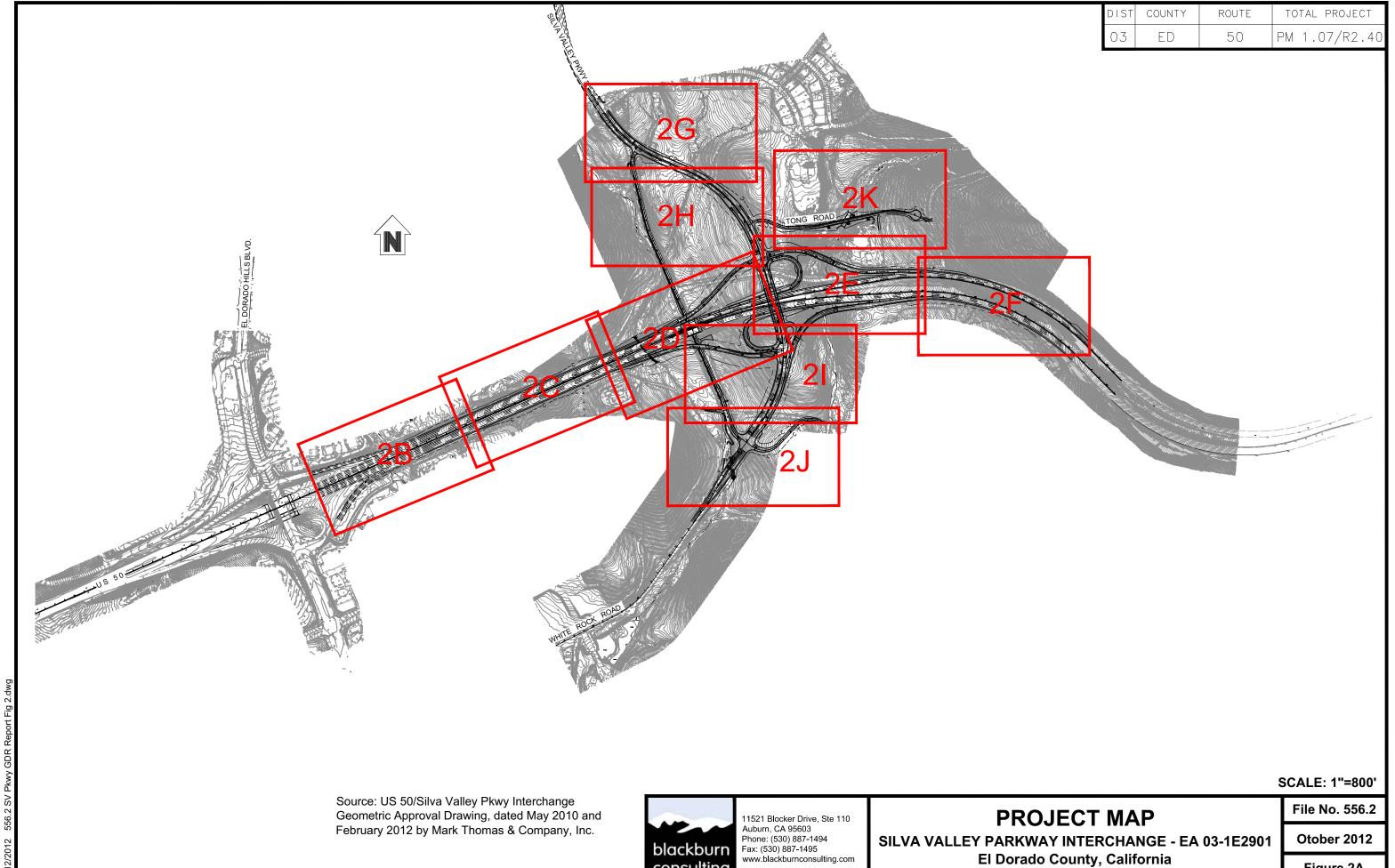
# **VICINITY MAP**

Silva Valley Parkway Interchange EA 03-1E2901 El Dorado County, California File No. 556.2

SCALE: 1"=0.5 Miles

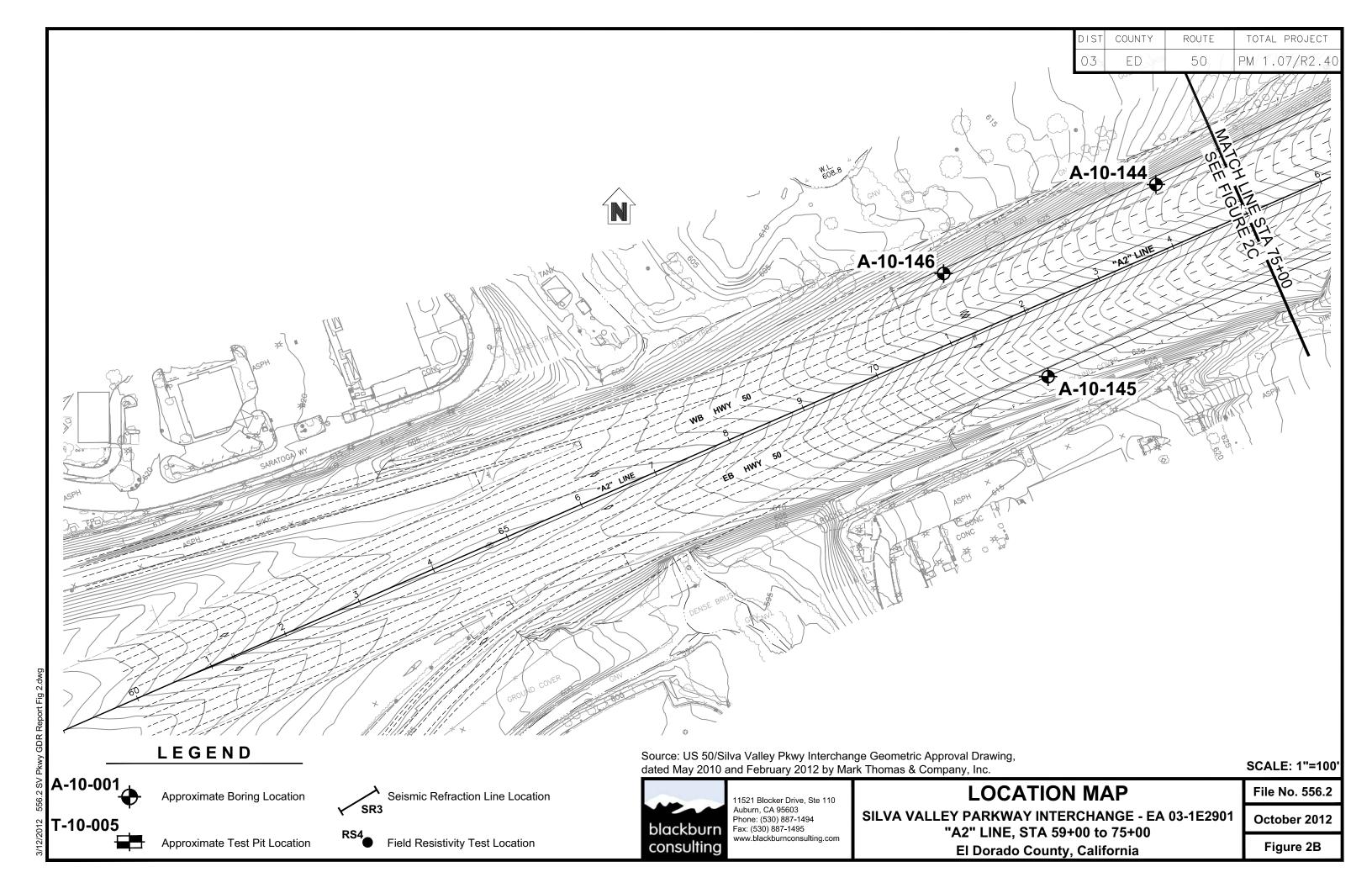
October 2012

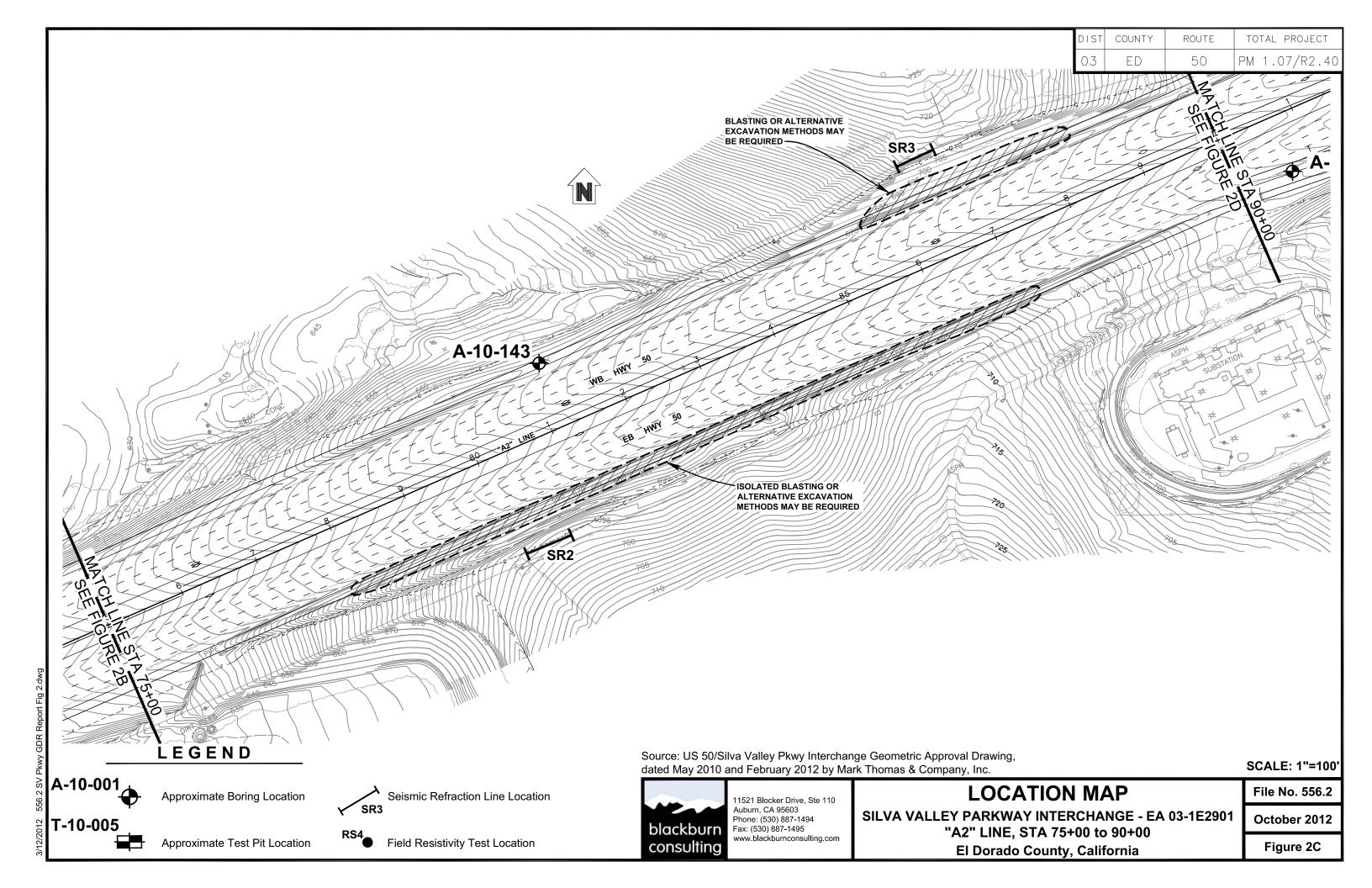
Figure 1

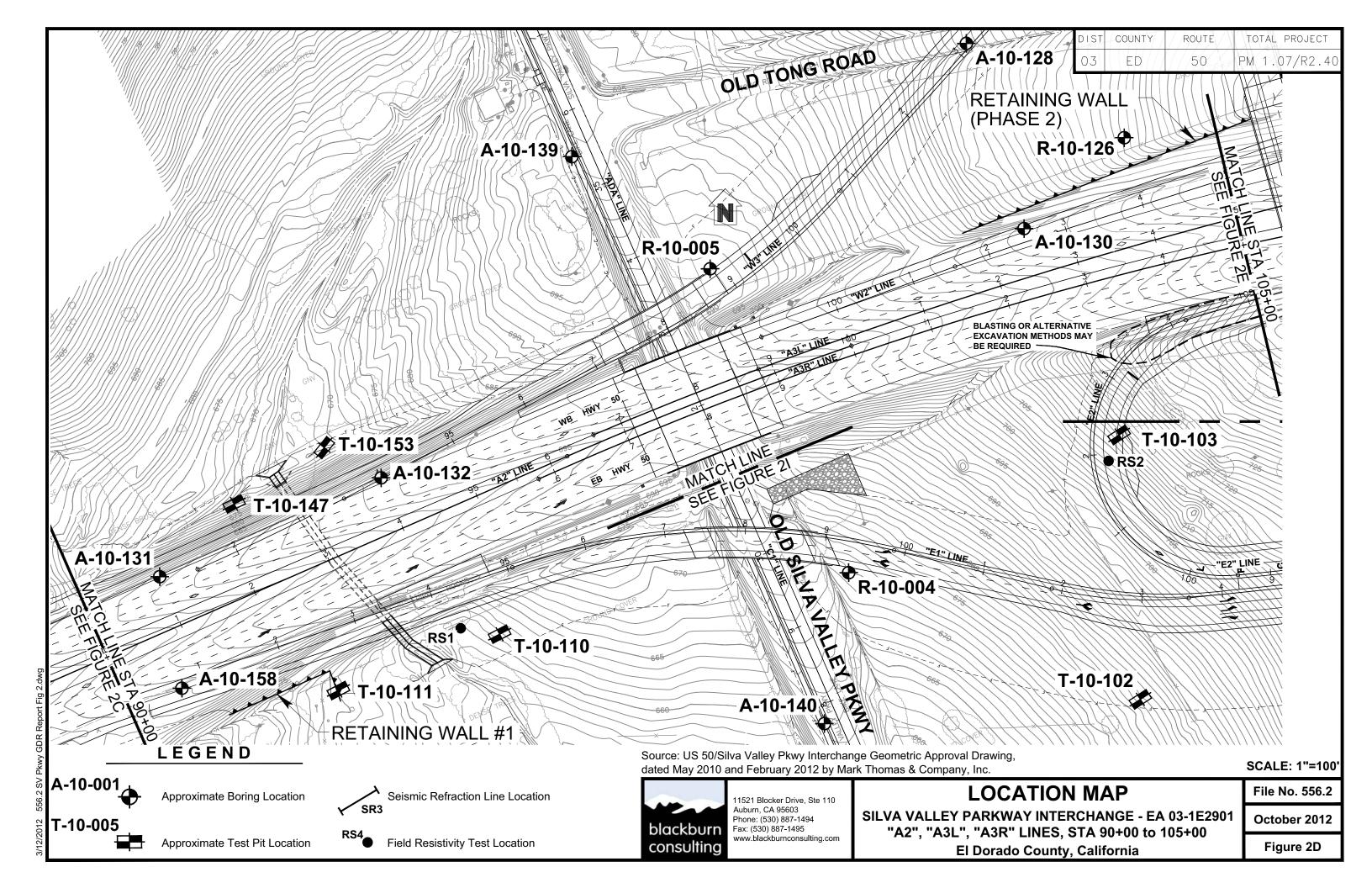


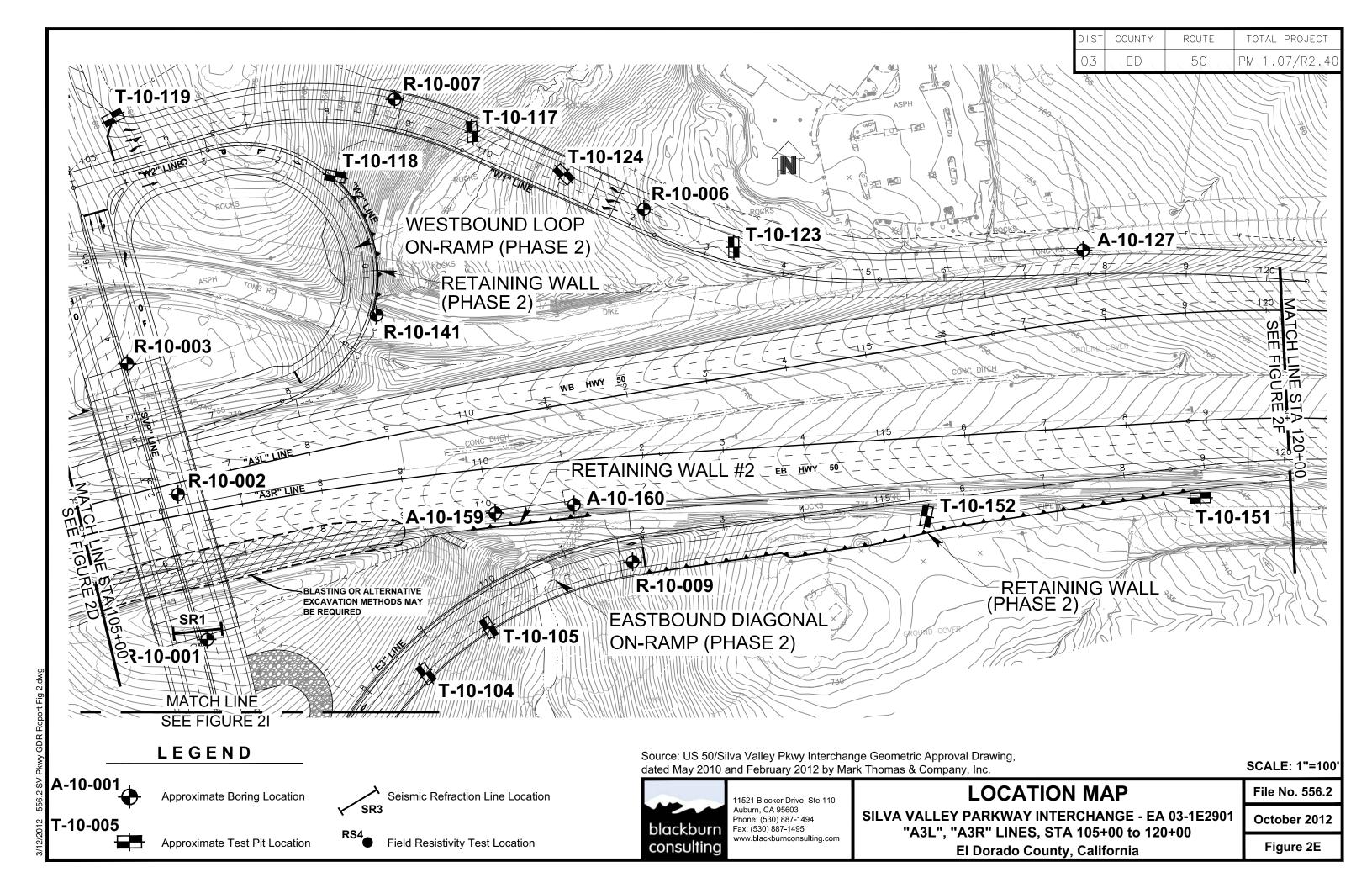
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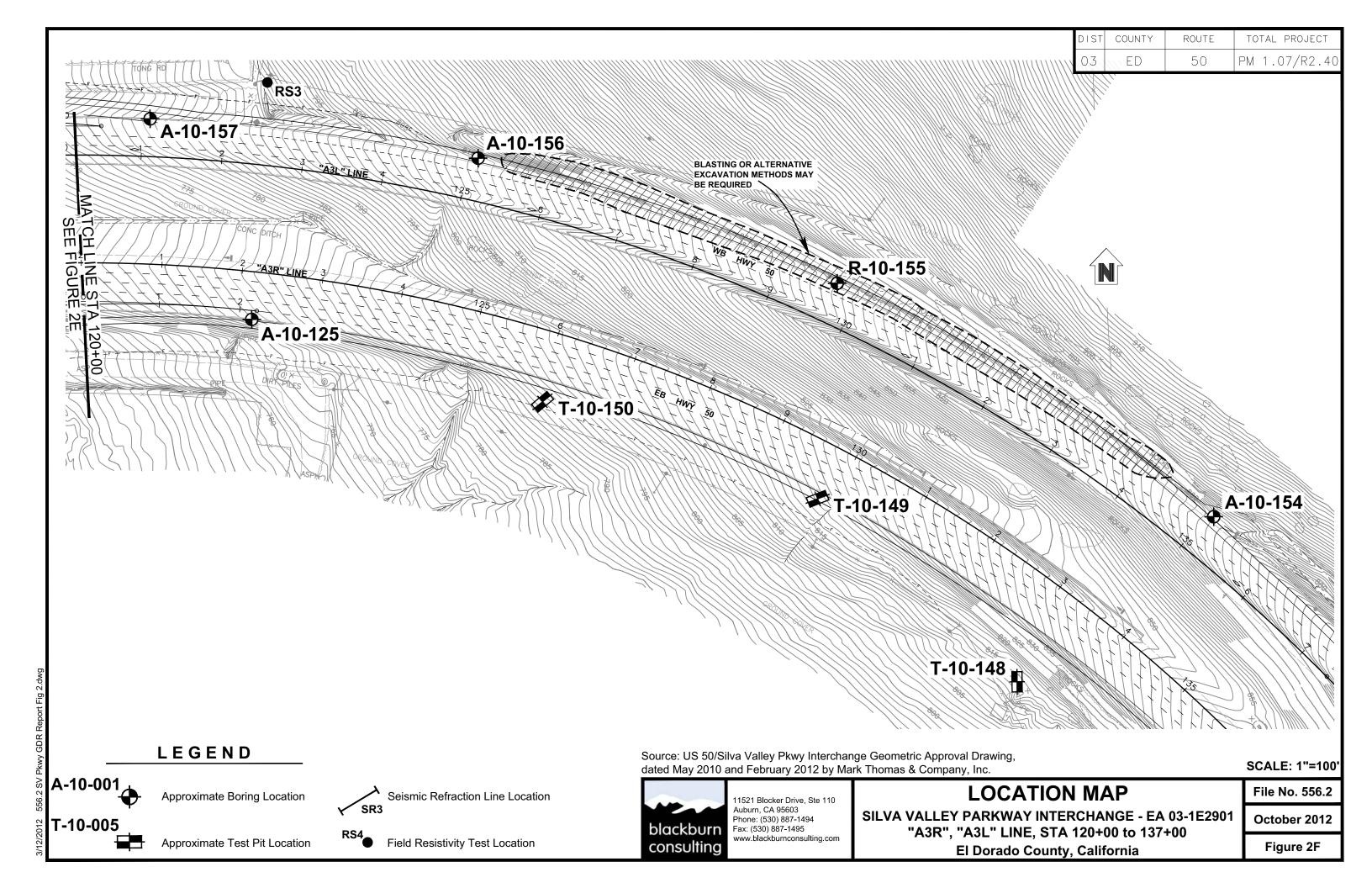
Figure 2A

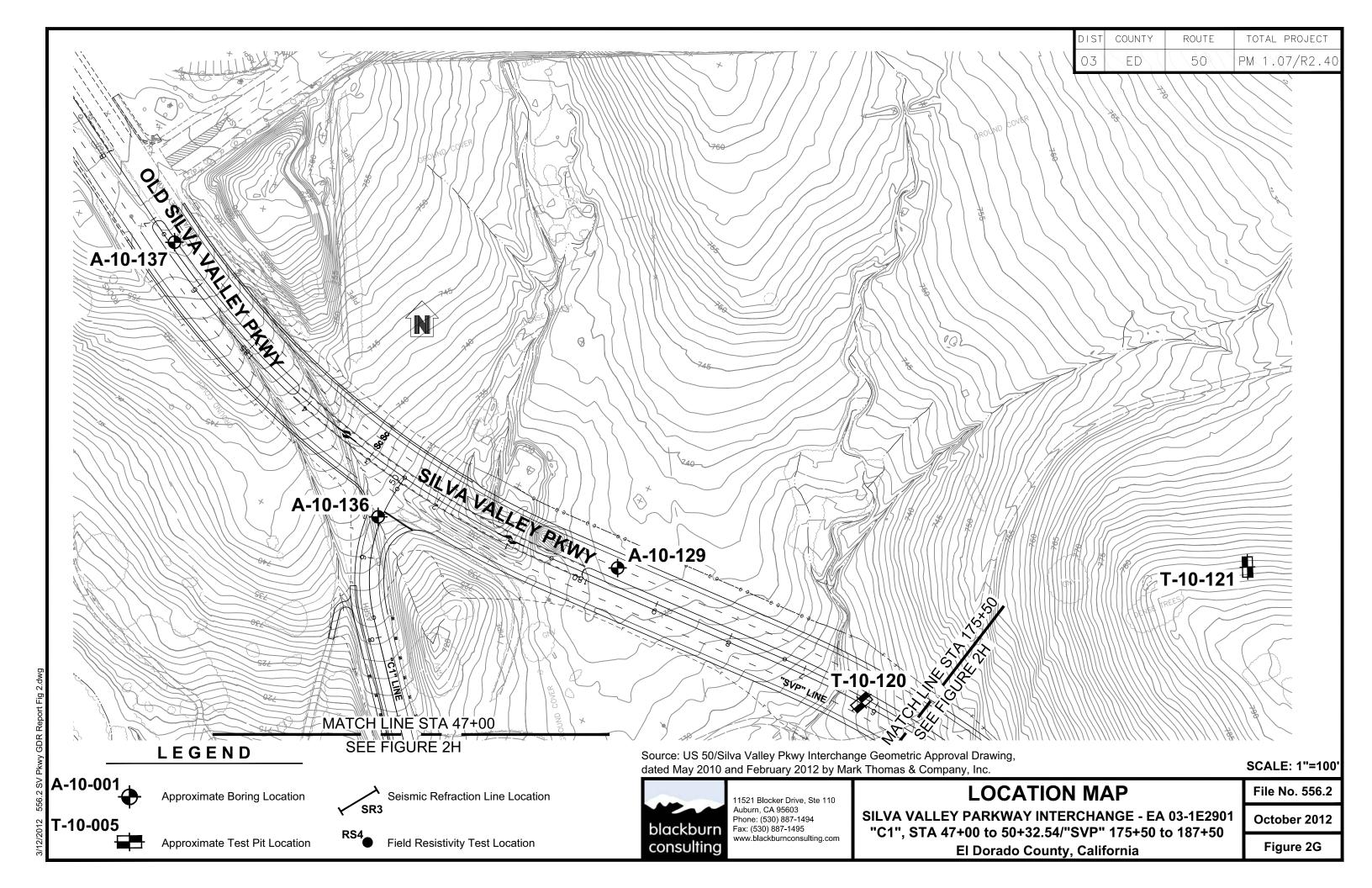


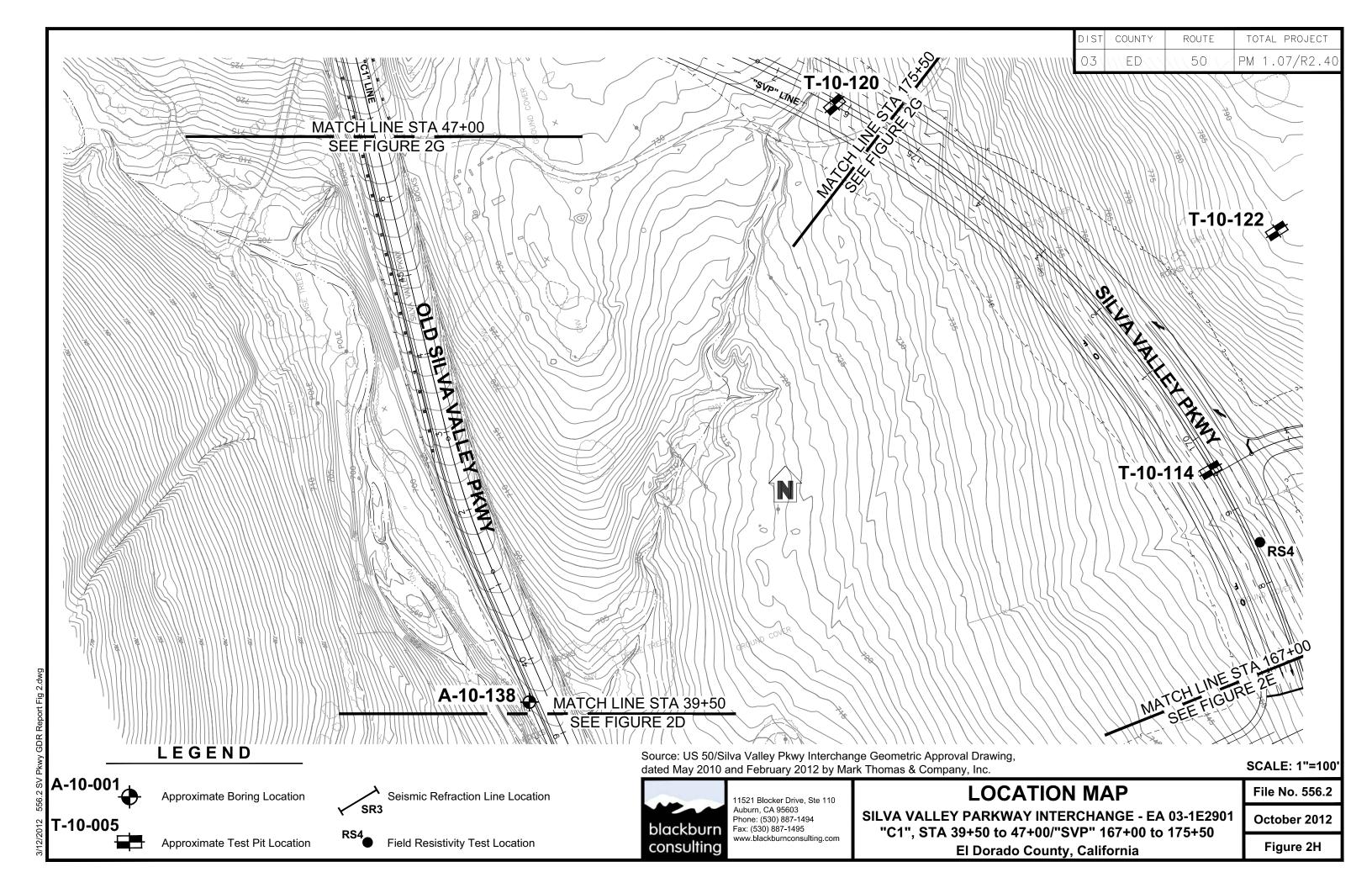


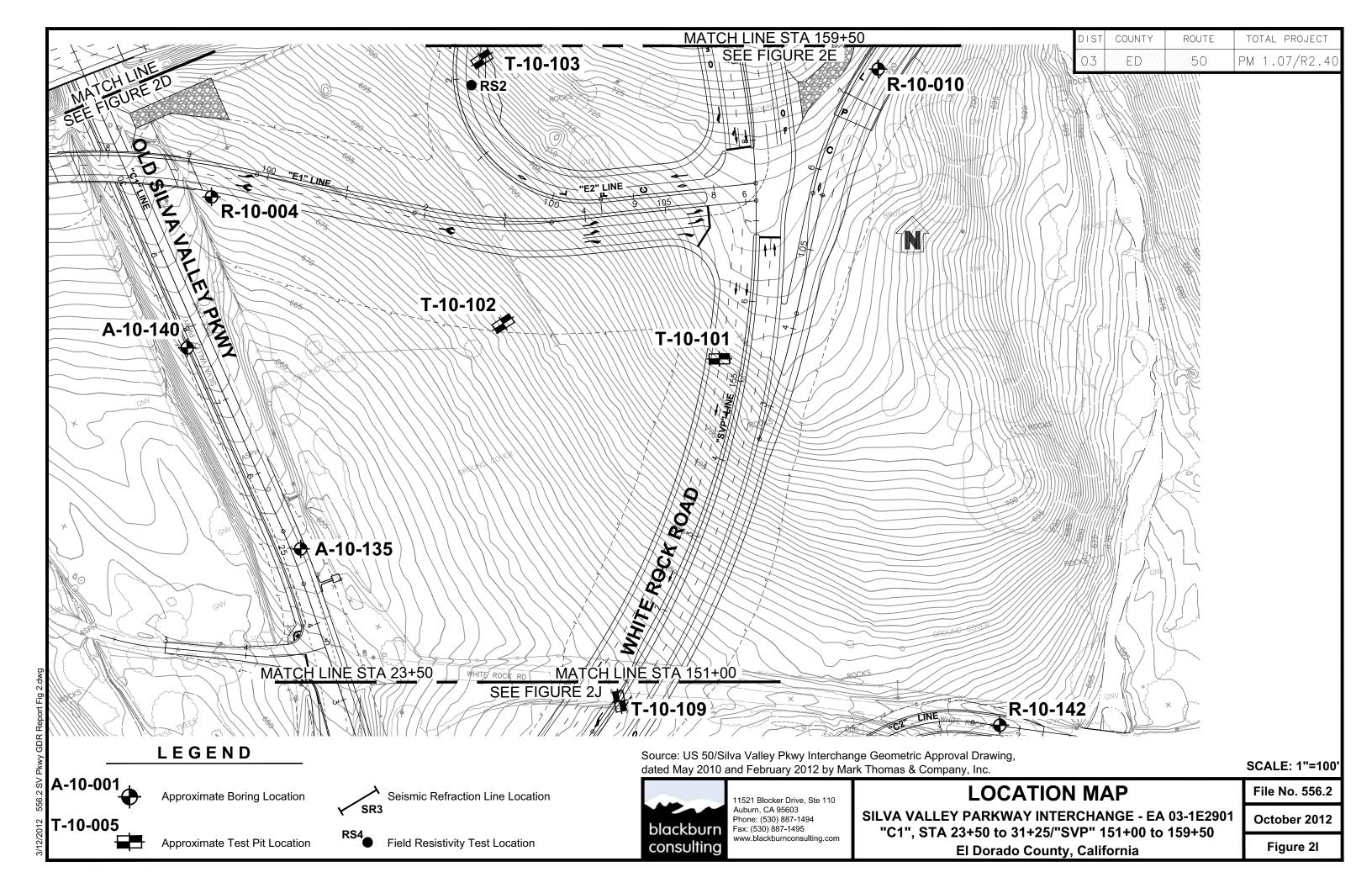


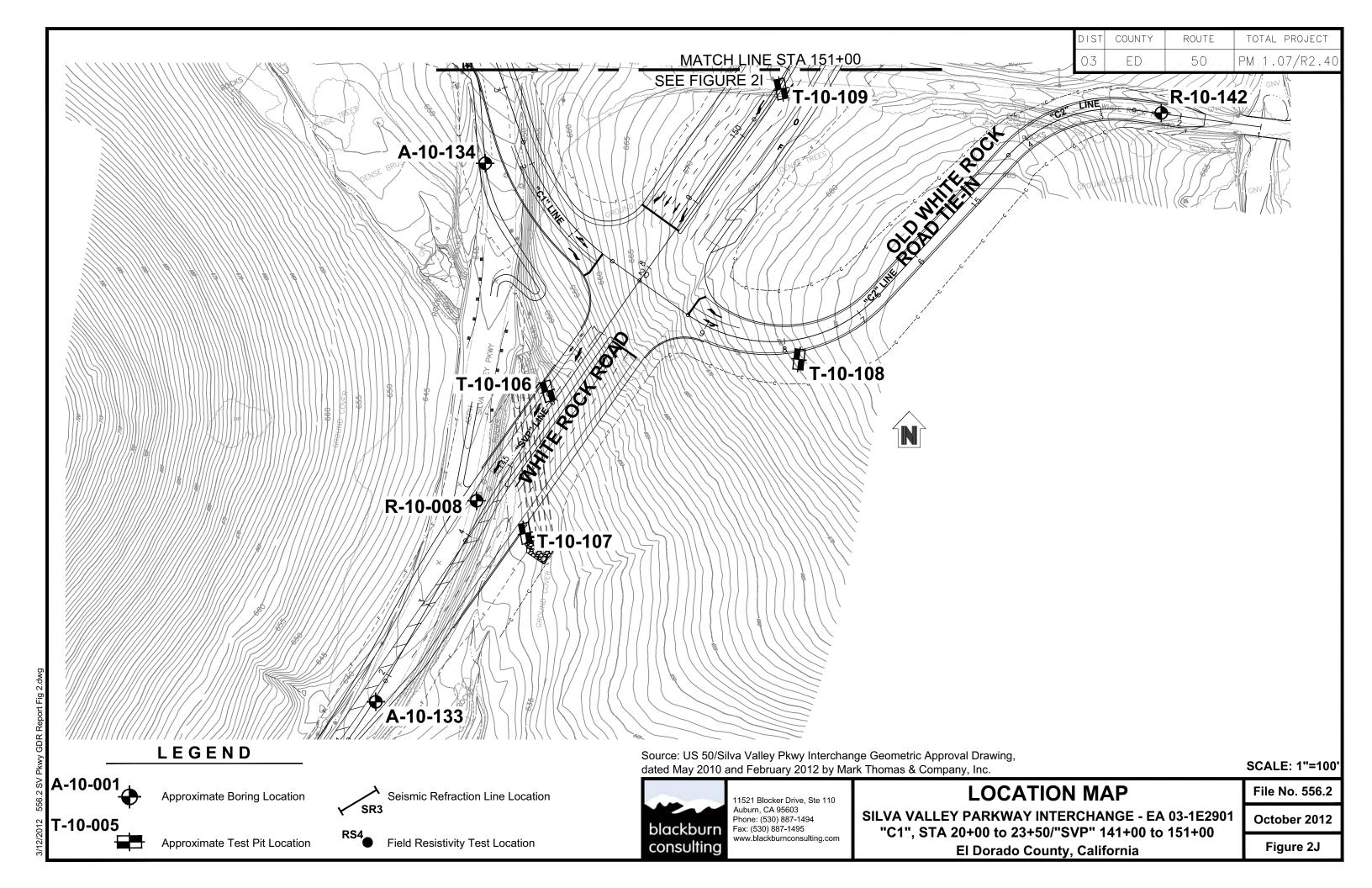


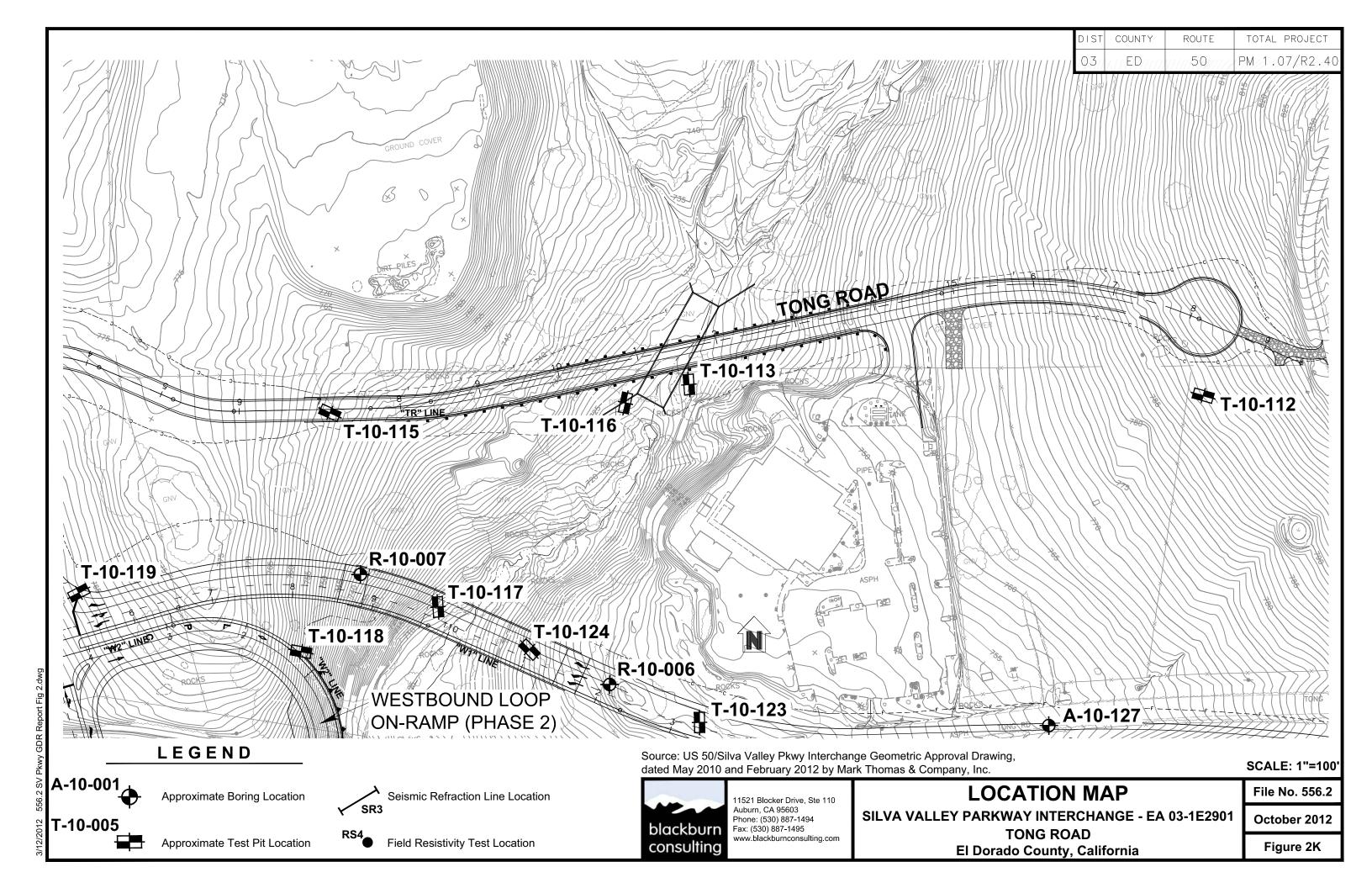


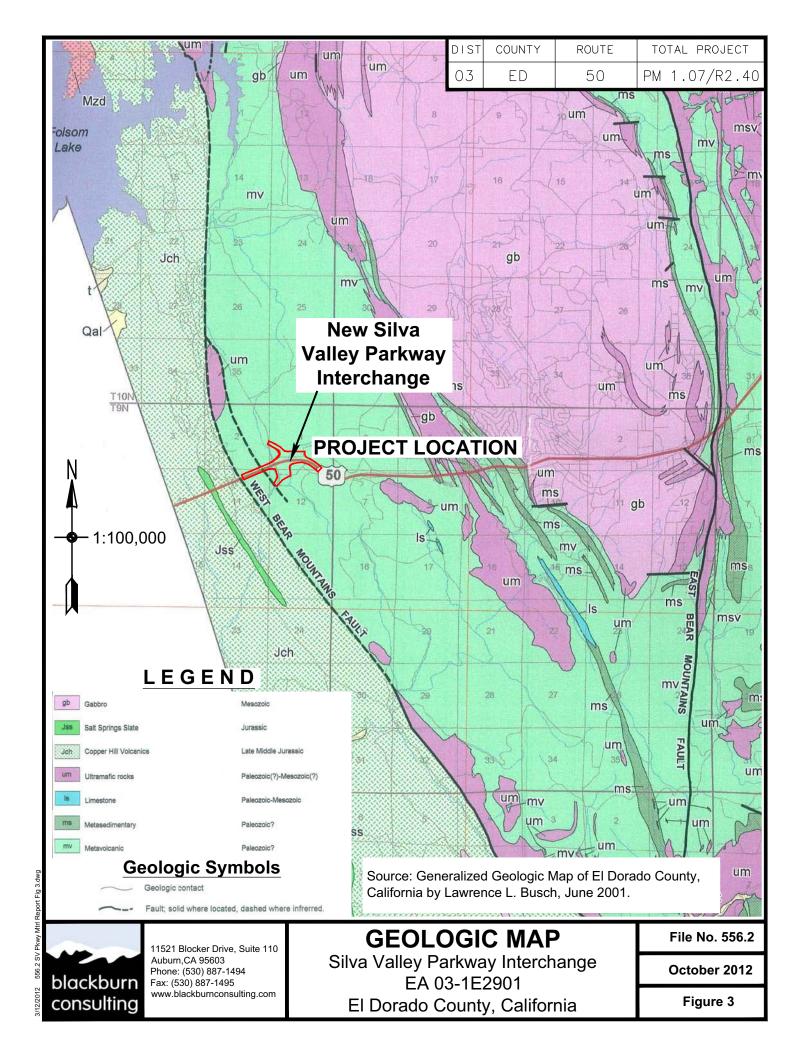


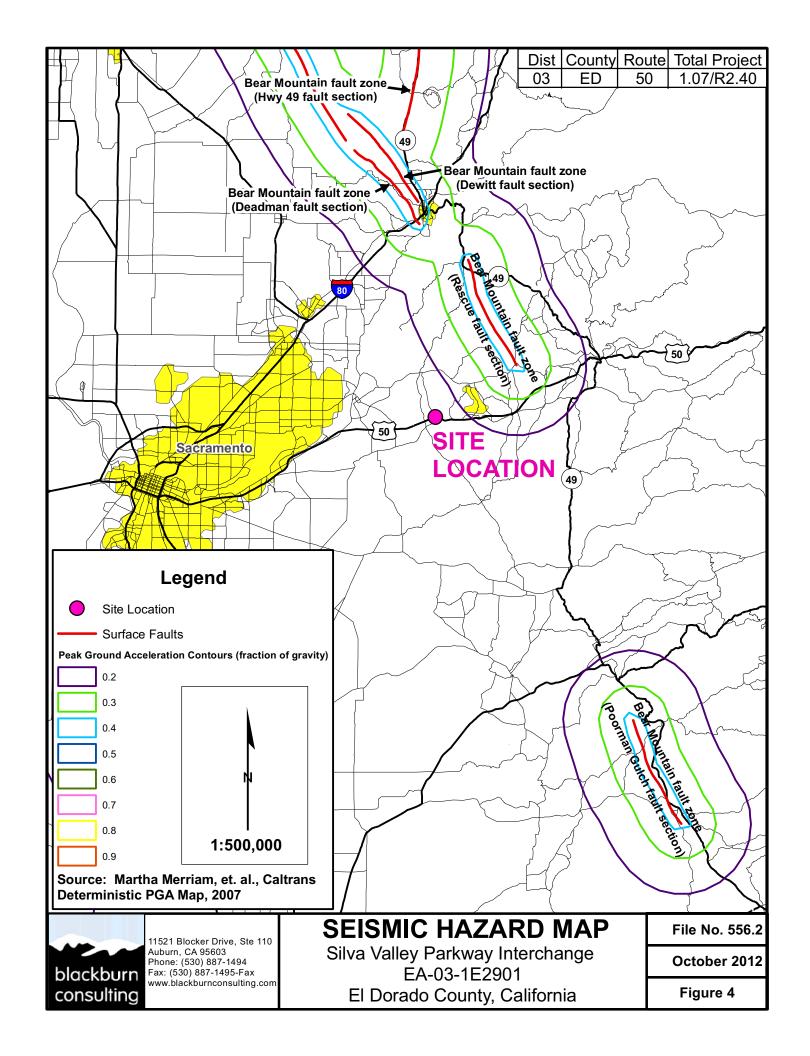








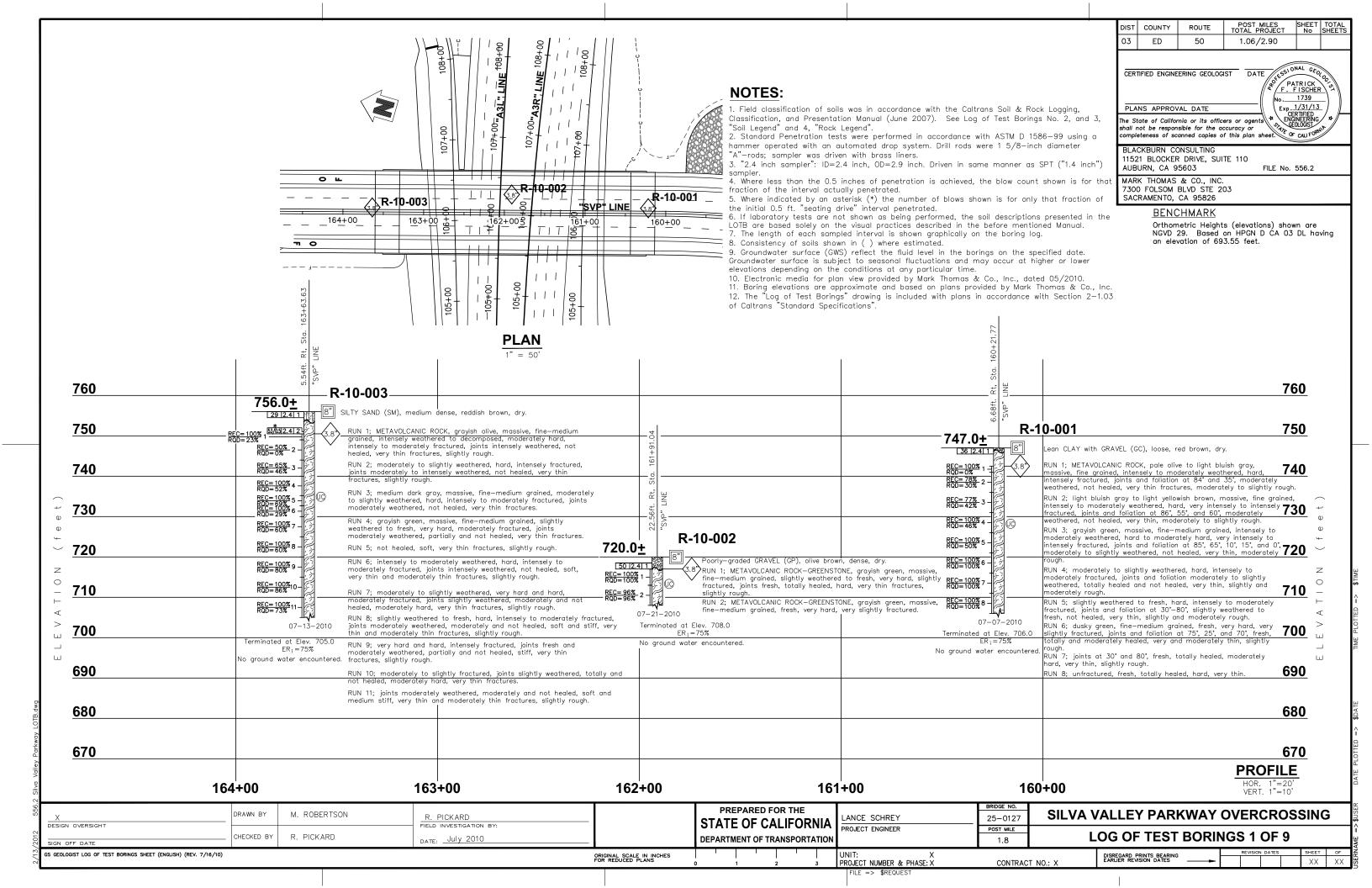


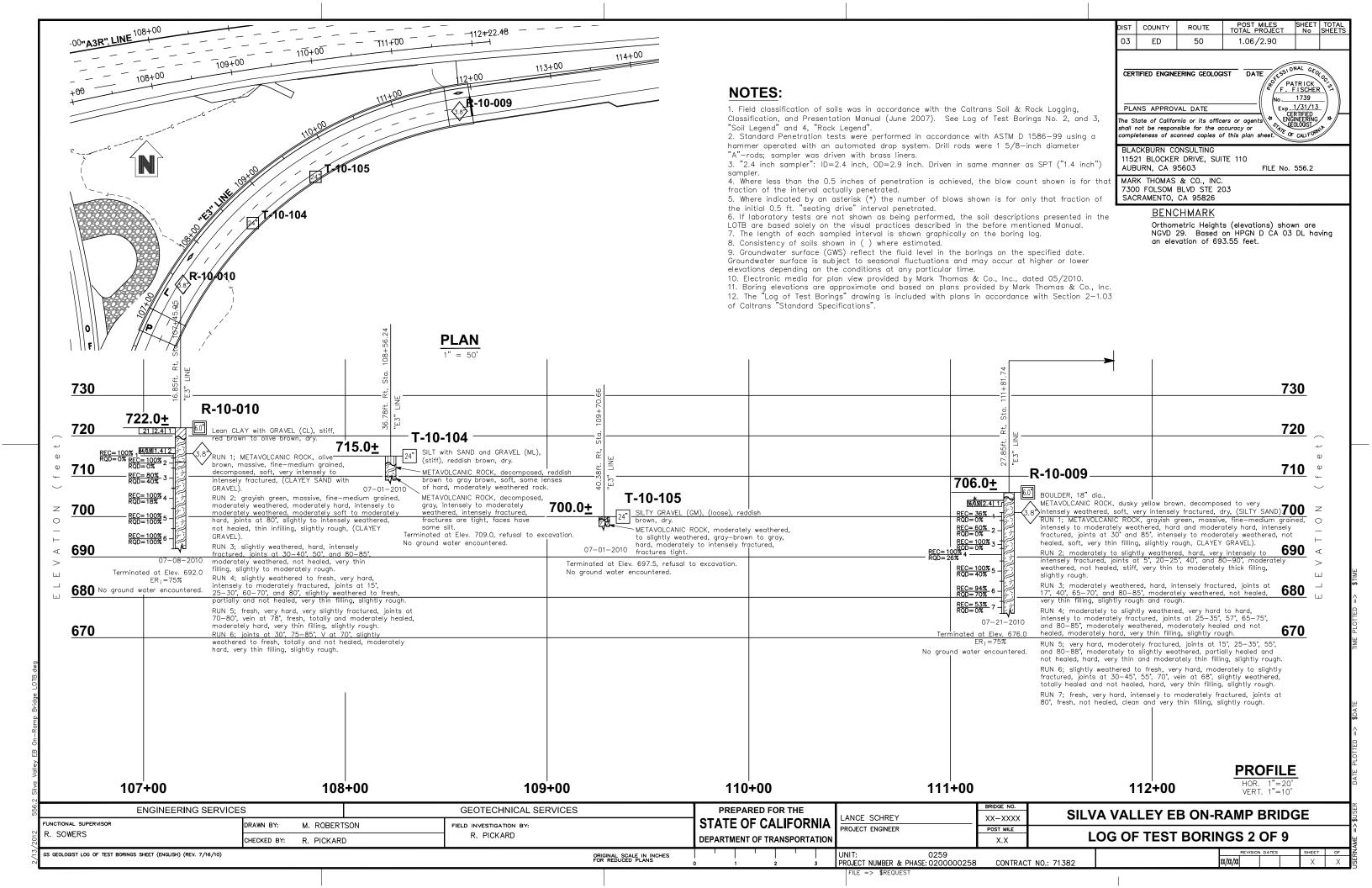


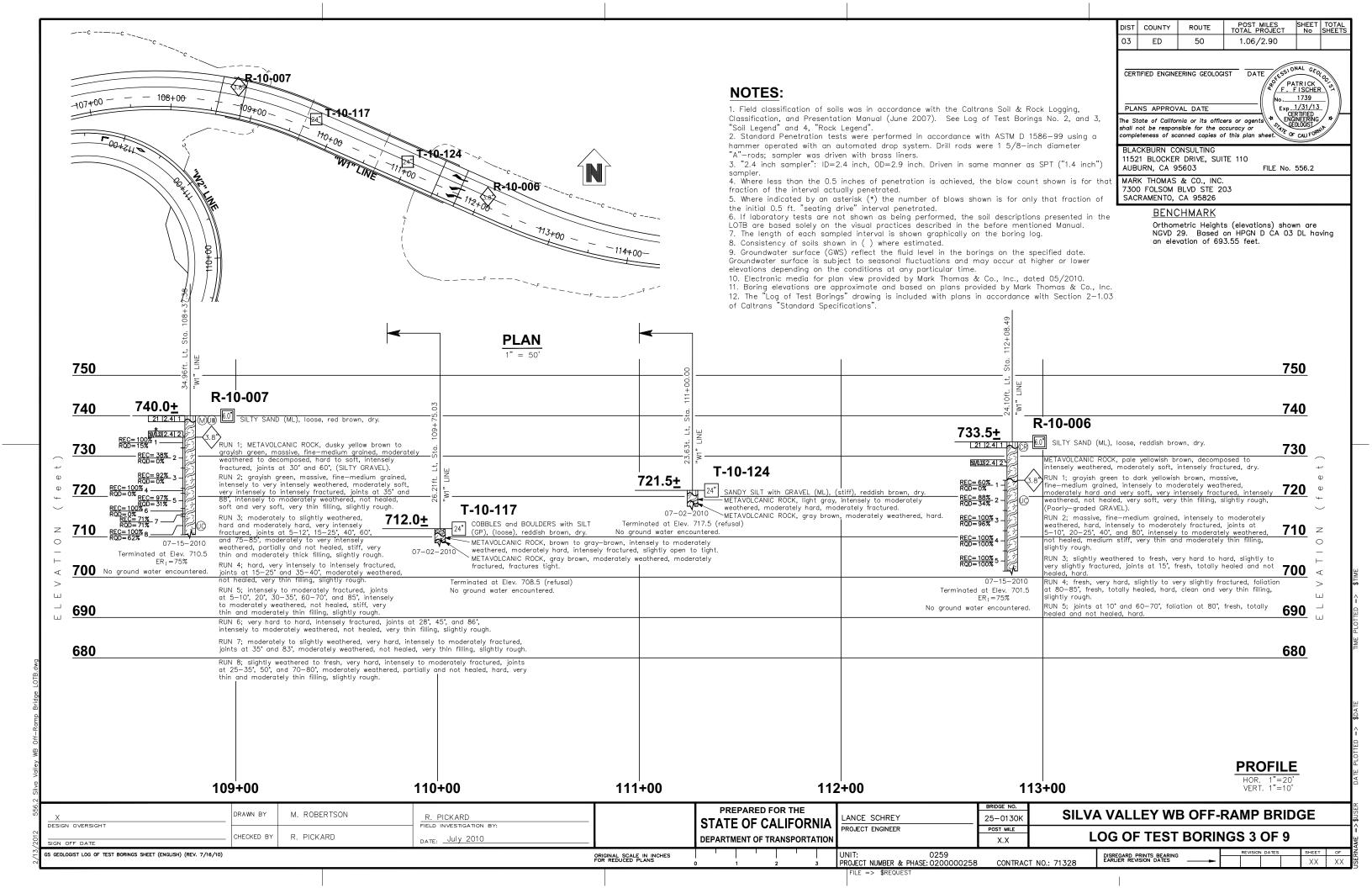
### **APPENDIX A**

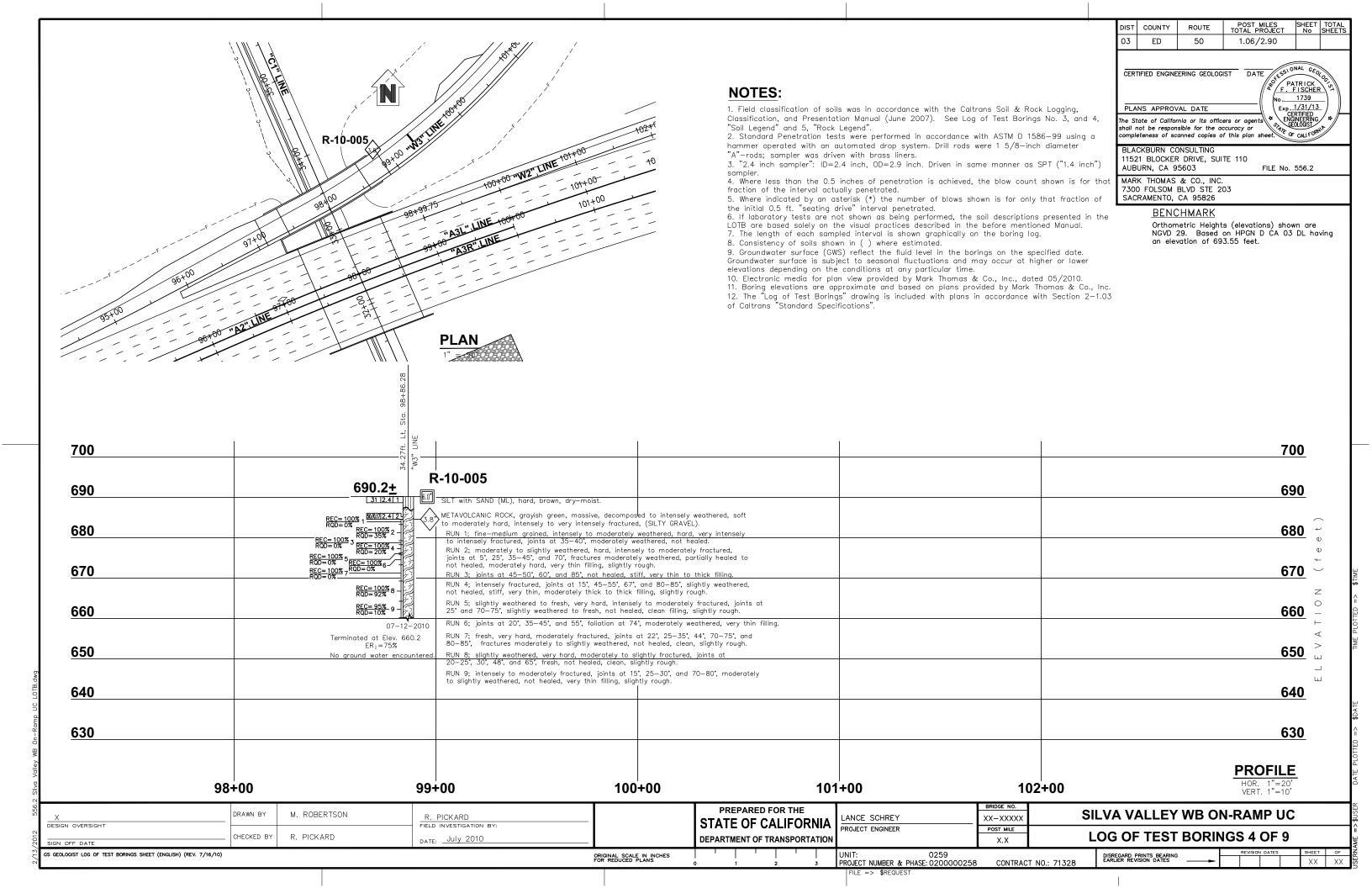
Legend of Logs (3sheets)

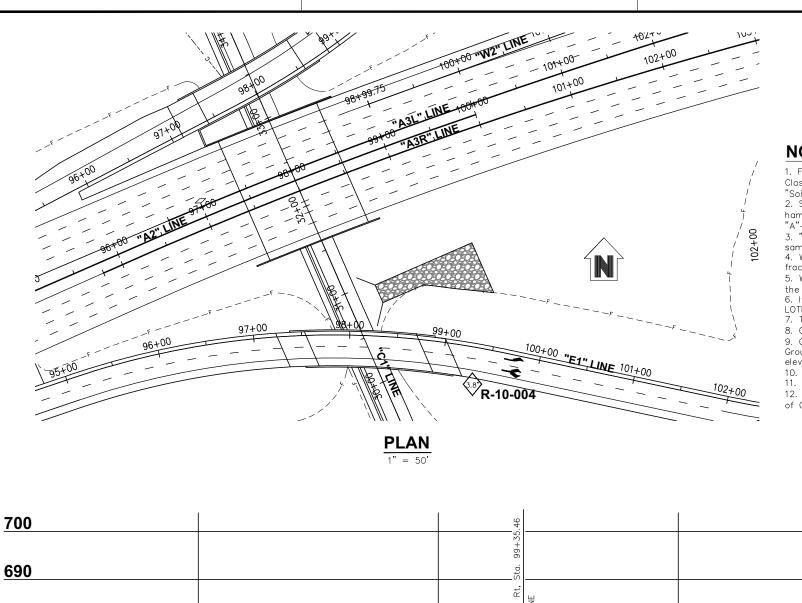
Log of Test Borings (Bridge Sites, Sheets 1 through 9)
Silva Valley Parkway OC
Eastbound On-Ramp at Carson Creek (Phase 2)
Westbound Off-Ramp at Carson Creek
Westbound On - Ramp UC
Eastbound Off-Ramp UC
White Rock Road Bridge
Boring and Test Pit Logs (R-10-008, T-10-101 to A-10-160)











DIST	COUNTY	ROUTE	TOTAL PROJECT	No	SHEETS
03	ED	50	1.06/2.90		
				•	•

PATRICK F. FISCHER

No. 1739 Exp. 1/31/13 CERTIFIED ENGINEERING GEOLOGST

OF CALIFORN

700

CERTIFIED ENGINEERING GEOLOGIST DATE

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of scanned copies of this plan sheet.

BLACKBURN CONSULTING 11521 BLOCKER DRIVE, SUITE 110 AUBURN, CA 95603 FILE No. 556.2

MARK THOMAS & CO., INC. 7300 FOLSOM BLVD STE 203 SACRAMENTO, CA 95826

### **BENCHMARK**

Orthometric Heights (elevations) shown are NGVD 29. Based on HPGN D CA 03 DL having an elevation of 693.55 feet.

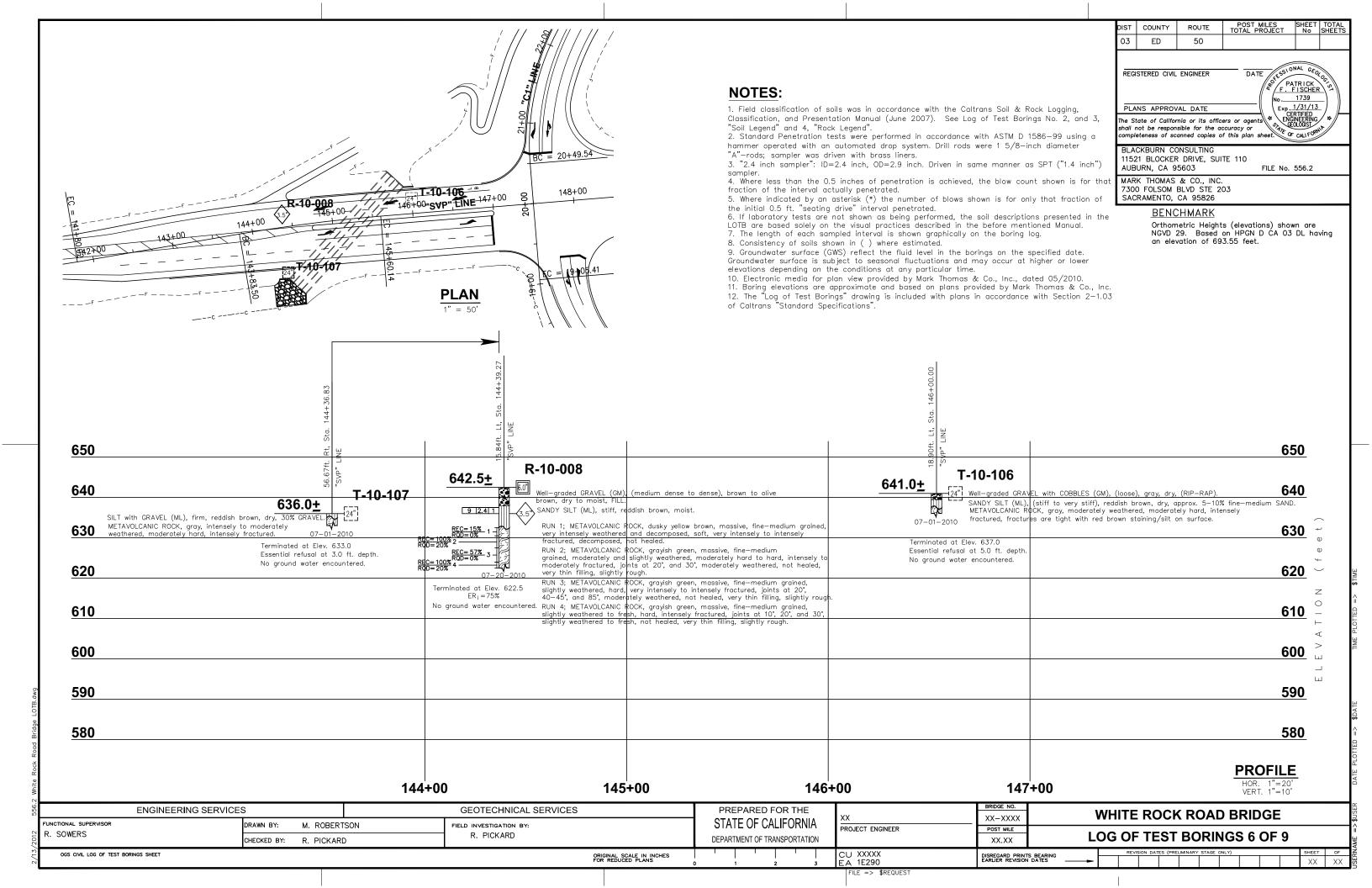
## **NOTES:**

- 1. Field classification of soils was in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007). See Log of Test Borings No. 3, and 4, "Soil Legend" and 5, "Rock Legend".

  2. Standard Penetration tests were performed in accordance with ASTM D 1586—99 using a
- hammer operated with an automated drop system. Drill rods were 1 5/8-inch diameter "A"-rods; sampler was driven with brass liners.
- 3. "2.4 inch sampler": ID=2.4 inch, OD=2.9 inch. Driven in same manner as SPT ("1.4 inch") 4. Where less than the 0.5 inches of penetration is achieved, the blow count shown is for that fraction of the interval actually penetrated.
- 5. Where indicated by an asterisk (\*) the number of blows shown is for only that fraction of the initial 0.5 ft. "seating drive" interval penetrated.

  6. If laboratory tests are not shown as being performed, the soil descriptions presented in the LOTB are based solely on the visual practices described in the before mentioned Manual.
- 7. The length of each sampled interval is shown graphically on the boring log.
- 8. Consistency of soils shown in ( ) where estimated.
- 9. Groundwater surface (GWS) reflect the fluid level in the borings on the specified date. Groundwater surface is subject to seasonal fluctuations and may occur at higher or lower elevations depending on the conditions at any particular time.
- 10. Electronic media for plan view provided by Mark Thomas & Co., Inc., dated 05/2010.
- 11. Boring elevations are approximate and based on plans provided by Mark Thomas & Co., Inc.
- 12. The "Log of Test Borings" drawing is included with plans in accordance with Section 2-1.03of Caltrans "Standard Specifications".

IGN OVERSIGHT	DRAWN BY M. ROBERTSON	R. PICKARD  FIELD INVESTIGATION BY:		STATE OF CALIFORNIA	PROJECT ENGINEER 25	5-0128S SILVA	VALLEY EB OFF-RAMP UC
				PREPARED FOR THE		RIDGE NO.	VALLEY ED OFF DAMP HO
	98+00	99+00	100+00	101	+00	102+00	PROFILE  HOR. 1"=20' VERT. 1"=10'
630		Terminated at Elev. 643 ER;=75% No ground water encoun					630
<u>640</u>		NQD=32%	fresh to slightly weathered. very intensely fractured.				640
<u>650</u>		REC= 100% 3 - 3 RQD= 24%	intensely to moderately weathered.  fresh to slightly weathered.				650
660		AS 12.412 M fr	(ETAVOLCANIC ROCK, yellowish brown, m ractured, moist, soft to very soft, (CLA METAVOLCANIC ROCK, gray green, mass weothered, hard, very intensely to inten	assive, decomposed, very intensely YEY SAND (SC), dense, moist). ive, fine—medium grained, moderately			660
670		6/2.0 <u>+</u>	ean CLAY (CL), (stiff), olive brown, dry.	ura maiat			670
680		8.40ft. Rt,					680



REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL, (JUNE, 2007)

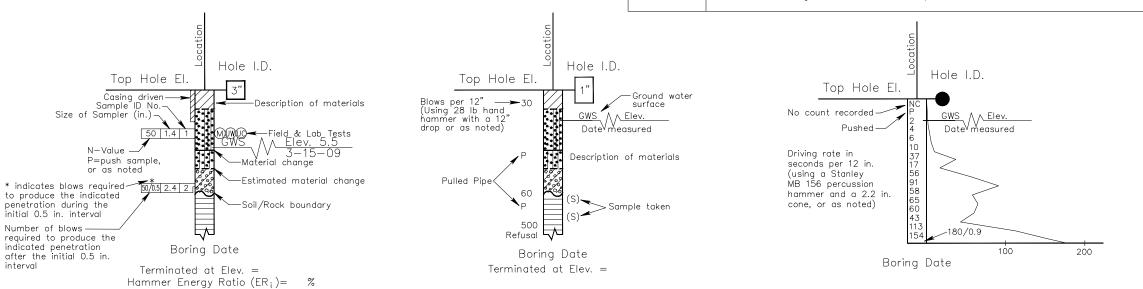
CEMENTATION				
Description	Criteria			
Weak	Crumbles or breaks with handling or little finger pressure.			
Moderate	Crumbles or breaks with considerable finger pressure.			
Strong	Will not crumble or break with finger pressure.			

	BOREHOLE IDENTIFICATION				
Symbol	Hole Type	Description			
Size	А	Auger Boring			
Size	R P	Rotary drilled boring Rotary percussion boring (air)			
	R	Rotary drilled diamond core			
Size	HD HA	Hand driven (1—inch soil tube) Hand Auger			
•	D	Dynamic Cone Penetration Boring			
	CPT	Cone Penetration Test (ASTM D 5778)			
	Т	Test Pit			
	NOTE: Size in inches.				

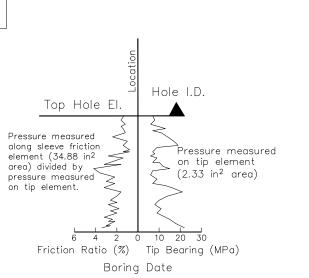
**ROTARY BORING** 

	CONSISTENCY OF COHESIVE SOILS						
Description	Unconfined Compressive Strength (tsf)	Pocket Penetrometer Measurement (tsf)	Torvane Measurement (tsf)	Field Approximation			
Very Soft	<0.25	<0.25	<0.12	Easily penetrated several inches by fist			
Soft	0.25 to 0.50	0.25 to 0.50	0.12 to 0.25	Easily penetrated several inches by thumb			
Medium Stiff	0.50 to 1.0	0.50 to 1.0	0.25 to 0.50	Penetrated several inches by thumb with moderate effort			
Stiff	1 to 2	1 to 2	0.50 to 1.0	Readily indented by thumb but penetrated only with great effort			
Very Stiff	2 to 4	2 to 4	1.0 to 2.0	Readily indented by thumbnail			
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty			

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



**HAND BORING** 



COUNTY

ED

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

BLACKBURN CONSULTING 11521 BLOCKER DRIVE, SUITE 110

MARK THOMAS & CO., INC. 7300 FOLSOM BLVD STE 203 SACRAMENTO, CA 95826

AUBURN, CA 95603

ROUTE

50

The State of California or its officers or agents shall not be responsible for the accuracy or

ompleteness of scanned copies of this plan sheet.

DATE

PATRICK F. FISCHER o. 1739 Exp. 1/31/13 CERTIFIED ENGINEERING GEOLOGIST

STATE OF CALIFORN

FILE No. 556.2

DYNAMIC CONE PENETRATION BORING

**CONE PENETRATION TEST (CPT) SOUNDING** 

2 Whit							S	OIL LEGEND		
556.	ENGINEERING SERVICES	GEOTECHNICAL SERVICES	PREPARED FOR THE	YY	BRIDGE NO.	SILVA V	ALLEY PA	RKWAY ALL S	TRUCTI	JRES
~	DRAWN BY:	M. ROBERTSON	STATE OF CALIFORNIA	PROJECT ENGINEER	POST MILE					
/201	CHECKED BY:	R. PICKARD	DEPARTMENT OF TRANSPORTATION		XX.XX	L	OG OF II	ST BORINGS 7	OF 9	
2/13	OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS	0 1 2 3	CU XXXXX EA 1E290	DISREGARD PRINT EARLIER REVISION	S BEARING I DATES	REVISION D	TES (PRELIMINARY STAGE ONLY)		SHEET OF XX

TLE => \$REQUEST

	GROUP SYMBOLS AND NAMES						
Graph	ic/Symbol	Group Names	Graph	ic/Symbol	Group Names		
0000	GW	Well-graded GRAVEL Well-graded GRAVEL with SAND		CL	Lean CLAY Lean CLAY with SAND Lean CLAY with SRAVEL SANDY lean CLAY SANDY lean CLAY		
	GP	Poorly—graded GRAVEL Poorly—graded GRAVEL with SAND			GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND		
	GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND		CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY		
	GW-GC	Well—graded GRAVEL with CLAY (or SILTY CLAY) Well—graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)			SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND		
	GP-GM	Poorly—graded GRAVEL with SILT Poorly—graded GRAVEL with SILT and SAND		ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT		
	GP-GC	Poorly—graded GRAVEL with CLAY (or SILTY CLAY) Poorly—graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		IVIC	SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND		
10000000000000000000000000000000000000	GM	SILTY GRAVEL SILTY GRAVEL with SAND		OL	ORGANIC lean Clay ORGANIC lean Clay with SAND ORGANIC lean Clay with GRAVEL SANDY ORGANIC lean CLAY		
	GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND		<u> </u>	SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND		
	GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND		OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT		
	SW	Well-graded SAND Well-graded SAND with GRAVEL			SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND		
	SP	Poorly—graded SAND Poorly—graded SAND with GRAVEL		СН	Fot CLAY Fot CLAY with SAND Fot CLAY with GRAVEL SANDY fot CLAY		
	SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL			SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND		
	SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)		МН	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT With CRAVE		
	SP-SM	Poorly—graded SAND with SILT Poorly—graded SAND with SILT and GRAVEL			SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND		
	SP-SC	Poorly—graded SAND with CLAY (or SILTY CLAY) Poorly—graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)		ОН	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY		
	SM	SILTY SAND SILTY SAND with GRAVEL			SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND		
	SC	CLAYEY SAND CLAYEY SAND with GRAVEL		ОН	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT		
	SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL			SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND		
77 77 77 77 77 77 7 77 77	PT	PEAT	9 9 9 F IT ) IT IT )	OH/OL	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL		
		COBBLES COBBLES and BOULDERS BOULDERS	FF) FF)		SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND		

FIELD AND	LABORATORY
TE	STING

- C Consolidation (ASTM D 2435)
- ©D Collapse Potential (ASTM D 5333)
- (CP) Compaction Curve (CTM 216)
- © Corrosivity Testing (CTM 643, CTM 422, CTM 417)
- © Consolidated Undrained Triaxial (ASTM D 4767)
- DS Direct Shear (ASTM D 3080)
- (E) Expansion Index (ASTM D 4829)
- M) Moisture Content (ASTM D 2216)
- OC Organic Content-% (ASTM D 2974)
- P Permeability (CTM 220)
- PA Particle Size Analysis (ASTM D 422)
- Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)
- (PL) Point Load Index (ASTM D 5731)
- (PM) Pressure Meter
- PP Pocket Penetrometer
- R-Value (CTM 301)
- SE Sand Equivalent (CTM 217)
- SG Specific Gravity (AASHTO T 100)
- SL) Shrinkage Limit (ASTM D 427)
- (SW) Swell Potential (ASTM D 4546)
- (TV) Pocket Torvane
- Unconfined Compression-Soil
  (ASTM D 2166)
  Unconfined Compression-Rock
  (ASTM D 2938)
- Unconsolidated Undrained Triaxial (ASTM D 2850)
- (W) Unit Weight (ASTM D 2937)
- VS Vane Shear (AASHTO T 223)

DIST	COUNTY	ROUTE	TOTAL PROJECT	No	SHEETS
03	ED	50			
PLA The St	not be respon	/AL DATE mia or its offic sible for the a	ers or agents	1739 1/31/13 RTIFIED NEFRING	
1152	CKBURN CO 21 BLOCKEF URN, CA 9	R DRIVE, SUI	TE 110 FILE No.	556.2	
7300		& CO., INC. BLVD STE 2 CA 95826			

APPARENT DEN	SITY OF COHESIONLESS SOILS
Description	SPT N <sub>60</sub> -Value (Blows / 12 inches)
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 — 30
Dense	31 – 50
Very Dense	> 50

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

PERCENT	OR PROPORTION OF SOILS
Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

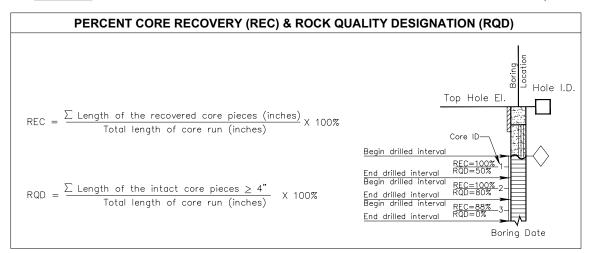
	PARTI	CLE SIZE
De	scription	Size
Boulder		> 12"
Cobble		3" to 12"
0 1	Coarse	3/4" to 3"
Gravel	Fine	No. 4 to 3/4"
	Coarse	No. 10 to No. 4
Sand	Medium	No. 40 to No. 10
	Fine	No. 200 to No. 40

					SOIL LEGEND
ENGINEERING SERVICES	GEOTECHNICAL SERVICES	PREPARED FOR THE	wy	BRIDGE NO.	SILVA VALLEY PARKWAY ALL STRUCTURES
DRAWN BY:	M. ROBERTSON	STATE OF CALIFORNIA	PROJECT ENGINEER	XX-XXXX POST MILE	
CHECKED BY:	R. PICKARD	DEPARTMENT OF TRANSPORTATION		XX.XX	LOG OF TEST BORINGS 8 OF 9
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS		CU XXXXX	DISREGARD PRINTS EARLIER REVISION	S BEARING REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF DATES XX XX

White Rock Road Bridge LOTB.dwg

FILE => \$REQUEST

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL, (JUNE, 2007)



	ROCK HARDNESS
Description	Criteria
Extremely Hard	Specimen cannot be scratched with a pocket knife or sharp pick; can only be chipped with repeated heavy hammer blows.
Very Hard	Specimen cannot be scratched with a pocket knife or sharp pick. Breaks with repeated heavy hammer blows.
Hard	Specimen can be scratched with a pocket knife or sharp pick with difficulty (heavy pressure). Heavy hammer blows required to break specimen.
Moderately Hard	Specimen can be scratched with a pocket knife or sharp pick with light or moderate pressure. Core breaks with moderate hammer pressure.
Moderately Soft	Specimen can be grooved 1/16" deep with a pocket knife or sharp pick with moderate or heavy pressure. Breaks with light hammer blow or heavy manual pressure.
Soft	Specimen can be grooved or gouged easily by a pocket knife or sharp pick with light pressure, can be scratched with fingernail. Breaks with light to moderate manual pressure
Very Soft	Specimen can be readily indented, grooved or gouged with fingernail, or carved with a pocket knife. Breaks with light manual pressure.

FRACTURE DENSITY								
Description	Observed Fracture Density							
Unfractured	No fractures.							
Very slightly fractured	Lengths greater than 3 feet.							
Slightly fractured	Lengths from 1 to 3 feet with few lengths less than 1 foot or greater than 3 feet.							
Moderately fractured	Lengths mostly in 4" to 1 foot range with most lengths about 8"							
Intensely fractured	Lenghts average from 1" to 4" with scattered fragmented intervals with lengths less than 4 in.							
Very intensely fractured	Mostly chips and fragments with a few scattered short core lengths.							
th fracture density characteristi	"Very intensely to intensely fractured") are used where equal distribution of ics is present over a significant interval or exposure, or where characteristics efinitions. Only two adjacent descriptors may be combined.							

RELATIVE STI	RENGTH OF INTACT ROCK
Term	Uniaxial Compressive Strength (PSI)
Extremely Strong	> 30,000
Very Strong	14,500 - 30,000
Strong	7,000 - 14,500
Medium Strong	3,500 - 7,000
Weak	700 - 3,500
Very Weak	150 - 700
Extremely Weak	< 150

BEDDING	SPACING							
Description	Thickness / Spacine							
Massive	Greater than 10 ft							
Very thickly bedded	3 to 10 ft							
Thickly bedded	1 to 3 ft							
Moderately bedded	3-5/8" to 1 ft							
Thinly bedded	1-1/4" to 3-5/8"							
Very thinly bedded	3/8" to 1-1/4"							
Laminated	Less than 3/8"							

03	ED	50									
	STERED CIVIL		DA	PA F. F	1739	06/51					
PLANS APPROVAL DATE  The State of California or its officers or agents  The State of California or its officers or agents  Approval provided to the accuracy or completeness of scanned copies of this plan sheet.											
				sheet. ATE OF	CALI FORM						
BLA 1152	eteness of sc CKBURN CO	anned copies o DNSULTING R DRIVE, SUI	f this plan	sheet. OF							

ROUTE

LEGEND	OF ROCK MATERIALS
	IGNEOUS ROCK
	SEDIMENTARY ROCK
	METAMORPHIC ROCK

DIST COUNTY

		WEATHERIN	IG DESCRIPTORS FOR	INTACT RO	CK			
		Diagno	stic features					
Description	Chemical weathering and/or oxi		Mechanical Weathering— Grain boundary condi— tions (disaggregation)	Texture ar	d solutioning	General Characteristics		
	Body of rock	Fracture Surfaces	primarily for granitics and some coarse—grained sediments	Texture	Solutioning			
		No separation, intact (tight).	No change.	No solutioning.	Hammer rings when crystalline rocks are struck.			
Slightly Weathered	tance from, fractures; some feldspar crystals are dull.  Discoloration or oxida— tion extends from frac— tures usually throughout; Fe—Mg minerals are "rusty", feldspar crystals are "cloudy".  Discoloration or oxidation throughout; all feldspars and Fe—Mg minerals are altered to clay to some are discolored or		No visible separation, intact (tight).	Preserved.	Minor leaching of some solu— ble minerals may be noted.	Hammer rings when crystalline rocks are struck. Body of rock not weakened.		
Moderately Weathered			Partial separation of boundaries visible.	Generally preserved.	Soluble min— erals may be mostly leached.	Hammer does not ring when rock is struck. Body of rock is slightly weakened.		
Intensely Weathered			throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in—situ disaggregation, see  All fracture surfaces are discolored or oxidized, surfaces friable.  All fracture surfaces are discolored or oxidized, surfaces friable.  Partial separation, rock is friable; in semiarid conditions granitics are disaggregated.			Dull sound when struck with hammer, usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures, or veinlets. Rock is significantly weakened.		
Decomposed	Discolored or oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe—Mg minerals are completely altered to clay.		Complete separation of grain boundaries (disaggregated).	oundaries structure may be pre		Can be granulated by hand. Resistant minerals such as quartz may be present as "stringers" or "dikes".		

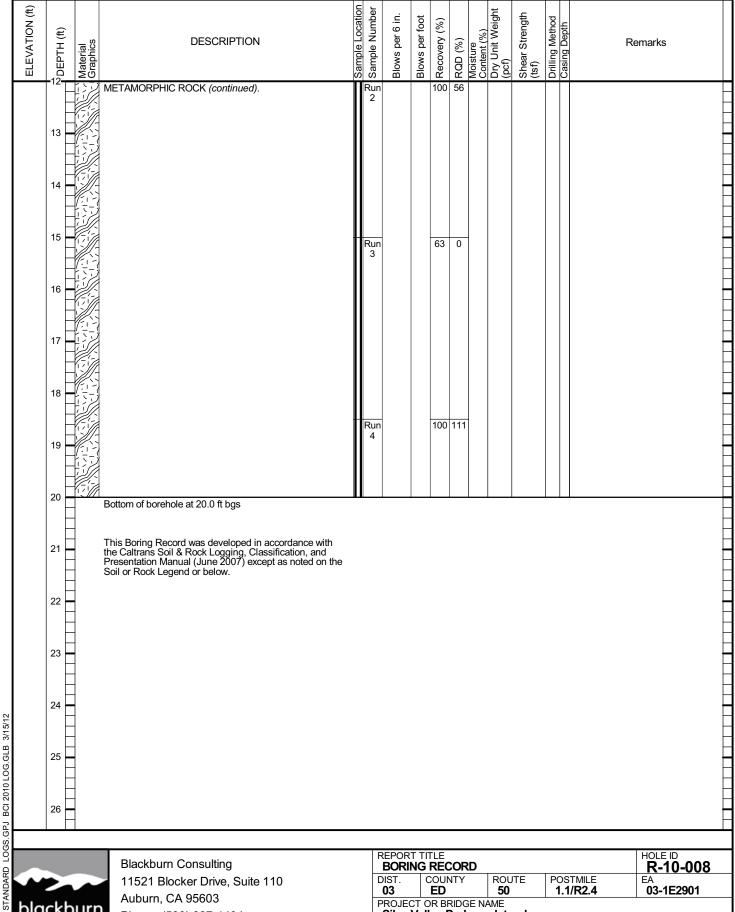
Combination descriptors (such as "slightly weathered to fresh") are used where equal distribution of both weathering characteristics is present over significant intervals or where characteristics present are "in between" the diagnostic features. However, combination descriptors should not be used where significant, identifiable zones can be delineated. Only two adjacent descriptors may be combined. "Very intensely weathered" is the combination descriptor for "intensely weathered to decomposed".

Z White						ROCK LEGEND	
556.	ENGINEERING SERVICES	GEOTECHNICAL SERVICES	PREPARED FOR THE		RIDGE NO.	SILVA VALLEY PARKWAY ALL STRUCTURES	
	DRAWN BY:	M. ROBERTSON	STATE OF CALIFORNIA		X-XXXX		
72012	CHECKED BY:	R. PICKARD	DEPARTMENT OF TRANSPORTATION		XX.XX	LOG OF TEST BORINGS 9 OF 9	
2/13/	OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS	0 1 2 3	CU XXXXX EA 1E290	REGARD PRINTS RLIER REVISION D	ITS BEARING REVISION DATES (PRELIMINARY STAGE ONLY)  SHEET OF  XX XX	

556.2 White Rock Road Bridge LOTB.dwg

LE => \$REQUEST

RCF	SED B	, ,		BEGIN <b>7-20-</b>			-20-10	ION DATE	BOREHO		OCA	IIION	(Lavi	Lung	OI IN	iOi ti i/	Last	ina Batt	,			EID -10-0	80	
DRILL				OR					BOREHO	LE L	OCA	TION	(Offs	et, S	tatio	n, Lin	ne)					RFACE E		ΓΙΟΝ
DRILL		oration METHO							DRILL RIC	<u> </u>											BOF	REHOLE	DIAME	ETER
Rota	ary V	Vire-	Line						CME 75										4 i	n				
SAMPLER TYPE(S) AND SIZE(S) (ID) <b>Bulk</b> BOREHOLE BACKFILL AND COMPLETION				SPT HAMMER TYPE Automatic											80									
BOREHOLE BACKFILL AND COMPLETION		GROUNDWATER DURING DRILLING AFTER DRILLING (DATREADINGS										DATI		Oft.	'TH OF	BORIN								
ELEVATION (ft)	Роертн (ft)	Material	Grapnics			DESC	CRIPTIC	DN		Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Ren	narks	
	1 2 3		SIE	. <b></b>				own; moist.	own; dry to		D01	3	9	100										
	6 7 8 9											4 5												
	11		ME ma	ETAMORI Issive, gra rd, intenso	PHIC R ayish greatly frac	OCK, fireen, motured.	ne-grain oderatel	ned to mediu y to slightly	m-grained, weathered,		Run 1			30	0									
	12					(cc	ontinued)	)																
				Blackb	urn C	onsult	ing					EPOR BORI			COR	D						[1	HOLE I <b>R-1</b>	D-008
				11521			-	ite 110			D	IST. <b>03</b>		COUI			ROL <b>50</b>		PC	OSTN .1/F	IILE	E	A 03-1E	
bla	الماء	hu	'n	Auburi							Р	ROJE	ст с	R BI	RIDG	E N/	AME			. I/N	∠.4		U3-1E	<b>-290</b> 1
blo	ICK	DUI 	П	Phone								Silva	Vall	ley I	Park	way	/ Inte	rchan	ge		Т	D.***	1.	
COL	ารบ	ıltin	Q	Fax: (5	30) 8	87-14	95				B	RIDGI	= NU	MBE	ĸ	PRI	EPAR <b>CP</b>	ED BY				DATE	{	SHEET 1



blackburn consulting

Blackburn Consulting 11521 Blocker Drive, Suite 110

Auburn, CA 95603 Phone: (530) 887-1494 Fax: (530) 887-1495

REPORT BORING	TITLE <b>G RECORD</b>			HOLE ID <b>R-10-008</b>
DIST.	COUNTY	ROUTE	POSTMILE	EA
03	ED	50	1.1/R2.4	03-1E2901
DDO IECT	OD DDIDGE N	\ N / E		

Silva Valley Parkway Interchange

PREPARED BY RCP BRIDGE NUMBER DATE SHEET 2 of 2

LOGGE <b>PFF</b>	ED B	Y	BEGIN DATE <b>7-1-10</b>	COMPLETION DATE <b>7-1-10</b>	BOREHOL	E LO	OCA	TION	(Lat/l	ong	or N	orth/	East a	nd Datı	ım)		HOLE II	)-101		
			RACTOR <b>Excavating</b>		BOREHOL	E LO	OCA <sup>®</sup>	TION	(Offs	et, S	tatior	n, Lin	e)					CE ELE\	/ATION	
DRILLIN	NG M	1ETHC			DRILL RIG														METER	
SAMPL	ER T	YPE(S	S) AND SIZE(S) (ID)		SPT HAMI		TYF	ΡE									HAMME	R EFFIC	CIENCY, E	Ri
	IOLE	BACK	gs (FILL AND COMPLETIOI <b>h native cuttings</b>	N	GROUND' READING	WAT S	ER	DURII					TER	DRILLIN	IG (E	DATE)	TOTAL 6.5 ft		OF BORI	NG
ELEVATION (ft)	Роертн (#)	Material		DESCRIPTION		Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depin		Remark	s	
			SANDY SILT (ML); re	ddish brown; dry to mois	t.															
709.00	1 -	<u>-</u>				<u></u>	001													-
708.00	3		medium-grained, mas	CK, Metavolcanic, fine-gr sive, grayish brown, dec ntensely fractured, (Silty	composed.															
706.00	4		medium-grained, mas weathered, moderatel Predominate fracture	CK, Metavolcanic, fine-gi sive, medium gray, mod y hard, very intensely fra (foliation) N35W, 75-85 res tight, silt filled, break	erately ctured, N and															-  -  -  -  -
704.00	6		Bottom of borehole at	6.5 ft bgs																
	7		Essential Refusal at 6 This Boring Record w the Caltrans Soil & Ro	.5 ft. as developed in accorda ock Logging, Classificatic (June 2007) except as no	ince with															
702.00	8	_	Soil or Rock Legend of	June 2007) except as no or below.	oled on the															
	9																			
700.00	10																			
	11																			-
	-12 <del>-</del>		_				P	EPOR	T T17									HOL	E ID	
•	>		Auburn CA OF	Drive, Suite 110			D (	BORI IST. 03	NG C	REC OUN ED	ΙΤΥ		ROU <b>50</b>	TE		STMIL . <b>1/R2.</b>		<b>T-</b>	10-10 1E2901	
blad			Phone: (530) 8	387-1494			_ (		Vall	ey F	Park	way	<i>I</i> nte	rchan	ge		15.	T	0.155	
con	SU	ITIN	<b>9</b> Fax: (530) 887	'-1495			BI	RIDGE	INUI	VIDE	`		CP CP	ED BY				TE -9-10	SHEET 1 of	

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

LOGGI PFF	ED B	Y		BEGIN <b>7-1-</b>	DATE		COMPLI <b>7-1-10</b>	ETION DAT	TE B	OREHO	LE I	OCA	ATION	(Lat/	Long	or N	lorth/	East a	and Dati	ım)			LE ID	400		
DRILLI	NG C	CON	TRA		10		7-1-10	,	В	OREHO	LE I	OC/	ATION	(Offs	et. S	statio	n. Lir	ne)					-10-		'ATION	
				xcavatin	g					0.120		-00,		(0	, o., o		,	.0,					682.5			
DRILLI			HOD	)						RILL RIC												ВО	REHO	LE DIA	METER	3
Back			E(S)	AND SIZE(	6) (ID)					CAT 43 PT HAM			DE									ПΛ	MMED	EEEIC	IENCY,	EDi
buck					3) (10)				3	F I I IÆIVI	IVILI	<b>\ 11</b>	F L									''^	IVIIVILIX	LITIC	ILINO I ,	LIXI
BORE	HOLE	ВА	CKF	ILL AND CO	OMPLE	TION			G	ROUND EADING	WA	TER						TER	DRILLI	NG (	DATE			EPTH	OF BOR	RING
									K	EADING	_		not	enco	ount		_					5.	0 ft			
ELEVATION (ft)											Sample Location	Sample Number	.⊑	ಕ	<u></u>			Dry Unit Weight (pcf)	gt.	b	_					
Į	(#)		s			DE:	SCRIP1	TION			P	N N	er 6	er fc	6)		<b>%</b>	We	tren	<b>Jeth</b>	Sept		R	emark	2	
ΞVΑ	DEPTH (ft)	i d	Graphics								nple	ngle	Blows per 6 in.	Blows per foot	Recovery (%)	8)	sture	Į,	ar S	ing	ing			oman	,	
ELI	JOE JOE	Mot	g g								San	San	Blo	B	Rec	R	S S	Dry (pcf	Shear Strength (tsf)	Drilling Method	Cas					
				SANDY SI	LT (ML	.); stiff;	reddish	brown; dry	/ to moi	st.																
	1																									
	ŀ																		PP = 2.0							
	-	-Ľ		METAMOR	RPHIÇ	ROCK	, Metav	olcanic, fine	— — — e-graine	ed to	-															-
680.50	2			METAMOF medium-gr moderately	ained, soft, ir	massiv	e, grayi y fractur	sn brown, ored, Predor	decom minate	posed, fracture																F
		   		(foliation)	N65W,	90 and	randon	n. (Silty Gra	avel).																	
		7/7																								
	3	_;																								
	-	-(:																								H
		7																								
678.50	4	1		METAMOR	RPHIÇ	ROCĶ	, Metavo	olcanic, fine	— — — e-graine	ed to	1															<u> </u>
		1/2		METAMOF medium-gr weathered becomes of	ained, , moder	massiv rately h	e, medi ard, inte	um gray, m ensely fract	noderat tured, F	Rock																
	5			diameter.	IIfficult	to exca	vate, br	eaks into p	neces 3	3-10" in																
	٦			Bottom of b	orehol	e at 5.0	) ft bgs																			
				Essential F	Refusal	at 5.0	ft.																			
676.50	6	4		This Boring the Caltrar Presentation	g Reco	rd was & Rock	develop	ed in acco	ordance	with																
				Presentation Soil or Roo	on Man	ual (Ju	ne 2007	7) except as	s noted	on the																
				3011 01 1100	K Lege	ila oi L	CIOW.																			
	7	-																								-
674.50	8																									
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	<b>-</b> 12																									
				Disal	burn f	Cons	ıltin ~					F	REPOF	T TI	TLE									HOL	ID ,	
					burn (		_	Suite 110					BOR		REC		KD_	ROL	JTF	PC	STM	III F		<b>T-</b>	<u> 10-1</u>	02
~~		~	$\sim$	1152	ו סוטנו	L C	rive, S	ouite 110					03		ED	• • •		50			.1/R			03-	1E290	)1

Auburn, CA 95603 Phone: (530) 887-1494 Fax: (530) 887-1495

DIST. COUINT.

03 ED DU

PROJECT OR BRIDGE NAME

Silva Valley Parkway Interchange

BRIDGE NUMBER PREPARED BY

RCP 1.1/R2.4 03-1E2901

SHEET 1 of 1 DATE

LOGGE <b>PFF</b>	D BY		BEGIN DATE <b>7-1-10</b>	COMPLETION DATE 7-1-10	BOREHOLE	LOCA	TION	(Lat/l	Long	or No	orth/l	East a	nd Datu	ım)		HOLE	ID   <b>0-10</b> ;	3	
DRILLIN					BOREHOLE	LOCA	TION	(Offs	et, S	tation	ı, Lin	e)				SURF		VATION	
ORILLIN	IG ME				DRILL RIG													AMETER	?
Backl SAMPLE		YPE(S)	) AND SIZE(S) (ID)		CAT 430		PE									HAMN	IER EFF	CIENCY,	ERi
bucke ROBEH		_	S FILL AND COMPLETIC	NN	GROUNDW	ΔTER	DURI	NG F	ו וום	ING	ΔΕ	TERI	DRII I IN	IG (	ΠΔΤΙ	E) TOTA	I DEDTI	I OE BOE	SING
JOINLII	OLL	BACKI	ILL AND CONFELTIC	ON .	READINGS	AILK	not e					ILIXI	DIVILLII	) O	DAII	3.5		TOT BOT	VIIVO
ELEVATION (ft)	DEPTH (ft)	Material Graphics	1	DESCRIPTION		Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	3QD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Remar	ks	
	0_	-	SANDY SILT with GF dry.	RAVEL (ML); stiff; yellowis		D01				<u> </u>			<i>0,</i> C						
11.00	1 -		medium-grained, ma	ICK, Metavolcanic, fine-grassive, grayish brown, inter ly hard, intensely fractured	nsely														
	3		Predominate fracture	CK, Metavolcanic, fine-grassive, grayish brown ly hard, intensely fractured (foliation) N35W, 85 N, m	nostly					_				-					
09.00	4 -		Bottom of borehole at Essential Refusal at 3 This Boring Record v	3.5 ft.	nce with														•
07.00	6		Presentation Manual Soil or Rock Legend	ock Logging, Classificatio (June 2007) except as no or below.	ted on the														
	7																		
05.00	8																		
	9																		
03.00	10																		
	11																		
	12																		
2	×	>	Auburn CA Q	er Drive, Suite 110		D	EPOR BORI IST. 03	NG I	REC COUN ED	NTY		ROU <b>50</b>	TE		OSTN .1/R		EA	LE ID -10-1 3-1 <b>E290</b>	
blac			Phone: (530)	887-1494		;		Vall	ey F	Park	way	/ Inte	rchan ED BY	ge		Γ =	\ATE	SHEE	
~	ALI I	ting	Fax: (530) 88	7 1 10 5		I B	RIDGE	- 1311 11				-レムレ	-11 KY			1 [	ATE		: I

Logs T-10-104 and T-10-105 on LOTB for Eastbound On-Ramp (Phase 2)

DRILLING CONTRACTOR  Monte Rickey Excavating  DRILLING METHOD  Backhoe  SAMPLER TYPE(S) AND SIZE(S) (ID)  bucket cuttings  BOREHOLE BACKFILL AND COMPLETION  GROUNDWATER DURING DRILLING AFTER DRILLING (DATE)  TOTAL DE  READINGS  READINGS	106
DRILLING METHOD  Backhoe  SAMPLER TYPE(S) AND SIZE(S) (ID)  bucket cuttings  BOREHOLE BACKFILL AND COMPLETION  GROUNDWATER DURING DRILLING AFTER DRILLING (DATE)  TOTAL DE  SOME MALE TYPE  DESCRIPTION	ELEVATION
SAMPLER TYPE(S) AND SIZE(S) (ID)  bucket cuttings  BOREHOLE BACKFILL AND COMPLETION  GROUNDWATER DURING DRILLING AFTER DRILLING (DATE)  TOTAL DE  SEADINGS  READINGS	E DIAMETER
BOREHOLE BACKFILL AND COMPLETION  GROUNDWATER READINGS NOT encountered  (i) NOLLY AT THE PRILLING (DATE) TOTAL DESCRIPTION  DESCRIPTION	EFFICIENCY, ERI
READINGS not encountered  (#) NOLLY   Had a part of the properties	PTH OF BORING
Well-graded GRAVEL with SAND (GW); gray; dry; Rip-rap on surface  SANDY SILT (ML); reddish brown; dry.  PP = 3.0  METAMORPHIC ROCK, Metavolcanic, fine-grained to medium-grained, massive, medium gray, moderately	
Well-graded GRAVEL with SAND (GW); gray; dry; Rip-rap on surface  SANDY SILT (ML); reddish brown; dry.  PP = 3.0  METAMORPHIC ROCK, Metavolcanic, fine-grained to medium-grained, massive, medium gray, moderately	marks
640.00 2 PP = 3.0  METAMORPHIC ROCK, Metavolcanic, fine-grained to medium-grained, massive, medium gray, moderately	
3 METAMORPHIC ROCK, Metavolcanic, fine-grained to medium-grained, massive, medium gray, moderately	
638.00 4 — medium-grained, massive, medium gray, moderately weathered, moderately hard, intensely fractured.	
5 Diving of heart last 5 0 ft has	
Bottom of borehole at 5.0 ft bgs  Essential Refusal at 5.0 ft.	
636.00 6 This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007) except as noted on the Soil or Rock Legend or below.	
7 -	
634.00 8	
632.00 10	
12	
Blackburn Consulting Blackburn Consulting DIST. COUNTY ROUTE POSTMILE DIST. COUNTY ROUTE POSTMILE	
Auburn, CA 95603    03   ED   50   1.1/R2.4	HOLE ID T-10-106
Phone: (530) 887-1494  CONSULTING  Phone: (530) 887-1494  Fax: (530) 887-1495  Silva Valley Parkway Interchange  BRIDGE NUMBER  PREPARED BY  RCP  DATE	T-10-106

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

LOGGE	ED BY	′	BEGIN DATE	COMPLETION DATE	BOREHOL	E LOCA	NOITA	(Lat/l	Long	or N	orth/E	ast a	nd Datu	ım)	HOLE ID		
<b>PFF</b> DRILLII	NC C	ONTD/	7-1-10	7-1-10	BOREHOL	ELOC/	TION	(Offo	ot Ct	tation	o Line	2)			T-10	=107 E ELEVATION	
			Excavating		BOREHOL	E LOCA	ATION	(Olis	ei, Si	laliUi	i, Liik	=)			~636.0		
DRILLII					DRILL RIG											DLE DIAMETER	
Back					CAT 430	DD											
			AND SIZE(S) (ID)		SPT HAMI	IER TY	PE								HAMMER	R EFFICIENCY, E	Ri
		Ittings BACKE	SILL AND COMPLETIO	N	GROUND	VATFR	DUR	NG F	DRILL	ING	AF	TFRI	DRILLIN	IG (DAT	F) TOTAL I	DEPTH OF BORI	NG
BOILE	IOLL	D, torti	LET WE COM LETTO	•	READINGS	3	not						DI (ILLII	(B/ (1	3.0 ft	7E. 111 O. BOTA	
(£						e o						t	_				
N N	£					lmb Jmb	6 in	foot	(%)			/eig	ngt	thod			
ATIC	Ή	ics	[	DESCRIPTION		e Lo	per	per	ery	(%	re (%	it <	Stre	Me	F	Remarks	
ELEVATION (ft)	DEPTH (ft)	Material Graphics				Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	д ОС	oistu	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method Casing Depth			
Ш	<u>-</u> G	≱ૅંઇ					ĕ	B	200	쮼	≱ິຽ	≙ ೬	S st)	ြင်ပြ			
	E	<u> </u>	GRAVELLY SILT (ML	.); stiff; reddish brown; dr	y.	D01			100								Н
	F																Н
	1 -	<del> </del>															
	E		medium-grained, mas	SK, Metavolcanic, fine-gr ssive, medium light gray,	ained to intensely												
	H		to moderately weather fractured, (Silty Grave	CK, Metavolcanic, fine-gr ssive, medium light gray, red, moderately hard, inte el). Predominate fracture tly random, breaks up to	ensely (foliation)												Н
634.00	2		N80W, 85-90 S, mos in diameter.	tlý random, breaks up to	pieces 2-8"												
	t	155															Н
	H	1//															H
	3		Bottom of borehole at	2.0.ft bas													-
	þ			· ·													
			Essential Refusal at 3														Н
632.00	4	-	This Boring Record w the Caltrans Soil & Ro	as developed in accorda ock Logging, Classification	nce with on, and												$\Box$
	þ	1	Presentation Manual Soil or Rock Legend	ock Logging, Classification (June 2007) except as no per helow	oted on the												H
	E	_	Con or record Logoria (	51 DOIOW.													Н
	5	-															Н
	F																
	Ė	1															Н
630.00	6	-															H
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	12																
			Blackburn Coi	nsulting		F	EPOR <b>BOR</b>	T TI	LLE DEC	יחי	'n					HOLE ID	<del>,                                    </del>
		_		r Drive, Suite 110			IST.		COUN		ري.	ROU	TE	POSTI	MILE	<b>T-10-10</b>	
			11021 DIOUNG	- Dilvo, Galle 110			03		ED	•		50		1.1/F		03-1E2901	

Auburn, CA 95603

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DOMIN	3 KECOKD			1-10-107
DIST.	COUNTY	ROUTE	POSTMILE	EA
03	ED	50	1.1/R2.4	03-1E2901
PROJECT	OR BRIDGE N	AME .		

Silva Valley Parkway Interchange
BRIDGE NUMBER PREPARED BY
RCP SHEET 1 of 1 BRIDGE NUMBER DATE

LOGGI	ED B\	Y			GIN DA	ATE				DATE	BORE	HOLI	E LOC	ATION	(Lat/	Long	or N	orth/l	East a	nd Dati	um)		HOLE		00		
PFF	VIO 0	ONT	- DAG		-1-10			7-1-1	U		DODE	11011	- 1 00	ATION	(O.								T-1			1011	
DRILLI <b>Mon</b> t				xcava	ting						BORE	HOLI	E LOC	ATION	(Offs	et, S	tatior	n, Lin	e)				~680		LEVAT	ION	
DRILLI			OD								DRILL CAT		חו										BORE	HOLE	DIAME	TER	
SAMPL	ER T	YPE		AND SIZ	ZE(S) (	(ID)							IER TY	'PΕ									HAMM	IER EI	FICIE	NCY, ER	ti .
BORE				LL AND	COMF	PLETI	ON				GROU	JNDV	VATER	DUR	ING I	DRILL	ING	AF	TER	DRILLI	NG (I	DATE)	TOTA	L DEF	TH OF	BORIN	G
											READ	INGS			enco		erec	ł			·		3.0 f				
ELEVATION (ft)	оертн (ft)	Material	Graphics				DES	CRIP	TION				Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Ren	narks		
	1 -			 METAN medium	 MORPH n-grain	 HIC RO	OCK,	 Metav e, brow	 olcanic	ray, very	y.  rained to y intense Gravel)	ely	D01			100											
678.50	2			METAN	40DD																						
	3	- <u> </u>   <u> </u>  -  -		medium weather Predom Bottom	n-graine red, mo ninate for of bore	ed, ma oderat ractur ehole a	assive tely ha e (foli at 3.0	e, med ard, mo ation) ft bgs	lium grate oderate N35W	e, fine-gr ay, modely fractu , 75-80 I	rained to erately ıred, N.	, 															
676.50	4	_	t I	Essenti This Bo the Calt Present Soil or F	ring Retrans Station N	ecord Soil & F Manua	was o Rock l	develo Loggir ne 200	ped in ng, Clas 7) exce	accorda ssificatio ept as no	ince with on, and oted on t	he															
	5		•	OON OF T	TOOK L	egene	2 OI D	SIOVV.																			
674.50	6	_																									
	7																										
672.50	8	_																									
	9																										
670.50	10	_																									
	11																										
	-12																										
				Bla	ckbu	rn Co	onsu	ıltina					F	REPOF BOR	INC TTTI	TLE <b>RF</b>	COP							I	HOLE II	)-108	
	>	Ţ	>					_	Suite	110			[	DIST.		COUN		_	ROU <b>50</b>	TE	PC 1	STMIL	.E.	E	<u>I - I (</u> EA 03-1F		,

Auburn, CA 95603 Phone: (530) 887-1494 Fax: (530) 887-1495

BORING	G RECORD			T-10-108
DIST. <b>03</b>	COUNTY <b>ED</b>	ROUTE <b>50</b>	POSTMILE <b>1.1/R2.4</b>	EA <b>03-1E2901</b>
PRO IECT	•			

Silva Valley Parkway Interchange
BRIDGE NUMBER PREPARED BY
RCP SHEET 1 of 1 DATE

LOGGI PFF	ED BY	<b>′</b>	BEGIN DA 7-1-10	ATE	COMPLETION DATE 7-1-10	BOREHOLE L	OCA	TION	(Lat/l	ong	or No	orth/l	East a	nd Datu	ım)		HOLE ID	400		٦
	NG C	ONTR	ACTOR		7-1-10	BOREHOLE L	OCA	TION	(∩ffe	et St	ation	Lin	۵)				T-10	-109 E ELEVAT	ION	-
			Excavating			BONEFIOLE	.00/	111011	(0113	ot, ot	auoi	ı, <b>L</b> ııı	<b>C</b> )				~670.5		ioi <b>v</b>	
DRILLI			D			DRILL RIG											BOREHO	LE DIAME	TER	٦
Back			) AND 0175(0) (			CAT 430D													10) ( ED:	4
		YPE(S utting	) AND SIZE(S) (	ID)		SPT HAMMER	K I YI	PE									HAMMER	EFFICIEN	ICY, ERI	
			FILL AND COMF	PLETION		GROUNDWA	TER	DURI	NG E	RILL	ING	AF	TER [	ORILLIN	IG (E	DATE)	TOTAL D	EPTH OF	BORING	1
						READINGS		not e	enco								3.0 ft			╝
ELEVATION (ft)	- (ft)	- SO		DE	ESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	(%)	e : (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Deptu	R	emarks		
ELEV	рертн (ft)	Material Graphics				Sample	Sample	Blows	Blows	Recove	RQD (	Moistur Conten	Dry Ur (pcf)	Shear (tsf)	Drilling	Casing				
	1			(ML); stiff	; reddish brown; dry.		D01			120				PP = 2.5						
668.50	2		METAMORPH medium-grain weathered, mo up to pieces 4'	HIC ROCH ed, mass oderately " in diame	<. Metavolcanic, fine- ive, light olive gray, ir hard, intensely fractuster.	grained to tensely red, Breaks									-					
	3		Bottom of bore Essential Refu																	
666.50	4				s developed in accord k Logging, Classifica une 2007) except as	dance with tion, and														
			Soil or Rock L	egend or	below.	noted on the														
	5 -																			
664.50	6																			
	7																			
662.50	8																			
	9																			Н
660.50	10																			
	11																			
	12																			
			Dlockb	rn Cara			R	EPOR	T TII	LE								HOLE II	)	-
			Blackbu		Suiting Drive, Suite 110			BORI IST.		REC		<u>ט</u>	ROU	TF	P∩	STMIL	F	<b>T-10</b>	-109	$\dashv$
~~			Δuburn					03		ED			50	-		1/R2.		03-1E	2901	

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BORING	G RECORD			T-10-109
DIST. <b>03</b>	COUNTY <b>ED</b>	ROUTE <b>50</b>	POSTMILE <b>1.1/R2.4</b>	EA <b>03-1E2901</b>
PRO IFCT	OR BRIDGE NA	ΔN/E		

PROJECT OR BRIDGE NAME

Silva Valley Parkway Interchange

BRIDGE NUMBER PREPARED BY

RCP SHEET 1 of 1 DATE

LOGGI PFF	D B	Υ			GIN D					DATE	BORE	HOLE	E LC	CA	TION	(Lat/l	ong	or N	orth/	East a	ınd Datı	ım)		HOLE		10		
DRILLI	NG (	201	VTP^		'-1-10	'		7-1-1	<u> </u>		BORE	HOL	=10	)C.A	MOIT	(∩ffe	et 9	tatio	n Lin	ıe)				T-1		TU LEVATI	ON	
				Excava	tina						BOIL	IIOLI	_ LC	,,,	VI IOIN	(Olis	ei, o	laliUi	ı, Lıı	ie)				~661		LLVAII	ON	
DRILLI					5						DRILL	RIG														DIAME	ΓER	-
Back	hoe	•									CAT	430	D															
				AND SI	ZE(S)	(ID)					SPT H	IAMM	IER	TYF	PE									HAMM	ER EF	FICIEN	CY, ER	i
buck																												
BORE	HOLE	ΞB	ACKF	ILL AND	O COM	IPLET	ION				GROL READ	JNDW INGS	/ATI	ER	DURI not e					TER	DRILLIN	1G ([	DATE)	3.0 f		TH OF	BORING	ì
-£													5	_						<b>+</b>					-			$\top$
ELEVATION (ft)	DEPTH (ft)	,	Material Graphics				DES	CRIP	TION				Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Rem	arks		
	_0_			SAND	Y SILT	(ML);	stiff; r	eddish	brown	; dry.																		
659.60	1			METAN mediur weathe Predon pieces	m-grair ered, m ninate	ned, m nodera fractui	nassive tely ha re N25	Metave, med ard, int	— — — olcanic ium gra ensely 70-85 \$	fine-gr ay, mode fracture b, break	ained to erately d, s up to	<u> </u>																
	3			Bottom	of bor	ehole	at 3.0	Ū																				
657.60	4			This Bo the Cal Presen Soil or	oring F Itrans S Itation Rock I	Record Soil & Manua Legen	l was o Rock al (Jur d or be	develo Loggir ne 200 elow.	ped in a lg, Clas 7) exce	accorda ssificatio ept as no	nce with on, and oted on t	he																
655.60	5																											
	7																											
653.60	8	_																										
651.60	9																											
651.60	10																											
	<b>-</b> 12 <b>-</b>																											
														R	EPOR	т тіт	ΓLF									IOLE ID		—
				Bla	ackbu	ırn C	onsu	ılting						Ĺì	BORI	NG	REC	OR	D						[	<u>T-</u> 10	-110	
	~			11	521 I	Block	er D	rive. S	Suite 1	110				D	IST.	C	1000	VTV		ROU	ITE	PC	STMIL	E		A		

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BORING	RECORD			T-10-110
DIST. <b>03</b>	COUNTY <b>ED</b>	ROUTE <b>50</b>	POSTMILE <b>1.1/R2.4</b>	EA <b>03-1E2901</b>
PROJECT	OR BRIDGE NA	ZME		

LOGGI <b>PFF</b>												BOREH	OLE	LOC	CAT	ΓΙΟΝ (	Lat/l	Long	or N	lorth/	East a	and Dat	um)		HOLE	ID 10-1	11		
DRILLI	PFF 7-1-10 7-1-10  RILLING CONTRACTOR  Monte Rickey Excavating											BOREH	OLE	LOC	CAT	ΓΙΟΝ (	Offs	et, S	tatio	n, Lir	ne)						LEVAT	ION	
	RILLING METHOD																									5.1 ft			
Back			THOL	)								DRILL F		)											BORE	HOLE	DIAME	TER	
SAMPL buck					SIZE(S	) (ID)	1					SPT HA			ΥPI	E									HAMI	/IER E	FFICIEN	ICY, ER	i
BORE					ID CO	MPLE	IOITE	V				GROUN READIN	IDW/ IGS	ATE		DURII					TER	DRILLII	NG (I	DATE)	TOTA 4.0		TH OF	BORING	3
(£)													2	j j		_					Ħ	ے							
ELEVATION (ft)	DEPTH (#)	טבר זרו (ווי)	Material Graphics				С	)ESC	RIPT	ION			Sample Location	Sample Location	<u>.</u>	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Ren	narks		
	1		000000000000000000000000000000000000000	Poorly brown	/ grade i; dry;	ed Gl (fill).	RAVE	EL with	n SAN	ND (GP	P); loose	e; grayish																	
663.10	2			SAND	Y SIL	 Т (МІ	 _); sti	 ff; red	 dish l	 brown;	 moist.		-																
	3			META mediu weath fractur	MORI Im-gra ered, i red.	PHIC nined, mode	RO0 , mas eratel	CK, Mesive, o	etavo olive ( I to ha	 Icanic, gray, m ard, mo	 fine-gra loderate deratel	ained to ely y																	
661.10	4			Bottor	n of bo	oreho	ole at	4.0 ft	bgs																				<u> </u>
				Essen	ntial Re	efusa	l at 4	.0 ft.																					
	5			This E the Ca Prese Soil or	Boring altrans ntatior r Rock	Reco Soil Mar Lege	ord w & Ro nual ( end c	as de ock Lo June or belo	velope gging 2007 w	ed in a g, Class ) excep	ccordar sification ot as no	nce with n, and ted on th	е																
659.10	6																												
	7																												
657.10	8																												
	9																												
655.10	10																												
	11																												
	12																												<u> </u>
	Blackburn Consulting															POR BORII			, D								HOLE II	)-111	$\dashv$
•			$\supset$						-	uite 1	10			+	DIS	ST.		NOC		ט	ROL			STMIL			EΑ		
la Las		n			ubur									-	O PR	I <b>3</b> ROJEC	_	ED R B	RIDG	E N	50 AME		1	.1/R2	.4		03-1E	2901	

PROJECT OR BRIDGE NAME
Silva Valley Parkway Interchange
BRIDGE NUMBER PREPARED BY
RCP

SHEET 1 of 1

DATE

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12 blackburn consulting

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PFF	OGGED BY BEGIN DATE COMPLETION DAT PFF 7-1-10 7-1-10  RILLING CONTRACTOR															,					ınd Dat	um)			OLE ID <b>T-10</b>	-112			
					inc							BOF	REHOL	E LOC	CATIO	V (Off	set, S	tatio	n, Lin	e)				- 1	URFAC		VATIO	ON	
Monte DRILLIN			-	cava	ıng							DRII	L RIG	i											~/92.0 OREH		IAMET	ER	
Backl												1	T 43													5			
SAMPLE <b>buck</b> e				ND SIZ	ZE(S)	(ID)						SPT	HAM	MER T	YPE									Н	AMMEI	REFF	ICIENC	CY, ERi	
BOREH	IOLE	BAC	CKFIL	LAND	COM	IPLET	ΓΙΟΝ						DIND\ DING			RING enc				TER	DRILLI	NG (	DA	1	OTAL I <b>3.0 ft</b>	DEPTH	H OF B	ORING	
ELEVATION (ft)	РОЕРТН (#)	Material	Graphics				DE	SCR	IPTIC	ON				Sample Location Sample Number		Blows per foot		RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		F	Remar	·ks		
790.00	1 2		F. Mm sl	y.  at CLA  ETAN ediun ightly	Y (CH	– – – H); sti – – – HIC F ned, r	iff; gre	— — - eenish — — - (, Met ve, oli eratel	 n gray  avolc ive gr	— — /; mois — — anic, ay, m d to h	st. fine-gr oderat ard, ini	 rained tely to	- — — - — — to	DO	1		100				PP = 2.5 PP = 1.0								-
788.00	3		E T th P	ottom ssenti his Bo le Calt resent oil or I	al Ref ring F rans S ation	iusal a Recore Soil & Manu	at 3.0 d was Rockual (Ju	ft. deve k Logo une 20	elopeo ging,	d in ad Class excep	ccorda sificatio t as no	nce w on, and oted or	ith d n the																
	5																												-
786.00	7																												
784.00	8																												-
700.00	9																												-
782.00	IU																												
	11																												-
															REPC	ד דק	TIF									ПO	IEID		_
								ultin	_						BOF	RING	REC		D							T	LE ID -10-	·112	
*	Ž	4			521 I burn				, Sui	ite 1	10				DIST.		ED ED			<b>50</b>	ITE	P(	OST  .1/	MILE <b>R2.4</b>		EA <b>0</b> 3	3-1E2	901	
blac								,00 37-14	194						PROJ <b>Silv</b>						rchar	nge							
	~	100	ng				387-								BRIDO				PRE		ED BY				DA	ΤE	SH	of 1	

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

LOGGI <b>PFF</b>	ILLING CONTRACTOR										ON DA	ATE	BORE	HOL	ΞL	OCA	ATION	(Lat/	Long	or N	lorth/	East a	and Dati	um)			OLE 10 <b>T-1</b> 0		13			
	ILLING CONTRACTOR  Onte Rickey Excavating  ILLING METHOD												BORE	HOL	ΞL	OCA	ATION	(Offs	et, S	tatio	n, Liı	ne)				S		CE E	LEVAT	ION		
DRILLII <b>Back</b>			THOD											DRILL CA1	. RIG	D											В	OREH	OLE	DIAME	TER	
SAMPL buck			PE(S) A		SIZE	(S) (	(ID)							SPT	HAMM	IEF	RTY	PE									Н	AMME	R EF	FICIEN	ICY, ER	li
BORE					ND C	OMI	PLE	TION	l					GROI READ	JNDV	/A	ΓER	DUR not					TER	DRILLI	NG (	DAT		OTAL <b>2.0 ft</b>	DEP	TH OF	BORING	G
ELEVATION (ft)	Элертн (#)	מבו ווו (וו)	Material Graphics								TIOI					Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		ı	Rem	arks		
723.00	METAMORPHIC ROCK, Metavolcanic, fin medium-grained, massive, grayish blue, m slightly weathered, moderately hard to har fractured, Predominate fracture (foliation) for the Caltrans Soil & Rock Logging, Classifier Presentation Manual (June 2007) except a Soil or Rock Legend or below.																															
	3	_								velo oggir 200 ow.	peding, C	in acc Classif xcept	cordar icatio as no	nce with n, and ted on	n the																	
721.00	4																															
	5	_																														
719.00	6	_																														
	7																															
717.00	8	_																														
	9																															
715.00	10																															
	11																															
	12																														႕	
	Blackburn Consulting														R	REPOR BOR	T TI	TLE <b>RE</b> (	COR	RD_							H	OLE ID	) -113			

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BORING	G RECORD			T-10-113
DIST. <b>03</b>	COUNTY <b>ED</b>	ROUTE <b>50</b>	POSTMILE <b>1.1/R2.4</b>	EA <b>03-1E2901</b>
DDO IECT	OD BDIDGE N	ΔME		•

LOGGE <b>PFF</b>	ED BY	1	BEGIN DATE <b>7-2-10</b>	COMPLETION DATE 7-2-10	BOREHOLE I	LOCA	ATION	(Lat/l	Long	or N	orth/l	East a	nd Datu	ım)		HOLE ID	444	
	NG C	ONTE	RACTOR	7-2-10	BOREHOLE I	004	MOLTA	(∩ffe	ot St	tation	ı Lin	۵۱				T-10-		LIUN
			Excavating		BOILLIOLL		XI IOIN	(Olis	et, o	laliUi	ı, Lııı	<del>C</del> )				~757.5		IION
DRILLII					DRILL RIG											BOREHO		ETER
Back			-		CAT 430D	)												
SAMPL	ER T	YPE(	S) AND SIZE(S) (ID)		SPT HAMME	R TY	PE									HAMMER	EFFICIE	NCY, ERi
buck																		
BORE	HOLE	BAC	KFILL AND COMPLETI	ON	GROUNDWA READINGS	TER						TER	DRILLIN	IG (DA	ATE)		EPTH OF	BORING
							not e	enco	_							2.8 ft		
ELEVATION (ft)	рертн (#)	Material	Gaptillo	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method Casing Depth		R	emarks	
		411		stiff; reddish brown; dry.	*	D01			100						PA, F	기		
755.50	1 -		medium-grained, msoft, intensely fractu 4-6" thick.  METAMORPHIC Romedium-grained, mmoderately weather fractured, Predomin	OCK, Metavolcanic, fine-grassive, grayish brown, decorded, (Sandy Clay), with clayock, Metavolcanic, fine-grassive, medium gray, intensed, moderately hard, intensate fracture (foliation) N35\	omposed, y lenses													
	3	-	and random Bottom of borehole a	· ·														-
	F		Essential Refusal at															F
753.50	4		the Caltrans Soil & F Presentation Manua Soil or Rock Legend	was developed in accordar Rock Logging, Classificatio Il (June 2007) except as no Il or below.	nce with n, and ted on the													
	5																	
751.50	6	_																-
	7	-																-
749.50	8																	-
	9																	-
747.50	10																	-
	11																	
	12	1																-
	-12																	L
			Blackburn Co	onsulting			REPOR <b>BORI</b>			יחי	<u> </u>						HOLE I	D-114
4				er Drive, Suite 110		_	IST.		COUN		<u>ں</u>	ROU	TE	POS	TMILI	 E	EA	J-114
~ ~			1 102 1 DIOCK	Ci Diive, Juile 110		ا ا	03		ED			50	-	1.1	/R2.	4	03-1	<b>-2901</b>

Auburn, CA 95603

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BORING	G RECORD			T-10-114
DIST.	COUNTY	ROUTE	POSTMILE	EA
03	ED	50	1.1/R2.4	03-1E2901
DDO IEOT	OR BRIDGE N	A B 4 =		

LOGGE PFF	D B	Υ		BEGIN <b>7-2-</b>	I DATE		OMPLET '-2-10	TION DATE	BOREHO	)LE L	.OCA	TION	(Lat/l	ong	or N	orth/	East a	ınd Datı	ım)		ı	EID -10-	115		
DRILLIN							· <del>-</del>		BOREHO	)LE L	OCA	TION	(Offs	et, St	atior	n, Lin	e)				SUF		ELE\	/ATION	
DRILLIN	NG N	ИЕТН							DRILL RI															METER	?
SAMPL buck	ER T	ГҮРЕ	. ,	AND SIZE(	S) (ID)				SPT HAN		RTYF	PE									HAN	MER	EFFIC	CIENCY,	ERi
			_	LL AND CO	OMPLE.	TION			GROUNI READING		TER	DURI not e					TER	DRILLIN	IG (I	DATE)	ı	TAL DE	EPTH	OF BOI	RING
ELEVATION (ft)	ОЕРТН (#)	Material	Graphics			DES	CRIPTIO	ON		Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Re	emark	s	
				SANDY SI	LT (ML	); very st	iff; redd	ish brown; d	ry.																
756.00	1 -										D01			100		9	98	PP = 3.0							
750.00	-		43;	medium-ar	ained.	massive	. liaht ar	canic, fine-gr ray, intensely sely fractured	/																
754.00	3																								
754.00	4			METAMOR medium-gr weathered Predomina	RPHIC lained, moder te fract	ROCK, Note that the second sec	— — — Metavolo , grayish rd to har ttion) N3	canic, fine-gr n brown, mod rd, intensely 30W, 90.	ained to derately fractured,																
	5			Bottom of t			Ū																		
752.00	6		1	Essential F This Boring the Caltrar Presentation Soil or Roo	g Recorus Soil & Son Man	d was d Rock L ual (June	evelope .ogging, e 2007)	d in accorda Classificatio except as no	nce with on, and oted on the																
	7	_																							-
750.00	8																								
	9																								
748.00	10																								
	11																								
	12																								
						Consul	_					EPOR B <b>ORI</b>	NG I	REC		D								E ID 10-1	15
bla		M	 	Aubu	rn, CA	9560	3	ite 110			P	IST. <b>03</b> ROJE	CT O		RIDG				1	.1/R2			EA <b>03</b> -	1E290	1
bla con				1 11011		0) 887 887-14					;		Vall	ey P	ark	way	Inte	e <b>rchan</b> ED BY	ge			DATE	<u> </u>	SHEE	

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

LOGGE PFF	ED B	Y			GIN DAT <b>2-10</b>	E	DATE	BOREH	OLE	LOC	ATION	(Lat/l	Long	or N	orth/	East a	ind Datu	ım)		HOLE T-1		16				
DRILLII				TOR						BOREH	OLE	LOC	ATION	(Offs	et, S	tation	n, Lir	ie)					ACE E	LEVAT	ION	$\neg$
DRILLI				kcavat	ing					DRILL R	RIG													DIAME	TER	_
Back	hoe	<b>!</b>								CAT 4	130E															
SAMPL <b>buck</b>				AND SIZ	E(S) (ID	))				SPT HA	MME	RTY	PE									HAMM	ER E	FICIEN	ICY, ERi	
				LL AND	COMPL	ETION	1			GROUN READIN	IDW A	ATER	DURI					TER	DRILLIN	IG ([	DATE)	TOTAL <b>2.5 f</b>		TH OF	BORING	_
ELEVATION (ft)	Роертн (ft)	Material	Graphics			D	ESCRII	PTION			Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Deptn		Rem	narks		
721.50	1 -		W L A		ORPHIC-grained		 CK. Meta	eddish b  volcanic lyish gre actured,	 : . fine-ara																	
719.50	3		E	Essentia	al Refus	al at 2.			accordar ssificatio ept as no	nce with n, and ted on the	е															
	5																									
717.50	7																									
715.50	8																									
713.50	10																									
	11																									
				DI-	olch: :r::	. Car	oultin -					F	REPOR	T TI	ΓLE								F	OLE ID	-116	$\dashv$
				l <sub>Bia</sub>	CKDUIT	Con	sulting	1					BORI	NG	KE(	JOR	ש	_						<u>1-10</u>	<u>-116</u>	

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BORING	RECORD			T-10-116
DIST. <b>03</b>	COUNTY <b>ED</b>	ROUTE <b>50</b>	POSTMILE 1.1/R2.4	EA <b>03-1E2901</b>

PROJECT OR BRIDGE NAME
Silva Valley Parkway Interchange
BRIDGE NUMBER PREPARED BY
RCP SHEET 1 of 1 DATE

Log T-10-117 on LOTB for Westbound Off-Ramp

LOGGI <b>PFF</b>	ED B	3Y		E		N DAT	Έ				N DATE	BOREHO	DLE	LOC	ATI	ON (	Lat/l	ong	or N	orth/	East a	ind Dat	um)		HOLE	□   <b>0-1</b>	10		$\neg$
DRILLI	ILLING CONTRACTOR onte Rickey Excavating											BOREHO	DLE	LOC	ATI	ON (	Offs	et, S	tation	n, Lir	ne)				SURF	ACE E	LEVATION	ON	$\dashv$
	ILLING METHOD										DDILLD	10													5.0 ft	DIAMET	-ED	_	
Back			HUL	,								DRILL R		)											BORE	HOLE	DIAMET	EK	
SAMPL <b>buck</b>					SIZE(	S) (ID	)					S'PT HAI	ИМЕ	R T\	/PE										HAMM	IER EI	FICIEN	CY, ERi	
BORE					ND C	OMPL	ETIC	N				GROUN READIN	DW A	ATEF		URIN					TER	DRILLI	NG (I	DATE)	TOTA 6.0 f		TH OF E	BORING	
Œ.													5	ē	_				_	_	Ħ	_			0.0	-			П
ELEVATION (ft)	DEPTH (ft)		Material Graphics				I	DES	CRIP	TION			Sample Location	Sample Number		Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Ren	arks		
	-0-			SANI dry.	DY SI	LT wi	th GF	RAVE	EL (MI	L); stiff	; reddish	brown;																	I
	1																												H
753.00	2			MET	AMOF	RPHI	RO	CK,	 Metav	 /olcani	c, fine-gi	 rained to n, intensely	-																Ħ
		H		to mo	oderat ured. I	tely we Predo	eathe mina	ered, int fra	mode acture	rately s (folia	hard, intention) N4:	ensely 5W, 90																	
	3			(Silty	Grav	el).																							$\exists$
																													$\exists$
751.00	4			MET			- <u>-</u> -					rained to	_																H
				medi	ıım-aı	rainec	l ma	ssive	arav	<i>i</i> ish hr	own mo	derately ured, to 16" in																	
	5			Breal lengt	ks up h.	to pie	ces 2	2-8" i	n diar	neter,	some up	to 16" in																	Н
		H.																											H
749.00	6																												
749.00	U					boreh			Ū				-										-						
						Refusa a Rec				ned in	accorda	nce with																	H
	7			the C Prese Soil o	altrar entation	ns Soi on Ma ck Leg	l & R inual gend	ock I (Jun or be	Loggii le 200 elow.	ng, Cla 17) exc	ept as no	on, and oted on the	:																
747.00	8																												Н
	9																												В
	9																												
745.00	10																												Ħ
	11																												Н
	-12-	Н																											븨
				,	Noc!	hu		no	ltin~							PORT				_						I	IOLE ID	446	$\dashv$
•						dburn 1 Blo			_	Suite	110				DIS		С	100		ט	ROL	ITE		STMIL		E	T-10		$\dashv$
	1	ď				ırn, C					-			-	<b>03</b>	).IFC	_	ED R BE	ארו ארו איני	F N/	50		1	.1/R2	.4		03-1E2	901	$\dashv$

PROJECT OR BRIDGE NAME
Silva Valley Parkway Interchange
BRIDGE NUMBER PREPARED BY
RCP

SHEET 1 of 1

DATE

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12 blackburn consulting

Phone: (530) 887-1494

LOGGE <b>PFF</b>	D BY	<b>′</b>		GIN DAT -2-10	ГΕ	7-2-10	ON DATE	BOREHO	LE LOCA	ATION	(Lat/l	ong	or No	orth/E	ast a	nd Datu	ım)		HOLE II	)-119		
DRILLII <b>Mont</b>			ACTOR <b>Excava</b>	ting				BOREHO	LE LOCA	ATION	(Offs	et, St	tatior	ı, Line	e)				SURFA- ~762.	CE ELE		
DRILLII <b>Back</b>			)					DRILL RI											BOREH	OLE DIA	METER	
		YPE(S)	) AND SI	ZE(S) (IC	D)			SPT HAN	MER TY	PE									HAMME	R EFFI	CIENCY, E	Ri
			FILL AND	COMPL	ETION			GROUNE READING		DURI not e					TERI	DRILLIN	1G (E	DATE)	TOTAL <b>2.8 ft</b>	DEPTH	OF BORI	NG
ELEVATION (ft)	рертн (#)	Material Graphics			DE	ESCRIPTIO	N		Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Remark	ss	
760.60	1 -		METAN medium intense fracture	MORPHION CONTROL OF THE CONTROL OF T	C ROCI	VEL (ML); st	nic, fine-gr. e reddish b rd, intensel	ained to rown,	D01			100					-					
	3	- (1.2.1///	Bottom Essenti	of boreh ial Refus	nole at 2 sal at 2.8	.8 ft bgs 3 ft.																
758.60	4	-	This Bo the Cal Presen Soil or	oring Rec trans Soi tation Ma Rock Lec	cord was il & Roc anual (J gend or	s developed k Logging, C une 2007) e below.	in accordai Classificatio xcept as no	nce with n, and ted on the														
756.60	5	- - - - -																				
	7																					
754.60	8																					
752.60	10	- - - -																				
	11	- - -																				
	-12 <sup></sup>																					
			Bla	ackburr	n Cons	sulting			F	REPOR BORI	T TI	REC	OR	D						HOL <b>T</b> -	E ID 10-11	9

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BORING	GRECORD			T-10-119
DIST. <b>03</b>	COUNTY <b>ED</b>	ROUTE <b>50</b>	POSTMILE <b>1.1/R2.4</b>	EA <b>03-1E2901</b>
PRO IFCT	OR BRIDGE NA	ΔME		

LOGGE <b>PFF</b>	D BY		BEGIN DATE <b>7-2-10</b>	COMPLETION DATE <b>7-2-10</b>	BOREHO	LE LO	CATIO	N (Lat/	Long	or N	lorth/l	East a	nd Datı	um)		HOLE T-1	ID 10-12	20	
DRILLIN			CTOR Excavating		BOREHO	LE LO	CATIO	N (Offs	set, S	tatio	n, Lin	e)				SURF		EVATION	I
DRILLIN	NG ME				DRILL RIC													DIAMETER	R
	ER TY		AND SIZE(S) (ID)		SPT HAM		YPE									HAMN	/IER EF	FICIENCY	, ERi
			FILL AND COMPLETION	ON	GROUND READING	WATE SS		RING I				TERI	DRILLIN	NG (I	DATE)	TOTA 6.5		H OF BO	RING
ELEVATION (ft)	<sup>р</sup> DЕРТН (ft)	Material Graphics		DESCRIPTION		Sample Location	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Rema	arks	
			SANDY SILTY CLAY	Y (CL-ML); stiff to very stiff	; brown;														
728.30	1					DO	)1		100				PP = 2.0						
726.30	3	TIU/A	medium-grained, ma	DCK, Metavolcanic, fine-gr assive, light olive gray, inte	ensely to	_							PP = 1.0						
726.30	4		'fractured, (Clayey G METAMORPHIC RC medium-grained, ma	ed, soft to moderately soft, ravel). DCK, Metavolcanic, fine-gr assive, light olive brown, moderately soft, intensely	ained to	DO	)2		100				PP = 3.0						
724.30	6																		
	7		Bottom of borehole a Essential Refusal at This Boring Record the Caltrans Soil & F	· ·	nce with														
722.30	8	-	Presentation Manua Soil or Rock Legend	l (June 2007) except as no or below.	oted on the														
	9																		
720.30	10	-																	
	11	-																	
	12																		
•		>	Blackburn Co	onsulting er Drive, Suite 110			DIST.	RING	REC		D	ROU	TE		STMIL		E		
			Auburn, CA 9				03		ED			50		1	.1/R2	.4	1.0	03-1E290	01
blad	ckb	urn	Phone: (530)				PROJ	ECT C	OR BE			ME	rchan			-		JO-1L23	

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

LOGGE <b>PFF</b>	ED B	Υ		BEGIN DATE <b>7-2-10</b>	COMPLETION DATE <b>7-2-10</b>	BOREHOLI	ELOCA	TION	(Lat/l	Long	or N	lorth/	East a	and Datu	ım)		- 1	-10-12	1	
DRILLII						BOREHOLI	ELOCA	TION	(Offs	et, S	tatio	n, Lir	ie)				SU	RFACE ELI		
DRILLII	NG N	ИЕТН		xcavating		DRILL RIG	n											REHOLE D	DIAMETER	
SAMPL	ER T	ГҮРЕ		AND SIZE(S) (ID)		SPT HAMM		PE									HA	MMER EFF	ICIENCY, E	Ri
<b>buck</b> BOREH				ILL AND COMPLETIO	N	GROUNDV	/ATER	DURI	NG E	RILL	ING	AF	TER	DRILLIN	IG (I	DAT	E) TO	TAL DEPT	H OF BORI	NG
						READINGS		not e			erec	t		r				.5 ft		
ELEVATION (ft)	DEPTH (ft)	Material	Graphics	[	DESCRIPTION		Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Rema	rks	
	_0_			SANDY SILT (ML); st	iff; reddish brown; dry.															
							D01			100					1	Р	Ά			E
	1	_					<b>⊗</b> S02			100		14	89		1					
							<b>*</b>								$\mid \mid$					
782.00	2	<del> </del>	<u>ll</u>	METAMORPHIC RO	CK Metavolcanic fine-gr															F
				medium-grained, mas weathered, moderatel	CK, Metavolcanic, fine-grassive, olive gray, intensely y soft to moderately hard,	intensely														
	3			fractured.																E
		-/: ::																		þ
700.00																				F
780.00	4																			F
	5						<b>×</b>								1					
				METAMORPHIC RO	CK Metavolcanic fine-gra	ined to														F
778.00	6		7-1	weathered, hard, inter	CK, Metavolcanic, fine-grassive, olive gray, moderate assive, fractured, Predomin	ely ate														
				fractures (foliation) N3																
	7			Bottom of borehole at Essential Refusal at 6																E
	'			This Boring Record w	as developed in accordar	nce with														
				the Caltrans Soil & Ro Presentation Manual	ock Logging, Classificatio (June 2007) except as no	n, and ted on the														F
776.00	8			Soil or Rock Legend of	or below.															F
																				F
	9																			
774.00	10																			L
		$\exists$																		þ
		$\exists$																		F
	11																			F
	-12-																			
				Blackburn Cor	nsulting			EPOR <b>BORI</b>			:OP	D.						HC	DLE ID <b>[-10-12</b>	1
	$\geq$			11521 Blocker	r Drive, Suite 110			IST. 03	C	COUN		<u>ب.</u>	ROL <b>50</b>				MILE <b>R2.4</b>	EA		1
bla	ck	ЬШ	rn	Auburn, CA 95			P	ROJE	CT O	R BF			ME			. 1/1	<b>14.4</b>		J-1⊑2901	
con				1 110110. (000)				SIIVA RIDGE				PRI	EPAR	erchan ED BY	ge			DATE	SHEET	
			-3	1 ax. (000) 001	1 100							R	CP_					<u> </u>	1 of	1

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

LOGGE <b>PFF</b>	ED B	Y	BEGIN DAT <b>7-2-10</b>	TE COMPL <b>7-2-1</b> (	ETION DATE )	BOREHO	LE LOCA	ATION	(Lat/l	ong	or No	rth/Ea	ast ar	nd Datu	ım)	HOLE T-	⊡ 10-12	22	
			ACTOR Excavating			BOREHO	LE LOCA	ATION	(Offs	et, St	ation,	, Line	)			SUR		EVATION	
DRILLII	NG M	1ETHO				DRILL RIC												DIAMETER	
SAMPL	ER T		) AND SIZE(S) (IE	D)		SPT HAM		PE								HAMI	MER EF	FICIENCY,	ERi
			FILL AND COMPL	ETION		GROUND READING	WATER S	DURI not e				AFT	ER D	RILLIN	IG (DA	TE) TOT/		TH OF BOF	RING
ELEVATION (ft)	DEPTH (ft)	Material Graphics		DESCRIP	TION		Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Content (%)	(pcf)	Shear Strength (tsf)	Drilling Method Casing Depth		Rema	arks	
786.00	1 2		SANDY SILT (N METAMORPHI medium-graine	AL); stiff; reddish	olcanic, fine-gr	to to	- D01			100									
784.00	4	- 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	METAMORPHI medium-grained weathered, hard pieces, up to 16 Bottom of boreh		olcanic, fine-gra gray, moderati ured, Breaks in	ained to ely to 2-8"													
782.00	5 • 6 • 6		Essential Refus This Boring Ret the Caltrans So Presentation Ma	cord was develor il & Rock Loggin anual (June 2007	ped in accordal g, Classificatio 7) except as no	nce with in, and ited on the													
	7																		
780.00	8																		
778.00		- - - -																	
	11	- - - -																	
	<b>-</b> 12 <del>-</del>		_				1 -		T T17								1.0	OLE ID	
				n Consulting	N. H. 440			REPOR BORI	NG I	REC			ROUT	re	POST	TMILE	H <u>i</u>	OLE ID T-10-12	22

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BORING	G RECORD			T-10-122
DIST. <b>03</b>	COUNTY <b>ED</b>	ROUTE <b>50</b>	POSTMILE <b>1.1/R2.4</b>	EA <b>03-1E2901</b>
DDO IECT	OD BDIDGE N	ΔN/E		

LOGGE PFF	ED E	3Y		BEGIN DATE <b>7-2-10</b>	COMPLETION DATE 7-2-10	BOREHOL	E LOCA	ATION	(Lat/l	ong	or No	orth/E	ast a	nd Datu	ım)		HOLE II	)-123	1	
DRILLII						BOREHOL	E LOCA	ATION	(Offs	et, St	tation	n, Line	e)					CE ELE	VATION	
DRILLI				Excavating		DRILL RIG													AMETER	
Back			IT(C)	AND SIZE(S) (ID)		CAT 430		DE									LIANANAE	ם בבבע	CIENCY	CD:
buck						SPT HAIVIIV	MEK I Y	PE									HAIVIIVIE	K EFFI	CIENCY,	EKI
BORE	HOLI	E BA	ACKF	FILL AND COMPLETIO	N	GROUNDV READINGS	VATER	DURI not e			ered	<u> </u>		ORILLIN	IG (I	DATE)	TOTAL <b>5.5 ft</b>		OF BOR	ING
ELEVATION (ft)	DEPTH (ft)		Material Graphics		DESCRIPTION		Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Remarl	<b>«</b> s	
	-0-			SANDY SILT with GR reddish brown; dry.	RAVEL (ML); very stiff to h	ard;														
734.00	1 2			METAMORPHIC RO	CK, Metavolcanic, fine-grassive, grayish green, inter	 ained to sely to	D01			100				PP = 4.0						
732.00	3			moderately weathered fractured, Breaks into feet.	ssive, grayish green, inter d, moderately hard, intens pieces 2-6". Becomes ha	ely <sup>*</sup> ard at 5					-									
	5																			
730.00	6			Bottom of borehole at Essential Refusal at 5	· ·															
730.00	7	_ _ _			vas developed in accordar ock Logging, Classificatio (June 2007) except as no or below.	nce with n, and ted on the														
728.00	8	_																		
	9																			
726.00	10																			
	11																			
	<b>-</b> 12 <b>-</b>	$\vdash$																		
				Blackburn Cor	nsulting r Drive, Suite 110			REPOR BORI DIST.	NG	REC			ROU	TE		STMIL		T.	E ID -10-12	
				Auburn CA Q				03 ROJE		ED			50			1/R2.			-1E290 <sup>-</sup>	1
bla				1 110110. (000)					Vall	ey F	ark	way	Inte	rchan ED BY	ge		D^	TE	SHEE	Т
con	SU	Ш	пg	Fax: (530) 887	/-1495 ————————————————————————————————————				• • • •	اعداد	`	RC	P	וט ט					1 of	

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

LOGGI <b>PFF</b>	ED B	3Y			BEGIN   <b>7-2-1</b>				MPLET 2-10	TION DA	TE	BOREH	OLE	LOC	ATIO	N (La	/Lon	g or I	North	/East a	and Dat	um)		HOLE	D 0-12	1		
DRILLI	NG (	COI	NTRA					1-2	- 10			BOREH	OLE	LOC	ATIO	N (Of	set,	Statio	on, Li	ne)						EVATIO	DN	$\dashv$
					ating																			~722				
DRILLI Back			THOL	)								DRILL R		)										BORE	HOLE I	DIAMET	ER	
SAMPL buck					SIZE(S	) (ID)						SPT HA			/PE									HAMM	ER EFI	FICIENC	Y, ERi	
BORE					ID COI	MPLE	TION					GROUN READIN	DW A	ATEF		RING t enc				FTER	DRILLI	NG (I	DATE)	TOTAL <b>4.0</b> f		H OF B	ORING	
(ft)													2	ē	نہ					Ħ	ح							П
ELEVATION (ft)	DEPTH (ft)	(2)	Material Graphics				Di	ESCF	RIPTI	ON			Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Rema	arks		
	<b>-</b> 0-		Ш	SANE dry.	OY SIL	T with	GRA	VEL (	(ML);	stiff; redo	dish b	orown;																$\exists$
	1			mediu	um-gra rately v	ined,	mass	ive, li	aht ai	— — — canic, find ray, inten / hard, m	isely t	to	_															
720.00	2																											
718.00	3			mediu weath	um-gra iered, h	ined, hard,	mass mode	ive, li rately	ght gi fracti	canic, find ray, mode ured.	 e-gra eratel	ined to																
					m of bo ntial Re				gs																			
	5	_		This E the Ca Prese Soil o	Boring altrans entation r Rock	Reco Soil Man Lege	ord wa & Roc lual (J end or	s deve k Log lune 2 belov	elope gging, 2007) v.	d in acco Classific except a	ordan cation is not	ce with , and ed on the	9															
716.00	6	_																										
	7	_																										
714.00	8	_																										
	9																											
712.00	10	_																										
	11																											
	-12-																											Ē
				В	lackb	urn	Con	sultin	ng							RT T			RD						H	DLE ID <b>Γ-10-</b>	124	$\dashv$
-	$\geq$		$\overline{\lambda}$	1	1521	Bloo	cker	Drive	-	ite 110	)				DIST. <b>03</b>			JNTY		ROU <b>50</b>	JTE		STMIL .1/R2		E/			$\dashv$
				Α	uburi	n, C	4 95	603						-		IFCT			GE N			1	. 1/1142	. 7		- IEZ	JU 1	$\dashv$

PROJECT OR BRIDGE NAME
Silva Valley Parkway Interchange
BRIDGE NUMBER PREPARED BY
RCP

SHEET 1 of 1

DATE

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12 blackburn consulting

Phone: (530) 887-1494

LOGGE	D B	Y		BEGIN <b>9-21-</b>			OMPLET -21-10	TION DATE	BOREHO	LE LOC	ATION	(Lat/l	ong	or No	orth/E	East a	and Datu	ım)		HOLE <b>A-1</b>		95		$\neg$
DRILLII									BOREHO	LE LOC	ATION	(Offs	et, St	tation	ı, Lin	e)				SURFA	CE EL	EVATIO	)N	$\dashv$
Tabe DRILLII									DRILL RIC	3										~774		DIAMET	FR	-
Solid	-Ste	em A	luger						CME 5	5										6 in	.0		,	
split	spo	on		O SIZE(S					SPT HAM Autom	atic										80%		FICIENC		
				AND CO		ION			GROUND READING	WATER SS	DURI not (					TER	DRILLIN	IG ([	DATE)	3.0 f		H OF B	ORING	
ELEVATION (ft)	РОЕРТН (#)	Material	Graphics				CRIPTI			Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Rema	arks		
	1 •		000	orly grade	ed GRA	AVEL (C	6P); der	se; yellowish	n brown;	D02		44	100					-						
772.00	2	00000000000								*	20 24			-				-						
	3	0,0	Bot Ess	tom of bo	fusal at	3.0 ft.		d in accorda	noo with															
770.00	4		the Pre Soi	Caltrans Sentation For Rock	Soil & Manu Legen	Rock L al (June d or be	ogging, e 2007) low.	d in accorda Classificatio except as no	on, and oted on the															
768.00	5																							
	7	_ _ _																						
766.00	8																							
704.00	9																							
764.00	10																							
	12																							
				DI ···						F	REPOR	T TI	ΓLE								H	DLE ID		$\dashv$
4				Blackb				it≏ 110			BORI	NG	REC		D	ROU	ITE	PO	STMIL	F	E/	<u> 4-10-</u>	·125	$\dashv$

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DIST. **03** COUNTY **ED** ROUTE **50** POSTMILE **1.1/R2.4** EA 03-1E2901

PROJECT OR BRIDGE NAME
Silva Valley Parkway Interchange
BRIDGE NUMBER PREPARED BY
RCP SHEET 1 of 1 DATE

LOGGE RCP	D BY	,	BEGIN DATE COMPLETION DATE <b>7-12-10 7-12-10</b>	BOREHO	LE LOC	ATION	(Lat/	Long	or No	orth/E	East a	nd Datı	ım)		HOLE ID	126	
DRILLIN				BOREHO	LE LOC	ATION	(Offs	et, S	tatior	n, Lin	e)				SURFACE ~739.0	ELEVATION	
SAMPL split	NG MI I-Ste ER T' spoo	ETHOD <b>m Aug</b> YPE(S) <b>on</b>	jer AND SIZE(S) (ID)	DRILL RIC CME75 SPT HAM Automa	MER TY										BOREHO 4 in HAMMER 80%	E DIAMETER	ERi
			ILL AND COMPLETION  17/13/10	GROUND READING		DURI not					TERI	ORILLIN	1G (E	DATE)	<b>30.0 ft</b>	EPTH OF BOR	RING
ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION		Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Re	emarks	
	1		SANDY SILT (ML); hard; reddish brown; dry.  METAMORPHIC ROCK, Metavolcanic, fine-g medium-grained, massive, dusky yellowish bi intensely weathered, soft to moderately soft, v	rown, very erv	S01	6 11 22	33	100				PP = >4.5					
737.00	2		intenselý to intenselý fractured, (Silty Gravel).										-				
735.00	3 -																
	5				S02	11 15	47	100									
733.00	6 -					32							_				
731.00	8																
	9																
29.00	10				S03	16 26	76	100					-				
	11				Run 1	50		100	0				-				
	12-		(continued)		#· 		) T 7'				'			•		1101 - 15	
o bla	> ckt	ourr	Blackburn Consulting 11521 Blocker Drive, Suite 110 Auburn, CA 95603 Phone: (530) 887-1494		[ F	REPOR BORI DIST. 03 PROJE Silva	NG CT C	REC COUN ED OR BF	NTY RIDG	E NA	ROU <b>50</b> ME	TE rchan	1.	STMILI . <b>1/R2.</b> 4	≣ 4	HOLE ID <b>R-10-1</b> EA 03-1E290	
con						BRIDGE					PARE	ED BY	ಶ <u>್</u>		DATI	SHEE	T of 3

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

ELEVATION (ft)	L NDEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location Sample Number	Blows per 6 in.		Recovery (%)	RQD (%)	Moisture Content (%)	(pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Remarks	
			METAMORPHIC ROCK (continued).	Run 1			100	0								
	13			Run		_	75	0								
		# <i>\$</i>		Run 2			75									
725.00	14															
20.00																
	15		METAMORPHIC ROCK, Metavolcanic, fine-grained to medium-grained, massive, dark greenish gray, moderately to slightly weathered, hard, intensely to moderately fractured.	Run 3			90	0								
			moderately to slightly weathered, hard, intensely to moderately fractured.													
723.00	16															
	17															
721.00	18															
	19															
719.00	20			Run 4		-	100	58								
	21															
717.00	22	1//-														
	23															
		- (-)														
715.00	24															
10.00																
		# <del> </del>														
	25			Run 5		-	100	80								
		1:1:														
713.00	26															
		Y/='-/	(continued)	14 11												
			Blackburn Consulting		EPOR <b>BORI</b>	NG I	REC		D						HOLE ID <b>R-10-12</b>	26
~	2		11521 Blocker Drive, Suite 110		IST. <b>03</b>		1UO: <b>ED</b>			ROUT <b>50</b>	ΓΕ	P	)       	MILE <b>R2.4</b>	EA <b>03-1E2901</b>	
		ourr			Silva	Valle	ey F	Park	E NAM	Inter	rchan					
con	ISU	lting	Fax: (530) 887-1495	В	RIDGE	NUN	MBE	R	PREF RC	PARE	D BY				DATE SHEET 2 of	[

ELEVATION (ft)	DEPTH (ft)	Material	Sample Location Sample Location Sample Location Sample Location Sample Location Blows per 6 in. Blows per 6 in. Blows per 6 in. Blows per foot Recovery (%) Moisture Content (%) Dry Unit Weight (pcf) Dry Unit Weight
	27		METAMORPHIC ROCK (continued).
711.00	-		
709.00	30		
	31		Bottom of borehole at 30.0 ft bgs  Terminated at 30 ft.  This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007) except as noted on the Soil or Rock Legend or below.
707.00	32	_	Soil or Rock Legend or below.
	33		
705.00	34		
703.00	-		
	37	_	
701.00	38		
	39		
699.00	40		

S BR-STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

Plackpurp

Consulting

Physics

Phy

Blackburn Consulting
11521 Blocker Drive, Suite 110

Auburn, CA 95603 Phone: (530) 887-1494 Fax: (530) 887-1495

REPORT BORING	TITLE G RECORD			HOLE ID <b>R-10-126</b>
DIST. <b>03</b>	COUNTY <b>ED</b>	ROUTE <b>50</b>	POSTMILE <b>1.1/R2.4</b>	EA <b>03-1E2901</b>
PROJECT	OR BRIDGE N	AME		

Silva Valley Parkway Interchange

BRIDGE NUMBER PREPARED BY
RCP

DATE SHEET 3 of 3

LOGGE RCP	D BY	,	BEGIN DATE <b>7-14-10</b>	COMPLETION DATE 7-14-10	BOREHO	LE LOCA	TION	(Lat/l	ong	or No	orth/	East a	and Dati	ım)		HOLE I		7	
DRILLIN			ACTOR		BOREHO	LE LOCA	TION	(Offs	et, St	ation	n, Lin	ne)				SURFA	CE ELI	EVATION	٧
PC E	NG MI	ETHOD	)		DRILL RIC													DIAMETE	R
Solid			ger ) AND SIZE(S) (ID)		CME 75		DE .									6 in	D EEE	ICIENCY	/ EDi
split	spoo	on `			Automa	atic										80%			
			FILL AND COMPLETIC native cuttings	DN	GROUND READING		not e					TER	DRILLIN	IG (I	DATE)	TOTAL <b>5.7 ft</b>		H OF BC	RING
ELEVATION (ft)	Роертн (ft)	Material Graphics		DESCRIPTION		Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Deptn		Rema	rks	
		000	SILTY GRAVEL (GM	l); dense; light olive brown	; dry.	S01	13	71	100										
	1 -					D02	38		100		7	122							
752.80	2	000000000000000000000000000000000000000																	
750.80	3 -		METAMORPHIC RC medium-grained, ma very intensely weath Gravel).	OCK, Metavolcanic, fine-gr ssive, moderate yellowish ered, soft, intensely fractu	ained to brown, red, (Silty														
	5					S03	40	50/2	100					-					
			Bottom of borehole a	t 5.7 ft has		_^_	50/2"												
748.80	6		Terminated at 5.6 ft.	ū															
	7		the Caltrans Soil & R Presentation Manual Soil or Rock Legend	was developed in accordar tock Logging, Classificatio (June 2007) except as no or below.	nce with on, and oted on the														
746.80	8	-																	
	9																		
744.80	10																		
	11																		
	12																		
			Blackburn Co	<del>-</del>			EPOR <b>BORI</b>	NG I	REC		D							OLE ID <b>\-10-</b>	127
4		~	Auburn CA 0	er Drive, Suite 110			IST. <b>03</b>		ED			ROL <b>50</b>	ITE		STMIL . <b>1/R2.</b>		EA		
blad			Phone: (530)					Vall	ey F	ark	way	/ Inte	erchan	ge					
con	SI I	ting	Fax: (530) 88			В	RIDGE	NUI	MBE	₹	PRI	EPAR <b>CP</b>	ED BY			DA	ATE	SHE	ET of 1

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

LOGGE RCP	ED B	<b>′</b>		EGIN D			MPLE -14-1	TION 0	DATE	BOREH	OLE LO	CA <sup>-</sup>	TION	Lat/L	ong	or N	orth/	East a	ınd Datı	ım)			OLE II		28		
DRILLIN PC E										BOREH	OLE LO	CA	TION	Offse	et, S	tatior	n, Lir	ie)				SI	JRFA( - <b>723.</b>	CE EL		ION	
DRILLIN Solid										DRILL R												- 1	OREH	OLE D	DIAME	TER	
	ER T	YPE(S		SIZE(S)	(ID)					SPT HA		ΥP	E										AMME	R EFF	ICIEN	NCY, EI	Ri
BOREH	IOLE	BACK		ID COM		ON				GROUN READIN	DWATE		DURII					TER	DRILLIN	1G (	DAT	E) T		DEPT	H OF	BORIN	IG
ELEVATION (ft)	овертн (ft)	Material Graphics				DESC	RIPT	ION			Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	'	ا	Rema	ırks		
	1 -		MET/	graded (	HIC RC	CK. N	letavo	Icanic.	 fine-gr en, mod ured.	ained to lerately to			22 50/5"	50/5	100		10	107									- - - -
721.00	2		7																								
	3	-	Esser	n of bor	sal at 2	2.7 ft.	Ū					02	50/0"	REF													
719.00	4		This E the Ca Prese Soil o	Boring R altrans S Intation I r Rock L	ecord v Soil & R Manual egend	was de Rock Lo (June or belo	velope ogging 2007 ow.	ed in a g, Clas: ) excep	eccorda sificatio ot as no	nce with on, and oted on the	Э																
	5	_																									
717.00	6																										
	7																										
715.00	8																										
713.00	9																										-
	11	- -																									-
	12																										
713.00	> -  -		1 A	lackbu 1521 E uburn	Blocke CA 9	er Driv 95603	/e, Si		10			DI C	EPOR B <b>ORI</b> I ST. )3 ROJE(	OT O	REC OUN ED R BF	NTY RIDG	E NA			1	OST  .1/	MILE <b>R2.4</b>		EA	١	) <b>)-12</b> 2901	8
blac con				hone: ax: (53				ļ 					<b>Silva</b> RIDGE				PRI		rchan ED BY	ge			DA	TE	S	HEET 1 of	1

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

LOGGE		3Y		BEGIN DATE <b>7-14-10</b>	COMPLETION DATE 7-14-10	BOREHOL	E LOCA	ATION	(Lat/l	ong	or N	lorth/l	East a	nd Datu	ım)		HOLE I		`	
DRILLI		CON	TRA		7-14-10	BOREHOL	E LOCA	ATION	(Offs	et, S	tation	n, Lin	e)					<b>0-12</b> 9	VATION	
PC E													,				~736			
DRILLII <b>Soli</b> d						DRILL RIG											BOREH 6 in	IOLE DI	AMETER	
SAMPL	ER	TYP	E(S)	AND SIZE(S) (ID)		SPT HAMI		PE									HAMME	R EFFI	CIENCY, E	:Ri
split				ILL AND COMPLE	TION	Automa		DUD	NO F	י ווח	INIO		TED		10 /	) A T ( )	80%	DEDTI	LOE DOD!	NO
				native cuttings		GROUND! READING:	WATER S	not e					IEKI	DRILLIN	IG (I	JATE)	5.1 ft		I OF BORI	NG
						ı	on er						ht							$\Box$
ELEVATION (ft)	£						ocati	. 6 in	fool	(%)		(%	Veig	engt	sthod	L D				
VAT	DEPTH (ft)	<u>.</u>	Pics Pics		DESCRIPTION		ole L	s pe	s be	very	(%)	ure ent (9	Juit	r Str	g Me	ğ		Remar	ks	
EE	DEF	Mate	Graphics				Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery	RQD	Mois	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth				
	<b>-</b> 0-	ПĪ		SANDY SILT (ML	); stiff; reddish brown; dry.		S01	7		100	_									
		Ħ					D02	14		100					$\  \ $					
	1						-	26												
		Ľ.		METAMORPHIC medium-grained	ROCK, Metavolcanic, fine-gramassive, moderate yellowish	ained to														
			<u> </u>	intensely weather Gravel)	ed, soft, intensely fractured, (	Silty									1					
734.50	2			Gravory																Н
		H.	5-)																	
		H																		
	3																			F
732.50	4																			
		H;																		
		H.																		
	5			Dottom of harohal	a at E 1 ft bas		₩  S03	50/1"	REF	100										<u></u>
				Bottom of borehol Terminated at 5.1	· ·				_	_										Н
730.50	6	Н				ace with														
730.50	O	H		the Caltrans Soil	rd was developed in accordar & Rock Logging, Classificatio ual (June 2007) except as no	n, and														
		H		Soil or Rock Lege	end or below.	aca on the														H
	7	_																		F
		Ħ																		
728.50	8																			
		Н																		
	9	Ц																		Н
	-	Н																		Н
		Н																		
726.50	10	Н																		Н
		H																		H
		H																		H
	11	Ħ																		H
		Ħ																		H
	<b>-</b> 12 <b>-</b>																			
							TE	REPOR	T TIT	ri E								IμΩ	LE ID	
				Blackburn	<del>-</del>			BORI	NG	REC		D						A	-10-12	9
M	2	~	~		cker Drive, Suite 110			03 03		ED			ROU <b>50</b>	ſΕ		STMIL . <b>1/R2</b> .		EA 03	3-1E2901	
bla	ck	bu	ırn	Auburn, CA	A 95603 (0) 887-1494			ROJE Silva						rchan				•		
con				1 110110. (00	•			RIDGE				PRE	EPARI	ED BY	3 <u>~</u>		DA	ATE	SHEET	
			3	. 3/11 (000)								_ R(	CP						1 of	1

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

LOGGE	ED BY	<b>′</b>	BEGIN DATE	COMPLETION DATE	BOREHOL	E LOC	ATION	(Lat/l	Long	or N	lorth/	East a	nd Datu	ım)		HOLE IC			
RCP	NG C	ONTRA	<b>7-14-10</b> ACTOR	7-14-10	BOREHOL	FLOC	ΔΤΙΩΝ	(∩ffe	ot S	tatio	n lin	۵۱				A-10	)-130		
		ration			BONLING	L LOC	ATION	(Olis	et, o	ialioi	II, LIII	<i>c)</i>				~712.		ATION	
DRILLII	NG M	ETHO	D		DRILL RIG											BOREH	OLE DIA	METER	
		m Au			CME 75											6 in			
SAMPL <b>split</b>			) AND SIZE(S) (ID)		SPT HAMM		'PΕ									80%	R EFFIC	SIENCY, E	Ri
			FILL AND COMPLETIC	DN	GROUND		R DUR	NG E	DRILL	LING	i AF	TERI	DRILLIN	IG (D	ATE)		DEPTH	OF BORI	NG
			native cuttings		READING		not							(-		6.3 ft			
(ft)						ion						ht	ч						
NO NO	£					Location	9	Į00	(%)		(9	Veig	əngt	thoc					
Ϋ́	E	is a		DESCRIPTION		e L	ber	per l	/ery	(%)	re (%	nit V	Str	Me P		I	Remark	S	
ELEVATION (ft)	DEPTH (ft)	Material Graphics				Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	g	oisti onte	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	3				
Ш	┉	≥o	SANDY SILT (ML); s	tiff: alive grav: dry		W W	B	m	ď	œ	ΣŬ	ㅁ유	<u>N</u> #	ا م					
			SANDT SILT (IVIL), S	uii, olive gray, dry.															
	1 -	4.4.		OCK Metavolcanic fine o		-													-
			medium-grained, ma	OCK, Metavolcanic, fine-grassive, dusky yellow, deco	omposed,														
	E		sort, very intensely fr	actured, (Silty Gravel).		S01	16	46	100										
710.00	2					M	19												H
		17				N	07												F
						И	27												
	3	- //:	1											1					-
																			F
708.00	4																		-
																			F
		137																	
	5	<b>-</b>				S02	18	86/9	100					$\left\{ \ \right\}$					$\vdash$
		T: <i>'//-</i> -				M													
						M	36												
706.00	6					И	50/3"												
	-		Bottom of borehole a	t 6.3 ft bgs						1									$\overline{}$
			Terminated at 6.23 ft																F
	7		This Boring Record v	was developed in accorda	ance with														
	H	-	the Caltrans Soil & R	was developed in accorda lock Logging, Classificatio (June 2007) except as no	on, and oted on the														-
	ļ		Soil or Rock Legend	or below.															F
704.00	8																		F
	E																		E
	F	-																	F
	9	7																	F
	þ																		
702.00	10																		$\vdash$
102.00	10	-																	F
	ļ																		F
	11																		E
	'' F	-																	F
	þ																		F
	12																		
	14																		
			Blackburn Co	nsultina			REPOR BOR			COP	חי						HOL	E ID 10-13	
				er Drive, Suite 110		1	DIST.		OUI			ROU	TE	POS	STMIL		EA		
			Auburn, CA 9				<b>03</b> PROJE		ED	סורכ	E N14	50		1.	1/R2.	4	03-	1E2901	
		STIFF				1 1	- KUJE	UI U	ᇄᇚ	NUG		√ıνı⊏							

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

blackburn consulting

Auburn, CA 95603 Phone: (530) 887-1494 Fax: (530) 887-1495

5	5 1 (E 0 0 1 (B			A-10-1
DIST. <b>03</b>	COUNTY <b>ED</b>	ROUTE <b>50</b>	POSTMILE <b>1.1/R2.4</b>	EA 03-1E290
PROJECT	OR BRIDGE NA	AME		

LOGG RCP		BY		BEGIN <b>7-19</b>	N DATE 0-10	COMPI <b>7-19</b> -	ETION DATE	BOREHOL	Εl	LOCA	ATION	(Lat/l	Long	or N	lorth/	East a	ınd Datı	ım)		HOLE ID	131	
DRILLI PC E			NTRA ation					BOREHOL	Εl	LOCA	ATION	(Offs	et, S	tatio	n, Lir	ne)					ELEVATION	ON
DRILLI	NG	ME		)				DRILL RIG												BOREHO 6 in	E DIAMET	TER
	ER	R TY	PE(S)	AND SIZE(	S) (ID)			SPT HAMI	MEF		PE									HAMMER	EFFICIEN	CY, ERi
BORE	HOL	LE E	BACKF	ILL AND CO		ON			ΝA		DURI not e					TER	DRILLIN	IG (I	DATE)	TOTAL D 2.0 ft	EPTH OF E	BORING
-		-		native ou	ittii igo				tion	per				_	_	ght	th.	ъ		2.0 10		
ELEVATION (ft)	<b>4</b>	É	cs			DESCRIP	PTION		e Loca	e Num	per 6 i	per for	ery (%	(%)	t (%)	iit Wei	Streng	Metho	Depth	R	emarks	
ELEV,		DEP T	Material Graphics						Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	<u>Moistur</u> Conten	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing			
	-0-			SILTY GRA	AVEL (GM nd boulder	1); dense; d s.	olive brown; dry	; with						_								
	1																					
	'	E																				F
685.50	2																					
				Bottom of b			•															
	3			This Boring	g Record	was develo	pped in accorda	nce with														
		E		Presentation Soil or Roo	on Manua ck Legend	l (June 200 or below.	pped in accorda ng, Classificatio 17) except as no	oted on the														
683.50	4	_																				-
	5																					
		F																				F
681.50	6	_																				
		E																				
	7																					E
		F																				
679.50	8																					
	9																					
677.50	10																					E
	11																					<u> </u>
	12	<u></u>																				
				Black	burn Co	nsulting				R	EPOR <b>BORI</b>	T TIT	TLE <b>REC</b>	OR	D						HOLE ID	-131

Blackburn Consulting 11521 Blocker Drive, Suite 110 Auburn, CA 95603

Phone: (530) 887-1494 Fax: (530) 887-1495

BORING	RECORD			A-10-131
DIST. <b>03</b>	COUNTY <b>ED</b>	ROUTE <b>50</b>	POSTMILE <b>1.1/R2.4</b>	EA <b>03-1E2901</b>
PRO IFCT	OR BRIDGE NA	AME		

LOGGI RCP	D B	Y			GIN DA <sup>-</sup> - <b>19-10</b>	TE	COMP <b>7-19</b>	LETION	DATE	BOREH	OLE LO	CATION	(Lat/	Long	or N	orth/	East a	nd Datu	ım)		HOLE ID			
DRILLI	NG C	ON	TRAG		13-10		7-13	-10		BOREH	OLE LO	CATION	(Offs	et, S	tation	n, Lin	e)				SURFAC			
PC E																					~693.			
DRILLI				۵r						DRILL R											BOREHO	DLE DIA	METER	
SAMPL	ER T	YPE		AND SIZ	ZE(S) (IE	D)				SPT HAI	MMER T	YPE									HAMME	R EFFIC	IENCY, E	-Ri
Split			CKEI	LL AND	COMPI	FTION	J			Auton GROUN		R DUR	ING I	) RILI	ING	ΔΕ	TER	DRILLIN	IG (F	ΔTF)	80% TOTAL	)EPTH	OF BOR	NG
				native			•			READIN	GS	not					ILIX	DINIELII	10 (L	/ATL)	3.0 ft	JE1 1111 ·	or bord	NO
ELEVATION (ft)	DEPTH (ft)	Material	Graphics	ASPHA	LT.	D	ESCRIF	PTION			Sample Location	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depui	F	Remark	S	
	1 -		73.		 GRAVEL	 _ with S	SAND (G	 6M); dens	se; yello	 wish	So	1 6 32	54	100					-					
691.50	2		0000000	SILTY ( cobbles	GRAVEL	(GM);	 dense;	yellowisł	- — — — n brown;	 ; dry; with		22							-					
	3		1299	Bottom	of boreh	nole at 3	3.0 ft bg:	s																$\dashv$
				Essentia																				
689.50	4			This Bo the Calt Present Soil or F	ring Rec rans So ation Ma Rock Le	cord wa il & Ro anual ( gend o	as develock Loggi June 20 r below.	oped in a ing, Clas 07) exce	accordar sificatio pt as no	nce with n, and ted on the	)													
	5																							
687.50	6																							
	7																							
685.50	8																							
	9																							
683.50	10																							
	11																							
	12																							—Ц
				Rla	ıckhur	n Con	sulting	ı				REPOR	RT TI	TLE		_						HOLI	EID 40	$\exists$
<b>◆</b>							_	Suite 1	110			DIST.		COUN		ט 	ROU	TE	PO	STMIL	E	EA	<u>10-13</u>	

11521 Blocker Drive, Suite 110 Auburn, CA 95603

Phone: (530) 887-1494 Fax: (530) 887-1495

BORING	GRECORD			A-10-132
DIST. <b>03</b>	COUNTY <b>ED</b>	ROUTE <b>50</b>	POSTMILE <b>1.1/R2.4</b>	EA <b>03-1E2901</b>
PRO IFCT	OR BRIDGE NA	ΔME		

LOGGE	ED BY	,	BEGIN DATE	COMPLETION DATE	BOREHOL	E LOC	ATION	(Lat/L	ong	or No	orth/l	East a	ınd Datı	ım)		HOLE II			
DRILLII				7-20-10	BOREHOL	LE LOCA	ATION	(Offs	et, St	tatior	n, Lin	e)				SURFA	)-133 CE ELEV	ATION	
DRILLI		ration ETHOD			DRILL RIG	<del>)</del>										<b>~640.</b> BOREH	<b>2 π</b> OLE DIA	METER	
		m Aug			CME 75											6 in			
SAMPL split			AND SIZE(S) (ID)		SPT HAMI		PΕ									80%	R EFFIC	IENCY, EF	₹i
BORE	HOLE	BACKF	ILL AND COMPLETION IN THE INTERIOR INTERIOR IN THE INTERIOR INTER		GROUND! READING:		DURI not e					TER	DRILLIN	IG (I	DATE)	TOTAL 6.5 ft	DEPTH (	OF BORIN	G
ELEVATION (ft)	DEPTH (ft)	Material Graphics		DESCRIPTION		Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Remarks	5	
638.20	1 2	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ASPHALT. Poorly graded GRAV dense; olive brown; o	/EL with SILT and SAND ( dry.	GP-GM);	D02			100		6	138	0.5						
636.20	4 -		SANDY SILT (ML); s	tiff; reddish brown; dry.		S03	16	41	100					-					
634.20	6		Bottom of borehole a Terminated at 6.5 ft.	Č			32												
632.20	8 -		This Boring Record of the Caltrans Soil & F Presentation Manual Soil or Rock Legend	was developed in accorda tock Logging, Classificatic (June 2007) except as no or below.	nce with on, and oted on the														
630.20	9 -																		
	11 -																		
			_			1 6	REPOR	ד דוד	ΠF								HOLE	= ID	
			Blackburn Co	<del>-</del>			BORI	NG I	REC		D	D.C.		I = -		_	A-	1 <mark>0-13</mark>	3
~		ندر	A., b.,	er Drive, Suite 110			DIST. <b>03</b>		ED			FOU <b>50</b>	ITE		STMI .1/R2		EA <b>03-</b>	1E2901	
bla	ckb	ourn	Auburn, CA 9 Phone: (530)				PROJEC Silva						rchan	ge.					
		tino	Filone: (530)	007-1494		-	BRIDGE	vall NIII	Sy F	air.	PRE	PAR	FD RY	a <sub>C</sub>		DA	TE	SHEET	-

Auburn, CA 95603 Phone: (530) 887-1494 Fax: (530) 887-1495

BORING	G RECORD			A-10-133
DIST.	COUNTY	ROUTE	POSTMILE	EA
03	ED	50	1.1/R2.4	03-1E2901
PROJECT	OR BRIDGE NA	AME		

LOGGE RCP	D B	Υ			GIN I				PLET <b>0-10</b>	ION DA	ATE I	BOREH	OLE	LOC	ATION	(Lat/	Long	or N	orth/	East a	ınd Datı	ım)		HOLE	ID 10-1	34		
DRILLII PC E											1	BOREH	OLE	LOC	ATION	(Offs	et, S	tatior	n, Lir	ne)				SURF		ELEVA	ΓΙΟΝ	
DRILLII	NG N	MET	HOD	or							1	DRILL R													HOL	E DIAMI	ETER	
SAMPL	ER	TYP	E(S)		ZE(S)	) (ID)					;	SPT HAI	MME		Έ										MER E	FFICIE	NCY, ER	i
BORE	IOLE	E BA	CKFI									GROUN READIN	DW A							TER	DRILLIN	IG (I	DATE	) TOTA	L DE	PTH OF	BORING	3
<b>—</b>	Tille	ea v	vith	native	cutt	ings	•					(L/(DIIV		<u></u>	not	enco	ount			+				1.0	π			$\dashv$
ELEVATION (ft)	Роертн (ft)		Material Graphics					ESCR					Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Rei	marks		
	0			Well-g dry.	raded	GRA	VEL (	(GW);	dens	e; yello	wish bı	rown;																
	1			METAI mediur hard, in Bottom	m-gra	ined, ely fra	mass acture	ive, gr d.	ayish	anic, fir green,	ne-grain fresh,	ned to very																
645.00	2			Essent					ys																			H
				This Both	oring Itrans	Reco Soil a	rd wa & Roc	s deve	eloped ging,	d in acc Classifi except a	ordand ication,	ce with , and ed on the	<b>.</b>															
	3			Soil or	Rock	Lege	nd or	below	i.	олоорг																		H
643.00	4																											
040.00	7																											
	5																											
641.00	6																											
	7																											H
																												H
639.00	8																											H
																												H
	9																											H
637.00	10																											Ħ
																												H
	11																											H
	10	Ħ																										H
	-12-														REPOF	)T TI	TIF									HOLE I	D	
<b>◆</b>								sultine Drive		ite 110	0				BOR DIST.	NG	REC		D	ROU <b>50</b>	ITE	PC	STMI	LE		<b>A-1</b> EA 03-16	<u>0-134</u>	<u> </u>

Auburn, CA 95603

Phone: (530) 887-1494 Fax: (530) 887-1495

BORING	GRECORD			A-10-134
DIST. <b>03</b>	COUNTY <b>ED</b>	ROUTE <b>50</b>	POSTMILE <b>1.1/R2.4</b>	EA <b>03-1E2901</b>
PROJECT	OR BRIDGE N	AME		

LOGGE RCP	D B	Y		BEGIN DATE <b>7-20-10</b>	COMPLETION DATE <b>7-20-10</b>	BOREHOLE LO	OCA <sup>-</sup>	TION (	Lat/L	ong	or No	orth/E	ast a	nd Datu	ım)		HOLE ID	.135	
DRILLI				CTOR	<del>-</del>	BOREHOLE LO	OCA <sup>-</sup>	TION (	Offse	et, St	ation	, Line	e)				SURFACE	ELEVAT	ION
PC E						DRILL RIG											<b>~656.5</b>		TED
Solid						CME 75											6 in	LL DIANL	I LIX
SAMPL <b>split</b>				AND SIZE(S) (ID)		SPT HAMMER Automatic	TYP	Έ									HAMMER <b>80%</b>	EFFICIEN	ICY, ERi
BORE	IOLE	ΒA	CKF	ILL AND COMPLETIO		GROUNDWAT READINGS							TER [	ORILLIN	IG (E	DATE)	TOTAL D <b>2.5 ft</b>	EPTH OF	BORING
(£)		1	<u> </u>	native cattings ai	14 001101010	٦	-			_			<u>.</u>			T	2.0 10		
ELEVATION (f	рертн (ft)	0.000	Graphics	I	DESCRIPTION	Sample Location	Sample Numbe	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weigh (pcf)	Shear Strength (tsf)	Drilling Method	Casing Deput	R	emarks	
				ASPHALT.															
			000	Poorly graded GRAV	EL (GP); dense; olive bro	wn; dry.													-
	1	<b>-</b> 000	200			15	301	16	50/3	100	ŀ								-
	-	_ <u>o</u>	30		==	N		50/3"											-
		70		Poorly graded GRAV dry; with cobbles.	EL (GP); very dense; olive	e brown;		30/3		-	ŀ								
654.50	2		000000000000000000000000000000000000000																<u> </u>
				Bottom of borehole at	2.5 ft has														
	3																		
	Ĭ					nce with													
				the Caltrans Soil & R	ock Logging, Classificatio	n, and ted on the													
652.50	4			Soil or Rock Legend	or below.	ica on the													-
	5																		-
	-	-																	-
050 50																			
650.50	6																		F
	7																		
	•																		
	-	$\dashv$																	-
648.50	8	_																	F
	ŀ																		
	9																		-
	ŀ																		-
646.50	10	-																	-
040.50	10																		F
	ļ																		F
	11	$\exists$																	<u> </u>
	ŀ	$\exists$																	
	ŀ	$\exists$																	
	12																		
				Diagleh C								_						HOLE	)
				DESCRIPTION  DESCRIPTION  DESCRIPTION  DESCRIPTION  DESCRIPTION  ASPHALT.  Poorly graded GRAVEL (GP); dense; olive brown; dry.  So1 16 50/3 100  So2 16 50/3 100  DESCRIPTION  DESCRIPTION  DESCRIPTION  Remarks  Remarks		) <del>-135</del>													
	1	4												_				03-1E	2901

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

blackburn consulting

Auburn, CA 95603

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BORIN	G RECORD			A-10-135
DIST. <b>03</b>	COUNTY <b>ED</b>	ROUTE <b>50</b>	POSTMILE <b>1.1/R2.4</b>	EA <b>03-1E2901</b>
DDO IECT	OD BDIDGE N	IANE		

PROJECT OR BRIDGE NAME

Silva Valley Parkway Interchange

BRIDGE NUMBER PREPARED BY

RCP SHEET 1 of 1 DATE

LOGGI	ED BY	1	BEGIN DATE	COMPLETION DATE	BOREHOL	E LOCA	TION	(Lat/l	ong	or No	orth/E	East a	nd Datı	ım)		HOLE ID	420		
RCP	NG C	ONTR	<b>7-20-10</b> ACTOR	7-20-10	BOREHOL	FLOCA	TION	(∩ffe	et St	tation	n Lin	e)				A-10	-136 E ELEVAT	ION	
		ratio			BONLINGE	L LOOA	111011	(Ons	et, o	lalioi	i, Liii	<b>5</b> )				~736.0		ION	
DRILLI					DRILL RIG												LE DIAME	TER	
		m Au			CME 75											6 in			
SAMPL			) AND SIZE(S) (ID)		SPT HAMM		'E									80%	EFFICIEN	ICY, ERI	
BORE	HOLE	BACK	FILL AND COMPLETIC		GROUND	WATER						TER I	DRILLIN	IG (D/	ATE)		EPTH OF	BORING	
	fille	d with	n native cuttings ar	nd concrete	READING	1_	not e	enco	unte	ered						6.3 ft			$\dashv$
ELEVATION (ft)	Эрертн (#)	Material Graphics		DESCRIPTION		Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method Casing Depth		R	emarks		
			ASPHALT.																
		000	Poorly graded GRAV	EL (GP); dense; yellowisl	n brown;	1													Н
	1	0000	dry.			S01	19	51	100										Н
				l); dense; brown; dry to m	 oist; (fill).	301		31	100										Ħ
	þ			•	•		32												Н
734.00	2					№ D02	19		100		5	122							Н
																			Н
	F																		Н
	3		SILTY GRAVEL (GM	); dense; reddish brown;	dry.														Н
732.00	4		e e																Ц
	E																		
	-																		Н
	5					<b>⊗</b> S03	5	80/9	100					-					Н
						303		00/3	100										Ħ
			METAMORPHIC RO	PCK, Metavolcanic, fine-gr ssive, dusky yellowish bro soft, intensely fractured, (	ained to		30												
730.00	6		intensely weathered, Gravel).	soft, intensely fractured, (	Silty	N	50/3"												
			Bottom of borehole a	t 6.3 ft bgs		4						!		1					Н
	_ [		Terminated at 6.3 ft.																
	7		This Boring Record v	was developed in accorda	nce with														Н
			Presentation Manual	cock Logging, Classification (June 2007) except as no or below.	on, and oted on the														Ħ
728.00	8		Soil or Rock Legend	or below.															Ц
	E	1																	Н
	ŀ	1																	Н
	9	-																	H
	F	7																	H
726.00	10																		H
	E	1																	Н
j	11																		Н
	'' F	7																	Я
	F																		H
<u>:</u>	_ <sub>12</sub>	_																	Ц
						1=	<u> </u>	T T'-									Lucia		_
			Blackburn Co	nsulting			EPOR B <b>ORI</b>			OR	D						HOLE ID	) -136	
~			11521 Blocke	er Drive, Suite 110			IST. <b>03</b>		OUN <b>ED</b>	νΤΥ		ROU <b>50</b>	TE		TMILE		EA <b>03-1E</b>		

Auburn, CA 95603 Phone: (530) 887-1494 Fax: (530) 887-1495

BORING	GRECORD			A-10-136
DIST. <b>03</b>	COUNTY <b>ED</b>	ROUTE <b>50</b>	POSTMILE <b>1.1/R2.4</b>	EA <b>03-1E2901</b>
PRO IFCT	OR BRIDGE NA	ΔME		

LOGGI RCP	ED B	3Y		BEGIN D. <b>7-20-1</b>		COMP <b>7-2</b> 0	PLETION D-10	N DATE	BOREHO	LE LOCA	TION	(Lat/l	Long	or N	lorth/	East a	ınd Datı	ım)		HOLE II	)-137	,	
DRILLI PC E			RACTO	R					BOREHO	LE LOCA	TION	(Offs	et, S	tatio	n, Lin	ie)				SURFA: ~757.		/ATION	
DRILLI	NG N	METH	OD						DRILL RIC											BOREH	OLE DI	METER	?
Solic SAMPL				SIZE(S)	(ID)				CME 75		PE									6 in	R EFFI	CIENCY,	ERi
split			IZEU L A	ND COM	DI ETIO	N.I			<b>Automa</b> GROUND		DUD	NO F	NDII 1	INIO	^ -	TED		10 (5	) A T ( )	80%	DEDTU	OF DOE	DINO
				ve cutti			rete		READING	S	not e					IEK	DKILLII	NG (L	JATE)	6.5 ft	DEPIN	OF BOF	KING
ELEVATION (ft)	р Роертн (ft)	Material			ı	DESCRI	PTION			Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Deptin		Remarl	is.	
755.50	1		Poor dry.	HALT.  lly gradec				yellowish	brown;	S01	18 33 32	65	100					-					
700.00	3		MET med inten	sely wea	HIC RO ned, ma thered,	CK, Meta ssive, du soft, very	avolcani isky yello y intense	 c, fine-grai owish brov ely fracture	 ined to wn, very ed, (Silty	D02			100		19	114		-					
753.50	5									S02	5	41	100					_					
751.50	6		Botto	om of bor	ehole at	6.5 ft bo	ıs				23												
	7		Tern This the C Pres	ninated at Boring R Caltrans S entation I	t 6.5 ft. Record v Soil & R Manual	vas deve ock Logo (June 20	loped in ging, Cla	accordano essification	ce with i, and ed on the														
749.50	9		SOIL	or Rock L	_egend	or below																	
747.50	10																						
	11 -12-																						
				Blackbu	ırn Co	nsultino				F	EPOR <b>BORI</b>	T TI	TLE <b>REC</b>	OR	D						HOL <b>A</b>	E ID -10-1	37
~	2	4		11521 E Auburn,	Blocke	r Drive		110			IST. <b>03</b>	C	ED	YTV		ROU <b>50</b>	ITE	PO <b>1</b> .	STMIL 1/R2.	E <b>4</b>	EA	-1E290	
<b>L L a</b> .	-1.	<b>L</b>	,	-upull)	, UA 9	JUUJ				F	ROJE	CT C	R BF	RIDG	E NA	\ME							

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consulting

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BORING	G RECORD			A-10-137
DIST. <b>03</b>	COUNTY <b>ED</b>	ROUTE <b>50</b>	POSTMILE <b>1.1/R2.4</b>	EA <b>03-1E2901</b>
PRO IFCT	OR BRIDGE NA			

LOGGE		Y		BEGIN <b>7-20</b>			OMPLETI - <b>-20-10</b>	ON DATE	BOREHO	)LE I	LOCA	TION	(Lat/l	ong	or N	orth/	East a	and Datu	ım)		ı	E ID -10-	138		
DRILLII PC E				OR					BOREHO	)LE I	LOCA	TION	(Offs	et, S	tation	n, Lir	ie)				SUF		ELEV	ATION	
DRILLII	NG N	/ETH	DD						DRILL RI													REHOL		METER	
SAMPL	ER T	ΓΥΡΕ(		D SIZE(S	S) (ID)				SPT HAN	ИΜЕ		PE									HAN	MER I	EFFIC	IENCY,	ERi
	HOLE	BAC		AND CC		TION			GROUNI	DWA		DUR	NG E	RILL	ING	AF	TER	DRILLIN	IG (I	DATE)		AL DE	PTH (	OF BOR	ING
	fille	d wit	th nat	tive cut	ttings				READING	_	<u> </u>	not	enco	unt	erec						6.5	ft			
ELEVATION (ft)	Роертн (#)	Material	Grapnics				CRIPTIO			Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Re	mark	6	
		0000	Po o dry		led GR	AVEL (G	SP); dens	e; yellowish	n brown;																
	1		SIL O	.TY GRA	AVEL (G	SM); den	ise; olive	brown; dry	to moist.																Ė
	'										S01	8	42	100											
695.00	2		O. Po							N		13 29													Ė
033.00	_		0							\		29				9	122								
	3		<b>6</b>																						Ė
	3		0																						
693.00	4																								
093.00	4																								
	_		0																						-
	5		SA	NDY SIL	T (ML)	; stiff; re	ddish bro	wn; moist.		-	S02	10	26	100											Ē
204.00		-   <u> </u>	] V ME	TAMOR	RPHIC F	ROCK. N	 /letavolca	_ — — — _ ınic, fine-gra	 ained to	-   \		11													-
691.00	6		me	dium-gra ensely w ctured, (	ained, r eathere	nassive,	dusky ye verv inter	ellowish bro sely to inte	own, very Insely	<b>/</b> \		15													-
	_		Bo	ttom of b	orehole	at 6.5 f														•					
	7			rminated is Borino			eveloped	in accorda	nce with																
			the Pre	Caltran	s Soil & n Manu	Rock L	ogging, (e 2007) e	in accorda Classificatio xcept as no	n, and oted on the																-
689.00	8		50	il or Roc	k Leger	ia or bei	OW.																		Ē
																									-
	9																								Ė
	,																								-
687.00	10																								Ē
																									-
	11																								Ē
	<b>-</b> 12																								
						Consul	_					EPOR BORI	NG	REC		D	DO:	.T.E		OT: ***	_			™ 10-1	38
×		4				ker Dri . 95603	ve, Suit 3	e 110				IST. <b>03</b> ROJE		ED ED		E N14	50	IIE		.1/R2			EA <b>03-</b>	1E290	1
bla				Phone	e: (530	0) 887-	1494				;		Vall	ey F	Park	way	/ Inte	erchan ED BY	ge		1	DATE	:	SHEE	т
con	SU		9	Fax: (	530) 8	387-14	95					וטטוי	_ INU	AIDEI	`		CP	וטטי				שאוב		1 0	

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

LOGGI RCP	ED E	3Y		BEGIN DAT <b>7-20-10</b>	E COMPLE <b>7-20-1</b>	TION DATE	BOREHOL	E LOC	ATION	(Lat/l	ong	or N	orth/l	East a	nd Datu	ım)		HOLE ID			
DRILLI				CTOR	. 23 1	-	BOREHOL	E LOC	ATION	(Offs	et, S	tatior	n, Lin	e)				SURFAC	E ELEVA	TION	
PC E							DDII I DIO											~693.		ICTED.	
DRILLII <b>Solic</b>							DRILL RIG											BOREHO 6 in	JLE DIAN	IETEK	
				AND SIZE(S) (ID)	)		SPT HAMI		Έ										R EFFICIE	ENCY, ER	i
split							Automa											80%			
				ILL AND COMPLI native cutting		te	GROUND\ READINGS		not o					TER	DRILLIN	IG (C	ATE)	3.5 ft	DEPTH O	F BORIN	3
ELEVATION (ft)	PDEPTH (ft)		Matenal Graphics		DESCRIPT	TON		Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casilig	F	Remarks		
				ASPHALT.																	
	1		000	Poorly graded G brown; dry.	RAVEL (GP); de	ense; dark yell	owish														
	1	90		SILTY GRAVEL	(GM); dense; oli	ve brown; moi	ist.	S01	32		100					1					H
								D02	50		100		6	132		1					
691.50	2									_											H
	3	<u>_</u>		METAMORPHIC	ROCK, Metavo	lcanic, fine-gr	ained to														
		H	<u> </u>	medium-grained weathered, mode	, massive, grayis erately hard, inte	sh green, mod ensely fracture	lerately d. ,	<b>⊗</b> S03	50/3"	REF	100										$\dashv$
689.50	4			Bottom of boreho	•																Н
003.50	7			Essential refusal																	
				This Boring Receive Caltrans Soil Presentation Ma	ord was develop & Rock Logging	ed in accorda g, Classificatio	nce with on, and														H
	5			Presentation Mar Soil or Rock Leg	nual (June 2007 end or below.	) except as no	oted on the														$\Box$
687.50	6																				
	7																				
	•																				
																					$\vdash$
685.50	8																				Н
	9	Ħ																			Ħ
683.50	10																				
	11	$\vdash$																			H
		Ħ																			H
		Ħ																			H
	<b>-</b> 12 <b>-</b>																				ᅱ
				Blackburn	Consulting			ı	REPOR BOR	NG I	LE DEC	'OP	n						HOLE	D-139	$\Box$
					cker Drive. S	uite 110		-	DIST.		COUN		<u>ر</u>	ROU	TE	РО	STMIL	E	EA	U-138	<u>'</u>

11521 Blocker Drive, Suite 110 Auburn, CA 95603

Phone: (530) 887-1494 Fax: (530) 887-1495

BORING	G RECORD			A-10-139
DIST.	COUNTY	ROUTE	POSTMILE	EA
03	FD	50	1.1/R2.4	03-1E2901
US	ED	50	I. I/RZ.4	03-1E2901

LOGGE RCP	D B	Y	BEGIN DATE <b>7-20-10</b>	COMPLETION DATE 7-20-10	BOREHOL	E LOCA	TION	(Lat/L	ong	or No	rth/E	ast aı	nd Datu	ım)		HOLE A_1	D <b>0-14</b>	n	
DRILLIN			RACTOR		BOREHOL	E LOCA	TION	(Offse	et, St	ation	, Line	<del>;</del> )				SURFA	CE ELE	VATION	
PC E	IG N	/ETH	OD		DRILL RIG													AMETER	R
Solid			(S) AND SIZE(S) (ID)		CME 75	IED TVI	DE									6 in	ED EEE	CIENCY,	FRi
split :	spo	on			Automa	tic										80%			
			KFILL AND COMPLETION th native cuttings	NC	GROUNDV READINGS	VATER	not e						ORILLIN	1G ([	DATE)	TOTAL <b>5.3 f</b>		OF BOF	RING
ELEVATION (ft)	РОЕРТН (ft)	_		DESCRIPTION		Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Remar	ks	
		000	SILTY GRAVEL (GN	Л); dense; yellowish brown	; dry.														
	1		00 00 00 00 00 00 00 00 00 00 00 00 00			S01 D02	18 29	55	100 100	-									
665.00	2	0000000	1000 also				26				7	2							
663.00	3 -		700000000000000000000000000000000000000																
	5		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			S02	32	50/3	100	-				-					
			Bottom of borehole a	at 5.3 ft bgs										4					
661.00	6		Essential refusal at S This Boring Record the Caltrans Soil & Presentation Manua	5.3 ft. was developed in accorda Rock Logging, Classificatio I (June 2007) except as no I or below.	nce with on, and oted on the														
	7	_	Soil or Rock Legend	for below.															
659.00	8																		
	9																		
657.00	10																		
	11																		
	12																		
•			Blackburn Co	onsulting er Drive, Suite 110			EPOR BORI IST.	NG I				ROU <sup>*</sup>	TE	PC	STMIL	E	<b>A</b>	LE ID <b>-10-1</b>	
blad	ckł	our	Auburn CA (	95603		P	03 ROJE	CT O	ED R BF	RIDGE	IAN E	<b>50</b> ME	rchan	1	.1/R2.			3-1E290	)1
			Friorie: (530) 88	,, ITUT															

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12 blackburn consulting

RCP	ED BY	ſ	BEGIN DATE 8-23-10		OMPLETION <b>8-23-10</b>	I DATE	BOREHO	OLE LOC	OITA	N (Lat/	Long	or N	orth/	East a	nd Datu	ım)		R-1	⊃ 0-141		
DRILLING CONTRACTOR  Taber Drilling							BOREHOLE LOCATION (Offset, Station, Line)											SURFACE ELEVATION ~736.0 ft			
		IIII <b>ng</b> IETHOD	)				DRILL RI	IG											Uπ OLE DIAI	METER	
Rotary Wire-Line						D120	_								_		4 in				
HQ C	ore		AND SIZE(S) (ID)				SPT HAMMER TYPE Automatic													ENCY, ERI	
			TILL AND COMPLE d <b>8/23/10</b>	ETION			GROUNI READING	DWATE GS		RING I				TERI	DRILLIN	IG (I	DATE)	30.2 1		F BORING	
ELEVATION (ft)	TH (ft)	ial nics		DES	CRIPTION			Sample Location Sample Number	Blows per 6 in.	Blows per foot	very (%)	(%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	g Depth		Remarks	- :	
ELE	рертн (	Material Graphics						Sample	Blows	Blows	Recovery	RQD (%)	Moiste Conte	Dry U (pcf)	Sheal (tsf)	Drillin	Casin				
734.00	1 -		CLAYEY GRAVE	EL (GC);	very dense; b	orown; dr	y.	l So	1 21	77	100										
	3								27 50		100										
732.00	4 -		METAMORPHIC medium-grained, intensely weather intensely fracture	ROCK, , massive red, very ed, (Claye	Metavolcanic e, dusky yello soft to soft, v ey Gravel).	 c, fine-gra owish bro very inter	ained to wn, very sely to														
730.00	7		METAMORPHIC medium-grained, slightly weathere moderately fractu	, massive	e, grayish gre	en, modentenselv	erately to	Ru 1			100	0									
728.00	8 -							Ru 2	n		100	0									
726.00	10							Ru 3			100	0									
	11							Ru 4	n		88	0									
			_	(0	continued)			ı	REPO	ד די	TIF								HOLE	: ID	
			Blackburn		-				BOF	RING	REC		D	_					R-	10-141	
×		ourr	11521 Blo Auburn, C	A 9560	3	110		}	DIST. 03 PROJI	ECT C	ED R BE	RIDG	E NA	FOU 50 AME		1	STMI .1/R2	LE 2.4	EA <b>03-</b>	IE2901	
hla			Phone: (53					1	C:L.					- 14-	rchan						

ELEVATION (ft)	(#) HIGHU2 12	סבר ווו (וו)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Remark	(S	
	T 12			METAMORPHIC ROCK (continued).		Run 4			88	0									
	13																		
722.00	14					Run 5			100	47									
	15																		
720.00	16					Run			98	37									
						Run 6													
	17																		-
718.00	18																		
	19																		
	19																		
716.00	20																		
	21					Run			100	60									
						Run 7			100	00									
714.00	22											186							
	23																		
740.00	0.4																		
712.00	24																		
710.00	25																		
710.00	26																		
			(-1-	(continued)		Run 8			100	161									
bla				Blackburn Consulting			EPOR <b>BORI</b> IST.	NG I	REC		D	DO!	ITE	D.	76.T.	W.E	HOL R	E ID -10-14	1
bla	ے مام			11521 Blocker Drive, Suite 110 Auburn, CA 95603		( P	03 ROJE	CT O	ED R BE	RIDG	E NA	ROU <b>50</b> AME			OSTN 1 <b>.1/R</b>	2.4	63 03	-1E2901	
con	ick ISI	uli ilu	ing	Phone: (530) 887-1494 Fax: (530) 887-1495			<b>Silva</b> RIDGE				way PRI R	/ Inte EPARI C <b>P</b>	erchan ED BY	ge			DATE	SHEET 2 of	3

ELEVATION (ft)	DEPTH (ft)	(-)	Material Graphics	DESCRIPTION	Sample Location		Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Re	marks
	27					Run 8			100	161						
708.00	28															
	29															
706.00	30			ottom of borehole at 30.2 ft bgs												
	31			erminated at 30.2 ft.  his Boring Record was developed in accordance with he Caltrans Soil & Rock Logging, Classification, and resentation Manual (June 2007) except as noted on the oil or Rock Legend or below.												
704.00	32	_	30	oil of Rock Legeria of below.												
	33	_														
702.00	34	_														
	35	_														
700.00	36	_														
	37	_														
698.00	38															
	39															
696.00	40															
				Blackburn Consulting		R	EPOR	T <u>T</u> IT	ΓLE							HOLE ID P-10-141

Blackburn Consulting 11521 Blocker Drive, Suite 110

Auburn, CA 95603 Phone: (530) 887-1494 Fax: (530) 887-1495

	BORING	G RECORD			R-10-141
DIST. COUNTY ED			ROUTE <b>50</b>	POSTMILE <b>1.1/R2.4</b>	EA <b>03-1E2901</b>
	PROJECT	OR BRIDGE NA	AME		

Silva Valley Parkway Interchange

BRIDGE NUMBER PREPARED BY RCP

SHEET
3 of 3 DATE

LOGGE RCP	D B\	Y	BEGIN DATE 8-23-10	COMPLETION DATE 8-23-10	BOREHOI	LE LOCA	TION	(Lat/L	ong	or No	orth/E	East a	nd Datu	ım)		HOLE ID <b>A-10</b> -	1/12		
DRILLIN		ONTRA			BOREHOI	LE LOCA	TION	(Offs	et, St	ation	n, Lin	e)				SURFACE	ELEV		
Tabe		illing IETHOD	)		DRILL RIG	<del></del>									l E	<b>~671.5</b> BOREHO		METER	
Solid	-Ste	m Auç	ger		D120											6 in			
SAMPLI S <b>plit</b> :			AND SIZE(S) (ID)		SPT HAMI Automa		PE									HAMMER <b>80%</b>	EFFIC	IENCY, E	.Ri
			TILL AND COMPLETION native cuttings	N	GROUND READING	WATER S	DURII not e					TERI	ORILLIN	IG (C		TOTAL D <b>5.1 ft</b>	EPTH (	OF BORII	NG
ELEVATION (ft)	DEPTH (ft)	Material Graphics	I	DESCRIPTION		Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	במאוווס המאוווס	R	emark	6	
	1 -		SANDY SILT (ML); si	tiff; brown; dry.  CK, Metavolcanic, fine-grassive, dusky yellowish bro	 ained to	D03			100										
669.50	2		medium-grained, ma- intensely weathered, (Silty Gravel).	ssive, dusky yellowish bro very soft to soft, intensely	wn, very fractured,	S01	50/6"	REF	100	-	5	118							
	3																		
667.50	4																		
	5		Bottom of borehole at Terminated at 5.1 ft.	g The state of the		S02	50/1"	REF	100	-									_
665.50	6		This Boring Record v the Caltrans Soil & R Presentation Manual Soil or Rock Legend	vas developed in accordar ock Logging, Classificatio (June 2007) except as no or below.	nce with n, and ted on the														
262.50	7																		
663.50	8 -																		
661.50	-																		
	11																		
	12																		-
	U		Blackburn Co	=			EPOR <b>BORI</b>	NG I	REC		D	_						⊡ 10-14	2
*			Auburn CA Q	r Drive, Suite 110 5603			IST. <b>03</b>		OUN <b>ED</b>			<b>50</b>	TE		STMILE <b>1/R2.4</b>		EA	1E2901	
		ourr	Phone: (530)	887-1494		;		Valle	ey F	ark	way	Inte	rchan	ge		n.=		Louiss	
con	SU	lting	Fax: (530) 88	7-1495		B	RIDGE	NUI	NRFH	۲	R(	CP CP	ED BY			DAT	E	SHEET 1 of	

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

LOGGE RCP		Y	BEGIN DATE <b>8-23-10</b>	COMPLETION DATE 8-23-10	BOREHOL	E LOCA	TION	(Lat/l	ong	or No	orth/E	East a	nd Datu	ım)		HOLE	⊡ 10-14	13	
	NG C		RACTOR		BOREHOL	E LOCA	TION	(Offs	et, St	tation	, Line	e)				SURF		EVATION	
DRILLI	NG N	/ETHC	)D		DRILL RIG											BORE	HOLE	DIAMETER	1
SAMPI			uger S) AND SIZE(S) (ID)		D120 SPT HAMN	MER TYP	DF.									6 in		FICIENCY,	FRi
split	spo	on			Automa	tic										80%	6		
			FILL AND COMPLETIO  h native cuttings	DN	GROUNDV READINGS		not e					TER	DRILLIN	IG ([	DATE)	<b>5.0</b>		TH OF BOF	RING
ELEVATION (ft)	р Образин (ft)	Material	5	DESCRIPTION		Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depin		Rema	arks	
			SILTY GRAVEL (GM	l); loose; brown; dry.															
		4	METAMORPHIC RO	CK, Metavolcanic, fine-gra	 ained to	S01 D03	50/4"	REF	100 100										
	1		🖊 medium-arained. ma:	ssive, dusky yellowish bro soft, intensely fractured.	wn, very														H
			7 -																
660.50	2		- 9			S02	50/1"	REF	0										H
	ŀ																		
	3																		
658.50	4																		
		157																	F
	5																		
			Bottom of borehole at	t 5.0 ft bgs															
050 50			Terminated at 5.0 ft.  This Boring Record v	was developed in accordar	nce with														
656.50	6		the Caltrans Soil & R Presentation Manual	was developed in accordar lock Logging, Classificatio (June 2007) except as no	n, and ted on the														E
			Soil or Rock Legend	or below.															
	7	=																	H
654.50	8																		
	9																		H
																			H
652.50	10																		
332.00																			
																			H
	11																		Ħ
	-12																		
			Blackburn Co	nsulting			EPOR BORI			ORI							H	OLE ID <b>A-10-1</b>	43
	$\geq$		11521 Blocke	er Drive, Suite 110		D	IST. <b>03</b>	С	COUN			ROU <b>50</b>	TE		STMIL 1/R2.		E		
bla	ckl	bur	Auburn, CA 9 Phone: (530)			Р	ROJE	ст о	R BF			ME	rchan		, . \	-			-
con			1 110110. (000)				RIDGE					PARI	ED BY	3 <u>c</u>		1	DATE	SHEE 1 o	
			, ,								116	<i>)</i> 1						1 0	. 1

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

LOGGI RCP		1	BEGIN DATE <b>8-23-10</b>	COMPLETION DATE 8-23-10	BOREHO	LE LOCA	TION	(Lat/l	Long	or No	orth/	East a	ınd Datı	ım)		HOLE ID			
		ONTR	8-23-10 ACTOR	8-23-10	BOREHO	LELOCA	TION	(Offs	et S	tation	ı Lin	ıe)				A-10	<b>)-144</b> E ELEV <i>A</i>	TION	
Tabe			7.07.01		BOILLIO			(0110	οι, σ	ionor	.,	.0)				~636.0	) ft		
DRILLI					DRILL RIC	3											OLE DIAN	IETER	
Solic			iger i) AND SIZE(S) (ID)		D120 SPT HAM	IMER TVI	DE									6 in	2 EEEICII	ENCY, ER	)i
split			) AND SIZE(S) (ID)		Autom		_									80%	V EI I IOII	LINOT, LIV	vi
			FILL AND COMPLETIC	N	GROUND READING	WATER						TER	DRILLIN	1G (E	ATE)		DEPTH O	F BORING	G
	Tille	a Witr	n native cuttings		TAE ID IT C		not e	encc	unt	ered				П		6.5 ft			
ELEVATION (ft)	DEPTH (ft)	Material Graphics		DESCRIPTION		Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depui	F	Remarks		
			SILTY SAND with GF dry.	RAVEL (SM); medium de	nse; brown;														
	þ		:			₩D02			100										
	1	<b>-</b>	:			₩ S01	19	27	100					1					
	L		]				15												
634.00	2	$\exists    $																	Н
034.00		7	]				12				5	127							
	F	7												1					
	3	-	]																H
	F	7	]																
	F		:																
632.00	4	<b>-</b>	}																
	þ		1											1					
	5 -		1																Н
	þ	]	1			S03	7	28	100										
	þ		1				11												
630.00	6	<b>-</b>	!				17				13	128							Н
	E		Bottom of borehole at	t G E ft bas															$- \exists$
	7	}	Terminated at 6.5 ft.	1 6.5 It bgs															
	,  F	}		vas develoned in accordo	ance with														H
	F	$\exists$	the Caltrans Soil & R Presentation Manual	vas developed in accorda ock Logging, Classificati (June 2007) except as n	on, and oted on the														H
628.00	8	-	Soil or Rock Legend	or below.															$\Box$
	F	-																	H
	<u> </u>	7																	H
	9 -	7																	H
	F	7																	H
626.00	10	7																	H
5   1	ļ	1																	H
		1																	H
	11	1																	Ħ
5		1																	H
	12	_																	
<u> </u>																	Luci	<u></u>	
			Blackburn Co	nsulting			EPOR BORI	NG	REC		D						HOLE A-1	<sup>™</sup>   <b>0-144</b>	. <u> </u>
4	2		11521 Blocke	er Drive, Suite 110			IST. <b>03</b>		ED	NTY		ROU <b>50</b>	ITE		STMIL <b>1/R2.</b>		EA	E2901	

Auburn, CA 95603 Phone: (530) 887-1494 Fax: (530) 887-1495

BORING	GRECORD			A-10-144
DIST. <b>03</b>	COUNTY <b>ED</b>	ROUTE <b>50</b>	POSTMILE <b>1.1/R2.4</b>	EA <b>03-1E2901</b>
PRO IFCT	OR BRIDGE NA	ΔME		

Silva Valley Parkway Interchange
BRIDGE NUMBER PREPARED BY
RCP SHEET 1 of 1 DATE

LOGGE RCP		Y	BEGIN DATE 8-24-10	COMPLETION DATE 8-24-10	BOREHO	LE LOCA	ATION	(Lat/	Long	or N	orth/	East a	and Datu	ım)		HOLE I	□ <b>0-14</b> {	5	
DRILLII	NG C		ACTOR	0 <u>2</u> T-10	BOREHO	LE LOCA	ATION	(Offs	et, S	tatior	n, Lir	ie)				SURFA	CE ELE	VATION	
Tabe DRILLII			n		DRILL RIG											~626		AMETER	
Solid					<b>DRILL RIG</b>	<b>,</b>										6 in	IULE DI	AIVIE I EK	
	ER T	YPE(S	B) AND SIZE(S) (ID)		SPT HAM  Automa		PE									HAMME <b>80%</b>	R EFFI	CIENCY, E	Ri
			FILL AND COMPLE	ΓΙΟΝ	GROUND	WATER	DUR	NG [	DRILL	ING	AF	TER	DRILLIN	IG (I	DATE)	TOTAL		OF BORII	\G
	fille	d with	n native cuttings		READING		not (	enco	ount	_	_					6.5 ft			
Œ L						Sample Location Sample Number	Ë.	od	(%)			Dry Unit Weight (pcf)	ıgth	ро	ے				
ATIO	Œ	- SS		DESCRIPTION		P Loc	per 6	per f	ery (	(%	t (%)	it W	Strer	Meth	Dept		Remar	ks	
ELEVATION	DEPTH (ft)	Material Graphics	-			Sample	Blows per 6 in.	Blows per foot	Recovery (	) QC	oistur	of) L	Shear Strength (tsf)	Drilling Method	asıng				
Ш	<u>-</u>	žõ V		. (GC); medium dense; light	vellowish	ഗ് ഗ് ⊗ D01	ă	ā	출 100	ĸ	žŏ	<u>ة</u> ق	St)	۵	<u>3</u>				$\dashv$
		29 29	brown; dry.	. ( • • ),• a.a a.a a.a	, 6 6 11														E
	1	72	8																
	Ϊ.	750				S01	14	37	100										F
	F					**	16				7	133							F
624.00	2						21												F
	F	-00 0 5 -00 2 5																	F
		123																	þ
	3																		F
		- 7° X - 7° X																	
622.00	4		<b>3</b>			- 📓 📗													
	E		CLAYEY GRAVEL brown; dry to mois	with SAND (GC); medium out.	lense;														E
	Ŀ																		E
	5 -					<b></b> S02	5	18	100										+
	-					M	9												
000 00	_ [					N													F
620.00	6		2			Ν	9				9	121							F
	F	799	Bottom of borehole	e at 6.5 ft bgs										Ш					$\dashv$
	7	7	Terminated at 6.5	ft.															
	F		This Boring Recor	d was developed in accordan	nce with														F
	_		Presentation Manu Soil or Rock Legel	k Rock Logging, Classificatio ual (June 2007) except as no ad or below	ted on the														F
618.00	8	7	Con or Nock Leger	id of below.															Ī
	İ																		þ
	9	╡																	ļ
																			þ
																			þ
616.00	10																		
																			F
	11																		E
																			E
	12																		
			Dia aldrica d	Conquitin -			REPOR				_						HŌI	LE ID	
4			Blackburn (	Consulting ker Drive, Suite 110			BORI		REC		D	ROL	JTE:	PC	STMIL	.E	A EA	-10-14	<u>5</u>
			Auburn CA				03		ED		- F - F	50			.1/R2			-1E2901	
bla			Phone: (53)	0) 887-1494				Vall	ey F	Park	way	/ Inte	erchan	ge					
con	SU	lting	Fax: (530) 8	•		В	RIDGI	E NU	MBE	R	PRI <b>R</b>	EPAR <b>CP</b>	ED BY			DA	ATE	SHEET 1 of	
			` '								13	<u> </u>						1 01	<u> </u>

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12 consulting

LOGGI		3Y			GIN DA		COMPI <b>8-24</b> -	LETION DATE	E BOF	REHOLI	ELOC	ATION	(Lat/	Long	or N	orth/	East a	nd Dati	um)		HOLE		10		
DRILLI		100	NTRA		3-24-10		0-24-	-10	BOF	REHOLI	E LOC	ATION	(Offs	et, S	tatior	n, Lin	e)					<b>0-14</b> ACE EL	<b>FO</b> .EVATIC	N	
Tabe													`								~622	2.0 ft			
DRILLI <b>Solic</b>									DRII <b>D1</b>	L RIG											BORE 6 in	HOLE I	DIAMET	ER	
SAMPL	ER	TYF	PE(S)		ZE(S) (II	D)			SPT	HAMN		Έ									HAMM		FICIENC	Y, ERi	
split				III ANI	O COMPI	I ETIO	NI			tomat		DIID	INIC I	ו ווםר	INIC	٨٥	TEDI	DRILLIN	JC (F	)ATE	80%		H OF B	OBING	
					cutting		IN		REA	DINGS	VAIER		enco				TEK	DRILLII	NG (L	JATE)	5.0 f		пОГБ	ORING	
ELEVATION (ft)	DEPTH (ft)		Material Graphics			[	DESCRIF	PTION			Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	D (%)	sture itent (%)	Dry Unit Weight (pcf)	ear Strength )	Drilling Method	sing Depth		Rema	arks		
ᆸ	- - - -			OL AVE	V OD AV	/FL /C	10\ di.	d					B		S.	δΩ	9 5	Shear (tsf)	ا ا	Š					Щ
620.00	1			CLAYE	ey grav	ÆL (G	C); mediu	um dense; bro	own; dry		D02			100											
	3										S01	4	33	100					1						$\forall$
											*	16													H
618.00	4											17													$\exists$
																			$\  \ $						H
	5	H	%5	Bottom	of bore	nole at	5.0 ft bgs	<u> </u>			▩														$\exists$
					ated at 5		3																		
616.00	6	_		This Bothe Cal	oring Re Itrans So Itation M	cord woil & Roanual	vas develo ock Loggi (June 200 or below.	oped in according, Classifica 07) except as	dance w ition, and noted or	ith d n the															
	7	_		SON OF	TOOK LE	gena	or below.																		
																									H
614.00	8																								$\mathbb{H}$
		H																							H
	9	H																							H
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612.00	10																								
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	11	H																							H
																									$\mathbb{H}$
	-12-	Ц																							뮈
				RI-	ackbur	n Co	nsulting					REPOR			, OP	<u> </u>						H	OLE ID	140	$\dashv$
•								Suite 110			-	BOR DIST.		NOC		ט	ROU	TE	PC	STMIL	Ę	E/	A-10-		$\dashv$
	1	ď			ıburn, (						-	03 PROJE		ED DR BE	SIDG	E NA	50		1	.1/R2	.4	(	)3-1E2	901	

PROJECT OR BRIDGE NAME
Silva Valley Parkway Interchange
BRIDGE NUMBER PREPARED BY
RCP

SHEET 1 of 1

DATE

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12 blackburn consulting

Phone: (530) 887-1494

LOGGE RCP	D BY		BEGIN DATE 9-13-10	COMPLETION DATE 9-13-10	BOREHOI	E L	OCA	TION	(Lat/l	Long	or N	orth/	East a	ınd Datı	ım)		HOLE T-1	D 0-14	7	
DRILLIN			CTOR		BOREHOI	E L	OCA	TION	(Offs	et, S	tatio	n, Lir	ne)					ACE ELE	EVATION	
DRILLIN Back	IG ME				DRILL RIG														IAMETER	
		YPE(S)	AND SIZE(S) (ID)		SPT HAM		TYF	PE									HAMM	ER EFF	ICIENCY,	ERi
BOREH			FILL AND COMPLETIO	N	GROUND READING	WA1	ΓER			PRILL	ING				1G (E	ATE			H OF BOR	ING
Eack	rilled	with	native cuttings		TAE/ABIIVO	1_1	<u>.</u>	9.0 f				_	0 ft o			Τ	10.0	π		
ELEVATION (f	оертн (ft)	Material Graphics	!	DESCRIPTION		Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depui		Rema	rks	
	0		CLAYEY GRAVEL wiyellowish brown; dry.	ith SAND (GC); medium o	lense;															
	1 -																			
		69																		
68.50	2	22																		
		800																		
	3		CLAYEY GRAVEL (G	GC); stiff; brown; moist to v	vet.		D01			100						PI				
														PP = 2.0						
6.50	4													2.0						
		200																		
	5																			
	J E																			
34.50	6	8 % A																		
		1887 1887																		
	7				-,,	. 🗸														
			medium-grained, mas	CK, Metavolcanic, fine-grassive, dusky yellowish gre	en,															
			fractured, (Lean Clay	oft, very intensely to intensions with Gravel).	sery															
52.50	8																			
	9 🔽																			
						.														
60.50	10		medium-grained, mas	CK, Metavolcanic, fine-grassive, grayish green, inter d, moderately soft to mode	nselv to															
50.50	" F		hard, intensely fractu	red.	eratery	Γ														
			Bottom of borehole at Essential refusal at 1																	
	11	-	This Boring Record v	vas developed in accorda	nce with															
			the Caltrans Soil & R Presentation Manual	ock Logging, Classificatio (June 2007) except as no	n, and ted on the															
	12		Soil or Rock Legend	or below.																
			_				₽	EPOR	T TIT	ΠF								НО	LE ID	
			Blackburn Co	<del>-</del>				BORI	NG I	REC		D	DO:	TE	- D-	OT		T	<u>-10-14</u>	<b>47</b>
*		~	Δuhurn CΔ Q	r Drive, Suite 110				IST. <b>03</b>		ED ED			50	IIE.		STM <b>1/R</b> 2		EA 0:	3-1E290 <sup>-</sup>	1
olac		ourn	Phone: (530)					ROJE <b>Silva</b>						rchan	ge					
		ting	- (/														D			

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

LOGGE RCP	D B	Y	BEGIN DATE <b>9-13-10</b>	COMPLETION DATE 9-13-10	BOREHO	LE LOC	OITAC	N (Lat/	Long	or No	orth/E	ast a	nd Datu	ım)		HOLE <b>T</b> -	<sup>≣ ID</sup> 10-1	48		
		CONTR.	ACTOR Iction		BOREHO	LE LOC	OITAC	N (Offs	et, S	tation	n, Line	e)				SUR		LEVAT	ION	
DRILLIN	NG N	/IETHOI			DRILL RIC													DIAME	TER	
Back SAMPL Bulk			S) AND SIZE(S) (ID)		SPT HAM		YPE									HAMI	MER E	FICIEN	ICY, ERi	
			FILL AND COMPLETING native cuttings	ON	GROUND READING	WATE		RING I				TER [	ORILLIN	IG (C	ATE)	TOT/ <b>5.3</b>		TH OF	BORING	}
ELEVATION (ft)	DEPTH (ft)	Material Graphics		DESCRIPTION		Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depui		Ren	narks		
811.00	1		METAMORPHIC R medium-grained, m intensely weathered	with GRAVEL (CL); stiff; re  OCK, Metavolcanic, fine-gr assive, dusky yellowish bro l, soft to moderately soft, in	 ained to own. verv		1		100											
	3		fractured, (Clayey G	oravel).	,	DO	1		100											
809.00	5		Bottom of borehole	at 5.3 ft bgs						_										
807.00	7		Essential refusal at This Boring Record the Caltrans Soil & Presentation Manua Soil or Rock Legend	was developed in accorda Rock Logging, Classificatio al (June 2007) except as no	nce with n, and ted on the															
805.00	8	_																		
803.00	9																			
	11																			
	12		District.	an author c			REPO											HOLE ID	)	
blad	> 	OUE	Auburn, CA	er Drive, Suite 110 95603		-	DIST. 03 PROJ	ECT C	COUN ED OR BE	NTY	E NAI			1.	STMIL <b>1/R2</b> .		E	<b>T-10</b> A 03-1E	<u>-148</u>	
con			1 110110. (000	•		_		a Val	ley F	Park	way	Inte PARE	rchan ED BY	ge			DATE		HEET <b>1 of 1</b>	

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

LOGGE	D BY	<b>′</b>	BEGIN DATE	COMPLETION DATE	BOREHOL	E LOC	ATION	(Lat/l	Long	or No	orth/E	ast ar	nd Datu	ım)		HOLE ID	40	
RCP	NG C	ONTR	<b>9-13-10</b> ACTOR	9-13-10	BOREHOL	FLOC	ΔΤΙΩΝ	(∩ffe	ot S	tation	lino					T-10-1	ELEVATION	
			uction		BOILLIOL	L LOC	ATION	(Olis	et, S	lalion	i, Lilic	•)				~818.2 ft		
DRILLII			D		DRILL RIG											BOREHOLE	DIAMETER	
Back			S) AND SIZE(S) (ID)		SPT HAMI		'n									LIANANEDE	FFICIENCY, E	D:
Bulk	EKI	TPE(S	S) AND SIZE(S) (ID)		SP I HAIVII	VIERII	PE									HAIVIIVIER E	FFICIENCY, E	KI
			FILL AND COMPLETIO	N	GROUND\ READINGS							ER D	RILLIN	IG (D/	ATE)		PTH OF BORIN	1G
	fille	d witl	h native cuttings		READINGS		not	enco	ount	_						8.0 ft		
TION (ft)	(#)	, s		DESCRIPTION		Sample Location Sample Number	er 6 in.	er foot	ry (%)	(9	Moisture Content (%)	weigni	Shear Strength (tsf)	Aethod Depth		Rer	marks	
ELEVATION	рертн	Material Graphics				Sample Sample	Blows per 6 in.	Blows per foot	Recovery	RQD (%	Moisture Content	(pcf)	Shear S (tsf)	Drilling Method Casing Depth		. 10.		
	-0 <u>-</u>			n GRAVEL (CH); stiff; red	ldish													
	ŀ																	Н
	1																	H
			Fat CLAY (CH); very	stiff; olive brown; moist.		1									PI			
816.20	2																	Н
						D01			100									Н
																		Н
	3																	Н
	L																	Н
814.20	4																	Н
014.20	7 -																	$\Box$
	F		METAMORPHIC RO	CK, Metavolcanic, fine-g	 rained to	1												H
	5		medium-grained, maintensely weathered,	ssive, dusky yellowish br soft to moderately soft, ir	own, very itensely													H
	F		fractured, (Clayey Gr	avei).														H
		15	}															H
812.20	6																	Ħ
	F		3															H
	7		3															H
																		H
																		H
810.20	8	- (- , · <u>-</u>	Bottom of borehole at	8.0 ft bgs														$\dashv$
	þ		Terminated at 8 ft.															日
	9		This Boring Record v	vas developed in accorda	ance with													日
	F		Presentation Manual Soil or Rock Legend	ock Logging, Classification (June 2007) except as no or below	oted on the													日
	F		Jan S. Frank Logoria															日
808.20	10																	$\exists$
																		Н
	,, [																	
	11																	$\exists$
	F																	H
	12																	
						[	REPOR	דן דו־	TIF							Т	HOLE ID	
			Blackburn Co	=			BOR	NG	REC								T-10-149	9
~				r Drive, Suite 110			DIST. <b>03</b>		ED	YTV		ROUT <b>50</b>	ΙE		TMIL <b>I/R2.</b> -		EA <b>03-1E2901</b>	
1.1			Auburn, CA 9	2003		1	PROJE	CTC	R RE	SIDGI	FΝΔΝ	ΛE						

Auburn, CA 95603 Phone: (530) 887-1494 Fax: (530) 887-1495

BORING	G RECORD			T-10-149
DIST.	COUNTY	ROUTE	POSTMILE	EA
00			4.4/00.4	00 450004
03	ED	50	1.1/R2.4	03-1E2901

Silva Valley Parkway Interchange

BRIDGE NUMBER PREPARED BY RCP SHEET 1 of 1 DATE

LOGGE RCP		ЗΥ			EGIN D <b>9-13-1</b>			OMPLE 9-13-1	TION E	DATE	BOREHO	LE I	LOC	ATION	l (Lat/	Long	or N	lorth/	East a	and Dat	um)		HOLE T-		150		
DRILLII <b>Burk</b>											BOREHO	LE	LOC	ATION	l (Offs	set, S	Statio	n, Lir	ne)				SURI		ELE\	'ATION	
DRILLI											DRILL RI	G														METE	₹
Back		-	DE (0)	4115.0	IZE(0)	(15)					CAT 4			<b></b>												IEN ION	
SAMPL	.ER	ΙΥI	PE(S)	AND S	IZE(S)	(ID)					SPT HAN	1ME	RIY	PE									HAM	MER	EFFIC	IENCY	, ERI
BOREH Back				ILL AN			ION				GROUNI READING	)WA SS	TER		ING I				TER	DRILLI	NG (I	DATE)	TOT/ <b>5.0</b>		PTH	OF BO	RING
ELEVATION (ft)	POEPTH (#)	בן ווו (ווי)	Material Graphics					CRIPT				Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Re	emark	S	
				SAND brown	Y lean ; dry.	CLAY	with G	RAVE	L (CL);	stiff; re	ddish																
	1							<del>.</del>	<del>.</del> – .–		-,,	_															
791.00	2			mediu intense fractur	m-grair ely wea ed, (Sil	ned, mathered ty Gra	nassive d, soft t avel).	vietavo , dusk o mod	y yellow erately s	ine-graish bro soft, inf	ained to wn, very ensely																
	3																										
789.00	4																										
	5	H	<i>[-</i> , -]	Botton	n of bor	ehole	at 5.0 f	ft bgs																			
				Essen	tial refu	ısal at	5.0 ft.																				
787.00	6	_		This B the Ca Preser Soil or	oring R Iltrans S ntation Rock I	Record Soil & Manua Legen	l was d Rock L al (Jund d or be	evelop .ogging e 2007 low.	ed in ac g, Class ') excep	ccordai sificatio t as no	nce with n, and ted on the																
	7	_																									
785.00	8	Ħ																									F
		H																									F
	9																										
		Н																									
783.00	10																										F
	44	H																									F
	11																										Ē
		Н																									E
	-12																										
				ВІ	ackbu	ırn C	onsul	tina					F	REPO <b>BOR</b>	RT TI	TLE <b>RE</b>		חא							HOL	<sup>≣ ID</sup> 10-1	50
									uito 1	10			-	TSIC		COLL			ROI	ITF	PC	STMI	F		<u>Ι</u> .	1 U - I	JU

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POSTMILE **1.1/R2.4** DIST. **03** COUNTY **ED** ROUTE **50** EA 03-1E2901

PROJECT OR BRIDGE NAME
Silva Valley Parkway Interchange
BRIDGE NUMBER PREPARED BY
RCP SHEET 1 of 1 DATE

LOGGE RCP			9-1	IN DATE	≣ (	COMPL 9-13-	ETION D <b>10</b>	ATE	BOREH									nd Dati	um)		HOLE ID	-151		
DRILLIN <b>Burk</b> e									BOREH	IOLE	LOC	ATION	(Offs	et, S	tation	n, Lin	ie)				SURFAC ~ <b>742.</b> (		/ATION	
DRILLIN									DRILL I	RIG													METER	
Back SAMPL		YPE(S)	) AND SIZE	E(S) (ID)					CAT SPT HA			PE									HAMME	R EFFIC	CIENCY, E	- - Ri
Bulk																								
			FILL AND ( native o						GROU! READ!!		ATER	DUR not					TER	DRILLI	NG (E	DATE)	TOTAL I 4.5 ft	DEPTH	OF BORI	NG
ELEVATION (ft)	Роертн (ft)	Material Graphics			DE	SCRIP	TION			o it ood	Sample Location	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	F	Remark	s	
740.00	1 2		SANDY I brown; d	ry. 																				
738.00	4		METAM0 medium- intensely fractured	grained, weather , (Silty G	massiv red, sof Gravel).	ve, dusk t to mod	cv vellowi	ish bro	wn. verv	,	D01			100					-					
736.00	6		This Bori the Caltra Presenta Soil or Ro	ng Reco ans Soil tion Mar	ord was & Rock	develo Loggir	ped in ac ig, Class 7) except	ccordan ificatior t as not	nce with n, and ted on th	ie														
'34.00	8 -																							
32.00		-																						
	11																							
			Blac	kburn	Cons	ultina						REPOR			;Op	D						HOL T	E ID 10-15	1
		$\supset$	115	21 Blo	cker E	Orive, S	Suite 11	10			Ī	DIST. 03		COUN ED		<u>.</u>	ROU <b>50</b>	TE	PO 1	STMILE .1/R2.4	 [	EA	·1U-15 ·1E2901	
- blad	-kh	Hirr	•	urn, C							F	PROJE	ст с	R BF			ME			. I/RZ.4	•	03	· 1⊏2901	
				ne: (53			4					Silva BRIDGI				way	/ Inte	rchan ED BY	ge		DA	ΓF	SHEET	•
con	SU	IIIIQ	Fax	(530)	887-1	1495						טטוי יי	40	اعاصات	``		CP			_	DA		1 of	1

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

LOGGE RCP	ED B	Y	BEGIN DATE <b>9-13-10</b>	COMPLETION DATE 9-13-10	BOREHO	LE LC	CAT	ΓΙΟΝ (	Lat/L	ong	or No	orth/l	East a	ind Datu	ım)		HOLE T-1	D-15	2	
		ONTRA Onstru	ACTOR Iction		BOREHO	LE LC	CAT	ΓΙΟΝ (	Offse	et, St	ation	n, Lin	e)				SURF		VATION	
DRILLIN			D		DRILL RIC												BORE	HOLE D	IAMETER	
Back SAMPL Bulk			) AND SIZE(S) (ID)		SPT HAM		TYP	E									HAMM	ER EFF	ICIENCY,	ERi
			FILL AND COMPLET  native cuttings	ION	GROUND READING	WATI S		DURII not e					TER	DRILLIN	IG ([	DATE)	TOTA <b>5.3 f</b>		H OF BOF	RING
ELEVATION (ft)	DEPTH (ft)	Material Graphics		DESCRIPTION		Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Rema	·ks	
730.00	1 -		CLAYEY SAND wit reddish brown; dry.	h GRAVEL (SC); medium d		D	001			100				PP = 2.25	-					
728.00	3 •		METAMORPHIC R medium-grained, rr intensely weathered fractured.	COCK, Metavolcanic, fine-grassive, dusky yellowish brod, soft to moderately soft, int	ained to own, very tensely										-					
726.00	5		Bottom of borehole Essential refusal at	5.3 ft.																
	7	-	This Boring Record the Caltrans Soil & Presentation Manu- Soil or Rock Legen	d was developed in accordar Rock Logging, Classificatio al (June 2007) except as no d or below.	nce with in, and ited on the															
724.00	8																			-
722.00	9																			
	11																			
•	2	•	Auburn CA	ker Drive, Suite 110			DIS O	EPOR B <b>ORII</b> ST.	NG I	REC OUN ED	ITY		ROU <b>50</b>	TE		STMII .1/R2		EA	LE ID -10-1: 3-1E290	
bla con			Phone: (530	) 887-1494			S	ROJE( Bilva ' RIDGE	Valle	ey F	ark	way PRE	/ Inte	e <b>rchan</b> ED BY	ge		D	ATE	SHEE 1 o	

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

LOGGE	D B	Y	BEGIN DATE <b>9-13-10</b>	COMPLETION DATE 9-13-10	BOREHOLE L	OC/	ATION	(Lat/l	ong	or N	orth/	East a	nd Datu	ım)		HOLE ID <b>T-10-153</b>	
			ACTOR uction		BOREHOLE L	OCA	ATION	(Offs	et, S	tatio	n, Lin	ie)				SURFACE ELEVATION ~669.0 ft	
DRILLII			D		DRILL RIG											BOREHOLE DIAMETER	2
			S) AND SIZE(S) (ID)		SPT HAMMER	RTY	PE									HAMMER EFFICIENCY,	ERi
BORE			FILL AND COMPLETION Native cuttings	DN	GROUNDWA' READINGS	TER	DURI 8.5 f		RILL	ING		TER I		IG (D	ATE)	TOTAL DEPTH OF BOR	RING
ELEVATION (ft)	DEРТН (ft)	Material Graphics		DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)		Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method		Remarks	
667.00	1 2		CLAYEY GRAVEL (C brown; dry.	GC); medium dense; yellor	wish	D01		ш	100				PP = 2.0		PI		
665.00 663.00	5 6		🖯 medium-grained. ma	DCK, Metavolcanic, fine-gr issive, grayish green, very ery hard, intensely to mod ravel).	intenselv ₩												
661.00	8		🛾 medium-grained, ma	DCK, Metavolcanic, fine-gr ssive, grayish green, mod ard to very hard, intensely	lerately to												
	9		Bottom of borehole a Essential refusal at 9	•											1		
659.00	10		This Boring Record value Caltrans Soil & Resentation Manual Soil or Rock Legend	was developed in accordar lock Logging, Classificatio (June 2007) except as no or below.	nce with on, and ted on the												
	11																
	•12 <del>-</del>		_			TE	REPOR	T TIT	TI E							HOLE ID	
•			Blackburn Co	onsulting er Drive, Suite 110			BORI DIST.	NG			D	ROU <b>50</b>	TE		STMIL	<b>T-10-1</b> E EA	

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1.1/R2.4 03-1E2901 03 ED 50

PROJECT OR BRIDGE NAME
Silva Valley Parkway Interchange
BRIDGE NUMBER PREPARED BY
RCP SHEET 1 of 1 DATE

LOGGE RCP	DΒ	3Y			GIN E		(	COMP <b>9-14</b>		DATE	BOREH	OLE LOC	ATION	(Lat/l	Long	or No	orth/	East a	ind Datu	ım)			)LE ID		4		
DRILLIN <b>Tabe</b>				CTOR							BOREH	OLE LOC	ATION	(Offs	et, S	tation	n, Lir	ne)				SL		E ELI	EVATIO	NC	
DRILLIN Solid											DRILL R												REHO in	DLE D	IAMET	ER	
SAMPL <b>split</b>	ER 1	TYF	PE(S)		ZE(S)	(ID)						MMER TY	/PE									H/		R EFF	ICIEN	CY, ERi	
BOREH Back				ILL AND			ION				GROUN READIN	DWATEF GS	not o					TER	DRILLIN	1G (	DAT		TAL I	DEPT	H OF E	BORING	;
ELEVATION (ft)	Роертн (#)	- 1	Material Graphics						PTION			Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		F	Rema	rks		
			000000	SILTY	GRAV	EL (G	SM); Ic	ose; r	eddish	brown; d	ry.	X S01	50/4"	REF													
	1			Bottom Essenti									•														_
877.00	2			This Bo the Cal Presen Soil or	oring F trans t tation Rock	Record Soil & Manu Legen	d was Rock Ial (Ju Ind or b	develo Loggi ne 200 pelow.	oped in ing, Cla 07) exc	accorda ssificatio ept as no	nce with on, and oted on the	)															
	3	_																									
875.00	4	_																									
	5	_																									
873.00	6																										
	7																										
871.00	8																										
	9																										
869.00	10																										
	11																										
	-12-																										
				Bla	ackbı	urn C	Cons	ulting					REPOR BORI	T TI	TLE <b>REC</b>	OR	<u> </u>							HC	DLE ID	-154	

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A-10-154 EA 03-1E2901 POSTMILE **1.1/R2.4** DIST. **03** COUNTY **ED** ROUTE **50** PROJECT OR BRIDGE NAME

Silva Valley Parkway Interchange
BRIDGE NUMBER PREPARED BY
RCP BRIDGE NUMBER

SHEET 1 of 1 DATE

LOGGI		′	BEGIN DATE	COMPLETION DATE	BOREHO	LE LOCA	NOITA	(Lat/l	Long	or No	orth/E	East a	nd Datu	ım)		HOLE ID	455		1
RCP		ONTR	<b>9-14-10</b> ACTOR	9-14-10	BOREHO	LELOCA	TION	(Offs	et St	tation	Lin	e)				R-10	-155 E ELEVAT	ION	$\dashv$
Tabe			101011		BOTTETTO			(0110	O., O	lation	.,	0,				~841.0			
DRILLI					DRILL RIC												LE DIAME	TER	
		/ire-Li	) AND SIZE(S) (ID)		CME 5		PF								-	3 in	EFFICIEN	ICY FRI	4
NX C	ore				Autom	atic										80%			
			FILL AND COMPLETIC  native cuttings	N	GROUND READING	WATER S	DUR!					TER	ORILLIN	IG (D	ATE)	TOTAL D <b>7.5 ft</b>	EPTH OF	BORING	
						r s						ŧ							7
ELEVATION (ft)	(#)	S		DESCRIPTION		Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	(9)	(%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method		R	emarks		
LEVA	EPTH (ft)	Material Graphics				ample ample	lows p	lows p	ecove	QD (%	Moisture Content (%)	ry Uni	hear S sf)	rilling [			011101110		
Ш	<u>-</u> -	20  20 	SILTY GRAVEL (GM	); medium dense; reddis	h brown;	ιχ ιχ	՝	<u> </u>	Ř	æ :	≥ŏ	≙ੁ	<u> </u>	ت م	i				4
	þ		dry.			S01	27	60	100					-					Ⅎ
	1 -					M	19												_
	þ					N													_
						И	41												_
839.00	2 -	-d. [																	_
	E		METAMORPHIC RO	CK, Metavolcanic, fine-g ssive, grayish green, mo	rained to	Run			66	12									_
	2		weathered, hard to ve	ery hard, intensely fractu	red.	1			00	12									_
	3 -					***													7
						***													=
837.00	4																		4
	þ					***													_
		15				***													
	5 -					***												•	1
	þ																		
835.00	6																		
000.00	Ĺ																		$\exists$
	F																		-
	7	- (-) - (-)																	-
	F											167							-
000.00	, F		Bottom of borehole at	7.5 ft bgs															_
833.00	8 -	-	Terminated at 7 ft.	upo dovoloped in second	anaa u ###													1	7
	F	-	the Caltrans Soil & R	vas developed in accord ock Logging, Classificati (June 2007) except as r	on. and														7
	9	1	Soil or Rock Legend	or below.	oted on the														1
	ļ	1																	1
<u>.</u>																			1
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	_ <sub>12</sub>																		1
			_				EPOR	דן דו	ΠF								HOLE ID	)	4
			Blackburn Co	<del>-</del>			BORI	NG	REC		D ,	Darr		l BC	T		R-10	)-1 <u>55</u>	4
<b>**</b>	2		11521 Blocke	r Drive, Suite 110			IST. <b>03</b>		ED	NΙΥ		ROU <b>50</b>	ΙĖ		1/ <b>R2.</b> 4		EA   <b>03-1E</b>	2901	

Auburn, CA 95603 Phone: (530) 887-1494 Fax: (530) 887-1495

DIST. COUINT.

03 ED DU

PROJECT OR BRIDGE NAME

Silva Valley Parkway Interchange

BRIDGE NUMBER PREPARED BY

RCP 1.1/R2.4 03-1E2901

SHEET 1 of 1 DATE

LOGGI RCP		Y		BEGIN DATE <b>9-14-10</b>	COMPLETION DATE 9-14-10	BOREHOL	E LOC/	ATION	(Lat/l	Long	or N	orth/	East a	nd Datu	ım)		HOLE ID <b>A-10</b> -	156		
DRILLII <b>Tabe</b>				CTOR		BOREHOL	E LOC	ATION	(Offs	et, S	tatior	n, Lin	ie)			5	SURFACE ~809.0	ELEV	ATION	
DRILLI	NG M	1ETI	HOD	or		DRILL RIG										E	BOREHO 6 in		METER	
SAMPL	ER T	YPI		AND SIZE(S) (ID)		SPT HAMM		'PΕ								ŀ	HAMMER	EFFIC	ENCY, EI	Ri
	HOLE	ВА		LL AND COMPLETIO	DN	GROUNDV	VATER						TER	ORILLIN	IG (D	ATE)		EPTH (	OF BORIN	IG
	fille	d w	/ith r	native cuttings		READINGS		not e	nco	ount	_	_	<b>.</b>				10.1 ft			$\overline{}$
ELEVATION (ft)	Эрертн (#)		Graphics		DESCRIPTION		Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	D.	R	emarks	;	
		000		SILTY GRAVEL (GM	l); loose; reddish brown; d	ry.														-
	1						S01		58/8											
		_0,					D01	8 50/2"		100										F
807.00	2	- 0 - 0 - 0		- – – – – – -																
	-	1	ו א/ע	medium-grained, mas	PCK, Metavolcanic, fine-gr ssive, dusky yellowish bro soft, intensely fractured, (	own.														F
	3			Silt).	,,,	<del>-</del> <i>- - -</i>														
		-/: - :;																		
805.00	4																			
000.00		1																		F
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	٦						S02	50/2"	REF	100,										E
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801.00	8																			E
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	9	<b>-</b> //:																		
		1																		F
799.00	10	_	///-	Bottom of borehole at	t 10.1 ft bgs		S03	50/1"	REF	100										+
				Terminated at 10.1 ft																E
	11	=	1	the Caltrans Soil & R	vas developed in accorda lock Logging, Classificatio (June 2007) except as no	on, and														F
	Ė		,	Soil or Rock Legend	or below.															E
	-12 <sup>_</sup>	_																		
				Blackburn Co	nsulting			REPOR <b>BORI</b>			OR	D						HOLE	10-15	 6
4	2	V	2	Auburn CA Q	er Drive, Suite 110			DIST. <b>03</b>		ED			ROU <b>50</b>	TE	POS <b>1.</b>	TMILE 1/R2.4		EA	1E2901	
bla				Phone: (530)				PROJEC <b>Silva</b>	Vall	ey F	Park	way	/ Inte		ge					
con	SU	liii	ng	Fax: (530) 88	7-1495		E	BRIDGE	NUI	MBEI	R		EPARI <b>CP</b>	ED BY			DAT	Ē	SHEET 1 of	1

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

LOGGE	ED B	Y	BEGIN DATE	COMPLETION DATE	BOREHOLE LOC	CATION	(Lat/l	Long	or No	orth/Ea	st and D	atum)		HOLE ID		
RCP	NG C	ONTE	<b>9-14-10</b> RACTOR	9-14-10	BOREHOLE LOG	NTION	(Offe	ot St	tation	Lino)				A-10-1 SURFACE E		
Tabe					BOREHOLE LOC	ATION	(Olis	ei, Si	laliOH	, Line)				~780.5 ft		
DRILLII	NG N	/ETHC	)D		DRILL RIG									BOREHOLE	DIAMETER	
Solid					CME 55									6 in		
			S) AND SIZE(S) (ID)		SPT HAMMER T	YPE									FFICIENCY, EF	Ri
Split			KFILL AND COMPLETIC	ON .	Automatic GROUNDWATE	R DUR	ING F	) RII I	ING	AFTI	R DRII	ING (	DATE)	80%	TH OF BORIN	G
			h native cuttings		READINGS		enco						D, (1 L)	5.4 ft	THE BOTT	
(£					lo la					+				1.		
ELEVATION (ft)	≘				Sample Location	Blows per 6 in.	Blows per foot	(%)		Moisture Content (%) Dry Unit Weight	(pcf) Shear Strength	(tsl) Drilling Method	듇			
ATIC	±) H	- S	3	DESCRIPTION		per	per	ery	(%)	it (%	Stre	Me	Ď	Ren	narks	
EV.	DEPTH (ft)	Material	2		Sample	SWC	SWC	Recovery (%)	) g		ear ear	ı, Iling	sing			
Ш	-0 <u>-</u>					置	ĕ	å	R 5	<u></u>	<u>ල</u> හි ෑ		రా			
	1		SILTY GRAVEL (GN	1); dense; olive brown; dry	fill.											
	Ī		1600		SO	1 24	54	100				-				
	1		å		<b>M</b> _	205										
			2. 8		D0	1 25		100								H
	ļ				å	29										
778.50	2				👢											
110.50		1//	SANDY lean CLAY v dry; fill.	with GRAVEL (CL); stiff; oli	ve brown;											Н
	ļ	1//	ury, IIII.													Н
		1//														H
	3	7/														П
	ŀ	1//														
	Ī	$\mathbb{I}//$														
776.50	4	₹//														
	}															H
	ļ	1//														
	5	₹//			<b>₹</b> S0	2 50/5"	REF	100				1				Н
	}		Bottom of borehole a	at 5.4 ft bac	<u> </u>											
	ļ			11 5.4 It bys												
774.50	6	-	Terminated at 5.4 ft.													Н
	F		This Boring Record v	was developed in accordar Rock Logging, Classification I (June 2007) except as no or below.	nce with n. and											
	ŀ		Presentation Manual	I (June 2007) except as no	ted on the											
	7	-	Soli of Rock Legend	or below.												Н
	ł	+														H
772.50	8	4														П
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770.50	10															日
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	-12-	•														
			Blackburn Co	nculting		REPOF				_				1	HOLE ID	=
4.				=	-	BOR DIST.		REC			OUTE	DC	STMIL	F	<u>Å-10-157</u> <sup>≣</sup> A	
~~	4			er Drive, Suite 110		03		ED			50		.1/R2	.4	03-1E2901	
bla	اداء	- I I K	Auburn, CA 9	10003	Ī	PROJE	CT C	R BF	RIDGE	E NAM	E					

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

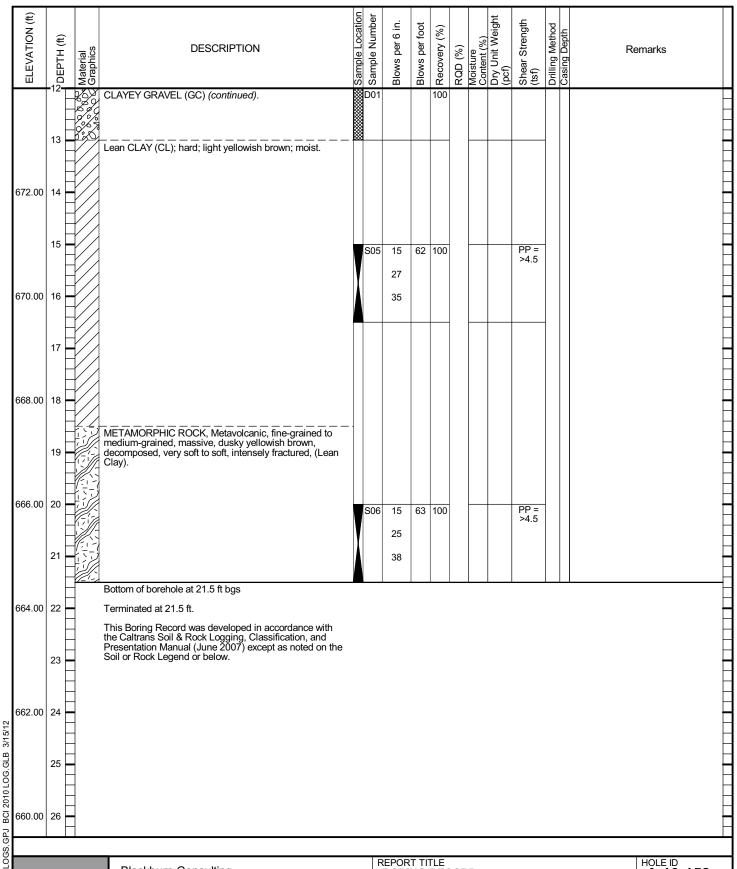
blackburn consulting

Auburn, CA 95603 Phone: (530) 887-1494 Fax: (530) 887-1495

BORING	GRECORD			A-10-157
DIST. <b>03</b>	COUNTY <b>ED</b>	ROUTE <b>50</b>	POSTMILE <b>1.1/R2.4</b>	EA <b>03-1E2901</b>
PRO IFCT	OR BRIDGE NA	ΔME		

Silva Valley Parkway Interchange
BRIDGE NUMBER PREPARED BY RCP SHEET 1 of 1 DATE

RCP		3Y	BEGIN D <b>9-21-1</b>		9-21-	ETION DATE 10												)-158	
		CONTRA	ACTOR		·		BOREHO	LE LO	CATION	V (Offs	set, S	tation	n, Line)				SURFA: ~686.	CE ELEVA <b>0 ft</b>	TION
DRILLII	NG I	METHO					DRILL RI										BOREH	OLE DIAM	METER
		em Au	<b>ger</b> ) AND SIZE(S)	(ID)			CME 5		VDE								6 in	R EFFICIE	NCV ED
split	spo	oon					Autom	atic									80%		
			FILL AND COM native cutt		ON		GROUNE READING	WATE SS		RING I		ered	l		NG (	DATE	E) TOTAL 21.5 f		F BORING
ELEVATION (ft)	PDEPTH (ff)	Material Graphics			DESCRIP	TION		Sample Location	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%) Dry Unit Weight	Shear Strength (tsf)	Drilling Method	Casing Depth		Remarks	
684.00	1 2 3	70 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SILTY GRAV	ÆL (GM	1); dense; li	ght yellowish I	orown; dry;	DO		71	100								
682.00	4 5		N <u>CLAYEY GR</u>	AVEL ((	<u>GC); dense</u>	<u>; brown; mo</u> is <u>t</u>	<u>fill</u>	J SC	03 15	81	100								
680.00	6 7								34										
678.00	9																		
676.00	10							SC	04 10 6 7	13	100								
		%																	
	-12-	LGZX	T.		(continu	ıed)		<b>1884</b>	1		1					Ш			
			Rlackhi	ırn Ca	nsulting	·			REPO	RT TI	TLE							HOLE	ID 450
1					_	Suite 110			DIST.	RING	COU		RO	UTE	P	OSTM	1ILE	EA	0-158
	1		Auburn					-	03		ED		50 E NAME		1	1.1/R	2.4	03-1	E2901
		burr	Phone:		887-149	4			Silva	a Val	ley I	Park	way Int		ige				
~~~	2	ulting	Fax: (5					İ	BRIDG				PREPAI RCP				DA	TE	SHEET



blackburn consulting Blackburn Consulting 11521 Blocker Drive, Suite 110

Auburn, CA 95603 Phone: (530) 887-1494 Fax: (530) 887-1495

REPORT BORING	TITLE <b>G RECORD</b>			HOLE ID <b>A-10-158</b>
DIST. <b>03</b>	COUNTY <b>ED</b>	ROUTE <b>50</b>	POSTMILE 1.1/R2.4	EA <b>03-1E2901</b>

SHEET

2 of 2

PROJECT OR BRIDGE NAME

Silva Valley Parkway Interchange

BRIDGE NUMBER PREPARED BY DATE

RCP

LOGGE		SY		OMPLETION DATE 9-21-10	BOREHOL	E LOCA	ATION (	(Lat/L	ong (	or No	orth/E	ast a	nd Datu	ım)		HOLE <b>A</b> _1	<sup>™</sup>	9	
DRILLI	NG (	CONTR	ACTOR	<u> </u>	BOREHOL	E LOCA	ATION	Offse	et, St	ation	, Line	e)				SURF		EVATION	
DRILLI	NG N	METHO			DRILL RIG											BORE		NAMETER	
		em Au	iger S) AND SIZE(S) (ID)		CME 55 SPT HAMM	IER TYI	PE									6 in	IER EFF	ICIENCY, EI	Ri
split	spc	on			Automa	tic		10.0	<b>D</b>					10 (		80%	)		
			FILL AND COMPLETION  native cuttings		GROUNDV READINGS		not e					TERI	ORILLIN	IG (L	DATE)	3.5		H OF BORIN	IG
ELEVATION (ft)	<b>]</b> Роертн (ft)	Material		CRIPTION		Sample Location Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Deptn		Rema	rks	
	-0-		Well-graded GRAVEL (GV	N); dense; brown; dr	y; fill.														
	1																		
						S01	28	75/12	80										H
729.00	2						25												F
						N i	50/5.5"												
	3													1					H
		<b>**</b>	Bottom of borehole at 3.5	ft bgs										Ш					$\dashv$
727.00	4		Essential auger refusal at																
			This Boring Record was d the Caltrans Soil & Rock L Presentation Manual (Jun- Soil or Rock Legend or be	leveloped in accordar Logging, Classificatio	nce with n, and														
	5		Soil or Rock Legend or be	e 2007) except as no elow.	nted on the														
725.00	6	H																	H
	7																		Н
723.00	8																		
723.00	0																		
	9																		
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721.00	10	Ħ																	H
	11																		
	<b>-</b> 12 <b>-</b>																		
			Blackburn Consul	 Itina			REPOR'			OPI	<u> </u>						HC	OLE ID <b>\-10-15</b> !	<u> </u>
•	>		11521 Blocker Dr	ive, Suite 110		D	DURII DIST. <b>03</b>	С	OUN ED			ROU <b>50</b>	TE	PC 1	STMIL .1/R2.	.E 1	EA		9
bla	ck	bur	Auburn, CA 9560			Р	ROJE	CT OI	R BR			ME	rchan		. I/T <b>\Z</b> .	•	0	J-1E23U I	
con			1 110110. (000) 001				RIDGE					PARE	ED BY	a <sub>c</sub>			ATE	SHEET 1 of	1
			. ,								110	<u> </u>						1 01	•

5 BR - STANDARD LOGS.GPJ BCI 2010 LOG.GLB 3/15/12

LOGGE RCP		Y			GIN D. - <b>21-1</b>			COMP <b>9-21</b>		ON DA	TE E	BOREH	IOLE	LOCA	ATION	(Lat/	Long	or N	lorth/	East a	ınd Datı	ım)		HOLE I		60		
DRILLII <b>Tabe</b>											E	BOREH	IOLE	LOCA	ATION	(Offs	et, S	tatio	n, Lir	ne)				SURFA ~734	CE E		ON	
DRILLII				r								ORILL F												BOREH 6 in	IOLE	DIAME	TER	
SAMPL					ZE(S)	(ID)						SPT HA	MME		PE										R EF	FICIEN	CY, ERi	i
BOREH Back							ION						NDW A		DUR not					TER	DRILLIN	1G (	DA			TH OF	BORING	3
ELEVATION (ft)	РОЕРТН (ft)		Graphics					SCRII			•		Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth		Rem	arks		
	1 •		00000					(GP);		e; brow	n; dry	; fill.																
732.00	2		T tr P	his Bo ne Calt	ring R rans S	Recore Soil & Manu	d was Rock	develous develous Logg une 20 pelow.	oped ing, C 07) e:	in acco Classific xcept a	ordanc cation, s note	e with and d on th	e															
	3		0	OII OI I	VOCK L	-egei	iu oi i	Jeiow.																				
730.00	4																											
728.00	6																											
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726.00	8																											
704.00	9																											
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	-12																											
				Bla	ıckbu	ırn C	Cons	ulting						F	REPOR <b>BOR</b> I	T TI	TLE <b>RE</b> C	COR	D						Н	OLE ID	-160	

Blackburn Consulting 11521 Blocker Drive, Suite 110 Auburn, CA 95603

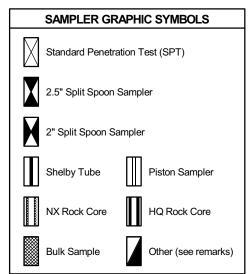
Phone: (530) 887-1494 Fax: (530) 887-1495

BORING	GRECORD			A-10-160
DIST. <b>03</b>	COUNTY <b>ED</b>	ROUTE <b>50</b>	POSTMILE <b>1.1/R2.4</b>	EA <b>03-1E2901</b>
PRO IFCT	OR BRIDGE NA	ΔME		

Silva Valley Parkway Interchange
BRIDGE NUMBER PREPARED BY
RCP SHEET 1 of 1 DATE

		GROUP SYMBO				
aphic	/ Symbol	Group Names	Graphic	/ Symbol	Group Names	
	GW	Well-graded GRAVEL Well-graded GRAVEL with SAND		CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY	
000	GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND			SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND	
	GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND			SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL	
	GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		CL-ML	SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND	
	GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND		ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT	
	GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)			SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND	
000	GM	SILTY GRAVEL with SAND		OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY	
	GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND		<u> </u>	SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND	
	GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND		OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND	
 	sw	Well-graded SAND Well-graded SAND with GRAVEL		OL		
	SP	Poorly graded SAND Poorly graded SAND with GRAVEL		СН	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY	
	SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL		GI.		
	SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)		МН	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT	
	SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL			SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND	
	SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)		ОН	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY	
	SM	SILTY SAND SILTY SAND with GRAVEL		-	SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND	
	sc	CLAYEY SAND with GRAVEL		ОН	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY elastic ELASTIC SILT	
	SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL		OII	SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND	
77 7 77 7 77 7	PT	PEAT		OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL	
		COBBLES COBBLES and BOULDERS BOULDERS		OLON	SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND	

	FIELD AND LABORATORY TESTS
С	Consolidation (ASTM D 2435-04)
CL	Collapse Potential (ASTM D 5333-03)
CP	Compaction Curve (CTM 216 - 06)
CR	Corrosion, Sulfates, Chlorides (CTM 643 - 99; CTM 417 - 06; CTM 422 - 06)
CU	Consolidated Undrained Triaxial (ASTM D 4767-02)
DS	Direct Shear (ASTM D 3080-04)
EI	Expansion Index (ASTM D 4829-03)
М	Moisture Content (ASTM D 2216-05)
ОС	Organic Content (ASTM D 2974-07)
Р	Permeability (CTM 220 - 05)
PA	Particle Size Analysis (ASTM D 422-63 [2002])
PI	Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89-02, AASHTO T 90-00)
PL	Point Load Index (ASTM D 5731-05)
PM	Pressure Meter
PP	Pocket Penetrometer
R	R-Value (CTM 301 - 00)
SE	Sand Equivalent (CTM 217 - 99)
SG	Specific Gravity (AASHTO T 100-06)
SL	Shrinkage Limit (ASTM D 427-04)
SW	Swell Potential (ASTM D 4546-03)
TV	Pocket Torvane
UC	Unconfined Compression - Soil (ASTM D 2166-06) Unconfined Compression - Rock (ASTM D 2938-95)



UU Unconsolidated Undrained Triaxial (ASTM D 2850-03)

UW Unit Weight (ASTM D 4767-04)

VS Vane Shear (AASHTO T 223-96 [2004])

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

WATER LEVEL SYMBOLS				
∑ First Water Level Reading (during drilling)				
▼ Static Water Level Reading (short-term)				
$\underline{\underline{V}}$ Static Water Level Reading (long-term)				



Blackburn Consulting 11521 Blocker Drive, Suite 110 Auburn, CA 95603 Phone: (530) 887-1494 Fax: (530) 887-1495

COUNTY	ROUTE		POSTMILE			
El Dorado	50		1.1/R2.4			
PROJECT OR BRIDGE NAME						
Silva Valley Parkway Interchange						
PREPARED BY		DATE		SHEET		
RCP				1 of 3		

**BORING RECORD LEGEND** 

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

APPARENT DENSITY OF COHESIONLESS SOILS				
Descriptor	SPT N <sub>60</sub> - Value (blows / foot)			
Very Loose	0 - 4			
Loose	5 - 10			
Medium Dense	11 - 30			
Dense	31 - 50			
Very Dense	> 50			

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

PERCENT OR PROPORTION OF SOILS				
Descriptor	Criteria			
Trace	Particles are present but estimated to be less than 5%			
Few	5 to 10%			
Little	15 to 25%			
Some	30 to 45%			
Mostly	50 to 100%			

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

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

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



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	BORING RECORD LEGEND					
	COUNTY	ROUTE		POSTMILE		
	El Dorado	50		1.1/R2.4		
PROJECT OR BRIDGE NAME Silva Valley Parkway Interchange						
	PREPARED BY		DATE		SHEET	
RCP					2 of 3	

# **ROCK GRAPHIC SYMBOLS IGNEOUS ROCK** SEDIMENTARY ROCK METAMORPHIC ROCK

BEDDING SPACING											
Descriptor	Thickness or Spacing										
Massive	> 10 ft										
Very thickly bedded	3 to 10 ft										
Thickly bedded	1 to 3 ft										
Moderately bedded	3-5/8 inches to 1 ft										
Thinly bedded	1-1/4 to 3-5/8 inches										
Very thinly bedded	3/8 inch to 1-1/4 inches										
Laminated	< 3/8 inch										

	WEATHERING DESCRIPTORS FOR INTACT ROCK														
	Diagnostic Features														
	Chemical Weathering-Discol	oration-Oxidation	Mechanical Weathering	Texture ar	nd Solutioning										
Descriptor	Body of Rock	Fracture Surfaces	and Grain Boundary Conditions	Texture	Solutioning	General Characteristics									
Fresh	No discoloration, not oxidized	No discoloration or oxidation	No separation, intact (tight)	No change	No solutioning	Hammer rings when crystalline rocks are struck.									
Slightly Weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull	Minor to complete discoloration or oxidation of most surfaces	No visible separation, intact (tight)	Preserved	Minor leaching of some soluble minerals may be noted	Hammer rings when crystalline rocks are struck. Body of rock not weakened.									
Moderately Weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty"; feldspar crystals are "cloudy"	All fracture surfaces are discolored or oxidized	Partial separation of boundaries visible	Generally preserved	Soluble minerals may be mostly leached	Hammer does not ring when rock is struck. Body of rock is slightly weakened.									
Intensely Weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in situ disaggregation (refer to grain boundary conditions)	All fracture surfaces are discolored or oxidized; surfaces are friable	Partial separation, rock is friable; in semi-arid conditions, granitics are disaggregated	Altered by chemical disintegration such as via hydration or argillation	Leaching of soluble minerals may be complete	Dull sound when struck with hammer; usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures or veinlets. Rock is significantly weakened.									
Decomposed	Discolored of oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay		Complete separation of grain boundaries (disaggregated)	Resembles a s complete remn may be presen soluble minera complete	ant rock structure ved; leaching of	Can be granulated by hand. Resistant minerals such as quartz may be present as "stringers" or "dikes".									

Note: Combination descriptors (such as "slightly weathered to fresh") are used where equal distribution of both weathering characteristics is present over significant intervals or where characteristics present are "in between" the diagnostic feature. However, combination descriptors should not be used where significant identifiable zones can be delineated. Only two adjacent descriptors shall be combined. "Very intensely weathered" is the combination descriptor for "decomposed to intensely weathered".

RELATIVE STRENGTH OF INTACT ROCK												
Descriptor	Uniaxial Compressive Strength (psi)											
Extremely Strong	> 30,000											
Very Strong	14,500 - 30,000											
Strong	7,000 - 14,500											
Medium Strong	3,500 - 7,000											
Weak	700 - 3,500											
Very Weak	150 - 700											
Extremely Weak	< 150											

#### **CORE RECOVERY CALCULATION (%)**

**\(\Sigma\)** Length of the recovered core pieces (in.) Total length of core run (in.)

#### **RQD CALCULATION (%)**

Σ Length of intact core pieces > 4 in. x 100 Total length of core run (in.)

ROCK HARDNESS											
Descriptor	Criteria										
Extremely Hard	Specimen cannot be scratched with pocket knife or sharp pick; can only be chipped with repeated heavy hammer blows										
Very hard	Specimen cannot be scratched with pocket knife or sharp pick; breaks with repeated heavy hammer blows										
Hard	Specimen can be scratched with pocket knife or sharp pick with heavy pressure; heavy hammer blows required to break specimen										
Moderately Hard	Specimen can be scratched with pocket knife or sharp pick with light or moderate pressure; breaks with moderate hammer blows										
Moderately Soft	Specimen can be grooved 1/6 in. with pocket knife or sharp pick with moderate or heavy pressure; breaks with light hammer blow or heavy hand pressure										
Soft	Specimen can be grooved or gouged with pocket knife or sharp pick with light pressure, breaks with light to moderate hand pressure										
Very Soft	Specimen can be readily indented, grooved, or gouged with fingernail, or carved with pocket knife; breaks with light hand pressure										

FRACTURE DENSITY										
Descriptor	Criteria									
Unfractured	No fractures									
Very Slightly Fractured	Lengths greater 3 ft									
Slightly Fractured	Lengths from 1 to 3 ft, few lengths outside that range									
Moderately Fractured	Lengths mostly in range of 4 in. to 1 ft, with most lengths about 8 in.									
Intensely Fractured	Lengths average from 1 in. to 4 in. with scattered fragmented intervals with lengths less than 4 in.									
Very Intensely Fractured	Mostly chips and fragments with few scattered short core lengths									



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В	BORING RECORD LEGEND														
COUNTY	ROUTE		POSTMILE												
El Dorado	50		1.1/R2.4												
PROJECT OR BRIDGE	NAME														
Silva Valley Parkv	Silva Valley Parkway Interchange														
PREPARED BY	_	DATE		SHEET											
RCP				3 of 3											

# Appendix B

Laboratory Test Results

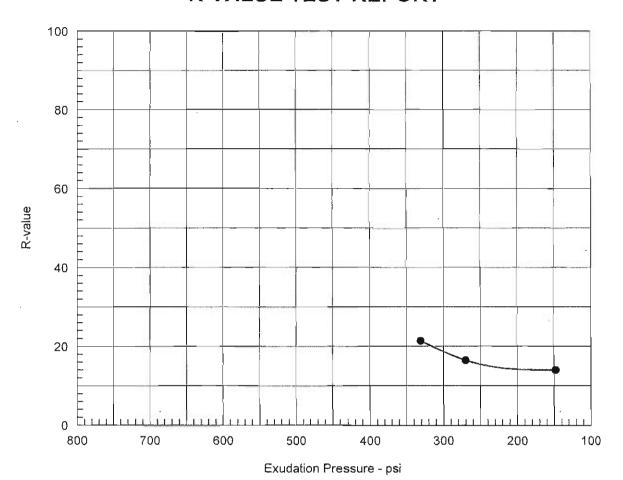


Blackburn Consulting US 50 / Silva Valley Parkway Interchange, Phase I File No. 556.2 October 2010

		Sulfate	Ì				67.5	35.5		0.2										0.4		0.8	<0.1				7.8										65.2		$\neg$
			╀			_	9.	3.	_	7	_	4	$\downarrow$	_	_					ت		٦	Ý				-	$\downarrow$	+				_	_	_		6.	$\dashv$	-
	Corrosivity	Chloride (nom)	(midd)				17.0	13.6		14.0										15.0		13.8	10.5				13.0										24.3		
	Солс	Resistivity	(iii)				1420	3220		6970										5630		3220	4290				2250										2060		
							7.1	5.6		5.3										5.7		6.1	5.8				2,6								*******		7.4		
		- Nalue												_					\$1		41					57			Ş	80	-	_		61					29
	CT236 Max Wet		┽┈				_																						2.18	1									1
	- 2	Unconfined Compression	-	23,000	15,750				5,800		5,810		18,330		11,320	26,690		12,710													12 460	2014	H						
			+	22				_	2		S		~		_	30		- 12							-		$\frac{1}{1}$	1	1	_	,	; 	_	L	_				_
		Cohesion,	2																											717									
mary		Friction	÷ (1)																											21.2									
ng Sumi		10										İ												7															
ory Testi		Ξ	3						i						_	-		l						54				1											
Laboratory Testing Summary		Percent Passing																						43.7					21.0										
		Percent Retained												J	_									24.4					50.9	1			-						
		Dry Density,				26				1		110		113			115								86			88			631	122	101		138	122		114	
		Moisture Content	t			14.7						9.4		5.7			8.4								9.1			14.3		6	8.0	6.7	9.7		5.6	~		18,7	
		USCS Classification	Rock	Rock	Rock	CL	Decomp Rock	ML	Rock	ML	Rock	ML	Rock	ML	Rock	Rock	CF	Rock	25	ML	SC	ML	ML	SC-SM	Decomp Rock	Decomp Rock	Decomp Rock	SM	WD	Decomp Rock	Decomp Rock	YOU	Decomb Rock	M	Ĝ	GM	WD CW	ME	ME
	-	Sample	FIO	오	НQ	MC	MC	MC	ΗÖ	MC	HQ.	ΣÇ	HQ	MC	HQ	НО	MC	FIQ	Bulk	Bulk	Bulk	Buik	Bulk	Bulk	MC	Bulk	Bulk	MC	Bulk	Bulk	S G	Z CW	MC	Bulk	MC	MC	Bulk	MC	Bulk
		Depth (fret)	8.25-18.9	5,4-6.5	20.0-20.7	1.0-1.5	5.0-6.5	0.0-1.3	9.3-10.2	0.0-1.5	3.0-14.3	1.0-1.5	28.0-29.0	6.0-6.5	14.5-15.2	21.3-22.5	1.0-1.5	16.0-16.5	0.0-2.0	0.0-1.5	0.0-2.5	0.5-2.5	0.25-2.0	0.0-2.0	1.5-2.0	0.0-2.5	4.0-5.0	1.0-1.5	0.5-5.0	0.0-5.5	21.0.1.5	10.3 5	10-1.5	0.5-5.0	2.0-2.5	2,0-2.5	2.0-5.0	2.0.2.5	2.3-5.0
		- ON slames				SI	S			$\dashv$	6)	+	53	-	Core	Core	Si	Core	ā	) IQ	IO	Di	ñ	ξQ	S2	مَ	20	33	20	5 5		+		D2	IS	SI	ā	SI	Ы
		Exploration	ē	R-10-002	R-10-003	R-10-004	R-30-004	R-10-005	R-10-005	R-10-006	R-10-006	R-10-007	R-10-007	R-10-008	R-10-008	R-10-009	R-10-010	R-10-010	T-10-103	T-10-107	T-10-108	T-10-109	T-10-112	T-10-114	T-10-115	T-10-119	T-10-120	T-10-121	T-10-121	T-10-122	R-10-126	A-10-120	A-10-128	A-10-129	A-10-133	A-10-136	A-10-136	A-10-137	A-10-137

Blackburn Consulting US 50 / Silva Valley Parkway Interchange, Phase I File No. 556.2 October 2010

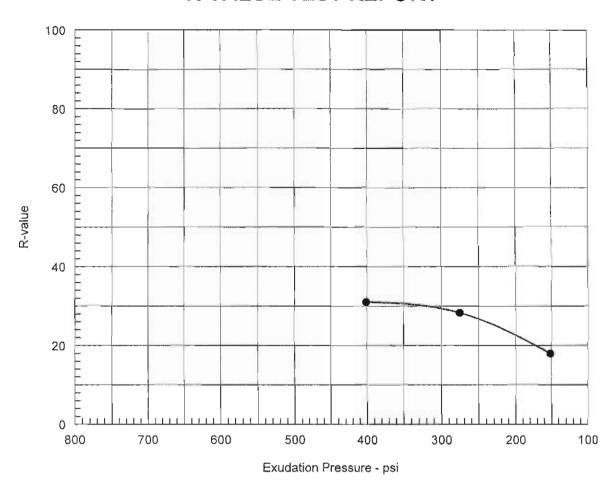
		Suffate	(mad)														3.2	11.0							
	sivity	Chloride	(mdd)														28.9	28.6							
	Corrosivity	Registroity						_	÷								960	1290							
			된				_										6.4	7.0			6.2	6.3	5.3	5.4	
		•	R-Value								28			56						25 {					
	CT216 Max Wet	Density,	(gm/cc)		_																				
		Cohesion Convession	(psi)				8,500												4,930						
		Cohesion	DSf, C																	-					
mary		Friction	Angle, 6											***							1			1	
Laboratory Testing Summary			ΡΙ												01	40		21							
tory Tes			ᆲ												2.7	60		39							
Labora		Percent	#200																						
		Percent	#4																						
		Dry Density,	7dry (pcf)	122	132	135	981	118	127	128		133	121						191						
		Moisture	(%)	8.9	5.8	7.4		4.8	5	12.7		9.9	8.7												
		SUSIE	Classification	CM	MD	MD	Rock	Decemp Rock	SM	SM	CL	SM	ÖÖ	C)	25	E.	CH	CL	Rock	ML	ML	ML	ML/SM	SM	
		Samole	Type	MC	MC	MC	ÒH	MC	MC	MC	Bulk	MC	MC	Bulk	Bulk	Bulk	Bulk	Bulk	PΙ	Bulk	Bulk	Bulk	Bulk	Buik	
		Denth	(feet)	2.0-2.5	1.5-2.0	2.0-2.5	22.1-22.5	2.0-2.5	2.0-2.5	6.0-6.5	0.5-5.0	1.5-2.0	6.0-6.5	0.5-5.0	3.0-7.0	1.5-4.0	2.0-3.0	1.5-6.0	7.25-7.5	0.5-8.0	0.5-2.0	0.5-2.0	0.5-2.0	0.5-2.0	
			Sample No.	Si	S1	Si	Core	SI	S.	S2	ĩα	SI	S2	Ια	ã	IQ	ΙŒ	DI	Core	D2	آ۵	ΙQ	D1	Di	
		Exploration	_	A-10-138	A-10-139	A-10-140	R-10-141	A-10-142	A-10-144	A-10-144	A-10-144	A-10-145	A-10-145	A-10-145	T-10-147	T-10-149	J-10-152	T-10-153	R-10-155	A-10-356	RSI (field)	RS2 (field)	RS3 (field)	RS4 (field)	



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	173	119.6	14.9	0.42	108	2.60	331	20	21
2	142	119.0	15.5	0.36	109	2.44	270	17	16
3	112	116.3	16.6	0.06	117	2.64	148	13	14

Test Results	Material Description
R-value at 300 psi exudation pressure = 19	CLAYEY SILT with SAND, dark yellowish brown (decomposed metavolcanic rock)
Project No.: 556.2  Project:Silva Valley Parkway Interchange Project  Source of Sample: A-10-129  Depth: 0.5-5.0'  Sample Number: D2	Tested by: MDR Checked by: RBL Remarks: 8.9% retained on No. 4 sieve.
Date: 9/24/2010	
R-VALUE TEST REPORT	
Blackburn Consulting	



Resistance R-Value and Expansion Pressure - Cal Test 301

psi	pcf	%	Pressure psi	Press. psi @ 160 psi	Height in.	Pressure psi	R Value	Value Corr.
320	121,6	14.1	_0.82	96.	2.61	401	29	.31
263	119.3	15.2	0.55	97	2.56	275	27	28
163	116.5	16.1	_0.36	111	2.52	151	18	18
_	320 263	320	psi       320     121,6     14.1       263     119.3     15.2	psi         psi           320         121.6         14.1         0.82           263         119.3         15.2         0.55	psi         psi         @ 160 psi           320         121,6         14.1         0.82         96           263         119.3         15.2         0.55         97	psi         psi         @ 160 psi         in.           320         121,6         14.1         0.82         96         2.61           263         119.3         15.2         0.55         97         2.56	psi         psi         @ 160 psi         in.         psi           320         121,6         14.1         0.82         96         2.61         401           263         119.3         15.2         0.55         97         2.56         275	psi         psi         @ 160 psi         in.         psi         Value           320         121,6         14.1         0.82         96         2.61         401         29           263         119.3         15.2         0.55         97         2.56         275         27

psi	pcf	%	Pressure psi	Press. psi @ 160 psi	Height in.	Pressure psi	Value	Value Corr.
320	121,6	14.1	0.82	96	2.61	401	29	.31
263	119.3	15.2	0.55	97	2.56	275	27	28
163	116.5	16.1	0.36	111	2.52	151	18	18
_	320 263	320121.6 263119.3	320     121.6     14.1       263     119.3     15.2	320     121.6     14.1     0.82       263     119.3     15.2     0.55	320     121,6     14.1     0.82     96       263     119.3     15.2     0.55     97	320     121,6     14.1     0.82     96     2.61       263     119.3     15.2     0.55     97     2.56	320     121,6     14.1     0.82     96     2.61     401       263     119.3     15.2     0.55     97     2.56     275	320     121,6     14.1     0.82     96     2.61     401     29       263     119.3     15.2     0.55     97     2.56     275     27

R-value at 300 psi exudation pressure = 29

SILT with SAND and some GRAVEL, yellowish brown (decomposed metavolcanic rock)

Material Description

Project No.: 556.2

Project: Silva Valley Parkway Interchange Project

Source of Sample: A-10-137

Depth: 2.25-5.0'

Sample Number: D1

Date: 9/24/2010

R-VALUE TEST REPORT

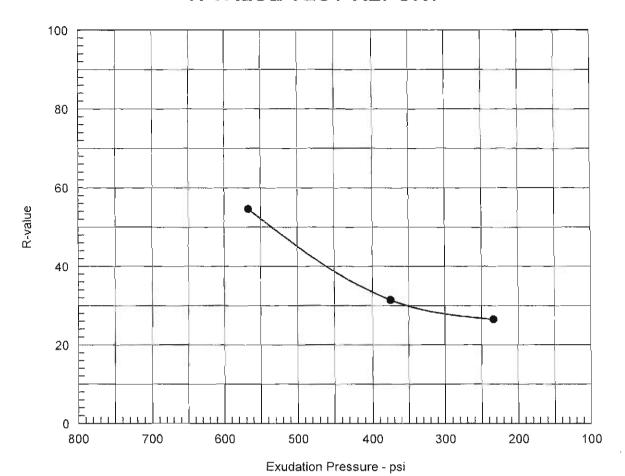
**Test Results** 

**Blackburn Consulting** 

Tested by: MDR Checked by: RBL

Remarks:

12.8% retained on No. 4 sieve.



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	138.3	9.4	0.00	53	2.31	567	59	55
2	224	136.0	10.2	0.00	91	2.47	375	31	31
3	81	133.0	11.1	0.00	98	2.52	234	26	26

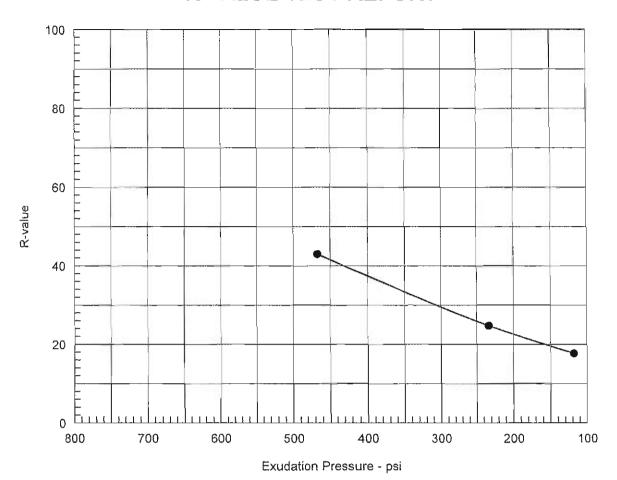
Test Re	Test Results					
R-value at 300 psi exudation pressu	SANDY, SILTY CLAY with GRAVEL, yellowish brown, (decomposed metavolcanic rock)					
Project No.: 556.2	Tested by: BKR					
Project:Silva Valley Parkway Interchang	e Project	Checked by: MDR				
Source of Sample: A-10-144 Sample Number: D1	Remarks: 25.3% retained on No. 4 sieve.					

R-VALUE TEST REPORT

Date: 9/10/2010

**Blackburn Consulting** 

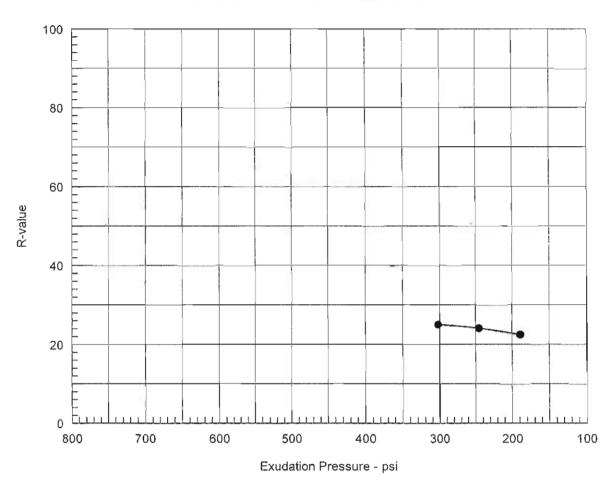
Figure \_\_\_



No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	244	136.1	9.6	0.00	70	2.42	467	45	43
2	102	129.6	11.3	0.00	101	2.53	233	25	25
3	61	126.0	13.1	0.00	111	2.46	118	18	18

Test Results	Material Description
R-value at 300 psi exudation pressure = 29	SANDY, SILTY CLAY with GRAVEL, yellowish brown, (decomposed metavolcanic rock)
Project No.: 556.2	Tested by: BKR
Project:Silva Valley Parkway Interchange Project	Checked by: MDR
Source of Sample: A-10-145 Depth: 0.5-5.0'	Remarks:
Sample Number: D1	
Date: 9/10/2010	
R-VALUE TEST REPORT	
Blackburn Consulting	Figure

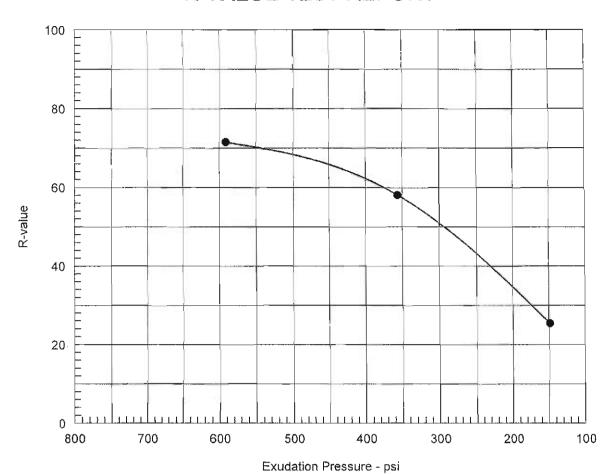




Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	123.7	13.2	0.24	99	2.55	302	25	25
2	263	119.5	13.9	0.12	103	2.67	245	22	24
3	234	120.1	14.6	0.09	106	2.67	189	20	22

Test Results	Material Description
R-value at 300 psi exudation pressure = 25	SANDY SILT, olive brown (decomposed metavolcanic rock)
Project No.: 556.2  Project:Silva Valley Parkway Interchange Project  Source of Sample: A-10-156  Depth: 0.5-8.0'  Sample Number: D2  Date: 9/24/2010	Tested by: MDR Checked by: RBL Remarks:
R-VALUE TEST REPORT  Blackburn Consulting	



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	127.8	11.3	0.00	30	2.55	591	71	71
2	224	126.8	12.1	0.00	47	2.53	356	58	58
3	102	123.3	13.8	0.00	94	2.51	148	25	25

	Test Results						scription	_
R-value at 300 psi exudation pressure = 51					SAN	TY, CLAYEY C D, dusky red, (o volcanic rock)		
Project No.: 556.2					Tes	ted bv: BKR		

Project No.: 556.2

Project: Silva Valley Parkway Interchange Project

Source of Sample: T-103

Depth: 0-2.0'

Sample Number: D1

**Date:** 9/10/2010

R-VALUE TEST REPORT

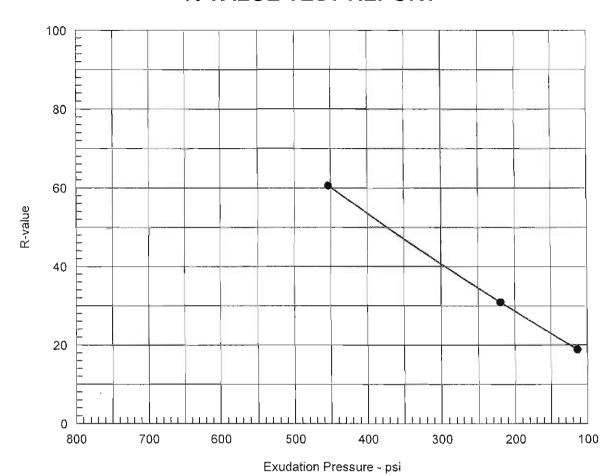
**Blackburn Consulting** 

Tested by: BKR Checked by: MDR

Remarks:

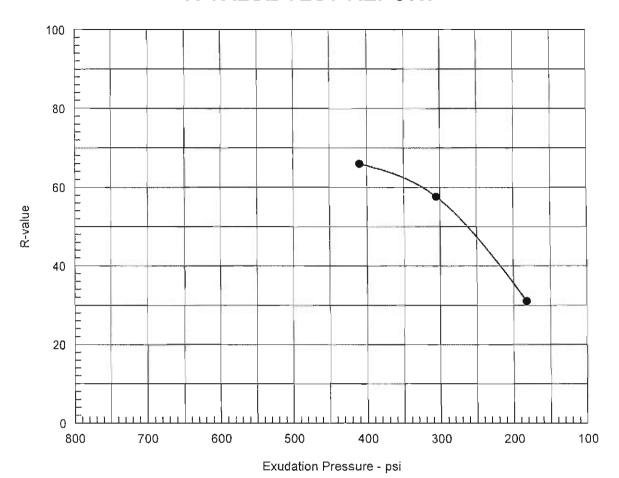
70.3% retained on No. 4 sieve.

Figure\_



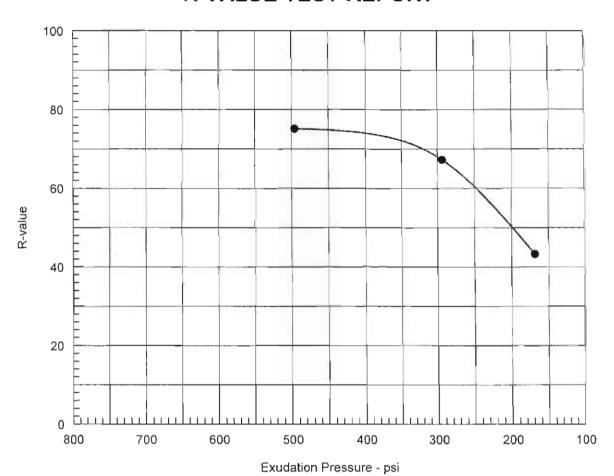
No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	189.5	10.7	0.00	43	2.45	453	61	61
2	203	129.6	12.4	0.00	87	2.50	220	31	31
3	61	126.3	13.7	0.00	108	2.54	113	19	19

Test Results	Material Description
R-value at 300 psi exudation pressure = 41	SILTY, CLAYEY SAND with GRAVEL, red, (decomposed metavolcanic rock)
Project No.: 556.2	Tested by: BKR Checked by: MDR
Project: Silva Valley Parkway Interchange Project	
Source of Sample: T-108 Depth: 0-2.5'	Remarks: 49.8% retained on No. 4 sieve.
Sample Number: D1	49.8% fetained on No. 4 steve.
Date: 9/10/2010	
R-VALUE TEST REPORT	
Blackburn Consulting	Figure



No.	Compact. Pressure psi	Density pcf	Moist.	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	129.2	11.1	0.00	35	2.53	410	66	66
2	350	127.9	12.0	0.00	50	2.65	305	54	58
3	142	124.7	13.3	0.00	87	2.60	182	29	31

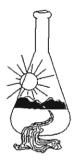
Test Results	Material Description
R-value at 300 psi exudation pressure = 57	SILTY, CLAYEY SAND with GRAVEL, red, (decomposed metavolcanic rock)
Project No.: 556.2  Project: Silva Valley Parkway Interchange Project  Source of Sample: T-119  Depth: 0-2.5'  Sample Number: D1  Date: 9/10/2010	Tested by: BKR Checked by: MDR Remarks: 28.6% retained on No. 4 sieve.
R-VALUE TEST REPORT  Blackburn Consulting	Figure



No.	Compact. Pressure psi	Density pcf	Moist.	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	118.5	14.5	0.00	25	2.50	496	75	75
2	282	117.2	15.4	0.00	34	2.50	294	67	67
3	224	115.9	16.2	0.00	64	2.60	169	41	43
									TREES!

Test Results	Material Description			
R-value at 300 psi exudation pressure = 68	SILTY, CLAYEY SAND with GRAVEL, dusky red (decomposed metavolcanic rock)			
Project No.: 556.2  Project:Silva Valley Parkway Interchange Project  Source of Sample: T-122  Depth: 0-3.5'  Sample Number: D1  Date: 9/10/2010	Tested by: BKR Checked by: MDR Remarks: 42.9% retained on No. 4 sieve.			
R-VALUE TEST REPORT  Blackburn Consulting	Figure			

# Sunland Analytical



11353 Pyrites Way, Suite 4 Rancho Cordova, CA 95670 (916) 852-8557

> Date Reported 09/17/2010 Date Submitted 09/14/2010

To: Ken Colburn Blackburn Consulting 11521 Blocker Dr. Ste. 110 95603 Auburn, CA

From: Gene Oliphant, Ph.D. \ Randy Horney General Manager \ Lab Manager

The reported analysis was requested for the following location: Location : SILVA VLY PKWY INTER Site ID : R-10-004-S2B. Thank you for your business.

\* For future reference to this analysis please use SUN # 58852-119538.

#### EVALUATION FOR SOIL CORROSION

Soil pH 7.08

Minimum Resistivity 1.42 ohm-cm (x1000)

Chloride

17.0 ppm 00.00170 %

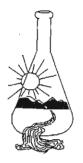
Sulfate

67.5 ppm

00.00675 %

#### METHODS

pH and Min.Resistivity CA DOT Test #643 Sulfate CA DOT Test #417, Chloride CA DOT Test #422



11353 Pyrites Way, Suite 4 Rancho Cordova, CA 95670 (916) 852-8557

> Date Reported 09/17/2010 Date Submitted 09/14/2010

To: Ken Colburn Blackburn Consulting 11521 Blocker Dr. Ste. 110 95603 Auburn, CA

From: Gene Oliphant, Ph.D. \ Randy Horney General Manager \ Lab Manager

The reported analysis was requested for the following location: Location : SILVA VLY PKWY INTER Site ID : R-10-005-S1B. Thank you for your business.

\* For future reference to this analysis please use SUN # 58852-119539.

#### EVALUATION FOR SOIL CORROSION

Soil pH 5.63

Minimum Resistivity 3.22 ohm-cm (x1000)

Chloride

13.6 ppm 00.00136 %

Sulfate

35.5 ppm 00.00355 %

#### METHODS



11353 Pyrites Way, Suite 4 Rancho Cordova, CA 95670 (916) 852-8557

> Date Reported 09/17/2010 Date Submitted 09/14/2010

To: Ken Colburn

Blackburn Consulting

11521 Blocker Dr. Ste. 110 Auburn, CA 95603

From: Gene Oliphant, Ph.D. \ Randy Horney General Manager \ Lab Manager

The reported analysis was requested for the following location: Location : SILVA VLY PKWY INTER Site ID : R10-006-S1B. Thank you for your business.

\* For future reference to this analysis please use SUN # 58852-119540.

#### EVALUATION FOR SOIL CORROSION

Soil pH

5.30

Minimum Resistivity 6.97 ohm-cm (x1000)

Chloride

14.0 ppm 00.00140 %

Sulfate

0.2 ppm 00.00002 %

#### METHODS



11353 Pyrites Way, Suite 4 Rancho Cordova, CA 95670 (916) 852-8557

> Date Reported 09/17/2010 Date Submitted 09/14/2010

To: Ken Colburn

Blackburn Consulting

11521 Blocker Dr. Ste. 110

Auburn, CA 95603

From: Gene Oliphant, Ph.D. \ Randy Horney/ General Manager \ Lab Manager

The reported analysis was requested for the following location: Location: SILVA VLY PKWY INTER Site ID: A-10-136-D1. Thank you for your business.

\* For future reference to this analysis please use SUN # 58852-119541.

\_\_\_\_\_\_

#### EVALUATION FOR SOIL CORROSION

Soil pH 7.37

Minimum Resistivity 2.06 ohm-cm (x1000)

Chloride

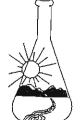
24.3 ppm

00.00243 %

Sulfate

65.2 ppm 00.00652 %

#### METHODS



11353 Pyrites Way, Suite 4 Rancho Cordova, CA 95670 (916) 852-8557

> Date Reported 09/17/2010 Date Submitted 09/14/2010

To: Ken Colburn

Blackburn Consulting

11521 Blocker Dr. Ste. 110 Auburn, CA 95603

From: Gene Oliphant, Ph.D. \ Randy Horney General Manager \ Lab Manager

The reported analysis was requested for the following location: Location : SILVA VLY PKWY INTER Site ID : T-10-107-D1. Thank you for your business.

\* For future reference to this analysis please use SUN # 58852-119542.

#### EVALUATION FOR SOIL CORROSION

Soil pH 5.71

Minimum Resistivity 5.63 ohm-cm (x1000)

Chloride

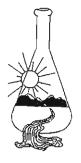
15.0 ppm

00.00150 %

Sulfate

0.4 ppm 00.00004 %

#### METHODS



11353 Pyrites Way, Suite 4 Rancho Cordova, CA 95670 (916) 852-8557

> Date Reported 09/17/2010 Date Submitted 09/14/2010

To: Ken Colburn Blackburn Consulting 11521 Blocker Dr. Ste. 110 Auburn, CA 95603

From: Gene Oliphant, Ph.D. \ Randy Horney General Manager \ Lab Manager

The reported analysis was requested for the following location: Location : SILVA VLY PKWY INTER Site ID : T-10-109-D1. Thank you for your business.

\* For future reference to this analysis please use SUN # 58852-119543. \_\_\_\_\_\_

EVALUATION FOR SOIL CORROSION

Soil pH

6.11

Minimum Resistivity 3.22 ohm-cm (x1000)

Chloride

13.8 ppm

00.00138 %

Sulfate

0.8 ppm

00.00008 %

METHODS



11353 Pyrites Way, Suite 4 Rancho Cordova, CA 95670 (916) 852-8557

> Date Reported 09/17/2010 Date Submitted 09/14/2010

To: Ken Colburn

Blackburn Consulting

11521 Blocker Dr. Ste. 110

Auburn, CA

95603

From: Gene Oliphant, Ph.D. \ Randy Horney General Manager \ Lab Manager

The reported analysis was requested for the following location: Location : SILVA VLY PKWY INTER Site ID : T-10-112-D1. Thank you for your business.

\* For future reference to this analysis please use SUN # 58852-119544.

#### EVALUATION FOR SOIL CORROSION

Soil pH 5.80

Minimum Resistivity 4.29 ohm-cm (x1000)

Chloride

10.5 ppm 00.00105 %

Sulfate

< .1

#### METHODS



567 West Shaw Avenue Suite B Fresno CA 93704 P 559.497.2880 F 559.497.2886 www.bskassociates.com

VIA US MAIL

September 15, 2010

Mr. Ken Colburn Blackburn Consulting 11521 Blocker Drive, Suite 110 Auburn, CA 95603

BSK Job G1008510F BSK SAMPLE ID: F10-498

SUBJECT: Laboratory Testing Results

PO 10050 - Silva Parkway Interchange

Sample Date: 7/2/2010

Dear Mr. Colburn:

BSK has performed testing on a soil sample shipped to our laboratory identified as follows:

T-120 / D2 @ 4' - 5'

Testing was performed in accordance with Caltrans Test Methods and consisted of Minimum Resistivity and pH (Caltrans Test Method 643), Sulfate Content (Caltrans Test Method 417), and Chloride Content (Caltrans Test Method 422). The results are tabulated below and the test reports are enclosed.

Sample ID	Minimum Resistivity, Ohm-cm @ 15.5°C	Нq	Sulfate, mg/kg	Chloride, mg/kg
T-120 / D2 @ 4' - 5'	2,250	7.6 @ 21.2°C	7.8	13

BSK appreciates the opportunity to be of service to Blackburn Consulting and looks forward to being of service to you in the future. Please call with any questions you may have @ 559-497-2870.

Respectfully,

**BSK** Associates

Nathan M. Shwiyhat, P.E.

Project Engineer

Enclosures:

Minimum Resistivity Test Report

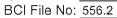
Analytical Report

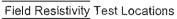
Distribution:

Client (1 original, 1 E-Copy)

BSK File



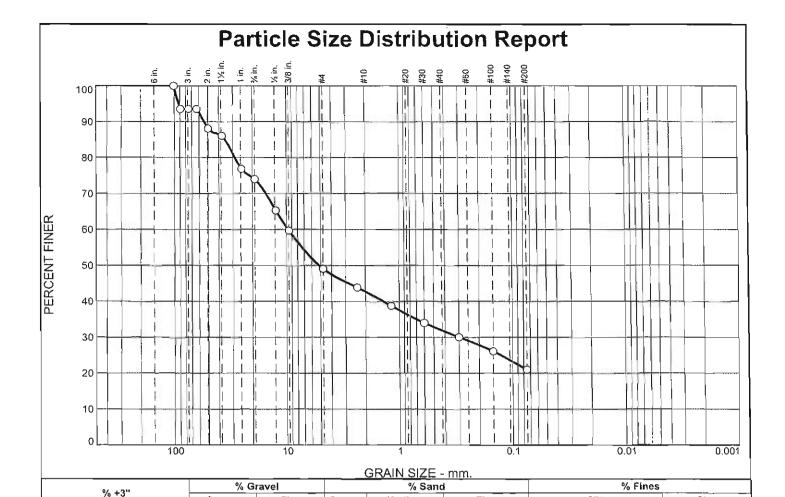






# pH Measurement of Soil CTM 643

Sample No:	1	2	3	4	_	
Sample Location:	RS-1	RS-2	RS-3	RS-4		
Soil Type:	ML	ML	ML/SM	SM		
Date:	9/27	9/27	9/27	9/27		
Temperature (°F) 77 ± 2 (25°C ±1)	25.0	24.2	24.5	24.5		
Required Amount of Dry Soil (g)	30.0	30.0	30.0	30.0		
Measured Amount of Dry Soil (g)	30.0	30.0	30.0	30.0		
Distilled Water (mL)	30.0	30.0	30.0	30.0		
Stand Time (start) minimum 1 hr.	8:30 AM	8:30 AM	8:30 AM	8:30 AM		
Stand Time (finish)	10:12 AM	10:15 AM	10:18 AM	10:20 AM		
pH Reading (0.00)	6.15	6.30	5.26	5.35		



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
4.0"	100.0		
3.5"	93.5		
3.0*	93.5		
2.5"	93.5		
2.0"	88.1		
1.5"	86.0		
1.0"	76.8		
3/4"	74.0		
1/2"	65.3		
3/8"	59.7		
#4	49.1		
#8	43.8		
#16	38.7		
#30	34.0		
#50	30.0		
#100	26.1		
#200	21.0		
			J.

Coarse

19.5

Fine

24.9

Coarse

6.4

Medium

10.8

	/				
PL=	Atterberg Limits LL=	PI= NP			
D <sub>90</sub> = 54.3331 D <sub>50</sub> = 5.1541 D <sub>10</sub> =	Coefficients D85= 35.1133 D30= 0.3002 Cu=	D <sub>60</sub> = 9.6739 D <sub>15</sub> = C <sub>c</sub> =			
USCS= GM	Classification AASHTO	)=			
Remarks 1 Piece retained on 3.5" sieve. Sample was hand shaken for entire sieve analysis.					

Soil Description

Metavolcanic Rock, yellowish brown, decomposed (SILTY)

Silt

21.0

Date: 9-14-10

Clay

(no specification provided)

**Blackburn Consulting** 

Source of Sample: T-121 Sample Number: D2

6.5

Depth: N/A

\_\_\_\_\_

Fine

10.9

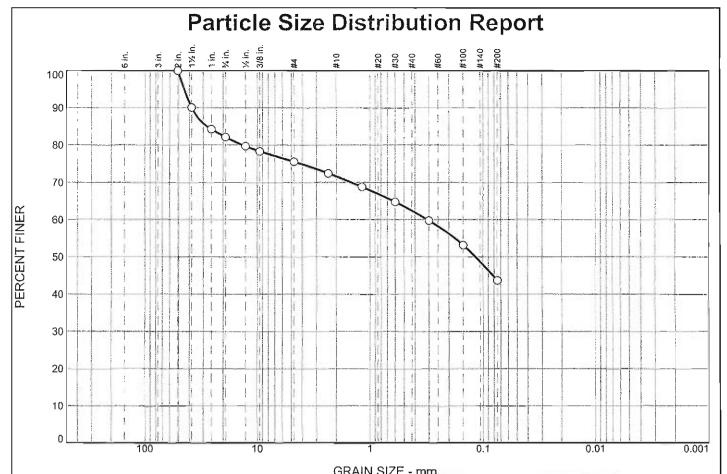
GRAVEL with SAND)

Client: Mark Thomas & Company, Inc.

Project: Silva Valley Parkway Interchange Project

W. Sacramento, CA Project No: 556.2 Figure

Tested By: MAR Checked By: MDR



% +3"	% Gravel		% Sand			% Fines	
76 +3 	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	17.8	6.6	4.0	9.2	18.7	43.7	

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
2"	100.0		
1.5"	90.1	}	
1"	84.3		
3/4"	82.2		
1/2"	79.7		
3/8"	78.3		
#4	75.6		
#8	72.4		
#16	68.8		l
#30	64.7		
#50	59.7		
#100	53.2		
#200	43.7		
	1		Į
		1	

_	Material Description Reddish Brown Silty Clayey SAND with Gravel					
PL= 20	Atterberg Limits LL= 24	PI≈ 4				
D <sub>90</sub> = 37.9937 D <sub>50</sub> = 0.1168 D <sub>10</sub> =	Coefficients D85= 27.6331 D30= Cu=	D <sub>60</sub> = 0.3104 D <sub>15</sub> = C <sub>c</sub> =				
USCS= SC-SM	Classification AASHT	O= A-4(0)				
	Remarks					

(no specification provided)

Sample Number: TP-10-114-D1

Depth: 0.0-2.0

Date: 9-17-2010

# **Blackburn Consulting**

Client: MTCo

Project: Silva Parkway Interchange

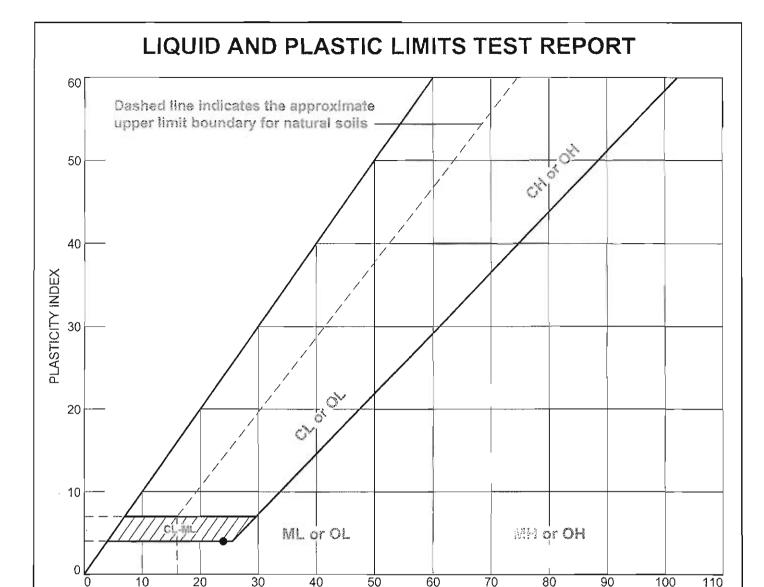
Auburn, CA

Project No: 556.2

Figure

Tested By: KLC

Checked By: KLC



	SOIL DATA							
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
•		TP-10-114- D1	0.0-2.0		20	24	4	SC-SM

LIQUID LIMIT

Blackburn Consulting

Client: MTCo

Project: Silva Parkway Interchange

Auburn, CA

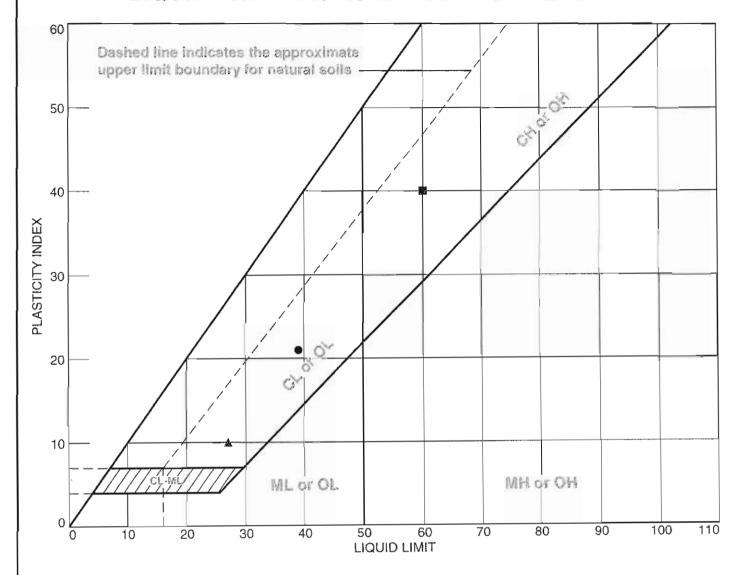
Project No.: 556.2

**Figure** 

Tested By: KLC

Checked By: KLC

# LIQUID AND PLASTIC LIMITS TEST REPORT



	SOIL DATA							
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	uscs
•		T-10-153-D1	1.5'-6.0'		18	39	21	
E		T-10-149-D1	1.5'-4.0'		20	60	40	
<b>A</b>		T-10-147-D1	3.0'-7.0'		17	27	10	

Blackburn Consulting

Client: MTCo

Project: Silva Parkway Interchange

Auburn, CA

Project No.: 556.2

**Figure** 

Tested By: KLC

Checked By: KLC



Project Name: Silva Valley Parkway Date: 9/10/10

Project No: 556.2 Tested by:

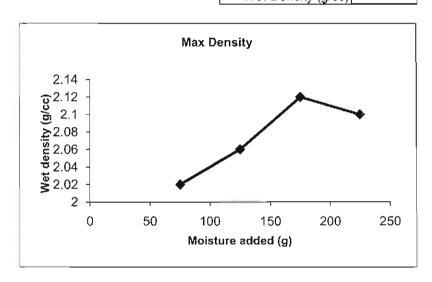
Boring/Sample No.: T-121-D2 Depth / Location: N/A Sample Description: Metavolcanic Rock, yellowish brown, decomposed

(SILTY GRAVEL with SAND)

		(CILIT CIT)	TAFF ANITH OVER	· ,		
IMPACT TEST DATA					SAND VOLUME	DATA
Initial Wet Weight of Sa	ample (g)	2	300		Initial Sand wt (g)	"N/A
Specimen Number	1	2	3	4	Residue wt (g)	N/A
Water Adjustment (g)	75	125	175	225	Sand used	
Tamper Reading	10.8	10.6	10.3	10.4	Cone Correction (g)	
Wet Density (g/cc)	2.02	2.06	2.12	2,1	Sand in hole (g)	
_					Sand Density (g/cc)	<b>的视频</b>
					Volume of Hole	
					Wet Density (a/cc)	

## **Rock Correction**

Total Sample (g)	16597.5
+3/4" in Air (g)	4611.5
+3/4" in Water (g)	2696.5
+3/4" Volume (cc)	1915.0
% +3/4"	27.8
% -3/4"	72.2
Density +3/4" (g/cc)	2.408
% +3/4"/ Den. +3/4"	11.77
% -3/4" / Den3/4"	34.06
SUM	45.84
Adj. density (g/cc)	2.18



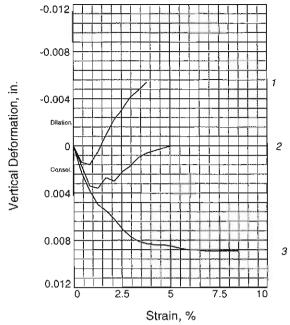
# MOISTURE ADJUSTMENT FOR AGGREGATE BASE PAY QUANTITY Inplace Wet Test Spec Wet Test Spec Dry Inplace Water Test Spec Water Inplace % Water Test Spec % Water

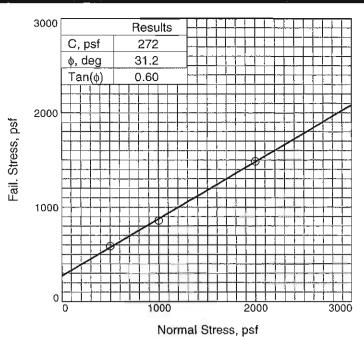
Dry Density Calculation					
Tare#	0	Max Wet Density (g/cc)	2.18		
Tare wt (g)	0	Max Dry Density (g/cc)			
Tare + wet (g)	0	Max Wet Density (pcf)	136.2		
Tare + dry (g)	0	Max Dry Density (pcf)			
% Moisture					

%+3/4 Adj	ustment
0.08	7

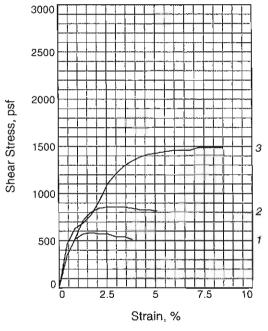
20	1.00
21-25	0.99
26-30	0.98
31-35	0.97
36-40	0.96
41-45	0.95
46-50	0.94
	21-25 26-30 31-35 36-40 41-45

Remarks:





USC NINGS OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONT



	_				
Sar	nple No.	1	2	3	
	Water Content, %	15.1	15.4	16.0	
	Dry Density, pcf	109.7	109.6	108.9	
Initial	Saturation, %	75.9	77.1	78.7	
三	Void Ratio	0.5370	0.5383	0.5474	
	Diameter, in.	2.36	2.36	2.36	
	Height, in.	0.94	<u>0</u> .94	0.94	
	Water Content, %	19.1	18.8	18.5	
	Dry Density, pcf	111.1	111.7	112.5	
At Test	Saturation, %	100.0	100.0	100.0	
¥	Void Ratio	0.5167	0.5088	0.4986	
	Diameter, in.	2.36	2.36	2.36	
	Height, in.	0.93	0.93	0.92	
No	rmal Stress, psf	500	1000	2000	
Fai	l. Stress, psf	586	858	1487	
S	train, %	1.7	2.5	7.2	
Ult	. Stress, psf				
S	train, %				
Str	ain rate, in./min.	0.10	0.10	0.10	

Sample Type: Remolded

Description: Dusky Red, Silty Clayey SAND with

Gravel (decomposed rock)

Assumed Specific Gravity= 2.70

Remarks: Remolded to 126 pcf wet density

Client: MTCo

Project: Silva Parkway Interchange

Sample Number: TP-10-122-D1

**Depth:** 0.0'-3.5'

**Proj. No.:** 556.2

**Date Sampled:** 

DIRECT SHEAR TEST REPORT

Blackburn Consulting

Figure \_\_\_\_

Tested By: KLC

\_\_\_\_\_ Checked By: KLC

# Auburn Office:

11521 Blocker Drive, Suite 110 • Auburn, CA 95603 (530) 887-1494 • Fax (530) 887-1495



Modesto Office: (209) 522-6273 West Sacramento Office: (916) 375-8706

# Rock Core Compression Test

( ASTM D7012)

BCI File No.: 556.2 Project Name: Silva Valley Interchange

Specimen	Depth (ft)	FINAL TRIM LENGTH (in.)	Trim Length ORIGINAL (in.)	ORIGINAL	DIAIMETER (in.)	AREA (in.²)	TOTAL LOAD (lbs.)	COMP STRENGTH (psi)	UB RATIO	CORR. FACTOR	CORR. COMP. STRENGTH. (psi)
-10-001	18.25-18.9	5.13	5.14	7.50	2.440	4.68	148980	31,860	2.10	1.01462	32330
R10-002	5.4-6.5	5.44	5.44	13.00	2.399	4.52	101660	22,490	2.27	1.0225991	23000
10-003	20.0-20.65	5.36	5.36	7.75	2.400	4.52	69805	15,430	2.23	1.0210302	15750
10-005	9.25-10.15	5.50	5.56	10.80	2.397	4.51	25585	5,670	2.29	1.0238017	5800
10-006	13.0-14.25	5.50	5.50	15.00	2.395	4.51	25560	5,670	2.30	1.0238863	5810
R10-007	28.0-29.0	5.38	5.44	12.00	2.401	4.53	81265	17,950	2.24	1.0212764	18330
R10-008	14.5-15.2	5.13	5.19	8.50	2.410	4.56	50835	11,140	2.13	1.0158533	11320
10-009	21.25-22.5	5.50	5.50	10.80	2.396	4.51	117550	26,070	2.30	1.023844	26690
R10-010	16.0-16.5	5.31	5.18	7.30	2.392	4.49	55995	12,460	2.22	1.0204035	12710
R10-126	21.73-22.65	5.38	5.44	10.80	2.397	4.51	99210	21,990	2.24	1.0214487	22460

11521 Blocker Drive, Suite 110 - Auburn, CA 95603 (530) 887-1494 • Fax (530) 887-1495



West Sacramento Office: (916) 375-8706 Modesto Office: (209) 522-6273

# **Rock Core Compression Test**

( ASTM D7012)

BCI File No.: 556.2 Project Name: Silva Valley Parkway

				_	
WEIGHT (Pcf)	186	167			
WET CÓRE WEIGHT	1116	331			
DRY CORE WEIGHT	1116	33.1			
CORR COMP. STRENGT H (psi)	8500	4930			
CORR	1.015272	*			
UD RATIO	2,12	1.75			
COMP STRENGTH (psi)	8,370	4,930			
TOTAL LOAD (lbs.)	37765	12050			
'AREA (in.²)	4.51	2.45			
DIAMETER (in.)	2.397	1.765			
ORIGINAL (in.)	10.750	3.630			
Trim Length (in.)	5.080	3.130			
FINAL TRIM LENGTH (in.)	5.070	3.090			]
Depth (ft)	22.1-22.5	7.25-7.50			
Specimen .	R10-141 Run 6	R10-155 Run 1			

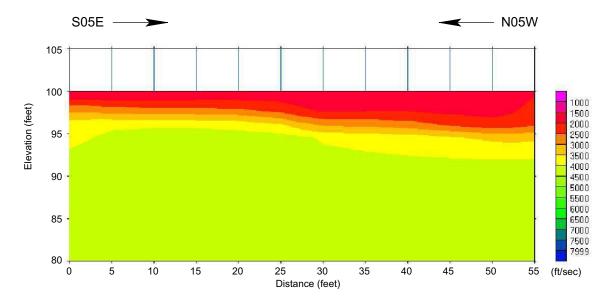
<sup>\*</sup> L/D ratio does not conform to ASTM standards

# Appendix C

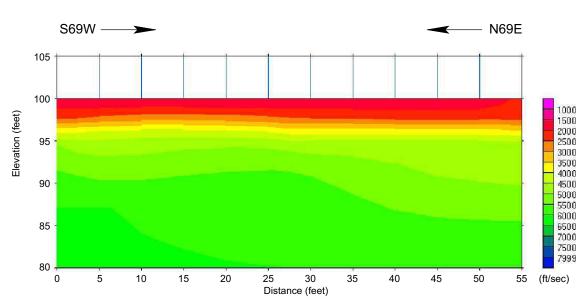
Seismic Refraction Profiles



# SR1



# SR2





11521 Blocker Drive, Ste 110 Auburn, CA 95603 Phone: (530) 887-1494 Fax: (530) 887-1495 www.blackburnconsulting.com

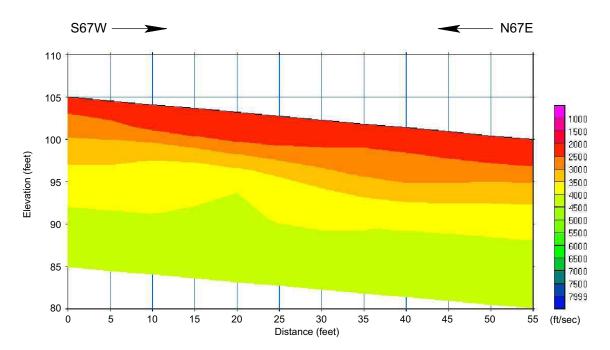
# **SEISMIC PROFILES**

Silva Valley Parkway Interchange EA 03-1E2901 El Dorado County, California File No. 556.2

October 2012

Appendix C

# SR3





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# **SEISMIC PROFILES**

Silva Valley Parkway Interchange EA 03-1E2901 El Dorado County, California File No. 556.2

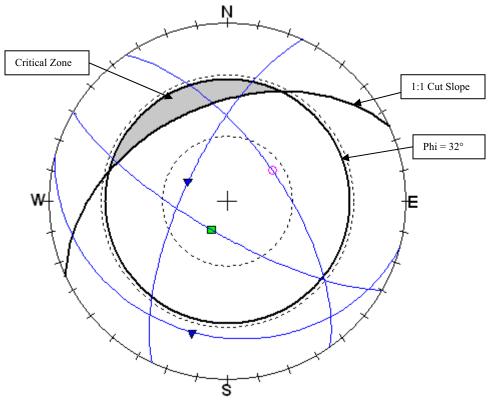
October 2012

Appendix C

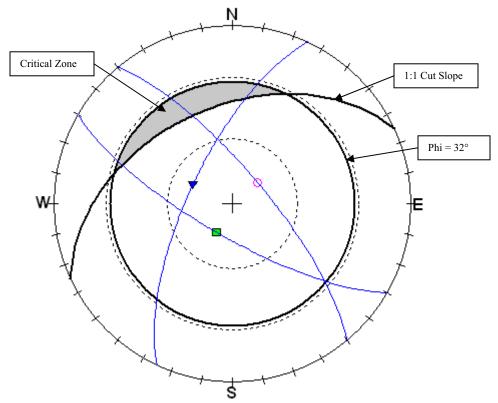
Appendix D

Calculations

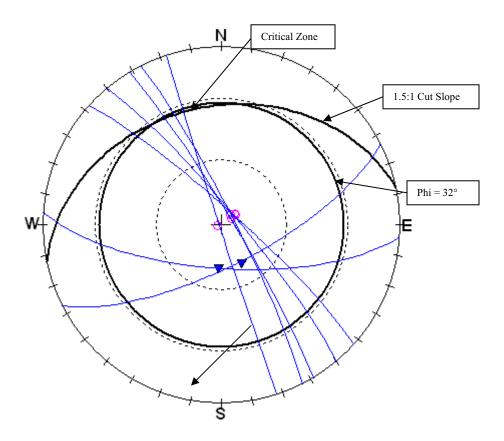




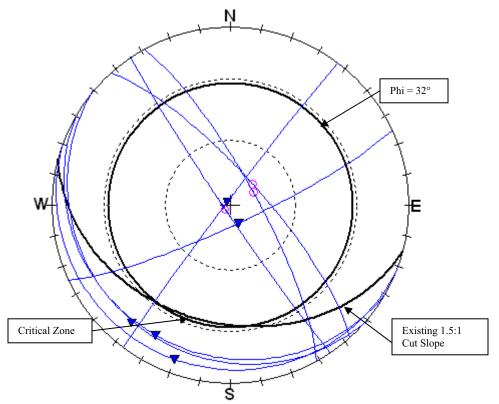
Stereonet Plot of Discontinuities, Eastbound Auxiliary Lane, 1:1 Cut A2 Line 77+00-89+00, Western End



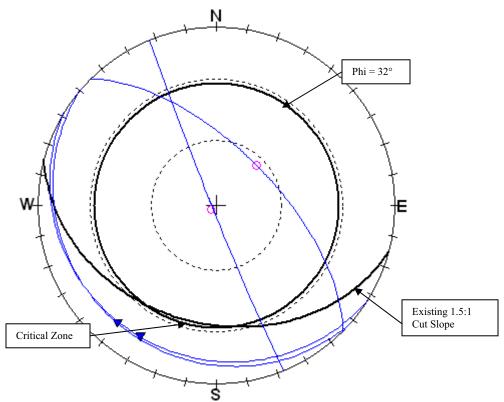
Stereonet Plot of Discontinuities, Eastbound Auxiliary Lane, 1:1 Cut A2 Line 77+00 – 89+00, Eastern End



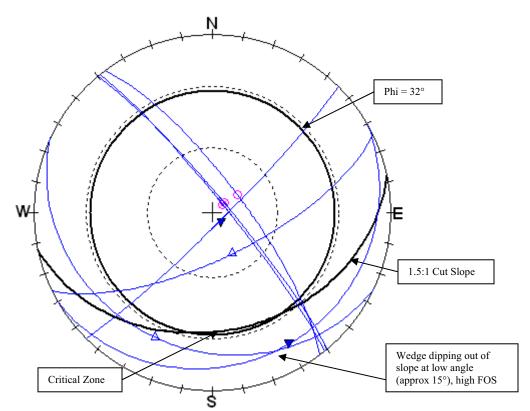
Stereonet Plot of Discontinuities, Silva Valley Parkway OC, 1.5:1 Cut At South Abutment (approximately A3R Line, 104+00 to 108+00)



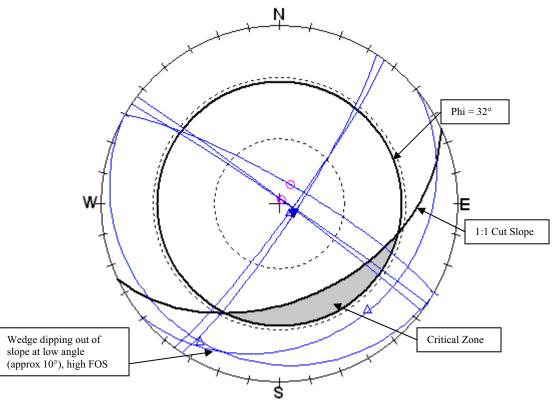
Stereonet Plot of Discontinuities, Westbound Auxiliary Lane Cut/Wall Approximately A3L Line 126+00 to 134+00, East End



Stereonet Plot of Discontinuities, Westbound Auxiliary Lane Cut/Wall Approximately A3L Line 126+00 to 134+00, West End



Stereonet Plot of Discontinuities, Silva Valley Parkway OC, 1.5:1 Cut At North Abutment (approximately A3L Line, 103+00 to 108+00)



Stereonet Plot of Discontinuities, Westbound Auxiliary Lane 1:1 Cut, Approximately A2 Line, Station 85+00 to 89+00

# NOMINAL BEARING RESISTANCE -- STRENGTH LIMIT STATE (AASHTO Bridge Design Specifications)

Date:10/1/2012Support:Retaining Wall No 1Project:Silva Valley Parkway InterchangeBoring:T-10-111 and A-10-158BCI No:556.2Base of Footing:Varies at 663 to 669 ft

# Equation: $q_n = cN_{cm} + \gamma D_f N_{qm} C_{wq} + 0.5 \gamma BN_{\gamma m} C_{w\gamma}$

in which:

 $N_{cm} = N_c s_c i_c$   $N_{qm} = N_q s_q d_q i_q$   $N_{\gamma m} = N_{\gamma} s_{\gamma} i_{\gamma}$ 

$D_{w}$	$C_{wq}$	$C_{w\gamma}$
0	0.5	0.5
$D_{\rm f}$	1.0	0.5
>1.5B+D <sub>f</sub>	1.0	1.0

where:

qn = nominal bearing resistance  $N_c$ ,  $N_q$ , and  $N_{\gamma} = \text{bearing capacity factors}$ 

c = cohesion (psf)  $C_{wq} & C_{w\gamma} = \text{correction factors for location of ground water}$ 

B = footing width (feet)  $s_c$ ,  $s_\gamma$ , and  $s_q = \text{ footing shape correction factors}$ 

 $\gamma$  = total (moist) unit weight of soil (pcf)  $d_q$  = correction factor to account for shearing resistance

 $D_f$  = footing embedment depth (feet) in material above bearing level

 $i_c$ ,  $i_\gamma$ , and  $i_q$  = load inclination factors

 $D_w$  = depth to ground water taken from the ground surface (feet)

#### Input Parameters

γ =	125	(pcf)
φ =	25	(degrees) *
c =	800	(psf)*
$D_f =$	3.5	(feet)
$D_w =$	10	(feet)



Bottom Footing Elevation (feet): 661.5
Finished Grade (feet): 665.0
Ground Water Elevation (feet): 655.0

Resistance Factor  $(\phi_b)$ = 0.50

#### Strength Limit State

	Solve for Nor	ninal Bearing	Resistar	<u>ıce</u>									
	Effe	ctive							Nominal		Fac	tored Non	ninal
		imensions	$C_{wq}$	C <sub>wv</sub>	S .	Sy	$S_q$		ring Resista			ring Resist	
	В'	L'	Cwq	Cwγ	5 c	5 γ	S q		istance Factor =			stance Factor	
Case 1	`	eet)						(psf)	(ksf)	(tsf)	(psf)	(ksf)	(tsf)
1	2.0	20.0	1.00	1.00	1.00	1.00	1.00	22600	22.60	11.3	11300	11.30	5.6
2	6.0	20.0	1.00	0.86	1.15	0.88	1.14	27542	27.54	13.8	13771	13.77	6.9
3	8.0	20.0	1.00	0.77	1.21	0.84	1.19	29043	29.04	14.5	14522	14.52	7.3
4	10.0	20.0	1.00	0.72	1.26	0.80	1.23	30490	30.49	15.2	15245	15.24	7.6
5	12.0	20.0	1.00	0.68	1.31	0.76	1.28	31882	31.88	15.9	15941	15.94	8.0
6	14.0	20.0	1.00	0.65	1.36	0.72	1.33	33220	33.22	16.6	16610	16.61	8.3
7	18.0	20.0	1.00	0.62	1.46	0.64	1.42	35732	35.73	17.9	17866	17.87	8.9
8	21.0	20.0	1.00	0.60	1.54	0.58	1.49	37473	37.47	18.7	18737	18.74	9.4
Case 2													
1													
2													
3													
4													
5													
6										_			
7										_			
8													

Bearing Capacity Factors

 $N_c = 20.72$ 

 $N_q = 10.66$ 

 $N_{v} = 10.88$ 

Shape Correction Factors

ф	s <sub>c</sub>	Sy	$s_q$
$\phi = 0$	1 + (B/5L)	1.0	1.0
φ > 0	$1 + (B/L)(N_q/N_c)$	1 - 0.4(B/L)	1 + (B/L)tanφ

Note: If L > 5B, then s<sub>c</sub>, s<sub>y</sub>, and s<sub>q</sub> = 1.0 (Geotechnical Engineering Circular No. 6, FHWA-SA-02-054, pgs 55-56)

<sup>\*</sup> Conservative value of phi and c assumed based on field conditions

BCI File No. 556.2 May 8, 2012

### MSE WALL - CALCULATIONS FOR BEARING

## **Wall Design Information**

The MSE wall will be designed to Caltrans 2010 Standard details/specifications. Bridge Design Aids (BDA), 3-8, Attachment 2, October 2011 is used for design reference. MTCo indicates that total wall height (H1, foundation to roadway level) will range from 14'-2" to 16'-8". Bearing stress for the Strength condition will range from 3.93 ksf to 4.37 ksf. The following design information is provided in BDA 3-8:

H1 (H, face height)	14'-2" (12'-6")	16'-8" (15'-0")
BW (L, reinf. length)	11'-6" (10'-0")	13'-6" (12'-0")
Service q, B'(effect. width)	2.47 ksf, 6.87 ft.	2.80 ksf, 8.58 ft.
Strength q, B'(effect. width)	3.93 ksf, 6.92 ft.	4.37 ksf, 8.56 ft.
Extreme q, B'(effect. width)	3.35 ksf, 5.08 ft.	3.79 ksf, 6.34 ft.

The MSE wall will be located on existing embankment fill for US 50. The fill consists of locally derived, coarse, rocky fill (silty/sandy gravel with cobbles). The embankment slope has a gradient of approximately 1.5H:1V. Minimum embedment depth is 2.5 feet with a minimum clearance of 4 feet from foundation face to slope.

Assumed embankment material properties:

- Moist unit weight  $(\gamma) = 140$  pcf, use 130 pcf in bearing calculation
- Phi  $(\Phi)$  angle = 44° (from Figure 10.4.6.2.4-1, AASHTO LRFD BDS), use 38° for evaluation
- Cohesion = 100 psf (for some fines and shear through weathered rock pieces)
- Groundwater is well below foundation elevation

#### Bearing Resistance (references are AASHTO LRFD BDS with California Amendments)

The factored resistance is:

```
qR = \varphi b \ qn \ (10.6.3.1.1-1)
```

#### Where:

 $\varphi b$  = resistance factor (specified in Table 11.5.6-1 for MSE Wall) = 0.65 at strength limit qn = nominal bearing resistance (ksf)

For footings on a slope:  $qn = cN_{cm} + 0.5\gamma BN_{vm}Cw$  (10.6.3.1.2a-1 and 10.6.3.1.2c)

#### Where:

c = cohesion =  $\sim 100$  psf,  $\gamma = \text{unit weight} = \sim 130$  pcf

B = effective footing width = B'= see above wall design information

 $N_{cm} = 5$  (based on Figure 10.6.3.1.2c-1 "Modified Bearing Capacity Factors for Footing in Cohesive Soils and on or adjacent to Sloping Ground")

 $N_{\gamma m}$  = 15 (based on reduced  $\Phi$  angle of 38°, and Figure 10.6.3.1.2c-2 "Modified Bearing Capacity Factors for Footing in Cohesionless Soils and on or adjacent to Sloping Ground")

Cw = 1.0 (groundwater depth >1.5B+footing depth)

# MSE WALL – CALCULATIONS FOR BEARING (continued)

# Capacity at Strength Limit

For B' = 6.92 ft  
qn = 100 psf (5) + 0.5 (130 pcf) (6.92 ft) (15) (1.0) = 7,247 psf  
qR = 0.65 (7,247 psf) = 4,711 psf = 
$$\underline{4.71 \text{ ksf}}$$
  
For B' = 8.56 ft  
qn = 100 psf (5) + 0.5 (130 pcf) (8.56 ft) (15) (1.0) = 8,846 psf  
qR = 0.65 (8,846 psf) = 5,750 psf =  $\underline{5.75 \text{ ksf}}$ 

### Capacity at Extreme Limit

For B' = 5.08 ft  
qn = 100 psf (5) + 0.5 (130 pcf) (5.08 ft) (15) (1.0) = 5,443 psf  
qR = 1.0 (5,443 psf) = 5,443 psf = 
$$\underline{5.44 \text{ ksf}}$$
  
For B' = 6.34 ft  
qn = 100 psf (5) + 0.5 (130 pcf) (6.34 ft) (15) (1.0) = 6,682 psf  
qR = 1.0 (6,682 psf) = 6,682 psf =  $\underline{6.68 \text{ ksf}}$ 

The Factored Resistance at the strength and extreme limit is adequate for design loads indicated above

Project: Silva Valley Parkway IC BCI No.: 556.2

Date: 5/8/2012 Location: MSE Wall at E3 110+00, H1 = 14' 2"

By: PFF

# FOOTING UNFACTORED VERTICAL LOAD BASED ON ELASTIC SETTLEMENT

Settlement (in.)	0.62
Footing Length (ft.)	150
Footing Width (ft.)	6.92
A, Footing Area (sq.	
ft)	1038
Square Root A	32.218007
Es (ksf)	1600
v, Poisson's Ratio	0.3
βz (shape and rigidity	
factor)	1.41
Qo (unfactored	
vertical pressure-	
ksf)	3.98
Qo (kPa)	190
_	

TABLE 4.4.7.2.2B Elastic Shape and Rigidity Factors EPRI (1983)

L/B	$\beta_z$ Flexible (average)	$\begin{array}{c} \beta_z \\ \text{Rigid} \end{array}$
Circular	1.04	1.13
1	1.06	1.08
2	1.09	1.10
3	1.13	1.15
5	1.22	1.24
10	1.41	1.41

TABLE 4.4.7.2.2A Elastic Constants of Various Soils Modified after U.S. Department of the Navy (1982) and Bowles (1982)

	Typical Range of Values		Estimating Es From E <sub>3</sub> F	rom N(1)
Soil Type	Young's Modulus, E <sub>a</sub> (ksf)	Poisson's Ratio, v (dim)	Soil Type	E <sub>a</sub> (ksf)
Clay:				
Soft sensitive Medium stiff	50-300 300-1,000	0.4-0.5 (undrained)	Silts, sandy silts, slightly cohesive mixtures	$8N_1^{(2)}$
to stiff Very stiff	1,000-2,000		Clean fine to medium sands and slightly silty sands	$14N_1$
			Coarse sands and sands with little gravel	$20N_1$
Loess	300-1,200	0.1-0.3	Sandy gravel and gravels	$24N_1$
Silt	40-400	0.3-0.35		
Fine sand:			Estimating E <sub>s</sub> Fron	n s <sub>u</sub> (3)
Loose	160-240			
Medium dense	240-400	0.25		
Dense	400-600		Soft sensitive clay	$400s_u$ -1,000 $s_u$
Sand:			Medium stiff to stiff clay	$1,500s_u-2,400s_u$
Loose	200-600	0.2-0.35	Very stiff clay	$3,000s_u$ - $4,000s_u$
Medium dense	600-1,000			
Dense	1,000-1,600	0.3-0.4	Estimating E <sub>s</sub> Fron	n q <sub>e</sub> <sup>(4)</sup>
Gravel:				
Loose	600-1,600	0.2-0.35	Sandy soils	$4q_e$
Medium dense	1,600-2,000		-	-
Dense	2,000-4,000	0.3-0.4		

<sup>(1)</sup>N = Standard Penetration Test (SPT) resistance.

Note: Tables from Caltrans Bridge Design Specifications (BDS), November 2003; Unfactored vertical pressure calculated using Equation 4.4.7.2.2-1 of the BDS.

$$S_e = [q_o (1-v^2) \sqrt{A}]/E_s \beta_z$$
 (4.4.7.2.2-1)

<sup>(2)</sup>N<sub>1</sub> = SPT corrected for depth. (3)S<sub>u</sub> = Undrained shear strength (ksf).

<sup>(4)</sup>q<sub>e</sub> = Cone penetration resistance (ksf).

Project: Silva Valley Parkway IC BCI No.: 556.2

Date: 5/8/2012 Location: MSE Wall at E3 110+00, H1 = 16' 8"

By: PFF

# FOOTING UNFACTORED VERTICAL LOAD BASED ON ELASTIC SETTLEMENT

0.76
150
8.56
1284
2946
1600
0.3
1.41
4.38
210

TABLE 4.4.7.2.2B Elastic Shape and Rigidity Factors EPRI (1983)

L/B	$\beta_z$ Flexible (average)	$\begin{array}{c} \beta_z \\ \text{Rigid} \end{array}$
ircular	1.04	1.13
1	1.06	1.08
2	1.09	1.10
3	1.13	1.15
5	1.22	1.24
10	1.41	1.41

TABLE 4.4.7.2.2A Elastic Constants of Various Soils Modified after U.S. Department of the Navy (1982) and Bowles (1982)

	Typical Range of Values		Estimating Es From E <sub>s</sub> Fr	rom N(1)
Soil Type	Young's Modulus, E <sub>a</sub> (ksf)	Poisson's Ratio, v (dim)	Soil Type	E <sub>n</sub> (ksf)
Clay:				
Soft sensitive Medium stiff	50-300 300-1,000	0.4-0.5 (undrained)	Silts, sandy silts, slightly cohesive mixtures	$8N_1^{(2)}$
to stiff Very stiff	1,000-2,000		Clean fine to medium sands and slightly silty sands	$14N_1$
			Coarse sands and sands with little gravel	$20N_l$
Loess	300-1,200	0.1-0.3	Sandy gravel and gravels	24N <sub>1</sub>
Silt	40-400	0.3-0.35		
Fine sand:			Estimating E <sub>s</sub> Fron	n s <sub>u</sub> (3)
Loose	160-240			
Medium dense	240-400	0.25		
Dense	400-600		Soft sensitive clay	$400s_u$ -1,000 $s_u$
Sand:			Medium stiff to stiff clay	$1,500s_u-2,400s_u$
Loose	200-600	0.2-0.35	Very stiff clay	$3,000s_u$ - $4,000s_u$
Medium dense	600-1,000			
Dense	1,000-1,600	0.3-0.4	Estimating E <sub>s</sub> Fron	n q <sub>e</sub> <sup>(4)</sup>
Gravel:				
Loose	600-1,600	0.2-0.35	Sandy soils	4q.
Medium dense	1,600-2,000			
Dense	2,000-4,000	0.3-0.4		

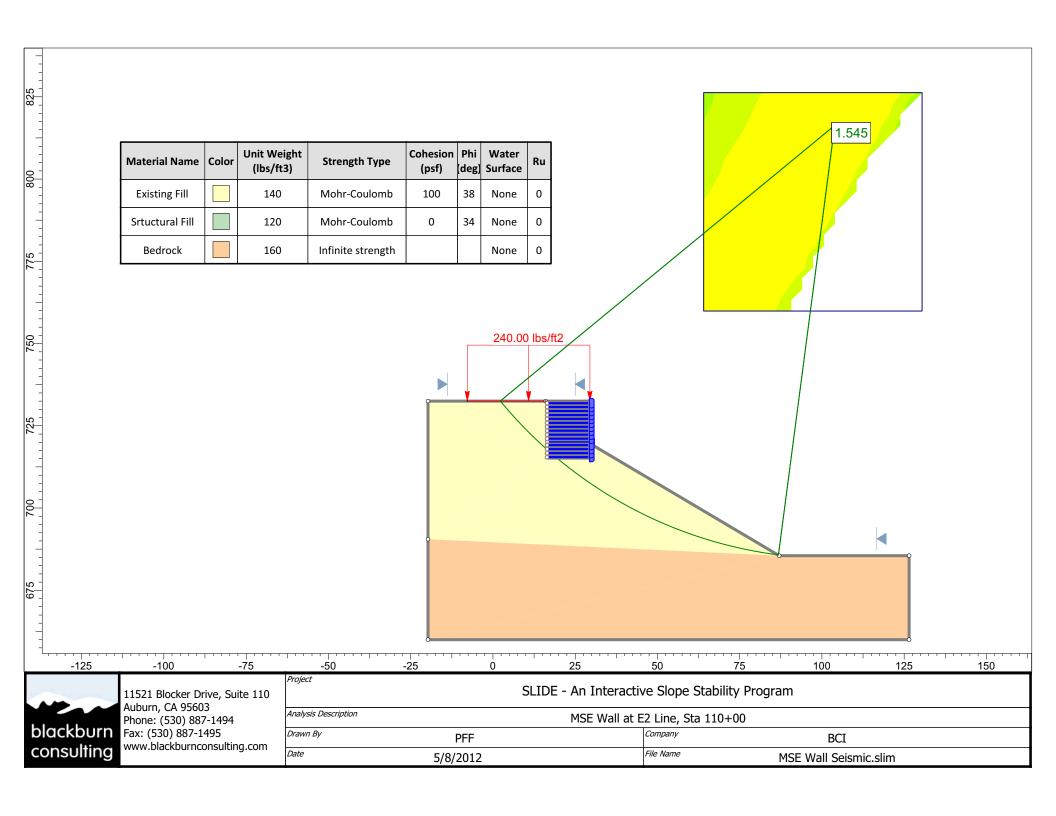
(1)N = Standard Penetration Test (SPT) resistance.

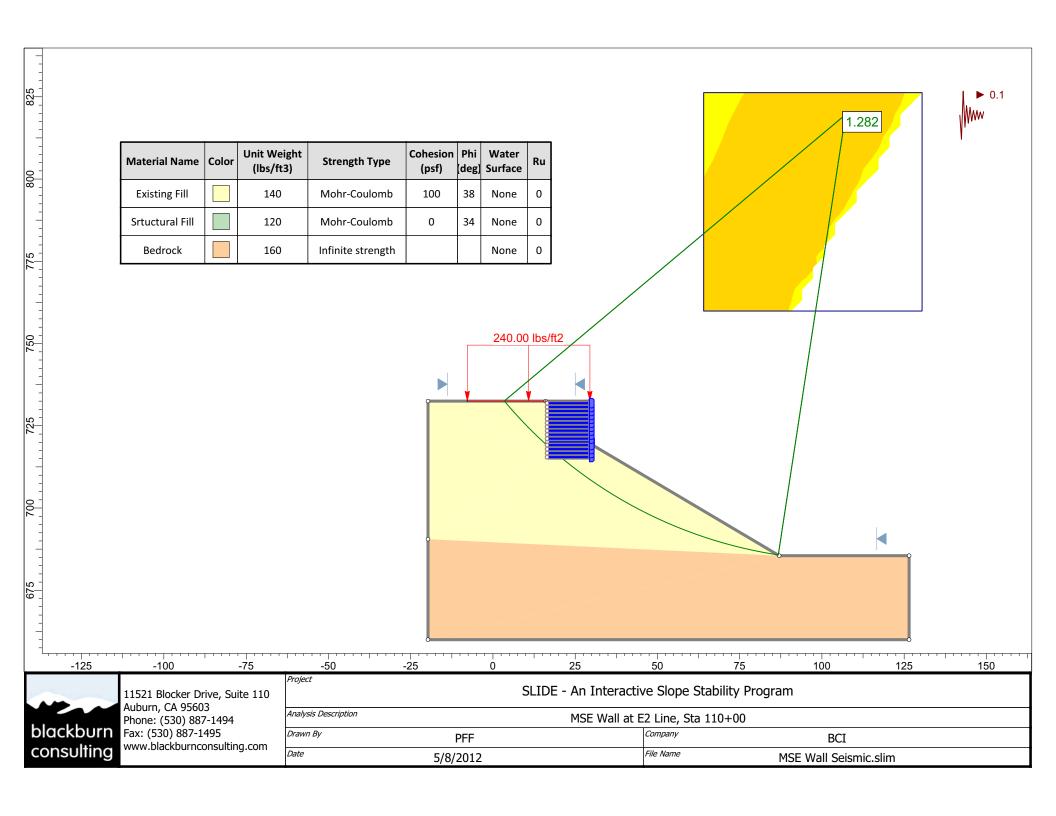
(2)N<sub>1</sub> = SPT corrected for depth. (3)s<sub>u</sub> = Undrained shear strength (ksf).

(4)q<sub>e</sub> = Cone penetration resistance (ksf).

Note: Tables from Caltrans Bridge Design Specifications (BDS), November 2003; Unfactored vertical pressure calculated using Equation 4.4.7.2.2-1 of the BDS.

$$S_e = Lq_o (1-v^2) \sqrt{A} J/E_i \beta_z$$
 (4.4.7.2.2-1)





# Appendix E

Report Comment and BCI Response



# **Office of Special Funded Projects** Comment & Response Form (Revised 08/2011)

General Project Information (OSFP Liaison to complete)				<b>/iew Phase</b> FP Liaison to c	omplete)	Reviewer Inform (Reviewer to comple		
Dist EA:	03-1E2901			PSR/PDS (R	eview No. 1 )	Reviewer Name:	Eric Fredrickson	
Proj ID (Phase):	03 0000 0258			APS/PSR (Re	eview No. )	Functional Unit:	OSFP	
Dist-Co-Rte	03-ED-50			APS/PR (Rev	view No. )	Cost Center:		
Project Name:	Silva Valley Pkw	y I/C		Type Selection	on	Phone Number:		
OSFP Liaison:	Eric Fredrickson			65% PS&E U	Inchecked Details	e-mail:		
Phone:	916-227-8916		V	PS&E (Revie	w No. 1)	Date of Review:	6-4-12	
E-mail:	eric_fredrickson	@dot.ca.gov		Construction		Structure Name*:	Silva Valley Pkwy	OC (and var)
				Other:		Br No*:	25-0127 (& var)	
						(*Use if necessary to	when comment sheets a	re by individual structure)
			Cor	nsultant Info	rmation (to be filled in by	Consultant)		
	Structure Lead Last Name)	Consult	ant F	irm	Phone Number	E-mail		Response Date
(1 11 00 0110		MTCo / Blackbu	rn Co	onsulting				

#	Doc. (See Note 1)	Page, Section, or SSP	GEOTECHNICAL DESIGN REPORT (March 2012) Review Comments	Consultant Responses	<b>✓</b>
1	GDR	8.4.1	Update section to reflect the Revised Standard Plan retaining wall Type 1 (2010). Verify Load Case, foundation pressure, footing dimensions, etc.	Update and verification is included in the report	
2		8.5.2	Need to acknowledge that the Bucks Ravine Box Culvert will be widened at both ends ("E1" Line and "W3" Line). Do same recommendations apply to upstream end of culvert?  Verify that LRFD loadings / capacities were considered.	Acknowledgement, discussion, and verification is included in the report	
3		11	Revise 2 <sup>nd</sup> paragraph to reference Caltrans 2010 Standard Plans and Standard Specifications for this project.	Revision is included in the report	
4		General	Verify 'blasting' / 'no blasting' requirements around structure foundations.	Requirements were discussed with MTCo and Caltrans personnel. Recommendations are included in the report.	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)							
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs		
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs			

✓= Comment Resolved (for Reviewer's use)

Submittal Data(Reviewer to complete)Project ID: 03 0000 0258Reviewer: EDFDate of Review:Functional Unit: \_. Str Name\*: Br No\*. \*=if applicable

	Doc.	Page,				
ш	(See	Section, or				
#	Note 1)	SSP	Review Comments	Consultant Responses	✓	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)						
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs	
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs		

✓= Comment Resolved (for Reviewer's use)

#### Silva Valley Parkway Interchange 95% Comment Matrix El Dorado County

	Code: A: Will Incorporate, B: MTCo to Evaluate, C: Will Not Incorporate, D: Agency to Evaluate, E: Caltrans to Evaluate, F: Will Incorporate Later, G: No Action Required							
# Reviewer Sheet Name Description		Response/Action	Code	Resp. By	Ver. By			
4	CG	GDR Page 17	Name of specific equipment "Caterpillar D9" may have to be removed.	We have incorporated your comment				
5	CG	GDR Page 21	Be consistent with unit, either "tsf" or "ksf".	We have incorporated your comment				
6	CG	GDR Page 25	Typo, replace EDAQMD with EDCAQMD	We have incorporated your comment				
7	CG	GDR Page 25	Typo, replace ACTM with ATCM	We have incorporated your comment				
8	CG	GDR Page 25	Specs shall meet 2010 version.	We have incorporated your comment				
9	CG	GDR Page 28	Delete "We do not warranty our services"	We have incorporated your comment				

US 50/SILVA VALLEY PARKWAY INTERCHANGE PHASE 1 CONTRACT NO. PW XX-XXXXX CIP NO. 71328 65% REVIEW DATE: December 2010

REVIEWER: <u>Janel Gifford</u>

#	PAGE	COMMENTS	RESPONSE	RESOLVED
1	pages 15 -16 Draft Geotech Report	Table 2 The line and stationing for the Silva Valley Overcrossing does not match the line and stationing used on the plans. Westbound Auxiliary Lane "A3L" Line should be "A2".	BCI Response - Reference to Silva Valley Overcrossing is a general location only. Stationing is referenced to the appropriate line. We understand that the station line reference to A3 rather than A2 is correct. No changes to GDR text.	
2	page 18 - Draft Geotech Report	Does the Environmental document allow blasting? OE and Construction requests to review the Supplement to the Environmental Document before it is circulated to the public for comment.	BCI Response - the discussion is provided in case blasting is used. MTCo will provide guidance on use of blasting. No changes to GDR text.	
3	page 18 - Draft Geotech Report	Section 8.2 "We observed other fill locations that we consider to be "non-structural fill" in the following areas: Westbound off-ramp, W1 Line Sta. 112+00 to 114+50 Tong Road, TR Line Sta. 111+75 to 114+50 Silva Valley Parkway, SVP Sta. 180+25 to 180+75 (dumped material)  Remove existing fill at these locations to the elevation of original grade (native ground) and replace as engineered fill in accordance with the project specifications."  The Plans and specs do not show this fill removal. Also the Tong Road stationing in the report does not match the stationing used in the Plans.	BCI Response - MTCo will address Plan and Specification requirements. The Tong Road alignment has been changed since our draft report and this section is modified appropriately.	
4	Draft Geotech Report & Typical Sections	8.3 Embankments "Construct embankments and place new fill in accordance with Caltrans "Standard Specifications" (including Section 19, "Earthwork"). Due to the presence of loose material at the toe of some slopes, we recommend excavation of a keyway (toe bench), 2 feet deep by 10 feet wide, into competent material and/or bedrock for the following locations: Westbound Shoulder, A2 Line, Sta. 70+00 to 76+00, and A3L Line, Sta. 135+00 to 137+50  Eastbound Shoulder, A3R Line, Sta. 119+00 to 123+00, and 131+00 to 136+00 Silva Valley Parkway, Southbound Shoulder, SVP Line Sta. 180+50 to 182+00"  X-2 implies that the toe key occurs between "A2" STA 80+75 and "A2" 83+75 but the Geotech report does not require it in this range.  X-6 does not show any toe rock for the SVP line.	BCI Response - BCI did not recommend removal at the "A2" STA 80+75 and "A2" 83+75 location but it appears that MTCo did for uniformity. No change to the GDR text.	

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5	page 19 - Draft Geotech Report	Section 8.3.1 states "We expect that embankment fill will consist of rocky fill material generated from cut portions of the project, a potential borrow area in the northeast quadrant, and unidentified commercial material sources."  Neither the plans nor the specs show this borrow area.	RESPONSE  BCI Response - This area was identified early in the project as a potential location to obtain borrow materials. No change to the GDR text.	RESOLVED
6	page 20 - Draft Geotech Report	The Plans did not include erosion control sheets. The erosion control considerations listed in the geotech report do not match the provisions of the Erosion Control (Type D) special provisions provided in the 65% specs.	BCI Response - The erosion control considerations provided are based on recommendations from Caltrans. MTCo will provide design specifications as appropriate. No change to the GDR text.	
7	pages 25-26 Draft Geotech report	The Geotech Report recommends preparation of an Asbestos Hazard Mitigation Plan (i.e. Asbestos Dust Mitigation Plan [ADMP]), but the specs (Dust Control spec) and the Engineers Estimate (bid items for Dust Control and for Prepare ADMP) do not address this.	BCI Response - No change to the GDR text.	
8	page 28 - Draft Geotech report	10.4 Hazardous Waste Considerations "An evaluation of potential aerially deposited lead (ADL) impacts is in progress."  What is the status of this evaluation?	BCI Response - ADL has been addressed in accordance with Caltrans' requirements. Final status is pending review by Caltrans. Text is modified to read "BCI evaluated the potential for aerially deposited lead (ADL) impacts and presents the results under separate cover."	
9	General	Will BCI be retained for consultation during construction? If so, will DOT engage them directly or through the design consultant?	MTCo to respond	
10	X-1, L-2	General- L2 shows sawcut at new ETW; typical sections shows sawcut 9' off existing ETW. Why are do some structural sections have only 0.90' of AB while others have 1.85' of AB?	BCI Response - The variable thickness of AB in the structural sections is due to subgrade with different Resistance Values (R-Value) used in design. Section thicknesses with 0.90° of AB are generally cut locations underlain by rock; sections with 1.85° of AB are generally fill, existing fill, and/or weaker soil locations.	
11	X-2, L-1, L-2	General- L-1 & L-2 show sawcut at new ETW; typical sections shows sawcut 9' off existing ETW. Why are do some structural sections have only 0.90' of AB while others have 1.85' of AB?  3. WB US-50 "A2" STA 69+11.05 to "A2" STA 78+25 and "A2" STA 80+75 to "A2" STA 83+75 - The 60' dimension from the HP to the RW line is not supported by what is shown on layout sheet. This typical section shows a bioswale, but for the range of STA 80+75 to 83+75 there is none. The Draft Geotech report recommends toe key between STA 70+00 and STA 76+00, but this typical implies it occurs throughout the ranges shown- the layout sheets do not provide any clarification.	MTCo to respond	

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REVIEWER: \_\_<u>Janel Gifford</u>

#	PAGE	COMMENTS	RESPONSE	RESOLVED
12	X-3	1. EB US 50 STA "A3R" 112+22.48 to A3R 128+25.82 - Toe ditch shown in this section should also be shown on drainage plans. Draft Geotech Report indicates toe key applies between STA 119+00 and 123+00, but typical section implies toe key applies through out the range- layout sheets provide no clarification.  2. WB US 50 - STA "A3L" 120+50 to "A3L" 124+55 and STA "A3L" 135+13.52 to STA "A3L" 137+42.64 - The 15' min dimension shown from the toe of slope to the RW and from toe of slope to HP does not work with the HP to RW dimensions of 35'-48'. Where 0' apply between ES and sawcut? The Draft Geotech Report recommends a toe key between STA 135+00 and 137+50, but this typical section implies the toe key applies throughout the range- layout sheet provides no clarification.		
13	X-6, C-18	Silva Valley Pkwy/White Road Typical Section-  3. This typical begins at STA "SVP" 121+04.74, but the work starts at STA 138+76.95 and this typical section is not representative of the work to be done between STA 138+76.95 and BB. Draft Geotech Report recommends toe key for southbound shoulder from STA 180+50 to 182+00.	MTCo to respond	
14	WB Off Ramp Ret Wall	Sheets 1 of 5 and 5 of 5 - General Plan No.1 and Retaining Wall Type 7 H=4'-11'- Draft Geotech Report has max height as 7'. This retaining wall is founded in rock, but the design parameters shown are for soil.	MTCo to respond	