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Geotechnical ▪ Construction Services ▪ Forensics

File No. 1072.14
June 4, 2012

Mr. Brent Lemon, P.E.
Quincy Engineering, Inc.
3247 Ramos Circle
Sacramento, CA 95827

Subject: **GEOTECHNICAL DESIGN/MATERIALS REPORT – ADDENDUM #1**
US 50/Latrobe Road West Bound On- and Off-Ramps
PM 0.02/1.4, 03-ED-50, EA 03-2E5101
El Dorado County, California

Dear Mr. Lemon:

Blackburn Consulting (BCI) prepared this addendum to our Geotechnical Design/Materials Report (GDR), dated March 30, 2012, for the subject project. This addendum addresses Caltrans comments to the GDR and foundations for new overhead signs CS-60 and CS-61.

To prepare this addendum, BCI:

- Reviewed comments by Caltrans, email submittal dated 4/13/2012
- Discussed the proposed overhead sign locations and design with Quincy Engineering, Inc. (QEI)
- Reviewed the project overhead sign plans by QEI dated 4/18/12 (Sheets S-1 through S-5, SD-1 through SD-4 and SQ-1 through SQ-6)
- Logged a cored test boring at the location of overhead sign CS-61
- Performed laboratory tests on soil and rock samples obtained from the test boring
- Performed engineering analysis to develop our conclusions and recommendations

Proposed Overhead Signs
CS-60 is a two-post truss, Type I-S post per Caltrans Standard Plans, to be located at the west-bound off-ramp. The foundation is shown as CIDH piles, 54" diameter and 18' deep, per Standard Plans. Existing subsurface data near this sign, including test boring R-99-B3 and test pit O-12-110, was submitted with the GDR report. No further exploration was performed at this location.

CS-61 is a single-post truss, Type I-VIII post per Caltrans Standard Plans, to be located at southbound El Dorado Hills Blvd. The foundation is expected to be either a CIDH pile, 60" diameter and 25' deep, or spread footing, 13'x18' in dimension, per Standard Plans. BCI completed test boring RDC-12-119 near this sign location to supplement a previous test pit (O-12-105).

Figure 1 shows the project vicinity and Figure 2 the exploration locations.

Supplemental Field Exploration
BCI completed Boring RDC-12-119 on May 16, 2012 to a depth of 31.6 feet. Our drilling sub-consultant (Taber Drilling) advanced the boring using 4" solid auger to a depth of 3.5 feet and HQ wire-line rock coring from 3.5 feet to 31 feet. We placed continuous core samples in labeled core boxes. Rob Pickard, BCI engineering geologist, logged the borings and retrieved samples for laboratory testing. We show the boring log and the Log of Test Borings (LOTB) drawing for the west-bound off-ramp bridge in Appendix A.

Subsurface Conditions
As described in the GDR, the site is underlain by variably weathered and fractured metavolcanic rock. Rock consistent with this description is present at both CS-60 and CS-61 sign locations.

At sign CS-60, boring R-99-B3 encountered 8 feet of fill (described as clayey sand with gravel and occasional cobble/boulder) underlain by meta-sedimentary and meta-volcanic rock to depth 26 feet. Core recovery within the rock was 69-94% and Rock Quality Designation (RQD)[1] between 10-72%. We classify this rock as having "poor to fair" rock mass quality based on Table 4.4.8.1.2A, Caltrans Bridge Design Specifications, November 2003.

At Sign CS-61, boring RDC-12-119 encountered 2.0 feet of pavement section (asphalt and baserock), underlain by meta-volcanic rock to depth 31.6 feet. Core recovery within the rock was nearly 100% and RQD between 52 to 100%. We classify this rock as having "good" rock mass quality based on Table 4.4.8.1.2A, Caltrans Bridge Design Specifications. Test Pit O-12-105 encountered silty gravel to depth 1.7 feet, with refusal on metavolcanic rock at this depth.

[1] RQD = Rock Quality Designation, defined as the sum of length of solid core pieces greater than 4 inches long divided by the total length of core run.

We did not observe serpentinite or other ultramafic rock types (a host rock for naturally occurring asbestos (NOA), or significant bands of fibrous (asbestiform) minerals within the rock cores.

Groundwater
Groundwater was present at approximately 7 feet deep in boring R-99-B3 (drilled February 1999), near the fill/rock interface. We did not encounter groundwater within the augered portion of boring RDC-12-119 (drilled May 2012). In general, we expect the surface soil/fill materials and upper portions of decomposed rock to be seasonally wet/saturated. Shallow groundwater and seepage can be expected along the soil/rock interface during the winter months or extended periods of rainfall.

Laboratory Testing
BCI completed the following laboratory tests on rock cores obtained from the test boring:

- Rock Compression - (ASTM D7012)
- Point Load Strength Index (ASTM 5731)
- Sulfate content (CTM 417), chloride content (CTM 422), pH (CTM 643) and resistivity testing (CTM 643)

Table 1 summarizes results of the rock compression tests.

Table 1 – Rock Compression Tests (ASTM D7012)

Test Boring	Core Depth (feet)	Compressive Strength (psi)
RDC-12-119	12.2-12.7	540*
RDC-12-119	16.9-17.5	4,510

*core broke along healed fracture

Results of Point Load Strength Index (PLI) on sections of hard rock show PLI from 290 to 841 psi. Based on a conversion factor of 24.5 to estimate unconfined compressive strength from PLI[2], compressive strengths range from 7,114 psi to 20,615 psi. Weaker rock cores, with PLI of 54-369 psi, correlate to compressive strength estimates of 1,334-9,040 psi.

We attach the laboratory test reports in Appendix B.

Table 2 shows results of the corrosivity tests from RDC-12-119. For comparison, corrosion tests previously completed for this project are included in Table 2.

[2]ASTM D5731

Table 2 - Corrosion Test Results (CTM 417, 422, 643)

Exploration/ Test Location ID	Sample No.	Sample Depth (feet)	pH	Resistivity (ohm-cm)	Chloride Content (ppm)	Sulfate Content (ppm)
RDC-12-119	Run 1	3.5-4.5	8.4	5,700	11	51
A-12-101	B7	0.5-5	8.5	2,676	7	12
A-12-104	B3	0.5-5	8.7	2,931	4	ND
A-12-111	B1	8-9	7.7	3,110	29	19
O-12-114	B2	5.5-6.5	7.9	1,810	10	18
R07-B1*	B1-1	5.5	7.01	1,930	16	52
R07-B1*	Run 1	15.5	7.55	1,050	32	154
A07-B2*	B2-4	21	7.25	3,220	6	19
A01-B2**	CB-2	0-6	7.0	3,880	8	5
A01-B5**	CB-5	0-6	6.9	3,347	13	8

*From BCI (2008) **From Espana (2002)

These results indicate non-corrosive soil and weathered rock conditions.

Foundation Recommendations

Based on the above, conditions are suitable for CIDH pile foundations (per Standard Plans) at both CS-60 and CS-61 locations, and for a spread footing at CS-61. At CS-60, Standard Plan CIDH depth of 18 feet will extend through about 8 feet of rocky fill and 10 feet into fractured rock. At CS-61, Standard Plan CIDH depth of 25 feet will extend through 2 feet of fill and about 23 feet into relatively hard rock.

The foundation drilling will require coring into the rock unit and may encounter seasonal ground water seepage along the soil/rock interface. These conditions are discussed below in Construction Considerations.

For footing design at CS-61, Standard Plan loading of 2.5 ksf is available within weathered rock underlying the existing pavement section. If necessary, a reduced footing dimension can be considered (or value engineered) by using drilled rock anchors to resist uplift and overturning loads. For pre-stressed rock anchors, use a minimum free-length of 10 feet and bond-length of 15 feet, ultimate grout-to-rock bond strength of 150 psi and working bond stress equal to 50% of the ultimate strength. Assuming 6-inch diameter drilled anchors, an ultimate design load of 500 kips per anchor can be developed within the rock unit (allowable load of 250 kips). Mechanical anchors can also be considered to engage the rock mass.

The actual quantity, spacing, length and diameter of anchors should be based on uplift loads determined by the designer. The type of anchors, grout (or resin) and installation method must be consistent with Caltrans Standard Specifications and approved by QEI and BCI prior to construction. Actual tensile capacity is the responsibility of the contractor and requires verification by proof testing during construction.

Construction Considerations

Caving of unconsolidated fill and soil overlying the rock can occur during excavation for the CIDH pile; use temporary casing for ground control, as needed.

CIDH drilling into rock will require coring at both sign locations. The rock varies from "moderately to slightly weathered", "soft to very hard" and "intensely to slightly fractured". Drilling within rock may require the use of equipment specifically tooled for "hard" rock excavation. The contractor should review the boring logs, including the RQD and compressive strength results, and plan accordingly.

Ground water seepage into CIDH pile excavations may be encountered during drilling, especially during winter construction. Use wet placement method for construction.

For footing construction (CS-61), excavation into the rock unit may be locally difficult and air tools/chiseling may be necessary.

Limitations

We assume the soil and groundwater conditions encountered in the subsurface explorations are representative of the conditions at the sign locations. Actual conditions between exploration points can be different. If differing site conditions are encountered, contact BCI immediately to provide additional recommendations.

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.

Please call if you have questions on this addendum or require additional information.

Sincerely;

BLACKBURN CONSULTING

Rick Sowers, P.E., C.E.G.
Senior Project Manager

for
Patrick Fischer, C.E.G.
Principal

FIGURES:

Figure 1: Vicinity Map
Figure 2: Site Plan

APPENDIX A:

Boring Log RDC-12-119
Log of Test Borings, Latrobe Road WB Off-Ramp UC (Sheet 1)
Legend of Logs

APPENDIX B:

Laboratory Test Results

APPENDIX C:

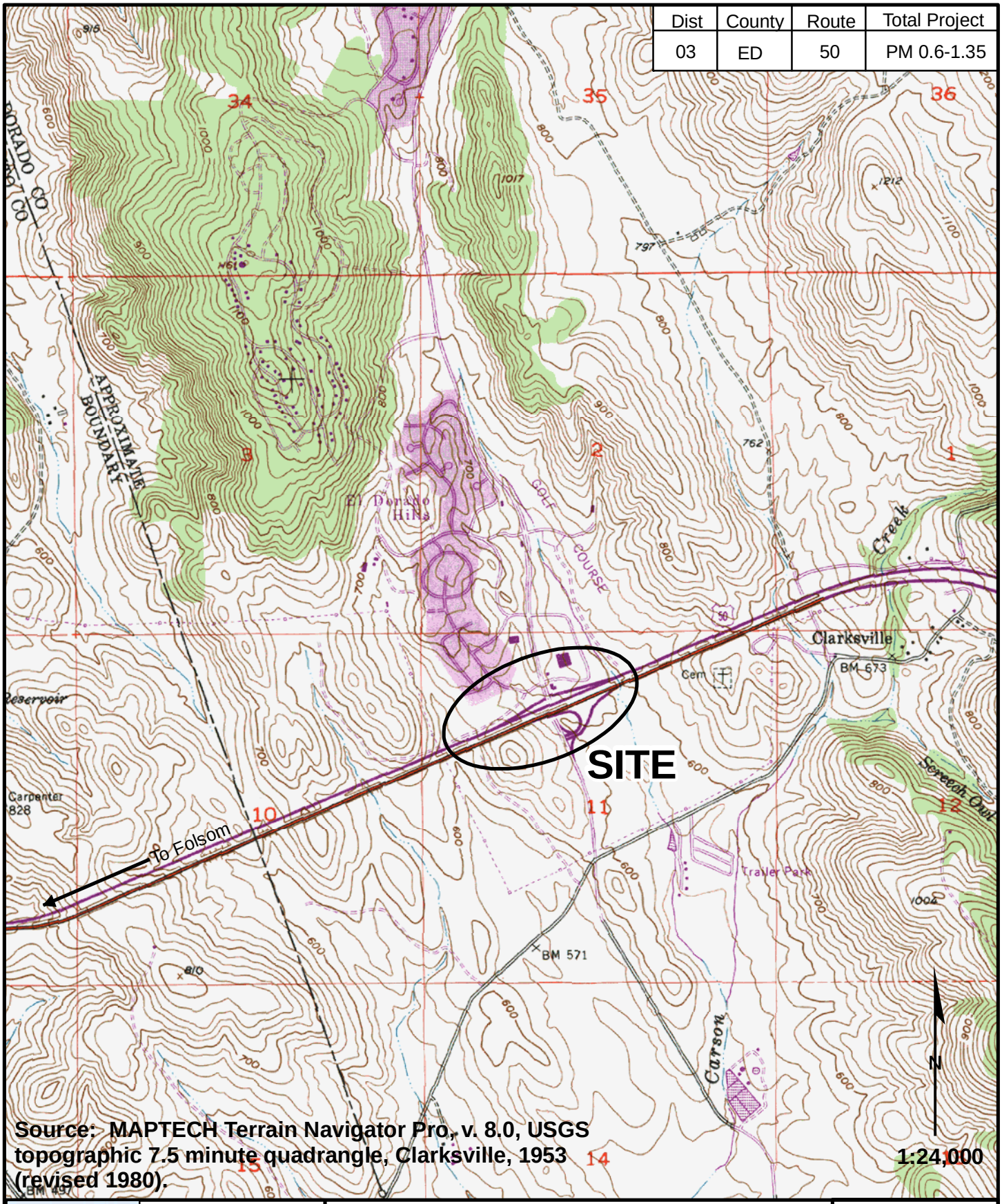
Core Photos

APPENDIX D:

Response to Caltrans Comments

Figures

Dist	County	Route	Total Project
03	ED	50	PM 0.6-1.35



Source: MAPTECH Terrain Navigator Pro, v. 8.0, USGS topographic 7.5 minute quadrangle, Clarksville, 1953 (revised 1980).

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VICINITY MAP

State Route 50 WB Latrobe Rd Ramps
EA 03-2E5101
El Dorado County, California

File No. 1072.14

June 2012

Figure 1

DIST	COUNTY	ROUTE	TOTAL PROJECT
03	ED	50	0.6/1.35

RDC-12-119
O-12-105
OVERHEAD SIGN (CS-61)
A-12-107
A-12-106
SR-01
SR-02
SR-03
A-12-108
O-12-113
O-12-111
O-12-112
OVERHEAD SIGN (CS-60)
O-12-110
R-99-B2
R-99-B3
R-99-B1
A-12-104
A-12-103
A-12-102
SEE "LATROBE ROAD UNDERCROSSING" LOG OF TEST BORINGS

LEGEND

- Approximate Boring Location
- Approximate Test Pit Location
- SR-01 Approximate Seismic Line Location

Source: Project contours and alignments by R.E.Y. Engineers, Inc. and Quincy Engineering, Inc. received July 2007,September 2007 and February 2012 respectively.

Scale 1"=100'

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SITE PLAN

US 50/Latrobe Road WB Ramps Project
(EA # 03-2E5101)
El Dorado County, California

File No. 1072.14
June 2012
Figure 2

6/5/12 1072.14 US 50 Latrobe Rd WB Off Ramp Fig 2.dwg m

APPENDIX A

Boring Logs RDC-12-119
Log of Test Borings, Latrobe Road WB Off-Ramp UC (Sheet1of4)
Legend of Logs

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
RCP	**5-16-12**	**5-16-12**		**RDC-12-119**
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Taber			**~78.56' Lt Sta ~517+80L**	**~636.2 ft**
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wire-Line			**Diedrich D120**	**3.8 in**
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
HQ rock core				
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Boring grout backfilled 5/17/2012			**not measured**	**31.6 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)	Strength (psi)	Drilling Method	Casing Depth	Remarks
	0		ASPHALT.												
	1		SILTY GRAVEL (GM); medium dense; olive brown; dry; Aggregate base.												
634.15	2		SILTY GRAVEL (GM); medium dense; yellowish brown; dry.												
	3		METAMORPHIC ROCK, METAVOLCANIC ROCK, fine-grained to medium-grained, grayish green, decomposed, very soft to soft, very intensely to intensely fractured.												
632.15	4				Run 1			65	65						
	5		METAMORPHIC ROCK, METAVOLCANIC ROCK, fine-grained to medium-grained, grayish green, moderately to slightly weathered, soft to moderately soft, moderately fractured.												PL
630.15	6														
	7				Run 2			100	100						
	8														PL
628.15			Very intensely fractured, shear (clay, partially healed), dipping 60°, from 8 to 8.6 feet.												PL
	9		Very intensely fractured, shear (clay, partially healed), dipping 60°, from 9 to 11.8 feet.												
626.15	10														
	11														
624.15	12		METAMORPHIC ROCK, METAVOLCANIC ROCK, fine-grained, grayish green, slightly weathered, very hard, very slightly fractured.		Run 3			100	52		147	UC =540			
	13														
622.15	14														
	15														
620.15	16		Joint dipping 60°.												PL PL
	17				Run 4			100	100		172	UC =5410			PL
618.15	18														PL
	19														PL
616.15	20		Joint dipping 65°.												PL PL
	21														
614.15	22				Run 5			100	86						PL PL PL
	23		Joint dipping 75°.												
612.15	24														PL
	25														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**RDC-12-119**
DIST.	COUNTY	ROUTE	POSTMILE	EA
03	**ED**	**50**	**0.6/1.4**	**03-1072.14**
PROJECT OR BRIDGE NAME				
US 50/Latrobe Rd WB On- and Off-Ramp				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	RCP		**5-17-12**	**1 of 2**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Strength (psi)	Drilling Method	Casing Depth	Remarks
	25		Joint dipping 45°. METAMORPHIC ROCK *(continued)*.		Run 5			100	86						
610.15	26		Joint dipping 80°.												
	27				Run 6			100	100						PL
608.15	28														PL
	29														
606.15	30														
	31														
604.15	32		Bottom of borehole at 31.6 ft bgs												
	33														
602.15	34		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
	35														
600.15	36														
	37														
598.15	38														
	39														
596.15	40														
	41														
594.15	42														
	43														
592.15	44														
	45														
590.15	46														
	47														
588.15	48														
	49														
586.15	50														
	51														
584.15	52														
	53														
582.15	54														
	55														

5 BR - STANDARD 1072.14LOG.GPJ BCI 2010 LOG.GLB 5/24/12

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REPORT TITLE				HOLE ID
BORING RECORD				**RDC-12-119**
DIST.	COUNTY	ROUTE	POSTMILE	EA
03	**ED**	**50**	**0.6/1.4**	**03-1072.14**
PROJECT OR BRIDGE NAME				
US 50/Latrobe Rd WB On- and Off-Ramp				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	RCP		**5-17-12**	**2 of 2**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
RCP	**2-6-12**	**2-6-12**	**38° 39' 15" / -121° 4' 17"**	**O-12-105**
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION **~634.0 ft**
DRILLING METHOD			DRILL RIG **Hand Excavation**	BOREHOLE DIAMETER
SAMPLER TYPE(S) AND SIZE(S) (ID) **NA**			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
BOREHOLE BACKFILL AND COMPLETION **Hand excavation backfilled with native material**			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING **1.7 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		SILTY GRAVEL (GM); loose; brown; moist.												Upper 1.7 feet contains approximately 20% cobble size metavolcanic rock 4-10 inches in diameter
632.00	2		Bottom of borehole at 1.7 ft bgs												Essential refusal at 1.7 feet
630.00	4														The upper 1.7 feet of fill material is underlain by METAVOLCANIC ROCK, greenish gray, slightly weathered, intensely to moderately fractured, hard
628.00	6														
626.00	8														
624.00	10														
622.00	12														
620.00	14														
618.00	16														
616.00	18														
614.00	20														
612.00	22														
610.00	24														
	25														

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REPORT TITLE				HOLE ID
BORING RECORD				**O-12-105**
DIST. **03**	COUNTY **ED**	ROUTE **50**	POSTMILE **0.2/1.4**	EA **03-1072.8**
PROJECT OR BRIDGE NAME **El Dorado SR 50 HOV Lanes Phase 0**				
BRIDGE NUMBER	PREPARED BY **Joe F**		DATE **3-2-12**	SHEET **1 of 1**

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	ED	50	0.60/1.35	242	245

CERTIFIED ENGINEERING GEOLOGIST — 03/30/12 DATE

PLANS APPROVAL DATE

PROFESSIONAL GEOLOGIST — PATRICK F. FISCHER — No. 1739 — Exp. 1/31/13 — CERTIFIED ENGINEERING GEOLOGIST — STATE OF CALIFORNIA

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

BLACKBURN CONSULTING
2491 BOATMAN AVENUE
WEST SACRAMENTO, CA 95691 FILE No. 1072.8

QUINCY ENGINEERING, INC.
3247 RAMOS CIRCLE
SACRAMENTO, CA 95827-2501

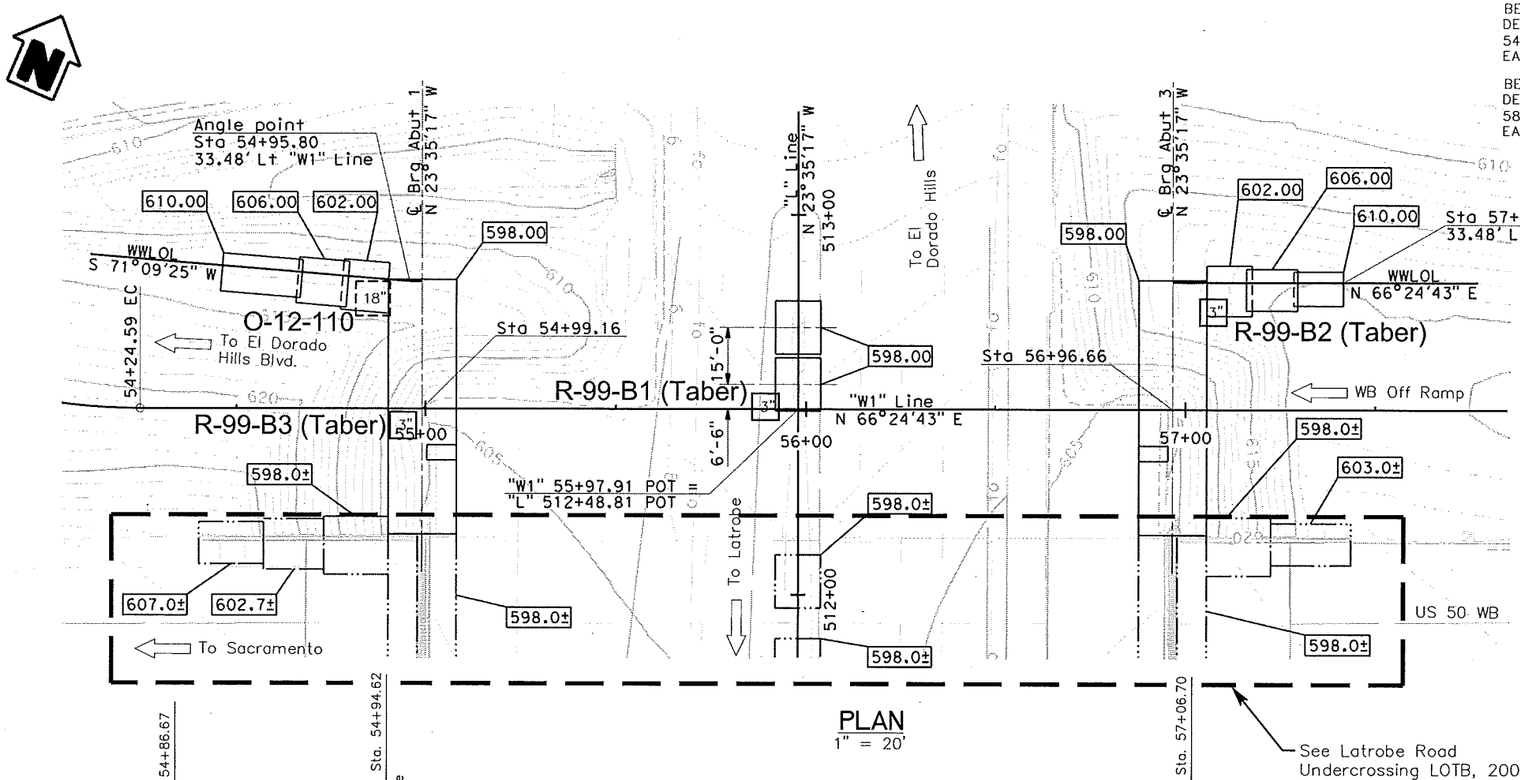
BENCHMARKS

BENCHMARK# 25113 ELEV. 624.68 NAVD 1929
DESCRIPTION: BRASS DISK, 78.24' LT, STATION 54+98.37, "A2" LINE, NORTHING 2000992.20, EASTING 682695.14.

BENCHMARK# 64 ELEV. 618.23 NAVD 1929
DESCRIPTION: MONUMENT, 67.26' RT, STATION 58+96.89, "A2" LINE, NORTHING 2001018.23, EASTING 6827374.58.

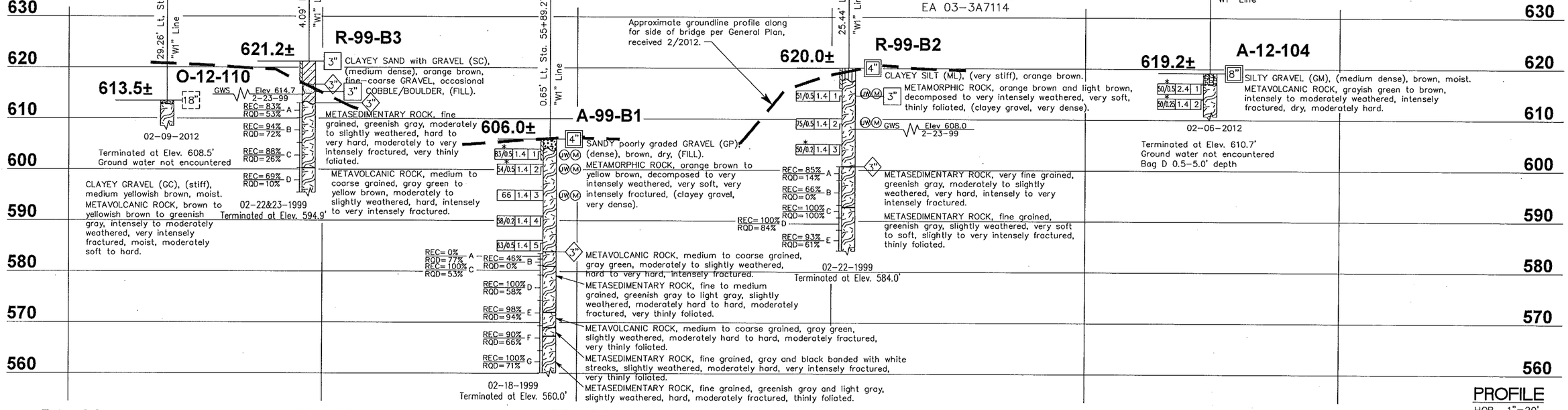
NOTES:

1. 1999 Field classification of soils was in accordance with ASTM D 2488-00 "Description and Identification of Soils (Visual-Manual Procedure)" and 2012 Field classification of soils was in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual 2010. See Log of Test Borings No. 2 and 3, "Soil Legend". 1999 boring logs converted from metric to english.
2. 1999 Rock classification according to Caltrans "Soil & Rock Logging Classification Manual (Field Guide)", August 1996, and Bureau of Reclamation, U.S. Department of the Interior, USBR-5000, "Procedure for Determining Unified Soil Classification", Earth Manual, Part II, Third Edition, 1990.
3. Standard Penetration tests were performed in accordance with ASTM D 1586-99 (1999) and 1586-08 (2012) using a hammer operated with cat-head, rope and pulley with a 30-inch drop (1999) and automated drop system (2012). Drill rods were 1 5/8-inch diameter "A"-rods; sampler was driven with brass liners.
4. "2.4 inch sampler": ID=2.4 inch, OD=2.9 inch. Driven in same manner as SPT ("1.4 inch") sampler.
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 Manuals.
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 Quincy Engineering, "Foundation Plan" dated March 2012.
11. Boring elevations are approximate and based on "Topography" received December 2004.
12. The "Log of Test Borings" drawing is included with plans in accordance with Section 2-1.06B of Caltrans "Standard Specifications", 2010.



PLAN
1" = 20'

See Latrobe Road Undercrossing LOTB, 2007. Br. No. 25-0122 EA 03-3A7114



PROFILE
HOR. 1"=20'
VERT. 1"=10'

DESIGN OVERSIGHT: Eric Fredericks 4-13-12 SIGN OFF DATE	DRAWN BY: M. ROBERTSON	W. NICHOLS 1999, R. PICKARD 2012 FIELD INVESTIGATION BY: DATE: FEBRUARY 1999 and FEBRUARY 2012	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Tim Osterkamp PROJECT ENGINEER	BRIDGE NO. 25-0122K; POST MILE 0.9
	CHECKED BY: R. PICKARD				LATROBE ROAD WB OFF RAMP UC
					LOG OF TEST BORINGS 1 OF 4

GS CIVIL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: X
PROJECT NUMBER & PHASE: 0312000163 CONTRACT NO.: 03-2E5101

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
03/30/12				20	23

FILE => $REQUEST

4/13/2012 1072.8 US 50 Latrobe Road WB Off Ramp LOTB.dwg

TIME PLOTTED => $TIME DATE PLOTTED => $DATE USERNAME => $USER

GROUP SYMBOLS AND NAMES

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

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

FIELD AND LABORATORY TESTS

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

SAMPLER GRAPHIC SYMBOLS

- Standard Penetration Test (SPT)
- 2.5" Split Spoon Sampler
- 2" Split Spoon Sampler
- Shelby Tube
- Piston Sampler
- NX Rock Core
- HQ Rock Core
- Bulk Sample
- Other (see remarks)

DRILLING METHOD SYMBOLS

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

WATER LEVEL SYMBOLS

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

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BORING RECORD LEGEND

COUNTY	ROUTE	POSTMILE
El Dorado	**50**	**0.6/1.4**

PROJECT OR BRIDGE NAME

PREPARED BY	DATE	SHEET
RCP	**5-17-12**	**1 of 3**

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

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

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

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

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

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

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

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BORING RECORD LEGEND

COUNTY	ROUTE	POSTMILE
El Dorado	**50**	**0.6/1.4**

PROJECT OR BRIDGE NAME

PREPARED BY	DATE	SHEET
RCP	**5-17-12**	**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-Discoloration-Oxidation		Mechanical Weathering and Grain Boundary Conditions	Texture and Solutioning		
Descriptor	Body of Rock	Fracture Surfaces		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 soil; partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete		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

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

CORE RECOVERY CALCULATION (%)

$$\frac{\Sigma \text{ Length of the recovered core pieces (in.)}}{\text{Total length of core run (in.)}} \times 100$$

RQD CALCULATION (%)

$$\frac{\Sigma \text{ Length of intact core pieces > 4 in.}}{\text{Total length of core run (in.)}} \times 100$$

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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BORING RECORD LEGEND

COUNTY	ROUTE	POSTMILE
El Dorado	**50**	**0.6/1.4**

PROJECT OR BRIDGE NAME

PREPARED BY	DATE	SHEET
RCP	**5-17-12**	**3 of 3**

APPENDIX B

Laboratory Test Results

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

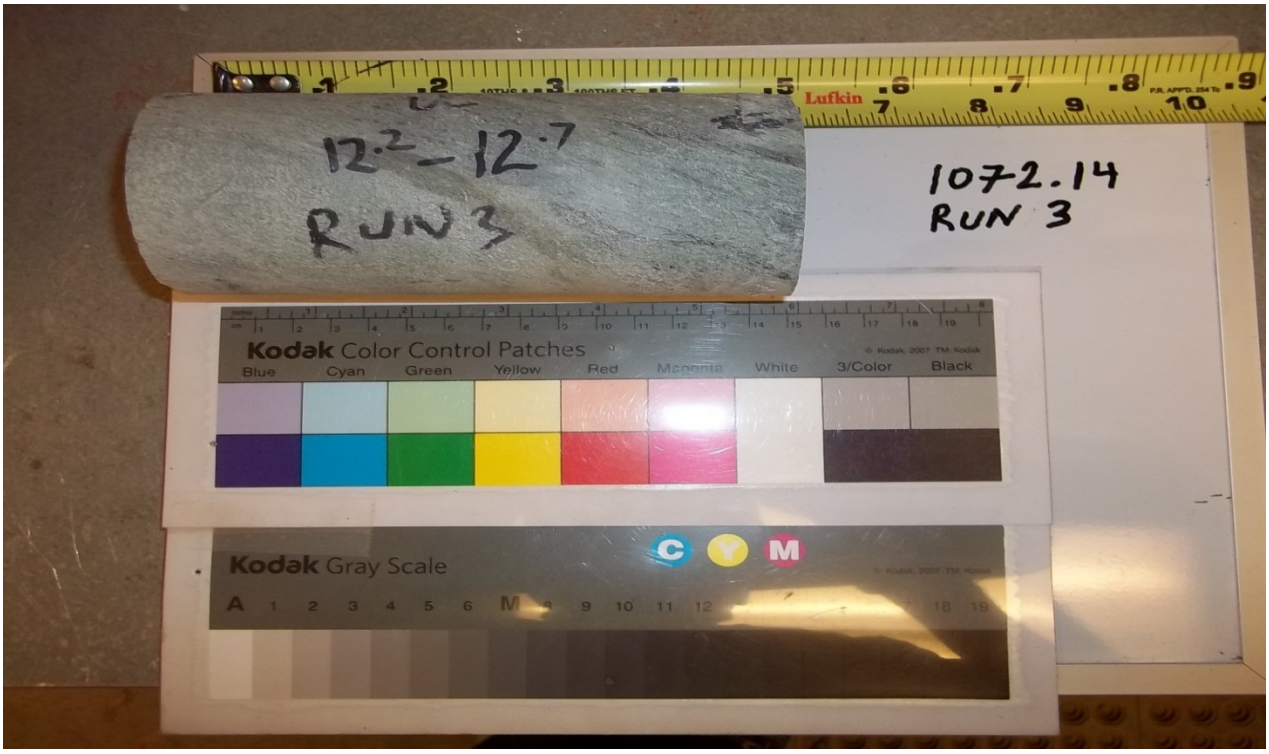
Modesto Office: (209) 522-6273
West Sacramento Office: (916) 375-8706

Rock Core Compression Test

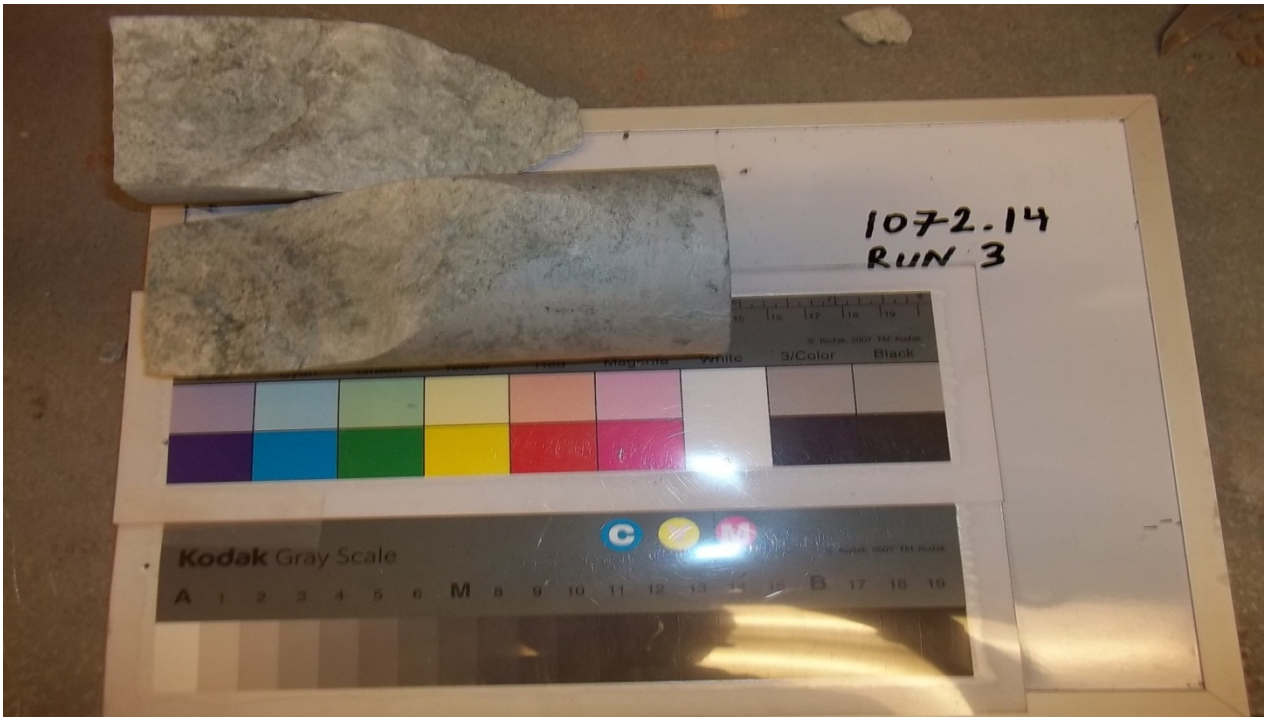
BCI File No.: 1072.14
Project Name: US 50 / Latrobe Road West Bound On - and off - Ramp

Specimen	Depth (ft)	FINAL TRIM LENGTH (in.)	Trim Length (in.)	ORIGINAL LENGTH (in.)	DIAMETER (in.)	AREA ($in.^2$)	TOTAL LOAD (lbs.)	COMP STRENGTH (psi)	L/D RATIO	CORR. FACTOR	CORR. COMP. STRENGTH (psi)	DRY CORE WEIGHT (grams)	WET CORE WEIGHT	UNIT WEIGHT (pcf)
RDC-12-119														
Run 3	12.2-12.7	5.82	5.90	20.00	2.391	4.49	2405	540	2.43	1	540	1010.1	1047.9	147.3
Run 4	16.9-17.5	5.87	5.90	16.50	2.391	4.49	20235	4,510	2.46	1	4510	1192.0	1194.2	172.3

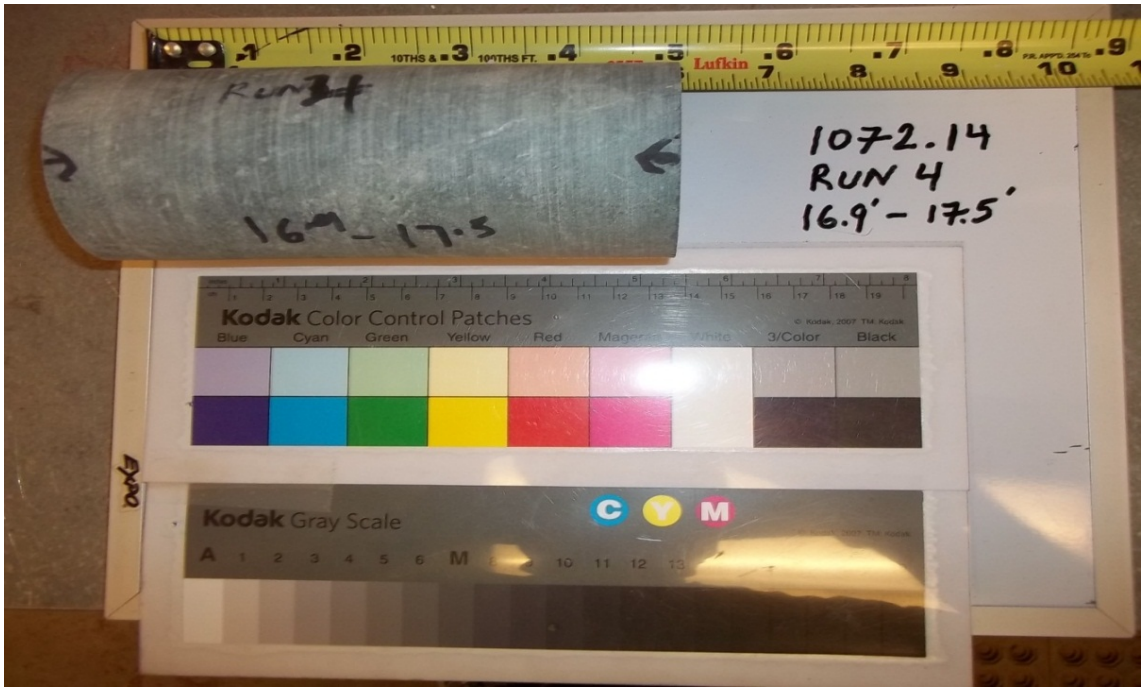
Note: Sample for Run 3 broke on healed fracture



Run 3 Before



Run 3 After



Run 4 Before

Run 4 After

Blackburn Consulting
Auburn Office:
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File No. 1072.14
May 24, 2012

Point Load Test Results ASTM D 5731
US 50/Latrobe Road West Bound On- and Off Ramps
EA 03-2E5101

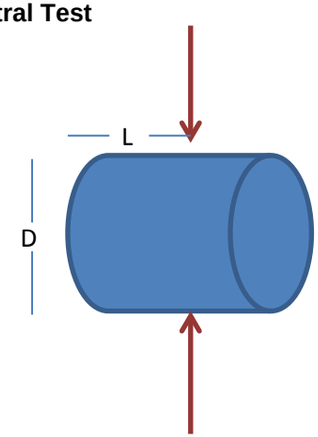
Boring	Run Number	Depth (ft)	D (in)	L (in) (W for axial tests)	L/D Ratio	Maximum Pressure (psi)	Load at Failure (lbf)	Size Correction Factor (F)	PLI (Point Load Index) (psi)	Size Corrected PLI (psi)	UCS Estimate (psi, K=24.5)	Notes
RDC-12-119	1	4.7-4.9	2.4	2.5	1.0	302	444	1.09	77	84	2064	break along healed fracture
	2	7.3-7.6	2.4	3.8	1.6	1709	2511	1.09	436	477	11678	
	2	8.1-8.4	2.4	3.0	1.3	2448	3597	1.09	624	683	16727	
	3	15.5-16	2.4	3.0	1.3	1186	1743	1.09	303	331	8104	break along healed fracture
	3*	15.5-15.65	1.8	2.4	0.7	209	307	0.95	57	54	1334	break along healed fracture
	4	16.6-16.85	2.4	3.0	1.3	1484	2181	1.09	379	414	10140	
	4	17.7-18.1	2.4	3.0	1.3	1323	1944	1.09	338	369	9040	break along healed fracture
	4	19.2-19.9	2.4	4.0	1.7	2585	3798	1.09	659	721	17664	
	4	19.9-20.7	2.4	5.0	2.1	2123	3120	1.09	542	592	14507	
	4*	20.15-20.3	2.0	2.4	0.8	1535	2256	1.01	369	372	9102	
	5	21.6-22	2.4	2.5	1.0	3017	4433	1.09	770	841	20615	
	5*	22.0-22.15	2.1	2.4	0.9	751	1104	1.03	172	177	4335	break along healed fracture
	5	22.3-22.8	2.4	3.0	1.3	2529	3716	1.09	645	705	17281	
	5*	23.7-23.85	2.3	2.4	1.0	1308	1922	1.08	269	290	7114	
	6	27-27.4	2.4	3.0	1.3	2808	4126	1.09	716	783	19187	
	6	27.4-27.8	2.4	4.8	2.0	2878	4229	1.09	734	803	19666	

Notes:

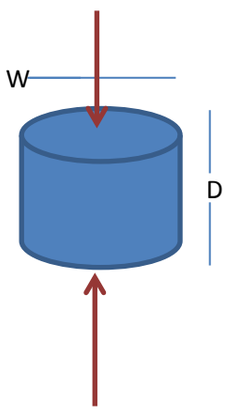
Diametral test performed unless denoted as axial tests by *.

Size corrected PLI is not equal to the uniaxial compressive strength. Uniaxial compressive strength can be estimated by $s_c = KI_s$ where s_c=uniaxial compressive strength, K=index to strength conversion factor that is site-specific, I_s= uncorrected point load strength index. A general guideline for K per ASTM D5731 for 2.36" diameter core is 24.5.

Diametral Test



Axial Test



BSK Associates
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June 1, 2012

BSK G10-085-10F
BSK SAMPLE ID: F12-218

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

SUBJECT: Laboratory Testing Results
PO 10250 – US 50 WB onramp overhead sign CS61

Dear Mr. Colburn:

BSK Associates (BSK) has performed testing on one (1) soil sample received at our laboratory on May 17, 2012. The sample was identified as follows:

Run 1 (3.5'-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 test reports are enclosed.

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 the undersigned with any questions you may have at (559) 497-2880.

Respectfully,
BSK ASSOCIATES

Kenneth M. Frank, E.I.T.
Staff Engineer

Nathan M. Shwiyhat, P.E.
Project Engineer

KMF/NMS/mlt

Enclosures: Analytical Results (3 pages)
Minimum Resistivity Results (1 page)

Distribution: Mr. Ken Colburn, Blackburn Consulting (1 original + eMail)
BSK (1 original + cCopy)

BSK Associates
Engineers & Laboratories

1415 Tuolumne St.
Fresno, CA 93706
Ph: (559) 497-2868
Fax: (559) 485-6140

MINIMUM RESISTIVITY OF SOILS

Caltrans Test Method 643

Project Name: US 50 HOV WB Onramp Overhead Sign **Report Date:** 5/24/2012
Project Number: G10-085-10F PO: 10250 **Sample Date:** 5/16/2012
Lab Tracking ID: F12-218 **Test Date:** 5/18/2012
Sample Location: Run 1 @ 3.5-4.5'
Sample Description: Silty Sand (SM), olive green, fine to coarse grained, trace of clay
Sampled By: Client **Tested By:** J. Frank

Soil temperature at minimum resistance = 23 °C

Total Moisture Added (ml)	Resistance Measured (ohms)	Resistivity (ohm-cm)
0	15,000	17813
10	5,400	6413
20	4,800	5700
25	5,000	5938
Minimum Resistivity at 15.5°C, Ohm-cm		**5700**

Remarks:

Certificate of Analysis

Lloyd Suehiro
BSK Associates - Fresno
567 W Shaw, Suite B
Fresno, CA 93704

Report Issue Date: 05/24/2012 15:09
Received Date: 05/22/2012
Received Time: 12:22

Lab Sample ID: A2E1725-01
Sample Date: 05/16/2012 00:00
Sample Type: Grab
Sampled by: Jason Frank
Matrix: Solid

Sample Description: Run 1 3.5'-4.5'

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
*Chloride, Cal Trans Extract	California Test 422	11	3.0	mg/kg	1	A205442	05/23/12	05/24/12	
*pH, Cal Trans Extract	California Test 643	8.4		pH Units	1	A205457	05/24/12	05/24/12	
*pH Temperature in °C		20.4							
*Sulfate as SO4, Cal Trans Extract	California Test 417	51	6.0	mg/kg	1	A205442	05/23/12	05/24/12	

1414 Stanislaus Street Fresno, CA 93706 (559) 497-2888 FAX (559) 485-6935 www.bsklabs.com

General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A205442				Analyst: AJT		Prepared: 05/23/2012					
Blank (A205442-BLK1) California Test 422 - Quality Control											
Chloride, Cal Trans Extract	ND	3.0	mg/kg							05/24/12	
Sulfate as SO4, Cal Trans Extract	ND	6.0	mg/kg							05/24/12	
Blank Spike (A205442-BS1) California Test 422 - Quality Control											
Chloride, Cal Trans Extract	50	1.0	mg/kg	50		100	90-110			05/24/12	
Sulfate as SO4, Cal Trans Extract	50	2.0	mg/kg	50		100	90-110			05/24/12	
Blank Spike Dup (A205442-BSD1) California Test 422 - Quality Control											
Chloride, Cal Trans Extract	50	1.0	mg/kg	50		100	90-110	0	10	05/24/12	
Sulfate as SO4, Cal Trans Extract	50	2.0	mg/kg	50		101	90-110	0	10	05/24/12	
Matrix Spike (A205442-MS1) California Test 422 - Quality Control					Source: A2E1725-01						
Chloride, Cal Trans Extract	360	6.0	mg/kg	300	11	115	80-120			05/24/12	
Sulfate as SO4, Cal Trans Extract	400	12	mg/kg	300	51	116	80-120			05/24/12	
Matrix Spike Dup (A205442-MSD1) California Test 422 - Quality Control					Source: A2E1725-01						
Chloride, Cal Trans Extract	360	6.0	mg/kg	300	11	115	80-120	0	10	05/24/12	
Sulfate as SO4, Cal Trans Extract	400	12	mg/kg	300	51	115	80-120	1	10	05/24/12	
Batch: A205457				Analyst: RCN		Prepared: 05/24/2012					
Duplicate (A205457-DUP1) California Test 643 - Quality Control					Source: A2E1579-01						
pH, Cal Trans Extract	7.5		pH Units		7.0			8	20	05/24/12	

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Certificate of Analysis

05/24/2012

Notes:

- The Chain of Custody document and Sample Integrity Sheet are part of the analytical report.
- Any remaining sample(s) for testing will be disposed of one month from the final report date unless other arrangements are made in advance.
- Sample(s) received, prepared, and analyzed within the method specified criteria unless otherwise noted within this report.
- The results relate only to the samples analyzed in accordance with test(s) requested by the client on the Chain of Custody document. Any analytical quality control exceptions to method criteria that are to be considered when evaluating these results have been flagged and are defined in the data qualifiers section.
- All results are expressed on wet weight basis unless otherwise specified.
- All positive results for EPA Methods 504.1, 502.2, and 524.2 require the analysis of a Field Reagent Blank (FRB) to confirm that the results are not a contamination error from field sampling steps. If Field Reagent Blanks were not submitted with the samples, this method requirement has not been performed.
- Results contained in this analytical report must be reproduced in its entirety.
- Samples collected by BSK Analytical Laboratories were collected in accordance with the BSK Sampling and Collection Standard Operating Procedures.
- BSK Analytical Laboratories certifies that the test results contained in this report meet all requirements of the NELAC Standards for applicable certified drinking water chemistry analyses unless qualified or noted in the Case Narrative.
- Analytical data contained in this report may be used for regulatory purposes to meet the requirements of the Federal or State drinking water, wastewater, and hazardous waste programs.
- J-value is equivalent to DNQ (Detected, not quantified) which is a trace value. A trace value is an analyte detected between the MDL and the laboratory reporting limit. This result is of an unknown data quality and is only qualitative (estimated). Baseline noise, calibration curve extrapolation below the lowest calibrator, method blank detections, and integration artifacts can all produce apparent DNQ values, which contribute to the un-reliability of these values.
- (1) - Residual chlorine and pH analysis have a 15 minute holding time for both drinking and waste water samples as defined by the EPA and 40 CFR 136. Waste water and ground water (monitoring well) samples must be field filtered to meet the 15 minute holding time for dissolved metals.
- * - This is not a NELAP accredited analyte.
- Summations of analytes (i.e. Total Trihalomethanes) may appear to add individual amounts incorrectly, due to rounding of analyte values occurring before or after the total value is calculated, as well as rounding of the total value.
- (2) The digestion used to produce this result deviated from EPA 200.2 by excluding hydrochloric acid in order to produce acceptable recoveries for affected metals.
- (2C) Result reported from secondary analytical column.
- RL Multiplier is the factor used to adjust the reporting limit (RL) due to variations in sample preparation procedures and dilutions required for matrix interferences.

Certifications:

State of California - CDPH - ELAP	1180
State of California - CDPH - NELAP	04227CA
State of Nevada - NDEP	CA000792009A
State of Hawaii - DOH	04227CA

Definitions and Flags for Data Qualifiers

mg/L:	Milligrams/Liter (ppm)	M:	Method Detection Limit	MDA95:	Min. Detected Activity
mg/Kg:	Milligrams/Kilogram (ppm)	RL:	Reporting Limit	MPN:	Most Probable Number
µg/L:	Micrograms/Liter (ppb)		:DL x Dilution	CFU:	Colony Forming Unit
µg/Kg:	Micrograms/Kilogram (ppb)	ND:	None Detected at RL	Absent:	Less than 1 CFU/100mLs
%:	Percent Recovered (surrogates)	pCi/L:	Picocuries per Liter	Present:	1 or more CFU/100mLs
		NR:	Non-Reportable	RL Mult:	RL Multiplier

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APPENDIX C

Core Photos


1072.14
US 50 HOV LANES
CS-61
RDC-12-119
Box 1 3.5-11.8 ft

Box 1


1072.14
US 50 HOV LANES
CS-61
RDC-12-119
Box 2 11.8-19.9 ft

Box 2


1072.14
US 50 HOV LANES
CS-61
RDC-12-119
Box 3
19.9-28.2 ft

Box 3


1072.14
US 50 HOV LANES
CS-61
RDC-12-119
Box 4
28.2-31.6 ft

Box 4

APPENDIX D

Response to Caltrans Comments

Response to Caltrans Comments

Caltrans Comment 1:
The BCI Geotechnical Design/Material Report dated March 30, 2012 (GDMR) does not reference the installation for the CIDH piles for Signs CS-60 and CS-61, particularly in Sections 2.2, 8.6 and 10.6.

BCI response:
Addressed in Addendum #1, pages 2, 4 and 5

Caltrans Comment 2:
Based on provided test pit logs (O-12-105 and O-12-110) and Boring Log R-99-B3, "hard" metasedimentary and metavolocanic rock was encountered at shallow depth in the vicinity of the proposed CIDH piles for OH signs CS-60 and CS-61. Hard rock excavation for CIDH installation was not addressed in Sections 8.6 and 10.6 of the GDMR.

BCI Response:
Addressed in Addendum #1, pages 4 and 5

Caltrans Comment 3:
Boring R-99-B3 depicts groundwater near the ground surface and atop the soil/rock interface. Section 7.3.2.3 of the GDMR notes "shallow groundwater and seepage along the soil/rock interface..." should be expected. Section 10.3 of the GDMR indicates that perched groundwater may require the utilization of sump pumps to facilitate construction. It is not clear if this comment applies to CIDH pile construction and the requirement for "dry hole" construction per Special Provision 10-1.58. A comment in Section 10.6 o of the GDMR regarding the potential for CIDH concrete placement in a wet hole may be desired.

BCI Response:
Addressed in Addendum #1, page 5

Caltrans Comment 4:
Section 8.1.2 of the GDMR indicates hard rock excavation methods may be required. If blasting is allowed on the project, then the project special provisions should include SSP 19-706 "Rock Excavation (Controlled Blasting)".

BCI Response:
To be addressed by Quincy Engineering in Project Specifications

Caltrans Comment 5:
The Exhibit A of the project special provisions did not have an item code for "Rock Excavation" (190161), or if blasting is allowed, an item code for "Rock Excavation (Controlled Blasting)" (190160).

BCI Response:
To be addressed by Quincy Engineering in Project Specifications