APPENDIX A

Boring Logs

APPENDIX A.1

Current Boring Logs

Current Exploration

The borings were drilled using four different truck-mounted (CME-85, CS 2000, Ingersoll Rand A400, and Speedstar 30K) drill rigs. All four drill rigs were equipped with rotary-wash drilling system and automatic hammer. Two of the drill rigs (CME-85 and CS 2000) were supervised by Caltrans staff and the other two (Ingersoll Rand A400 and Speedstar 30K) were supervised by the CH2M HILL team. CH2M HILL, EMI, and JA staff logged core holes for those borings drilled by the CH2M HILL team.

Soil samples were collected every 5 feet using a split barrel standard penetration test (SPT) sampler, California ring sampler, and modified California ring sampler in alluvial soils. The SPT and the California ring samplers were driven using automatic pneumatic hammers equivalent to a 140-pound hammer falling freely for 30 inches. Blow counts were recorded in 6-inch intervals for a penetration of 18 inches. Blow counts noted on the boring logs record the blows for the last 12 inches of penetration. The sampling procedures generally followed SPT and ring sampling of soils (American Society for Testing and Materials [ASTM] D1586). In addition, representative bulk samples of the upper 5 to 6 feet were collected from the borings. The soil samples were described in general accordance with the Unified Soil Classification System (USCS), following methods in ASTM D2487 and D2488, and following the guidelines in the *Soil and Rock Logging, Classification, and Presentation Manual* (Caltrans, 2007). Representative samples were stored in tubes/plastic bags, and regularly transported to a warehouse facility for storage and later laboratory testing. The headspace of soil and rock samples was tested using a MiniRAE 3000 multi-gas monitor to screen for hydrogen sulfide, methane, carbon monoxide, oxygen, and volatile organic compounds (VOCs). All of the gas monitor screenings yielded results that were well below threshold limits. The primary purpose of the field VOC screenings was to ensure the health and safety of field personnel. The readings of the VOCs are presented in the remarks column of the boring logs.

Continuous-core samples were taken in bedrock. Rock core sampling procedures generally consisted of the collection of continuous-core specimens in approximately 5-foot-run intervals. Cascade Drilling obtained 10-foot-run core samples in some of the borings. Caltrans drill rigs used a 94-mm HQ core barrel, and Cascade drill rigs used a PQ core barrel to obtain the rock samples. The continuous rock cores were logged, noting the lithology, structure, recovery percentage, fractures per foot, rock quality designation (RQD), and coring rate following the guidelines in the *Soil and Rock Logging, Classification, and Presentation Manual* (Caltrans, 2007). Rock samples were collected in core boxes and transported for storage and laboratory testing.

RQD values provided in the boring logs are based on the sum of intact core pieces of 4 inches or greater length between two natural discontinuities. The majority of core samples obtained in this study are soft and weak and commonly do not meet the "sound core" definition for the ASTM standard RQD method (ASTM D 6032). These RQD values should not be used to evaluate the rock mass quality for soft and weak rock. The RQD values reported for hard rock in Zone 3 are valid for such analysis. However, the density of fracturing (reflected by different RQD percentages) in weak and hard rock may play a significant role in the secondary permeability of those materials and may directly influence the occurrence of groundwater and its flow.

The following exceptions to policy were obtained from Caltrans.

- Five new lab test abbreviations for tunnel related rock testing were included [CAI – Cerchar Abrasivity Index, CS&EM – Compressive Strength and Elastic Moduli of Rock Core (ASTM D 7012), EM – Elastic Moduli of Rock Core in Uniaxial Compression (ASTM D 3148), PTS – Petrographic Thin Section Analysis, SD – Slake Durability (ASTM D 4644)]
- New material graphic was used for fault gouge to differentiate it from other rock types encountered in the project study
- Boring numbers are designated as R-09-Z1B5 to identify them based on the different zones established for SR-710 Tunnel Technical Study
- Log of test borings (LOTBs) are exempt from the compliance with the Soil and Rock Logging, Classification, and Presentation Manual (Caltrans, 2007) for the purpose of geotechnical feasibility study

The exception documents obtained from Caltrans are presented in this appendix.

TABLE A-1
Summary of Field Exploration

Soil Boring Number	Study Zone	Ground Surface Elevation[a] (feet)	Exploration Depth (feet)	Piezometer Installed?	Groundwater Table Elevation[b] (feet)
R-09-Z1B2	1	498.9	326 (inclined depth)	No	NM
R-09-Z1B3	1	343.2	303	Yes	313.3
R-09-Z1B4	1	388.6	325	Yes	353.2
R-09-Z1B5	1	442.2	502	Yes	419.5
R-09-Z1B6	1	447.2	400.5	Yes	425.7
R-09-Z1B7	1	480.5	300	Yes	440.5
R-09-Z1B8	1	419.6	200	Yes	394.6
R-09-Z2B1	2	451.0	150	Yes	437.1
R-09-Z2B2	2	601.1	285	No	NM
R-09-Z2B3	2	546.9	350	Yes	498.9
R-09-Z2B4	2	558.1	400	Yes	548.1
R-09-Z2B5	2	452.4	300	Yes	441.6
R-09-Z3B1	3	885.1	300	Yes	861.2
R-09-Z3B2	3	781.4	275	Yes	637.0
R-09-Z3B3	3	802.0	275	Yes	666.0
R-09-Z3B4	3	768.0	276	No	NM
R-09-Z3B5	3	698.2	402	Yes	675.7
R-09-Z3B6	3	750.0	326	Yes	698.8
R-09-Z3B7	3	596.7	326	Yes	582.2
R-09-Z3B8	3	594.3	275	Yes	NM[c]
R-09-Z3B9	3	624.3	300	Yes	550.4
R-09-Z3B10	3	626.8	375	Yes	578.3
R-09-Z3B11	3	533.1	275	Yes	375.1
R-09-Z3B12	3	501.0	275	Yes	488.2
R-09-Z4B4	4	454.4	277	Yes	408.1

Notes:
[a] Surveyed by Coast Surveying, Inc., June 2009, datum NAVD 88.
[b] Because some of the piezometers were not developed, groundwater may not be stabilized at the time of reading.
[c] Well cap stuck, could not access piezometer.
NM = Not Measured

Soil & Rock Logging, Classification, and Presentation Manual
Request for Exception

Name: Pratheep Piratheepan

Office: Office of Geotechnical Design South 1

District-EA: 07-187900

Project Name: SR-710 Tunnel Technical Study

Manual Section No.:

Figure 5.2, Section 2.3

Description of Exception Being Requested:

Please see the annexed document for the requested exceptions.
* Five new lab test abbreviation for tunnel related rock testings
* New material graphic for fault gouge
* Boring number format

Discussion of Why the Exception to Policy is Necessary:

The suggested laboratory testing abbreviations for rock samples are not included in the Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2007). These tests were necessary to characterize the rock for tunnel design purposes.

Material graphics for Fault Gouge also not included in the Caltrans Soil and Rock Logging Manual (2007). We would like to obtain the exception to show different material graphics for Fault Gouge material in the LOTB. Different material graphic will differentiate the Fault Gouge from the rock types encountered within the SR-710 Tunnel project study area.

Tunnel project area was divided into five zones. In order to differentiate borings in each zone, the zone numbers were included in the boring number. Boring numbers are designated as R-09-Z1B5 to identify them based on the different zones established for the SR-710 Tunnel Technical Study.

The above exceptions will be implemented by project consultant (CH2M HILL) and Caltrans Geotechnical Design South-1 in order to maintain the consistency in boring records and LOTBs.

Should the Manual be revised to allow for the exception? Please discuss.
No

P Shiva Kanini
Branch Chief

Office Chief
(Advisory & Mandatory Standards)

Deputy Division Chief
(Mandatory Standards)

7/7/09
Date Approved

cc: Project File, GS Corporate

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

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

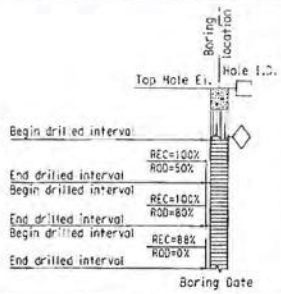
PLANS APPROVAL DATE

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

PERCENT CORE RECOVERY (REC) & ROCK QUALITY DESIGNATION (RQD)

$$REC = \frac{\sum \text{Length of the recovered core pieces (inches)}}{\text{Total length of core run (inches)}} \times 100\%$$

$$RQD = \frac{\sum \text{Length of intact core pieces} \geq 4"}{\text{Total length of core run (inches)}} \times 100\%$$



RELATIVE STRENGTH 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 / Spacing
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"

LEGEND OF ROCK MATERIALS

- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

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 pocket knife or sharp pick with light or moderate pressure. Core breaks with moderate hammer pressure.
Moderately Soft	Specimen can be grooved 1/6" 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	Lengths average from 1 to 4" with scattered fragmented intervals with lengths less than 4"
Very intensely fractured	Mostly chips and fragments with a few scattered short core lengths.

Combination descriptors (such as "Very intensely to intensely fractured") are used where equal distribution of both fracture density characteristics is present over a significant interval or exposure, or where characteristics are "in between" the descriptor definitions. Only two adjacent descriptors may be combined.

WEATHERING DESCRIPTORS FOR INTACT ROCK

Description	Diagnostic features: Chemical Weathering-Discoloration and/or oxidation: Body of Rock	Diagnostic features: Chemical Weathering-Discoloration and/or oxidation: Fracture Surfaces	Diagnostic features: Mechanical Weathering-Grain boundary conditions (disaggregation) primarily for granitics and some coarse-grained sediments	Diagnostic features: Texture and Solutioning: Texture	Diagnostic features: Texture and Solutioning: 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, see grain boundary conditions.	All fracture surfaces are discolored or oxidized, surfaces friable.	Partial separation, rock is friable; in semiarid conditions granitics are disaggregated.	Texture altered by chemical disintegration (hydration, 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 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).	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."

Combination descriptors (such as "slightly weathered to fresh") are permissible 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 may be combined. "Very intensely weathered" is the combination descriptor for "intensely weathered to decomposed."

ENGINEERING SERVICES	GEOTECHNICAL SERVICES	STATE OF CALIFORNIA — DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES — STRUCTURE DESIGN	BRIDGE NO.	ROCK LEGEND
PREPARED BY			DESIGN BRANCH	POST MILE	LOG OF TEST BORINGS
CHECKED BY					

GS LOTB ROCK LEGEND

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU EA

(FILE => $REQUEST)

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

DATE PLOTTED => $DATE

TIME PLOTTED => $TIME

USERNAME => $USER

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

FIELD AND LABORATORY TESTING

- (CAI) Cerchar Abrasivity Index
- (C) Consolidation (ASTM D 2435)
- (CL) Collapse Potential (ASTM D 5333)
- (CP) Compaction Curve (CTM 216)
- (CR) Corrosivity Testing (CTM 643, CTM 422, CTM 417)
- (D & M) Compressive Strength and Elastic Moduli of Rock Core (ASTM D 7012)
- (CU) Consolidated Undrained Triaxial (ASTM D 4767)
- (DS) Direct Shear (ASTM D 3080)
- (EM) Elastic Moduli of Rock Core in Uniaxial Compression (ASTM D 3148)
- (EI) 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)
- (PTS) Petrographic Thin Section Analysis
- (PI) Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)
- (PL) Point Load Index (ASTM D 5731)
- (PM) Pressure Meter
- (PP) Pocket Penetrometer
- (R) R-Value (CTM 301)
- (SD) Slake Durability (ASTM D 4644)
- (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
- (UC) Unconfined Compression-Soil (ASTM D 2166) Unconfined Compression-Rock (ASTM D 2938)
- (UU) Unconsolidated Undrained Triaxial (ASTM D 2850)
- (UW) Unit Weight (ASTM D 4767)
- (VS) Vane Shear (AASHTO T 223)

LEGEND OF ROCK MATERIALS

- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK
- FAULT GOUGE

ENGINEERING SERVICES	GEOTECHNICAL SERVICES	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH	BRIDGE NO. / POST MILE	ROCK LEGEND LOG OF TEST BORINGS
PREPARED BY					
CHECKED BY					

65 LOTB ROCK LEGEND

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU EA

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES | SHEET | OF

FILE => REQUEST

USERNAME => %USER DATE PLOTTED => %DATE TIME PLOTTED => %TIME

Soil & Rock Logging, Classification, and Presentation Manual
Request for Exception

Name: Shiva Karimi

Office: Office of Geotechnical Design South 1

District-EA: 07 -187900

Project Name: SR-710 Tunnel Technical Study

Manual Section No.: Appendix C

Description of Exception Being Requested:

Office of Geotechnical Design South-1, Branch D requests for exception for preparation of the Log of Test Borings (total of 25 borings) for SR-710 Tunnel Technical Study to be based on Caltrans GINT Template web released on 2008.

Discussion of Why the Exception to Policy is Necessary:

SR-710 Tunnel Technical Study is a unique and unusual geotechnical exploration conducted for the purpose of feasibility study, route selection, and to comply with the request of stakeholders involved in this project. The LOTBs will be included in the feasibility report and not in any contract plans. Final alignment of SR-710 Tunnel may or may not fall along the boring locations.

The Feasibility study is due by March 30, 2010, and the limited available funds will have to be spent on completing the critical components of the study.

The above exception will be implemented by project consultant (CH2M HILL) and Caltrans Geotechnical Design South -1.

Should the Manual be revised to allow for the exception? Please discuss.

No.

P Shiva Karimi

Branch Chief

Office Chief
(Advisory & Mandatory Standards)

Deputy Division Chief
(Mandatory Standards)

2/2/2010

Date Approved

NOTE: APPROVED FOR FEASIBILITY STUDY ONLY. IF A PROJECT REPORT IS PRODUCED IN FUTURE THIS EXCEPTION WILL NOT APPLY

cc: Project File, GS Corporate

GROUP SYMBOLS AND NAMES

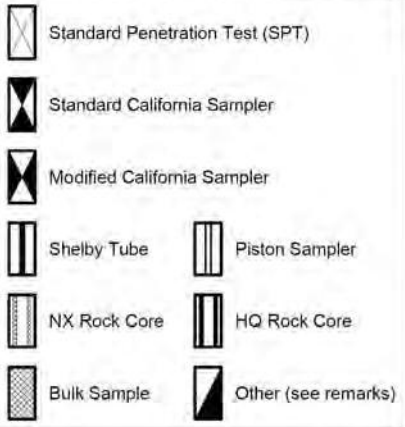
Graphic / Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or 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

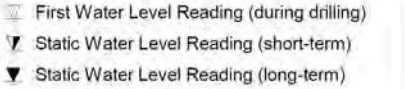
C	Consolidation (ASTM D 2435-04)
CL	Collapse Potential (ASTM D 5333-03)
CP	Compaction Curve (CTM 216 - 06)
CR	Corrosion, Sulfates, Chlorides (CTM 643 - 99; CTM 417 - 06; CTM 422 - 06)
CU	Consolidated Undrained Triaxial (ASTM D 4767-02)
DS	Direct Shear (ASTM D 3080-04)
EI	Expansion Index (ASTM D 4829-03)
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



DRILLING METHOD SYMBOLS

WATER LEVEL SYMBOLS



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

REPORT TITLE: **BORING RECORD LEGEND**

DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	D/D	07-187900

PROJECT OR BRIDGE NAME: SR-710 Tunnel Technical Study

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
N/A			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.

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

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 (%)

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

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

Department of Transportation
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Office of Geotechnical Design - North

REPORT TITLE: **BORING RECORD LEGEND**

DIST	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	D/D	07-187900

PROJECT OR BRIDGE NAME: SR-710 Tunnel Technical Study

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
N/A			3 of 3

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
J. Castle, B. Schell	3-25-09	4-3-09	34° 5' 20.0004" / 118° 14' 25.9692" NAD83	R-09-Z1B2
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Cascade Drilling Inc.			' Lt Sta Stadium Way at Elysian Park Drive	498.89 ft NAVD 88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wash			Ingersoll Rand A400	6 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
HQ core (2.4")			Automatic Hammer 140 lb. 30 inch drop	75%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Backfilled with Grout.			NA	326.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		ASPHALT 6" thick.												This Boring Record was prepared in accordance with the Caltrans soil & Rock Logging, Classification and Presentation Manual (June, 2007) except as noted in Appendix A1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
	1		Road Base; 12" thick; silty angular gravel.												
497.16	2		Poorly graded SAND (SP); yellow to brown; moist; trace coarse to fine GRAVEL; fine SAND.												
	3														
495.16	4														
	5		SEDIMENTARY ROCK (SANDTONE): fine-grained; thickly bedded to massive; yellow to brown; intensely weathered; very soft: (Poorly graded SAND-SP; moist, about 5% coarse sand and fine angular GRAVEL with maximum diameter of 1/2"; friable). [PUENTE FORMATION].		C1			67						**Boring is inclined at 60° from horizontal. Bedding and structural measurements are relative to core axis. Depth is down hole distance. Elevation on log are not valid.**
493.16	6														
	7														
491.16	8		Subangular GRAVEL, max. 2" dia.; fine SAND; decomposed siltstone fragment.		C2			73							
	9														
489.16	10														
	11														
487.16	12														
	13		Soft, yellowish brown to gray, subangular GRAVEL, max. 1.5" dia.; coarse to fine SAND, decomposed siltstone fragments.		C3			42							
485.16	14														
	15														
483.16	16														
	17														
481.16	18				C4			4							
	19														
479.16	20														
	21		Laminations of shale, gray, decomposed.		C5			40							
477.16	22														
	23														
475.16	24														
	25														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z1B2
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	LA	710	D/D	07-187900
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		6-22-09	1 of 12

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		*(continued).*		C5			40							
476.37	26		SEDIMENTARY ROCK (SANDSTONE): fine grained, laminated, gray, decomposed, very soft, trace of SILTSTONE laminations.		C6			70							
	27														
474.37	28														
	29														
472.37	30														
	31		Mottled yellowish brown, strong brown, and gray, trace of shale fragments max. 1" dia.		C7			75							
470.37	32														
	33														
468.37	34														
	35														
466.37	36		Very soft, highly oxidized.		C8			73							
	37														
464.37	38														
	39		Bedding inclination 66°.												
462.37	40														
	41				C9			42							
460.37	42														
	43														
458.37	44														
	45														
456.37	46				C10			72							
	47														
454.37	48		Fine-grained SANDSTONE, varies from yellowish brown to strong brown.												
	49														
452.37	50														
	51		Trace of shale and sandstone fragments to 1.5" dia.		C11			82							
450.37	52														
	53														
448.37	54														
	55														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B2**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**2 of 12**

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
	55		*(continued).*		C11			82							
450.39	56		SANDSTONE with trace SILTSTONE, laminated, gray to light gray, decomposed, very soft, possible bedding inclination 90°.		C12			92							
	57														
448.39	58		Decomposed SHALE laminations, inclined 0°.												
	59														
446.39	60														
	61		SANDSTONE, fine-grained, yellowish brown to gray, decomposed, trace of SHALE fragments up to 1/4" dia.		C13			53							
444.39	62		Thin bedding inclined 63°.												
	63														
442.39	64														
	65														
440.39	66				C14			88							
	67														
438.39	68														
	69														
436.39	70		SILTSTONE and SANDSTONE, laminated to thinly bedded, fine-grained, dark gray, very soft, decomposed.												
	71				C15			65							
434.39	72														
	73		Intensely weathered, moderately hard.												
432.39	74														
	75														
430.39	76		Joint inclination 60°, organic material; grass, wood.		C16			97							
	77														
428.39	78														
	79														
426.39	80														
	81				C17			78							
424.39	82														
	83														
422.39	84														
	85														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B2**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**3 of 12**

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
	85		Grass and wood pieces.		C17			78							
424.41	86		Very dark gray to black, moist, medium plasticity.		C18			100							PA
	87		Wood fragment.												
422.41	88														
	89		Medium dense, yellowish brown, moist, about 81% coarse to fine SAND, about 19% nonplastic fines.							17	113				
420.41	90		Joint inclined 80°.												
	91		Moderately weathered, oxidized zone.		C19			92							
418.41	92														
	93		SILTSTONE laminations, bedding inclination 90°.												
416.41	94														
	95														
414.41	96		SILTSTONE laminations inclined 85°.		C20			100							
	97														
412.41	98		Joint inclinations 30°, slight HCL reaction along joint plane.												
	99														
410.41	100														
	101		Becomes reddish yellow.		C21			95							
408.41	102														
	103														
406.41	104														
	105														
404.41	106				C22			80							
	107														
402.41	108														
	109														
400.41	110														
	111				C23			85							
398.41	112														
	113														
396.41	114		SILTSTONE/SHALE laminations, light gray, inclination 80°- 90°.												
	115														

(continued)

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DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**4 of 12**

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
	115				C23			85							See note at end of log regarding RQD.
398.43	116				C24			72	23						
	117														
396.43	118		SEDIMENTARY ROCK (SILTSTONE and SANDSTONE): fine-grained, laminated to thickly bedded, dark yellowish brown and very dark gray, slightly weathered, soft to very soft, bedding and bedding plane parting inclined 70° to 90°..												
	119														
394.43	120		Joint inclined 15°, polished surface, 0.1" aperture, filled with clay.												
	121		Faults inclined 80°- 90°, partially healed, 1/3" displacements.		C25			100	52						
392.43	122														
	123		SEDIMENTARY ROCK (SANDSTONE with SILTSTONE and CLAYSTONE): fine-grained to medium-grained, thinly bedded to massive, dark gray, intensely weathered, soft to moderately soft, intensely to slightly fractured, bedding inclined 70° to 90°, 80% sandstone.						15					CS & EM, SD, UC
390.43	124									16					UC
	125														
388.43	126				C26			100	100						
	127														
386.43	128														
	129				C27			98							
384.43	130		FeO lined bedding joint.												
	131		Minor faults inclined 75°, sand filling.		C28			92							
382.43	132														
	133														
380.43	134														
	135														
378.43	136				C29			100	23						
	137														
376.43	138														
	139		Zones of very soft and moderately hard sandstone, 1/2' to 2' thick between 135' -141' depth.												
374.43	140														
	141				C30			90							
372.43	142														
	143														
370.43	144														
	145														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B2**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**5 of 12**

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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
	145		*(continued).*		C30			90							See note at end of log regarding RQD.
372.45	146		SEDIMENTARY ROCK (SANDSTONE with SILTSTONE): fine-grained to medium-grained thinly bedded to massive, yellowish brown to dark gray, moderately weathered to fresh, intensely to slightly fractured, sandstone 85%.		C31			100	48						
	147														
370.45	148														CS & EM, UC
	149														
368.45	150														
	151				C32			95	60						
366.45	152														
	153														
364.45	154														
	155														
362.45	156				C33			77	10						
	157														
360.45	158		Light gray, hard, fresh zone 1.5' thick.												
	159		Brown to yellowish brown oxidation 1 .75" thick on each side of joint, inclination 25°.												CAI, CS & EM, UC
358.45	160		Becomes dark yellowish brown.												
	161		Becomes moderately soft, slightly fractured, bedding inclination 25°.		C34			98							
356.45	162														
	163		Bedding inclination 65°.												
354.45	164														
	165														
352.45	166				C35			100	17						
	167		SILTSTONE bed, gray to dark yellowish brown, slightly weathered, moderately soft, bedding inclination 80°-88°.							15					CS & EM, SD, UC
350.45	168														
	169														
348.45	170														
	171		Becomes medium to fine-grained, light gray, moderately hard, slightly fractured.		C36			100	90						
346.45	172														
	173		Concretion, fine SANDSTONE, light gray to yellowish brown, slightly weathered, hard, strong reaction to HCL.												CAI, CS & EM
344.45	174														
	175														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B2**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**6 of 12**

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
	175		*(continued).*		C36			100	90						See note at end of log regarding RQD.
346.47	176				C37			100	70						CAI, CS & EM, UC
	177														
344.47	178														
	179		Laminations inclined 75°.												
342.47	180														
	181				C38			100	47						
340.47	182		SILTSTONE laminations, gray, slightly weathered, soft, bedding and bedding plane parting inclined 75° to-80°, soft sediment deformation and worm burrows.												
	183														
338.47	184		Becomes gray, slightly weathered to fresh to 203' depth.												
	185														
336.47	186				C39			73	38						
	187														
334.47	188		Siltstone/Sandstone lamination, 4" thick.												
	189														
332.47	190														
	191									14					
330.47	192				C40			125	63						
	193		Bedding inclined 60°.												
328.47	194														
	195				C41			100	53						
326.47	196		Bedding inclination 90°, joint inclination 25°.												
	197														
324.47	198														
	199		SEDIMENTARY ROCK (SANDSTONE): fine-grained to medium-grained, moderately bedded, gray, fresh, hard, strong reaction to HCL, concretion.												
322.47	200		Becomes soft.		C42			97	77						
	201		Bedding inclined 75°.												
320.47	202														
	203		Joint inclined 80°.												
318.47	204		SEDIMENTARY ROCK (SILTSTONE/CLAYSTONE): fine-grained, laminated siltstone, thinly to thickly bedded, dark gray to very dark gray, fresh, soft, moderately fractured, bedding inclined 75°- 90°, sandstone 50% interbedded with siltstone 50%.												
	205														

(continued)

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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B2**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**7 of 12**

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
	205		*(continued).*		C43			87	67						CS & EM, UC See note at end of log regarding RQD.
320.49	206														
	207														
318.49	208		Siltstone rip-up fragments.												
	209														
316.49	210				C44			92	43						
	211														
314.49	212		Joint inclined 20°.												
	213														
312.49	214														
	215				C45			100	55						
310.49	216		SEDIMENTARY ROCK (SANDSTONE with SILTSTONE): fine grained to medium-grained, laminated to thinly bedded, gray to light gray, fresh, soft to moderately hard, slightly to moderately fractured, 90% of Sandstone, trace of hard zone, bedding and bedding plane parting inclined 70°- 90°. Coarse-grained zone, graded bedding, joints inclined 10° to 50°.												
	217														
308.49	218														
	219														
306.49	220				C46			83	33						
	221		Siltstone laminations inclined 60°.		C47			87	2						
304.49	222														
	223		Graded bedding, coarse to fine-grained zone.												
302.49	224														
	225		Joints inclined 30° to 35°, rough surfaces.												
300.49	226		Soft zone.		C48			102	48						
	227		Joints inclined 35°, weak HCL reaction, slightly rough to moderately rough surfaces.												
298.49	228														
	229		Hard cemented zone, calcite cement.							13					UC
296.49	230		Healed calcite, joints inclined 35°.												
	231				C49			100	87						CS & EM, UC
294.49	232		Siltstone laminations inclined 70°.												
	233														
292.49	234		Coarse to medium-grained zone.												
	235														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B2**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**8 of 12**

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
	235		*(continued).*		C49			100	87						See note at end of log regarding RQD.
294.51	236				C50			73	48						
	237		Joint inclined 20°.							13					
292.51	238		Becomes coarse-grained, trace fine gravel.												
	239														
290.51	240														
	241		SEDIMENTARY ROCK (SILTSTONE, SANDSTONE, CLAYSTONE): 65% siltstone, 5% claystone, 30% sandstone, fine grained to medium-grained, laminated to very thin bedded Siltstone with Claystone, thin to moderately bedded sandstone; gray to very dark gray and dark brown, fresh, moderately soft to hard, slightly to intensely fractured, bedding and bedding plane parting inclined 60°- 80°. Puente Formation.		C51			100	58					
288.51	242														
	243									14					CS & EM, SD, UC
286.51	244														
	245		Joint inclination 25°.		C52			40	0						
284.51	246														
	247														
282.51	248														
	249														
280.51	250		Joint inclination 25°.		C53			100	25						
	251		Bedding plane parting.												
278.51	252		Soft sediment deformation.		C54			56	40						
	253		Bedding inclined 70° to 90°.												
276.51	254														
	255														
274.51	256				C55			80	13						
	257														
272.51	258														
	259		Joint inclination 37°.		C56			100	0						
270.51	260		Bedding inclined 75°.												
	261				C57			100	77						
268.51	262														
	263		Bedding inclined 65° to 75°.							13					CS & EM, SD, UC
266.51	264		Joint inclined 30°.												
	265														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B2**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**9 of 12**

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
	265		*(continued).*		C57			100	77						See note at end of log regarding RQD.
268.53	266		Incipient joints, rough, moderately fractured, HCL reaction.		C58			100	27						
	267														
266.53	268		Bedding inclined 75° to 80°.												
	269														
264.53	270									13					EM, SD, UC
	271				C59			73	28						
262.53	272		Fault inclination 30°, 0.1" displacement.												
	273														
260.53	274														
	275														
258.53	276		Claystone rip-up fragments 1/4" to 1" size, , smooth, fault inclined 0-20° with slickensides, 0.1" displacement.		C60			97	22						
	277		Clay filling joint, inclination up to 18°.												
256.53	278														
	279														
254.53	280														
	281				C61			92	53						
252.53	282		Siltstone laminations inclined 75°.												
	283														
250.53	284														
	285		Siltstone rip-up fragments, 1" size.							15					
248.53	286				C62			95	57						
	287														
246.53	288														
	289		Soft sediment deformation, wavy bedding inclined 75°.												
244.53	290														
	291		Fractured zone; 6" thick in black to very dark gray Siltstone and Claystone.		C63			57	72						
242.53	292														
	293		Minor fault inclined 20°, slickensides parallel to core axis.												
240.53	294		Trace of coal and pyrite crystals.												
	295														

(continued)

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BORING RECORD				**R-09-Z1B2**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**10 of 12**

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
	295				C63			57	72						See note at end of log regarding RQD.
242.55	296				C64			100	54						
	297														
240.55	298									16					
	299														EM, SD, UC
238.55	300		Bedding inclined 70°, abundant bedding plane parting.												
	301				C65			92	40						
236.55	302														
	303		Becomes gray, hard, calcite cement 6" thick, minor fault inclined 0° to 30°.												
234.55	304														
	305		Trace of coal fragments.												
232.55	306		Bedding plane parting inclination 60° to 70°.		C66			62	0						
	307														
230.55	308														
	309		No recovery.												
228.55	310														
	311				C67										
226.55	312														
	313														
224.55	314														
	315														
222.55	316				C68										
	317														
220.55	318														
	319		Trace of pyrite crystals, black lamination of coal.		C69			30	0						
218.55	320		No recovery.												
	321				C70										
216.55	322														
	323														
214.55	324														
	325														

(continued)

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7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**11 of 12**

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
	325		No recovery.												
216.57	326		Bottom of borehole at 326.0 ft bgs (Inclined at 60° from horizontal)												
	327														
214.57	328		Backfilled with Grout.												
	329														
212.57	330		RQD values provided in the boring logs are based on intact core pieces obtained between two natural discontinuities. The majority of cores obtained in this boring are typically very weak to weak and do not meet the "sound core" definition provided in standard test method for RQD ASTM (D 6032). These RQD values should not be used to evaluate the rock mass quality.												
	331														
210.57	332														
	333														
208.57	334														
	335														
206.57	336														
	337														
204.57	338														
	339														
202.57	340														
	341														
200.57	342														
	343														
198.57	344														
	345														
196.57	346														
	347														
194.57	348														
	349														
192.57	350														
	351														
190.57	352														
	353														
188.57	354														
	355														

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REPORT TITLE				HOLE ID
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DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**12 of 12**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
J.Castle, B. Schell	1-23-09	1-31-09	34° 5' 27.7728" / 118° 13' 38.7114" NAD83	R-09-Z1B3
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Cascade Drilling Inc.			' Lt Sta Thorpe Ave at N. San Fernando Road	343.23 ft NAVD 88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wash			Speed Star 30K	6 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT (1.4"), Cal (2.4"), PQ core (3.2")			Automatic Hammer 140 lb. 30 inch drop	70%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer Installed on Completion			NM / 29.9 ft on 7-1-09	303.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method / Casing Depth	Remarks
	0		ASPHALT , 2.4" thick.											This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007) except as noted in Appendix A1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010. **VOC measurements were taken randomly and the readings were within normal value for ambient air.**
	1		SILTY SAND (SM); medium dense, yellowish brown, moist, fine to medium-grained.											
341.23	2													
	3													
339.23	4													
	5		Medium dense, yellowish brown, slightly moist, very fine SAND, slightly micaceous.		S1	1 4 5	9	100						
337.23	6													
	7													
335.23	8													
	9													
333.23	10		Lean CLAY (CL); medium stiff, grayish brown, moist, medium plasticity, very thin horizontal bed at tip, SILTY SAND in shoe, nonmarine gastropod shells.		D2	2 3 5	8	100				PP = 1.5		
	11													
331.23	12													
	13													
329.23	14													
	15		At EL. 328.2', becomes grayish brown, interbedded with Poorly graded SAND, horizontal bedding, trace GRAVEL to 0.5" dia, medium plasticity.		S3	3 5 8	13	100						
327.23	16													
	17													
325.23	18													
	19													
323.23	20		Poorly graded SAND with SILT (SP-SM); medium dense, dark grayish brown, moist, about 95% coarse to medium SAND, about 5% nonplastic fines, micaceous, locally oxidized, large wood chunk.		D4	10 20 15	35	100		13	93			
	21													
321.23	22													
	23													
319.23	24													
	25													

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z1B3
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	LA	710	D/D	07-187900
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		6-22-09	1 of 11

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ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		Poorly graded SAND with SILT (SP-SM) *(continued)*. Dense, gray, about 98% medium to fine SAND, 2% fines, subangular granitic sources.		S5	9 15 17	32	100							See note at end of log regarding RQD.
317.23	26														
	27														
315.23	28														
	29														
313.23	30		Fat CLAY (CH); stiff, very dark gray, moist, medium to high plastic, micaceous.		D6	5 6 8	14	100				PP = 2.75			
	31														
311.23	32														
	33														
309.23	34														
	35		Poorly graded SAND with SILT (SP-SM); very dense, dark gray, moist, about 1% fine GRAVEL, fine SAND, grading down to medium SAND, subrounded to subangular diorite and gabbroic gravel, max. 1" dia.		S7	22 24 26	50	100							
307.23	36														
	37														
305.23	38														
	39														
303.23	40		At EL. 303.2', becomes dense, fine GRAVEL, faintly bedded in horizontal laminations and beds, 3" thick.		D8	19 27 25	52	100		16	118				CR
	41														
301.23	42														
	43														
299.23	44														
	45		Fat CLAY (CH); hard, gray to very dark gray, moist, , about 20% fine SAND, medium to high plasticity fines, about 20% specks of soft carbonate nodules, predominantly quartz and feldspar, trace mica, trace black organics.		S9	4 11 23	34	100				PP = 2.25			VOC=0.4 ppm
297.23	46														
	47														
295.23	48														
	49														
293.23	50		Poorly graded SAND with SILT (SP-SM); very dense, gray, moist, about 11% rounded, coarse GRAVEL, max. 1.5" dia.; about 63% coarse to fine SAND, 6% nonplastic fines, moderately graded, granitic source, faint horizontal bedding.		D10	30 40 47	87	100		14	121				CR, PA, VOC=0.2 ppm
	51														
291.23	52														
	53														
289.23	54														
	55														

(continued)

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REPORT TITLE: **BORING RECORD**

HOLE ID: **R-09-Z1B3**

DIST.	COUNTY	ROUTE	POSTMILE	EA
7	LA	710	D/D	07-187900

PROJECT OR BRIDGE NAME: **SR-710 TUNNEL TECHNICAL STUDY**

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
	K.T	6-22-09	2 of 11

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
	55		Becomes coarse SAND, moderately graded bedding, channel deposits. Poorly graded SAND with SILT (SP-SM) *(continued)*.		S11	19 30 32	62	100						See note at end of log regarding RQD.
287.23	56													
	57													
285.23	58													
	59													
283.23	60				D12	16 45 48	93	100		10	126	PP = 3.5		PA, VOC=1.4 ppm
	61		ORGANIC SILT (OL); hard, black to olive, moist, about 29% coarse to fine GRAVEL, about 64% coarse to fine SAND, about 7% nonplastic fines, H2S odor.											
281.23	62													
	63													
279.23	64													
	65		SILT (ML); hard, olive, H2S odor, slight micaceous.		S13	16 19 21	40	100				PP = 2.5		VOC=0.3 ppm
277.23	66		SILTY SAND (SM); dense, gray, moist, coarse SAND, moderately angular, graded.											
	67													
275.23	68													
	69													
273.23	70		Poorly graded SAND with SILT and GRAVEL (SP-SM); about 20% coarse to fine GRAVEL, about 72% coarse to fine SAND, about 8% nonplastic fines.		D14	37 50/5		100		17	114			PA
	71													
271.23	72													
	73		SEDIMENTARY ROCK (SILTSTONE and SANDSTONE): fine-grained, laminated to thinly bedded,dark grayish brown to brownish gray, intensely weathered, soft, friable, minor oxidation, slightly micaceous. Puente Formation.											
269.23	74													
	75				S15	27 50/5		100				PP = 4.5		VOC=0.1 ppm
267.23	76													
	77													
265.23	78													
	79													
263.23	80				S16	11 42 50/3		100						VOC=0.2 ppm
	81													
261.23	82		SEDIMENTARY ROCK (SANDSTONE): fined-grained, moderately bedded, medium gray, slightly weathered, soft, slightly fractured, few thin SILTSTONE (10%) beds, dipping 10° to 20°.		C1			57	57					
	83													UC
259.23	84													
	85													

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B3**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**3 of 11**

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
	85		*(continued).*		C2			29	19						See note at end of log regarding RQD.
257.23	86		At EL. 257.2', cross bedding 0° to 20°.												
	87														
255.23	88														
	89		At EL. 254.2', siltstone beds dipping 20° to horizontal.												
253.23	90														Acoustic Televiewer (Appendix F) indicates beds dipping northeast
	91				C3			100	63						No reaction to HCL
251.23	92		At EL. 251.2', siltstone beds and laminations dipping 5° to 25°.												
	93														
249.23	94														
	95		At EL. 248.2', hard cemented sandstone zone, reacts to HCL (1.2' thick).		C4			100	53	3					UC
247.23	96														
	97														
245.23	98														
	99		At EL. 244.2', siltstone and claystone laminations, dipping 10° to 20°, rip-up fragments, flame structures.												
243.23	100		SEDIMENTARY ROCK (SANDSTONE): fined-grained, thick bedded to massive, gray, slightly weathered to fresh, very soft to moderately hard; slightly fractured, tight joints, slightly rough to smooth surface, bedding dip 5° to 10°.		C5			100	100						
	101														
241.23	102														
	103		At EL. 240.2', becomes altered lithic arkose sandstone; Quartz=26%, Plagioclase=26%, K-feldspar=25%, Plutonic volcanic fragments, dolomite cement 1%. Incipient joints dipping 40°.												PTS
239.23	104														
	105														
237.23	106														
	107		At EL. 236.2', mudstone laminations, dip 5° to 10°.												
235.23	108				C6			71	39						
	109														UC
233.23	110		At EL. 233.2', light gray Calcite veins, dipping 80° to 90°.												
	111		At EL. 231.6', calcite-cemented zone, 1' thick, light gray, very hard.												
231.23	112														
	113		At EL. 229.8', incipient random joints, thin Calcite-cemented zone.												
229.23	114														
	115														

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BORING RECORD				**R-09-Z1B3**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**4 of 11**

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
	115		AT EL. 228.2', becomes light gray cross-bedding dipping 50°. *(continued).*		C7			100	70						See note at end of log regarding RQD. CS & EM, UC
227.23	116														
	117														
225.23	118		At EL. 225', mudstone laminations offset by minor vertical fault.												
	119														
223.23	120		At, EL. 221.5', mudstone laminations dipping 10° to 15°.		C8			100	45						
	121														
221.23	122														
	123														
219.23	124														UC
	125														
217.23	126														
	127		At EL. 216.6', joint dipping 45°.												
215.23	128											PP = 3			
	129														
213.23	130				C9			87	38			PP = 3			
	131		At EL. 211.2', mudstone laminations displaced by fault dipping 85°.												
211.23	132														
	133		SEDIMENTARY ROCK (MUDSTONE and SANDSTONE interbeds): fine-grained, laminated to thickly bedded, fresh, very soft to hard; slightly to moderately fractured with joints, minor faults, bedding and bedding plane joints dip 5°- 25°, most fractures tight and without filling, 50% fine-grained sandstone, 50% mudsotne and sandstone interbeds.											
209.23	134														
	135														
207.23	136		At EL. 207.2', mudstone laminations dip 20°.												
	137														
205.23	138														
	139														
203.23	140		At EL. 203.2', minor faults displace laminations, dip 90° to 40°.		C10			91	22						
	141														
201.23	142														
	143														
199.23	144		At EL. 199.5', soft sediment deformation, mudstone.												
	145														

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BORING RECORD				**R-09-Z1B3**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
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BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**5 of 11**

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
	145		*(continued).*		C10			91	22						See note at end of log regarding RQD.
197.23	146		At EL. 197.2', becomes mudstone laminations dip 20° to 25°, bedding plane parting.												
	147														
195.23	148		At EL. 195.2', becomes deformed siltstone.												
	149														
193.23	150				C11			82	59						Lost core at top
	151														
191.23	152														
	153		SEDIMENTARY ROCK(SILTSTONE and CLAYSTONE interbeds): laminated, thinly bedded, light gray, slightly weathered, soft to moderately hard, laminations dip 5° to 10°, some beds deformed by soft-sediment deformation.												
189.23	154														PTS
	155		At EL. 189.2', becomes silty claystone; clay 50%, Organic 15%, Quartz 15%, K-feldspar 15%.												
187.23	156														
	157		At EL. 186.5', becomes breccia zone, small pieces of hard rock in clayey sand matrix, no shears. Probably ancient fracture zone.		C12			92	33						
185.23	158														
	159		At EL. 184.2', hard cemented zone, 6" thick interbedded mudstone and sandstone.												
183.23	160														
	161		At EL. 181.2', hard cemented zone, 0.9' thick several joints horizontal to 20° dip, smooth to slightly rough surfaces, tight, no filling, laminations dip 15° to 20°.												
181.23	162														
	163														
179.23	164		At EL. 179.2', becomes laminations dipping 15° to 20°.		C13			100	63						
	165														
177.23	166		At EL. 177.4', bedding plane parting.												
	167		At. EL. 175.8', several joints dipping 45° to 60°.												
175.23	168									10					SD, UC
	169														
173.23	170		At EL. 173.4', becomes coarse sandstone, sandstone 33%, claystone 33%, siltstone 33%, bedding joint 10°, fine gravel, 2" thick.												
	171		SEDIMENTARY ROCK (SANDSTONE): fined-grained, thickly bedded, gray, fresh, slightly weathered, soft to moderately hard, slightly fractured, joint dipping 10°, primarily bedding plane parting dipping 15°.												
171.23	172														
	173														
169.23	174		Performed Pressure Meter Test.		C14										PM
	175														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR710_BORINGLOG_3_13_2010.GPJ CALTRANS LIBRARY.GLB 3/28/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B3**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**6 of 11**

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
	175		*(continued)*. Pressure Meter Test.												See note at end of log regarding RQD.
167.23	176														
	177				C15			89	89	3					UC
165.23	178														
	179														
163.23	180		SEDIMENTARY ROCK (MUDSTONE and SANDSTONE): fine-grained, laminated to moderately bedded, gray to black, fresh, soft to hard; slightly fractured, predominantly bedding plane parting, dipping 15°, 30% sandstone.		C16			100	100						
	181														
161.23	182														
	183														
159.23	184														
	185									8					SD
157.23	186														
	187		At EL. 156', eroded bedding.												
155.23	188														
	189		At EL. 154', soft sediment deformation and eroded laminations.												
153.23	190		At EL. 153.2', reworked siltstone fragments, max. 2" dia.		C17			100	100						
	191														
151.23	192														
	193		At EL. 150.4', soft sediment deformation.												
149.23	194									10					CS & EM, SD
	195		At EL. 148.2', calcite-cemented sandstone 1' thick, sharp contact dipping 20°.												
147.23	196														
	197		At EL. 146.2', incipient cross cutting joints, minor oxidation on bedding plane surface.												
145.23	198														
	199		At EL. 144.5', calcite-cemented, fined-grained Sandstone 1" thick.												CS & EM
143.23	200		Performed Pressure Meter test.		C18										PM
	201														
141.23	202														
	203														
139.23	204		SEDIMENTARY ROCK (SANDSTONE): fined-grained to medium-grained, thickly bedded to massive, gray,		C20			83	79						
	205														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR710_BORINGLOG_3_13_2010.GPJ CALTRANS LIBRARY.GLB 3/28/10

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Division of Engineering Services
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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B3**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**7 of 11**

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
	205		fresh, predominantly very soft, locally hard, friable, slightly fractured. *(continued)*.		C20			83	79						See note at end of log regarding RQD.
137.23	206														
	207		At EL. 135.8', calcite veins dipping 35° to 45°.												
135.23	208														
	209														
133.23	210														
	211														
131.23	212														
	213														
129.23	214														
	215		At EL. 127.8', lineations on joint surface with clay filling, smooth, aperture 1 mm.		C21			79	79						
127.23	216														
	217		At EL. 126.2', joints dipping 30° to 40°, smooth surface, 1 mm aperture.							7					CAI
125.23	218														
	219														
123.23	220														
	221														
121.23	222		At EL. 121.6', laminations dipping 20° to 25°.												
	223														
119.23	224														
	225				C22			100	100						CS & EM, UC
117.23	226														
	227														
115.23	228														
	229														
113.23	230				C23			107	102						
	231		At EL. 112', light gray zone, calcite-cemented beds, dipping 30°.												
111.23	232		At EL. 111.2', siltstone fragment, max. 3" dia.												UC
	233														
109.23	234		At EL. 108.6', bedding dipping 20°.												
	235														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B3**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**8 of 11**

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
	235				C23			107	102						UC See note at end of log regarding RQD.
107.23	236		At EL. 107.23', light gray zone, cross beds dipping 30°.												
	237														
105.23	238		At EL. 105.23', very faint white line-incipient joint dipping 90°.												
	239														UC
103.23	240		At EL. 103', cross bedding dipping 40°, light gray, hard Calcite-cemented zone, 6" thick.		C24			100	84						
	241		At EL. 102', siltstone fragments, calcite-cemented bedding (?) dipping 15°.												
101.23	242														
	243														
99.23	244														
	245		At EL. 98.2', becomes siltstone/siltstone laminations.							12					
97.23	246		At EL. 97.2', rip-up fragments, graded bedding. At EL. 96.8', incipient joints dipping 40°.												SD
	247														
95.23	248		At EL. 95.2', faint light gray veins.												
	249		At EL. 94', becomes mudstone lamination, dipping 30°.												
93.23	250		At EL. 93', faint sandstone beds dipping 30°.		C25			100	72						
	251		SEDIMENTARY ROCK (SANDSTONE and MUDSTONE): fine-grained, laminated to thickly bedded, gray, fresh, soft, slightly to moderately fractured, bedding plane parting, dipping 15° to 20°, 70% sandstone.												EM, UC
91.23	252														
	253														
89.23	254														
	255														
87.23	256		At EL. 87.8', distorted laminations, worm burrows.												
	257		At EL. 85.8', light gray hard ridges, no reaction to HCL.												
85.23	258														
	259														
83.23	260				C26			100	100						
	261		At EL. 82.2', weak friable zone 3" thick.												
81.23	262														
	263														
79.23	264		At EL. 79', cemented zone dipping 25°.												
	265														

(continued)

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Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z1B3
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	LA	710	D/D	07-187900
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		6-22-09	9 of 11

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
	265		*(continued).*		C26			100	100						See note at end of log regarding RQD.
77.23	266														
	267														
75.23	268														
	269		At EL. 73.6', claystone lamination with SILT coating, bedding joint dipping 20° to 45°.		C27			100	96						
73.23	270														
	271		At EL. 72', soft sandstone zone.												
71.23	272														
	273		At EL. 71', mudstone laminations over claystone rip-up fragments.												
69.23	274														
	275														
67.23	276														
	277		At EL. 65.8', joints dipping 10° to 20°.		C28			100	88						
65.23	278		At EL. 64.6', soft sediment deformation.												
	279				C29			100	44						
63.23	280														
	281														CAI
61.23	282		At EL. 61.2', calcite-cemented sandstone, coarse-grained, 13" thick, few fine gravel of siltstone fragments.												
	283														
59.23	284		At EL. 59.2', fault dipping 65°, clam shell fragment.												
	285														
57.23	286		At EL. 57.2' soft zone, 5" thick.												
	287		At EL. 56.2', siltstone laminations with rip-up fragments.												
55.23	288														
	289		At EL. 54', hard calcite-cemented Sandstone, 10" thick, bedding dipping 5°.		C30			100	100						CS & EM, UC
53.23	290														
	291														
51.23	292		At EL. 51', becomes reworked siltstone fragments of 1/4" size, joints parallel to bedding plane.												CS & EM, UC
	293														
49.23	294		At EL. 49', becomes reworked siltstone fragments of 1/4" size.												
	295														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR710_BORINGLOG_3_13_2010.GPJ CALTRANS LIBRARY.GLB 3/28/10

Department of Transportation
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Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B3**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**10 of 11**

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
	295														
47.23	296		*(continued).*		C30			100	100						See note at end of log regarding RQD.
	297		SEDIMENTARY ROCK (SANDSTONE): fined-grained, gray, fresh, moderately hard, unfractured.												
45.23	298				C31			100	80						
	299									11					EM, UC
43.23	300		SEDIMENTARY ROCK (MUDSTONE): laminated to thinly bedded, gray to very dark brown, fresh; intensely fractured, bedding plane parting, dipping 5° to 10°, sandstone 10%. Puente Formation.												
41.23	302														
	303		Bottom of borehole at 303.0 ft bgs Bottom of borehole is at elevation 40.2 ft.												
39.23	304														
	305		RQD values provided in the boring logs are based on intact core pieces obtained between two natural discontinuities.												
37.23	306		The majority of cores obtained in this boring are typically very weak to weak and do not meet the "sound core" definition provided in standard test method for RQD ASTM (D 6032). These RQD values should not be used to evaluate the rock mass quality.												
	307														
35.23	308		Borehole converted to piezometer at the completion of drilling.												
	309														
33.23	310														
	311														
31.23	312														
	313														
29.23	314														
	315														
27.23	316														
	317														
25.23	318														
	319														
23.23	320														
	321														
21.23	322														
	323														
19.23	324														
	325														

CALTRANS BORING RECORD MET+ENG FIXED SR710_BORINGLOG_3_28_2010.GPJ CALTRANS LIBRARY.GLB 3/28/10

Department of Transportation
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Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B3**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**11 of 11**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Salisbury,K. Barker	2-12-09	2-27-09	34° 5' 20" / 118° 14' 25.9" NAD83	R-09-Z1B4
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Caltrans Drilling Services			' Lt Sta Midland St. s/o East Avenue 39	388.6 ft NAVD88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wire-Line			CS 2000 (truck)	4 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
Bulk, HQ Core			Diedrich Automatic, 140 lb., 30 inch drop	84%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer Installed on Completion			NM / 35.4 ft on 7-1-09	325.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		ASPHALT weak cementation; (5").												This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007), except as noted in Appendix A.1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
	1		Well-graded GRAVEL with SAND (GW); loose to medium dense; dry to moist; mostly coarse to fine, angular GRAVEL, max. 3 in. dia.; some coarse, rounded SAND; weak cementation; (Aggregate Base = 7").		D00			81							
386.60	2		SILTY SAND with GRAVEL and COBBLES (SM); loose to medium dense; light gray; dry to moist; about 20 to 40% COBBLES; little coarse to fine, angular GRAVEL, max. 3 in. dia.; mostly coarse, rounded SAND; little fines; weak cementation; COBBLES consist of Granite, rounded, flat; [ALLUVIUM].											
	3														
384.60	4														
	5														Cautious & Slow Drilling 1' - 10'
382.60	6														SPT and Mod Cal (2") samples were not collected due to the significant number of cobbles and loose sand. The soil was cored and logged. Samples C1 through C19 were then discarded.
	7														
380.60	8														
	9														
378.60	10														
	11														
376.60	12														
	13		Matrix is CLAYEY SAND (SC), trace fine GRAVEL, mostly medium to fine SAND, some fines.		C01			100		13					PA
374.60	14				C02			100							
	15		COBBLES about 70 to 100% COBBLES (Granite, rounded, flat), matrix consists of loose to medium dense, olive to olive gray, dry, weak cementation.		C02A			100							
372.60	16				C03			100							
	17				C04			100							
					C05			100							VOC=0.0 ppm
370.60	18				C06			100							
	19														
368.60	20				C07			100							VOC=0.0 ppm
	21									13					PA
366.60	22		Matrix is Well-graded SAND (SW) with GRAVEL, some coarse to fine GRAVEL, mostly coarse to fine SAND, trace fines.												VOC=0.0 ppm
	23				C08			100							
364.60	24														
	25														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z1B4
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	T/T	07-07-187900
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury, K.Barker			1 of 12

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/9/10

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		COBBLES *(continued)*.		C09			100							
362.60	26				C10			100							
	27				C11			100							
360.60	28														
	29														VOC=0.0 ppm
358.60	30				C12			100							
	31														
356.60	32														
	33														
354.60	34				C13			100		13					
	35				C14			100							
352.60	36														
	37		Well-graded SAND (SW); loose to medium dense; olive; dry to moist; mostly coarse to fine, rounded SAND; weak cementation.		C15			100							VOC=0.0 ppm
350.60	38														
	39														VOC=0.0 ppm
348.60	40		Well-graded SAND with GRAVEL (SW); loose to medium dense; olive; dry to moist; little coarse to fine, angular GRAVEL, max. 3 in. dia.; mostly coarse to fine, rounded SAND; weak cementation.		C16			100							
	41														
346.60	42														VOC=0.0 ppm
	43		SILTY SAND with GRAVEL (SM); loose to medium dense; olive; dry to moist; little coarse to fine, angular GRAVEL, max. 3 in. dia.; mostly coarse to fine, rounded SAND; little fines; weak cementation.												
344.60	44														
	45		SILTY SAND (SM); loose to medium dense; light brown; dry to moist; mostly medium to fine, rounded SAND; little fines; weak cementation.		C17			100							UW, PA
342.60	46														
	47		Poorly graded GRAVEL with SAND (GP); loose to medium dense; light brown; moist; mostly coarse to fine, angular GRAVEL, max. 3 in. dia.; little medium, rounded SAND; weak cementation.							21	105				
340.60	48														VOC=0.0 ppm
	49														
338.60	50		Well-graded SAND with GRAVEL (SW); loose to medium dense; reddish yellow to light brown; moist; little coarse to fine, angular GRAVEL, max. 3 in. dia.; mostly coarse to fine, rounded SAND; weak cementation; subround gravel to 1".		C18			100							
	51														
336.60	52				C19			100							
	53		SANDY SILTY CLAY (CL-ML); soft to medium stiff; light brown; moist; little fine, rounded SAND; little nonplastic fines; weak cementation; fine sand.							24					
334.60	54														VOC=0.0 ppm
	55														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/9/10

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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B4**
DIST. **07**	COUNTY **LA**	ROUTE **710**	POSTMILE **T/T**	EA **07-07-187900**
PROJECT OR BRIDGE NAME **SR-710 TUNNEL TECHNICAL STUDY**				
BRIDGE NUMBER	PREPARED BY **M.Salisbury, K.Barker**	DATE	SHEET **2 of 12**	

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
	55		SEDIMENTARY ROCK, CONGLOMERATE, thickly to very thickly bedded, olive gray, slightly weathered to fresh, moderately hard to hard, unfractured, with clay, gravel to 1/2". **[PUENTE FORMATION]**		C20			100	0						**See note at the end of the log regarding RQD.**
332.60	56														
	57		SEDIMENTARY ROCK, (SANDSTONE), moderately to thickly bedded, light brown, slightly weathered to fresh, moderately hard, unfractured, well graded, with some silt.												
330.60	58														
	59														
328.60	60				C21			100	0						VOC=0.0 ppm
	61		SEDIMENTARY ROCK, (CLAYSTONE)/MUDSTONE, moderately bedded, light brown, slightly weathered to fresh, hard, unfractured, with some fine sand.												
326.60	62		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, moderately to thickly bedded, light olive, slightly weathered to fresh, hard, unfractured, clayey.												
	63		No sample.												
324.60	64														
	65		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, light brown, slightly weathered to fresh, hard, unfractured, with fine sand and clay.		C22			52	0						VOC=0.0 ppm
322.60	66									31	91				UW, PI, PA
	67		With fine sand.												
320.60	68		Lens of clayey fine sand.												
	69														
318.60	70		SEDIMENTARY ROCK, (SANDSTONE), moderately to thickly bedded, olive gray, slightly weathered to fresh, moderately soft, unfractured, fine sand.		C23			100	0						VOC=0.0 ppm
	71														
316.60	72		SEDIMENTARY ROCK, (SILTSTONE), moderately to thickly bedded, olive gray, slightly weathered to fresh, hard, unfractured.												
	73														
314.60	74														
	75		Light brown.		C24			40	0						VOC=0.0 ppm
312.60	76														
	77		No sample.												
310.60	78														
	79														
308.60	80				C25			100	0						VOC=0.0 ppm
	81														
306.60	82														
	83		SEDIMENTARY ROCK, (CLAYSTONE), very thinly bedded, dark gray, slightly weathered to fresh, soft, unfractured.												
304.60	84		SEDIMENTARY ROCK, (SANDSTONE), thickly bedded, light gray, slightly weathered to fresh,												
	85														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/9/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury, K.Barker			**3 of 12**

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
	85		moderately hard to hard, unfractured, silty.		C25			90	0						VOC=0.0 ppm
302.60	86		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, slightly weathered to fresh, soft, unfractured, dipping 42°.												**See note at the end of the log regarding RQD.**
	87		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, light olive gray, slightly weathered to fresh, moderately hard to hard, unfractured, sandy, fine sand.												
300.60	88		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, slightly weathered to fresh, soft, unfractured, bedding plane separation dipping 62°.												
	89														
298.60	90		SEDIMENTARY ROCK, (SILTSTONE), moderately to thickly bedded, light olive gray, slightly weathered to fresh, moderately hard to hard, unfractured, sandy, fine sand. *(continued)*. Slightly to very slightly fractured, joint (CL, not healed), dipping 45°.		C26			90	0						VOC=0.0 ppm UW
	91									13	122				
296.60	92		SEDIMENTARY ROCK, (CLAYSTONE), moderately bedded, light olive gray, slightly weathered to fresh, moderately hard, slightly to very slightly fractured.												
	93														
294.60	94		SEDIMENTARY ROCK, (SANDSTONE), thickly bedded, light gray, slightly weathered to fresh, moderately hard, slightly to very slightly fractured, fine to medium sand.												
	95		No sample.		C27			80	70						
292.60	96		SEDIMENTARY ROCK, (SANDSTONE), thickly bedded, light olive gray, slightly weathered to fresh, hard, slightly fractured, silty, fine sand, some medium sand. Joint (CL, not healed), dipping 60°.												
	97														
290.60	98														
	99		No sample.												
288.60	100		SEDIMENTARY ROCK, (SANDSTONE), moderately bedded, light olive gray, slightly weathered to fresh, hard, slightly fractured, silty, fine to medium sand.		C28			82	62						VOC=0.0 ppm
	101														
286.60	102		Dipping 55°.												
	103		Soft, joint (CL, not healed), dipping 61°.												
284.60	104		No sample.												
	105		SEDIMENTARY ROCK, (SANDSTONE), moderately bedded, light olive gray, slightly weathered to fresh, soft, slightly fractured. Joint (CL, not healed), dipping 54°. Incipient fracture dipping 90°.		C29			90	90						VOC=0.0 ppm UW
282.60	106									13	117				
	107														
280.60	108														
	109		Incipient fracture dipping 67°.												
278.60	110		No sample.		C30			90	70						VOC=0.0 ppm
	111		SEDIMENTARY ROCK, (SANDSTONE), thickly bedded, light olive gray, slightly weathered to fresh, soft, slightly fractured.												
276.60	112		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, light brown, slightly weathered to fresh, hard, slightly fractured.												
	113		SEDIMENTARY ROCK, (SANDSTONE), moderately to thickly bedded, light gray, slightly weathered to fresh, hard, slightly fractured, silty, fine sand. Joint (CL, not healed), dipping 42°.												
274.60	114		Joint (CL, not healed), dipping 15°.												
	115														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury, K.Barker			**4 of 12**

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
	115		Joint (CL, not healed), dipping 15°. Joint (CL, not healed), dipping 15°.		C31			67	67						VOC=0.0 ppm
272.60	116		Soft. No sample.												**See note at the end of the log regarding RQD.**
	117		SEDIMENTARY ROCK, (SANDSTONE), moderately to thickly bedded, light olive gray, slightly weathered to fresh, soft, slightly fractured, silty, fine sand, with some medium sand.												
270.60	118		Joint (CL, not healed), dipping 64°.												
	119		No sample.												
268.60	120		SEDIMENTARY ROCK, (SANDSTONE), moderately bedded, light olive gray, slightly weathered to fresh, soft, slightly fractured, fine sand, some medium sand.		C32			100	100						VOC=0.0 ppm
	121		Shear (CL, not healed), dipping 42°, moist, plastic. Shear (CL, not healed), dipping 63°.												
266.60	122		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, slightly weathered to fresh, moderately hard to hard, slightly fractured.												
	123		SEDIMENTARY ROCK, (SANDSTONE), thinly to moderately bedded, light brown to light olive brown, slightly weathered to fresh, moderately hard to hard, slightly fractured, silty, fine sand.												
264.60	124		Shear (CL, not healed), dipping 65°.		C33			95	95						VOC=0.0 ppm
	125		Shear (CL, not healed). Shear (CL, not healed), dipping 62°.												
262.60	126		Soft to moderately soft, with some silt. Dark gray.												
	127		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, slightly weathered to fresh, soft to moderately soft, slightly fractured.												
260.60	128		SEDIMENTARY ROCK, (SANDSTONE), moderately bedded, dark gray, slightly weathered to fresh, soft to moderately soft, slightly fractured.												
	129		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, slightly weathered to fresh, soft to moderately soft, slightly fractured.												
258.60	130		SEDIMENTARY ROCK, (SANDSTONE), thinly to moderately bedded, light gray to dark gray, slightly weathered to fresh, soft to moderately soft, slightly fractured.		C34			100	100						VOC=0.0 ppm
	131		Shear (CL, not healed), dipping 15°.												
256.60	132		Shear (CL, not healed), dipping 15°. Light olive gray, silty, fine sand with some medium sand.							14	117				UW, PA
	133		Moderately hard to hard.												
254.60	134		Light gray.		C35			93	93						VOC=0.0 ppm
	135		Extremely hard.												
252.60	136		No sample.												
	137		SEDIMENTARY ROCK, (SANDSTONE), moderately to thickly bedded, light olive gray, slightly weathered to fresh, extremely hard, slightly fractured, silty, fine sand.		C36			100	100						
250.60	138		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, slightly weathered to fresh, moderately soft, slightly fractured.												
	139		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light gray, slightly weathered to fresh, moderately soft, slightly fractured, silty, fine sand.												
248.60	140														
	141														
246.60	142														
	143														
244.60	144														
	145														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/9/10

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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B4**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury, K.Barker			**5 of 12**

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
	145		Medium sand with some fine sand. *(continued).*		C37			83	0						**See note at the end of the log regarding RQD.**
242.60	146														
	147														
240.60	148		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, slightly weathered to fresh, hard to very hard, slightly fractured.												
	149		No sample.												
238.60	150		SEDIMENTARY ROCK, (SANDSTONE), moderately bedded, light olive gray, slightly weathered to fresh, hard to very hard, slightly fractured, silty, fine sand.		C38			83	83						VOC=0.0 ppm
	151		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, slightly weathered to fresh, hard to very hard, slightly fractured, sandy, fine sand.												
236.60	152		SEDIMENTARY ROCK, (SANDSTONE), moderately to thickly bedded, light gray, slightly weathered to fresh, hard to very hard, slightly fractured, silty, medium sand with some fine sand.												
	153		No sample.												
234.60	154														
	155		SEDIMENTARY ROCK, (SANDSTONE), thinly to moderately bedded, light olive gray, slightly weathered to fresh, hard to very hard, slightly fractured.		C39			80	80						VOC=0.0 ppm
232.60	156		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, slightly weathered to fresh, soft to moderately soft, slightly fractured, shear (CL, not healed), dipping 60°.												
	157		SEDIMENTARY ROCK, (SANDSTONE), moderately to thickly bedded, light gray, slightly weathered to fresh, moderately hard to hard, slightly fractured.												
230.60	158		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, slightly weathered to fresh, soft to moderately soft, slightly fractured.		C40			100	100						VOC=0.0 ppm
	159		SEDIMENTARY ROCK, (SANDSTONE), moderately to thickly bedded, light gray, slightly weathered to fresh, moderately hard to hard, slightly fractured, silty, fine sand.												
228.60	160		No sample.												
	161		SEDIMENTARY ROCK, (SANDSTONE), moderately bedded, light gray, slightly weathered to fresh, weak, moderately hard to hard, slightly fractured, medium sand.												
226.60	162		SEDIMENTARY ROCK, (SILTSTONE), thickly to very thickly bedded, moderate brown, slightly weathered to fresh, medium strong, moderately hard to hard, slightly fractured, sandy, fine sand.		C-41			100	63	18	110				UW, PI, UU, CR VOC=0.0 ppm
	163		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, slightly weathered to fresh, medium strong, moderately hard to hard, slightly to very slightly fractured, fractured parallel to bedding.												
224.60	164		SEDIMENTARY ROCK, (CLAYSTONE)/MUDSTONE, laminated, olive gray to olive black, slightly weathered, weak, moderately soft to moderately hard, slightly fractured, joint (not healed), dipping 45 to 50°, smooth, very thin, no filling, scattered 3" fine sandstone lenses.												VOC=0.0 ppm
	165														
222.60	166														
	167														
220.60	168														
	169														
218.60	170		SEDIMENTARY ROCK, (SANDSTONE), slightly weathered, strong, very hard, unfractured.		C-42			93	68						
	171		SEDIMENTARY ROCK, (CLAYSTONE)/MUDSTONE, laminated, olive gray to olive black, slightly weathered, weak, moderately hard, unfractured.							14	135				SD VOC=0.0 ppm
216.60	172														
	173		SEDIMENTARY ROCK, (SANDSTONE), slightly weathered, strong, very hard, unfractured.												
214.60	174		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, laminated, olive gray to olive black, slightly weathered, weak, moderately hard, slightly fractured, shear dipping 50°, slightly rough, very thin, no filling, 6" fracture zone												
	175		*(continued)*												

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/9/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B4**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury, K.Barker			**6 of 12**

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
	175		at 172.8'.		C-43			100	50						
212.60	176		At EL. 213.6 ft, becomes intensely fractured, slightly rough, very thin, no filling. *(continued)*.												**See note at the end of the log regarding RQD.**
	177		SEDIMENTARY ROCK, (SANDSTONE), slightly weathered, weak, moderately hard, unfractured.												
210.60	178		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, laminated, olive gray to olive black, slightly weathered, weak, moderately hard, intensely fractured, slightly rough, very thin, no filling.												VOC=0.0 ppm
	179		At EL. 211.6 ft, becomes moderately fractured, dipping 50°, smooth, no filling.												VOC=0.0 ppm
208.60	180		SEDIMENTARY ROCK, (SANDSTONE), slightly weathered, weak, moderately hard, unfractured.		C-44			80	70						
	181		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, laminated, olive gray to olive black, slightly weathered, weak, moderately hard, slightly fractured, dipping 60°, smooth, no filling.												
206.60	182														
	183		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, massive, dark greenish gray, slightly weathered, weak to medium strong, moderately hard, unfractured.												VOC=0.0 ppm
204.60	184		At EL. 205.3 ft, observed 2-3" siltstone lens.												
	185				C-45			98	75						
202.60	186		At EL. 203.3 ft, becomes extremely weak, soft.												
	187														
200.60	188														VOC=0.0 ppm
	189		At EL. 199.9 ft, becomes weak, moderately hard.												
198.60	190				C-46			97	97						VOC=0.0 ppm
	191		At EL. 197.6 ft, becomes weak to medium strong, very hard.												
196.60	192		At EL. 196.3 ft, becomes hard.												VOC=0.0 ppm
	193														VOC=0.0 ppm
194.60	194														
	195				C-47			38	38						VOC=0.0 ppm
192.60	196														
	197														VOC=0.0 ppm
190.60	198														
	199														
188.60	200				C-48			100	95						
	201														
186.60	202														
	203		At EL. 185.9 ft, observed shear, dipping 70°, slickensided, tight.												VOC=0.0 ppm
184.60	204		At EL. 185.6 ft, becomes laminated.							14	118				EM
	205		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, laminated, olive gray, slightly weathered, weak,												

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/9/10

Department of Transportation
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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B4**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury, K.Barker			**7 of 12**

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
	205		moderately hard.		C-49			100	54						
182.60	206		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, laminated, dark greenish gray, slightly weathered, weak, moderately hard.												**See note at the end of the log regarding RQD.**
	207		At EL. 181.9 ft, observed 4" fracture zone.												
180.60	208		SEDIMENTARY ROCK, (CLAYSTONE)/MUDSTONE, laminated, medium dark gray, slightly weathered, very weak, moderately soft, intensely to moderately fractured.												VOC=0.0 ppm
	209		At EL. 180.1 ft, observed 6" fracture zone.												
			At EL. 179.6 ft, becomes medium gray.												
178.60	210		At EL. 179.1 ft, observed joint, dipping 45°, polished, very thin, no filling.		C-50			100	50						
	211		At EL. 178.6 ft, observed 1' fracture zone.												
			At EL. 177.4 ft, observed shear, dipping 70°, slickensided, 1mm.												
176.60	212		At EL. 176.9 ft, observed shear, dipping 70°, slickensided, 1mm.												
	213		At EL. 176.6 ft, observed 6" fracture zone.							27	112				UW, SD
			At EL. 175.9 ft, observed shear, dipping 45°, slickensided, 1mm.												VOC=0.0 ppm
174.60	214		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, laminated, medium gray, slightly weathered, weak, moderately soft, unfractured.												
	215		At EL. 173.9 ft, becomes olive black.		C-51			98	78						
172.60	216		At EL. 173.6 ft, becomes massive, olive gray, moderately hard, slightly fractured.												
	217		At EL. 173.1 ft, observed shear, dipping 10°, slickensided.												
			At EL. 171.6 ft, becomes dark greenish gray.												
170.60	218														
	219														VOC=0.0 ppm
			SEDIMENTARY ROCK, (CLAYSTONE)/MUDSTONE, fine-grained, massive, olive gray, slightly weathered, weak, moderately soft.												
168.60	220		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, massive, olive gray, slightly weathered, weak, moderately hard, slightly fractured.		C-52			100	56						
	221														
166.60	222		At EL. 166.6 ft, observed joint, dipping 45°, rough, 1mm, no filling,.												
	223														
			SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, massive, olive gray, slightly weathered, weak, moderately soft to moderately hard, slightly fractured, scattered 1-3" sandstone lenses.												
164.60	224														
	225		At EL. 163.8 ft, observed shear, dipping 50°, slickensided, 1mm.		C-53			86	42						
162.60	226														VOC=0.0 ppm
										8	136				EM
	227														
			SEDIMENTARY ROCK, (SANDSTONE), fine-grained, massive, dark greenish gray, slightly weathered, weak, moderately hard to hard, unfractured.												
160.60	228														VOC=0.0 ppm
	229														
158.60	230				C-54			100	55						
	231														
			SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, olive gray, slightly weathered, weak, moderately hard, unfractured.												
156.60	232		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, massive, dark greenish gray, slightly weathered, weak, moderately soft, unfractured.												
	233		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, olive gray, slightly weathered, weak, moderately hard, intensely to moderately fractured, dipping 30 to 45°,												
154.60	234														
	235														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040806.GLB 3/9/10

Department of Transportation
Division of Engineering Services
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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B4**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury, K.Barker			**8 of 12**

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
	235		smooth, 0-1 mm, no filling and clay.		C-55			86	20						VOC=0.0 ppm
152.60	236		SEDIMENTARY ROCK, (SANDSTONE), fine-grained to silt, massive, dark greenish gray, slightly weathered, weak, moderately soft, unfractured. At EL. 153.6 ft, observed *(continued)*.												**See note at the end of the log regarding RQD.**
	237														
150.60	238		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, olive gray, slightly weathered, weak, moderately hard, moderately to slightly fractured, shear (clay), dipping 50°, slickensided.												VOC=0.0 ppm
	239														
148.60	240		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, massive, dark greenish gray, slightly weathered, extremely to very weak, soft to moderately soft, unfractured.		C-56			90	40						
	241														
146.60	242														
	243		At EL. 145.6 ft, becomes weak, moderately soft, very slightly fractured.							13	119				UU
144.60	244														
	245		At EL. 144.1 ft, observed joint, dipping 40°, slightly rough, 1 mm, no filling. At EL. 143.6 ft, becomes moderately soft to moderately hard.		C-57			70	60						
142.60	246														
	247														
140.60	248														
	249														
138.60	250		At EL. 138.6 ft, becomes extremely weak, soft.		C-58			96	30						
	251														
136.60	252														
	253		At EL. 135.6 ft, becomes weak, moderately hard.												VOC=0.0 ppm
134.60	254														
	255		At EL. 134.2 ft, observed joint, dipping 40°, slightly rough, very thin, no filling. At EL. 133.6 ft, becomes extremely weak, soft.		C-59			60	0						
132.60	256														VOC=0.0 ppm
	257														
130.60	258														
	259														
128.60	260		At EL. 128.6 ft, becomes soft to moderately soft.		C-60			80	16						
	261														
126.60	262		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, massive, dark greenish gray, slightly weathered, weak, moderately soft.												VOC=1.7 ppm
	263		SEDIMENTARY ROCK, (SANDSTONE), massive, dark greenish gray, slightly weathered, extremely weak, soft, scattered 3" claystone lenses.												VOC=0.0 ppm
124.60	264														
	265														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040806.GLB 3/9/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury, K.Barker			**9 of 12**

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
	265		*(continued).*		C-61			70	30						VOC=0.0 ppm **See note at the end of the log regarding RQD.**
122.60	266														
	267		At EL. 122.1 ft, becomes weak, moderately hard.												
120.60	268														VOC=3.5 ppm
	269														
118.60	270		At EL. 119.1 ft, becomes laminated, with thin black bedding. At EL. 118.6 ft, becomes massive, soft to moderately soft.		C-62			40	20						
	271														
116.60	272														
	273														VOC=0.0 ppm
114.60	274														VOC=13.4 ppm
	275		SEDIMENTARY ROCK, (SILTSTONE/ MUDSTONE, laminated, olive gray, slightly weathered, weak, moderately hard, unfractured, with scattered 2" lenses of fine sandstone.		C-63			85	62						
112.60	276														
	277														
110.60	278		At EL. 110.6 ft, becomes slightly fractured, shear, dipping 45°, smooth, 1-2 mm.												VOC=0.9 ppm
	279														
108.60	280		SEDIMENTARY ROCK, (CLAYSTONE)/MUDSTONE, thinly bedded, olive black, slightly weathered, very weak, moderately soft, unfractured, interbedded with dark greenish gray, fine sandstone.		C-64			100	50						
	281														
106.60	282		SEDIMENTARY ROCK, (SANDSTONE), dark greenish gray, slightly weathered, weak, moderately soft, unfractured.												
	283														VOC=1.2 ppm
104.60	284														
	285		At EL. 104.1 ft, observed 2" siltstone lens, moderately hard.		C-65			100	85						UW
102.60	286		SEDIMENTARY ROCK, (SILTSTONE/MUDSTONE, laminated, olive gray, slightly weathered, weak, moderately hard, slightly fractured.												
	287		SEDIMENTARY ROCK, (SANDSTONE), olive gray, slightly weathered, strong, very hard.												PTS VOC=1.2 ppm
100.60	288		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, olive gray, slightly weathered, weak, moderately hard, moderately to slightly fractured, joint dipping 40 to 50°, smooth, very thin, no filling.												
	289		SEDIMENTARY ROCK, (SANDSTONE), dark greenish gray, slightly weathered, weak, moderately soft, unfractured.							23	114				SD
98.60	290				C-66			100	66						VOC=0.0 ppm
	291														
96.60	292														
	293														VOC=0.0 ppm
			SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, laminated, olive gray, slightly weathered, weak, moderately hard, unfractured.												
94.60	294														VOC=0.7 ppm
	295														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/9/10

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Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B4**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury, K.Barker			**10 of 12**

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
	295		SEDIMENTARY ROCK, (SANDSTONE), dark greenish gray, slightly weathered, weak, moderately soft, slightly fractured.		C-67			100	90						**See note at the end of the log regarding RQD.**
92.60	296		At EL. 92.6 ft, observed joint, dipping 50°, smooth, 1 mm, no filling.												
	297		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, massive, olive gray, slightly weathered, weak, moderately soft to moderately hard, slightly fractured.												
90.60	298		At EL. 90.8 ft, observed fracture zone, smooth, very thin, no filling.												VOC=0.0 ppm
	299														VOC=0.7 ppm
88.60	300		At EL. 88.8 ft, becomes very hard, shear, dipping 50°, slickensided.		C-68			100	48						VOC=0.0 ppm
	301		At EL. 88.6 ft, becomes moderately hard, dipping 40°, smooth, very thin.												
86.60	302														
	303		SEDIMENTARY ROCK, (SANDSTONE), massive, olive gray, slightly weathered, weak, moderately hard, unfractured.												VOC=0.0 ppm
84.60	304														VOC=0.2 ppm
	305		SEDIMENTARY ROCK, (CLAYSTONE)/MUDSTONE, laminated, olive gray, slightly weathered, weak, moderately hard, slightly fractured, (clay), dipping 40°, smooth, very thin.		C-69			100	55						
82.60	306		At EL. 83.6 ft, observed shear, dipping 60°, smooth, 0.5mm.												
	307		At EL. 82.3 ft, observed shear, dipping 60°, smooth, 0.5mm.												SD, EM
80.60	308		At EL. 81.6 ft, observed shear, dipping 10°, 2mm.							17	113				VOC=0.0 ppm
	309		SEDIMENTARY ROCK, (SANDSTONE), massive, dark greenish gray, slightly weathered, weak, soft to moderately soft, unfractured.												VOC=0.0 ppm
78.60	310		At EL. 78.6 ft, becomes moderately soft to moderately hard.		C-70			100	42						
	311		At EL. 78.0 ft, becomes soft, shear, slickensided.												
76.60	312		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, laminated, olive gray, slightly weathered, weak, moderately hard to hard, moderately fractured, shear (clay), dipping 15 to 60°, smooth, 0-1 mm.												
	313														VOC=0.0 ppm
74.60	314														VOC=0.0 ppm
	315		SEDIMENTARY ROCK, (SANDSTONE), massive, dark greenish gray, slightly weathered, weak, soft to moderately soft, unfractured.		C-71			100	30						
72.60	316		At EL. 73.6 ft, becomes unfractured.												
	317														
70.60	318		At EL. 71.1 ft, becomes soft.												VOC=0.0 ppm EM
	319		At EL. 69.8 ft, becomes hard.							2	157				VOC=0.4 ppm
68.60	320		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, laminated, olive gray, slightly weathered, weak, hard, intensely fractured, shear (clay), dipping 45°, smooth, 1 mm.		C-72			100	50						
	321		At EL. 68.6 ft, becomes hard to very hard, moderately fractured, bedding plane separation, dipping 45°, smooth, very thin, no filling.												
66.60	322														
	323														VOC=0.0 ppm
64.60	324														
	325														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/9/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B4**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury, K.Barker			**11 of 12**

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
	325														
62.60	326		RQD values provided in the boring logs are based on intact core pieces obtained between two natural discontinuities. Majority of cores obtained in this boring are weak and does not meet the "sound core" definition provided in standard test method for RQD ASTM D 6032. These RQD values should not be used to evaluate the rock mass quality. Bottom of borehole at 325.0 ft bgs Borehole was converted to piezometer at the completion of drilling.											
	327														
60.60	328														
	329														
58.60	330														
	331														
56.60	332														
	333														
54.60	334														
	335														
52.60	336														
	337														
50.60	338														
	339														
48.60	340														
	341														
46.60	342														
	343														
44.60	344														
	345														
42.60	346														
	347														
40.60	348														
	349														
38.60	350														
	351														
36.60	352														
	353														
34.60	354														
	355														

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/9/10

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Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury, K.Barker			**12 of 12**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
D. Jankly	2-16-09	2-24-09	34° 4' 38.283" / 118° 12' 13.3308" NAD83	R-09-Z1B5
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Cascade Drilling Inc.			' Lt Sta (Emma Ave. w/o Lincoln Park Ave.)	442.2 ft NAVD 88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wash			Speedstar 30k	6 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT(1.4"), Cal (2.4"), PQ core (3.2")			Automatic Hammer 140 lb. 30 inch drop	70%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer Installed on Completion			NM	22.7 ft on7/1/09	502.0 ft

ELEVATION (ft)	DEPTH (ft)	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	ASPHALT 4 inches thick.												This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007), except as noted in Appendix A.1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
	1	Road base material, 5 inches thick. SANDY SILT (ML); soft; brown; moist; fine sand, homogeneous [OLDER ALLUVIUM].												
440.20	2			D01			100							
	3													
438.20	4													
	5													Hand Auger to 7'
436.20	6													
	7													
434.20	8													
	9													
432.20	10	Medium stiff.		S02	2 2 3	5	100							
	11													
430.20	12													
	13													
428.20	14													
	15	Very stiff; brown to dark brown; 43% medium to fine SAND, 57% fines. Iron staining, slightly porous, open voids to 1/16-inch diameter.		S03	7 9 11	20	100		17	109				PA
426.20	16													
	17													
424.20	18													
	19													
422.20	20	Hard; dark brown to dark gray; moist; homogeneous.		S04	8 22 34	56	100							
	21													
420.20	22													
	23													
418.20	24													
	25													

(continued)

Department of Transportation
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REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z1B5
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	D/D	07-187900
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	D. Jankly		4-7-09	1 of 18

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25														
416.20	26		SILTY CLAY (CL-ML); hard; brown; moist; medium to fine SAND; homogeneous.		S05	10 21 34	55	100							
	27														
414.20	28														
	29														
412.20	30		SANDY lean CLAY (CL); very stiff; brown; moist; some medium to fine SAND; homogeneous.		S06	4 9 11	20	100							
	31														
410.20	32														
	33														
408.20	34														
	35		42% medium to fine SAND, 58% fines.		S07	11 18 21	39	100		18	111				PA, PI
406.20	36														
	37														
404.20	38														
	39														
402.20	40		SANDY SILT (ML); very stiff; brown; moist to wet; medium to fine SAND; homogeneous.		S08	6 6 8	14	100							
	41														
400.20	42														
	43														
398.20	44														
	45														
396.20	46		SILTY SAND (SM); medium dense; brown; moist to wet; 55% medium to fine SAND, 45% low plasticity fines.		S09	8 14 18	32	100		22	104				PA
	47														
394.20	48														
	49														
392.20	50		SILTY CLAY with SAND (CL-ML); stiff; brown; moist to wet; fine SAND; homogeneous.		S10	3 3 5	8	100							
	51														
390.20	52														
	53														
388.20	54														
	55														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
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REPORT TITLE: **BORING RECORD**

HOLE ID: **R-09-Z1B5**

DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	D/D	07-187900

PROJECT OR BRIDGE NAME: **SR-710 TUNNEL TECHNICAL STUDY**

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
N/A	D. Jankly	4-7-09	2 of 18

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
	55														
386.20	56		SANDY SILTY CLAY (CL-ML); very stiff; light brown; moist; fine SAND; some iron staining, homogeneous.		S11	7 17 7	24	100		17	111				See note at end of log regarding RQD.
	57														
384.20	58														
	59														
382.20	60		SILTY SAND (SM); very dense; brown; moist; medium to fine SAND; homogeneous.		S12	50/5"		100							
	61														
380.20	62														
	63														
378.20	64														
	65														
376.20	66		SEDIMENTARY ROCK, (SILTSTONE and SANDSTONE), yellowish brown and light olive brown, intensely to moderately weathered, fine sand. **[PUENTE FORMATION]**		S13	30 41 50/5"		100		31	88				
	67														
374.20	68														
	69														
372.20	70		SEDIMENTARY ROCK, (SANDSTONE), light olive brown, fine grained, intensely to moderately weathered.		S14	28 50/6"		100							
	71														
370.20	72														
	73														
368.20	74														
	75				S15	50/4"		100		18	106				
366.20	76														
	77														
364.20	78														
	79														
362.20	80		SEDIMENTARY ROCK, Silty fine (SANDSTONE) with interbedded CLAYEY SILTSTONE, thinly bedded, yellowish brown and light olive brown, intensely to moderately weathered, soft, moist, very slightly fractured, local iron oxide staining.		S16	9 31 50/4"		100							
	81														
360.20	82		At EL. 360.2 ft, observed bedding joint, dipping 70°, ½-inch thick, fine SANDSTONE bed.		C17			90	60	19	107				
	83														
358.20	84		At EL. 358.4 ft, observed bedding joint, dipping 50°, faint SANDSTONE lamination.												
	85														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-7-09**	**3 of 18**

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
	85		At EL. 357.4 ft, observed bedding joint, dipping 50°, ¾-inch thick siltstone bed. *(continued)*.		C17			90	60						See note at end of log regarding RQD. VOC = 9.8 ppm
356.20	86														
	87		SEDIMENTARY ROCK, (SANDSTONE), massive with iron oxide staining.												
354.20	88														
	89														
352.20	90		SEDIMENTARY ROCK, (SILTSTONE) with interbedded fine SANDSTONE, olive gray to pale yellowish brown, laminated to thinly bedded, occasional diatomaceous laminations to 3/8-inch thick.		C18			83	75						
	91														
350.20	92		At EL. 350.2 ft, observed bedding joint, dipping 35°.												VOC = 8.7 ppm
	93														
348.20	94														
	95		At EL. 347.2 ft, observed bedding joint, dipping 40°.												
346.20	96				C19			88	75						
	97		SEDIMENTARY ROCK, (SANDSTONE), fine to medium grained, massive, pale yellowish brown, intensely to moderately weathered.												
344.20	98		At EL. 344.7 ft, observed fault, dipping 70°, polished with paper thin clay lining, juxtaposes SANDSTONE above with thinly bedded SILTSTONE below.												
	99		SEDIMENTARY ROCK, (SILTSTONE) with interbedded DIATOMACEOUS SILTSTONE, thinly bedded, olive gray.												
342.20	100		At EL. 342.7 ft, observed bedding joint, dipping 45°.												
	101														
340.20	102														
	103		SEDIMENTARY ROCK, (SANDSTONE), fine to medium grained, pale yellowish brown, bedding joint dipping 55°, Upper 1" to 2" of bed is black, pale yellowish brown below.												VOC = 3.2 ppm
338.20	104		SEDIMENTARY ROCK, Interbedded (SILTSTONE), CLAYEY SILTSTONE and DIATOMACEOUS SILTSTONE, laminated to very thinly bedded, olive gray, intensely to moderately weathered, soft to moderately soft, very slightly fractured to unfractured.		C20			100	75						
	105														
336.20	106		At EL. 337.2 ft, observed bedding joint, dipping 50°.												
	107		SEDIMENTARY ROCK, (SANDSTONE), fine to medium grained, pale yellowish brown, moderately soft, oxidized.												VOC = 9.7 ppm
334.20	108		SEDIMENTARY ROCK, Interbedded (SILTSTONE), CLAYEY SILTSTONE and DIATOMACEOUS SILTSTONE, laminated to very thinly bedded, olive gray, intensely to moderately weathered, soft to moderately soft, very slightly fractured to unfractured, bedding joint dipping 50°.							13	113				
	109														
332.20	110		SEDIMENTARY ROCK, (SANDSTONE), fine to medium grained, pale yellowish brown.		C21			90	80						
	111		SEDIMENTARY ROCK, Interbedded (SILTSTONE), CLAYEY SILTSTONE and DIATOMACEOUS SILTSTONE, laminated to very thinly bedded, olive gray, intensely to moderately weathered, soft to moderately soft, very slightly fractured to unfractured.												
330.20	112														
	113		SEDIMENTARY ROCK, (SANDSTONE), fine grained, pale yellowish brown, in upper 6", black from 109.5 to 110.												
328.20	114														
	115		SEDIMENTARY ROCK, Interbedded (SILTSTONE, fine												

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-7-09**	**4 of 18**

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
	115		SANDSTONE) and DIATOMACEOUS SILTSTONE, thinly bedded, olive gray to pale yellowish brown, intensely to moderately weathered.		C21			90	80						See note at end of log regarding RQD. VOC = 2.2 ppm
326.20	116		SEDIMENTARY ROCK, (SANDSTONE), fine to medium grained, massive, bedding joint dipping 30°, bedding shallows, 60 degree dip at 112', 30 degree at 112.5 at top of SANDSTONE bed. Beds pinch and swell.												
	117														
324.20	118		SEDIMENTARY ROCK, Interbedded (SILTSTONE), CLAYEY SILTSTONE and DIATOMACEOUS SILTSTONE, laminated to very thinly bedded, olive gray, intensely to moderately weathered, soft to moderately soft, very slightly fractured to unfractured, bedding joint dipping 50°.												
	119														
322.20	120				C22			95	80						
	121		SEDIMENTARY ROCK, (SANDSTONE), fine to medium grained, with irregular, undulatory laminations, possible soft sediment deformation. Possible charcoal fleck, 1/8-inch diameter at EL. 325.8 ft.							21					
320.20	122														
	123		SEDIMENTARY ROCK, Interbedded (SILTSTONE), CLAYEY SILTSTONE and DIATOMACEOUS SILTSTONE, laminated to very thinly bedded, olive gray to black, intensely to moderately weathered, soft to moderately soft, very slightly fractured to unfractured, bedding joint dipping 55°, becoming unfractured.											
318.20	124														
	125		At EL. 324.2 ft, observed bedding joint, dipping 60°, ¾-inch thick, black SANDSTONE bed.												
316.20	126		SEDIMENTARY ROCK, (SILTSTONE) with interbedded fine SANDSTONE, thinly bedded, black to grayish blue, moderately weathered, moderately soft, very slightly fractured. At EL. 322.0 to 310.5 ft, observed highly disturbed and folded rock, 1.5-foot thick disturbed SILTSTONE and SANDSTONE.												
	127														
314.20	128		At EL. 321.2 ft, observed bedding joint, dipping 45°.												
	129		SEDIMENTARY ROCK, (SANDSTONE), grayish blue, moderately weathered, beds dipping 25 degrees, continuous, folded.												
312.20	130		SEDIMENTARY ROCK, (SILTSTONE) as 120', bedding joint dipping 70°, beds are continuous, folded.		C23			95	95						VOC = 11.5 ppm
	131		At EL. 317.2 ft, observed bedding joint, dipping 70°, to vertical, folded. At EL. 315.7 ft, observed bedding joint, dipping 55°.												
310.20	132		SEDIMENTARY ROCK, (SANDSTONE), grayish blue, moderately weathered, bedding joint dipping 60°, on 3-inch thick SANDSTONE bed.												
	133		At EL. 310.7 ft, becomes fine-grained, thickly bedded, light olive brown, very soft to soft, bedding joint, dipping 50°.												
308.20	134		At EL. 309.2 ft, observed bedding joint, dipping 45°, 1/2" thick SILTSTONE bed.												
	135		At EL. 308.2 ft, observed bedding joint, dipping 50°, olive brown above, black below.												
306.20	136														
	137														
304.20	138														
	139														
302.20	140		At EL. 302.2 ft, becomes fine to medium grained, some soft sediment deformation.		C24			100	94	8	108				
	141		At EL. 301.4 ft, observed bedding joint, dipping 60°, 1/4" inch to 1 inch thick black SANDSTONE lamination.												VOC = 8.5 ppm
300.20	142		SEDIMENTARY ROCK, Interbedded (SILTSTONE and fine SANDSTONE), sandstone beds pinch and swell.												
	143		At EL. 299.2 ft, observed bedding joint, dipping 60°. At EL. 298.9 ft, observed 4-inch thick SANDSTONE bed.												
298.20	144														
	145														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-7-09**	**5 of 18**

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
	145		At EL. 297.5 ft, observed 6-inch thick SILTSTONE bed, intensely fractured.		C24			100	94						See note at end of log regarding RQD.
296.20	146		*(continued)*. At EL. 296.9 ft, observed bedding joint, dipping 60°, 1-inch thick SILTSTONE bed.												VOC = 23.9 ppm
	147		At EL. 295.5 ft, observed bedding joint, dipping 55°, 6-inch thick, thinly bedded SILTSTONE sequence.												
294.20	148		At EL. 294.4 ft, observed 6-inch thick SILTSTONE bed, depositionally irregular contact at top.												
	149		At EL. 293.6 ft, observed bedding joint, dipping 55°, faint black lamination.		C25			100	100						
292.20	150		At EL. 293.2 ft, becomes very thinly bedded, dark greenish gray to dark bluish gray, fresh, moderately soft to moderately hard, slightly fractured.												
	151		At EL. 292.2 ft, observed bedding joint, dipping 45°.												
290.20	152		At EL. 290.2 ft, observed 6-inch thick SANDSTONE bed, depositionally irregular contact at base.												
	153		At EL. 289.2 ft, observed bedding joint, dipping 50°.												
288.20	154		At EL. 288.9 ft, observed SANDSTONE bed, fine grained, with numerous siltstone rip-up clasts dipping parallel to bedding. Possible charcoal flecks at base of bed.												
	155														
286.20	156		At EL. 286.2 ft, observed bedding joint, dipping 60°, Decreasing SILTSTONE.		C26			100	100						VOC = 3.8 ppm
	157														
284.20	158		At EL. 284.7 ft, observed bedding joint, dipping 50°.												
	159		At EL. 283.7 ft, observed bedding joint, dipping 50°.												
282.20	160		SEDIMENTARY ROCK, (SANDSTONE) with occasional SILTSTONE beds and rip-up clasts, sand is fine to medium grained.		C27			100	100						
	161		At EL. 282.4 ft, observed bedding joint, dipping 50°, 3/8-inch thick SILTSTONE bed.												
280.20	162		At EL. 281.2 ft, observed bedding joint, dipping 45°, SILTSTONE with interbedded SANDSTONE.												
	163		At EL. 279.9 ft, becomes SANDSTONE with some SILTSTONE rip-up clasts at top.												
278.20	164		At EL. 278.7 ft, observed bedding joint, dipping 40°, 2" thick SILTSTONE bed.												VOC = 34.9 ppm
	165		At EL. 277.7 ft, observed joint, dipping 40°, tight, paperthin clay lining.												
276.20	166														
	167		SEDIMENTARY ROCK, Interbedded (SILTSTONE and fine SANDSTONE), dark greenish gray to dark bluish gray, fresh, moderately soft to moderately hard, slightly fractured.												
274.20	168		At EL. 274.6 ft, observed 0.4' thick cemented fine SANDSTONE bed, moderately hard, bedding dipping 45 degrees at base.		C28			100	89						VOC = 0.4 ppm
	169		At EL. 273.2 ft, observed joint, dipping 70°.												
272.20	170		At EL. 272.7 ft, observed bedding joint, dipping 45°.												
	171														
270.20	172		At EL. 270.8 ft, observed silty fine to medium grained SANDSTONE with siltstone rip-up clasts. Very weak.							10	117				UU
	173		At EL. 269.9 ft, observed SILTSTONE bed, 0.7' thick.												
268.20	174		At EL. 269.2 ft, observed shear, vertical juxtaposes SANDSTONE and SILTSTONE. Material highly disturbed at EL. 268.5 ft.												
	175		SEDIMENTARY ROCK, (SANDSTONE), thickly bedded.												

(continued)

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Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-7-09**	**6 of 18**

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
	175		to very thickly bedded, dark greenish gray, fresh, soft to moderately soft, slightly fractured, moist, bedding joint dipping 50°, on black SANDSTONE laminations. *(continued)*.		C28			100	89						See note at end of log regarding RQD.
266.20	176		At EL. 266.7 ft, observed bedding joint, dipping 50°, at base of 6" thick massive CLAYEY SILTSTONE bed.		C29			70	60						VOC = 14.3 ppm
	177		At EL. 265.2 ft, becomes Silty fine SANDSTONE, occasional cross beds.												
264.20	178		At EL. 264.2 ft, observed bedding joint, dipping 40°, massive SANDSTONE, faint joint, light gray lining.												
	179		At EL. 263.2 ft, observed joint, dipping 30°, faint, tight, light gray lining.												
262.20	180		At EL. 262.2 ft, observed bedding joint, dipping 35°, SANDSTONE bed, 5-inches thick, very hard, fine to medium grained.												VOC = 63.8 ppm
	181														
260.20	182		At EL. 260.2 ft, observed bedding joint, dipping 50°, on laminations within SANDSTONE.												
	183														
258.20	184		At EL. 258.7 ft, observed SANDSTONE bed, 5-inches thick, very hard, fine to medium grained, joint in center, tight, rough, dipping 60-70 degrees.												
	185														
256.20	186														
	187		At EL. 255.2 ft, becomes fine to medium grained.		C30			86	71						
254.20	188		At EL. 254.7 ft, observed bedding joint, dipping 45°, on lamination within SANDSTONE.												
	189		SEDIMENTARY ROCK, (SILTSTONE), laminated, dipping 40 degrees. Bed offset (reverse) 2.5-inches by tight fault with fine sand lining. Fault dipping 60 degrees.												
252.20	190		At EL. 252.2 ft, observed Fault, undulatory, roughly 30° dip, tight, polished, striated along strike, unknown offset.												VOC = 39.5 ppm
	191		SEDIMENTARY ROCK, (SANDSTONE), thickly bedded to very thickly bedded, dark greenish gray, fresh, soft to moderately soft, slightly fractured, moist, bedding joint dipping 30 to 50°, cross bedded.												
250.20	192														
	193														
248.20	194		At EL. 248.2 ft, becomes Silty fine SANDSTONE.		C31			89	67						
	195		At EL. 247.7 ft, observed bedding joint, dipping 45°, locally fractured, joints dipping 70°, 30°, and 20°.												
246.20	196		At EL. 246.2 ft, becomes very thickly bedded to massive, bedding joint, dipping 40°, on 1/8-inch thick SILTSTONE bed.												
	197		At EL. 245.7 ft, observed bedding joint, dipping 20°, tight, faint, no lining.												
244.20	198														
	199														
242.20	200		At EL. 242.2 ft, becomes very thickly bedded, soft.		C32			88	88						VOC = 2.8 ppm
	201		At EL. 241.2 ft, observed bedding joint, dipping 45°, on 1/8-inch thick SILTSTONE lens. Very weak.							14	113				UU
240.20	202														
	203		At EL. 239.2 ft, observed bedding joint, dipping 50°, on 1/8-inch thick SILTSTONE lens.												
238.20	204		At EL. 238.2 ft, observed moderately soft to hard, 6" thick section of silty fine SANDSTONE.		C33			100	80						
	205														

(continued)

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Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-7-09**	**7 of 18**

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
	205		*(continued).*		C33			100	80						See note at end of log regarding RQD.
236.20	206		At EL. 236.9 ft, observed bedding joint, dipping 30°, very faint, cemented SANDSTONE lamination. At EL. 236.2 ft, becomes moderately soft.												
	207		At EL. 235.2 ft, becomes soft, massive SANDSTONE.												
234.20	208		At EL. 234.5 ft, observed fault, dipping 30°, ¾-inch normal offset. At EL. 233.9 ft, observed fault, dipping 30°, truncates 1/8-inch thick SILTSTONE lamination, fault has 1/8 inch thick brown, slightly clayey gouge, unknown offset.												
232.20	210		At EL. 233.2 ft, observed fault, dipping 50°, 1/8 inch thick, brown, slightly clayey gouge, unknown offset.												
	211		At EL. 231.2 ft, becomes moderately soft, bedding joint, dipping 40°, faint SANDSTONE lamination.							8	139				UC
230.20	212		At EL. 230.2 ft, becomes moderately soft to moderately hard, massive SANDSTONE, medium strong. At EL. 229.7 ft, becomes soft to moderately soft, joint, dipping 60°, tight, planar, no lining.												
228.20	214				C34			100	100						
	215		At EL. 227.0 ft, observed bedding joint, dipping 45°, SILTSTONE lamination with massive SANDSTONE.												
226.20	216														
	217		SEDIMENTARY ROCK, SANDY (SILTSTONE), laminated, bedding joint dipping 45°.												
224.20	218														
	219		At EL. 223.2 ft, observed very faint randomly oriented fractures to 4-inches long.												
222.20	220														VOC = 3.5 ppm
	221														
220.20	222		At EL. 220.2 ft, observed bedding joint, dipping 40°, 1/8-inch thick SILTSTONE lamination.												
	223		At EL. 219.2 ft, observed 4-inch thick interbedded SILTSTONE and fine SANDSTONE, depositionally chaotic, folded, sandstone to 6" below has siltstone rip-ups.												
218.20	224				C35			94	75						
	225		At EL. 217.7 ft, observed bedding joint, dipping 45°, on 6" thick section of interbedded SILTSTONE, moderately fractured.												VOC = 1.8 ppm
216.20	226		At EL. 216.2 ft, observed fault, dipping 70°, tight, no lining, silty fine SANDSTONE above and fine to medium SANDSTONE below.												
	227		SEDIMENTARY ROCK, Interbedded (SILTSTONE and fine sandy SILTSTONE), thinly to moderately bedded, moderately soft to moderately hard, local beds with soft sediment deformation, pinch, swell and folded.												
214.20	228														
	229														
212.20	230		At EL. 212.3 ft, observed bedding joint, dipping 55°.												
	231		Very weak.							15	106				SD, UC
210.20	232		SEDIMENTARY ROCK, Silty (SANDSTONE), bedding joint dipping 55°.		C36			100	88						
	233		SEDIMENTARY ROCK, (SILTSTONE) with interbedded fine SANDSTONE. At EL. 209.7 ft, observed bedding joint, dipping 60°.												
208.20	234		At EL. 209.2 ft, observed shear, dipping 30°, slightly polished, below is roughly 1.5 thick silty fine sandstone bed with soft sediment deformation (tightly folded												
	235														

(continued)

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Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

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BORING RECORD				**R-09-Z1B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-7-09**	**8 of 18**

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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
	235		siltstone beds, rip-ups).		C36			100	88						See note at end of log regarding RQD.
206.20	236		At EL. 207.7 ft, observed bedding joint, dipping 60°. At EL. 207.2 ft, observed fault, dipping 70°, 1-inch to 2-inch thick gouge zone of intensely fractured SILTSTONE and soft SANDSTONE, material highly disturbed adjacent to fault. *(continued)*.		C37			100	63						VOC = 2.0 ppm
	237														
204.20	238		At EL. 205.7 ft, observed bedding joint, dipping 55°.												
	239		At EL. 203.2 ft, observed bedding joint, dipping 55°.												VOC = 3.2 ppm
202.20	240		At EL. 202.2 ft, observed bedding joint, dipping 50°, material is locally slightly brittle.												
	241		At EL. 201.9 ft, observed intensely fractured rock. At EL. 201.2 ft, observed joint, dipping 80°.		C38			100	0						
200.20	242		At EL. 200.7 ft, observed bedding joint, dipping 60°, material highly broken, fragments are moderately hard.												
	243														VOC = 2.5 ppm
198.20	244		At EL. 198.7 ft, observed bedding joint, dipping 60°.												
	245														
196.20	246		SEDIMENTARY ROCK, Interbedded (SILTSTONE and fine SANDSTONE), laminated to thinly bedded.		C39			96	96						
	247		At EL. 195.7 ft, observed bedding joint, dipping 50°.												
194.20	248		At EL. 194.7 ft, observed joint, dipping 55°, conjugate to bedding.												
	249		SEDIMENTARY ROCK, Silty fine (SANDSTONE), beds are highly folded immediately above (soft sediment deformation).												
192.20	250		At EL. 192.2 ft, observed fault, dipping 70°, very tight, striated perpendicular to dip, unknown offset, 2" thick SILTSTONE fragment observed adjacent to fault.												VOC = 1.5 ppm
	251														
190.20	252		At EL. 191.2 ft, observed bedding joint, dipping 55°, 2-inch thick SILTSTONE bed within fine SANDSTONE.												
	253		At EL. 190.2 ft, observed bedding joint, dipping 55°, on 2" thick SILTSTONE bed.												
188.20	254		At EL. 188.3 ft, observed bedding joint, dipping 55°, on 4" thick SILTSTONE bed.												
	255		At EL. 187.4 ft, observed 1.5' thick laminated SILTSTONE bed.		C40			100	89						
186.20	256														
	257		At EL. 185.7 ft, observed bedding joint, dipping 60°. At EL. 185.2 ft, observed bedding joint, dipping 55°, faint SANDSTONE lamination.												
184.20	258		At EL. 184.2 ft, observed shear, dipping 40 to 0°, undulatory, 1/8-inch thick, soft clay lining.												
	259														
182.20	260		SEDIMENTARY ROCK, (SILTSTONE), laminated, bedding joint dipping 50°, on contact to SILTSTONE.												VOC = 3.4 ppm
	261		At EL. 181.2 ft, observed bedding joint, dipping 60°, Some interbedded fine SANDSTONE.												
180.20	262														
	263		SEDIMENTARY ROCK, (SANDSTONE), fine to medium grained, very thickly bedded, dark bluish gray, fresh, very weak, moderately soft to moderately hard, very slightly fractured, bedding joint dipping 55°, on contact to SANDSTONE.												
178.20	264				C41			100	67	11	116				UU
	265														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-7-09**	**9 of 18**

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
	265		At EL. 177.8 ft, observed bedding joint, dipping 55°, on 6" thick section of SILTSTONE with interbedded fine SANDSTONE, laminated to thinly bedded.		C41			100	67						See note at end of log regarding RQD.
176.20	266		At EL. 177.4 ft, observed SANDSTONE laminations with abundant black detritus. *(continued)*.												
	267														
174.20	268		At EL. 174.4 ft, observed bedding joint, dipping 50°, SANDSTONE lamination.												
	269		SEDIMENTARY ROCK, (SILTSTONE), laminated, local soft sediment deformation, bedding joint dipping 55°.												
172.20	270		SEDIMENTARY ROCK, (SANDSTONE), fine to medium grained, very thickly bedded, dark bluish gray.												VOC = 1.3 ppm
	271		At EL. 171.2 ft, becomes soft, saturated, some black staining.												
170.20	272														
	273		Pressuremeter testing at EL. 169.0 to 160.1 ft.												
168.20	274														
	275														
166.20	276														
	277														
164.20	278														
	279														
162.20	280														
	281														
160.20	282		At EL. 160.2 ft, observed bedding joint, dipping 55°, 1-inch thick SILTSTONE lamination. Material is locally cemented, hard.		C42			100	100						VOC = 1.7 ppm
	283		At EL. 158.9 ft, observed bedding joint, dipping 55°, 1/8-inch to 1/2-inch thick SANDSTONE lamination.												
158.20	284				C43			93	93						
	285		At EL. 157.6 ft, observed joint, dipping 90 to 60°, numerous irregular, black lined joints, tight.												
156.20	286		At EL. 157.2 ft, becomes fine to coarse grained, with some interbedded SILTSTONE, thickly to very thickly bedded, sandstone is dark bluish gray, siltstone is dark greenish gray, fresh, moderately soft to moderately hard, slightly fractured..												
	287		At EL. 156.7 ft, observed bedding joint, dipping 60°.												
154.20	288		At EL. 155.4 ft, observed bedding joint, dipping 60°, on 5" thick CLAYEY SILTSTONE bed. Rock to 6-inches below is depositionally chaotic mix of SILTSTONE and SANDSTONE.												
	289		At EL. 153.2 ft, observed 4" thick cemented SANDSTONE bed, hard.		C44			100	95						
152.20	290														
	291														
150.20	292		At EL. 150.8 ft, observed bedding joint, dipping 50°, 2" thick SILTSTONE bed. Some rip-up clasts below.												
	293		At EL. 150.4 ft, observed bedding joint, dipping 55°, 1/8-inch thick SILTSTONE lamination.												
148.20	294		At EL. 149.2 ft, observed bedding joint, dipping 65°, 2" thick SILTSTONE bed, thinly bedded.												
	295		At EL. 148.4 ft, observed bedding joint, dipping 60°, 8" thick brown SILTSTONE sequence with some internal light gray fine SANDSTONE laminations.												

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BORING RECORD				**R-09-Z1B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-7-09**	**10 of 18**

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
	295				C44			100	95						See note at end of log regarding RQD.
146.20	296		At EL. 146.7 ft, observed 1/8-inch thick SILTSTONE rip-up clast, roughly 3" long.												
	297														VOC = 3.8 ppm
144.20	298														
	299				C45			90	89						
142.20	300														
	301														VOC = 4.0 ppm
140.20	302		At EL. 140.7 ft, observed bedding joint, dipping 60°, ¾-inch thick laminated SILTSTONE bed.												
	303		SEDIMENTARY ROCK, Interbedded (SILTSTONE and fine SANDSTONE), laminated to thinly bedded, some soft sediment deformation, local rip-ups and beds that pinch and swell, bedding joint dipping 60°.												
138.20	304		At EL. 139.0 ft, observed shear, dipping 40 to 20°, ½-inch normal offset, tight.												
	305		SEDIMENTARY ROCK, (SANDSTONE), fine to coarse grained, with some interbedded SILTSTONE, thickly to very thickly bedded, sandstone is dark bluish gray, siltstone is dark greenish gray, fresh, moderately soft to moderately hard, slightly fractured., bedding joint dipping 60°.												
136.20	306		At EL. 136.2 ft, observed bedding joint, dipping 60°.												
	307		At EL. 135.0 ft, observed bedding joint, dipping 60°, Two parallel siltstone beds.												
134.20	308		At EL. 133.2 ft, becomes fine to medium grained SANDSTONE.												
	309				C46			100	100						
132.20	310														VOC = 3.7 ppm
	311		At EL. 131.2 ft, observed bedding joint, dipping 55°, 3-inch thick SILTSTONE sequence, beds are locally polished along bedding planes.												
130.20	312		At EL. 130.7 ft, observed bedding joint, dipping 55°, faint tight shear with 3/8-inch reverse offset.							11	118				UU
	313		Very weak.												
128.20	314														
	315														
126.20	316		At EL. 126.7 ft, observed ¾-inch to 1-inch thick SILTSTONE bed, SANDSTONE immediately above is coarse grained.												
	317		At EL. 126.2 ft, observed bedding joint, dipping 55°, 2-inch thick laminated SILTSTONE bed. Material is soft to moderately soft.												
124.20	318														
	319				C47			63	63						
122.20	320														VOC = 3.7 ppm
	321		At EL. 121.2 ft, observed light brown, joint, dipping 50°, faint, 1/8-inch thick, moist, silty clay lining.												
120.20	322									5	142				UC
	323		Weak.												
			At EL. 119.4 ft, observed bedding joint, dipping 55°, ¼-inch thick silty lamination.												
118.20	324														
	325														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-7-09**	**11 of 18**

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
	325				C47			63	63						See note at end of log regarding RQD.
116.20	326														
	327		At EL. 115.2 ft, observed shear, dipping 65°, 1/16-inch thick, silt lined, unknown offset.		C48			100	58						VOC = 4.2 ppm
114.20	328		At EL. 114.2 ft, observed shear, dipping 40°, 1/16-inch thick, silt lined, unknown offset.												
	329		At EL. 113.5 ft, observed shear/fault zone, dipping 80 to 25°, 1/16-inch thick, silt lined, unknown offset.												
112.20	330		At EL. 113.0 ft, observed bedding joint, dipping 60 to 50°, 3-inches thick, laminated, faulted SILTSTONE bed, 1/2-inch reverse offset by shear dipping 50 to 30 degrees, 1/16-inch thick, silt lined.												
	331		At EL. 112.4 ft, observed shear, dipping 70 to 60°, 1/16-inch thick, silt lined, unknown offset.												
110.20	332		At EL. 111.9 ft, observed shear, dipping 90 to 50°, some shears with silty lining, unknown offset, very tight, faint.												
	333		At EL. 111.2 ft, observed shear, dipping 40 to 20°, 1/16-inch thick, silt lined, unknown offset.												
108.20	334		At EL. 110.2 ft, observed shear, dipping 50°, 1/16-inch thick, silt lined, unknown offset.		C49			100	100						VOC = 5.2 ppm
	335		At EL. 109.7 ft, observed bedding joint, dipping 90 to 0°, folded and overturned laminations.												
106.20	336		At EL. 108.7 ft, observed shear, dipping 30°, 1/16-inch thick, silt lined, unknown offset.												
	337		At EL. 107.7 ft, observed shear, dipping 30 to 20°, 1/16-inch thick, silt lined, unknown offset.												
			At EL. 106.7 ft, observed scour mark with siltstone rip-ups below.												
104.20	338		At EL. 106.5 ft, observed bedding joint, dipping 60°, 6" thick CLAYEY SILTSTONE bed, brown, very faintly laminated.												
	339		At EL. 105.2 ft, observed bedding joint, dipping 60°, SILTSTONE bed, 5" thick, brown.												
102.20	340														
	341		Pressuremeter testing at EL. 101.5 to 95.0 ft.												
100.20	342														
	343														
98.20	344														
	345														
96.20	346														
	347		At EL. 95.7 ft, becomes soft to moderately soft.		C50			20	20						
94.20	348														
	349				C51			94	94						
92.20	350		SEDIMENTARY ROCK, Interbedded (SILTSTONE and fine SANDSTONE).							10					
	351		At EL. 91.2 ft, observed bedding joint, dipping 50°, fault dipping 78°, very tight with paper thin clay lining, unknown offset.												
90.20	352		At EL. 90.2 ft, observed bedding joint, dipping 60°, local siltstone rip-ups.												
	353														
88.20	354		At EL. 88.7 ft, becomes bedding joint, dipping 55°.												SD
	355														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
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Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-7-09**	**12 of 18**

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
	355		SEDIMENTARY ROCK, (SANDSTONE), thickly to very thickly bedded, gray, fresh, soft to moderately soft, slightly fractured, fine to medium grained.		C51			94	94						See note at end of log regarding RQD.
86.20	356														
	357				C52			80	80						VOC = 4.9 ppm
84.20	358														
	359														
82.20	360														
	361		At EL. 81.7 ft, becomes well cemented, irregular, undulatory contact below. At EL. 81.1 ft, observed joint, dipping 60°, black lining, rough.												
80.20	362		SEDIMENTARY ROCK, Interbedded (SILTSTONE and fine SANDSTONE), highly sheared, bedding joint dipping 60°. At EL. 79.2 ft, observed bedding joint, dipping 70°, material is folded and faulted, unknown offset, tight, tight massive, moderately fractured..		C53			92	77						
	363														
78.20	364		SEDIMENTARY ROCK, (SANDSTONE), thickly to very thickly bedded, gray, fresh, soft to moderately soft, slightly fractured, fine to medium grained, shear dipping 30 to 40°, faint shears, tight silty lining. At EL. 76.7 ft, observed shear, dipping 70°, faint shear 1/8-inch thick brown silty clay lining, within soft, very moist sandstone. At EL. 75.6 ft, observed shear, dipping 70 to 30°.												
	365														
76.20	366														
	367														VOC = 2.0 ppm
74.20	368														
	369		SEDIMENTARY ROCK, SANDY (SILTSTONE) sequence, soft, moist, massive. At EL. 72.5 ft, observed bedding joint, dipping 60°, on ¾-inch thick SILTSTONE bed.		C54			94	88						
72.20	370									9	101				UU
	371		SEDIMENTARY ROCK, Silty fine (SANDSTONE), gray, very weak, moderately soft. At EL. 70.7 ft, grades to fine to medium grained SANDSTONE, moderately soft to moderately hard.												
70.20	372														
	373														
68.20	374		At EL. 68.0 ft, observed shear, dipping 45 to 20°, 1/8" thick silty lining.												
	375														
66.20	376		At EL. 66.0 ft, observed 3-inch thick cemented SANDSTONE bed, hard.												
	377		At EL. 65.2 ft, observed bedding joint, dipping 55°, 0.3' thick SILTSTONE bed, 1.5" thick, 4" long rip-up clast below.		C55			100	100						
64.20	378		At EL. 64.9 ft, grades to fine grained SANDSTONE, moist, moderately soft to moderately hard.												
	379														VOC = 3.9 ppm
62.20	380		At EL. 62.8 ft, observed shear, dipping 50 to 20°, tight silty lining.												
	381														
60.20	382		At EL. 60.8 ft, observed bedding joint, dipping 60°, on 1-inch thick SILTSTONE bed, fractured, consistent sandstone above and below. At EL. 60.2 ft, observed bedding joint, dipping 60°, 1.5-inch thick laminated SILTSTONE bed, undulatory.												
	383														
58.20	384		SEDIMENTARY ROCK, Interbedded (SILTSTONE and fine SANDSTONE), laminated to thinly bedded, fault dipping 80 to 90°, three subparallel faults with roughly 3"		C56			53	47						
	385														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-7-09**	**13 of 18**

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
	385		total reverse offset, paper thin black clay lining, adjacent bedding dipping 60°.		C56			53	47						See note at end of log regarding RQD.
56.20	386		At EL. 56.7 ft, observed bedding joint, dipping 50°, SANDSTONE bed truncated by fault above, beds are locally folded to EL. 56.0 ft.												
	387		At EL. 55.2 ft, observed bedding joint, dipping 50°, 1/8" thick SILTSTONE bed truncated by fault dipping 50 degrees. Fault is tight with paper thin clay lining. Locally intensely fractured.												
54.20	388														
	389														
52.20	390														
	391														
50.20	392		Pressuremeter Testing at EL. 50.0 to 43.0 ft.												
	393														
48.20	394														
	395														
46.20	396														
	397														
44.20	398														
	399		SEDIMENTARY ROCK, (SANDSTONE), fine to coarse grained, thickly to very thickly bedded, gray, fresh, soft to moderately soft, slightly fractured, shear dipping 55 to 60°, tight, light gray silty lining.		C57			100	90						
42.20	400		At EL. 42.2 ft, observed bedding joint, dipping 65 to 55°, on dark gray SANDSTONE lamination.												
	401														
40.20	402		At EL. 40.3 ft, observed shear, dipping 20°, tight, light gray silty lining.												
	403														
38.20	404														
	405														VOC = 0.8 ppm
36.20	406		At EL. 36.7 ft, becomes moderately soft to moderately hard, shear, dipping 60 to 20°, tight, light gray silty lining.												
	407		At EL. 35.2 ft, becomes soft.							5	144				UC
34.20	408		At EL. 34.2 ft, becomes weak, moderately hard.												
	409		At EL. 34.0 ft, observed bedding joint, dipping 55°, 3" thick sequence of interbedded SILTSTONE and SANDSTONE, faulted, intensely fractured.		C58			100	100						
32.20	410		At EL. 33.0 ft, observed some Siltstone rip-ups. At EL. 32.2 ft, observed shear, dipping 30°, faint, light gray 1/16-inch to 1/8-inch thick silty lining.												
	411		At EL. 31.2 ft, observed shear, dipping 30°, faint, light gray 1/16-inch to 1/8-inch thick silty lining.												
30.20	412		At EL. 30.2 ft, observed shear, dipping 70 to 20°, numerous shears, faint, light gray 1/16-inch to 1/8-inch thick silty lining.												
	413														
28.20	414		At EL. 28.2 ft, observed shear, dipping 70 to 40°, unknown offset, numerous SILTSTONE fragments,												
	415														

(continued)

Department of Transportation
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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-7-09**	**14 of 18**

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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
	415		juxtaposed to massive SANDSTONE.												
26.20	416		At EL. 26.9 ft, observed shear, dipping 20°, 1/8-inch to 1/4-inch thick silty lining. SANDSTONE is dark bluish gray, fine grained, moist.		C58			100	100						See note at end of log regarding RQD.
	417		At EL. 26.4 ft, observed shear, dipping 20°, 1/8-inch to 1/4-inch thick silty lining.												
24.20	418		At EL. 25.6 ft, observed shear, dipping 20°, 1/8-inch to 1/4-inch thick silty lining.												
			At EL. 25.2 ft, observed shear, dipping 60 to 45°, 1/8-inch to 1/4-inch thick silty lining.												
	419		At EL. 24.7 ft, observed shear, dipping 25°, 1/8-inch to 1/4-inch thick silty lining.		C59			94	80						VOC = 8.7 ppm
22.20	420		At EL. 24.5 ft, observed shear, dipping 30°, 1/8-inch to 1/4-inch thick silty lining.												
	421		At EL. 23.8 ft, observed shear, dipping 20°, 1/8-inch to 1/4-inch thick silty lining.												
20.20	422		At EL. 23.6 ft, observed shear, dipping 20°, 1/8-inch to 1/4-inch thick silty lining.												
	423		At EL. 22.2 ft, becomes SANDSTONE, fine to medium grained, with some interbedded SILTSTONE, massive to thickly bedded, dark bluish gray, fresh, moderately soft, moist to saturated..												
18.20	424														
	425														
16.20	426														
	427														
14.20	428				C60			100	100						VOC = 10.4 ppm
	429														
			At EL. 12.9 ft, observed shear, dipping 20°, very faint.												
12.20	430		At EL. 12.2 ft, observed fresh, moderately soft.												
	431														
10.20	432		At EL. 10.2 ft, observed bedding joint, dipping 65°, on 2-inch thick SILTSTONE bed, SANDSTONE to 1.2' below is soft, tightly folded, soft sediment deformation.												
	433														
8.20	434														
	435														VOC = 8.8 ppm
6.20	436		At EL. 6.7 ft, observed shear, dipping 20°, faint, tight gray silty lining.												
	437														PA
4.20	438				C61			97	90						
	439														
2.20	440		At EL. 2.7 ft, observed bedding joint, dipping 75 to 70°, on SANDSTONE lamination with abundant black grains.												
	441														
0.20	442														
	443		At EL. -0.3 ft, observed bedding joint, dipping 70°, on ¼-inch thick SILTSTONE bed, offset 1/2" normally by 15 degree dipping shear.												
-1.80	444		At EL. -1.6 ft, observed bedding joint, dipping 65°, Siltstone rip-up clasts to 1-inch thick, some fine SANDSTONE laminations below are depositionally												
	445														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-7-09**	**15 of 18**

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
	445		folded.		C61			97	90						See note at end of log regarding RQD.
-3.80	446		At EL. -2.8 ft, becomes massive, dark bluish gray, fresh, moderately soft, moist to saturated, scarce SILTSTONE beds..												
	447		At EL. -3.8 ft, observed local black stringers, randomly oriented.												
-5.80	448		At EL. -4.3 ft, observed bedding joint, dipping 70°, 2-inch thick SILTSTONE bed.												
			At EL. -5.8 ft, grades to SILTY fine SANDSTONE, as above.		C62			100	100						
	449														
-7.80	450														
	451		At EL. -8.6 ft, observed bedding joint, dipping 50°, ½-inch to 1-inch thick SILTSTONE bed, offset ¾-inch by two shears which are very faint, no lining, dipping 40 and 50 degrees..												
-9.80	452														VOC = 3.2 ppm
	453														
-11.80	454		PTS: Coarse-grained granitic arkosic SANDSTONE with crystal and rock fragments up to 3mm in size, in a predominantly calcite matrix (50%).												
	455		At EL. -12.8 ft, observed 7" thick SANDSTONE bed, moderately hard.												PTS
-13.80	456		At EL. -13.5 ft, observed bedding joint, dipping 60°, on siltstone bed at base of cemented SANDSTONE above.												
	457		At EL. -14.4 ft, observed shear, dipping 25°, silty lining, very faint, massive SANDSTONE above and below.												
-15.80	458				C63			100	100						
	459		At EL. -16.8 ft, observed shear, dipping 25°, silty lining, very faint, tight, 1/16-inch to 1/8-inch thick.												
-17.80	460		At EL. -17.8 ft, observed possible bedding plane (dipping 60 degrees) on contact from fine to medium grained SANDSTONE above to fine SANDSTONE below, faint.												
	461		At EL. -18.8 ft, observed shear, dipping 25°, silty lining, very faint, tight, 1/16-inch to 1/8-inch thick.												
-19.80	462		At EL. -20.2 ft, observed shear, dipping 15°, silty lining, very faint, tight, 1/16-inch to 1/8-inch thick.												VOC = 1.3 ppm
	463				C64			50	10						
-21.80	464														
	465														
-23.80	466		At EL. -23.8 ft, observed shear, dipping 55°, silty lining, very faint, tight, 1/8-inch thick, continuing massive SANDSTONE above and below.												
	467														
-25.80	468														
	469														
-27.80	470														
	471														
-29.80	472														
	473				C65			100	90						VOC = 7.8 ppm
-31.80	474														
	475														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-7-09**	**16 of 18**

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
	475				C65			100	90						See note at end of log regarding RQD.
-33.80	476														
	477									12	119				PA
-35.80	478														
	479														
-37.80	480														
	481														
-39.80	482														
	483		At EL. -40.8 ft, observed shear, dipping 70 to 25°, faint, up to 1/8" thick clay lining.		C66			97	97						VOC = 2.3 ppm
-41.80	484		At EL. -41.1 ft, observed shear, dipping 40°, faint, up to 1/8" thick clay lining.												
	485		At EL. -41.5 ft, observed shear, dipping 10°, faint, up to 1/8" thick clay lining.												
-43.80	486		At EL. -41.7 ft, observed shear, dipping 35°, faint, up to 1/8" thick clay lining.												
	487		At EL. -42.3 ft, observed possible bedding (dipping 65 degrees) on black sand bed which pinches out. At EL. -42.6 ft, observed shear, dipping 30°, faint, up to 1/8" thick clay lining.												
-45.80	488		At EL. -42.9 ft, observed shear, dipping 20°, faint, up to 1/8" thick clay lining.												
	489		At EL. -43.2 ft, observed shear, dipping 25°, faint, up to 1/8" thick clay lining.												
-47.80	490		At EL. -43.7 ft, observed shear, dipping 20 to 0°, faint, up to 1/8" thick clay lining. At EL. -43.9 ft, observed shear, dipping 30°, faint, up to 1/8" thick clay lining.												
	491		At EL. -44.3 ft, observed shear, dipping 30°, faint, up to 1/8" thick clay lining. Unit grades to Silty fine SANDSTONE, gray, massive, soft, moist.												
-49.80	492		At EL. -45.3 ft, observed shear, dipping 50°, faint, up to 1/8" thick clay lining.												
	493		At EL. -46.1 ft, observed shear, dipping 40°, faint, up to 1/8" thick clay lining.		C67			56	50						VOC = 1.5 ppm
-51.80	494		At EL. -46.3 ft, observed fault, dipping 55°, clay lined to 1/16" thick, 1" reverse offset of 1" thick SILTSTONE bed dipping 50°.												
	495		At EL. -48.8 ft, observed bedding joint, dipping 55°, on ¾-inch thick laminated SILTSTONE and fine SANDSTONE bed.												
-53.80	496		At EL. -49.1 ft, observed shear, dipping 50°, 1/4" to 1/8" thick silty clay lining. At EL. -50.8 ft, becomes very soft.												
	497		At EL. -54.8 ft, observed 3.5" thick SANDSTONE bed, hard. Below SANDSTONE is greenish gray to gray, very soft to soft, moist to very moist.												
-55.80	498		At EL. -55.8 ft, observed numerous 1/8" to 1/4" thick shears with silty lining, dipping from 30 to 70 degrees.												
	499		At EL. -56.2 ft, observed numerous 1/8" to 1/4" thick shears with silty lining, dipping from 30 to 65 degrees.												
-57.80	500														
	501		At EL. -58.4 ft, observed shear, dipping 60°, 3/8" thick silty lining.												
-59.80	502														VOC = 0.9 ppm
	503														
-61.80	504														
	505														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-7-09**	**17 of 18**

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
	505		RQD values provided on the boring logs are based on intact core pieces obtained between two natural discontinuities. The majority of core obtained from this boring is typically very weak to weak and does not meet the "sound core" definition provided in the standard test method for RQD (ASTM D 6032). These RQD values should not be used to evaluate rock mass quality. Borehole converted to piezometer at the completion of drilling. Borehole terminated at planned depth. Bottom of borehole at 502.0 ft bgs										
-63.80	506												
	507												
-65.80	508												
	509												
-67.80	510												
	511												
-69.80	512												
	513												
-71.80	514												
	515												
-73.80	516												
	517												
-75.80	518												
	519												
-77.80	520												
	521												
-79.80	522												
	523												
-81.80	524												
	525												
-83.80	526												
	527												
-85.80	528												
	529												
-87.80	530												
	531												
-89.80	532												
	533												
-91.80	534												
	535												

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-7-09**	**18 of 18**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
R.Chavez/D.Jankly	1-30-09	2-10-09	34° 5' 0.7224" / 118° 11' 25.9506" NAD83	R-09-Z1B6
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Cascade Drilling Inc.			' Lt Sta (N/o Huntington Dr. N. at Topaz St.)	447.2 ft NAVD 88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wash			Ingersoll Rand A400	6 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT(1.4"), Cal (2.4"), PQ core (3.2")			Automatic Hammer 140 lb. 30 inch drop	75%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer Installed on Completion			NM	21.5 ft on7/1/09	400.5 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	Remarks
	0		ASPHALT 6" thick.												This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007), except as noted in Appendix A.1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
			Road base material, 6" thick.												
	1		SANDY SILT (ML); medium stiff; dark brown; moist; few fine GRAVEL; low to medium plasticity fines [OLDER ALLUVIUM].		D01										
445.20	2														
	3														
443.20	4														
	5		Medium stiff.		S02	3 3 3	6								Hand Auger to 7'
441.20	6														
	7														
439.20	8														
	9														
437.20	10		CLAYEY SAND (SC); medium dense; olive yellow; moist; fine SAND; medium plasticity fines.		S03	5 10 14	24								
	11														
435.20	12														
	13														
433.20	14														
	15		No Recovery.		S04	4 6 6	12								
431.20	16														
	17														
429.20	18														
	19														
427.20	20		SANDY SILT (ML); very stiff; brown mottled with olive gray; moist; fine SAND; low plasticity fines.		S05	5 9 12	21			21	109				
	21														
425.20	22														
	23														
423.20	24														
	25														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z1B6
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	D/D	07-187900
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	D. Jankly		3-23-09	1 of 14

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		Dark brown; trace mica. SANDY SILT (ML) *(continued)*.		S06	5 7 9	16								
421.20	26														
	27														
419.20	28														
	29														
417.20	30		Lean CLAY (CL); very stiff; dark brown mottled with olive gray; moist; trace mica.		S07	8 14 14	28			21	109				PI
	31														
415.20	32														
	33														
413.20	34														
	35		Hard.		S08	6 10 16	26								
411.20	36														
	37														
409.20	38														
	39														
407.20	40		SANDY; 30% fine SAND, 70% fines.		S09	9 19 23	42			19	112				PA
	41														
405.20	42														
	43														
403.20	44														
	45				S10	8 12 18	30								
401.20	46														
	47														
399.20	48														
	49														
397.20	50				S11	14 23 25	48			23	106				
	51														
395.20	52														
	53														
393.20	54														
	55														

(continued)

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REPORT TITLE: **BORING RECORD**
HOLE ID: **R-09-Z1B6**

DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**

PROJECT OR BRIDGE NAME: **SR-710 TUNNEL TECHNICAL STUDY**

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
N/A	**D. Jankly**	**3-23-09**	**2 of 14**

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
	55		SILTY SAND (SM); dense; olive yellow; moist; fine SAND; low plasticity fines; trace mica.		S12	9 14 17	31								
391.20	56														
	57														
389.20	58														
	59														
387.20	60		SILTY CLAY with SAND (CL-ML); hard; olive yellow; moist; 23% fine SAND, 77% low plasticity fines, trace mica.		S13	14 22 22	44			26	100				PA
	61														
385.20	62														
	63														
383.20	64														
	65		SANDY SILT (ML); hard; olive yellow; moist; fine SAND; low plasticity fines; friable, no reaction to HCL solution.		S14	13 15 15	30								
381.20	66														
	67														
379.20	68		SEDIMENTARY ROCK: SANDY (SILTSTONE), massive, light olive mottled with greenish gray, decomposed, very soft, unfractured, friable, no reaction to HCL solution, micaceous, decreasingly weathered with depth., (Sandy SILT, very stiff, moist fine to medium sand) **[PUENTE FORMATION]**												
	69														
377.20	70				S15	9 19 22	41			23	106				
	71														
375.20	72														
	73														
373.20	74														
	75				S16	9 11 14	25								
371.20	76														
	77														
369.20	78														
	79														
367.20	80				S17	12 22 31	53			23	103				PA
	81														
365.20	82														
	83														
363.20	84														
	85														

(continued)

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BORING RECORD				**R-09-Z1B6**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-23-09**	**3 of 14**

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
	85													
361.20	86		SANDY SILTSTONE, massive, light olive mottled with greenish gray, decomposed, very soft, unfractured, friable, no reaction to diluted HCL, micaceous. (Sandy SILT, hard, moist fine to medium sand). *(continued)*.		S18	10 14 17	31							See note at end of log regarding RQD.
	87													
359.20	88													
	89													
357.20	90				S19	16 34 50/5"				17	113			
	91													
355.20	92													
	93		At EL. 354.2 ft, becomes laminated to thinly bedded, greenish gray, moderately weathered.											
353.20	94													
	95				S20	31 50/6"								
351.20	96													
	97													
349.20	98				C21			0	0					
	99													
347.20	100													
	101													
345.20	102													
	103				C22			36	36					
343.20	104													
	105													
341.20	106		At EL. 341.2 ft, observed bedding joint, dipping 60°.											
	107		SEDIMENTARY ROCK, (SILTSTONE) with Interbedded SILTY fine SANDSTONE, laminated to very thinly bedded, dark greenish gray and light greenish gray, slightly weathered, soft, slightly to very slightly fractured, shear dipping 50°, 1/4" thick Clay lining.											
339.20	108				C23			50	50					VOC = 24.0 ppm
	109		At EL. 339.7 ft, observed bedding joint, dipping 60°.											
337.20	110		At EL. 337.2 ft, observed bedding joint, dipping 60°, unit is fresh.											
	111													
335.20	112		At EL. 335.2 ft, observed bedding joint, dipping 60°.											
	113				C24			80	78					VOC = 14.0 ppm
333.20	114													
	115													

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B6**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-23-09**	**4 of 14**

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
	115		At EL. 332.2 ft, observed bedding plane separation, dipping 45°, locally bedding becomes thinly bedded to laminated. Interbedded SILTSTONE, parting along bedding, strong reaction to diluted HCL.		C24			80	78						See note at end of log regarding RQD.
331.20	116														
	117		At EL. 330.2 ft, observed bedding joint, dipping 45°.												
329.20	118				C25			65	65						VOC = 38.8 ppm
	119														
327.20	120		At EL. 327.4 ft, observed bedding joint, dipping 45°.												
	121		At EL. 326.7 ft, observed bedding joint, dipping 70°.												
325.20	122		SEDIMENTARY ROCK, (Siliceous SILTSTONE), moderately bedded, light greenish gray, fresh, hard, healed short and discontinuous fractures, no reaction to diluted HCL, bedding plane separation dipping 45°.												
	123		SEDIMENTARY ROCK, (SILTSTONE) with Interbedded SILTY SANDSTONE, laminated to very thinly bedded, dark greenish gray and light greenish gray, fresh, soft to moderately soft, very slightly fractured to unfractured.		C26			87	63						VOC = 32.2 ppm
323.20	124														
	125		As 122.2' with very thin interbeds of black SHALE;, joint dipping 90°, slightly open, smooth, silt infill.												
321.20	126														
	127														
319.20	128		At EL. 319.7 ft, observed bedding joint, dipping 55°.		C27			83	83						VOC = 2.5 ppm
	129														
317.20	130		At EL. 317.0 ft, observed joint, dipping 35°.												
	131		At EL. 316.7 ft, observed bedding joint, dipping 50°.												PA
315.20	132														
	133		At EL. 314.7 ft, observed bedding joint, dipping 55°.		C28			100	100						
313.20	134		At EL. 313.7 ft, observed joint, dipping 20°.												
	135		At EL. 312.2 ft, observed joint, dipping 30°.												
311.20	136		At EL. 311.7 ft, observed bedding joint, dipping 60°. At EL. 311.5 ft, observed joint, dipping 20°.												
	137														
309.20	138		At EL. 308.9 ft, observed bedding joint, dipping 60°, strong brown phosphatic nodule.		C29			100	100						
	139		At EL. 308.1 ft, observed bedding joint, dipping 60°, 5" thick, SILTY SANDSTONE interbed.												
307.20	140														
	141		At EL. 306.7 ft, observed bedding joint, dipping 60°, 1" thick SILTY SANDSTONE interbed.												
305.20	142														
	143		At EL. 304.7 ft, observed bedding joint, dipping 60°, 10" thick SILTY SANDSTONE BED.		C30			100	93						
303.20	144														
	145														

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B6**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-23-09**	**5 of 14**

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
	145		At EL. 302.3 ft, observed bedding joint, dipping 60°, 1" thick SILTY SANDSTONE bed, light greenish gray.		C30			100	93						See note at end of log regarding RQD.
301.20	146		SILTSTONE with Interbedded SILTY SANDSTONE, laminated to very thinly bedded, dark greenish gray and light greenish gray, fresh, soft to moderately soft, very slightly fractured to unfractured. Occasional thin black SHALE beds.												
	147														
299.20	148		At EL. 301.0 ft, observed joint, dipping 30°, through 4" thick SILTY SANDSTONE bed.												
	149		At EL. 300.1 ft, observed bedding joint, dipping 60°, 3" thick SILTY SANDSTONE bed.												
297.20	150		At EL. 299.7 ft, observed joint, dipping 35°. At EL. 298.2 ft, observed joint, dipping 30°, bedding dipping 60 degrees on 1" thick SILTY SANDSTONE bed.												
	151		At EL. 296.6 ft, observed 1.5" thick SILTY SANDSTONE bed.												
295.20	152		At EL. 295.7 ft, observed bedding joint, dipping 60°, 3" thick SILTY SANDSTONE bed. At EL. 295.2 ft, observed bedding joint, dipping 60°, 1.5" thick SILTY SANDSTONE bed.												
	153				C31			86	80						VOC = 39.1 ppm
293.20	154		At EL. 293.2 ft, observed bedding joint, dipping 50°.												
	155														
291.20	156														
	157		At EL. 289.9 ft, observed bedding joint, dipping 50°.												
289.20	158														VOC = 33.9 ppm
	159		At EL. 288.4 ft, observed 1/2" thick SILTY SANDSTONE bed.												
287.20	160		At EL. 287.9 ft, observed 1" thick SILTY SANDSTONE bed.												
	161		At EL. 286.8 ft, observed joint, dipping 80 to 45°, two joints. At EL. 286.2 ft, observed bedding joint, dipping 50°.												
285.20	162														
	163				C32			100	100						VOC = 29.4 ppm
283.20	164		At EL. 283.8 ft, observed 1.5" thick SILTY SANDSTONE bed.												
	165		At EL. 283.0 ft, observed 1.5" thick SILTY SANDSTONE bed. At EL. 282.2 ft, observed bedding joint, dipping 60°, 3" thick SILTY SANDSTONE bed.												
281.20	166		At EL. 281.4 ft, observed 1" thick SILTY SANDSTONE bed.												
	167														
279.20	168														
	169		At EL. 278.8 ft, observed 1" thick SILTY SANDSTONE bed. At EL. 278.2 ft, observed bedding joint, dipping 60°.												
277.20	170		At EL. 277.2 ft, observed 1" thick SILTY SANDSTONE bed.												
	171														
275.20	172				C33			100	100						VOC =5.3 ppm
	173														
273.20	174														
	175														

(continued)

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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B6**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-23-09**	**6 of 14**

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
	175		SILTSTONE with Interbedded SILTY SANDSTONE, laminated to very thinly bedded, dark greenish gray and light greenish gray, fresh, soft to moderately soft, very slightly fractured to unfractured. Occasional thin black SHALE beds.		C33			100	100						See note at end of log regarding RQD.
271.20	176														
	177														
269.20	178		At EL. 269.2 ft, observed bedding joint, dipping 50°.												
	179				C34			100	100						
267.20	180		At EL. 266.9 ft, observed bedding joint, dipping 50°.												
	181														
265.20	182														
	183		At EL. 264.7 ft, observed 4" thick SILTY SANDSTONE bed.												
263.20	184		At EL. 263.7 ft, observed 1" thick SILTY SANDSTONE bed.												
	185		At EL. 262.3 ft, observed bedding joint, dipping 50°.												
261.20	186														
	187		At EL. 260.8 ft, observed joint, dipping 45°.												
259.20	188		At EL. 259.2 ft, observed bedding joint, dipping 50°.												
	189				C35			100	100						
257.20	190														
	191														
255.20	192														
	193														
253.20	194														
	195														
251.20	196		At EL. 251.8 ft, observed bedding joint, dipping 50°.												VOC = 32.4 ppm
	197														
249.20	198		At EL. 249.7 ft, observed bedding joint, dipping 50°. Pressuremeter testing at 198' to 203.5'.												
	199														
247.20	200														
	201														
245.20	202														
	203														
243.20	204		At EL. 243.7 ft, observed bedding joint, dipping 50°. Very weak.		C36			90	75	12	113				UC
	205														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B6**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-23-09**	**7 of 14**

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
	205		SILTSTONE with Interbedded SILTY SANDSTONE, laminated to very thinly bedded, dark greenish gray and light greenish gray, fresh, soft to moderately soft, very slightly fractured to unfractured. Occasional thin black SHALE beds.		C36			90	75						See note at end of log regarding RQD.
241.20	206														
	207														
239.20	208														
	209														
237.20	210		At EL. 237.7 ft, observed bedding joint, dipping 50°.												
	211		At EL. 236.7 ft, observed joint, dipping 70°.												
235.20	212														
	213														
233.20	214				C37			100	95						
	215														
231.20	216		At EL. 231.2 ft, observed shear, dipping 90 to 75°, 1-inch wide sheared zone, 1/8-inch thick clay lining in center, faintly polished 1/16-inch to 1/4-inch offset. Consistent bedding dipping 50 degrees.												
	217														
229.20	218														
	219														
227.20	220		At EL. 227.2 ft, observed joint, dipping 70°.												
	221														
225.20	222		At EL. 225.2 ft, observed bedding joint, dipping 45°.		C38			95	90						
	223														
223.20	224														
	225														
221.20	226		At EL. 221.7 ft, observed bedding joint, dipping 40°.												
	227		At EL. 220.2 ft, observed 2" thick bed with abundant soft sediment deformation.												
219.20	228														
	229														
217.20	230														
	231														
215.20	232				C39			93	93						
	233		At EL. 214.2 ft, observed bedding joint, dipping 40°.												
213.20	234		At EL. 213.7 ft, with local interbedded DIATOMACEOUS SILTSTONE beds less than 1/8-inch thick.												
	235														

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B6**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-23-09**	**8 of 14**

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
	235		At EL. 213.0 ft, observed bedding joint, dipping 45°. SILTSTONE with Interbedded SILTY SANDSTONE, laminated to very thinly bedded, dark greenish gray and light greenish gray, fresh, soft to moderately soft, very slightly fractured to unfractured. Occasional thin black SHALE beds.		C39			93	93						See note at end of log regarding RQD.
211.20	236														
	237									16	111				UU
			Very weak.												
209.20	238									18	111				UC, SD
	239		Very weak.												
			At EL. 208.0 ft, observed possible charcoal fleck, 1/8" dia.												
207.20	240		At EL. 207.2 ft, observed bedding joint, dipping 50°.												
	241														
205.20	242		Pressuremeter testing at 242' to 247'.												
	243														
203.20	244														
	245														
201.20	246														
	247				C40			100	92						
199.20	248		At EL. 199.7 ft, observed phosphate nodule, occasional DIATOMACEOUS SILTSTONE beds up to 1/4-inch thick.												
	249														
197.20	250		At EL. 197.7 ft, observed bedding joint, dipping 45°.												
	251														
195.20	252		At EL. 195.2 ft, observed bedding joint, dipping 45°.												
	253				C41			100	95						
193.20	254		At EL. 193.2 ft, observed bedding joint, dipping 45°.												
	255		At EL. 192.5 ft, observed 3-inch thick, weak, fine to medium grained SANDSTONE sequence.												
191.20	256														
	257														
189.20	258		At EL. 189.2 ft, observed bedding joint, dipping 40°.												
	259														
187.20	260		At EL. 187.2 ft, observed bedding joint, dipping 45°.												
	261														
185.20	262														
	263		At EL. 184.7 ft, observed bedding joint, dipping 45°.		C42			100	100						SD
183.20	264		At EL. 183.0 ft, observed bedding joint, dipping 45°.												
	265														

(continued)

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Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B6**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-23-09**	**9 of 14**

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
	265		SILTSTONE with Interbedded SILTY SANDSTONE, laminated to very thinly bedded, dark greenish gray to light greenish gray, fresh, soft to moderately soft, very slightly fractured to unfractured. Occasional thin black SHALE beds.		C42			100	100						See note at end of log regarding RQD.
181.20	266														
	267									12	122				UC
179.20	268		Very weak. At EL. 179.2 ft, observed bedding joint, dipping 40°.		C43			100	100						
	269														
177.20	270														
	271		At EL. 176.7 ft, observed bedding joint, dipping 45°.												
175.20	272														
	273		As 125', SILTSTONE beds are dark greenish gray, SANDSTONE beds are dark bluish gray.		C44			98	96						
173.20	274														
	275		At EL. 172.2 ft, observed bedding joint, dipping 40°.												
171.20	276														
	277														
169.20	278														
	279		At EL. 168.2 ft, observed bedding joint, dipping 40°.							12	114				UU
167.20	280		Very weak.												
	281														
165.20	282		At EL. 165.2 ft, observed bedding joint, dipping 40°.												
	283				C45			98	98						
163.20	284		At EL. 163.5 ft, observed moderately fractured zone with 1/16" thick clay film along bedding. At EL. 163.2 ft, observed bedding joint, dipping 40°.												
	285														
161.20	286														
	287														
159.20	288		At EL. 159.2 ft, observed bedding joint, dipping 40°.												
	289														
157.20	290														
	291		At EL. 156.7 ft, observed bedding joint, dipping 45°.												
155.20	292		At EL. 155.4 ft, observed shear, dipping 20°, 1/8-inch thick clay lining, tight, slightly polished, less than 1" offset.												
	293				C46			100	80						SD
153.20	294														
	295														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B6**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-23-09**	**10 of 14**

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
	295				C46			100	80						See note at end of log regarding RQD.
151.20	296		SILTSTONE with Interbedded SILTY SANDSTONE, laminated to very thinly bedded, dark greenish gray to dark bluish gray, fresh, soft to moderately soft, very slightly fractured to unfractured. Occasional thin black SHALE beds, shear dipping 10 to 20°, ½-inch offset along two bisecting shear planes, very tight.												
	297														
149.20	298														
	299		At EL. 148.2 ft, observed shear, dipping 90 to 70°, tight, 1/16-inch to 1/4-inch clay lining.							17	111				UC
147.20	300		Weak.												
	301		At EL. 146.2 ft, observed bedding joint, dipping 50°.												
145.20	302		At EL. 145.2 ft, observed bedding joint, dipping 50°, on ½-inch thick, very soft, plastic, CLAY seam.												
	303				C47			92	80						
143.20	304		At EL. 143.5 ft, observed shear, 20, tight, less than 1/16-inch clay lining, less than 1-inch offset.												
	305		At EL. 142.2 ft, observed bedding joint, dipping 45°.												
141.20	306														
	307														
139.20	308		At EL. 139.2 ft, observed bedding joint, dipping 40°, Shear also observed, tight, less than 1/16-inch clay lining, less than 1-inch offset. Very weak.							15	111				UU, CR
	309		At EL. 137.7 ft, observed bedding joint, dipping 40°.												
137.20	310		At EL. 137.2 ft, observed 2-inch thick SHALE bed.												
	311														
135.20	312		At EL. 135.5 ft, observed bedding joint, dipping 40°, 2-inch thick, moderately hard, DIATOMACEOUS SHALE bed.												
	313		At EL. 135.2 ft, observed 2-inch thick, moderately hard, DIATOMACEOUS SHALE bed.		C48			78	70						
133.20	314		At EL. 133.7 ft, observed shear, dipping 20°, tight, 1/16-inch thick clay lining, ¼-inch offset.												
	315		At EL. 132.2 ft, observed bedding joint, dipping 45°.												
131.20	316														
	317														
129.20	318		At EL. 129.2 ft, observed bedding joint, dipping 45°.												
	319		At EL. 128.2 ft, observed bedding joint, dipping 45°.												
127.20	320														
	321														
125.20	322														
	323				C49			100	100						
123.20	324		PTS - Finely bedded SILTSTONE, bedded at millimeter scale, alternating iron oxide rich and poor bands.												PTS
	325														

(continued)

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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B6**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-23-09**	**11 of 14**

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
	325		At EL. 122.3 ft, observed bedding joint, dipping 45°.		C49			100	100						See note at end of log regarding RQD.
121.20	326		SILTSTONE with Interbedded SILTY SANDSTONE, laminated to very thinly bedded, dark greenish gray to dark bluish gray, fresh, soft to moderately soft, very slightly fractured to unfractured. Occasional thin black SHALE beds.												
	327		Pressuremeter testing at 326' to 333'.												
119.20	328														
	329														
117.20	330														
	331														
115.20	332														
	333				C50			100	100						
113.20	334		Very weak.							17	115				UC SD
	335		At EL. 112.7 ft, observed bedding joint, dipping 45°.												
111.20	336														
	337														
109.20	338		At EL. 109.7 ft, observed bedding joint, dipping 45°.												
	339														
107.20	340		At EL. 108.2 ft, observed bedding joint, dipping 45°, 2-inch thick, moderately cemented sequence of medium to coarse grained SANDSTONE, 1/8-inch thick laminations.												
	341				C51			100	100						
105.20	342		At EL. 105.7 ft, observed bedding joint, dipping 45°.												
	343				C52			100	100						
103.20	344		At EL. 103.2 ft, observed bedding joint, dipping 50°.												
	345														
101.20	346														
	347		At EL. 100.2 ft, observed bedding joint, dipping 45°.												
99.20	348		At EL. 99.2 ft, observed steepened bedding between 348' and shear below at 349.9', beds dipping 60°.												
	349														
97.20	350		At EL. 97.3 ft, observed shear, dipping 70°, tight, paper thin clay lining, ¼-inch normal offset.												
	351		At EL. 97.2 ft, observed bedding joint, dipping 45°.												
			At EL. 96.2 ft, observed bedding joint, dipping 45°.		C53			94	81						
95.20	352														
	353														
93.20	354		At EL. 93.7 ft, observed shear/fault zone, dipping 90 to 70°, ¼-inch to ½-inch thick clay lining, irregular, undulatory shear, bedrock within shear zone is												
	355														

(continued)

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Department of Transportation
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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B6**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-23-09**	**12 of 14**

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
	355		moderately contorted, beds are folded and irregular, beds dip up to 60°..		C53			94	81						See note at end of log regarding RQD.
91.20	356		SILTSTONE with Interbedded SILTY SANDSTONE, laminated to very thinly bedded, dark greenish gray to dark bluish gray, fresh, soft to moderately soft, very slightly fractured to unfractured. Occasional thin black SHALE beds.												
	357														
89.20	358		At EL. 91.2 ft, observed bedding joint, dipping 45°. At EL. 89.2 ft, observed shear, dipping 65°, tight, paper-thin clay lining.												
	359				C54			100	63						
87.20	360		At EL. 88.2 ft, observed bedding joint, dipping 50°, interbedded fine SANDSTONE and SHALE, gradually increasing cemented, moderately hard to 365.5'.												
	361		At EL. 86.2 ft, observed bedding joint, dipping 55°, well cemented, moderately fractured.												
85.20	362		At EL. 85.2 ft, observed local bedding planes with chrome colored minerals.												
	363				C55			100	0						
83.20	364		At EL. 83.2 ft, observed roughly 1.5' thick, moderately hard, laminated, SILTSTONE bed, moderately fractured.												
	365														
81.20	366		At EL. 81.7 ft, observed bedding joint, dipping 45°, soft to moderately soft.		C56			92	85						
	367														
79.20	368														
	369														
77.20	370		At EL. 77.7 ft, observed bedding joint, dipping 45°.												
	371														
75.20	372		At EL. 75.2 ft, observed bedding joint, dipping 45°.		C57			95	90						
	373														
73.20	374		At EL. 73.2 ft, observed bedding joint, dipping 45°.												
	375														
71.20	376									15	111				UC, SD
	377		At EL. 70.7 ft, observed bedding joint, dipping 45°, . Very weak.												
69.20	378														
	379		At EL. 68.7 ft, observed 3-inches thick moderately cemented zone, moderately hard. At EL. 68.2 ft, observed bedding joint, dipping 45°.												
67.20	380														
	381														
65.20	382		At EL. 65.2 ft, observed bedding joint, dipping 45°.		C58			100	88						
	383														
63.20	384		At EL. 63.2 ft, observed bedding joint, dipping 45°, occasional SHALE beds up to ¼-inch thick.												
	385														

(continued)

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Department of Transportation
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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B6**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-23-09**	**13 of 14**

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
	385		SILTSTONE with Interbedded SILTY SANDSTONE, laminated to very thinly bedded, dark greenish gray to dark bluish gray, fresh, soft to moderately soft, very slightly fractured to unfractured. Occasional thin black SHALE beds.		C58			100	88						See note at end of log regarding RQD.
61.20	386		At EL. 61.7 ft, observed ¾-inch thick, cross-bedded, fine SANDSTONE bed, pinches and swells. Increasing SANDSTONE beds.												
	387		At EL. 61.2 ft, observed ¾-inch thick, cross-bedded, fine SANDSTONE bed, pinches and swells.												
59.20	388		At EL. 60.7 ft, observed 2" thick SANDSTONE bed, laminated.												
	389		At EL. 59.7 ft, observed bedding joint, dipping 50°.												
57.20	390		At EL. 58.2 ft, observed bedding joint, dipping 50°.												
	391		At EL. 57.2 ft, observed 1.5" diameter granitic clast, subrounded.		C59			100	100						
55.20	392		At EL. 56.8 ft, grades to moderately soft to moderately hard, SANDSTONE is light greenish gray, SILTSTONE is black.												
	393		At EL. 54.7 ft, observed bedding joint, dipping 45°, 2" thick SANDSTONE bed, well cemented, ¼" thick SILTSTONE lamination in center.												
53.20	394		At EL. 53.2 ft, observed 1-inch thick SANDSTONE bed, pinches out at center of core.												
	395		At EL. 52.7 ft, observed bedding joint, dipping 50°, SANDSTONE beds exhibit soft sediment deformation: cross bedding, pinch and swell.												
51.20	396														
	397														
49.20	398		At EL. 49.7 ft, observed bedding joint, dipping 45°.												
	399														
47.20	400		At EL. 47.2 ft, observed bedding joint, dipping 50°.												
	401		Bottom of borehole at 400.5 ft bgs Borehole terminated at planned depth.												
45.20	402		Borehole converted to piezometer at the completion of drilling.												
	403		RQD values provided on the boring logs are based on intact core pieces obtained between two natural discontinuities. The majority of core obtained from this boring is typically very weak to weak and does not meet the "sound core" definition provided in the standard test method for RQD (ASTM D 6032). These RQD values should not be used to evaluate rock mass quality.												
43.20	404														
	405														
41.20	406														
	407														
39.20	408														
	409														
37.20	410														
	411														
35.20	412														
	413														
33.20	414														
	415														

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
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Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B6**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-23-09**	**14 of 14**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
R. Chavez	1-19-09	1-23-09	34° 4' 32.1234" / 118° 10' 59.6814" NAD83	R-09-Z1B7
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Cascade Drilling Inc.			' Lt Sta (Klamath St. at Ditman Ave.)	480.5 ft NAVD 88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wash			Ingersoll Rand A400	6 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT(1.4"), Cal (2.4"), PQ core (3.2")			Automatic Hammer 140 lb. 30 inch drop	75%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer Installed on Completion			NM	40.0 ft on7/1/09	300.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		ASPHALT 6" thick.												This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007), except as noted in Appendix A.1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
	0.5		Road base material, 6" thick.												
	1		SANDY lean CLAY (CL); stiff; olive yellow; moist; fine SAND; medium plasticity fines [OLDER ALLUVIUM].												Vacuum extracted from 1' to 7.5' for utility clearance.
478.50	2														
	3														
476.50	4														
	5														
474.50	6														
	7														
472.50	8														
	9			X	S01	5 5 4	9								VOC = 2.9 ppm
470.50	10														
	11														
468.50	12														
	13														
466.50	14														
	15		Lean CLAY with SAND (CL); hard; dark brown; moist; fine SAND; medium plasticity fines.	X	S02	8 14 24	38								VOC = 3.8 ppm
464.50	16														
	17														
462.50	18														
	19														
460.50	20		Very stiff; micaceous.	X	S03	5 8 14	22								VOC = 6.4 ppm
	21														
458.50	22														
	23														
456.50	24														
	25														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z1B7
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	D/D	07-187900
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	D. Jankly		3-13-09	1 of 11

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		Lean CLAY with SAND (CL) *(continued)*. 24% medium to fine SAND, 76% fines.		S04	9 14 17	31			20	108				See note at end of log regarding RQD. PI, PA VOC = 11.0 ppm
454.50	26														
	27														
452.50	28														
	29														
450.50	30		Lean CLAY (CL); hard; brown to dark brown; moist; little medium to fine SAND; medium plasticity fines.		S05	8 17 50/6"									VOC = 1.0 ppm
	31														
448.50	32														
	33														
446.50	34														VOC = 8.1 ppm
	35		19% medium to fine SAND, 81% fines.		S06	14 50/4"				24	102				PI, PA
444.50	36														
	37		Olive gray; friable.		C07			100	100						
442.50	38														
	39		SEDIMENTARY ROCK: DIATOMACEOUS (SILTSTONE), massive, olive to white, decomposed, very soft, oxidized, (Clayey SILT, hard, moist) **[PUENTE FORMATION, (Diatomaceous Member)]**												
440.50	40		At EL. 440.3 ft, contains SHALE interbeds, laminated to very thinly bedded, pale olive to, pale yellow, intensely weathered, very soft, carbonate nodules.												
	41		At EL. 439.5 ft, observed bedding joint, dipping 5°.		C08			100	100						VOC = 5.2 ppm
438.50	42														
	43		At EL. 437.5 ft, observed bedding joint, dipping 15°.												
436.50	44														
	45														
434.50	46		At EL. 434.8 ft, observed bedding joint, dipping 15°.		C09			93	93						VOC = 4.0 ppm
	47		At EL. 434.5 ft, becomes very pale brown to brownish yellow, moderately weathered, soft, with carbonate veins and nodules.												
432.50	48														
	49		At EL. 432.0 ft, observed light gray to light olive brown, 2" thick SANDSTONE bed, fine grained, dipping 20 degrees, friable, no reaction to HCL.												
430.50	50														
	51				C10			100	80						VOC = 21.5 ppm
428.50	52		At EL. 429.2 ft, observed SANDSTONE bed, 3" thick, fine grained, dipping 20 degrees, friable.							19	83				PA
	53		At EL. 428.8 ft, observed light greenish gray, SANDSTONE bed, 1" thick, fine grained, dipping 20 degrees, friable.												
426.50	54		At EL. 427.4 ft, observed SANDSTONE bed, 2" thick, fine grained, dipping 20 degrees, friable.												
	55														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B7**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-13-09**	**2 of 11**

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
	55		At EL. 425.8 ft, observed bedding joint, dipping 20°, 0.6' thick SANDY SILTSTONE bed. *(continued)*.		C10			100	80						See note at end of log regarding RQD.
424.50	56				C11			73	59						VOC = 3.0 ppm
	57		At EL. 423.5 ft, observed SANDSTONE bed, 3" thick, fine grained, dipping 20 degrees, friable.												
422.50	58														
	59														
420.50	60		At EL. 420.5 ft, observed SANDSTONE bed, 3" thick, fine grained, dipping 20 degrees, friable.												
	61		At EL. 419.8 ft, observed SANDSTONE bed, 4" thick, fine grained, dipping 20 degrees, friable.		C12			100	100						VOC = 7.5 ppm
418.50	62		At EL. 419.5 ft, becomes DIATOMACEOUS SILTSTONE with fine SANDSTONE laminations, light greenish gray, locally contorted and bioturbated. Bedding dipping 20 degrees.												
	63		At EL. 417.5 ft, grades to DIATOMACEOUS SILTSTONE, lacks sandstone.												
416.50	64														
	65														
414.50	66		At EL. 414.5 ft, observed bedding joint, dipping 20°.		C13			100	100						VOC = 2.5 ppm
	67														
412.50	68														
	69		At EL. 411.5 ft, observed joint, dipping 70°, tight, calcite lining.												
410.50	70		SEDIMENTARY ROCK: (SILTSTONE), laminated to very thinly bedded, very dark gray, slightly weathered, soft, slightly fractured. Abrupt contact between oxidized and unoxidized at 70.3' **[PUENTE FORMATION, (Siltstone Member)]**												
	71				C14			100	100						VOC = 7.7 ppm
408.50	72		At EL. 410.0 ft, observed bedding joint, dipping 10°. At EL. 408.0 ft, becomes SANDY (fine grained), massive, unfractured, unoxidized, no reaction to HCL solution.												
406.50	74														
	75									3	97				PA
404.50	76		At EL. 404.5 ft, becomes intensely to moderately weathered, soft to moderately soft.		C15			92	92						VOC = 29.0 ppm
	77														
402.50	78														
	79														
400.50	80														
	81		At EL. 399.5 ft, becomes thinly bedded to laminated.		C16			87	87						VOC = 2.6 ppm
398.50	82														
	83		At EL. 398.0 ft, observed bedding joint, dipping 40°. At EL. 397.5 ft, observed bedding joint, dipping 40°.												
396.50	84		At EL. 397.0 ft, becomes massive.												
	85														

(continued)

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BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-13-09**	**3 of 11**

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
	85		At EL. 395.5 ft, becomes SILTSTONE with thin interbeds of SILTY SANDSTONE, laminated, slightly weathered, soft, very slightly fractured, weak reaction to HCL solution. *(continued)*.												See note at end of log regarding RQD.
394.50	86				C17			100	100						VOC = 3.2 ppm
	87														
392.50	88														
	89														
390.50	90														
	91		Pressuremeter testing at 90.5' to 96.5'.												
388.50	92														
	93														
386.50	94														
	95														
384.50	96				C18			80	80						
	97														
382.50	98		At EL. 383.1 ft, observed bedding joint, dipping 10°.												
	99														
380.50	100		At EL. 380.7 ft, observed bedding joint, dipping 10°.												
	101		At EL. 379.3 ft, observed fault, dipping 90°.		C19			82	67	12	101				PI, PA
378.50	102		At EL. 378.5 ft, observed bedding joint, dipping 20°.												
	103														
376.50	104		At EL. 376.5 ft, observed joint, dipping 45°.												
	105														
374.50	106		At EL. 374.9 ft, observed bedding joint, dipping 20°. At EL. 374.6 ft, observed bedding joint, dipping 20°. Pressuremeter testing at 106' to 111.5'.												
	107														
372.50	108														
	109														
370.50	110														
	111				C20			98	98						
368.50	112														
	113		At EL. 367.7 ft, observed joint, dipping 60°, tight, no lining.												
366.50	114														
	115														

(continued)

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N/A	**D. Jankly**		**3-13-09**	**4 of 11**

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
	115		At EL. 365.7 ft, observed bedding joint, dipping 80°. SILTSTONE with thin interbeds of SILTY SANDSTONE, laminated, slightly weathered, soft, very slightly fractured, weak reaction to HCL solution.		C20			98	98						See note at end of log regarding RQD.
364.50	116				C21			98	98						
	117														
362.50	118		At EL. 362.5 ft, observed bedding joint, dipping 80°.												
	119														
360.50	120														
	121		SEDIMENTARY ROCK, SILTY (SANDSTONE), very thickly bedded to massive, very dark grayish brown, slightly weathered, soft. Scattered very thin SILTSTONE interbeds.		C22			87	87						
358.50	122														
	123		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, very dark grayish brown, weak reaction to HCL solution.												
356.50	124		SEDIMENTARY ROCK, SILTY (SANDSTONE), with scarce very thin SILTSTONE beds, very thickly bedded to massive, very dark grayish brown, slightly weathered, soft.												
	125														
354.50	126				C23			82	32						VOC = 4.7 ppm
	127														
352.50	128		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, very dark grayish brown, bedding joint dipping 15°, weak reaction to HCL solution.												
	129														
350.50	130		SEDIMENTARY ROCK, SILTY (SANDSTONE), fine grained, with scattered very thin SILTSTONE interbeds, very thickly bedded to massive, very dark grayish brown, slightly weathered, soft. Pressuremeter testing at 131' to 136'.												
	131														VOC = 6.8 ppm
348.50	132														
	133														
346.50	134														
	135														
344.50	136				C24			77	68						
	137														
342.50	138														
	139														
340.50	140		At EL. 341.0 ft, observed bedding joint, dipping 80°, local CLAY beds.												
	141				C25			100	100						VOC = 2.9 ppm
338.50	142														
	143		At EL. 338.0 ft, observed bedding joint, dipping 80°, ½-inch thick SILTSTONE interbed.												
336.50	144		At EL. 337.2 ft, observed bedding joint, dipping 80°, 1½-inch thick SILTSTONE interbed.												PA
	145														

(continued)

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BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-13-09**	**5 of 11**

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
	145		*(continued).*		C25			100	100						See note at end of log regarding RQD.
334.50	146		SEDIMENTARY ROCK, (SILTSTONE) with scattered very thin interbeds of SANDY SILTSTONE, laminated to very thinly bedded, very dark gray, fresh, soft. Unoxidized, moderate reaction to HCL.		C26			100	100						VOC = 3.7 ppm
	147														
332.50	148														
	149		SEDIMENTARY ROCK, SILTY (SANDSTONE), with scarce very thin SILTSTONE beds, every thickly bedded to massive, very dark grayish brown, fresh, soft.												
330.50	150		At EL. 331.0 ft, observed bedding joint, dipping 45°.												
	151		SEDIMENTARY ROCK, (SILTSTONE), with scattered very thin SANDY SILTSTONE beds, laminated to very thinly bedded, very dark gray, fresh, soft, unoxidized, moderate reaction to HCL.		C27			100	100						VOC = 2.0 ppm
328.50	152		At EL. 330.0 ft, observed bedding joint, dipping 45°.							19					PA
	153		At EL. 328.0 ft, observed bedding joint, dipping 70°.												
326.50	154														
	155														
324.50	156		At EL. 324.5 ft, becomes locally intensely weathered and moderately soft, bedding joint, dipping 80°.		C28			100	100						VOC = 2.2 ppm
	157														
322.50	158		At EL. 323.2 ft, observed 6" thick calcareous concretion, fresh, hard, moderate reaction to HCL solution.												
	159														
320.50	160														
	161		At EL. 319.9 ft, observed bedding joint, dipping 80°.		C29			100	100						VOC =2.8 ppm
318.50	162														
	163														
316.50	164		SEDIMENTARY ROCK, (LIMESTONE), very thinly to thinly bedded, dark olive gray, fresh, medium strong, hard, unfractured, unoxidized, moderate reaction to HCL solution. Bedding dipping 80 degrees.		C30			100	100						
	165														PL
314.50	166		At EL. 314.9 ft, observed bedding joint, dipping 80°.		C31			100	100						VOC = 1.8 ppm
	167		SEDIMENTARY ROCK, (SILTSTONE), with scattered very thin interbeds of SANDY SILTSTONE, laminated to very thinly bedded, very dark gray, fresh, moderately soft, unoxidized, moderate reaction to HCL.												
312.50	168														
	169														
310.50	170		SEDIMENTARY ROCK, (LIMESTONE), light greenish gray, fresh, hard, unfractured, unoxidized, strong reaction to HCL solution.												
	171		SEDIMENTARY ROCK, SILTY (SANDSTONE), with light bluish gray fine SANDSTONE beds, laminated, very dark gray, fresh, moderately soft, unfractured. Micaceous, unoxidized.		C32			100	100						
308.50	172														
	173		SEDIMENTARY ROCK, (SILTSTONE), laminated to very thinly bedded, very dark gray, fresh, weak, soft, with scattered very thin interbeds of SANDY SILTSTONE, unoxidized, mostly non-plastic, moderate reaction to HCL.							14	104				PL
306.50	174														
	175														

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DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-13-09**	**6 of 11**

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
	175		At EL. 307.0 ft, observed bedding joint, dipping 80°, unit is weak.		C32			100	100						See note at end of log regarding RQD.
304.50	176		At EL. 305.5 ft, observed bedding joint, dipping 80°, 1 inch thick, calcareous interbed, white. *(continued)*.		C33			98	67						VOC = 1.2 ppm
	177		SEDIMENTARY ROCK, SANDY (SILTSTONE) to SILTY (SANDSTONE), fine sand, moderately to thickly bedded, very dark gray brown, fresh, soft, unfractured, unoxidized, micaceous, no reaction to HCL solution.												
302.50	178														
	179		SEDIMENTARY ROCK, (SILTSTONE/SHALE) with fine SANDSTONE laminations, laminated to very thinly bedded, very dark gray, (light bluish gray sandstone beds), fresh, unfractured, tar impregnated bedding.												
300.50	180														
	181		At EL. 300.9 ft, observed bedding joint, dipping 80°.		C34			83	0						VOC = 0.7 ppm
298.50	182														
	183		At EL. 298.0 ft, observed bedding joint, dipping 80°.												
296.50	184														
	185														
294.50	186				C35			125	0						
	187		At EL. 293.3 ft, observed bedding joint, dipping 70°.												
292.50	188														
	189														
290.50	190				C36			100	80						
	191														VOC = 0.9 ppm
288.50	192		At EL. 288.5 ft, observed bedding joint, dipping 80°, 2 inch thick, medium strong, hard, calcareous bed, strong reaction to diluted HCL.							2	147				PL
	193														
286.50	194														
	195				C37			80	72						VOC = 1.1 ppm
284.50	196		At EL. 284.3 ft, observed bedding joint, dipping 70°, interval with abundant very thin interbeds of light bluish gray, friable, fine-grained SANDSTONE beds between 196' and 208'.												
	197														
282.50	198														
	199														
280.50	200				C38			100	100						VOC = 0.5 ppm
	201		At EL. 279.5 ft, observed bedding joint, dipping 70°, 1½-inch thick fine grained sandstone bed, light bluish gray.												
278.50	202									14	111				SD, UC
	203		At EL. 278.0 ft, observed tar impregnated bedding plane. Very weak.												
276.50	204				C39			100	100						VOC = 0.4 ppm
	205														

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BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-13-09**	**7 of 11**

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
	205		*(continued).*		C39			100	100						See note at end of log regarding RQD.
274.50	206														
	207		At EL. 273.5 ft, observed bedding joint, dipping 70°.												
272.50	208														
	209		SEDIMENTARY ROCK, (SHALE), very thinly bedded to laminated, very dark gray, fresh, moderately soft, unfractured, moderate reaction to HCL solution, unoxidized.		C40			100	100						VOC = 0.5 ppm
270.50	210									9					SD
	211														
268.50	212		At EL. 268.5 ft, observed bedding joint, dipping 70°, unit is weak.												
	213														
266.50	214		SEDIMENTARY ROCK, SILTY (SANDSTONE), fine grained, massive, very dark gray, fresh, soft, very slightly unfractured, friable, weak reaction to HCl, unoxidized.		C41			100	100						
	215														VOC = 0.1 ppm
264.50	216														
	217		SEDIMENTARY ROCK, (LIMESTONE), light greenish gray, fresh, hard, unfractured, unoxidized, strong reaction to HCL solution. At EL. 263.5 ft, observed bedding joint, dipping 70°.												
262.50	218														
	219		SEDIMENTARY ROCK, (SILTSTONE/SHALE) with fine silty SANDSTONE laminations, laminated to very thinly bedded, very dark gray, (light bluish gray sandstone beds), fresh, moderately soft, unfractured. At EL. 261.5 ft, observed bedding joint, dipping 70°.		C42			100	100						VOC = 0.9 ppm
260.50	220		At EL. 260.5 ft, observed bedding joint, dipping 70°.												
	221														
258.50	222														
	223														
256.50	224				C43			100	16						
	225		At EL. 256.0 ft, observed bedding joint, dipping 70°. At EL. 255.5 ft, observed bedding joint, dipping 70°.												VOC = 1.5 ppm
254.50	226														
	227														
252.50	228		At EL. 252.2 ft, observed bedding joint, dipping 70°.												
	229														
					C44			80	0						
250.50	230														VOC = 0.2 ppm
	231														
248.50	232														
	233														
246.50	234				C45			100	100						
	235														

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N/A	**D. Jankly**		**3-13-09**	**8 of 11**

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
	235		*(continued).*		C45			100	100						See note at end of log regarding RQD.
244.50	236														VOC = 0.9 ppm
	237		SEDIMENTARY ROCK, SILTY (SANDSTONE), laminated, very dark gray, fresh, extremely weak, moderately soft, unfractured. Laminations of light bluish gray, fine grained SANDSTONE, locally impregnated with tar. Micaceous, unoxidized.							5	112				UC
242.50	238														
	239		At EL. 243.5 ft, observed bedding joint, dipping 70°.		C46			100	100						
240.50	240														VOC = 1.3 ppm
	241														
238.50	242														
	243														
236.50	244				C47			100	100						
	245		At EL. 235.5 ft, observed bedding joint, dipping 70°, 2" thick SILTSTONE bed.												VOC = 1.8 ppm
234.50	246														
	247									13	113				PL, UC, EM
232.50	248		Very weak.												
	249		PTS - Arkosic SANDSTONE, biotite rich.		C48			60	50						PTS
230.50	250														VOC = 0.6 ppm
	251														
228.50	252		At EL. 228.8 ft, observed 0.9' thick SILTSTONE/SHALE bed, dipping 70 degrees. Extremely weak.							13	107				UU VOC = 1.3 ppm
	253		At EL. 227.4 ft, observed 1' thick SILTSTONE/SHALE bed, dipping 70 degrees. Unit is extremely weak.												
226.50	254				C49			100	100						
	255														
224.50	256														
	257				C50			100	100						VOC = 6.4 ppm
222.50	258														
	259														
220.50	260		At EL. 220.5 ft, with with gravel-sized SILTSTONE/SHALE fragments.												
	261														VOC = 5.9 ppm
218.50	262		At EL. 219.2 ft, observed 0.9' thick SILTSTONE/SHALE bed, dipping 70 degrees.		C51			100	100						
	263														
216.50	264														
	265														

(continued)

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N/A	**D. Jankly**		**3-13-09**	**9 of 11**

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
	265		SILTY SANDSTONE, laminated, very dark gray, fresh, moderately soft, unfractured; with laminations of light bluish gray, fine grained SANDSTONE impregnated with tar. Micaceous, unoxidized. *(continued)*.		C52			80	80						See note at end of log regarding RQD.
214.50	266														VOC = 1.8 ppm
	267														
212.50	268														VOC = 1.1 ppm
					C53			100	100						
	269														
210.50	270														
	271														
208.50	272														
	273		SEDIMENTARY ROCK, (SILTSTONE/SHALE) with fine SANDSTONE laminations, laminated to very thinly bedded, very dark gray, (light bluish gray sandstone beds), fresh, moderately soft, unfractured. Locally impregnated with tar.. At EL. 206.2 ft, observed bedding joint, dipping 80°. At EL. 205.3 ft, observed bedding joint, dipping 70°.											VOC = 0.5 ppm
206.50	274				C54			100	100						
	275														
204.50	276														
	277														
202.50	278														
					C55			100	100						
	279														
200.50	280														
	281		At EL. 199.5 ft, observed bedding joint, dipping 80°.												
198.50	282														VOC = 1.1 ppm
					C56			100	100						
	283														
196.50	284									13	108				PL, SD, UC, EM
	285		Weak.												
194.50	286														
	287														VOC = 1.2 ppm
192.50	288		At EL. 193.2 ft, observed bedding joint, dipping 80°, LIMESTONE bed, 2 inches thick.		C57			100	100						
	289		SEDIMENTARY ROCK, SILTY (SANDSTONE), laminated, very dark gray, fresh, moderately soft, unfractured; with laminations of light bluish gray, fine grained SANDSTONE, micaceous, unoxidized. Locally impregnated with tar.. At EL. 192.0 ft, becomes locally bioturbated.											
190.50	290														
	291														
188.50	292														VOC = 0.6 ppm
					C58			100	100						
	293														
186.50	294														
	295														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B7**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-13-09**	**10 of 11**

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
	295		At EL. 185.5 ft, observed bedding joint, dipping 70°, LIMESTONE bed, 6 inches thick.		C58			100	100						See note at end of log regarding RQD.
184.50	296														
	297														
182.50	298				C59			100	100						
	299														VOC = 1.0 ppm
180.50	300		Bottom of borehole at 300.0 ft bgs Borehole terminated at planned depth. Borehole converted to piezometer at the completion of drilling. RQD values provided on the boring logs are based on intact core pieces obtained between two natural discontinuities. The majority of core obtained from this boring is typically very weak to weak and does not meet the "sound core" definition provided in the standard test method for RQD (ASTM D 6032). These RQD values should not be used to evaluate rock mass quality.											
	301														
178.50	302														
	303														
176.50	304														
	305														
174.50	306														
	307														
172.50	308														
	309														
170.50	310														
	311														
168.50	312														
	313														
166.50	314														
	315														
164.50	316														
	317														
162.50	318														
	319														
160.50	320														
	321														
158.50	322														
	323														
156.50	324														
	325														

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B7**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-13-09**	**11 of 11**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
K. Barker	1-6-09	1-12-09	34° 4' 38" / 118° 9' 58" NAD83	R-09-Z1B8
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Caltrans Drilling Services			' Lt Sta Caltrans ROW @ Front St.	419.6 ft NAVD88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wire-Line			CME 85	4 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT(1.4"),Punch Core(2.5"),Shelby(2.87"),HQ Core			CME Automatic, 140 lb., 30 inch drop	87%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer Installed on Completion			READINGS NM / 25.0 ft on 7-1-09	200.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		SILTY, CLAYEY SAND (SC-SM); medium dense; light olive brown; dry; fine SAND; little low to medium plasticity fines [RECENT ALLUVIUM].		D01			100							This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007), except as noted in Appendix A.1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
417.63	2														
415.63	4														
	5		At EL. 414.6 ft, contains trace fine GRAVEL.		S02	5 5 17	22	100							Hand Auger 0'-5'
413.63	6														
	7		At EL. 412.6 ft, with olive yellow mottled with light gray.												
411.63	8														
409.63	10				O03			33							
407.63	12														
405.63	14														
	15		At EL. 404.6 ft, becomes black.		S04	3 4 5	9	100		23					PA
403.63	16		SANDY SILT (ML); stiff; dark grayish brown; dry; few GRAVEL; little coarse to fine SAND; mostly low plasticity fines.												
401.63	18														
399.63	20		SILTY SAND (SM); loose; dark yellowish brown; medium SAND.		O05			33							
397.63	22														
395.63	24														
	25														

(continued)

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z1B8
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	T/T	07-07-187900
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.Barker			1 of 7

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		Lean CLAY (CL); soft, very dark grayish brown slightly mottled with rust staining; medium plasticity fines.		S06	p p 2		100		32					PI
393.63	26														
	27														
391.63	28														
	29														
389.63	30		SILTY SAND (SM); very dark grayish brown; fine SAND.		O07			33							
	31														
387.63	32														
	33														
385.63	34														
	35		Poorly graded SAND (SP); medium dense; grayish brown; coarse to medium SAND; weak cementation.		S08	5 7 13	20	100							
383.63	36														
	37														
381.63	38														
	39														
379.63	40		SILTY, CLAYEY SAND (SC-SM); medium dense; grayish brown; trace fine GRAVEL; mostly medium to fine SAND; some low plasticity fines.		O09			17							PA, DS
	41														
377.63	42		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, olive gray, intensely weathered, weak, soft, unfractured, with thin (1") clay lenses. **[PUENTE FORMATION]**							21	110				
	43														
375.63	44														
	45				S10	8 13 20	33	100							
373.63	46														
	47														
371.63	48														
	49														
369.63	50				O11		8	100				TV = 8			UW
	51														
367.63	52														
	53									22	109				
365.63	54														
	55														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B8**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.Barker			**2 of 7**

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
	55		At EL. 364.6 ft, contains pebble to cobble. *(continued)*.		S12	24 23 20	43	100							
363.63	56														
	57														
361.63	58														
	59														
359.63	60				O13			0							UW
	61														
357.63	62														
	63														
355.63	64														
	65				S14	6 14 18	32	100							
353.63	66														
	67		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, massive, medium dark gray to dark gray, moderately weathered, weak, soft, unfractured.												
351.63	68														
	69														
349.63	70				O15A			0							UW
	71														
347.63	72														
	73														
345.63	74														
	75				U15B			0							
343.63	76														
	77				S15C	12 29 50/5.5"		0							
341.63	78				C16			100	0						**See note at the end of the log regarding RQD.**
	79														
339.63	80				C17			97	47	26	97				PI, PA, UU
	81														
337.63	82														
	83														
335.63	84														
	85														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B8**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.Barker			**3 of 7**

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
	85		*(continued).*		S18	10 18 23	41	100							UW **See note at the end of the log regarding RQD.**
333.63	86														
	87				C19			0	0						
331.63	88														
	89		At EL. 330.6 ft, grades to greenish black.												
329.63	90		At EL. 329.6 ft, becomes slightly fractured, not healed, dipping 60 to 50°.		C20			100	100						
	91														
327.63	92														
	93														
325.63	94														
	95				C21			100	100						
323.63	96														
	97														
321.63	98														
	99														
319.63	100				C22			50	50						
	101		At EL. 318.6 ft, becomes unfractured.												
317.63	102														
	103														
315.63	104														
	105		At EL. 314.6 ft, becomes slightly fractured, not healed, dipping 50°.		C23			100	100						PI, PA, UU
313.63	106														
	107														
311.63	108														
	109									23	103				
309.63	110		At EL. 309.6 ft, becomes unfractured.		C24			83	83						
	111														
307.63	112														
	113														
305.63	114														
	115														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B8**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.Barker			**4 of 7**

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
	115				C25										**See note at the end of the log regarding RQD.**
303.63	116														
	117														
301.63	118														
	119														
299.63	120		At EL. 299.6 ft, becomes moderately soft.		C26			100	100	21 16	104				PI, PA, UU, CR
	121														
297.63	122														
	123														
295.63	124														
	125				C27			83	83						
293.63	126														
	127														
291.63	128														
	129														
289.63	130		At EL. 289.6 ft, becomes laminated.		C28			100	100						SD, EM
	131														
287.63	132														
	133														
285.63	134									23	100				
	135				C29			100	100						
283.63	136														
	137														
281.63	138		At EL. 281.6 ft, contains 6" lens of fresh, very strong, very hard.												
	139														
279.63	140				C30			100	0						
	141		At EL. 279.1 ft, becomes medium strong, very slightly fractured, bedding plane separation.												
277.63	142														
	143														
275.63	144														
	145														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B8**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.Barker			**5 of 7**

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
	145				C31			100	100						**See note at the end of the log regarding RQD.**
273.63	146														
	147														
271.63	148									22	105				PTS, SD, EM
	149														
269.63	150				C32			100	100						
	151														
267.63	152														
	153														
265.63	154														
	155				C33			100	100						UW, PI, CR
263.63	156														
	157														
261.63	158														
	159														
259.63	160		At EL. 259.6 ft, becomes soft.		C34			98	98	22	106				
	161														
257.63	162														
	163														
255.63	164														
	165				C35			95	95						
253.63	166														
	167														
251.63	168														
	169														
249.63	170		At EL. 249.6 ft, with few coarse sand.		C36			100	100						
	171														
247.63	172														
	173														
245.63	174														
	175														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B8**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.Barker			**6 of 7**

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
	175				C37			100	100						SD, EM
243.63	176									22	102				**See note at the end of the log regarding RQD.**
	177		At EL. 243.1 ft, contains 3" lens of fresh, very strong, very hard.												
241.63	178														
	179														
239.63	180				C38			100	100						
	181														
237.63	182														
	183														
235.63	184														
	185		At EL. 235.1 ft, contains 6" lens of fresh, very strong, very hard.		C39			93	93						
233.63	186														
	187														
231.63	188														
	189														UU
229.63	190				C40			95	95	25	100				
	191														
227.63	192														
	193														
225.63	194														
	195				C41			100	100						SD, EM
223.63	196									22	102				
	197														
221.63	198														
	199														
219.63	200		Bottom of borehole at 200.0 ft bgs												
	201		Borehole was converted to piezometer at the completion of drilling.												
217.63	202		RQD values provided in the boring logs are based on intact core pieces obtained between two natural discontinuities. Majority of cores obtained in this boring are weak and does not meet the "sound core" definition provided in standard test method for RQD ASTM D 6032. These RQD values should not be used to evaluate the rock mass quality.												
	203														
215.63	204														
	205														

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z1B8**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.Barker			**7 of 7**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
J. Castle, B. Schell	1-13-09	1-21-09	34° 7' 13.7526" / 118° 13' 40.7496" NAD83	R-09-Z2B1
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Cascade Drilling Inc.			' Lt Sta Eagle Rock Blvd at Ave 40	451.02 ft NAVD 88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wash			Speed Star 30K	6 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT (1.4"), Cal (2.4"), PQ core (3.2")			Automatic Hammer 140 lb. 30 inch drop	70%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer Installed on Completion			10.2 ft	13.9 ft on 7-1-09	150.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		GRASS-LANDSCAPE (Fill).		B0										This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007) except as noted in Appendix A1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
	1		SANDY lean CLAY (CL); very stiff, strong brown and gray, moist, about 1% coarse GRAVEL, 90% medium to fine-grained SAND, 9% fines, slightly plastic, granitic gravel.												
449.02	2														
	3														
447.02	4														
	5		At EL. 446', becomes brownish yellow.		D1	7 11 15	26	100				PP = 1.5			**VOC measurements were taken randomly and the readings were within normal value for ambient air.** VOC=0.1 ppm VOC=0 ppm
445.02	6														
	7														
443.02	8														
	9														
441.02	10		SEDIMENTARY ROCK (SANDSTONE/MUDSTONE), fine-grained, laminated to thinly bedded, gray, decomposed, soft, unfractured, bedding dips 60°; hard, plastic clay interbedded with fine sand, moist. Topanga Formation.		S2	7 14 16	30	100		29	96	PP = 4			CR, PI, VOC=0.2 ppm
	11														
439.02	12														
	13														
437.02	14														
	15				D3	9 16 18	34	100				PP = 4			VOC=0.2 ppm CR
435.02	16														
	17														
433.02	18														
	19														
431.02	20				S4	5 10 14	24	100				PP = 4.5			
	21														
429.02	22		At EL. 429.2', bedding 60°.		C1			100							VOC=0.2 ppm
	23														
427.02	24														
	25														

(continued)

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z2B1
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	LA	710	D/D	07-187900
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		6-22-09	1 of 6

CALTRANS BORING RECORD MET+ENG FIXED SR710_BORINGLOG_3_28_2010.GPJ CALTRANS LIBRARY.GLB 3/28/10

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		Same as above. *(continued)*.		C2			92							
425.02	26														
	27		At EL. 425', bedding 45°.												
423.02	28														
	29														
421.02	30				C3			97							
	31		At EL. 420', becomes bedding 30°- 45°.												
419.02	32														
	33									30					SD, UC
417.02	34														
	35		At EL. 416', horizontal bedding, 1/4" thick gypsum veins, steeply dipping, random orientation.		C4			98							
415.02	36														
	37														
413.02	38														
	39														
411.02	40		At EL. 411', thin laminated Gypsum veins, 1/4" thick.		C5			32							
	41		At EL. 410', bedding 45°.												
409.02	42		No recovery at EL. 409'.												Lost Core
	43														
407.02	44														
	45		At EL. 406', wavy bedding dipping 85° to 90°.		C6			83							
405.02	46														
	47														
403.02	48		At EL. 403', gypsum vein, 1/8" thick on some bedding planes.												
	49														
401.02	50		SEDIMENTARY ROCK (MUDSTONE and SANDSTONE), fine-grained, laminated to thinly bedded, very dark gray to dark yellowish brown, intensely weathered to moderately weathered, very soft to soft, unfractured; wavy bedding dipping near vertical (85° to 90°). Parting along some mudstone bedding planes.		C7			48		24					SD, UC
	51														
399.02	52														
	53														
397.02	54		At EL. 396.5', gypsum veins, 1/4" thick.												
	55														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B1**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**2 of 6**

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
	55		*(continued).*		C8			90							
395.02	56		At EL. 395.5', parting along bedding planes, smooth and polished bedding surfaces.												
	57														
393.02	58														
	59														
391.02	60		At EL. 391', becomes very dark gray and brown to black, slightly to moderately weathered, very soft, micaceous.		C9			42							
	61														
389.02	62														
	63														
387.02	64														
	65		At EL. 386', joint 60°, polished surface.		C10			65							
385.02	66														
	67														
383.02	68														
	69														
381.02	70		At EL. 381', becomes slightly fractured, minor faults, dipping 65°, displaces bedding 1/4".		C11			43							
	71														
379.02	72														
	73														
377.02	74														
	75		At EL. 375.5', becomes slightly weathered to moderately weathered, minor faults, horizontal to 60° dip, 1/4" displacements, folded bedding 50°- 90° dip.		C12			76							
375.02	76														
	77														
373.02	78		At EL. 373.5', 1/8" to 1/4" fault offsets, fault with polished surface.		C13			64							
	79														
371.02	80														
	81				C14			44							
369.02	82														
	83														
367.02	84														
	85														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B1**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**3 of 6**

CALTRANS BORING RECORD MET+ENG FIXED SR710_BORINGLOG_3_28_2010.GPJ CALTRANS LIBRARY.GLB 3/28/10

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
	85		Same as above.		C15			43							See note at end of log regarding RQD.
365.02	86														
	87		At EL. 364', bedding 80° dip, easy parting on bedding planes.												
363.02	88		Weak calcite cementation.												
	89														
361.02	90		At EL. 360.8', becomes diagonal shear, moderately fractured, smooth, CLAY filling faults dipping 60°- 45°.		C16			98							
	91														
359.02	92									20					SC & EM, SD, UC
	93		At EL. 358.5', minor fault dipping 45°.												
357.02	94														
	95		SEDIMENTARY ROCK (MUDSTONE and SANDSTONE), fine-grained, laminated to thinly bedded, gray to very dark gray, slightly weathered, very soft to soft, friable, slightly to moderately fractured, wavy bedding dipping near vertical (85°-90°).		C17			70							
355.02	96														
	97		Parting along some bedding planes.												
353.02	98														
	99														
351.02	100				C18			100							
	101														
349.02	102														
	103														
347.02	104				C19			100							
	105				C20			17							
345.02	106														
	107														
343.02	108														
	109		At EL. 342', minor reaction to HCL.		C21			92							
341.02	110														
	111														
339.02	112		At EL. 339', becomes bedding 70°- 90°.												
	113														
337.02	114		Same as above (appear more rock-like).		C22			63	13	22					SD, UC
	115														

(continued)

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BORING RECORD				**R-09-Z2B1**
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7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**4 of 6**

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
	115		At EL. 342', minor HCL reaction. *(continued)*.		C22			63	13						See note at end of log regarding RQD.
335.02	116														
	117		At EL. 332', several minor hairline faults with 1/8" to 1/2" displacement.												
333.02	118				C23			112	0						
	119														
331.02	120														CS & EM, UC
	121														
329.02	122		At 328.8', performed Pressure Meter test.		C24										PM
	123														
327.02	124														
	125														
325.02	126														
	127														
323.02	128														
	129		At EL. 322', altered sandstone; feldsparthic litharenite, calcite cement, carbonaceous matter, collophane.		C25			20	20						PTS
321.02	130														
	131														
319.02	132														
	133														
317.02	134		At EL. 317', performed Pressure Meter Test.		C26										PM
	135														
315.02	136														
	137														
313.02	138														
	139														
311.02	140		At EL. 310.8', healed fault, minor HCL reaction.		C27			45	35						
	141														CAI
309.02	142		At EL. 308.8', seperates upon drying-slaking.												
	143														
307.02	144														
	145														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B1**
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PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**5 of 6**

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
	145														
305.02	146		At EL. 306', minor fault displacements, 0.1", dipping 45°.		C28			100	79	21					See note at end of log regarding RQD. CS & EM, SD, UC
	147														
303.02	148				C29			61	39						
	149														
301.02	150		Bottom of borehole at 150.0 ft bgs Bottom of borehole is at elevation 301 ft.												
	151														
299.02	152		RQD values provided in the boring logs are based on intact core pieces obtained between two natural discontinuities. The majority of cores obtained in this boring are typically very weak to weak and do not meet the "sound core" definition provided in standard test method for RQD ASTM (D 6032). These RQD values should not be used to evaluate the rock mass quality.												
	153														
297.02	154														
	155		Borehole converted to piezometer at the completion of drilling.												
295.02	156														
	157														
293.02	158														
	159														
291.02	160														
	161														
289.02	162														
	163														
287.02	164														
	165														
285.02	166														
	167														
283.02	168														
	169														
281.02	170														
	171														
279.02	172														
	173														
277.02	174														
	175														

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B1**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**6 of 6**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Salisbury	1-26-09	2-11-09	34° 7' 0.96" / 118° 12' 10.7" NAD83	R-09-Z2B2
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Caltrans In-House			' Lt Sta E Hub St. e/o N Ave. 52	601.1 ft NAVD88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wire-Line			CS 2000 (truck)	4 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
HQ Core			Diedrich Automatic, 140 lb., 30 inch drop	84%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Bentonite slurry and capped with "Quickcrete"			NM / N/A	285.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		CONCRETE (Concrete Slab = 5").												This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007), except as noted in Appendix A.1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
	1		Poorly graded GRAVEL with SAND (GP); dense; yellowish brown; dry; mostly coarse to fine, rounded GRAVEL, max. 3 in. dia.; little medium to fine SAND; trace fines; weak cementation; (Aggregate Base = 7").												
599.07	2		CLAYEY SAND with GRAVEL (SC); dense; yellowish brown; dry to moist; few coarse to fine, rounded GRAVEL, max. 3 in. dia.; mostly coarse to medium SAND; few fines; weak cementation; Artificial fill.												
597.07	4		SEDIMENTARY ROCK, (SANDSTONE), thinly to moderately bedded, pale yellowish brown, moderately to slightly weathered, moderately hard, very slightly fractured, coarse sand, poorly cemented. **[FERNANDO FORMATION]**												Hand Auger 2'-10'
595.07	6														
593.07	8														
591.07	10				C01			100	100						**See note at the end of the log regarding RQD.**
589.07	12														
587.07	14														
	15		SEDIMENTARY ROCK, (MUDSTONE), thinly to moderately bedded, dusky red, moderately to slightly weathered, moderately hard, very slightly fractured.		C02			100	100						
585.07	16														
	17									12	120				UW, PA
583.07	18														
	19														
581.07	20		SEDIMENTARY ROCK, (SANDSTONE), thinly to moderately bedded, light brown, moderately to slightly weathered, moderately hard, very slightly fractured, coarse sand.		C03			100	100						
	21														
579.07	22														
	23														
577.07	24														
	25														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z2B2
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	T/T	07-07-187900
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			1 of 10

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		*(continued).*		C04			100	100						**See note at the end of the log regarding RQD.**
575.07	26														
	27														
573.07	28														
	29														
571.07	30		SEDIMENTARY ROCK, (MUDSTONE), thinly to moderately bedded, light brown, moderately to slightly weathered, moderately hard, very slightly fractured, sandy, fine sand, moderately graded.		C05			100	100						
	31														
569.07	32														
	33														
567.07	34														
	35		SEDIMENTARY ROCK, (SANDSTONE), thinly to moderately bedded, light brown, moderately to slightly weathered, moderately soft to moderately hard, very slightly fractured, coarse.		C06			100	100						
565.07	36														
	37														
563.07	38									10	123				UW
	39														
561.07	40		Silty, fine sand, poorly graded.		C07			95	100						
	41														
559.07	42														
	43		Dipping 33°, coarse sand, with gravel.												
557.07	44		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, light brown, moderately to slightly weathered, moderately soft to moderately hard, unfractured, dipping 27°, sandy, fine sand.												
	45		SEDIMENTARY ROCK, (SANDSTONE), thinly to moderately bedded, light brown, moderately to slightly weathered, moderately soft to moderately hard, unfractured, silty, fine sand.		C08			100	100						
555.07	46														
	47		Dipping 8°, fine sand, with silt.												
553.07	48														
	49		Dipping 8°, coarse sand.												
551.07	50		Medium sand, with silt.		C09			100	100						
	51														
549.07	52														
	53														
547.07	54														
	55		To light brown, fine sand, with clay.												

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B2**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**2 of 10**

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
	55		*(continued).*		C10			100	100						
545.07	56		Grayish orange, dipping 22°, silty, fine sand.							11	125				**See note at the end of the log regarding RQD.** UW, PA
	57		Light brown, dipping 18°, sandy, fine sand.												
543.07	58		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, light brown, slightly weathered to fresh, moderately soft to moderately hard, unfractured, dipping 19°, sandy, medium sand.												
	59														
541.07	60		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, moderate brown mottled with light olive, slightly weathered to fresh, moderately soft to moderately hard, unfractured, dipping 22°, sandy,.		C11			100	100						
	61		SEDIMENTARY ROCK, (SANDSTONE), thinly to moderately bedded, moderate brown, slightly weathered to fresh, moderately hard, unfractured, clayey, medium sand.												
539.07	62														
	63		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, light brown, slightly weathered to fresh, moderately hard, unfractured, dipping 19°.												
537.07	64		SEDIMENTARY ROCK, (SANDSTONE), thinly to moderately bedded, light brown mottled with light olive, slightly weathered to fresh, moderately hard, very slightly fractured, bedding joint (clay, not healed), dipping 12°.		C12			100	100						
	65														
535.07	66		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, light brown, slightly weathered to fresh, moderately hard, unfractured, dipping 28°, clayey, with sand.												
	67														
533.07	68		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, light brown, slightly weathered to fresh, moderately hard, unfractured, sandy, fine sand.												
	69														
531.07	70		SEDIMENTARY ROCK, (SANDSTONE), thinly to moderately bedded, light brown, slightly weathered to fresh, moderately hard, very slightly fractured, dipping 12°, silty, fine sand. Dipping 14°, silty, clayey. Joint (clay, not healed), dipping 25°. Grayish orange, coarse sand.		C13			100	100						
	71														
529.07	72		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, grayish orange, slightly weathered to fresh, moderately hard, unfractured, dipping 22°, sandy, fine sand.												
	73														
527.07	74		SEDIMENTARY ROCK, (SANDSTONE), thinly to moderately bedded, light brown to grayish orange, slightly weathered to fresh, moderately hard, slightly to very slightly fractured, dipping 15°, medium sand. Dipping 10°, coarse. Joint (clay, not healed), dipping 10°, clayey.		C14			100	100						
	75														
525.07	76		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, light brown, slightly weathered to fresh, moderately hard, unfractured, sandy, medium to coarse sand.							13	122				PA, PI
	77														
523.07	78		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, light brown, slightly weathered to fresh, moderately hard, unfractured, dipping 11°, sandy.												
	79														
521.07	80		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, light brown, slightly weathered to fresh, moderately hard, unfractured, sandy.		C15			100	100						
	81		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, light brown, slightly weathered to fresh, moderately hard, slightly fractured, dipping 12°, sandy.												
519.07	82		Light olive to light brown, dipping 11°, sandy, fine to medium sand. Concretion ~ 1" diameter. Concretion ~ 0.5" diameter. Concretion ~ 1" diameter. Joint (clay, not healed), dipping 30°. Concretion ~3" diameter.												
	83														
517.07	84														
	85														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B2**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**3 of 10**

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
	85														
515.07	86		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, light olive, slightly weathered to fresh, moderately hard, slightly to very slightly fractured, sandy, fine sand. Joint dipping 38°. Joint (clay, not healed), dipping 8°, 1/4" thick clay. Concretion ~ 3" diameter.		C16			100	100	10	122				**See note at the end of the log regarding RQD.** UW
	87														
513.07	88		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, light olive, slightly weathered to fresh, moderately hard, unfractured, with coarse sand.												
	89														
511.07	90		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, light olive, slightly weathered to fresh, moderately hard, unfractured, sandy, medium to coarse sand, some gravel to 3/4".		C17			100	100						
	91		SEDIMENTARY ROCK, (SANDSTONE), thinly to moderately bedded, light olive mottled with light brown, slightly weathered to fresh, moderately hard, unfractured, silty, medium to coarse sand. Concretion ~ 1" diameter.												
509.07	92														
	93		Grayish orange, dipping 12°, coarse sand.												
507.07	94		SEDIMENTARY ROCK, (SILTSTONE), moderately to thickly bedded, light brown, slightly weathered to fresh, moderately hard, unfractured, with fine sand,. Sandy, coarse sand.												
	95		Concretion ~ 3" diameter.		C18			100	100						
505.07	96		SEDIMENTARY ROCK, (SANDSTONE), thinly to moderately bedded, grayish orange, slightly weathered to fresh, moderately hard, unfractured, medium to coarse sand.												
	97														
503.07	98		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, light brown, slightly weathered to fresh, moderately hard, unfractured, dipping 24°, sandy, fine sand.												
	99		SEDIMENTARY ROCK, (SANDSTONE), thickly bedded, light brown, slightly weathered to fresh, moderately hard, unfractured, dipping 20°, clayey, medium to coarse sand. Concretion ~ 1" diameter.												
501.07	100				C19			98	98						
	101		Dipping 11°. Concretion ~1/2" diameter.												
499.07	102		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, light brown, slightly weathered to fresh, moderately hard, unfractured, sandy, coarse sand.												
	103		SEDIMENTARY ROCK, (SANDSTONE), very thinly bedded, grayish orange, slightly weathered to fresh, moderately hard, unfractured, medium sand.												
497.07	104		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, light brown, slightly weathered to fresh, moderately hard, slightly to very slightly fractured, dipping 32°, sandy, coarse sand, gravel to 1/2".												
	105				C20			100	100						
495.07	106		Joint (not healed), dipping 15°. Concretion ~ 3" diameter. Concretion ~ 2" diameter.												
	107		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light olive, slightly weathered to fresh, moderately hard, unfractured, coarse sand with some silt.												
493.07	108														
	109		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, light brown and light olive, slightly weathered to fresh, hard, unfractured, dipping 22°, sandy, coarse sand.												
491.07	110				C21			100	100						
	111		SEDIMENTARY ROCK, (SANDSTONE), moderately to thickly bedded, grayish orange, slightly weathered to fresh, moderately hard, unfractured, dipping 28°, silty, coarse sand.												
489.07	112		Light brown, clayey, fine sand.												
	113		Grayish orange, dipping 27°, some silt, trace gravel to 1/2".												
487.07	114		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, light brown mottled with light olive, slightly weathered to fresh, hard, unfractured, sandy, fine sand.							13	118				
	115		SEDIMENTARY ROCK, (CLAYSTONE), thickly												

(continued)

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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Division of Engineering Services
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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B2**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**4 of 10**

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
	115		bedded, light brown, slightly weathered to fresh, moderately soft to moderately hard, unfractured, sandy, medium sand.		C22			100	100						**See note at the end of the log regarding RQD.**
485.07	116		SEDIMENTARY ROCK, (SILTSTONE), moderately to thickly bedded, light brown, slightly weathered to fresh, hard, unfractured, sandy, fine sand.												
	117		SEDIMENTARY ROCK, (SANDSTONE), moderately to thickly bedded, grayish orange, slightly weathered to fresh, moderately soft to moderately hard, unfractured, coarse sand.												
483.07	118														
	119		SEDIMENTARY ROCK, (SILTSTONE), moderately to thickly bedded, light brown mottled with light olive, slightly weathered to fresh, hard, unfractured, dipping 35°, sandy.							13	115				UW
481.07	120				C22			100	100						
	121		SEDIMENTARY ROCK, (CLAYSTONE), moderately bedded, light brown, slightly weathered to fresh, moderately soft to moderately hard, unfractured, dipping 28°, sandy, coarse sand.												
479.07	122		SEDIMENTARY ROCK, (SANDSTONE), moderately bedded, grayish orange, slightly weathered to fresh, hard, unfractured, dipping 30°, coarse sand.												
	123		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, light brown, slightly weathered to fresh, hard, unfractured, sandy, coarse sand.												
477.07	124		SEDIMENTARY ROCK, (SANDSTONE), thickly bedded, dark yellowish brown to pale olive, slightly weathered to fresh, hard, unfractured, dipping 22°, coarse. Laminated to very thinly bedded.		C23			100	100						
	125														
475.07	126														
	127		SEDIMENTARY ROCK, (SILTSTONE), moderately bedded, dark yellowish brown, slightly weathered to fresh, hard, unfractured.												
473.07	128														
	129		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, dusky yellow, slightly weathered to fresh, moderately soft to moderately hard, unfractured, dipping 39°, medium to coarse sand.												
471.07	130		SEDIMENTARY ROCK, (CONGLOMERATE), moderately bedded, grayish orange, slightly weathered to fresh, moderately soft to moderately hard, unfractured, clast supported, sand matrix, gravel to 3", cobbles to 4".					0							130.0 - 136.0: 3" dia. pressuremeter pocket was drilled for the field test.
	131														
469.07	132		SEDIMENTARY ROCK, (CLAYSTONE), thickly bedded, light brown to light olive, slightly weathered to fresh, hard, unfractured, sandy, coarse sand.												
	133														
467.07	134		SEDIMENTARY ROCK, (SANDSTONE), moderately bedded, light brown, slightly weathered to fresh, moderately soft to moderately hard, unfractured, silty, clayey, coarse sand.												
	135		SEDIMENTARY ROCK, (SILTSTONE), moderately bedded, light brown, slightly weathered to fresh, hard, unfractured, sandy, fine sand.												Exterior plates of the pressuremeter apparatus lost inside the hole. Remains of the pressuremeter plates slowed down the drilling and disturbed sample recovery.
465.07	136		SEDIMENTARY ROCK, (SANDSTONE), thickly bedded, light brown, slightly weathered to fresh, moderately soft to moderately hard, unfractured, clayey, coarse sand. Dusky yellow, dipping 32°, coarse sand. Light brown to light olive, hard, coarse sand, with silt.												
	137														
463.07	138														
	139		No sample.												
461.07	140														
	141														
459.07	142														
	143		SEDIMENTARY ROCK, (CONGLOMERATE), thinly to moderately bedded, grayish orange, slightly weathered to fresh, hard, unfractured, clast supported, coarse sand matrix, gravel to 1/2".		C24			100	100						
457.07	144		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, light olive, slightly weathered to												PA, UU
	145														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B2**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME: **SR-710 TUNNEL TECHNICAL STUDY**				
BRIDGE NUMBER	PREPARED BY: **M.Salisbury**		DATE	SHEET: **5 of 10**

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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
	145		fresh, hard, unfractured, sandy, fine sand.		C25			78	0						**See note at the end of the log regarding RQD.**
455.07	146		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, light brown, slightly weathered to fresh, moderately hard, unfractured, sandy, coarse sand.												
	147														
453.07	148		SEDIMENTARY ROCK, (SANDSTONE), thinly to moderately bedded, dusky yellow green, slightly weathered to fresh, very weak, moderately hard, unfractured, coarse sand.												
	149		SEDIMENTARY ROCK, (CLAYSTONE), thickly bedded, light brown, slightly weathered to fresh, moderately hard, very slightly fractured, sandy, coarse sand.												
451.07	150		Light brown mottled with light olive, joint (CL, not healed), dipping 38°.		C26			100	0						
	151														
449.07	152		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, light olive, slightly weathered to fresh, moderately hard, unfractured, sandy, fine sand.												
	153														
447.07	154		SEDIMENTARY ROCK, (CLAYSTONE), very thinly to thinly bedded, light brown, slightly weathered to fresh, moderately hard, unfractured.												
	155		SEDIMENTARY ROCK, (SANDSTONE), thickly bedded, grayish orange to dusky yellow green, slightly weathered to fresh, moderately hard, unfractured, with silt and clay, coarse sand with subround gravel to 1".		C27			100	167						
445.07	156														
	157		SEDIMENTARY ROCK, (CONGLOMERATE), moderately to thickly bedded, dusky yellow green, slightly weathered to fresh, moderately hard, unfractured, clast supported, coarse sand matrix, gravel to 1/2".												
443.07	158														
	159		SEDIMENTARY ROCK, (SANDSTONE), thickly bedded, pale yellowish brown to grayish orange, slightly weathered to fresh, moderately soft, unfractured, dipping 32°.												
441.07	160		Coarse sand with subround gravel to 1/2".		C28			79	75						
			Fine sand.												
	161		Grayish orange, coarse sand with subround gravel to 1/2".												
439.07	162		SEDIMENTARY ROCK, (CONGLOMERATE), moderately to thickly bedded, grayish orange, slightly weathered to fresh, moderately soft, unfractured, round gravel to 2", clast supported, coarse sand matrix.		C29			86	67						
	163														
437.07	164		SEDIMENTARY ROCK, (SANDSTONE), thickly bedded, grayish orange, slightly weathered to fresh, moderately soft, unfractured, coarse sand.												
	165		SEDIMENTARY ROCK, (CONGLOMERATE), moderately to thickly bedded, yellowish gray, slightly weathered to fresh, moderately soft, unfractured, matrix supported subround gravel to 1", medium to coarse sand matrix.		C29			100	0	16	114				UU
435.07	166														
	167		SEDIMENTARY ROCK, (SILTSTONE), thickly bedded, light brown, slightly weathered to fresh, very weak, soft, very slightly fractured to unfractured, with some fine sand.												
433.07	168				C29			100	58						
	169		SEDIMENTARY ROCK, (SANDSTONE), thickly bedded, light brown, slightly weathered to fresh, very to extremely hard, unfractured, strongly cemented, fine sand.												
431.07	170		Light gray, soft, moderately to slightly fractured, clayey, fine to medium sand.		C30			100	100						
	171		SEDIMENTARY ROCK, (SILTSTONE), thickly bedded, light brown, slightly weathered to fresh, moderately soft to moderately hard, slightly fractured, clayey with some fine sand.												
429.07	172														
	173														
427.07	174		SEDIMENTARY ROCK, (SANDSTONE), moderately bedded, light brown, slightly weathered to fresh,		C30			100	67						
	175														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B2**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**6 of 10**

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
	175		moderately soft to moderately hard, slightly fractured, fine to medium sand, with gravel.		C31			100	100						**See note at the end of the log regarding RQD.**
425.07	176		SEDIMENTARY ROCK, (SILTSTONE), thickly bedded, olive gray, slightly weathered to fresh, moderately soft to moderately hard, slightly fractured, with fine to medium gravel.												
	177		Light olive, clayey, with coarse round gravel.		C31			100	100						
423.07	178														
	179														
421.07	180		SEDIMENTARY ROCK, (CONGLOMERATE), moderately bedded, light gray, slightly weathered to fresh, very hard, intensely to moderately fractured, clast supported subround gravel to 3", granite clasts.		C32			100	100						
	181				C32			100	100						
419.07	182		SEDIMENTARY ROCK, (SANDSTONE), very thickly bedded, light brown, slightly weathered to fresh, soft, slightly to very slightly fractured, medium to coarse sand.												
	183														
417.07	184														
	185		Fine sand.		C33			100	100						
415.07	186		Coarse sand.												
	187		Light olive gray, fine sand.							18	112				UW
413.07	188														
	189				C33			100	100						
			With clay and gravel to 1/2".												
411.07	190		Dusky yellow, silty, coarse sand.		C34			92	0						
	191		SEDIMENTARY ROCK, (CLAYSTONE), thickly bedded, light brown mottled with light olive, slightly weathered to fresh, extremely weak, moderately hard, slightly to very slightly fractured.												
409.07	192														
	193									12	127				SD, EM
407.07	194														
			Light brown.												
	195		Light brown mottled with light olive, with well graded sand.		C35			100	0						
405.07	196														
	197		SEDIMENTARY ROCK, (CONGLOMERATE), thinly bedded, light brown, slightly weathered to fresh, moderately hard, slightly to very slightly fractured, dipping 50°, subround clast supported gravel to 1", coarse sand matrix.												
403.07	198														
	199		SEDIMENTARY ROCK, (SANDSTONE), moderately to thickly bedded, grayish orange, slightly weathered to fresh, moderately hard, slightly to very slightly fractured, coarse sand, well graded.												
401.07	200				C36			100	0						
	201		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, light brown, slightly weathered to fresh, moderately hard, slightly to very slightly fractured, sandy, fine sand.												
399.07	202		With coarse sand.												
	203		SEDIMENTARY ROCK, (SANDSTONE), thinly to moderately bedded, light brown to light olive, slightly weathered to fresh, moderately soft, slightly to very slightly fractured, silty, fine sand.												
397.07	204		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, light brown, slightly weathered to												
	205														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B2**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**7 of 10**

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
	205		fresh, moderately soft, slightly to very slightly fractured, dipping 33°, sandy, coarse sand. Concretion ~ 2" diameter.		C37			90	0						**See note at the end of the log regarding RQD.**
395.07	206		SEDIMENTARY ROCK, (SILTSTONE), moderately to thickly bedded, light brown, slightly weathered to fresh, moderately soft, unfractured, sandy, fine sand. Light brown mottled with light olive, very weak. *(continued)*.							11	129				SD, EM
	207														
393.07	208		Medium sand.												
	209		SEDIMENTARY ROCK, (SANDSTONE), moderately to thickly bedded, light brown, slightly weathered to fresh, moderately soft, unfractured, clayey, coarse sand.												
391.07	210		Grayish orange to light olive, silty, coarse sand.		C38			90	90						
	211														
389.07	212		SEDIMENTARY ROCK, (CONGLOMERATE), moderately bedded, grayish orange, slightly weathered to fresh, moderately soft, unfractured, clast supported sub round gravel to 3/4", clayey fine sand matrix.												
	213		SEDIMENTARY ROCK, (SANDSTONE), moderately to thickly bedded, light brown, slightly weathered to fresh, very weak, moderately soft, unfractured, clayey, coarse sand.							11	121				UU
387.07	214														
	215		Light brown to light olive, lithic fragments (angular volcanic clasts).		C39			100	0						
385.07	216														
	217		Grayish olive, silty, coarse to medium sand, with some gravel to 3/8".												
383.07	218		SEDIMENTARY ROCK, (SILTSTONE), moderately bedded, light brown mottled with light olive, slightly weathered to fresh, moderately soft, unfractured, sandy, coarse sand.												
	219														
381.07	220		SEDIMENTARY ROCK, (CONGLOMERATE), thinly bedded, light brown, slightly weathered to fresh, moderately soft, unfractured, clast supported gravel to 1/2".		C40			100	0						
	221														
379.07	222		SEDIMENTARY ROCK, (SANDSTONE), thickly bedded, light brown, slightly weathered to fresh, moderately soft, unfractured, silty, fine sand. Grayish orange, silty, coarse sand.												
	223		Dipping 42°. Light brown, silty, fine to medium sand.												
377.07	224		To grayish orange, silty, coarse sand, with some rounded gravel to 1".												
	225		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, light brown, slightly weathered to fresh, moderately soft, unfractured, sandy, medium sand.		C41			100	0						
375.07	226		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, light brown, slightly weathered to fresh, soft, unfractured, dipping 37°, plastic, moist.												
	227		To grayish orange, moderately hard, sandy, coarse sand.												
373.07	228														
	229														
371.07	230		SEDIMENTARY ROCK, (SANDSTONE), very thinly bedded, light brown to pale yellowish brown, slightly weathered to fresh, moderately hard, unfractured, dipping 35°, clayey, coarse sand.		C42			100	95						
	231														
369.07	232		SEDIMENTARY ROCK, (SILTSTONE), very thinly bedded, light brown to light olive gray, slightly weathered to fresh, moderately hard, unfractured, coarse sand.												UC, PTS
	233									11	128				CR
367.07	234		SEDIMENTARY ROCK, (CLAYSTONE), very thinly bedded, light brown, slightly weathered to fresh, moderately hard, unfractured.												
	235														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B2**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**8 of 10**

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
	235		SEDIMENTARY ROCK, (SILTSTONE), very thinly to thinly bedded, light brown, slightly weathered to fresh, very weak, moderately hard, unfractured.		C43			100	0						**See note at the end of the log regarding RQD.**
365.07	236														
	237		SEDIMENTARY ROCK, (CLAYSTONE), very thinly to thinly bedded, light brown, slightly weathered to fresh, moderately hard, unfractured.												
363.07	238		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, light brown mottled with light olive, slightly weathered to fresh, moderately hard, unfractured, sandy, well graded sand.												
	239														
361.07	240		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, light brown, slightly weathered to fresh, soft, unfractured, plastic, moist.		C44			63	0						
	241		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light olive, slightly weathered to fresh, soft, unfractured, silty, fine to medium sand.							12	119				UW
359.07	242		Medium sand.												
			Fine sand.												
	243		Dusky yellow green, moderately hard, coarse sand, with subround gravel to 3/4".												
357.07	244														
	245		No sample.					0							245.0 - 250.0: 3" dia. pressuremeter pocket was drilled for the field test.
355.07	246														
	247														
353.07	248														
	249														
351.07	250				C45			73	0						
	251		Silty, medium to coarse sand, with some subround gravel to 1/2".												
349.07	252														
	253														VOC=0.0 ppm
347.07	254				C46			100	0						
	255				C47			65	0						
345.07	256														
	257														
343.07	258		SEDIMENTARY ROCK, (CLAYSTONE), moderately to thickly bedded, light brown, slightly weathered to fresh, very weak, moderately hard, unfractured, sandy, coarse sand.												
	259														
341.07	260				C48			48	0						VOC=0.0 ppm
	261		SEDIMENTARY ROCK, (SANDSTONE), moderately bedded, dusky yellow green, slightly weathered to fresh, soft, unfractured, dipping 44°, silty, medium sand.							11	125				PA, UU
339.07	262														
	263		SEDIMENTARY ROCK, (CONGLOMERATE), thinly bedded, dusky yellow green, slightly weathered to fresh, soft, unfractured, clast supported subround gravel to 1", medium sand matrix.												
337.07	264		SEDIMENTARY ROCK, (SANDSTONE), thickly bedded, dusky yellow green, slightly weathered to fresh,												
	265														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B2**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**9 of 10**

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
	265		soft, unfractured, medium sand, with subround gravel to 1/2". *(continued)*.		C49			92	0						VOC=0.0 ppm **See note at the end of the log regarding RQD.**
335.07	266														
	267				C50			89	0						
333.07	268		SEDIMENTARY ROCK, (CONGLOMERATE), thinly to moderately bedded, dusky yellow green, slightly weathered to fresh, soft, unfractured, clast supported subround gravel to 1", medium sand matrix.												
	269		SEDIMENTARY ROCK, (SANDSTONE), thickly bedded, dusky yellow green, slightly weathered to fresh, soft, unfractured, fine sand. Silty.												
331.07	270				C51			83	0						VOC=0.0 ppm
	271		Dusky green, silty, coarse sand, moist to wet.												
329.07	272				C52			42	0						
	273		SEDIMENTARY ROCK, (CONGLOMERATE), thinly bedded, dusky green, slightly weathered to fresh, soft, unfractured, clast supported round gravel to 1", coarse sand matrix.												VOC=0.0 ppm
327.07	274		SEDIMENTARY ROCK, (SANDSTONE), very thickly bedded, dusky green, slightly weathered to fresh, soft, unfractured, silty, coarse sand. Silty, fine sand.												
	275				C53			70	0						
325.07	276														
	277														
323.07	278		Medium sand. Fine sand.												VOC=0.0 ppm
	279														
321.07	280		Dusky yellow green, silty, fine sand.		C54			50	0						
	281														
319.07	282				C55			100	0						
	283														
317.07	284														
	285		Bottom of borehole at 285.0 ft bgs Boring backfilled w/bentonite slurry and capped with "Quickcrete".												
315.07	286														
	287		RQD values provided in the boring logs are based on intact core pieces obtained between two natural discontinuities. Majority of cores obtained in this boring are weak and does not meet the "sound core" definition provided in standard test method for RQD ASTM D 6032. These RQD values should not be used to evaluate the rock mass quality.												
313.07	288														
	289														
311.07	290														
	291														
309.07	292														
	293														
307.07	294														
	295														

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B2**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**10 of 10**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
K. Lai,T. Halda, K. Barker	3-9-09	3-12-09	34° 6' 36" / 118° 11' 27" NAD83	R-09-Z2B3
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Caltrans Drilling Services			' Lt Sta Avenue 59, s/o N. Figueroa St.	546.9 ft NAVD88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wire-Line			CS 2000 (truck)	4 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT(1.4"), Punch Core (2.5"), HQ Core			Diedrich Automatic, 140 lb., 30 inch drop	84%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer Installed on Completion			NM	48.0 ft on 7-1-09	350.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		ASPHALT (8"- 9").												This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007), except as noted in Appendix A.1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
	1		SANDY SILT (ML); light gray; dry; contains few cobbles and little coarse gravel [FILL].												
544.93	2														
	3				D01										
542.93	4														
	5														Hand Auger 0.9' - 10'
540.93	6														
	7				D02										
538.93	8														
	9														
536.93	10		SILTY SAND (SM); very dense; yellowish brown; moist; little coarse to fine GRAVEL; mostly coarse to fine SAND; [ALLUVIUM].		O03										
	11														
534.93	12														
	13														
532.93	14														
	15		Little coarse to fine GRAVEL; mostly coarse to fine SAND; little low plasticity fines.		S04	23 37 45	82			9					PA
530.93	16														
	17				O05										
528.93	18														
	19														
526.93	20				S06	35 64 50/6"									
	21														
524.93	22				O07										
	23														hard drilling
522.93	24		At EL. 522.9 ft, observed boulders and cobbles.												
	25														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z2B3
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	T/T	07-07-187900
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	T.Halda, K.Barker			1 of 12

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/9/10

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		At EL. 521.9 ft, becomes dark gray to yellowish brown; little coarse to fine GRAVEL; mostly coarse to fine SAND; little low plasticity fines. SILTY SAND (SM) *(continued)*.		S08	42 45 17	62			10					PA
520.93	26														
	27				O09										lost mud thru cobble and coarse sand VOC=11.2 ppm
518.93	28														28'- 29.5' drilling thru granite rock
	29														
516.93	30		At EL. 517.4 ft, observed cobbles (29.5'- 30'). At EL. 516.9 ft, becomes brown.		S10	58 50/6"									
	31														piece of cobble blocked the shoe
514.93	32				O11										
	33		SILTY CLAY (CL-ML); stiff to very stiff; dark yellowish brown; moist.												
512.93	34														
	35				S12	9 8 11	19								
510.93	36														
	37		SEDIMENTARY ROCK, (SILTSTONE), laminated to very thinly bedded, grayish orange to moderate yellowish brown, moderately weathered, weak, very soft, very intensely to intensely fractured, bedding joint (partially healed), beds dip 20°, partly FeO lined, strong very closely spaced fractures. **[TOPANGA FORMATION]**		C13			100	0						lost mud again. stopped drilling to place cement into the hole to seal the leaks, then resumed drilling/rock coring the next day. **See note at the end of the log regarding RQD.**
508.93	38														
	39				C14			100	0						VOC=22.7 ppm
506.93	40				C15			100	0						
	41														
504.93	42														
	43														
502.93	44														
	45		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, very thinly bedded, dark yellowish brown and moderate yellowish brown, moderately weathered, extremely weak, moderately hard, very intensely fractured, fracture zone (FE), dipping 0 to 90°, slightly rough, thin.		C16			100	0	18	119				UW, PA
500.93	46														
	47														
498.93	48														
	49														
496.93	50				C17			100	0						VOC=5.1 ppm
	51														
494.93	52														
	53														
492.93	54														
	55														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/9/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B3**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	T.Halda, K.Barker			**2 of 12**

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
	55		At EL. 491.9 ft, becomes weak, hard, intensely fractured, bedding joint, dipping 15°, slightly rough, thin, zones of very intensely fractured. *(continued)*.		C18			100	50	17	107				UW **See note at the end of the log regarding RQD.**
490.93	56														
	57														
488.93	58														
	59														
486.93	60				C19			100	40						VOC=10.5 ppm
	61														
484.93	62														
	63														
482.93	64														
	65		At EL. 481.9 ft, becomes very intensely fractured, dipping 80 to 15°.		C20			100	7						
480.93	66														
	67														
478.93	68														
	69														VOC=3.0 ppm
476.93	70				C21			100	0						
	71														
474.93	72														
	73														
472.93	74														
	75		At EL. 471.9 ft, becomes very intensely to intensely fractured, bedding joint, dipping 15°.		C22			100	0						
470.93	76														
	77														
468.93	78		At EL. 468.9 ft, observed no fracture filling.		C23			100	17						VOC=10.2 ppm
	79														
466.93	80		At EL. 466.9 ft, becomes intensely to moderately fractured.		C24			100	35	15	115				UW
	81														
464.93	82														
	83														
462.93	84														
	85														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/9/10

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SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	T.Halda, K.Barker			**3 of 12**

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
	85		At EL. 461.9 ft, becomes dark yellowish brown and dusky yellowish brown, hard to very hard, intensely fractured.		C25			100	40						**See note at the end of the log regarding RQD.** VOC=8.6 ppm
460.93	86														
	87														
458.93	88														
	89														
456.93	90		At EL. 456.9 ft, becomes olive gray, moderately hard to hard.		C26			100	42						
	91														
454.93	92		At EL. 455.4 ft, becomes moderately soft, intensely fractured, joint, dipping 45 to 15°.												
	93														
452.93	94														
	95		At EL. 451.9 ft, becomes slightly fractured, dipping 45°.		C27			100	80						VOC=21.5 ppm
450.93	96														
	97		At EL. 449.9 ft, becomes dusky yellowish brown.												
448.93	98														
	99														
446.93	100		At EL. 446.9 ft, becomes moderately soft to moderately hard, slightly fractured, bedding joint, dipping 30°.		C28			100	90						
	101														
444.93	102														
	103														
442.93	104														
	105														VOC=39.3 ppm
					C29			100	80	22	94				UW, PI
440.93	106														
	107														
438.93	108														
	109		At EL. 437.9 ft, becomes intensely fractured, fracture zone, dipping 45 to 30°, rough, slightly open.												
436.93	110				C30			100	25						
	111														
434.93	112		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, laminated, moderate yellowish brown, moderately weathered, weak, hard, intensely fractured, bedding joint (FE, MN), dipping 20°, slightly rough, thin.		C31			100	50						
	113														
432.93	114														VOC=9.3 ppm
	115														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/9/10

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07	**LA**	**710**	**T/T**	**07-07-187900**
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SR-710 TUNNEL TECHNICAL STUDY				
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	T.Halda, K.Barker			**4 of 12**

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
	115				C32			100	22						PTS **See note at the end of the log regarding RQD.**
430.93	116														
	117														
428.93	118														
	119														
426.93	120				C33			100	55						
	121														
424.93	122														
	123														VOC=3.9 ppm
422.93	124														
	125		At EL. 421.9 ft, becomes fracture zone, dipping 80 to 20°, locally moderately soft, bedding joints at 20 degrees.		C34			100	39						
420.93	126														
	127		At EL. 420.4 ft, becomes dusky yellowish brown and dark yellowish brown.		C35			100	17						
418.93	128														
	129														
416.93	130				C36			100	0						
	131														VOC=16.3 ppm
414.93	132				C37			100	0						
	133														
412.93	134														
	135		At EL. 411.9 ft, becomes dusky yellowish brown, hard, intensely fractured, joint, dipping 50 to 20°, slightly rough, slightly open.		C38			100	30						
410.93	136														
	137														
408.93	138														
	139														
406.93	140		At EL. 406.9 ft, becomes locally moderately soft.		C39			100	7						VOC=12.1 ppm
	141														
404.93	142														
	143														
402.93	144														
	145		At EL. 402.4 ft, becomes hard, very intensely												

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/9/10

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	T.Halda, K.Barker			**5 of 12**

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
	145		fractured, fracture zone, slightly rough, thin, also bedding joints, some calcite cementation.		C40			100	0						**See note at the end of the log regarding RQD.**
400.93	146														
	147														
398.93	148														
	149														VOC=3.1 ppm
396.93	150		At EL. 396.9 ft, becomes very intensely to intensely fractured, dipping 80 to 20°, slightly rough, slightly open, clean.		C41			100	18	14	114				UW, PL
	151														
394.93	152														
	153														
392.93	154														
	155				C42			100	15						
390.93	156														
	157														
388.93	158														
	159														
386.93	160				C43			100	0						
	161														
384.93	162														
	163														VOC=16.3 ppm
382.93	164														
	165		At EL. 381.9 ft, becomes locally moderately soft.		C44			100	8						SD
380.93	166														
	167														
378.93	168														VOC=17.7 ppm
	169														
376.93	170				C45			100	23						
	171														
374.93	172														
	173														VOC=22.9 ppm
372.93	174														
	175														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/9/10

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	T.Halda, K.Barker			**6 of 12**

ELEVATION (ft)	DEPTH (ft)	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
	175			C46			100	7					**See note at the end of the log regarding RQD.**
370.93	176												
	177												
368.93	178												VOC=23.1 ppm
	179												
366.93	180			C47			100	18	4	140			UW, PL
	181												
364.93	182												VOC=22.3 ppm
	183												
362.93	184												
	185			C48			100	13					
360.93	186												
	187												VOC=21.7 ppm
358.93	188												
	189												
356.93	190	At EL. 356.9 ft, becomes intensely fractured, bedding joint, dipping 10°.		C49			100	28					
	191												
354.93	192												VOC=17.8 ppm
	193												
352.93	194												
	195			C50			100	25					
350.93	196												
	197								10	124			SD, EM
348.93	198												VOC=14.9 ppm
	199												
346.93	200	At EL. 346.9 ft, becomes very intensely to intensely fractured, fracture zone, with bedding joints.		C51			100	22					
	201												
344.93	202												
	203												VOC=15.5 ppm
342.93	204												
	205												

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/9/10

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REPORT TITLE				HOLE ID
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DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	T.Halda, K.Barker			**7 of 12**

ELEVATION (ft)	DEPTH (ft)	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
	205			C52			100	19						**See note at the end of the log regarding RQD.**
340.93	206													
	207													VOC=13.6 ppm
338.93	208													
	209			C53			100	0						
336.93	210	At EL. 336.9 ft, becomes intensely fractured, bedding joint, dipping 10°.		C54			100	32						
	211													
334.93	212													
	213													VOC=15.9 ppm
332.93	214													
	215	At EL. 331.9 ft, becomes locally moderately soft.		C55			100	52	11	127				SD, EM
330.93	216													
	217													
328.93	218													VOC=24.9 ppm
	219													
326.93	220	At EL. 326.9 ft, becomes bedding joints dip 5 degrees.		C56			100	0						
	221													
324.93	222													
	223													VOC=25.9 ppm
322.93	224													
	225	At EL. 321.9 ft, becomes very intensely to intensely fractured, fracture zone, bedding joints dip 5 degrees.		C57			100	17						
320.93	226													
	227													
318.93	228													VOC=024.3 ppm
	229													
316.93	230	At EL. 316.9 ft, becomes intensely fractured.		C58			100	32						
	231													
314.93	232	At EL. 314.9 ft, becomes moderately fractured, bedding joint, dipping 5°, slightly rough, slightly open.												VOC=10.4 ppm
	233													
312.93	234													
	235													

(continued)

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BORING RECORD				**R-09-Z2B3**
DIST	COUNTY	ROUTE	POSTMILE	EA
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SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	T.Halda, K.Barker			**8 of 12**

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
	235				C59			100	62						**See note at the end of the log regarding RQD.**
310.93	236														
	237														
308.93	238														VOC=20.3 ppm
	239														
306.93	240		At EL. 306.9 ft, becomes intensely fractured.		C60			100	22						
	241														
304.93	242														
	243														VOC=17.1 ppm
302.93	244														
	245				C61			100	52						
300.93	246														
	247														
298.93	248														VOC=18.3 ppm
	249														
296.93	250		At EL. 296.9 ft, becomes olive gray, increased sand content.		C62			100	33						
	251									3	155				EM
294.93	252														
	253														VOC=16.5 ppm
292.93	254														
	255				C63			100	33						
290.93	256														
	257														
288.93	258														VOC=22.9 ppm
	259														
286.93	260		At EL. 286.9 ft, becomes dusky yellowish brown.		C64			100	35						
	261														
284.93	262		At EL. 285.4 ft, becomes moderately fractured.												
	263														VOC=18.9 ppm
282.93	264														
	265														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/9/10

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07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
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BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	T.Halda, K.Barker			**9 of 12**

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
	265				C65			100	58						**See note at the end of the log regarding RQD.**
280.93	266														
	267														CR
278.93	268														VOC=10.7 ppm
	269														
276.93	270		At EL. 276.9 ft, becomes intensely fractured.		C66			100	28						
	271														
274.93	272														
	273														VOC=12.3 ppm
272.93	274														
	275				C67			100	42						
270.93	276														
	277														
268.93	278														VOC=15.9 ppm
	279														
266.93	280		At EL. 266.9 ft, becomes slightly fractured, dipping 10 to 5°.		C68			100	87	12	119				
	281														SD, EM
264.93	282														
	283														VOC=11.2 ppm
262.93	284														
	285				C69			100	70						
260.93	286														
	287														
258.93	288														
	289														
256.93	290		At EL. 256.9 ft, becomes intensely fractured, fracture zone.		C70			100	30						PL
	291														
254.93	292														
	293														VOC=15.3 ppm
252.93	294														
	295														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/9/10

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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B3**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	T.Halda, K.Barker			**10 of 12**

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
	295				C71			100	60						**See note at the end of the log regarding RQD.**
250.93	296														
	297		At EL. 250.4 ft, becomes moderately fractured, bedding joint, dipping 10°, slightly rough, thin.												
248.93	298														VOC=15.6 ppm
	299														
246.93	300				C72			100	73						
	301														
244.93	302														
	303														VOC=21.1 ppm
242.93	304														
	305				C73			100	100	8	137				
240.93	306														SD, EM
	307														
238.93	308														
	309														
236.93	310				C74			100	55						
	311														
234.93	312														
	313														VOC=15.7 ppm
232.93	314		At EL. 232.9 ft, becomes intensely fractured.												
	315				C75			100	42						
230.93	316														
	317														
228.93	318		At EL. 228.9 ft, becomes moderately fractured.												VOC=15.4 ppm
	319														
226.93	320				C76			100	55						
	321														
224.93	322														
	323														VOC=17.8 ppm PL
222.93	324														
	325														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/9/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B3**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	T.Halda, K.Barker			**11 of 12**

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
	325				C77			100	65						**See note at the end of the log regarding RQD.**
220.93	326														
	327														VOC=13.7 ppm
218.93	328														
	329														
216.93	330				C77B			100	57						
	331														
214.93	332														VOC=19.0 ppm
	333														
212.93	334														
	335		At EL. 211.9 ft, becomes locally moderately hard.		C78			100	47						
210.93	336														
	337														
208.93	338														VOC18.8 ppm
	339		At EL. 208.4 ft, becomes olive gray, very intensely to intensely fractured.												
206.93	340		At EL. 206.9 ft, becomes dusky yellowish brown, moderately fractured, joint, dipping 65°, bedding		C79			100	60	7	137				
	341		joints dip 5-10 degrees.												
204.93	342														
	343		At EL. 203.9 ft, observed increased calcite cementation.												VOC=19.7 ppm EM
202.93	344														
	345		At EL. 201.9 ft, becomes joint, dipping 60°, bedding		C80			100	62						
200.93	346		joints dip 5-10 degrees, locally moderately soft.												
	347														
198.93	348														VOC=18.9 ppm
	349														
196.93	350		Bottom of borehole at 350.0 ft bgs												
	351		Borehole was converted to piezometer at the completion of drilling.												
194.93	352		RQD values provided in the boring logs are based on intact core pieces obtained between two natural discontinuities. Majority of cores obtained in this boring are weak and does not meet the "sound core" definition provided in standard test method for RQD ASTM D 6032. These RQD values should not be used to evaluate the rock mass quality.												
	353														
192.93	354														
	355														

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/9/10

Department of Transportation
Division of Engineering Services
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Office of Geotechnical Design - South 1

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07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	T.Halda, K.Barker			**12 of 12**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
K. Barker	3-19-09	4-3-09	34° 5' 52" / 118° 10' 46" NAD83	R-09-Z2B4
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Caltrans Drilling Services			' Lt Sta Pullman St., e/o Collis Ave.	558.1 ft NAVD88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wire-Line			CS 2000 (truck)	4 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT(1.4"),Punch Core(2.5"),HQ Core			Diedrich Automatic, 140 lb., 30 inch drop	84%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer Installed on Completion			NM	10.0 ft on 7-1-09	400.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		ASPHALT (3").		D01			100							This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007), except as noted in Appendix A.1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
	1		Well-graded SAND with SILT and GRAVEL (SW-SM); (Aggregate Base = 12").												
556.11	2		SANDY fat CLAY (CH); stiff; very dark gray; moist; some medium SAND; high plasticity fines; **[ALLUVIUM]**												
	3														
554.11	4														
	5				D02			100							Hand Auger 1.3' - 10' VOC=3.3 ppm
552.11	6														
	7														
550.11	8		Fat CLAY (CH); stiff; olive brown; moist; some medium to fine SAND; high plasticity fines.												
	9														
548.11	10		At EL. 548.1 ft, becomes about 10 to 15% fine SAND.		S03	2 3 4	7	100		30		PP = 1.25			PI VOC=3.2 ppm
	11														
546.11	12														
	13														
544.11	14														
	15		At EL. 543.1 ft, becomes about 10 to 15% fine, subangular GRAVEL.		O04			67							
542.11	16														
	17														
540.11	18														
	19														
538.11	20				S05	5 3 4	7	100				PP = 3.75			
	21														
536.11	22														
	23														
534.11	24														
	25														

(continued)

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		SANDY fat CLAY (CH); stiff; olive brown; moist; about 40 to 50% fine SAND; high plasticity fines.		S06	2 2 3	5	100		34		PP = 0.75			PI VOC=3.6 ppm
532.11	26														
	27														
530.11	28														
	29														
528.11	30				S07	2 3 3	6	100				PP = 1.25-1.75			VOC=1.8ppm
	31		Elastic SILT (MH); stiff; very dark gray and dark olive gray; moist; medium plasticity fines; 1" interbeds of fine sand.												
526.11	32														
	33														
524.11	34														
	35		At EL. 523.1 ft, grades to black.		S08	2 2 4	6	100				PP = 1.25-1.75			VOC=3.2 ppm
522.11	36														
	37														
520.11	38		At EL. 520.1 ft, observed trace fine, angular GRAVEL.												
	39														
518.11	40		Fat CLAY with SAND (CH); hard; dark greenish gray; moist; few coarse to fine GRAVEL; little coarse to fine SAND; mostly high plasticity fines.		S09	3 5 7	12	100		32		PP = 2.5			PI, PA VOC=4.0 ppm
	41														
516.11	42														
	43		At EL. 515.1 ft, becomes mottled with olive brown; silty.												
514.11	44														
	45				S10	3 5 6	11	100				PP = 2.5			VOC=2.5ppm
512.11	46														
	47														
510.11	48														
	49														
508.11	50		SILT (ML); hard; dark yellowish brown; moist; low plasticity fines; few 1/2" white lenses.		S11	5 7 11	18	100				PP = 2-2.5			VOC=3.6 ppm
	51														
506.11	52														
	53		Poorly graded SAND with SILT (SP-SM); medium dense; dark yellowish brown mottled with dark greenish gray; moist; fine SAND; weak to moderate cementation.												
504.11	54														
	55														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
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Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K. Barker			**2 of 14**

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
	55		Poorly graded SAND with SILT (SP-SM) *(continued)*.		S12	9 12 17	29	100							VOC=0.1 ppm
502.11	56														
	57		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, thinly bedded, dark greenish gray and moderate yellowish brown, slightly weathered, weak, moderately soft, unfractured, **[PUENTE FORMATION]**		C13			100	100						**See note at the end of log regarding RQD.**
500.11	58														
	59														
498.11	60				S14	5 9 11	20	100		31					VOC=0.0 ppm
	61														
496.11	62		At EL. 496.6 ft, becomes laminated, moderate olive brown and olive gray, soft to moderately soft.		C15			100	100						
	63														VOC=2.7 ppm
494.11	64														
	65		SEDIMENTARY ROCK, (CLAYSTONE)/MUDSTONE, massive, olive black, slightly weathered, weak, soft to moderately soft, unfractured, lenses of fine sandstone.		S16	11 20 31	51	100							
492.11	66														
	67				C17			100	100						
			SEDIMENTARY ROCK, (SANDSTONE), fine-grained, moderate olive brown mottled with olive gray, slightly weathered, weak, moderately soft, unfractured.												VOC=2.8 ppm
490.11	68		SEDIMENTARY ROCK, (CLAYSTONE)/MUDSTONE, massive, olive black, slightly weathered, weak, moderately soft, unfractured.												
	69		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, massive, grayish olive green, slightly weathered, weak, moderately soft, unfractured.		S18	8 17 21	38	100							
488.11	70		At EL. 488.6 ft, grades to olive black.												
	71		SEDIMENTARY ROCK, (CLAYSTONE)/MUDSTONE, massive, olive black, slightly weathered, weak, moderately soft to moderately hard, unfractured, little thin fine sandstone lenses.		C19			100	100						
486.11	72														
	73		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, massive, grayish olive green, slightly weathered, weak, soft to moderately soft, unfractured.												VOC=5.3 ppm
484.11	74														
	75		SEDIMENTARY ROCK, (CLAYSTONE)/MUDSTONE, massive, olive black, slightly weathered, weak, moderately hard, slightly fractured, joint dipping 30°, slightly rough, very thin, clean.		S20	17 27 37	64	100							
482.11	76				C21			100	100						
	77														
480.11	78														VOC=2.5 ppm
	79		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, massive, olive gray, slightly weathered, weak, moderately soft to moderately hard, slightly fractured, joint dipping 30°, slightly rough, very thin, clean.												
478.11	80		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, massive, olive gray, slightly weathered, weak, moderately soft, unfractured.		C22			60	15						
	81														
476.11	82		SEDIMENTARY ROCK, (CLAYSTONE)/MUDSTONE, massive, olive black, slightly weathered, weak, hard, very intensely fractured, fracture zone (clean), thin, locally moderately soft.												
	83														
474.11	84														
	85														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B4**
DIST **07**	COUNTY **LA**	ROUTE **710**	POSTMILE **T/T**	EA **07-07-187900**
PROJECT OR BRIDGE NAME **SR-710 TUNNEL TECHNICAL STUDY**				
BRIDGE NUMBER	PREPARED BY **K. Barker**	DATE	SHEET **3 of 14**	

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
	85		At EL. 473.1 ft, becomes moderately soft to moderately hard, slightly fractured, random fracture, dipping 30°, rough, thin. *(continued)*.		C23			105	100						**See note at the end of log regarding RQD.**
472.11	86														
	87														
470.11	88														
	89									23	100				UW, PI, PA
468.11	90		At EL. 468.1 ft, becomes moderately soft, moderately to slightly fractured, dipping 45°, rough, open.		C24			105	100						
	91														
466.11	92														
	93														VOC=4.6 ppm
464.11	94														
	95		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, massive, dark greenish gray, slightly weathered, weak, moderately hard.		C25			100	62						
462.11	96		At EL. 462.1 ft, observed fracture zone, 1.5', rough, moderately open.												
	97														
460.11	98														VOC=2.3 ppm
	99		At EL. 459.5 ft, observed fracture zone, 4", rough, moderately open.												
458.11	100		At EL. 458.1 ft, becomes hard, intensely to moderately fractured, random fracture, dipping 90 to 0°, moderately rough, moderately open.		C26			100	0						
	101		At EL. 457.1 ft, observed 10" moderately soft zone.												
456.11	102														
	103														VOC=2.3 ppm
454.11	104														
	105				C27			80	0						
452.11	106														
	107		At EL. 451.1 ft, becomes moderately soft, very intensely to intensely fractured, fracture zone, moderately thin.												
450.11	108														VOC=2.3 ppm
	109		At EL. 449.1 ft, becomes moderately soft to moderately hard, unfractured.												
448.11	110		At EL. 448.3 ft, observed 3" mudstone lens.		C28			105	100						
	111		At EL. 448.1 ft, becomes moderately hard, slightly fractured, shear, dipping 60°, smooth, very thin.												
446.11	112														
	113									17	109				UW, PI, PA
444.11	114														
	115														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME: **SR-710 TUNNEL TECHNICAL STUDY**				
BRIDGE NUMBER	PREPARED BY: **K. Barker**		DATE	SHEET: **4 of 14**

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
	115														
442.11	116		SEDIMENTARY ROCK, (CLAYSTONE)/MUDSTONE, massive, olive black, slightly weathered, weak, hard, very intensely fractured, fracture zone (trace calcite), slightly rough, slightly open.		C29			100	8						**See note at the end of log regarding RQD.**
	117														
440.11	118														VOC=2.8 ppm
	119														
438.11	120		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, thickly bedded, olive black and dark greenish gray, slightly weathered, weak, moderately hard, slightly fractured, random fracture (clay), dipping 60 to 80°, slightly rough to smooth, very thin, few sandstone lenses.		C30			100	90						
	121														
436.11	122														VOC=3.9 ppm
	123														
434.11	124														
	125		At EL. 433.1 ft, becomes thinly bedded, rock expands upon excavation (continues to bottom of hole).		C31			140	100						
432.11	126														VOC=8.8 ppm
	127														
430.11	128				C32			100	100						VOC=3.7 ppm
	129														
428.11	130				C33			110	100						
	131														
426.11	132														
	133														
424.11	134														
	135		At EL. 423.1 ft, becomes unfractured, 30-40% sandstone.		C34			110	100						
422.11	136														
	137														
420.11	138														VOC=6.2ppm SD, EM
	139				C35			125	100	15	113				
418.11	140														
	141														VOC=7.3 ppm
416.11	142				C36			83	83						
	143														
414.11	144														VOC=13.6 ppm
	145														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K. Barker			**5 of 14**

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
	145		*(continued).*		C37			125	100						**See note at the end of log regarding RQD.**
412.11	146														
	147														
410.11	148														VOC=6.6 ppm
	149				C38			108	100						
408.11	150		At EL. 408.1 ft, becomes laminated to very thinly bedded, trace sandstone lenses.												
	151														VOC=2.4 ppm
406.11	152				C39			111	100						
	153														
404.11	154														VOC=2.9 ppm
	155		At EL. 403.1 ft, becomes thinly to moderately bedded, olive gray and dark greenish gray, slightly fractured, joint, dipping 80°, slightly rough, thin.		C40			119	100						
402.11	156														
	157									11	121				PA, UU
400.11	158														
	159				C41			100	100						
398.11	160														
	161														VOC=2.9 ppm
396.11	162		At EL. 396.1 ft, becomes very thinly bedded.		C42			117	90						
	163														VOC=2.9 ppm
394.11	164														
	165		At EL. 393.1 ft, becomes unfractured.		C43			121	100						VOC=2.9 ppm
392.11	166														VOC=2.7 ppm
	167														
390.11	168														VOC=19.3 ppm
	169				C44			133	81						
388.11	170		At EL. 388.1 ft, becomes laminated, slightly fractured, joint, dipping 80°, slightly rough, thin, no sandstone lenses.												
	171														
386.11	172				C45			117	95						
	173														
			At EL. 384.9 ft, observed 3" fracture zone.												
384.11	174														VOC=2.9 ppm
	175														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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BORING RECORD				**R-09-Z2B4**
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07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K. Barker			**6 of 14**

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
	175		At EL. 383.1 ft, becomes unfractured, few sandstone lenses.		C46			125	100						**See note at the end of log regarding RQD.**
382.11	176														
	177														
380.11	178														VOC=13.8 ppm
	179				C47			117	100						
378.11	180														
	181														VOC=11.8 ppm
376.11	182				C48			92	92						
	183														
374.11	184									21	106				UU VOC=3.5ppm
	185				C49			125	100						
372.11	186														
	187														VOC=3.4 ppm
370.11	188														
	189				C50			125	100						
368.11	190														
	191														VOC=3.5 ppm
366.11	192		At EL. 366.1 ft, observed trace hard sandstone lenses.		C51			119	100						
	193														
364.11	194														VOC=1.8 ppm
	195		At EL. 363.1 ft, becomes hard.		C52			121	100						
362.11	196														
	197														VOC=3.8 ppm
360.11	198														VOC=2.5 ppm
	199				C53			111	100						
358.11	200														VOC=3.1 ppm
	201		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, massive, dark greenish gray, slightly weathered, weak, hard.												
356.11	202		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, laminated, olive black and dark greenish gray, slightly weathered, weak, hard, unfractured, trace 1-3" sandstone lenses.		C54			125	100						
	203														
354.11	204														VOC=2.0 ppm
	205														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K. Barker			**7 of 14**

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
	205		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, massive, olive gray, slightly weathered, medium strong, hard, unfractured.		C55			100	100						**See note at the end of log regarding RQD.**
352.11	206														
	207														VOC=1.6 ppm
350.11	208														EM
	209		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, laminated, olive black and dark greenish gray, slightly weathered, medium strong, hard, unfractured.		C56			111	100	8	127				
348.11	210														
	211														VOC=2.2ppm
346.11	212				C57			100	100						
	213														
344.11	214														VOC=2.4 ppm
	215				C58			115	100						
342.11	216														
	217														VOC=1.7ppm
340.11	218		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, laminated, olive gray, slightly weathered, medium strong, hard, unfractured.												
	219		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, massive, olive black, slightly weathered, weak to medium strong, moderately hard, unfractured.		C59			119	100	15	112				PI, UC
338.11	220														
	221														VOC=1.5 ppm
336.11	222				C60										
	223														
334.11	224		At EL. 334.3 ft, observed sandstone lens.												VOC=2.3 ppm
	225				C61			114	50						
332.11	226														
	227		At EL. 331.6 ft, becomes medium strong, hard to very hard, very intensely to intensely fractured, fracture zone, slightly rough, 1 mm.												VOC=1.6 ppm
330.11	228														
	229				C62			114	50						
328.11	230														VOC=2.1 ppm
	231														
326.11	232		At EL. 326.1 ft, observed dipping 50°, veins crosscut bedding.		C63			100	31						
	233														
324.11	234		At EL. 324.6 ft, becomes intensely to moderately fractured, dipping 20°.												VOC=1.8 ppm
	235														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K. Barker			**8 of 14**

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
	235		*(continued).*		C64			114	55						**See note at the end of log regarding RQD.**
322.11	236														VOC=2.2 ppm
	237														
320.11	238														
	239		At EL. 319.6 ft, becomes weak to medium strong, moderately hard, unfractured.		C65			100	100						
318.11	240														VOC=2.0 ppm
	241														
316.11	242		At EL. 316.1 ft, becomes medium strong, moderately hard to hard.		C66			117	100						
	243														
314.11	244														VOC=1.7 ppm
	245				C67			120	100						
312.11	246														
	247														VOC=1.8 ppm
310.11	248														
	249														
308.11	250				C68			100	100						
	251														
306.11	252														VOC=3.9 ppm
	253														
304.11	254				C69			114	100						
	255														
	256		At EL. 302.9 ft, observed 6" fracture zone.							15	147				VOC=5.8ppm
302.11	257				C70			117	90						
300.11	258														
	259														VOC=3.6 ppm
298.11	260		At EL. 298.1 ft, observed few sandstone lenses.		C71			133	100						
	261														
296.11	262														VOC=2.2 ppm
	263				C72			100	100						
294.11	264														
	265														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B4**
DIST. **07**	COUNTY **LA**	ROUTE **710**	POSTMILE **T/T**	EA **07-07-187900**
PROJECT OR BRIDGE NAME **SR-710 TUNNEL TECHNICAL STUDY**				
BRIDGE NUMBER	PREPARED BY **K. Barker**		DATE	SHEET **9 of 14**

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
	265		At EL. 293.1 ft, observed 25% sandstone lenses.		C72			100	100						VOC=1.3 ppm **See note at the end of log regarding RQD.**
292.11	266														
	267														
290.11	268				C73			100	100						
	269		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, massive, olive gray, slightly weathered, medium strong, moderately hard to hard, unfractured.												
288.11	270				C74			100	100						
	271		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, massive, olive black, slightly weathered, medium strong, moderately hard to hard, unfractured.												
286.11	272		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, massive, olive gray, slightly weathered, medium strong, moderately hard to hard, unfractured.												
	273														
284.11	274														VOC=2.1 ppm
	275				C75			100	100						
282.11	276														EM
	277									11	115				VOC=1.5 ppm
280.11	278				C76			44	44						
	279														VOC=5.1 ppm
278.11	280														VOC=2.9 ppm
	281														
276.11	282		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, massive, olive black, slightly weathered, medium strong, moderately hard to hard, unfractured.												
	283				C77			120	100						
274.11	284														VOC=2.7 ppm
	285				C78			119	100						
272.11	286														
	287														VOC=2.6 ppm
270.11	288														
	289				C79			136	100	16	110				SD, EM
268.11	290		At EL. 268.1 ft, observed few 1-3" olive gray sandstone lenses.												VOC=3.2 ppm
	291														
266.11	292				C80			110	100						
	293														
264.11	294														VOC=2.2 ppm
	295														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K. Barker			**10 of 14**

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
	295				C81			110	100	13					**See note at the end of log regarding RQD.**
262.11	296														
	297														VOC=2.1 ppm
260.11	298														
	299				C82			100	100						
258.11	300														
	301														
256.11	302				C83			100	100						
	303														
254.11	304		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, laminated, olive gray, slightly weathered, medium strong, moderately hard to hard, unfractured.												VOC=2.3 ppm
	305		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, massive, olive black, slightly weathered, medium strong, moderately hard to hard, unfractured, few 1-3" olive gray sandstone lenses.		C84			100	100						
252.11	306														
	307														VOC=2.1 ppm
250.11	308														
	309				C85			114	100						
248.11	310														VOC=4.9 ppm VOC=4.7ppm
	311														
246.11	312				C86			100	100						
	313														
244.11	314														VOC=2.5 ppm
	315				C87			143	100	16	145				SD VOC=6.1 ppm
242.11	316														
	317														VOC=2.6 ppm
240.11	318														
	319				C88			38	38						PTS
238.11	320														VOC=2.3 ppm
	321														
236.11	322				C89			133	100						VOC=2.7 ppm
	323														
234.11	324														VOC=17.8 ppm
	325														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B4**
DIST. **07**	COUNTY **LA**	ROUTE **710**	POSTMILE **T/T**	EA **07-07-187900**
PROJECT OR BRIDGE NAME **SR-710 TUNNEL TECHNICAL STUDY**				
BRIDGE NUMBER	PREPARED BY **K. Barker**		DATE	SHEET **11 of 14**

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
	325				C90			71	71						**See note at the end of log regarding RQD.**
232.11	326														
	327														VOC=2.5 ppm
230.11	328		At EL. 230.1 ft, observed joint, dipping 80°, smooth, thin.												
	329				C91			114	100	13	120				EM
228.11	330														
	331														
226.11	332				C92			156	100						
	333														
224.11	334														VOC=2.6 ppm
	335				C93			114	100						
222.11	336														
	337														VOC=2.9 ppm
220.11	338				C94			130	100						
	339														
218.11	340														VOC=2.0 ppm
	341		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, laminated, olive gray, slightly weathered, medium strong to strong, hard, unfractured.												
216.11	342		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, massive, olive black, slightly weathered, weak to medium strong, moderately hard to hard, unfractured, few 1-3" olive gray sandstone lenses.		C95			125	100						
	343														VOC=3.9 ppm
214.11	344														
	345				C96			130	100						
212.11	346														
	347														VOC=3.3 ppm
210.11	348														
	349				C97			120	100						
208.11	350														VOC=10.0 ppm
	351														
206.11	352				C98			127	100						CR
	353														
204.11	354														VOC=20.4 ppm
	355														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K. Barker			**12 of 14**

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
	355				C99			120	100						**See note at the end of log regarding RQD.**
202.11	356														
	357									14	115				UU
200.11	358														VOC=2.8 ppm
	359				C100			114	100						
198.11	360														VOC=12.3 ppm
	361														
196.11	362				C101			122	100						
	363														
194.11	364														VOC=3.8 ppm
	365				C102			120	100	14					
192.11	366														
	367														VOC=9.1 ppm
190.11	368				C103			114	100						
	369														
188.11	370														VOC=3.0 ppm
	371														
186.11	372				C104			130	100						
	373														
184.11	374														VOC=3.2 ppm
	375				C105			130	100						
182.11	376														
	377														VOC=2.3 ppm
180.11	378														
	379		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, massive, olive gray, slightly weathered, weak, moderately hard, unfractured.		C106			140	100						
178.11	380														VOC=2.6 ppm
	381		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, massive, olive black, slightly weathered, weak, moderately hard to hard, unfractured.												
176.11	382				C107			100	100						
	383		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, massive, olive gray, slightly weathered, weak, moderately hard, unfractured.												
174.11	384														VOC=2.6 ppm
	385									14	117				UU

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K. Barker			**13 of 14**

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
	385		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, massive, olive black, slightly weathered, weak, moderately hard to hard, unfractured.		C108			100	100						**See note at the end of log regarding RQD.** VOC=4.0 ppm
172.11	386														
	387														
170.11	388				C109			161	100						
	389														
168.11	390														VOC=7.6 ppm
	391														
166.11	392				C110			100	100						SD, EM
	393									15	115				VOC=2.6 ppm
164.11	394														
	395				C111			130	100						
162.11	396														VOC=7.5 ppm
	397														
160.11	398				C112			140	100						
	399														VOC=2.7 ppm
158.11	400		Bottom of borehole at 400.0 ft bgs												
	401		Borehole was converted to piezometer at the completion of drilling.												
156.11	402		RQD values provided in the boring logs are based on intact core pieces obtained between two natural discontinuities. Majority of cores obtained in this boring are weak and does not meet the "sound core" definition provided in standard test method for RQD ASTM D 6032. These RQD values should not be used to evaluate the rock mass quality.												
	403														
154.11	404														
	405														
152.11	406														
	407														
150.11	408														
	409														
148.11	410														
	411														
146.11	412														
	413														
144.11	414														
	415														

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B4**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K. Barker			**14 of 14**

LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
K. Lai, M Islam, K. Barker 4-14-09	34° 5' 3" / 118° 9' 52" NAD83	R-09-Z2B5
DRILLING CONTRACTOR	**BOREHOLE LOCATION (Offset, Station, Line)**	**SURFACE ELEVATION**
Caltrans Drilling Services	' Lt Sta Edna St., w/o Dorchester Ave.	452.4 ft NAVD88
DRILLING METHOD	**DRILL RIG**	**BOREHOLE DIAMETER**
Rotary Wire-Line	CS 2000 (truck)	4 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	**SPT HAMMER TYPE**	**HAMMER EFFICIENCY, ERi**
SPT(1.4"),Punch Core(2.5"),HQ Core	Diedrich Automatic, 140 lb., 30 inch drop	84%
BOREHOLE BACKFILL AND COMPLETION	**GROUNDWATER READINGS** DURING DRILLING / AFTER DRILLING (DATE)	**TOTAL DEPTH OF BORING**
Piezometer Installed on Completion	NM / 10.8 ft on 7-1-09	300.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method / Casing Depth	Remarks
	0		ASPHALT (4").											This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007), except as noted in Appendix A.1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
	1		SILTY CLAY (CL-ML); soft to medium stiff; dark brown; moist; low plasticity fines; **[ALLUVIUM]**											
450.38	2													
	3													
448.38	4													
	5		SANDY SILT (ML); medium stiff; dark brown; moist; fine SAND; nonplastic fines.		S01	4 6 8	14					PP = 0.3		Hand Auger 0.3' - 5' VOC=12.1 ppm
446.38	6													
	7													
444.38	8		Lean CLAY with SAND (CL); stiff; dark brown; moist.											
	9													
442.38	10				S02	7 3 4	7			19				PI VOC=28.1 ppm
	11													
440.38	12													
	13		SILTY SAND (SM); dense; yellowish brown; moist; fine SAND.											
438.38	14													
	15				S03	13 16 16	32			17				
436.38	16													VOC=37.2 ppm
	17													
434.38	18													
	19													
432.38	20				S04	10 14 19	33							
	21		At EL. 431.4 ft, contains coarse to fine SAND.											VOC=6.3 ppm
430.38	22													
	23													
428.38	24													
	25													

(continued)

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z2B5
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	T/T	07-07-187900
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K. Barker, M. Islam			1 of 11

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method / Casing Depth	Remarks
	25		SANDY SILT (ML); hard; light brown; moist; some fine SAND; mostly nonplastic to low plasticity fines; interbedded with silty sand (SM).		S05	10 11 11	22							
426.38	26													VOC=8.8 ppm
	27													
424.38	28													
	29													
422.38	30				S06	7 11 8	19			27				PA
	31													VOC=8.5 ppm
420.38	32		SILTY SAND (SM); medium dense; yellowish brown; moist; medium to fine SAND; nonplastic fines.											
	33													
418.38	34													
	35				S07	3 6 8	14							
416.38	36													
	37													VOC=2.3 ppm
414.38	38													
	39													
412.38	40				S08	9 7 6	13							
	41													VOC=33.1 ppm
410.38	42													
	43		SANDY SILT (ML); stiff to very stiff; olive gray; moist; few fine GRAVEL; fine SAND; nonplastic to low plasticity fines.											
408.38	44													
	45				S09	4 8 10	18							
406.38	46													VOC=21.1 ppm
	47													
404.38	48		SILTY SAND (SM); medium dense; light brown; moist; little fine GRAVEL; fine SAND.											
	49													
402.38	50				S10	4 8 10	18			21				PA
	51		At EL. 401.4 ft, with trace fine GRAVEL; mostly fine SAND; some low plasticity fines.											VOC=5.6 ppm
400.38	52													
	53													
398.38	54													
	55													

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE: **BORING RECORD**
HOLE ID: **R-09-Z2B5**

DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	T/T	07-07-187900

PROJECT OR BRIDGE NAME: **SR-710 TUNNEL TECHNICAL STUDY**

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
	K. Barker, M. Islam		2 of 11

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
	55		At EL. 397.4 ft, grades to medium to fine SAND. SILTY SAND (SM) *(continued)*.		S11	20 20 14	34								
396.38	56														VOC=9.0 ppm
	57														
394.38	58		SILTY CLAY (CL-ML); stiff to very stiff; olive brown to olive gray; moist; low plasticity fines.												
	59														
392.38	60				S12	6 8 11	19								
	61														VOC=17.4 ppm
390.38	62														
	63														
388.38	64														
	65				S13	5 6 8	14								
386.38	66														VOC=4.2 ppm
	67														
384.38	68														
	69														
382.38	70				S14	7 9 15	24								
	71														VOC=9.5 ppm
380.38	72														
	73		Fat CLAY (CH); very stiff; olive gray; moist; medium to high plasticity fines.												
378.38	74														
	75				S15	5 9 11	20			21					PI
376.38	76														VOC=7.6 ppm
	77														
374.38	78		SILTY CLAY (CL-ML); stiff to very stiff; light brown; moist; low plasticity fines.												
	79														
372.38	80				S16	4 5 7	12								
	81														VOC=9.2 ppm
370.38	82														
	83														
368.38	84														
	85														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE: **BORING RECORD**
HOLE ID: **R-09-Z2B5**

DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	T/T	07-07-187900

PROJECT OR BRIDGE NAME: **SR-710 TUNNEL TECHNICAL STUDY**

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
	K. Barker, M. Islam		3 of 11

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
	85		SILTY CLAY (CL-ML) *(continued)*.		S17	6 9 11	20			21					
366.38	86														VOC=10.8 ppm
	87														
364.38	88		Very stiff; olive gray; low to medium plasticity fines.												
	89														
362.38	90				S18	5 8 9	17								
	91														VOC=8.8 ppm
360.38	92														
	93														
358.38	94														
	95				S19	5 7 9	16								
356.38	96														VOC=11.4 ppm
	97														
354.38	98														
	99														
352.38	100				S20	6 9 13	22								
	101														VOC=12.4 ppm
350.38	102														
	103														
348.38	104														
	105		At EL. 347.4 ft, with few fine SAND.		O21					27	101	PP = 3.75			PI, PA, UU, C
346.38	106														
	107														
344.38	108		CLAYEY SAND (SC); medium dense; light brown; moist; fine SAND; nonplastic to low plasticity fines.												VOC=6.4 ppm
	109														
342.38	110				S22	4 6 8	14								
	111														VOC=4.6 ppm
340.38	112														
	113														
338.38	114		SANDY lean CLAY (CL); stiff; light brown to light gray; moist to wet; fine SAND; low plasticity fines.												
	115														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE **BORING RECORD**				HOLE ID **R-09-Z2B5**
DIST. **07**	COUNTY **LA**	ROUTE **710**	POSTMILE **T/T**	EA **07-07-187900**
PROJECT OR BRIDGE NAME **SR-710 TUNNEL TECHNICAL STUDY**				
BRIDGE NUMBER	PREPARED BY **K. Barker, M. Islam**		DATE	SHEET **4 of 11**

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
	115		SANDY lean CLAY (CL) *(continued)*.		S23	5 5 6	11					PP = 1.5			
336.38	116														VOC=11.5 ppm
	117														
334.38	118														
	119														
332.38	120		At EL. 332.4 ft, grades to very stiff.		S24	5 6 8	14					PP = 3.0			
	121														VOC=9.5 ppm
330.38	122														
	123		Fat CLAY (CH); very stiff; light brown to light gray; moist to wet.												
328.38	124														
	125				O25					28	95	PP = 2.0			PI, UU
326.38	126														
	127														
324.38	128														
	129		SANDY lean CLAY (CL); very stiff; light brown to light gray; moist to wet.												VOC=9.3 ppm
322.38	130				S26	10 12 15	27					PP = 4.0			
	131														VOC=10.7 ppm
320.38	132														
	133														
318.38	134														
	135		Very stiff to hard.		S27	12 18 25	43								
316.38	136														VOC=8.2 ppm
	137		SEDIMENTARY ROCK, (CLAYSTONE)/MUDSTONE, thinly bedded, moderate olive brown and olive gray, slightly weathered, extremely weak, very soft, unfractured, **[PUENTE FORMATION]**		C26			100	100						**See note at the end of log regarding RQD.**
314.38	138														
	139														
312.38	140		At EL. 312.4 ft, becomes laminated, soft.		C27			100	100						VOC=1.6 ppm
	141														
310.38	142														
	143														
308.38	144														
	145														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B5**
DIST **07**	COUNTY **LA**	ROUTE **710**	POSTMILE **T/T**	EA **07-07-187900**
PROJECT OR BRIDGE NAME **SR-710 TUNNEL TECHNICAL STUDY**				
BRIDGE NUMBER	PREPARED BY **K. Barker, M. Islam**		DATE	SHEET **5 of 11**

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
	145		At EL. 307.4 ft, becomes slightly fractured, joint, not healed, dipping 30°. *(continued)*.		C28			90	90						VOC=2.8 ppm **See note at the end of log regarding RQD.**
306.38	146														
	147														VOC=1.1 ppm
304.38	148									40	80				PI, PA, UU
	149														
302.38	150		At EL. 302.4 ft, becomes unfractured.		C29			100	100						
	151														
300.38	152														
	153														
298.38	154														
	155		At EL. 297.9 ft, becomes soft to moderately soft. SEDIMENTARY ROCK, (CLAYSTONE)/MUDSTONE, massive, black, slightly weathered, weak, soft to moderately soft, unfractured.		C30			100	84						VOC=1.1 ppm
296.38	156														
	157														
294.38	158														VOC=2.7 ppm
	159														
292.38	160				C31			100	88						
	161														
290.38	162														
	163														VOC=1.9 ppm
288.38	164														
	165		At EL. 287.4 ft, becomes very slightly fractured, shear, dipping 45°.		C32			100	100						
286.38	166														VOC=2.6 ppm
	167														
284.38	168				C33			120	80						
	169														
282.38	170		At EL. 282.4 ft, becomes moderately soft, unfractured.		C34			100	100						VOC=1.7 ppm
	171														
280.38	172														
	173				C35			108	80						VOC=1.8 ppm
278.38	174														
	175														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
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Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME: **SR-710 TUNNEL TECHNICAL STUDY**				
BRIDGE NUMBER	PREPARED BY: **K. Barker, M. Islam**		DATE	SHEET: **6 of 11**

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
	175		At EL. 277.4 ft, becomes very slightly fractured, joint, dipping 70°, few subhorizontal silty laminations. *(continued)*.		C36			100	20						VOC=1.7 ppm **See note at the end of log regarding RQD.**
276.38	176														
	177									23	101				PI, PA, UC
274.38	178														
	179														
272.38	180				C37			100	33						VOC=1.6 ppm
	181														
270.38	182														VOC=3.4 ppm
	183				C38			100	100						
268.38	184														
	185														VOC=2.9 ppm
266.38	186														
	187				C39			100	83						VOC=3.7 ppm
264.38	188									21	107				
	189														
262.38	190				C40			104	100						
	191														VOC=4.1 ppm
260.38	192														
	193														
258.38	194		At EL. 258.4 ft, contains about 50% siltstone, weakly subvertically laminated.		C41			100	75						VOC=20.0 ppm
	195														
256.38	196														
	197														
254.38	198														
	199		At EL. 253.4 ft, becomes unfractured.		C42			106	100						VOC=25.4 ppm
252.38	200														
	201														
250.38	202														
	203				C43			100	100						VOC=28.1 ppm SD, EM
248.38	204									22	105				
	205														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K. Barker, M. Islam			**7 of 11**

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
	205				C43			100	100						**See note at the end of log regarding RQD.**
246.38	206														
	207		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, laminated, black, slightly weathered, weak, moderately soft, unfractured, subvertical laminations.		C44			100	100						VOC=2.7 ppm
244.38	208														
	209														
242.38	210				C45			100	100						
	211														
240.38	212														VOC=17.3 ppm
	213				C46			100	100						VOC=25.0 ppm
238.38	214														
	215														
236.38	216														
	217														
234.38	218				C47			100	82	23	102				UU, CR VOC=3.2 ppm
	219														
232.38	220														
	221														
230.38	222														
	223		At EL. 229.4 ft, observed fine grained sand lenses.		C48			104	73						
228.38	224														VOC=16.5 ppm
	225														
226.38	226														
	227														
224.38	228		At EL. 224.4 ft, becomes dark greenish gray.		C49			100	75						VOC=4.6 ppm
	229														
222.38	230				C50			92	92						
	231														
220.38	232														PTS
	233				C51			94	40						VOC=29.0 ppm
218.38	234		At EL. 218.4 ft, becomes slightly fractured, shear, dipping 80°.												
	235														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K. Barker, M. Islam			**8 of 11**

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
	235		*(continued).*		C51			94	40						**See note at the end of log regarding RQD.**
216.38	236														
	237		At EL. 215.8 ft, observed 2-3" gravel lens, fine, rounded and sub-angular.		C52			100	100						VOC=2.5 ppm
214.38	238														
	239														
212.38	240				C53			100	92						VOC=3.2 ppm
	241									21	109				SD, EM VOC=1.5 ppm
210.38	242														
	243														
208.38	244				C54			88	79						
	245														
206.38	246														
	247														
204.38	248		At EL. 204.4 ft, becomes extremely weak, very soft.		C55			42	10						VOC=4.1 ppm
	249														
202.38	250														
	251														
200.38	252		At EL. 200.9 ft, observed breccia lens, fine gravel, sub-rounded, black siltstone matrix.		C56			89	0						VOC=1.0 ppm
	253		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, massive, dark greenish gray, slightly weathered, extremely weak, very soft, unfractured.												
198.38	254														
	255				C57			30	0						VOC=5.1 ppm
196.38	256														
	257														
194.38	258														
	259														
192.38	260				C58			67	16						VOC=17.0 ppm
	261														
190.38	262														
	263														VOC=6.2 ppm
188.38	264		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, laminated, dark gray, slightly weathered, weak,												
	265														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME: **SR-710 TUNNEL TECHNICAL STUDY**				
BRIDGE NUMBER	PREPARED BY: **K. Barker, M. Islam**		DATE	SHEET: **9 of 11**

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
	265		moderately soft, unfractured. At EL. 187.4 ft, observed 1' lens of little coarse sand and trace fine gravel. *(continued)*.		C59			111	83	24	100				UU **See note at the end of log regarding RQD.**
186.38	266														
	267														
184.38	268		SEDIMENTARY ROCK, (CONGLOMERATE), coarse sand to cobble, dark gray, slightly weathered, extremely weak, very soft, unfractured, sand and clay matrix, clasts are very hard, sub-rounded and sub-angular, metamorphosed granitics, trace shell fragments, (possible shear zone).		C60			111	33						VOC=0.7 ppm
	269														
182.38	270														
	271														
180.38	272				C61			42	0						VOC=2.7 ppm
	273														
178.38	274														
	275		SEDIMENTARY ROCK, (CLAYSTONE)/MUDSTONE, massive, dark gray, slightly weathered, weak, moderately soft, with lenses of siltstone.		C62			100	40						VOC=1.0 ppm
176.38	276														
	277														
174.38	278														
	279		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, dark gray, slightly weathered, weak, hard, slightly fractured, joint dipping 45°. At EL. 172.4 ft, observed little coarse and fine gravels, sub-rounded, granitic.												
172.38	280				C63			90	0						VOC=14.5 ppm
	281														VOC=4.9 ppm
170.38	282														
	283		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, laminated to very thinly bedded, dark gray, slightly weathered, weak, moderately soft, slightly fractured, locally very soft, with sandstone laminations.												
168.38	284														
	285				C64			135	40						
166.38	286														
	287														VOC=4.5 ppm
164.38	288														
	289				C65			107	50						VOC=3.0 ppm
162.38	290														
	291														
160.38	292									31	88				SD, EM
	293		At EL. 159.9 ft, observed 1' bed of little fine to coarse gravels, sub-angular.		C66			100	92						
158.38	294														
	295														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K. Barker, M. Islam			**10 of 11**

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
	295				C67			120	80						VOC=1.7 ppm
156.38	296														**See note at the end of log regarding RQD.**
	297														
154.38	298				C68			100	80						VOC=2.7 ppm
	299														
152.38	300		Bottom of borehole at 300.0 ft bgs												VOC=1.6 ppm
	301		Borehole was converted to piezometer at the completion of drilling.												
150.38	302		RQD values provided in the boring logs are based on intact core pieces obtained between two natural discontinuities. Majority of cores obtained in this boring are weak and does not meet the "sound core" definition provided in standard test method for RQD ASTM D 6032. These RQD values should not be used to evaluate the rock mass quality.												
	303														
148.38	304														
	305														
146.38	306														
	307														
144.38	308														
	309														
142.38	310														
	311														
140.38	312														
	313														
138.38	314														
	315														
136.38	316														
	317														
134.38	318														
	319														
132.38	320														
	321														
130.38	322														
	323														
128.38	324														
	325														

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z2B5**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K. Barker, M. Islam			**11 of 11**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Torsiello	3-12-09	3-24-09	34° 8' 26.199" / 118° 10' 47.6106" NAD83	R-09-Z3B1
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Cascade Drilling Inc.			' Lt Sta (Avenue 64 at W. Colorado Blvd.)	885.1 ft NAVD 88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wash			Ingersoll Rand A400	6 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT(1.4"), Cal (2.4"), PQ core (3.2")			Automatic Hammer 140 lb. 30 inch drop	75%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer Installed on Completion			NM	23.9 ft on07/01/09	300.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		ASPHALT 2" thick.												This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007), except as noted in Appendix A.1 of the Draft Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated March 18, 2010.
	1		CONCRETE 6" thick.												
883.10	2		SILTY SAND (SM); medium dense; brown; moist; medium to fine SAND; low plasticity fines [OLDER ALLUVIUM].												
	3														
881.10	4														
	5														Hand Auger to 6'
879.10	6														
	7														
877.10	8														
	9														
875.10	10		Medium dense; 1% fine GRAVEL, 68% medium to fine SAND, 31% low plasticity fines, iron oxide staining.		S01	7 14 22	36	100		14	122				PA VOC = 0.0 ppm
	11														
873.10	12														
	13														
871.10	14														
	15		At EL. 870.1 ft, becomes dense; dark brown.		S02	6 14 21	35	100							VOC = 0.0 ppm
869.10	16														
	17														
867.10	18														
	19														
865.10	20		At EL. 865.1 ft, becomes medium dense; 1% fine GRAVEL, 56% coarse to fine SAND, 43% fines, iron oxide staining.		S03	6 12 18	30	100		16	117				PA, PI VOC = 0.0 ppm
	21														
863.10	22														
	23														
861.10	24														
	25														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z3B1
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	D/D	07-187900
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	D. Jankly		5-12-09	1 of 11

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		Poorly graded SAND with SILTY CLAY (SP-SC); very dense; brownish yellow; moist; coarse to fine SAND; medium plasticity fines.		S04	14 50/5"		100							See note at end of log regarding RQD.
859.10	26														VOC = 0.0 ppm
	27														
857.10	28														
	29														
855.10	30		At EL. 855.1 ft, becomes very pale brown.		S05	50/4"		100							
	31		SEDIMENTARY ROCK: (SANDSTONE), fine sand to coarse sand, pale brown, moderately weathered, moderately soft to moderately hard, slightly fractured, slight iron oxide staining. **[TOPANGA FORMATION]**		C06			100	60						VOC = 0.0 ppm
853.10	32		At EL. 853.1 ft, grades to light yellowish brown with iron oxide staining.												VOC = 0.0 ppm
	33		At EL. 852.6 ft, observed fault, dipping 75°, Bedding joint dipping 15 degrees.												
851.10	34		At EL. 851.8 ft, observed fault, dipping 80°, dark gray clay lining.		C07			100	45						
	35		At EL. 851.3 ft, observed 15 mm thick clay seam, dipping 15 degrees, yellowish red.												
849.10	36		At EL. 851.1 ft, becomes medium sand to coarse sand, dusky brown, intensely to moderately weathered, moderately hard.												
	37		At EL. 849.7 ft, becomes very thinly to thinly bedded, bedding joint, dipping 15 to 0°, clay lined, 1 to 2 mm aperture.												VOC = 0.0 ppm
847.10	38		At EL. 849.1 ft, contains bedding joint, dipping 15°, 1" thick, gray silty clay seam.												
	39		At EL. 848.6 ft, contains fault, dipping 65°, clay lined. At EL. 847.9 ft, contains fault, dipping 55°, calcite lined.		C08			3	0						VOC = 0.0 ppm
845.10	40		At EL. 847.6 ft, contains bedding joint, dipping 15°. At EL. 846.6 ft, contains 2" thick silty sand lens, light gray, very moist.												
	41														
843.10	42														
	43														
841.10	44		SEDIMENTARY ROCK, (CONGLOMERATE), granule to cobble, massive, light gray, moderately weathered, recovered as pebble-sized clasts of intrusive rock, clasts are very hard.		C09			38	0						
	45		At EL. 840.1 ft, observed moderately hard, sandstone, as 30.5'. Numerous joints.												VOC = 0.0 ppm
839.10	46		At EL. 839.4 ft, observed extremely hard, cobble-sized intrusive clast.												
	47														
837.10	48														
	49		At EL. 836.1 ft, becomes pebble to granule, intensely to moderately weathered, moderately hard, intensely to moderately fractured, bedding joint, dipping 5°, Matrix is fine to coarse sand, clasts are angular to subangular, diorite derived.		C10			33	0						
835.10	50														VOC = 0.0 ppm
	51														
833.10	52														
	53														
831.10	54				C11			30	0						
	55														

(continued)

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DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
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SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**5-12-09**	**2 of 11**

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
	55		At EL. 830.3 ft, becomes dark reddish brown, moderately weathered, Local highly fractured siltstone lens, soft, gray. *(continued)*. At EL. 829.9 ft, observed coarse sandstone lens, abundant iron oxide staining, intensely weathered (SAND, dense, moist).		C11			30	0						See note at end of log regarding RQD. VOC = 0.0 ppm
829.10	56														
	57														
827.10	58														
	59				C12			37	0						
825.10	60														
	61		At EL. 824.6 ft, observed bedding joint, dipping 5 to 2°.												VOC = 0.0 ppm
823.10	62														
	63														
821.10	64		At EL. 821.1 ft, becomes soft to moderately soft.		C13			50	13						
	65														
819.10	66		At EL. 819.2 ft, observed bedding joint, dipping 5°, very thinly bedded siltstone, intensely fractured.												
	67														VOC = 0.2 ppm
817.10	68														
	69		At EL. 816.1 ft, becomes intensely to moderately weathered.		C14			57	13						
815.10	70		At EL. 814.8 ft, contains gray sandstone bed, non-indurated, 0.3' thick.												
	71														VOC = 0.4 ppm
813.10	72														
	73														
811.10	74		No recovery at El. 811 to 806 due to drilling error.		C15			0	0						
	75														
809.10	76														VOC = 0.0 ppm
	77														
807.10	78														
	79		At EL. 806.1 ft, becomes light bluish gray mottled with pale brown, moderately to slightly weathered, soft, iron oxide staining. At EL. 805.0 ft, becomes light olive brown, moderately weathered.		C16			77	18						
805.10	80														
	81														VOC = 1.2 ppm
803.10	82		At EL. 803.5 ft, becomes dusky blue, slightly weathered, moderately hard, calcite cement.												
	83				C17			98	25						
801.10	84														
	85														VOC = 0.0 ppm

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B1**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**5-12-09**	**3 of 11**

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
	85		At EL. 800.3 ft, becomes slightly weathered to fresh, dark yellowish brown becoming dark bluish gray below.		C17			98	25						See note at end of log regarding RQD.
799.10	86				C18			39	0						VOC = 0.2 ppm
	87														
797.10	88														
	89														
795.10	90				C19			0	0						
	91														
793.10	92														
	93														
791.10	94														
	95				C20			100	0						
789.10	96		At EL. 789.7 ft, observed granule to pebble-sized crasts in fine to coarse sand matrix, soft to moderately soft. Clasts are subrounded to angular.		C21			85	33						
	97														VOC = 3.0 ppm
787.10	98		At EL. 788.1 ft, observed shear, dipping 60°, 5 mm aperture, clay lined, slickensided. At EL. 787.2 ft, contains joint, dipping 0°.												
	99														
785.10	100														
	101		Fine to very coarse grained sand matrix, clasts are subangular.		C22			27	0						
783.10	102														
	103														VOC = 3.4 ppm
781.10	104														
	105														
779.10	106		At EL. 779.7 ft, observed granule to cobble, very thickly bedded to massive, intensely to moderately fractured.		C23			97	74						
	107		At EL. 778.4 ft, contains joint, dipping 80°, 2" aperture.												VOC = 1.9 ppm
777.10	108														
	109		At EL. 776.3 ft, contains shear, dipping 20°, 1" to 1.5" aperture, slickensided.												
775.10	110		At EL. 775.7 ft, observed four joints dipping 0, 20, 45, and 80 degrees.												
	111		At EL. 774.6 ft, becomes moderately soft to moderately hard, numerous horizontal joints, likely due to drilling.		C24			80	47						
773.10	112														
	113														VOC = 1.3 ppm
771.10	114		At EL. 772.2 ft, observed possible 2" sheared zone - infilled sand is decomposed to silt. Local zones with calcite cement.												
	115														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B1**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**5-12-09**	**4 of 11**

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
	115														See note at end of log regarding RQD.
769.10	116				C25			80	38						
	117		At EL. 768.7 ft, contains possible fracture zone, 5" thick.												VOC = 1.7 ppm
767.10	118		At EL. 768.1 ft, becomes very intensely fractured, joint, dipping 40°. At EL. 767.2 ft, observed joint, dipping 20°, slickensided with chlorite alteration.												
	119														
765.10	120														
	121				C26			96	23						VOC = 3.8 ppm
763.10	122														
	123		At EL. 762.1 ft, becomes dark gray mottled with white, slightly weathered to fresh, intersected igneous clasts. Numerous joints dipping 0 to 70 degrees, apertures up to 3 mm.												
761.10	124				C27			100	0						
	125														VOC = 2.0 ppm
759.10	126				C28			100	40						
	127		At EL. 758.6 ft, becomes intensely fractured, Numerous joints dipping 0 to 15 degrees. Shear dipping 50 degrees, slight clay lining.												
757.10	128														
	129														VOC = 0.0 ppm
755.10	130		At EL. 755.8 ft, observed random fracture, dipping 60°. At EL. 755.5 ft, observed random fracture, dipping 60 to 20°.												
	131		At EL. 754.4 ft, observed medium to very coarse sandstone lens, 2.5" thick.		C29			77	20						
753.10	132		At EL. 754.0 ft, becomes fresh, soft, numerous joints dipping 0 to 50 degrees.												
	133		At EL. 752.1 ft, observed numerous joints dipping 50 to 80 degrees, 1 to 2mm aperture, calcite infill.												VOC = 0.0 ppm
751.10	134														
	135														
749.10	136				C30			0	0						
	137														
747.10	138														
	139														
745.10	140														
	141														
743.10	142		At EL. 744.0 ft, observed local slickensided surfaces on diorite clasts.		C31			39	0						VOC = 0.3 ppm
	143														
741.10	144		At EL. 741.1 ft, observed numerous joints dipping 0 to 90 degrees.		C32			100	42						
	145														

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B1**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
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SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**5-12-09**	**5 of 11**

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
	145				C32			100	42						See note at end of log regarding RQD.
739.10	146		At EL. 739.0 ft, observed fine to very coarse sand matrix, clasts up to 3" observed, local slickensided joint faces dipping 70 to 80 degrees.		C33			93	63						VOC = 8.5 ppm
	147														VOC = 3.3 ppm
737.10	148														
	149		At EL. 736.0 ft, observed 4" thick section of possible gouge.												
735.10	150		At EL. 735.0 ft, with coarse grained sand matrix, joint, dipping 75°.												
	151				C34			40	0						
733.10	152		At EL. 733.0 ft, observed 1' thick section of sandstone with granule to pebble sized clasts, dark gray, clasts are angular to subrounded.												
	153														VOC = 1.5 ppm
731.10	154														
	155														
729.10	156		At EL. 729.0 ft, becomes fresh, moderately soft, very slightly fractured, clasts are easily friable.		C35			90	57						
	157														VOC = 7.0 ppm
727.10	158														
	159		At EL. 726.0 ft, observed zone with light greenish gray sand and fragments of hardened clay, possibly gouge.												
725.10	160														
	161		At EL. 724.0 ft, becomes granule to cobble sized clasts with fine to coarse grained sand matrix, clasts are subangular, very thickly bedded to massive, soft, very intensely fractured.		C36			55	7						
723.10	162														VOC = 5.5 ppm
	163														
721.10	164														
	165														
719.10	166		At EL. 719.0 ft, becomes soft to moderately soft.		C37			25	0						
	167														VOC = 6.3 ppm
717.10	168														
	169														
715.10	170														
	171				C38			75	42						
713.10	172		At EL. 713.1 ft, becomes intensely to moderately fractured, contains numerous joints dipping 0 to 20 degrees. Very weak.												PL
	173		At EL. 712.4 ft, observed joint, dipping 10°.												VOC = 0.0 ppm
711.10	174		At EL. 711.5 ft, observed joint, dipping 10°, Strong. PTS - Coarse grained arkosic Sandstone with crystal and rock fragments to 2mm, fragments composed of												PL PTS
	175														

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B1**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**5-12-09**	**6 of 11**

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
	175		diorite and sandstone. Fine to medium grained calcite matrix.		C38			75	42						See note at end of log regarding RQD.
709.10	176		At EL. 711.0 ft, observed joint, dipping 20°. At EL. 709.0 ft, becomes very intensely fractured, intersected clasts up to 7", abundant joints dipping 0 to 65 degrees.		C39			100	55						
	177														
707.10	178		At EL. 707.4 ft, observed joint, dipping 45°.												VOC = 0.4 ppm
	179		PTS - Quartz Diorite clast: Plutonic rock with allotriomorphic-granular texture.												PTS
705.10	180		At EL. 706.0 ft, observed joint, dipping 45°. At EL. 705.4 ft, observed joint, dipping 65°.												
	181				C40			63	13						
703.10	182														VOC = 0.0 ppm
	183		At EL. 702.8 ft, observed joint, dipping 60°, slickensided. Unit exhibits numerous joints dipping from 0 to 60 degrees, joints are typically rough, aperture uncertain due to intensely fractured nature of the unit. Weak.												
701.10	184														PL
	185														
699.10	186		At EL. 699.0 ft, becomes slightly weathered to fresh, very intensely to intensely fractured, Numerous clay lined, slickensided joints at 186' to 187' dipping 70 to 85 degrees.		C41			38	0						
	187														VOC = 0.0 ppm
697.10	188														
	189														
695.10	190														
	191		At EL. 694.0 ft, becomes granule to boulder sized. At 192.1', intersected 1.7' long diorite boulder. Boulder is intensely fractured, medium strong.		C42			79	30						
693.10	192									0	164				UC
	193														VOC = 0.0 ppm
691.10	194		Very strong.												PL
	195				C43			94	25						VOC = 0.2 ppm
689.10	196				C44			90	43						
	197		At EL. 688.5 ft, observed joint, dipping 30°, unit becomes granule to pebble sized.												
687.10	198		At EL. 688.0 ft, observed joint, dipping 35°.												
	199														VOC = 0.1 ppm
			Medium strong.												PL
685.10	200		At EL. 685.9 ft, observed joint, dipping 20°.												
	201				C45			100	22						
683.10	202		At EL. 684.0 ft, becomes moderately soft to moderately hard, moderately hard zones due to calcite cementation. At EL. 683.6 ft, observed joint, dipping 30 to 10°. Weak.												PL
	203														VOC = 0.0 ppm
681.10	204		At EL. 681.1 ft, observed joint, dipping 80°, roughly 2 foot long.												
	205														

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N/A	**D. Jankly**		**5-12-09**	**7 of 11**

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
	205				C45			100	22						See note at end of log regarding RQD.
679.10	206														
	207		At EL. 678.0 ft, observed joint, dipping 45°.		C46			28	12						VOC = 0.1 ppm
677.10	208														
	209														
675.10	210														
	211				C47			40	7						
673.10	212														VOC = 0.7 ppm
	213		At EL. 672.0 ft, observed joint, dipping 45°.												
671.10	214														
	215														
669.10	216		At EL. 669.0 ft, observed numerous slickensided joints dipping from 0 to 60 degrees.		C48			70	28						
	217									8					PA VOC = 6.3 ppm
667.10	218														
	219														
665.10	220														
	221		At EL. 664.1 ft, becomes granule to cobble sized clasts.		C49			60	27						
663.10	222		At EL. 663.0 ft, observed joint, dipping 50°.												
	223														VOC = 21.7 ppm
661.10	224		At EL. 661.5 ft, observed joint, dipping 85°.												
	225														
659.10	226														
	227		At EL. 658.8 ft, observed joint, dipping 45°.		C50			17	7						VOC = 3.7 ppm
657.10	228														
	229														
655.10	230														
	231				C51			40	7						
653.10	232		At EL. 654.0 ft, observed numerous joints dipping 0 to 20 degrees, 1mm aperture. Unit consists of angular to subrounded clasts of diorite and gneiss to 3" dia with fine to very coarse sand matrix. Soft to moderately soft, intensely fractured.												VOC = 0.9 ppm
	233														
651.10	234														
	235														

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N/A	**D. Jankly**		**5-12-09**	**8 of 11**

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
	235				C51			40	7						
649.10	236		At EL. 649.0 ft, observed predominantly diorite clasts.		C52			88	33						
	237		Weak.												PL
647.10	238		At EL. 647.8 ft, observed bedding joint, dipping 10°, 4" thick zone, thinly bedded.												
	239		Weak.												PL PTS VOC = 0.3 ppm
645.10	240		PTS - Highly fractured and altered clast of brecciated Quartz Monzonite. Very weak.												PL
	241														
643.10	242		At EL. 644.0 ft, observed numerous joints dipping 0 to 20 degrees, 1mm aperture.. Weak.		C53			53	21						PL
	243														VOC = 5.3 ppm
641.10	244														
	245														
639.10	246		At EL. 639.0 ft, observed clasts up to 5.5".		C54			60	21						
	247		At EL. 638.6 ft, observed numerous joints dipping 0 to 45 degrees.												
637.10	248														VOC = 0.4 ppm
	249														
635.10	250														
	251				C55			58	22						
633.10	252														
	253														
631.10	254		Weak.												VOC = 15.5 ppm PL
	255														
629.10	256				C56			60	8						
	257		Weak.												PL
627.10	258														
	259														VOC = 0.0 ppm
625.10	260														
	261				C57			68	18						
623.10	262		At EL. 624.0 ft, observed 1.7' thick sandstone bed with some clasts, medium to coarse grained, increasingly coarse with depth.												
	263		At EL. 622.3 ft, observed joint, dipping 45°, at base of sandstone.												
621.10	264		At EL. 621.0 ft, observed joint, dipping 65°.												VOC = 0.0 ppm CAI
	265														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B1**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**5-12-09**	**9 of 11**

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
	265				C57			68	18						See note at end of log regarding RQD.
619.10	266		At EL. 619.0 ft, becomes intensely to moderately fractured. Intersected clasts up to 8", medium strong.		C58			73	53	0	168				UC
	267														
617.10	268														
	269														VOC = 0.1 ppm
615.10	270														
	271		Very weak.												PL
			At EL. 613.9 ft, becomes very intensely fractured, with numerous slickensided surfaces.		C59			42	10						
613.10	272														
	273														VOC = 0.0 ppm
611.10	274														
	275														
609.10	276				C60			53	15						
	277														VOC = 0.0 ppm
			At EL. 608.0 ft, observed shear, dipping 70°.							8					PA
607.10	278		At EL. 607.0 ft, observed joint, dipping 65°.												
	279														
605.10	280														
	281				C61			25	15						
603.10	282		At EL. 603.6 ft, observed bedding joint, dipping 10°, clasts up to 2" observed.												VOC = 0.0 ppm
	283														
601.10	284														
	285														
599.10	286				C62			35	0						VOC = 0.0 ppm
	287														
597.10	288														
	289														
595.10	290														
	291				C63			28	7						
593.10	292														VOC = 0.0 ppm
	293														
591.10	294														
	295														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B1**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**5-12-09**	**10 of 11**

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
	295				C63			28	7						See note at end of log regarding RQD.
589.10	296		At EL. 589.0 ft, observed pebble to cobble sized clasts.		C64			88	26						
	297		At EL. 588.5 ft, observed numerous joints dipping 0 to 80 degrees.												
587.10	298														
	299														VOC = 0.0 ppm
585.10	300														
	301		Bottom of borehole at El. 585.1'.												
583.10	302		Bottom of borehole at 300.0 ft bgs												
	303		Borehole terminated at planned depth.												
			Borehole converted to piezometer at the completion of drilling.												
581.10	304		RQD values provided on the boring logs are based on intact core pieces obtained between two natural discontinuities. The majority of core obtained from this boring is typically very weak to weak and does not meet the "sound core" definition provided in the standard test method for RQD (ASTM D 6032). These RQD values should not be used to evaluate rock mass quality.												
	305														
579.10	306														
	307														
577.10	308														
	309														
575.10	310														
	311														
573.10	312														
	313														
571.10	314														
	315														
569.10	316														
	317														
567.10	318														
	319														
565.10	320														
	321														
563.10	322														
	323														
561.10	324														
	325														

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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Division of Engineering Services
Geotechnical Services
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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B1**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**5-12-09**	**11 of 11**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
J. Pratt/ T. Halda	1-13-09	1-22-09	1872415.7 ft / 6514868.4 ft NAD83	R-09-Z3B2
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Caltrans In-House			' Lt Sta S. Pasadena Ave & Calif. Blvd	781.4 ft NAVD88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wire-Line			CS 2000 (truck)	3.7 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT(1.4"), Punch Core(2.5") & HQ Rock Coring			Diedrich Automatic, 140 lb., 30 inch drop	84%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Installed Piezometer for water monitoring			NM	144.4 ft on 7-1-09	275.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		Woody debris, pine needles.		D01										This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007), except as noted in Appendix A.1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
	1		SILTY SAND (SM); loose; strong brown; moist; fine SAND; nonplastic fines; (probable Recent ponded Alluvial deposit).												
779.40	2														
	3														
777.40	4		SANDY SILT (ML); very stiff; yellowish brown; moist; fine SAND; nonplastic fines.												
	5				S02	2 7 11	18								
775.40	6														VOC=0.2 PPM
	7				C03										
773.40	8														
	9														
771.40	10				O04										
	11		Well-graded SAND with SILT and GRAVEL (SW-SM); very dense; yellowish brown to pale brown; moist; little fine to coarse GRAVEL; mostly coarse to fine SAND; few fines; dominantly hard (slightly weathered) to soft (intensely weathered) granitic rock fragments (older Quaternary Alluvium, Qoa).							10	129				UW, PI VOC=1.5 PPM
769.40	12														
	13														
767.40	14														
	15				S05	32 20 28	48			9					PA
765.40	16														VOC=0.5 PPM
	17														
763.40	18														
	19														
761.40	20				S06	19 27 25	52								
	21														VOC=0.6 PPM
759.40	22														
	23		COBBLES gravel, and sand, hard drilling.												
757.40	24														
	25														

(continued)

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Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z3B2
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	T/T	07-07-187900
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		1-26-09	1 of 10

CALTRANS BORING RECORD MET+ENG FIXED JOE - CALTRANS WITH REV Z3B2 Z3B5 Z3B7 ONLY SR-710TUNLS CT BORING LOGS11_23_09JPCOPY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method / Casing Depth	Remarks
	25		SANDY SILT (ML); hard; yellowish brown; moist; nonplastic to low plasticity fines; FeO stained.		S07	12 11 17	28							
755.40	26													VOC=0.0.5 PPM
	27		Well-graded SAND with SILT and GRAVEL (SW-SM); very dense; yellowish brown; moist; some fine to coarse GRAVEL; mostly fine to coarse SAND; subangular to subrounded hard (slightly weathered) to minor soft (intensely weathered) granitic and schist rock fragments.		C08									
753.40	28													
	29													
751.40	30				O09									
	31									9	132			VOC=2.3 PPM UW, PA
749.40	32													
	33													
747.40	34													
	35				S10	27 45 41	86							
745.40	36													VOC=2.1 PPM
	37													
743.40	38													
	39													
741.40	40				S11	13 13 30	43			15				
	41		SILT (ML); hard; yellowish brown; moist; nonplastic fines.											VOC=1.7 PPM
739.40	42		SILTY SAND (SM); very dense; yellowish brown; moist; nonplastic fines.		C12									
	43		Well-graded SAND with SILT, GRAVEL, and COBBLES (SW-SM); very dense; yellowish brown; moist; about 1 to 5% COBBLES; little fine to coarse GRAVEL; mostly coarse to fine SAND; few fines; COBBLES consist of; up to 6 in. diameter subangular to subrounded hard to moderately hard (slightly weathered) granitic rock fragments.										VOC=3 PPM
737.40	44													
	45				S13	21 42 49	91							
735.40	46													VOC=0.8 PPM
	47				C14									VOC=1.9 PPM
733.40	48													
	49													
731.40	50				S15	60								VOC=2.4 PPM
	51				C16	88/0.2'		81						
729.40	52													
	53													VOC=1.1 PPM
727.40	54													
	55													

(continued)

CALTRANS BORING RECORD MET+ENG FIXED JOE - CALTRANS WITH REV Z3B2 Z3B5 Z3B7 ONLY SR-710TUNLS CT BORING LOGS11_23_09JPCOPY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B2**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		**1-26-09**	**2 of 10**

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
	55		Well-graded SAND with SILT, GRAVEL, and COBBLES (SW-SM) *(continued)*.		S17	31 50/0.5'				11					VOC=7.1 PPM PA
725.40	56							0							
	57														
723.40	58														
	59														
721.40	60				S18	48 48 44	92								VOC=4.2 PPM
	61														
719.40	62				C19			74							
	63														VOC=2.9 PPM
717.40	64		SILTY SAND (SM); hard; yellowish brown; moist; trace coarse to fine GRAVEL; mostly medium to fine SAND; some nonplastic fines; gradationally interbedded with silty sand.							18					PA
	65				S20	9 31 38	69								VOC=135 PPM
715.40	66														
	67		Well-graded SAND with GRAVEL and COBBLES (SW); very dense; yellowish brown; moist; about 10% COBBLES; about 15 to 25% fine to coarse GRAVEL; COBBLES consist of; up to 4 in. diameter subrounded hard (slightly weathered) granitic rock fragments.		C21			63							
713.40	68														VOC=0.8 PPM
	69														
711.40	70		SILTY SAND (SM); very dense; yellowish brown; moist; trace fine GRAVEL.		S22	30 50 50	100								VOC=2. PPM
	71														
709.40	72				C23			97		15					
	73		CLAYEY SAND (SC); dense to very dense; strong brown; moist; nonplastic fines; gradationally interbedded with silty sand, possible hardpan (paleosol).												VOC=1.4 PPM
707.40	74														
	75				S24	16 45 50	95								VOC=1.9 PPM
705.40	76		Well-graded SAND with GRAVEL (SW); very dense; yellowish brown to light yellowish brown; moist; about 0 to 10% fine to coarse GRAVEL; fine to coarse SAND; interbedded with up to 10% silty sand, subangular hard sheared granitic rock fragments.		C25			97							
	77														
703.40	78														VOC=2.3 PPM
	79														
701.40	80		Poorly graded SAND with GRAVEL (SP); very dense; yellowish brown to light yellowish brown; moist; little coarse to fine GRAVEL; mostly coarse to fine SAND; trace fines.		S26	24 48 41	89								VOC=6.1 PPM
	81														
699.40	82				C27			91		15					PA
	83														VOC=0.8 PPM
697.40	84														
	85														

(continued)

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE: **BORING RECORD**
HOLE ID: **R-09-Z3B2**

DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	T/T	07-07-187900

PROJECT OR BRIDGE NAME: **SR-710 TUNNEL TECHNICAL STUDY**

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
	J. Pratt, M. Islam	1-26-09	3 of 10

CALTRANS BORING RECORD MET+ENG FIXED JOE - CALTRANS WITH REV Z3B2 Z3B5 Z3B7 ONLY SR-710TUNLS CT BORING LOGS11_23_09JPCOPY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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
	85		Poorly graded SAND with GRAVEL (SP) *(continued)*.		S28	50 70 50/0.4'									VOC=4.9 PPM
695.40	86														
	87		SILTY SAND (SM); very dense; strong brown to light yellowish brown; moist; trace fine GRAVEL; mostly coarse to fine SAND; interbedded with well graded sand and sandy silt, about 75% silty sand, about 20% well graded sand, crosslaminated.		C29			92							VOC=1.0PPM
693.40	88														
	89														
691.40	90				S30	27 35 22	57			15					PA VOC=2.3 PPM
	91														
689.40	92				C31			74							VOC=0.4 PPM
	93														
687.40	94														
	95		Well-graded SAND (SW); very dense; light yellowish brown; moist; trace fine to coarse GRAVEL; (up to 1 in. dia.) hard granitic rock fragments.		S32	42 26 75/0.4'									VOC=0.1 PPM
685.40	96														
	97				C33			100							
683.40	98		Well-graded SAND with GRAVEL (SW); very dense; light yellowish brown to yellowish brown; moist; about 5% COBBLES; coarse GRAVEL; up to 4 in. diameter subangular hard (slightly weathered) sheared quartz diorite rock fragments, little silt interbeds.												VOC0.0 PPM
	99														
681.40	100		SILTY SAND (SM); dense to very dense; strong brown to reddish brown; moist; trace GRAVEL; mostly coarse to fine SAND; little nonplastic to low plasticity fines; interbedded with about 20% well graded sand and 25% silt, intensely weathered soil and quartz diorite and schist rock fragments.		S34	24 25 35	60			17					PA VOC=1.9 PPM
	101														
679.40	102				C35			91							
	103														VOC=0.8 PPM
677.40	104														
	105				S36	11 15 20	35								VOC=1.8 PPM
675.40	106														
	107				C37			100		18					
673.40	108														VOC=0.4 PPM
	109														
671.40	110		SILTY SAND (SM); very dense; yellowish brown to reddish brown; moist; few fine GRAVEL; mostly coarse to fine SAND; some nonplastic to low plasticity fines; gradationally interbedded with clayey sand, subangular hard (slightly weathered) to soft (intensely weathered) quartz diorite and schist rock fragments, intensely weathered zone (paleosol).		S38	16 15 31	46								VOC=0.48 PPM
	111														
669.40	112				C39			100		12					PA
	113														VOC=0.1 PPM
667.40	114														
	115														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED JOE - CALTRANS WITH REV Z3B2 Z3B5 Z3B7 ONLY SR-710TUNLS CT BORING LOGS11_23_09JPCOPY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE: **BORING RECORD**
HOLE ID: **R-09-Z3B2**

DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	T/T	07-07-187900

PROJECT OR BRIDGE NAME: **SR-710 TUNNEL TECHNICAL STUDY**

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
	J. Pratt, M. Islam	1-26-09	4 of 10

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
	115		CLAYEY SAND (SC); dense to very dense; very stiff to hard; yellowish brown to reddish brown mottled; moist; nonplastic to low plasticity fines; to sandy lean clay, intensely weathered (paleosol or regolith).		S40	10 15 21	36								VOC=0.2 PPM
665.40	116														
	117				C41			69		14					PI
			CLAYEY SAND (SC); very dense; very stiff; light yellowish brown to yellowish red mottled; moist to wet; nonplastic to low plasticity fines; wet between EL 663.1 to 662.6 ft, minor weakly calcite cemented sand, intensely weathered soft (paleosol/regolith).												VOC=0.2 PPM
663.40	118														
	119														
661.40	120				S42	26 50/.2'						PP = 3.0 to 4.0			VOC=0.1 PPM
	121		METAMORPHIC ROCK, (GNEISS); medium-grained to aphanitic; thinly to moderately foliated (0.2 to 1.0 ft), foliations dip 20°, dark yellowish orange to light brown, decomposed to intensely weathered; very soft to soft; intensely fractured; joints dip from 60 to 80°, very thin slightly open fractures partly filled with clay and FeO (forms rubble), moderately thin totally silica healed fractures below EL +654.4 ft [fractures moderately rough; friable (Well graded SAND with CLAY (SW-SC), very dense). **[Wilson Quartz Diorite]**.		C43			100	0						
659.40	122														VOC=0.0 PPM
	123														
657.40	124														
	125				S44	60/.33'									
					C45			51	0						
655.40	126														
	127														
653.40	128														VOC=0.0 PPM
	129														
651.40	130				C46			0							
	131														
649.40	132														
	133		METAMORPHIC ROCK, (GNEISS); coarse-grained to very coarse-grained; generally foliated, pale yellowish brown to yellowish gray, intensely weathered, moderately soft to moderately hard, very intensely fractured, joints dip 55°, thin moderately open fractures partly healed with clay and FeO, some thin fractures (3 to 5 mm thick) moderately healed with silica or feldspar and dip 25 to 30°, and 55°; friable; estimated upper contact.											
647.40	134														
	135				C47			38	0						
645.40	136														
	137														
643.40	138														VOC=0.0 PPM
	139														
641.40	140				C48			42	0						
	141														
639.40	142														
	143														VOC=0.6 PPM
637.40	144														
	145														

(continued)

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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B2**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		**1-26-09**	**5 of 10**

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
	145		*(continued).*		C49			70	10						UW, PL
635.40	146		METAMORPHIC ROCK, (GNEISS); medium-grained; generally foliated, pale yellowish brown to dark gray, intensely weathered, decomposed below EL 635.1 ft; moderately hard to hard; intensely fractured; below EL 635.1 ft, very soft (decomposed gneiss altered to clay with slickensides); rubble.							0	160				
	147														
633.40	148		METAMORPHIC ROCK, (GNEISS); generally foliated, light brownish gray to white, intensely weathered, moderately hard to hard, very intensely to intensely fractured, joints dip 60º, 75º, and 40 to 25º, very closely spaced fractures (7 mm spacing) below EL 633.4 ft; seams infilled with FeO and intensely weathered to decomposed mica (weathered to clay); fractures not healed.											VOC=0.4 PPM
	149														
631.40	150				C50			58	0						
	151														
629.40	152		METAMORPHIC ROCK, (GNEISS);, light brownish gray to white, intensely weathered, moderately hard to hard, intensely to moderately fractured, joints dip 65 to 75º, closely to moderately spaced (0.4 to 0.1 ft), FeO and clay lined, not healed. Below EL 629.2 ft,, aphanitic to medium-grained, very intensely to intensely fractured, joints dip 25-30º and 65-75º (jointsets), very close to closely spaced (0.05 to 0.3 ft), subvertical joints not healed (FeO and clay infill); low angle joints moderately to totally healed with FeO and silica (0.5 to 10 mm thick).										VOC=0.3 PPM
	153														
627.40	154														
	155				C51			56	16						
625.40	156														
	157		METAMORPHIC ROCK, (GNEISS); generally foliated, light gray to brownish gray, hard, intensely fractured, (decomposed seams); joints dip 80º, 50-55º, 65-25º, FeO and silica lined fractures are moderately healed to not healed; wet clay lined fractures (1 to 10 mm thick) not healed, slightly rough, slickensides on low angle shears, 5 to 30 mm fracture [spacing, lots rubble].										VOC=1.1 PPM
623.40	158														
	159														
621.40	160				C52			68	8						
	161														
619.40	162														VOC=0.5 PPM
	163														
617.40	164														
	165				C53			38	0						
615.40	166		METAMORPHIC ROCK, (GNEISS); intensely weathered, hard, very intensely to intensely fractured, fracture zone , forms rubble.												
	167		METAMORPHIC ROCK, (GNEISS); decomposed to intensely weathered, very soft to soft, possible veins/dike, seams weathered to clay (Well graded SAND with CLAY (SW-SC)).												VOC=0.9 PPM
613.40	168														
	169														
611.40	170		METAMORPHIC ROCK, (GNEISS); possibly thinly foliated (0.1 to 0.3 ft), yellowish gray, intensely weathered, hard, intensely fractured, continuous joints dip 60 to 70º and 25 to 40º, partly healed with silica and infilled with clay, slightly rough surfaces,.		C54			48	0						UW, PL
	171														
609.40	172									0	155				
	173														VOC=0.4 PPM
607.40	174														
	175														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED JOE - CALTRANS WITH REV Z3B2 Z3B5 Z3B7 ONLY SR-710TUNLS CT BORING LOGS11_23_09JPCOPY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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Division of Engineering Services
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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B2**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		**1-26-09**	**6 of 10**

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
	175		*(continued).*		C55			88	7						
605.40	176		METAMORPHIC ROCK, (SCHIST); fine- to medium-grained; intensely foliated (<3mm); intensely weathered to decomposed (possible altered mafic dike), dark gray, intensely weathered to decomposed (possible altered mafic dike); moderately hard; intensely to moderately fractured; fractures very closely spaced (10 to 15 mm), partly silica healed, remainder infilled with soft clay (not healed), [slightly to moderately open fractures (0.5 to 3 mm)].											
	177														
603.40	178														VOC=0.3 PPM
	179														
601.40	180		METAMORPHIC ROCK, (SCHIST); Chloritic, dark greenish gray, decomposed, very soft to soft, (decomposed to Lean CLAY (CL), medium plasticity, moist)).		C56			88	0						
	181		METAMORPHIC ROCK, (GNEISS); very thinly foliated, light gray to pale yellowish brown, intensely weathered to decomposed; mostly hard to some soft; very intensely to intensely fractured; soft clay lined fractures not healed (slightly open to moderately open, 0.5 to 2 mm), forms rubble (some Poorly graded GRAVEL with CLAY and SAND (GP-GC)).											
599.40	182														
	183														VOC=0.9 PPM
597.40	184		METAMORPHIC ROCK, (GNEISS);, medium light gray, intensely weathered, hard, intensely fractured, joint sets dip 80 to 70º, 60º, and 30º, fractures partly healed with silica and remainder infilled with soft clay (not healed, moderately open, 1 to 2 mm), slightly rough to smooth surfaces; rubble.											
	185				C57			85	10						
595.40	186														
	187		METAMORPHIC ROCK, (GNEISS);, fine-grained to medium-grained, medium light gray, intensely weathered to decomposed; hard to some very soft; very intensely to intensely fractured; joints dip 70º to 20º, very closely spaced (10 to 20 mm fracture spacing), siliceous & clay lined (1 to 2 mm), slightly rough to smooth surfaces [breaks down to rubble and coarse sand (some Poorly graded GRAVEL with SAND (GP))].											
593.40	188														
	189				C58			71	0						
591.40	190														
	191		METAMORPHIC ROCK, (GNEISS);, white to dark greenish gray, decomposed to intensely weathered; very soft to moderately soft; very intensely fractured; very closely spaced fractures (10 mm spacing) dip 70º, altered clay material is moist to wet (mostly Poorly graded GRAVEL with CLAY and SAND (GP-GC), moist to wet).											
589.40	192														
	193														
587.40	194		METAMORPHIC ROCK, (GNEISS); fine-grained to aphanitic; thinly to moderately foliated (0.2 to 0.4 ft), greenish gray to medium bluish gray, intensely to moderately weathered, hard, intensely fractured, fractures dip 20 to 30º, and 50º, closely spaced (0.2 to 0.3 ft), chlorite and slickensides on shear and fracture surfaces, fractures/shears partly calcite healed.		C59			80	0						
	195				C60			17	0						
585.40	196														
	197		METAMORPHIC ROCK, (GNEISS);, medium gray to white, mostly decomposed (80%) to intensely weathered; mostly very soft to little hard; intensely fractured; chloritic alteration, (mostly Poorly graded GRAVEL with CLAY and SAND (GP-GC); Pressure meter test (195-201 ft depth).											
583.40	198														
	199														
581.40	200														
	201				C61			93	0						
579.40	202		METAMORPHIC ROCK, (GNEISS);, medium-grained to fine-grained, medium gray to medium light gray, mostly moderately to intensely weathered (75%) with little thin (0.1 to 0.3 ft) decomposed intervals (25%); mostly hard to little very soft; intensely fractured, joints dip 75-70º, 50º & 25º, [closely spaced (0.1 to 0.3 ft), continuous, partly healed with silica, clay lined (not healed), slightly rough surfaces (little Poorly graded SAND with CLAY (SP-SC))].											
	203														VOC=0.9 PPM
577.40	204														
	205														

(continued)

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Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B2**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		**1-26-09**	**7 of 10**

CALTRANS BORING RECORD MET+ENG FIXED JOE - CALTRANS WITH REV Z3B2 Z3B5 Z3B7 ONLY SR-710TUNLS CT BORING LOGS11_23_09JPCOPY GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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
	205				C62			100	0						
575.40	206		METAMORPHIC ROCK, (GNEISS);, medium-grained, medium gray to medium light gray, mostly intensely weathered (70%) to some decomposed (30%); mostly moderately hard to some very soft; very intensely to intensely fractured; joints dip 70-80°, 50°, & 25 to 35°, very thin subvertical fractures very closely spaced (7 mm) [and totally silica healed, remaining lower angle joints are partly healed with silica and calcite and not healed with clay infill, slickensides plunge 20° on subvertical shears (some Lean CLAY with SAND (CL))].											
	207														
573.40	208														VOC=1.0 PPM
	209														
571.40	210				C63			86	0						
	211		METAMORPHIC ROCK, (GNEISS);, medium gray to medium dark gray, decomposed, very soft to soft, (Lean CLAY (CL), soft).												
569.40	212		METAMORPHIC ROCK, (GNEISS); medium-grained to fine-grained; very thinly to thinly foliated (dip 20°), medium gray to medium light gray, intensely to moderately weathered, moderately hard to hard, very intensely to intensely fractured, irregular discontinuous fractures dip 60 to 70° and 20°, fractures partly healed with chlorite and silica, slightly rough surfaces, 35% rubble.											
	213														VOC=0.8 PPM
567.40	214														
	215				C64			96	0						
565.40	216														
	217		METAMORPHIC ROCK, (GNEISS);, medium-grained, medium light gray to medium gray, mostly intensely to moderately weathered (80%) to little decomposed (20%); mostly moderately hard to little very soft; intensely fractured; joints dip 75°, 50°, and 25°, subvertical joints are very closely spaced (30 mm), low angle joints [are closely spaced (60 to 70 mm), continuous not healed fractures are lined with minor chlorite and rare calcite, moderately to slightly rough surfaces (little Lean CLAY (CL))].											
563.40	218														VOC=0.5 PPM
	219														
561.40	220				C65			100	0						
	221		METAMORPHIC ROCK, (GNEISS); medium-grained; foliated, medium gray, mostly moderately to intensely weathered (5% decomposed), mostly moderately hard to few soft; very intensely to intensely fractured; joints dip 70° and 20°, closely to very closely spaced (<0.1 to 0.2 ft) [subvertical very thin (0.5 mm thick) fractures moderately healed with silica, moderately rough surfaces]. Below EL 559.2 ft becomes, dark gray, (Pressuremeter test from 221.0 to 227.0 ft depth).		C66			76	0					
559.40	222														
	223														
557.40	224														
	225														
555.40	226				C67			100	0						
	227		METAMORPHIC ROCK, (GNEISS); medium-grained; foliated, medium light gray to medium gray, moderately to intensely weathered; moderately hard; very intensely to intensely fractured; joints dip 70 to 80° & 20-25°, continuous subvertical joints partly healed with silica and not healed with clay infill [slightly rough surfaces, 80% soft decomposed below EL 551.4 ft].		C68			77	20	3	156			UW, PTS, PL
553.40	228														
	229														VOC=0.8 PPM
551.40	230				C69			88	0						
	231														
549.40	232														
	233		IGNEOUS ROCK (QUARTZ DIORITE; medium-grained, medium light gray, moderately to slightly weathered, hard to very hard, intensely fractured, low angle moderately open joints lined with waxey chlorite, slickensides show 65° rake from horizontal in 50° dip shear planes; continuous joints dip 75°, 50°, and 20°, closely (40 mm) to very closely													VOC=0.8 PPM
547.40	234														
	235		(10												

(continued)

CALTRANS BORING RECORD MET+ENG FIXED JOE - CALTRANS WITH REV Z3B2 Z3B5 Z3B7 ONLY SR-710TUNLS CT BORING LOGS11_23_09JPCOPY GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B2**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		**1-26-09**	**8 of 10**

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
	235		mm) spaced, [moderate and low angle joints closely spaced, subvertical joints very closely spaced and moderately healed with very thin silica (0.5 to 1 mm thick)]. *(continued).*		C70			94	22						
545.40	236														
	237		METAMORPHIC ROCK, (MARBLE) (partly replaced with QUARTZ DIORITE in patches); medium- to coarse-grained, light gray to medium light gray, moderately to intensely weathered; moderately hard; intensely fractured, low angle moderately open joints lined with waxey chlorite, high and low angle fractures moderately healed with calcite [fractures very closely spaced (20 to 25 mm), possible crinoidal debris in recrystalized mass].											VOC=0.8 PPM
543.40	238														
	239														
541.40	240				C71			83	15						
	241		At EL. 542.4 ft, becomes dark greenish gray, intensely fractured, joints dip 70º, 50 to 45º, and 20º, joints partly healed with calcite and chlorite infill to totally healed with calcite, 10% very soft decomposed interval altered to clay (few Lean CLAY (CL)).											VOC=0.9 PPM
539.40	242														
	243		METAMORPHIC ROCK, (MARBLE)(partly replaced with QUARTZ DIORITE in patches); medium-grained, dark greenish gray to light brownish gray, moderately to intensely weathered; moderately soft; intensely fractured, joints dip 80º , 50º, and 20º, partly to totally healed with calcite, moderately thin (1 to 2 mm) subvertical calcite veins very closely spaced (15 mm).		C72			92	0						
537.40	244														
	245														
535.40	246		METAMORPHIC ROCK, (MARBLE) (partly replaced with QUARTZ DIORITE in mixed patches and layers); medium- to coarse-grained, medium light gray to greenish gray, intensely to moderately weathered, moderately soft to moderately hard, intensely fractured, joints dip 75 to 60º, 50º, and 20º, joints partly to totally calcite healed (1 to 2 mm calcite veins), all continuous, some clay lined not healed open joints.												
	247				C73			50	0						
533.40	248														
	249		METAMORPHIC ROCK, (MARBLE);, medium-grained, greenish gray, intensely to moderately weathered, moderately hard, very intensely to intensely fractured, joints dip 20 to 30º and 60º, subvertical joints very closely spaced, low angle joints closely spaced, partly to totally calcite healed.		C74			80	0						
531.40	250				C75			80	0						
	251				C76			88	8						
529.40	252		IGNEOUS ROCK (DIORITE to QUARTZ DIORITE); medium- to coarse-grained, medium gray, intensely to moderately weathered, hard to very hard, intensely fractured, continuous joints dip 85 to 70º and 30º, very closely spaced subvertical joints partly healed with calcite and some infilled with clay and slightly open, low angle joints partly healed to totally healed with calcite (1 to 2 mm thick).												
	253														VOC=1.0 PPM
527.40	254														
	255				C77			80	7						
525.40	256														
	257														
523.40	258		IGNEOUS ROCK (DIORITE to QUARTZ DIORITE); medium- to coarse-grained, medium gray, moderately to intensely weathered; hard; moderately to intensely fractured; continuous subvertical joints dip approximately 70º.												VOC=0.9 PPM
	259														
521.40	260				C78			74	9						
	261														
519.40	262		IGNEOUS ROCK (DIORITE to QUARTZ DIORITE); medium- to coarse-grained, light olive gray to greenish gray, decomposed, very soft, (Lean CLAY (CL), stiff to hard clay (PP=1.0 to >4.5 tsf).												
	263														VOC=1.0 PPM
517.40	264														
	265														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED JOE - CALTRANS WITH REV Z3B2 Z3B5 Z3B7 ONLY SR-710TUNLS CT BORING LOGS11_23_09JPCOPY GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B2**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		**1-26-09**	**9 of 10**

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
	265		*(continued).*		C79			70	0						
515.40	266		IGNEOUS ROCK (DIORITE to QUARTZ DIORITE); medium- to coarse-grained, medium dark gray to medium light gray, intensely to moderately weathered, few (8%) decomposed intervals sometimes along fractures; moderately hard to hard (few zones very soft); intensely to moderately fractured, shear dipping 45° is waxey clay lined with slickensides showing 70° rake from horizontal on fracture plane, [slightly rough surface), joints dip 80 to 70°, 50°, and 20°, subvertical joints very closely spaced, low angle joints moderately to closely spaced, partly healed to not healed with calcite, clay lined (few Lean CLAY (CL) intervals)].											VOC=0.9 PPM
513.40	268														
	269				C80			90	0						
511.40	270														
	271														
509.40	272														
	273				C81			85	0						
507.40	274														
	275		Bottom of borehole at 275.0 ft bgs Borehole was converted to piezometer at the completion of drilling.												
505.40	276														
	277														
503.40	278														
	279														
501.40	280														
	281														
499.40	282														
	283														
497.40	284														
	285														
495.40	286														
	287														
493.40	288														
	289														
491.40	290														
	291														
489.40	292														
	293														
487.40	294														
	295														

CALTRANS BORING RECORD MET+ENG FIXED JOE - CALTRANS WITH REV Z3B2 Z3B5 Z3B7 ONLY SR-710TUNLS CT BORING LOGS11_23_09JPCOPY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B2**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		**1-26-09**	**10 of 10**

LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
J. Castle, B. Schell 2-4-09 2-13-09	34° 7' 52.6146" / 118° 9' 17.823" NAD83	R-09-Z3B3
DRILLING CONTRACTOR: Cascade Drilling Inc.	BOREHOLE LOCATION (Offset, Station, Line): ' Lt Sta Bellefontaine St at St. John Ave	SURFACE ELEVATION: 801.90 ft NAVD 88
DRILLING METHOD: Rotary Wash	DRILL RIG: Speed Star 30K	BOREHOLE DIAMETER: 6 in
SAMPLER TYPE(S) AND SIZE(S) (ID): SPT (1.4"), Cal (2.4"), PQ core (3.2")	SPT HAMMER TYPE: Automatic Hammer 140 lb. 30 inch drop	HAMMER EFFICIENCY, ERi: 70%
BOREHOLE BACKFILL AND COMPLETION: Piezometer Installed on Completion	GROUNDWATER READINGS DURING DRILLING: NM AFTER DRILLING (DATE): 136.0 ft on 7-1-09	TOTAL DEPTH OF BORING: 275.5 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	Remarks
	0		GRASS and LANDSCAPE (Fill).												This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007) except as noted in Appendix A1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
	1		SILTY SAND (SM); Loose, yellowish brown, medium to fine SAND [ALLUVIUM].												
799.90	2														
	3														
797.90	4														
	5														
795.90	6														
	7														
793.90	8														
	9														
791.90	10		Dense, yellowish brown mottled with brown, moist, fine SAND, micaceous, oxidized.		S1	9 12 15	27	100							
	11														
789.90	12														
	13														
787.90	14														
	15		Poorly graded SAND with GRAVEL (SP); dense, yellowish brown, moist, subangular GRAVEL, max. 3/4" dia.; coarse SAND, micaceous, granitic source.		D2	28 50/5		100							
785.90	16														
	17														
783.90	18														
	19														
781.90	20				S3	16 29 36	65	100							
	21														
779.90	22														
	23														
777.90	24														
	25														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR710_BORINGLOG_3_13_2010.GPJ CALTRANS LIBRARY 040808.GLB 3/14/10

Department of Transportation
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Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z3B3
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	D/D	07-187900
PROJECT OR BRIDGE NAME: SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	K.T		6-22-09	1 of 10

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		Poorly graded SAND with GRAVEL (SP) *(continued)*. Same as above. At EL. 775.99', becomes GRAVEL max. 2 1/4" dia.		D4	20 50/5		100							
775.99	26														
	27														
773.99	28														
	29														
771.99	30				S5	12 22 33	55	100							
	31														
769.99	32														
	33														
767.99	34														
	35				D6	50/6		100							
765.99	36														
	37														
763.99	38														
	39														
761.99	40		SILTY SAND (SM); very dense, yellowish brown and strong brown, moist, fine to very fine SAND, micaceous, oxidized.		S7	18 24 38	62	100							
	41														
759.99	42														
	43														
757.99	44														
	45		Assume Silty SAND as above.		D8	50/6		0							Note: Sampler Jammed with rock that fell into hole
755.99	46														
	47														
753.99	48														
	49														
751.99	50		No recovery.		D9	24 50/3		0							
	51														
749.99	52														
	53														
747.99	54														
	55														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B3**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**2 of 10**

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
	55		SILT (ML); yellowish brown, moist, nonplastic fines, finely micaceous.		S10	17 50/1		100						
745.99	56		GRAVELLY SILT (ML); medium stiff, dark yellowish brown, moist, about 50%, GRAVEL, max. 1" dia.; nonplastic fines, GRAVEL consists of diorite, subrounded to subangular, oxidized.											
	57													
743.99	58													
	59													
741.99	60		SILT (ML); yellowish brown, moist, finely micaceous.		D11	50/0.5		100						
	61		Poorly graded SAND with GRAVEL (SP); very dense, dark yellowish brown, moist, about 10% GRAVEL, max.1" dia.; coarse to fine SAND, GRAVEL consist of diorite, subangular, uncemented, unbedded.											
739.99	62													
	63													
737.99	64													
	65													
			SILTY SAND (SM); very dense, yellowish brown to brown, moist, trace fine GRAVEL, coarse to medium SAND.		S12	29 39 50/4		100						
735.99	66													
	67													
733.99	68													
	69													
731.99	70		SILTY CLAY (CL-ML); hard, brown to dark yellowish brown, moist, medium plasticity; 0.2" to 0.4" thick beds, horizontal bedding, oxidized, trace of organic material.		D13	19 50/5		100						
	71													
729.99	72		SILTY SAND (SM); dense, brown mottled with yellowish brown, moist, fine GRAVEL, coarse to fine SAND, about 20% nonplastic fines, dendritic manganese.											
	73													
727.99	74													
	75				S14	50/6		100						
725.99	76													
	77													
723.99	78													
	79													
721.99	80		SILTY SAND with GRAVEL (SM); very stiff, dark brown mottled with dark yellowish brown, about 10% fine GRAVEL, max. 1/2" dia; coarse to fine SAND, GRAVEL consist of diorite, subrounded to subangular, increase in fine towards bottom, unbedded, one 0.08"-thick vein.		D15	9 18 27	45	100						
	81													
719.99	82													
	83													
717.99	84													
	85													

(continued)

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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B3**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**3 of 10**

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
	85													
715.99	86		Well-graded SAND with GRAVEL (SW); very dense, yellowish brown, moist, about 30% subangular to subrounded GRAVEL, max. 1.5" dia.; coarse to fine SAND, gravel consist of diorite.		S16	50/6		100						
	87													
713.99	88													
	89													
711.99	90				D17	32	80	100				PP =		
	91		SILTY SAND (SM); very dense, brown to yellowish brown, moist, about 20% fine GRAVEL, medium to fine SAND, sharp contact 20° dip; gravel consist of igneous and metamorphic rocks, more oxidized, more rounded, grading down to bottom.			39						2.75		
709.99	92					41								
	93													
707.99	94													
	95													
705.99	96		Poorly graded SAND with SILT and GRAVEL (SP-SM); very dense, brown to yellowish brown, moist, fine GRAVEL, max. 1/4" dia.; coarse to fine SAND, 2" to 4" thick horizontal bedding.		S18	23	84	100						
	97					34								
703.99	98					50								
	99													
701.99	100		SILTY SAND (SM); very dense, yellowish brown mottled with brown, moist, coarse to fine SAND, micaceous, oxidized.		D19	10		100						
	101					50/5								
699.99	102													
	103													
697.99	104													
	105				S20	20		100						
695.99	106					50/6								
	107													
693.99	108													
	109													
691.99	110		At EL. 691', trace GRAVEL, max. 1/4" dia.		D21	20		100						
	111					50/6								
689.99	112													
	113													
687.99	114													
	115													

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B3**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**7-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**4 of 10**

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
	115														
			No recovery.		S22	20 50/6		0							
685.99	116														
	117														
683.99	118														
	119														
681.99	120														
			Poorly graded SAND with GRAVEL (SP); very dense, yellowish brown, moist, coarse to fine subangular GRAVEL, max. 1.5" dia.; coarse to fine SAND, gravels consist of feldspar rich granitic rock.		S23	50/6		100							
	121														
679.99	122														
	123														
677.99	124														
	125														
			Well-graded GRAVEL (GW); very dense, gray to dark gray, moist, coarse to fine GRVEL; gravel consist of diorite and granite, slightly weahtered, hard, slightly fractured, 10% dark minerals, oxidized.		D24	50/5		100							
675.99	126														
	127				C1			55							
673.99	128											PP = 3			
			SILT (ML); very stiff, nonplastic, slightly micaceous.												
	129														
671.99	130		SILTY SAND (SM); medium dense, brown to dark yellowish brown, moist, fine SAND, about 5% low plasticity fines, very stiff, sharp contact.		C2			100				PP = 3			
	131														
			Well-graded GRAVEL with SAND (GW); dense, brown to dark yellowish brown, moist, trace COBBLE; coarse GRAVEL; max. 2.5" dia.; coarse to fine SAND; about 5% low plasticity fines; gravel consist of diorite, gabbro and gneiss, hard to decomposed.											
669.99	132														
	133				C3			55							
			SILTY SAND (SM); dense to medium dense, dark yellow to brown, medium to fine SAND; about 20% nonplastic fines.												
667.99	134														
	135														
			Well-graded GRAVEL with SAND (GW); dense, multi colored, moist, trace BOULDER; about 20% COBBLES; coarse to fine SAND; nonplastic fines; cobbles consist of diorite, quartz diorite, gabbro, granite, gneiss rocks, hard to decomposed, rounded to subrounded.											
665.99	136														
	137														Lost core at EL. 666.5' to 662'
663.99	138														
	139														
661.99	140				C4			58							Lost core
	141				C5			67							
659.99	142														
	143														
657.99	144				C6			22							Lost core
	145														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B3**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**5 of 10**

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
	145		Well-graded GRAVEL with SAND (GW) *(continued)*.												
655.99	146				C7			42							Difficult to drill
	147				C8			27							
653.99	148														
	149														
651.99	150														
	151														
649.99	152		Poorly graded SAND with GRAVEL (SP); dense, reddish brown, moist, about 35% coarse to fine GRAVEL, max. 2.75" dia.; coarse SAND; gravel consist of igneous and metamorphic rocks, hard to decomposed, subrounded to rounded, horizontal bedding.		C9			75							most likely Pleistocene age soil horizon based on oxidation and density
	153														
647.99	154		At EL. 648', becomes yellowish brown, moist, wide variety of igneous and metamorphic rocks, hard to decomposed.		C10			100							
	155														
645.99	156		COBBLES with some well graded SAND with GRAVEL; medium desne to dense, brown and yellowish brown, moist, about 60% COBBLES, medium to coarse SAND; cobbles consist of igneous and metamorphic rocks, well rounded to subrounded, hard to decomposed.												
	157														
643.99	158														
	159				C11			0							
641.99	160														
	161														
639.99	162														
	163														
637.99	164				C12			50							
	165														
635.99	166														
	167														
633.99	168		Poorly graded SAND (SP); dense, yellowish brown, moist, coarse SAND.												
	169		SILT (ML); stiff, yellowish brown, moist, nonplastic, micaceous. no bedding.		C13			60							Lost core at top
631.99	170		Well-graded SAND with GRAVEL (SW); dense, yellowish brown, moist, little GRAVEL, max. 4" dia.; coarse SAND, gravel consist of igneous and metamorphic rocks.												
	171														
629.99	172														
	173														
627.99	174				C14			60							
	175														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B3**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**6 of 10**

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
	175														
625.99	176				C14			60							See note at end of log regarding RQD.
	177		Well-graded SAND with GRAVEL (SW) *(continued)*.												
623.99	178		At EL. 624.2', gabbro boulder, soft, crumbly.												
	179				C15			70							
621.99	180		COBBLES , BOULDERS, GRAVEL; multi colored, about 50% COBBLES, about 10% BOULDERS, about 30% GRAVEL, about 10% coarse SAND matrix, cobbles consist of igneous and metamorphic rocks, rounded to subrounded, hard to decomposed, some oxidized, some fresh.												
	181														
619.99	182														
	183														
617.99	184				C16			48							
	185														
615.99	186														
	187														
613.99	188														
	189				C17			92	0						
611.99	190		IGNEOUS and METAMORPHIC ROCKS (DIORITE, QUARTZ DIORITE, QUARTZ MONZONITE, foliated DIORITE, GNEISS); intersecting intrusive bodies and dikes; fine-grained to coarse-grained, light gray to bluish green, intensely weathered, soft, (FAULT GOUGE, intensely sheared and altered to SANDY CLAY; stiff, coarse to fine SAND, high plasticity fines) (WILSON QUARTZ DIORITE).												
	191														
609.99	192														
	193														
607.99	194				C18			67	0			PP = 3.5 to 4.5			
	195														
605.99	196														
	197				C19			87	0			PP = 4.5			
603.99	198														
	199														
601.99	200														
	201														
599.99	202														
	203														Lost core
597.99	204		At EL. 597.5', becomes FAULT GOUGE.		C20			79	0						
	205														

(continued)

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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B3**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**7 of 10**

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
	205				C20			79	0						See note at end of log regarding RQD.
595.99	206														
	207														
593.99	208														
	209														
591.99	210														Lost core
	211		At EL. 593', sheared, altered igneous and metamorphic rocks in SANDY CLAY matrix, dark gray to bluish green, about 50% dark minerals, joints and shears dipping 35° to 45°, clay filling small scale fault, dipping 40°.		C21			75	0			PP = 4.5			
589.99	212														
	213														
587.99	214														
	215														
585.99	216														Lost core
	217														
583.99	218				C22			83	0						
	219														
581.99	220														
	221														
579.99	222				C23			40	0						
	223														
577.99	224														Lost core
	225														
575.99	226														
	227				C24			73	0						
573.99	228														
	229														
571.99	230														
	231				C25			58	0						
569.99	232		At EL. 569.5', hard zones; highly fractured and sheared igneous and metamorphic rocks, decomposed.												
	233														
567.99	234														
	235														

(continued)

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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B3**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**8 of 10**

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
	235				C26			10	0						See note at end of log regarding RQD. Very poor recovery
565.99	236														
	237														
563.99	238														
	239		At EL. 562', sheared DIORITE, soft, decomposed, oxidized, altered.												
561.99	240				C27			0	0						
	241														
559.99	242														
	243														
557.99	244				C28			50	58			PP = 4.5			
	245		At EL. 556.6', hard fragment of sheared diorite, max. 2.25" dia.												
555.99	246									13	125				PI
	247		At EL. 555', fault gouge zone with CLAYEY SAND; about 2% GRAVEL, about 64% coarse to fine SAND, about 34% nonplastic fines; gravel consists of igneous and metamorphic rocks, decomposed, intensely fractured and sheared.									PP = >4.5			
553.99	248				C29			100	100						Difficult to drill at EL. 554'
	249														
551.99	250		IGNEOUS and METAMORPHIC ROCKS (DIORITE): fine grained to coarse grained, gray, moderately weathered, hard, intensely fractured, abundant soft zones of sheared and altered rocks.												
	251														
549.99	252		At EL. 549.8', slickensides on fault surface, reddish brown, oxidation, clay filling, dipping 35°.												
	253		At EL. 548', minor scale fault dipping 30°.												
547.99	254				C30			98	45	4					CS & EM, UC
	255		At EL. 546', altered DIORITE, soft to moderately soft, fractured.												
545.99	256														
	257		At EL. 545', wavy fracture with oxidized clay filling, smooth polished surface, dipping 30°.												
543.99	258														
	259		At EL. 543', becomes healed fault, dipping 40°, abundant slickenside.												UC
541.99	260		At EL. 542.5', FAULT GOUGE, light gray, very soft, altered to sandy clay.												
	261		At EL. 540.5', recemented igneous rock, moderately hard, altered.												
539.99	262														
	263														
537.99	264				C31			100	0						
	265														

(continued)

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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B3**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**9 of 10**

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
	265		*(continued).*		C31			100	0						See note at end of log regarding RQD.
535.99	266		At EL. 535.5', shattered zone, moderately hard, 1.25" wide.												
	267														
533.99	268		At EL. 533', calcite crystals, max. 1/4" dia.												
	269														
531.99	270														CS & EM, PTS
	271				C32			98	0			PP = 4.5			
529.99	272		IGNEOUS ROCK (altered DIORITE), coarse-grained, light gray, predominantly very soft, locally hard, intensely fractured, small scale faults, dipping 50° to 70°, recrystallization along fault plane, abundant FeO on joint and fault surfaces, hydrothermally altered, Plagioclase 40%,Hornblende 29%, Chlorite 8%, Quartz 8%, biotite 5%, K-feldspar 1%, Calcite 3%, weak directional fabric. At EL. 528', becomes intensely fractured.											
	273														
527.99	274														
	275														
525.99	276		Bottom of borehole at 275.5 ft bgs Bottom of borehole is at elevation 526.5 ft. Borehole converted to piezometer at the completion of drilling.												
	277														
523.99	278														
	279														
521.99	280														
	281														
519.99	282														
	283														
517.99	284														
	285														
515.99	286														
	287														
513.99	288														
	289														
511.99	290														
	291														
509.99	292														
	293														
507.99	294														
	295														

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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B3**
DIST.	COUNTY	ROUTE	POSTMILE	EA
7	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K.T		**6-22-09**	**10 of 10**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
D. Jankly	3-2-09	3-6-09	34° 7' 58.7712" / 118° 8' 54.5316" NAD83	R-09-Z3B4
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Cascade Drilling Inc.			' Lt Sta (Fillmore St. e/o S. Raymond Ave.)	768.0 ft NAVD 88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wash			Speedstar 30k	6 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT(1.4"), Cal (2.4"), PQ core (3.2")			Automatic Hammer 140 lb. 30 inch drop	70%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Bentonite and cement grout backfill			NM	N/A	276.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		ASPHALT 4" thick.												This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007), except as noted in Appendix A.1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
	1		Road base material, 4" thick.												
			CLAYEY SAND with GRAVEL (SC); yellowish brown; moist [FILL].												
766.00	2				D01										
	3														
764.00	4														
	5														Hand Auger to 5'
762.00	6														
	7		SILTY SAND (SM); dense; light reddish brown; moist; coarse to fine SAND; low plasticity fines [OLDER ALLUVIUM].												
760.00	8														
	9														
758.00	10				S02	10 19 21	40	100							VOC = 2.5 ppm
	11														
756.00	12														
	13														
754.00	14														
	15		Medium dense; 2% fine GRAVEL, 60% coarse to fine SAND, 38% fines.		S03	9 16 19	35	67		17	107				PI, PA
752.00	16														
	17														
750.00	18														
	19														
748.00	20		Poorly graded SAND with GRAVEL (SP); very dense; light reddish brown; moist; fine GRAVEL; coarse to fine SAND; weak cementation.		S04	30 40 50/5"		71							VOC = 2.6 ppm
	21														
746.00	22														
	23														
744.00	24														
	25														

(continued)

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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z3B4
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	D/D	07-187900
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	D. Jankly		5-7-09	1 of 10

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		Poorly graded SAND with GRAVEL (SP) *(continued)*.		S05	50/4"		0							
742.00	26														
	27														
740.00	28														
	29														
738.00	30				S06	50/6"		0							
	31														
736.00	32														
	33														
734.00	34														
	35		SILT with SAND (ML); hard; brown; moist; little medium to fine SAND; mostly low plasticity fines.		S07	26 37 46	83	89							VOC = 2.0 ppm
732.00	36														
	37														
730.00	38														
	39														
728.00	40		At EL. 728.0 ft, becomes grayish brown with orange (FeO2) stained zones; 22% medium to fine SAND, 78% fines.		S08	18 43 50/3"		100		24	104				PI, PA
	41														
726.00	42														
	43														
724.00	44														
	45				S09	11 19 31	50	100							VOC = 1.7 ppm
722.00	46														
	47														
720.00	48														
	49														
718.00	50		SILTY SAND (SM); very dense; grayish brown with orange (FeO2) stained zones; moist; 8% coarse to fine GRAVEL, 50% coarse to fine SAND, 42% fines, micaceous.		S10	28 50/4"		100		16	118				PI, PA
	51														
716.00	52														
	53														
714.00	54														
	55														

(continued)

Department of Transportation
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Office of Geotechnical Design - South 1

REPORT TITLE: **BORING RECORD**
HOLE ID: **R-09-Z3B4**

DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	D/D	07-187900

PROJECT OR BRIDGE NAME: **SR-710 TUNNEL TECHNICAL STUDY**

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
N/A	D. Jankly	5-7-09	2 of 10

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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
	55		Poorly graded SAND with GRAVEL (SP); brown; moist; fine GRAVEL; coarse to fine SAND.		S11	50/5"		100							VOC = 2.2 ppm
712.00	56														
	57														
710.00	58														
	59														
708.00	60				S12	50/4"		0							
	61														
706.00	62														
	63														
704.00	64														
	65		SILTY SAND (SM); very dense; gray to orange brown; moist; 1% fine GRAVEL, 51% predominantly fine SAND, 48% low plasticity fines.		S13	39 42 43	85	100		24					PA VOC = 2.2 ppm
702.00	66														
	67														
700.00	68														
	69														
698.00	70				S14	50/4"		0							
	71														
696.00	72														
	73														
694.00	74														
	75				S15	19 50		75		21					VOC = 1.7 ppm
692.00	76														
	77														
690.00	78														
	79														
688.00	80				S16	26 50/1"		0							
	81														
686.00	82														
	83														
684.00	84														
	85														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**5-7-09**	**3 of 10**

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
	85		Poorly graded GRAVEL (GP); very dense; light brown and dark gray; moist; cobbles to 3" dia. derived from granite and gneiss (slightly weathered, subangular to subrounded).		S17	50/5"		0	0						
682.00	86				C18										
	87														
680.00	88														
	89														
678.00	90				C19			38	0						
	91														
676.00	92														
	93														
674.00	94		SILTY SAND (SM); brown; moist; 2% fine GRAVEL, 65% predominantly medium to fine SAND, 33% low plasticity fines.		C20			50	33	12					PA
	95		At EL. 673.0 ft, observed 2" thick, very dark brown silty clay to clayey silt bed, probable paleosol.												
672.00	96		Poorly graded SAND with GRAVEL (SP); brown; moist; few fine GRAVEL; medium to fine SAND; low plasticity fines.												
	97														
670.00	98														
	99														
668.00	100		SANDY SILT (ML); soft to medium stiff; brown; moist to wet; fine SAND; homogeneous, micaceous.		C21			20	0						
	101														
666.00	102														
	103														
664.00	104														
	105		Poorly graded GRAVEL (GP); light brown and dark gray; moist.		C22			80	60						
662.00	106		SILTY SAND (SM); brown; moist to wet; 1% fine GRAVEL, 55% predominantly fine SAND, 44% low plasticity fines, homogenous.							13					PA
	107														
660.00	108														
	109														VOC = 51.3 ppm
658.00	110				C23			54	30						
	111		Poorly graded GRAVEL with SAND (GP); light brown and dark gray; moist; coarse, subangular to subrounded GRAVEL; moderately to slightly weathered, moderately hard to hard, subangular to subrounded; clasts. Clasts composed of granite, diorite, and gneiss.												
656.00	112														
	113														
654.00	114														
	115														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
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REPORT TITLE: **BORING RECORD**
HOLE ID: **R-09-Z3B4**

DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	D/D	07-187900

PROJECT OR BRIDGE NAME: **SR-710 TUNNEL TECHNICAL STUDY**

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
N/A	D. Jankly	5-7-09	4 of 10

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
	115		Poorly graded GRAVEL with SAND (GP) *(continued)*.		C24			30	0						
652.00	116														
	117														
650.00	118														
	119														
648.00	120				C25			16	0						
	121														
646.00	122														
	123														
644.00	124														
	125		At EL. 643.0 ft, observed 5-inch intersected granitic clast.		C26			40	0						
642.00	126														
	127		At EL. 641.4 ft, observed 5-inch intersected granitic clast.												
640.00	128														
	129														
638.00	130				C27			40	0						
	131														
636.00	132		At EL. 636.3 ft, observed 3-inch intersected granitic clast.												
	133														
634.00	134														
	135				C28			50	0						
632.00	136														
	137		At EL. 631.5 ft, observed 5-inch intersected granitic clast.												
630.00	138		At EL. 630.7 ft, observed 3-inch intersected granitic clast.												
	139														
628.00	140				C29			0	0						
	141														
626.00	142														
	143														
624.00	144														
	145														

(continued)

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REPORT TITLE **BORING RECORD**				HOLE ID **R-09-Z3B4**
DIST. **07**	COUNTY **LA**	ROUTE **710**	POSTMILE **D/D**	EA **07-187900**
PROJECT OR BRIDGE NAME **SR-710 TUNNEL TECHNICAL STUDY**				
BRIDGE NUMBER **N/A**	PREPARED BY **D. Jankly**		DATE **5-7-09**	SHEET **5 of 10**

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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
	145				C29			0	0						
622.00	146				C30			25	0						
	147														
620.00	148														
	149														
618.00	150				C31			20	0						
	151		At EL. 616.8 ft, observed 3-inch intersected granitic clast.												
616.00	152														
	153														
614.00	154														
	155		Poorly graded SAND with SILT (SP-SM); moist to wet; 9% fine GRAVEL, 84% coarse to fine SAND, 7% low plasticity fines.		C32			50	20	14					PA
612.00	156														VOC = 10.0 ppm
	157		SILTY SAND (SM); moist to wet; trace fine GRAVEL; medium to fine SAND; homogeneous.												
610.00	158		At EL. 610.4 ft, observed SAND with faint subhorizontal laminations.												
	159														
608.00	160		Poorly graded GRAVEL with SAND (GP); and COBBLES, to poorly graded SAND with GRAVEL and COBBLES, dark olive brown, moist to wet. Recovered predominately as gravel and cobble fragments with limited sandy matrix.		C33			6	0						
	161														
606.00	162														
	163														
604.00	164														
	165				C34			20	0						
602.00	166														
	167														
600.00	168														
	169														
598.00	170				C35			40	0						
	171														
596.00	172														
	173														
594.00	174														
	175														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**5-7-09**	**6 of 10**

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
	175		Poorly graded GRAVEL with SAND (GP) *(continued)*.		C36			0	0						See note at end of log regarding RQD.
592.00	176														
	177														
590.00	178														
	179														
588.00	180				C37			0	0						
	181														
586.00	182														
	183														
584.00	184														
	185		Gravel, cobbles and rock fragments in coarse-grained sandy matrix. Clasts are subrounded to well rounded, granitic and metamorphic derived.		C38			40	0						
582.00	186														
	187														
580.00	188														
	189														
578.00	190				C39			40	0						
	191		At EL. 577.2 ft, observed 2 to 4-inch thick intersected diorite and granite clasts.												
576.00	192														
	193														
574.00	194														
	195				C40			37	0						
572.00	196														
	197														
570.00	198														
	199														
568.00	200		At EL. 568.0 ft, observed decomposed bedrock consisting of Silty Clay.		C41			94	40						VOC = 17.0 ppm
	201		IGNEOUS ROCK (DIORITE), fine-grained, massive, dark greenish gray mottled with white, intensely to moderately weathered, moderately hard, moderately fractured, some fractures with up to 1/8" thick, soft, moist silty lining. Fractures are undulatory and irregular, tight to slightly open, smooth to moderately rough, no reaction to HCL sol. Becomes locally foliated at depth. **[WILSON QUARTZ DIORITE]**											
566.00	202														
	203														VOC = 1.2 ppm
564.00	204		At EL. 567.0 ft, observed joint, dipping 90 to 70°, 0 to 1 mm aperture, smooth to moderately rough.												
	205														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/5/10

Department of Transportation
Division of Engineering Services
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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B4**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**5-7-09**	**7 of 10**

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
	205		At EL. 565.2 ft, observed joint, dipping 80°, 0 to 1 mm aperture, smooth to moderately rough.		C42			66	20						
562.00	206		At EL. 563.5 ft, observed intensely fractured zone, 3" thick.												
	207		*(continued)*. At EL. 562.9 ft, becomes moderately weathered. Locally intensely fractured zone, 1.6' thick.												
560.00	208		At EL. 561.2 ft, observed joint, dipping 40°, 1 to 3 mm aperture, smooth to moderately rough.												
	209		At EL. 561.1 ft, observed joint, dipping 70°, 1 to 3 mm aperture, smooth to moderately rough.												
558.00	210		At EL. 561.0 ft, becomes fine-grained to medium-grained, moderately soft.												
			At EL. 560.5 ft, observed joint, dipping 50°, 1 to 3 mm aperture, smooth to moderately rough.		C43			60	20						VOC = 76.6 ppm
	211		At EL. 560.2 ft, observed joint, dipping 20°, 1 to 3 mm aperture, smooth to moderately rough.												
556.00	212		At EL. 557.5 ft, observed shear, dipping 50 to 5°, undulatory, irregular shear, dusky red, paperthin clay lining, striated along strike, parallels faint foliations 4" above and 4" below.												
	213		At EL. 557.3 ft, observed joint, dipping 30 to 0°, 2 mm aperture, rough, no infill.												
554.00	214		At EL. 556.9 ft, observed shear, dipping 40°, tight, moderately rough, 1/8" thick clay lining.												
	215		At EL. 556.3 ft, observed shear, dipping 45°, tight, moderately rough, 1/8" thick clay lining, intensely fractured below shear.		C44			86	52						
552.00	216		At EL. 556.2 ft, becomes intensely to moderately weathered, soft, intensely fractured.												
	217		At EL. 552.8 ft, observed joint, dipping 35°, 1 to 2 mm aperture, moderately rough.												VOC = 1.7 ppm
550.00	218		At EL. 552.2 ft, observed shear/fault zone, dipping 30°, 3" thick, highly sheared zone with dusky red clay lining (medium plasticity), along sub parallel shears, polished and striated.							1	162				UC
	219		At EL. 551.9 ft, becomes coarse-grained, moderately weathered, moderately soft, intensely fractured.												
548.00	220		At EL. 551.0 ft, becomes intensely to moderately fractured, joint, dipping 60 to 50°, 3 mm aperture, moderately rough.		C45			100	60						
	221		At EL. 549.5 ft, observed faint clay lined discontinuity, possible shear, irregular and undulatory, dipping 70 degrees to vertical. Clay is greenish gray, soft, wet, low to medium plasticity. Very weak.												PL, UC
546.00	222		At EL. 547.0 ft, observed intensely fractured, joint, dipping 60°, smooth. Very weak.												
	223		At EL. 546.0 ft, observed shear, dipping 60°, polished and striated.												
544.00	224		At EL. 545.5 ft, observed shear, dipping 90 to 45°, tight, 1/16" to 1/8" thick dusky red clay lining, undulatory.												
	225		At EL. 545.2 ft, observed joint, dipping 70 to 60°, 1-2mm aperture, moderately rough.		C46			73	27						VOC = 2.3 ppm
542.00	226		At EL. 545.0 ft, becomes intensely to moderately weathered, soft.												
	227		At EL. 544.0 ft, observed shear, dipping 90 to 60°, 1/8" thick dusky red clay lining, undulatory.												
540.00	228		At EL. 543.5 ft, observed joint, dipping 65°. At EL. 541.5 ft, becomes moderately weathered, moderately hard.												VOC = 4.7 ppm
	229		At EL. 541.0 ft, observed joint, dipping 80 to 40°, 2-4mm aperture, moderately rough.												
538.00	230		At EL. 540.5 ft, observed joint, dipping 70°, 2mm aperture, moderately rough.												
			At EL. 540.2 ft, observed joint, dipping 60°, 2mm aperture, moderately rough.		C47			100	30						
	231		At EL. 539.6 ft, observed joint, dipping 60°, 2mm aperture, moderately rough.												
536.00	232		At EL. 537.5 ft, observed joint, dipping 70°, numerous subparallel joints within 2" thick fractured zone. 2-3mm aperture, slightly rough.												
	233		At EL. 536.4 ft, observed joint, dipping 60 to 0°, 1-2mm aperture, moderately rough.												
534.00	234		At EL. 535.7 ft, observed fault, dipping 50°, paperthin clay lining, 1-2mm thick, smooth. Becomes fine grained, very dark gray, slightly weathered, hard, and												VOC = 10.5 ppm
	235														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**5-7-09**	**8 of 10**

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
	235		moderately to intensely fractured below fault.		C48			100	33						PTS
532.00	236		At EL. 534.5 ft, observed shear, dipping 70°, tight, paperthin clay lining.												
	237		At EL. 534.0 ft, observed shear, dipping 40°, paperthin dusky red clay lining, striated roughly downdip. Vein dipping 70 degrees with 1/8" thick carbonate infill.												PL VOC = 0.8 ppm
530.00	238		At EL. 533.3 ft, observed shear, dipping 25°, paperthin dusky red clay lining, striated roughly downdip.		C49			100	0						
	239		At EL. 533.0 ft, PTS - Quartz Diorite, Plutonic Rock with allotriomorphic-granular texture.												
528.00	240		At EL. 532.7 ft, becomes moderately to slightly weathered, hard, intensely to moderately fractured.												
	241		At EL. 532.4 ft, observed fault, dipping 70°, 3/8" reverse offset, tight, striated roughly downdip, offsets 1/16" thick carbonate lined vein.												
526.00	242		At EL. 532.1 ft, observed 1/4" thick vein with carbonate infill.												
	243		At EL. 531.6 ft, observed shear, dipping 50 to 45°, two shears with paperthin dusky red clay lining. Unit is medium strong.		C50			100	0						VOC = 5.7 ppm
524.00	244		At EL. 530.9 ft, observed shear, dipping 70 to 25°, undulatory, dusky red clay lining, striated roughly parallel to strike.												
	245		At EL. 530.5 ft, observed shear, dipping 65 to 25°, three shears with paperthin, dusky red clay lining.												
522.00	246		At EL. 529.6 ft, observed joint, dipping 90 to 80°, very intensely fractured, numerous joints with olive yellow staining.		C51			100	0						
	247		At EL. 529.2 ft, becomes very intensely fractured.												
520.00	248		At EL. 528.3 ft, observed shear, dipping 75 to 65°, 3-4mm aperture with dusky red clay film, slightly to moderately rough.		C52			83	33						VOC = 0.2 ppm
	249		At EL. 527.3 ft, observed shear, dipping 70°, 2-3mm aperture, striated with paperthin dusky red clay lining.												
518.00	250		At EL. 526.7 ft, observed shear, dipping 60°, 2-3mm aperture, paperthin dusky red clay lining.												PL
	251		At EL. 526.0 ft, observed shear, dipping 90 to 70°, 2-3mm aperture, paperthin dusky red clay lining.												CAI
516.00	252		At EL. 525.2 ft, observed shear, dipping 90 to 80°, 4mm aperture, 1/8" thick dusky red clay lining.												
	253		At EL. 523.5 ft, observed shear, dipping 40 to 20°, three shears and numerous fractures from 244.2 to 245 ft bgs, with yellowish red and dark red lining.												
514.00	254		At EL. 522.9 ft, contains joint, dipping 30°, moderately rough.												
	255		At EL. 522.0 ft, observed shear, dipping 50 to 40°, three shears from 245.8 to 246.5 ft bgs, clay lined.												VOC = 7.9 ppm
512.00	256		At EL. 521.5 ft, becomes soft to moderately soft from 246.5' to 247.5'.												
	257		At EL. 520.5 ft, observed shear, dipping 65°, 2mm aperture, clay lined, striated downdip.												
510.00	258		At EL. 520.0 ft, becomes fine-grained, dark greenish gray to light greenish gray, slightly weathered, hard, intensely to moderately fractured.		C53			75	0						
	259		At EL. 519.5 ft, observed joint, dipping 30°, unit is weak.												
508.00	260		At EL. 518.8 ft, observed joint, dipping 30 to 20°.												
	261		At EL. 518.1 ft, observed shear, dipping 60 to 40°, 2mm aperture, dusky red clay lining.												VOC = 6.9 ppm
506.00	262		At EL. 516.8 ft, observed shear, dipping 30°, 2mm aperture, clay lined, moderately rough.												
	263		At EL. 515.0 ft, observed joint, dipping 90°, numerous carbonate lined joints up to 1/16" thick.		C54			83	20						
504.00	264		At EL. 511.0 ft, observed joint, dipping 60°, carbonate lined joint or shear, dusky red lining, tight 1/16" thick.												
	265		At EL. 508.5 ft, observed foliation joint, dipping 40°, faint.												
			At EL. 508.4 ft, observed joint, dipping 60°, paperthin carbonate lining, tight.												
			At EL. 507.8 ft, observed numerous carbonate lined joint faces, scattered dusky red lined joints and shears.												
			At EL. 505.7 ft, observed shear/fault zone, dipping 45°, roughly 1' thick gouge zone with highly polished fault plane at 263', striated down dip. Gouge consists of light greenish gray bentonitic clay with abundant diorite gravel to 1/4" dia. Gouge is moist, stiff, highly plastic.		C55			100	25						VOC = 6.8 ppm
			At EL. 503.9 ft, becomes moderately fractured, shear,												

(continued)

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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**5-7-09**	**9 of 10**

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
	265		dipping 40°, clay lined.		C55			100	25						
502.00	266		At EL. 503.7 ft, observed joint, dipping 90°, 2mm aperture.		C56			88	0						
	267		At EL. 503.5 ft, observed fault, dipping 65°, 1/4" thick, soft clay gouge, striated down dip.												
			At EL. 502.9 ft, observed joint, dipping 60°, 2mm aperture, slightly to moderately rough.												
500.00	268		At EL. 502.5 ft, observed faint, undulatory, subhorizontal foliations.												VOC = 7.3 ppm
	269		At EL. 502.0 ft, observed intensely fractured, shear, dipping 60°, 2mm aperture, clay lined, striated downdip.												
498.00	270		At EL. 501.8 ft, observed joint, dipping 80°.		C57			100	76						PL
			At EL. 501.0 ft, becomes very intensely fractured, remnant dusky red lined shears.												
	271		At EL. 499.2 ft, observed shear, dipping 50°, dusky red clay and carbonate infill.												
496.00	272		At EL. 497.5 ft, becomes moderately fractured, joint, dipping 50 to 20°, numerous joint to 272 ft bgs, generally 1 mm aperture, slightly to moderately rough. Weak.							1	90				UC
	273		At EL. 497.0 ft, observed foliation joint, dipping 40 to 30°, faint.												
494.00	274		At EL. 496.0 ft, observed shear, dipping 60°, tight, dusky red, 1/16" thick clay lined shear, truncates foliations.												VOC = 11.4 ppm
	275		At EL. 495.5 ft, observed shear, dipping 30°, tight, dusky red, 1/16" thick clay lined shear. Weak.												
492.00	276		At EL. 495.2 ft, becomes locally very intensely fractured..												
	277		At EL. 495.0 ft, observed foliation joint, dipping 40°, faint.												
490.00	278		At EL. 494.6 ft, observed joint, dipping 80°.												
			At EL. 494.0 ft, observed shear, dipping 50°, very tight, dusky red, 1/16" thick clay lined shear, truncates foliations.												
	279		At EL. 493.5 ft, contains foliation joint, dipping 45°, faint foliation.												
488.00	280		At EL. 493.0 ft, observed shear, dipping 50°, tight, dusky red, 1/16" thick clay lined shear, truncates foliations above, massive below.												
	281		At EL. 492.7 ft, observed joint, dipping 50°.												
486.00	282		Bottom of borehole at 276.0 ft bgs												
			Boring terminated at planned depth.												
	283		Borehole converted to piezometer at the completion of drilling.												
484.00	284														
	285														
482.00	286														
	287														
480.00	288														
	289														
478.00	290														
	291														
476.00	292														
	293														
474.00	294														
	295														

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**5-7-09**	**10 of 10**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
K. Lai/J. Pratt	4-15-09	5-1-09	1867650.1 ft / 6507366.4 ft NAD83	R-09-Z3B5
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Caltrans In-House			' Lt Sta N. Ave 63 & Church St.	698.2 ft NAVD88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wire-Line			CME-85	4 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT(1.4"), Punch Core(2.5") & HQ Rock Coring			CME Automatic, 140 lb., 30 inch drop	87%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Installed Piezometer for water monitoring			NM	22.5 ft on 7-1-09	402.1 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		CONCRETE PAVEMENT.												
	1		CLAYEY SAND (SC); medium dense; yellowish brown; moist; low plasticity fines; interstratified with minor silt (FILL).		D01										This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007), except as noted in Appendix A.1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
696.18	2														
	3														
694.18	4														
	5				S01	3 7 8	15								VOC=0 ppm
692.18	6														
	7														
690.18	8		SILTY SAND (SM); brown; moist; nonplastic fines; drill rig recorded 700 PSI downfeed with push sampler.												
	9														
688.18	10				S02										
	11														
686.18	12														
	13		SANDY lean CLAY (CL); stiff; yellowish brown; moist; low plasticity fines.												
684.18	14														
	15				S03	3 6 9	15			18					PI VOC=30.3 ppm
682.18	16														
	17														
680.18	18														
	19														
678.18	20		SILTY SAND (SM); dense; yellowish brown to light brown; moist; trace GRAVEL; nonplastic fines; (Alluvium).		S04										
	21														
676.18	22														
	23														
674.18	24														
	25														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z3B5
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	T/T	07-07-187900
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		5-7-09	1 of 15

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method / Casing Depth	Remarks
	25		SILTY SAND (SM) *(continued)*.		S05	6 12 14	26							VOC=32.4 ppm
672.18	26													
	27													
670.18	28													
	29													
668.18	30				S06									
	31													
666.18	32													
	33													
664.18	34													
	35		Trace GRAVEL; mostly medium to fine SAND; some fines.		S07	7 12 14	26			14				PA VOC=55.6 ppm
662.18	36													
	37													
660.18	38		SILTY SAND (SM); dense; light brown; moist; fine SAND; nonplastic fines; interstratified with minor clayey sand and trace very stiff lean clay.											
	39													
658.18	40				S08							PP = 3.0		
	41													
656.18	42													
	43		SANDY lean CLAY (CL); very stiff; light brown; moist.											
654.18	44													
	45				S09	7 10 14	24			14				PI VOC=75.2 ppm
652.18	46													
	47													
650.18	48		SILTY SAND (SM); dense; light brown; moist; fine SAND; nonplastic fines; interstratified with minor clayey sand and trace very stiff lean clay.											
	49													
648.18	50				S10	8 11 12	23							VOC=19.5 ppm
	51													
646.18	52		SILT (ML); hard; moist; fine SAND; nonplastic to low plasticity fines.											
	53													
644.18	54													
	55													

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		**5-7-09**	**2 of 15**

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
	55		SANDY SILT (ML); hard; light brown; moist.		S11	7 29 50/3"				13					PA VOC=36.1 ppm
642.18	56		SILTY SAND with GRAVEL (SM); very dense; light gray; moist; some coarse GRAVEL; coarse to fine SAND; hard (slightly weathered) quartz diorite rock fragments.												
	57														
640.18	58		SILTY SAND (SM); very dense; dark yellowish brown; moist; coarse to fine SAND; some fines.					100	0						
	59														
638.18	60				S12	10 19 22	41								VOC=30.9 ppm
	61														
636.18	62							100	0						
	63														
634.18	64		SANDY SILT (ML); very stiff; yellowish brown; moist; trace coarse to fine GRAVEL; some medium to fine SAND; mostly nonplastic to low plasticity fines; gradationally interstratified with minor very stiff sandy lean clay; contains minor gypsum filaments (intensely weathered paleosol/regolith).												
	65				S13	7 13 16	29			16		PP = 4.0			PA VOC=19.3 ppm
632.18	66														
	67				C14			100	0						
630.18	68														
	69														See note at end of log regarding RQD
628.18	70		SEDIMENTARY ROCK, (SANDSTONE); fine sand; thin to moderately bedded (0.1 to 0.8 ft), beds dip 50°, dark yellowish orange to moderate yellowish brown, intensely weathered, very soft, unfractured, contains minor claystone laminations (<1%, 2 to 10 mm thick) and trace coarse sand; also contains minor gypsum filaments and iron oxide patches (weathered); below EL 626.1 ft. contains thin (0.3 ft) claystone interbed, trace gravel at EL 625.7 ft; weakly [feldspar cemented (Poorly graded SAND with SILT (SP-SM), SILTY SAND (SM), and SANDY Lean CLAY (CL) interbed; very stiff clay (PP=4.0 tsf); fine sand, few to little silt, trace clay) **[TOPANGA FORMATION]**.		C15			100	0						VOC=20.7 ppm
	71														
626.18	72														
	73														
624.18	74														
	75				C16			100	0	13	123				UW, PA VOC=17.1 ppm
622.18	76														
	77														
620.18	78														
	79														
618.18	80				C17			100	0						VOC=22.6 ppm
	81		SEDIMENTARY ROCK, (SANDSTONE) (60%), fine sand, gradationally thinly interbedded with SANDY CLAYSTONE (40%), moderate yellowish brown to grayish brown, intensely weathered, very soft, (sandstone contains trace gravel); (Poorly graded SAND with SILT (SP-SM), SILTY SAND (SM), and SANDY Lean CLAY (CL) interbed; very stiff clay (PP=3.0 tsf); fine sand, few to little silt, few clay).												
616.18	82														
	83														
614.18	84		SEDIMENTARY ROCK, (SANDSTONE); fine sand, thinly to moderately bedded, dark yellowish orange,												
	85														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		**5-7-09**	**3 of 15**

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
	85		intensely weathered, very soft, unfractured, trace very soft claystone seams (2 to 5 mm thick), FeO coating on bedding surfaces, at EL 613.6 ft is trace black organic debris(peat/coal) and very thin seams; (Poorly graded SAND with SILT (SP-SM) interbedded with SILTY SAND (SM); SANDY Lean CLAY (CL) [seams; fine sand, few to little silt, trace clay)]. *(continued)*.		C18			100	0						VOC=21.0 ppm See note at end of log regarding RQD
612.18	86														
	87														
610.18	88		SEDIMENTARY ROCK, (PEAT/COAL), black, very soft, organic (PEAT (PT), highly organic soil, hard (PP>4.5 tsf)).												
	89														
608.18	90		SEDIMENTARY ROCK, (SANDSTONE); fine to medium sand, thinly to moderately bedded, dark yellowish orange to light brownish gray, intensely weathered, very soft, unfractured, contains trace to little sporadic fine to coarse gravel; very soft to moderately soft (intensely to moderately weathered) quartz diorite rock fragments; feldspar grains and FeO grains intensely weathered; uncemented to weakly feldspar cemented (SILTY SAND [(SM); few to little silt)].		C19			100	0						VOC=18.6 ppm
	91														
606.18	92														
	93														
604.18	94		SEDIMENTARY ROCK, (SANDSTONE) with 25% scattered cobbles (6" diameter), fine to medium sand,, thinly to moderately bedded, medium gray to light gray, intensely weathered, very soft, unfractured, trace thin claystone seams (1 to 3 mm thick); subrounded, moderately soft to moderately hard, (moderately to slightly weathered) quartz diorite rock fragments; weakly calcite cemented (Poorly graded SAND with SILT (SP-SM); Lean CLAY with SAND (CL) seams).												
	95				C20			92	0						VOC=9.1 ppm
602.18	96														
	97		SEDIMENTARY ROCK, (SANDSTONE), contains few scattered fine gravel; fine to medium sand; thinly to moderately bedded (0.2 to 0.5 ft), beds dip ~50º, light gray to medium light gray, intensely weathered, very soft to soft, slightly fractured, at EL 597.2 ft is 3 mm thick black peat/coal lamination and incipient clay lined bedding plane fracture (dip 55º) with slickensides (rake 70º from horizontal), incipient fractures dip from 50 (bedding plane) to 15º below EL 600.7 ft; weakly to moderately [calcite cemented (Poorly graded SAND with SILT SP-SM))].												
600.18	98														
	99														
598.18	100				C21			100	6	9	131				UW VOC=25.1 ppm
	101														
596.18	102		SEDIMENTARY ROCK, (SANDSTONE), contains few sporadic subrounded gravel, fine to medium sand, medium light gray, intensely to moderately weathered, very soft to soft, moderately fractured, when sporadically cemented, incipient fractures dip 65º subparallel to bedding planes; at EL 595.7 ft raised linear ridges show a rake angle of 40º on a clay lined fracture plane (mostly Poorly graded SAND with SILT (SP-SM)).												
	103														
594.18	104														
	105				C22			84	0						VOC=17.7 ppm
592.18	106		SEDIMENTARY ROCK, (CLAYSTONE), black to grayish olive green, soft, incipient clay lined fracture dips 35º, slightly rough surface.												
	107		SEDIMENTARY ROCK, (SANDSTONE); contains little fine gravel, few coarse gravel, 10% cobbles (up to 5 in. diameter); fine to medium sand, medium light gray, intensely weathered, very soft to soft, unfractured, contains trace claystone seams (laminations); hard (slightly weathered) quartz diorite rock fragments, cobble below EL 589.8 ft; weakly cemented (SILTY SAND with GRAVEL (SM); contains 10% cobbles).												
590.18	108														
	109														
588.18	110		SEDIMENTARY ROCK, (SANDSTONE) (85%), fine sand, thinly to moderately interbedded with MUDSTONE/CLAYSTONE (15%); beds dip 50º, medium light gray, intensely weathered, very soft to soft, intensely to moderately fractured, almost all continuous incipient bedding plane fractures with clay seams dipping from 50 to 75º, smooth surfaces with faint slickensides with 30º rake angle at EL 580.7 ft; weakly to moderately calcite cemented (Poorly graded SAND with SILT (SP-SM) [; very stiff to hard clay (PP=4.0 to >4.5 tsf)].		C23			100	0						VOC=30.2 ppm
	111														
586.18	112														
	113														
584.18	114														
	115														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B5**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		**5-7-09**	**4 of 15**

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
	115		*(continued).*		C24			100	0						VOC=13.9 ppm See note at end of log regarding RQD
582.18	116														
	117														
580.18	118														
	119		SEDIMENTARY ROCK, (SANDSTONE), trace fine to coarse gravel (5%); fine to medium sand, thinly to moderately bedded, medium light gray to light gray, intensely weathered, very soft to soft, slightly fractured, incipient fractures are generally claystone lined and dip from 40 to 80º, at EL 568.5 ft slickensides show 20º rake angle on fracture dipping 80º; angular hard (slightly weathered) quartz diorite rock fragments, below EL 568.2 ft is black peat/coal debris [; weakly to moderately calcite cemented; (Poorly graded SAND with SILT (SP-SM) grading to SILTY SAND (SM); Lean CLAY with SAND (CL) lining, hard clay (PP>4.5 tsf)].											
578.18	120				C25			92	0						VOC=19.1 ppm
	121														
576.18	122														
	123														
574.18	124														
	125				C26			100	8						VOC=21.7 ppm
572.18	126														
	127														
570.18	128														
	129														
568.18	130				C27			100	0						VOC=11.6 ppm
	131		SEDIMENTARY ROCK, (SANDSTONE) (94%), fine sand, interbedded with MUDSTONE/SILTSTONE (6%); beds dip 40 to 50º, continuous clay lined incipient fractures dip 65 to 70º between EL 564.7 and 563.9 ft, thinly to moderately bedded, medium gray to light gray, intensely weathered, very soft to soft, moderately to slightly fractured, unfractured below EL 558, incipient clay lined fractures dip 20 to 25º at EL 566.5 and 559 ft (slickensides show 25º rake), black peat/coal laminations (3 to 4 mm thick) and debris occur sporadically above EL 561 ft; clay seams cross each other (different [orientations); weakly to minor strongly calcite cemented (Poorly graded SAND with SILT (SP-SM) interbedded with SILTY SAND (SM) and SILT (ML) to Lean CLAY with SAND (CL); hard silt to clay (PP>4.5 tsf)].											
566.18	132														VOC=3.0 ppm
	133														
564.18	134														
	135				C28			100	8	8	137				UW, PA
562.18	136														
	137														
560.18	138														
	139														
558.18	140				C29			100	8						VOC=28.8 ppm
	141														
556.18	142														
	143														
554.18	144														
	145		SEDIMENTARY ROCK, (SANDSTONE); fine to												

(continued)

CALTRANS BORING RECORD MET+ENG FIXED JOE - CALTRANS WITH REV Z3B2 Z3B5 Z3B7 ONLY SR-710TUNLS CT BORING LOGS11_23_09JPCOPY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		**5-7-09**	**5 of 15**

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
	145		medium sand; moderately soft to very soft, intensely to moderately fractured, fractures dip 60 to 70º with chlorite on fracture surfaces, strongly to weakly calcite cemented.		C30			100	40						VOC=33.5 ppm See note at end of log regarding RQD
552.18	146		SEDIMENTARY ROCK, Clayey (SANDSTONE); fine sand, brownish gray, intensely weathered, very soft to soft, weakly to strongly calcite cemented (mostly CLAYEY SAND (SC), little clay).												
550.18	147		SEDIMENTARY ROCK, (SANDSTONE); fine sand; beds dip ~40º, medium light gray to brownish gray, intensely to moderately weathered, very soft to soft, moderately fractured, incipient fractures dip from 40 (parallel to bedding) to 70º; crosslaminated; predominantly weakly to minor strongly calcite cemented (mostly Poorly graded SAND with SILT (SP-SM)).												
548.18	148				C31			100	36						VOC=4.0 ppm
546.18	149		SEDIMENTARY ROCK, (SANDSTONE); fine sand; moderately bedded, beds dip 35 to 40º, brownish gray, very soft, moderately fractured, at EL 545.8 ft fracture dips 55º, slickensides show 30º rake angle on bedding planes and fractures; contains thin organic black peat/coal seams and debris; weakly calcite cemented (SILTY SAND (SM); little to some silt).												
544.18	150														
	151														
	152														
	153														
	154														
	155		SEDIMENTARY ROCK, (SANDSTONE); fine to medium sand; thinly to moderately bedded (0.1 to 0.8 ft), beds dip 45 to 55º, penecontemporaneous faulting (soft sediment deformation) at EL 541.1 ft, medium light gray, intensely weathered, very soft to moderately soft; moderately to slightly fractured; continuous incipient clay lined bedding plane fractures dip 45 to 55º; at EL 541.1 ft fracture dips 45º and contains raised ridges with 40º rake angle, crosscuts bedding ; [unfractured below EL 538.2 ft with few to little fine gravel; weakly to moderately calcite cemented (minor strongly cemented); (partly Poorly graded SAND with SILT (SP-SM) interbedded with minor SILTY SAND (SM))].		C32			100	72	6	142				UC VOC=1.2 ppm
542.18	156														
	157														
540.18	158														
	159														
538.18	160				C33			100	44						VOC=3.0 ppm
	161														
536.18	162														
	163														
534.18	164														
	165		SEDIMENTARY ROCK, Cobble/Boulder (CONGLOMERATE) with silty sandstone matrix, fine sand; 70% cobbles/boulders with 30% sandstone matrix, boulder (12.5 in diameter) and cobbles (9 to 10 in. diameter), brownish gray, unfractured, subrounded moderately hard to moderately soft (slightly to intensely weathered) quartz diorite rock fragments; fine sandstone matrix is intensely weathered, very soft, weakly cemented (COBBLES and BOULDERS in SILTY SAND (SM) matrix; mostly sand, little silt).		C34			100	0						VOC=1.4 ppm
532.18	166														
	167														
530.18	168		SEDIMENTARY ROCK, (SANDSTONE); contains trace fine gravel; fine to medium sand; dominantly moderately bedded (minor thinly to thickly bedded), beds dip ~30º, medium light gray, intensely to moderately weathered, very soft to moderately soft; very slightly fractured to unfractured; incipient fractures on bedding planes dip 30º; some fractures moderately to totally healed with silica (0.5 mm thick) and minor clay infill, slightly rough; [thin claystone seams; arkosic; predominantly strongly and minor weakly to moderately calcite cemented (minor Poorly graded SAND with SILT interbedded with SILTY SAND (SM); few to little silt)].												
	169														
528.18	170				C35			100	86						PA VOC=9.8 ppm
	171														
526.18	172														
	173														VOC=29.0 ppm
524.18	174														UU
	175														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED JOE - CALTRANS WITH REV Z3B2 Z3B5 Z3B7 ONLY SR-710TUNLS CT BORING LOGS11_23_09JPCOPY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B5**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		**5-7-09**	**6 of 15**

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
	175		*(continued).*		C36			100	70						See note at end of log regarding RQD
522.18	176														
	177		SEDIMENTARY ROCK, isolated cobble (11 in. diameter) within (SANDSTONE) matrix, fine sand, subrounded moderately hard (moderately weathered) quartz diorite rock fragment.												
520.18	178		SEDIMENTARY ROCK, (SANDSTONE), fine to medium sand, dominantly moderately bedded (minor thin to thick bedded), beds dip ~30°, medium light gray, intensely to moderately weathered, very soft to soft, very slightly fractured to unfractured, between EL 518.4 and 513.2 ft fractures dip 75 to 70°; unfractured above and below; scattered few coarse gravel (1 to 3 in. diameter); thin irregular claystone seams (1 to 2 mm thick); chlorite in matrix; weakly to strongly calcite cemented [(predominantly Poorly graded SAND with SILT (SP-SM))].											
	179														
518.18	180				C37			104	20						VOC=3.2 ppm
	181														
516.18	182														
	183														
514.18	184														
	185				C38			100	0						VOC=27.2 ppm
512.18	186														
	187														
510.18	188														
	189														
508.18	190		SEDIMENTARY ROCK, (SANDSTONE); fine to coarse; moderately to thickly bedded (0.3 to 1.4 ft), beds dip ~30 to 40°, very soft to soft, slightly fractured, incipient bedding plane fractures dip 30 to 60° and are lined with chlorite; chlorite in matrix; contains few fine gravel; weakly cemented (SILTY SAND (SM) grading to Poorly graded SAND with SILT (SP-SM)).		C39			98	0						VOC=8.2 ppm
	191														
506.18	192														
	193														
504.18	194														
	195		SEDIMENTARY ROCK, (MUDSTONE/ CLAYEY SILTSTONE); organic, brownish gray to brownish black, very soft, (SILT (ML) to Lean CLAY with SAND (CL), hard (PP>4.5 tsf)).		C40			100	80						VOC=29.6 ppm
502.18	196		SEDIMENTARY ROCK, (SANDSTONE); fine to medium sand; moderately to thinly bedded, beds dip ~40°, soft, very slightly fractured, chlorite in matrix; lithic arkose composition; predominantly moderately to strongly calcite cemented (minor weakly cemented).												
	197														
500.18	198		SEDIMENTARY ROCK, (SANDSTONE); fine sand, very soft, unfractured, chlorite in matrix; weakly calcite cemented (SILTY SAND (SM)).												
	199														
498.18	200		SEDIMENTARY ROCK, (SANDSTONE); fine to medium sand; beds dip ~25 to 30°, very slightly fractured to unfractured, predominantly moderately to little strongly calcite cemented (some weakly cemented) (partly Poorly graded SAND with SILT (SP-SM) interbedded with SILTY SAND (SM)).		C41			100	46	6	142				EM VOC=40.8 ppm
	201														
496.18	202		SEDIMENTARY ROCK, (SANDSTONE) (60%), fine to medium sand, interbedded with MUDSTONE/SILTSTONE, brownish gray, very soft, unfractured, mudstone interbeds are organic rich; weakly cemented (SILTY SAND (SM) interbedded with SANDY SILT (ML) and Lean CLAY (CL), very stiff to hard clay (PP=4.0 to >4.5 tsf)).												
	203														
494.18	204														
	205		SEDIMENTARY ROCK, (SANDSTONE); fine to												

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		**5-7-09**	**7 of 15**

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
	205		medium sand; beds dominantly moderately bedded but range from thinly to thickly bedded (0.2 to 1.1 ft thick), beds dip ~30°, medium light gray, very soft to soft, dominantly slightly fractured (minor intensely fractured), mostly incipient fractures on bedding planes, at EL 490.6 ft fractures dip 75°; predominantly weakly to minor moderately calcite cemented (predominantly Poorly graded SAND with SILT (SP-SM) [grading to SILTY SAND (SM))]. *(continued)*.		C42			100	30						VOC=22.0 ppm See note at end of log regarding RQD
492.18	206														
	207														
490.18	208														
	209														
488.18	210		SEDIMENTARY ROCK, (SANDSTONE) (95%), fine sand, with thin MUDSTONE/CLAYSTONE (5%) interbeds and laminae (0.3 to 1 mm), dominantly thickly bedded (1.9 ft thick), beds dip ~30°, medium light gray to moderate brown, soft to moderately soft, very slightly fractured to unfractured, at EL 484.6 ft beds dip 30° and incipient bedding plane fracture has slickensides with 30° rake angle; moderately to strongly cemented.		C43			100	100						VOC=18.1 ppm
	211														
486.18	212														
	213														
484.18	214														
	215				C44			100	32						VOC=19.6 ppm
482.18	216		SEDIMENTARY ROCK, (MUDSTONE/CLAYSTONE), thin bed, moderate brown, very soft, (Lean CLAY with SAND (CL), hard clay (PP>4.5 tsf)).												
	217		SEDIMENTARY ROCK, isolated boulder (16 in. diameter) within (SANDSTONE) matrix, subrounded hard quartz diorite rock fragment, igneous boulder contains numerous calcite veins; FeO stained.												
480.18	218														
	219		SEDIMENTARY ROCK, (SANDSTONE); fine to medium sand; moderately bedded; intensely to moderately weathered; moderately soft to very soft, slightly fractured, incipient fractures dip 60°; contains thin irregular claystone seams; predominantly strongly cemented to some weakly cemented (partly Poorly graded SAND with SILT (SP-SM) grading to SILTY SAND (SM)).											
478.18	220				C45			100	0						VOC=16.98 ppm
	221														
476.18	222		SEDIMENTARY ROCK, (MUDSTONE/SANDY CLAYSTONE), moderate brown, soft.												
	223		SEDIMENTARY ROCK, (SANDSTONE); fine sand; dominantly moderately bedded (0.3 to 0.4 ft thick) and minor thickly bedded, beds dip ~30°, medium light gray, intensely weathered, very soft to soft, slightly fractured, incipient bedding plane fractures; predominantly weakly to minor moderately calcite cemented (Poorly graded SAND with SILT (SP-SM) grading to SILTY SAND (SM)).											
474.18	224														
	225				C46			106	44						VOC=26.6 ppm
472.18	226		SEDIMENTARY ROCK, (MUDSTONE/SANDY CLAYSTONE); contains few charcoal or coal debris, thinly bedded, (SANDY lean CLAY (CL), hard (PP>4.5 tsf)).												
	227														
470.18	228		SEDIMENTARY ROCK, (SANDSTONE), fine to medium sand; contains a cobble (7%, 4 in. diameter) below EL 471 ft, medium light gray, soft to moderately soft, very slightly fractured to unfractured, trace coarse gravel; moderately hard quartz diorite rock fragments; strongly to weakly calcite cemented (some Poorly graded SAND with SILT (SP-SM)).												
	229														
468.18	230				C47			100	0						VOC=6.6 ppm VOC=17.8 ppm
	231		SEDIMENTARY ROCK, (CONGLOMERATE) with fine to medium sandstone matrix, cobbles (up to 12 in. diameter), beds dip ~25°, medium light gray, moderately weathered, unfractured, some very soft to moderately soft sandstone matrix; subrounded to angular, moderately hard, (moderately weathered) quartz diorite and minor soft mudstone rock fragments; weakly to moderately calcite cemented matrix (GRAVEL and COBBLES with SILTY SAND [(SM) matrix)].												
466.18	232														
	233														VOC=32.8 ppm
464.18	234														
	235														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B5**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		**5-7-09**	**8 of 15**

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
	235		*(continued).*		C48			100	66						UC See note at end of log regarding RQD
462.18	236														
	237														
460.18	238														
	239		SEDIMENTARY ROCK, (SANDSTONE); fine sand; thinly interbedded (0.1 ft) with SANDY MUDSTONE/CLAYSTONE, medium light gray to brownish gray, intensely to moderately weathered, moderately soft to very soft; unfractured; predominantly moderately to minor weakly cemented (partly Poorly graded SAND with SILT (SP-SM) interbedded with SANDY fat CLAY (CH); hard clay (PP>4.5 tsf) (weak).											
458.18	240				C49			102	60						
	241														
456.18	242		SEDIMENTARY ROCK, (SANDSTONE) (60%), fine to medium sand; moderately interbedded with Gravel/Cobble CONGLOMERATES (40%), cobbles (up to 6 in. diameter), beds dip ~40 to 50°, medium light gray, unfractured, contains thin irregular mudstone beds and seams (0.2 ft to 1 mm thick); subrounded moderately soft to moderately hard quartz diorite rock fragments; intensely weathered feldspar grains; predominantly strongly to some weakly calcite cemented (partly [Poorly graded SAND with SILT (SP-SM))].						5	142				
	243														
454.18	244														
	245				C50			104	58						
452.18	246														
	247		SEDIMENTARY ROCK, (SANDSTONE) (80%); contains 11% cobbles (up to 5 in. diameter) and few gravel; fine to medium sand; moderately to thinly interbedded with MUDSTONE/SILTSTONE, medium light gray to brownish gray, intensely weathered, soft to moderately soft, unfractured, subrounded quartz diorite rock fragments; predominantly moderately to strongly calcite cemented (some weakly cemented); (partly Poorly graded SAND with SILT (SP-SM) and SILT (ML) interbeds, hard silt (PP>4.5 tsf)).											
450.18	248														VOC=22.5 ppm
	249														
448.18	250				C51			102	36						VOC=6.7 ppm
	251		SEDIMENTARY ROCK, Coarse Gravel/Cobble (CONGLOMERATE) with fine SANDSTONE matrix, cobbles (up to 10 in. diameter), moderately bedded, unfractured, soft to very soft matrix; contains claystone seams; subrounded to subangular moderately hard quartz diorite rock fragments; predominantly moderately to minor weakly cemented matrix (partly Poorly graded SAND with SILT (SP-SM).											
446.18	252														
	253														
444.18	254		SEDIMENTARY ROCK, (SANDSTONE) (85%); fine to medium sand; thinly to moderately interbedded with MUDSTONE/CLAYSTONE (15%), beds dip ~40°, medium light gray to brownish gray, intensely weathered, very soft to moderately soft; very slightly fractured to unfractured; at EL 439.6 ft moderately spaced incipient fractures dip 60 to 65° and lined with clay (3 to 5 mm thick); pervasive irregular mudstone seams; mudstone very soft to soft; bioturbated; [weakly to strongly calcite cemented (partly SILTY SAND (SM) interbedded with Poorly graded SAND with SILT (SP-SM) and SANDY lean CLAY (CL); hard clay (PP.4.5 tsf)].											
	255				C52			104	64						UC VOC=19.3 ppm
442.18	256														
	257														
440.18	258														
	259									5	136				
438.18	260				C53			102	38						VOC=7.3 ppm
	261														
436.18	262		SEDIMENTARY ROCK, (SANDSTONE); fine sand; moderately to thinly bedded (0.5 to 0.2 ft thick), beds dip ~40°, medium gray, very soft to soft, very slightly fractured, at EL 435 ft incipient fracture dips 60° and is clay lined and smooth; thin (2 to 3 mm) clay seams are truncated by opposite dipping clay seams; weakly to moderately cemented (partly Poorly graded SAND with SILT (SP-SM)).											
	263														
434.18	264		SEDIMENTARY ROCK, (SANDY MUDSTONE/SANDY CLAYSTONE) with minor thin SANDSTONE interbed												
	265		*(continued)*												

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B5**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		**5-7-09**	**9 of 15**

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
	265		thinly bedded, soft, contains minor sporadic very thin (1 to 2 mm thick) tar or organic seams.		C54			102	34						VOC=10.7 ppm See note at end of log regarding RQD
432.18	266		SEDIMENTARY ROCK, (SANDSTONE) (60%); fine to medium sand; thinly to moderately interbedded with MUDSTONE/SILTSTONE grading to CLAYSTONE with SAND, medium gray to brownish gray, very soft to soft, unfractured, contains irregular claystone seams; bioturbated; predominantly weakly to some moderately calcite cemented (mostly Poorly graded SAND with SILT (SP-SM) grading to SILTY SAND (SM) interbedded with SILT (ML) and lean CLAY with SAND (CL); hard clay and silt [(PP>4.5 tsf)); vuggy zone between EL +432.2 to 431.2 ft].											
	267														
430.18	268														
	269														
428.18	270				C55			125	50						VOC=28.7 ppm
	271		SEDIMENTARY ROCK, (SANDSTONE) (80%); fine sand; thinly interbedded with MUDSTONE/CLAYSTONE/SILTSTONE (20%), beds dip ~45º, medium light gray to brownish gray, very soft to soft, moderately fractured, incipient bedding plane fractures dip 60 to 65º; strongly to weakly calcite cemented (partly SILTY SAND (SM) grading to Poorly graded SAND with SILT (SP-SM) interbedded with Lean CLAY with SAND (CL) to SILT (ML); very stiff to hard clay and silt [(PP=4.0 to >4.5 tsf))].						10	139				
426.18	272														
	273														
424.18	274				C56			125	50						
	275		SEDIMENTARY ROCK, (MUDSTONE/CLAYSTONE) (60%) thinly interbedded (0.1 to 0.2 ft thick) with SANDSTONE (40%), fine sand; beds dip ~60º, medium light gray to brownish gray, very soft to moderately soft; unfractured; irregular thin beds, laminations, and mudstone seams (seams are roughly parallel to and also crosscut bedding), contains laminated mudstone rip-up clasts and also bioturbated beds between EL 422.3 to 421.2 ft; [predominantly weakly to minor moderately calcite cemented (partly SILTY SAND (SM) grading to Poorly graded SAND with SILT (SP-SM))]											VOC=31.6 ppm
422.18	276														
	277														
420.18	278				C57			107	83						
	279		SEDIMENTARY ROCK, (SANDSTONE) (60%), fine sand, thinly interbedded with MUDSTONE/SILTSTONE/CLAYSTONE with SAND (40%), beds dip ~50 to 60º, medium light gray to brownish gray, intensely weathered, predominantly moderately soft to minor very soft; unfractured; contains sporadic black coal and possibly trace organic tar seams (laminae) between EL 419.9 to 417.9 ft, predominantly strongly to minor weakly calcite cemented (partly SILTY SAND (SM) [grading to Poorly graded SAND with SILT (SP-SM))].											
418.18	280														
	281				C58			100	52						VOC=37.5 ppm
416.18	282														
	283														
414.18	284		SEDIMENTARY ROCK, (SANDSTONE) (65%), fine sand, thinly interbedded with MUDSTONE/CLAYSTONE (35%), beds dip ~60º, mudstone also laminated, medium light gray to brownish gray, soft to moderately soft, predominantly moderately soft to minor very soft; between EL 414.5 to 413.5 ft laminations and thin beds are offset along small fault dipping 75º (possible penecontemporaneous faulting/soft sediment deformation); thin coal seam at EL 414 ft; bioturbated [below EL 412.2 ft; predominantly strongly to minor weakly calcite cemented (partly SILTY SAND (SM) interbeds)]											
	285														
412.18	286				C59			95	88						
	287														
410.18	288		SEDIMENTARY ROCK, (SANDSTONE), fine to medium sand; few coarse sand, moderately bedded, medium light gray, moderately soft to moderately hard, unfractured, strongly calcite cemented.												
	289														
408.18	290		SEDIMENTARY ROCK, (MUDSTONE/CLAYSTONE) (90%) thinly interbedded with SANDSTONE (10%), fine sand; also laminated, beds dip up to ~70º, brownish gray, moderately soft to moderately hard, slightly fractured, mudstone lined fracture at EL 408.4 ft dips 70º in opposite direction of bedding dip (crosscuts bedding).		C60			120	68						VOC=11.5 ppm
	291														
406.18	292														VOC=9.7 ppm
	293		SEDIMENTARY ROCK, (SANDSTONE) (85%), fine to medium sand, moderately to thinly interbedded with MUDSTONE (15%), beds dip ~70º, medium dark gray to medium light gray, predominantly moderately hard to minor very soft; sporadic trace black organic/coal patches and debris between EL 407.2 to 405 ft; thin											
404.18	294				C61			100	93						EM VOC=22.9 ppm
	295														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B5**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		**5-7-09**	**10 of 15**

CALTRANS BORING RECORD MET+ENG FIXED JOE - CALTRANS WITH REV Z3B2 Z3B5 Z3B7 ONLY SR-710TUNLS CT BORING LOGS11_23_09JPCOPY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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
	295		mudstone seams; predominantly strongly to moderately calcite cemented (minor weakly cemented) (minor SILTY SAND (SM) [interbeds)].		C61			100	93	1	162				VOC=17.3 ppm See note at end of log regarding RQD
402.18	296		SEDIMENTARY ROCK, (SANDSTONE), fine to medium sand; thinly to moderately bedded, beds dip ~65º, light brownish gray to brownish gray, moderately hard to hard, intensely fractured, very closely spaced to closely spaced (20 to 60 mm spaced) fractures dip 25, 40 ,and 60º, moderately thin (1 to 1.5 mm) fractures are totally healed with calcite; strongly calcite cemented; organic brown film appeared in drilling mud tub at EL 404.2 ft.										
	297														
400.18	298				C62			100	60						
	299														VOC=10.4 PPM
398.18	300		SEDIMENTARY ROCK, (SANDSTONE) (55%), fine sand; thinly interbedded with MUDSTONE/CLAYSTONE (45%), mudstone is dominantly laminated, soft to moderately soft, unfractured, irregular claystone seams, strongly calcite cemented below EL 400.2 ft, predominantly moderately to minor weakly cemented above (minor SILTY SAND (SM)).										
	301														
396.18	302				C63			108	50						
	303		SEDIMENTARY ROCK, (MUDSTONE/CLAYSTONE) (75%) interbedded with SANDSTONE (25%); contains few sporadic fine to coarse gravel (1 in. length); beds dip ~70º,, brownish gray to medium light gray, soft to very soft; unfractured; black organic patches at EL 397.2 ft, bioturbated, irregular laminations, moderately to weakly calcite cemented (partly SILTY SAND (SM) interbeds).												
394.18	304														
	305														
392.18	306				C64			113	50						SD, EM
	307		SEDIMENTARY ROCK, (SANDSTONE) (65%), fine to medium sand, interbedded with MUDSTONE/CLAYSTONE (35%), thinly bedded to laminated, some moderately bedded, beds dip ~50 to 70º, dominantly soft to moderately soft (minor very soft), medium light gray to brownish gray, intensely weathered, unfractured, organic coal seam at EL 392.7 ft; sporadically bioturbated; strongly to weakly calcite cemented (some SILTY SAND (SM)).							9	133			VOC=30.8 ppm
390.18	308														
	309														
388.18	310		SEDIMENTARY ROCK, (SANDSTONE (80%),fine interbedded with MUDSTONE/CLAYSTONE (20%), sandstone is moderately to thinly bedded (0.5 to 0.1 ft thick) and mudstone is thinly bedded to laminated (0.1 ft to 5 mm thick), beds dip 60 to 70º, medium light gray to brownish gray, very soft to moderately soft; unfractured; moderately to weakly calcite cemented (partly SILTY SAND (SM) interbedded with Lean CLAY with SAND (CL), hard clay (PP>4.5 tsf).		C65			95	50						VOC=3.9 ppm
	311														
386.18	312														
	313														
384.18	314				C66			100	48						VOC=13.0 ppm
	315		SEDIMENTARY ROCK, (SANDSTONE), fine sand; contains few gravel (rounded fine sandstone rock fragments), medium light gray, very soft to soft, unfractured, black coal patches and thin layers (0.2 to 0.3 ft thick); moderately to weakly calcite cemented (partly SILTY SAND (SM) interbeds).												
382.18	316														
	317														
380.18	318		SEDIMENTARY ROCK, (SANDSTONE) (80%), fine sand, interbedded with SILTSTONE/CLAYSTONE (20%), thinly to moderately bedded, beds dip ~70º, medium light gray to brownish gray, very soft to soft, unfractured, moderately to weakly calcite cemented (some Poorly graded SAND with SILT (SP-SM) and SILTY SAND (SM)).		C67			105	53						
	319														
378.18	320														
	321														
376.18	322		SEDIMENTARY ROCK, (SANDSTONE) (70%), fine sand, interbedded with MUDSTONE/SHALE (30%), beds generally thinly bedded to laminated, some moderately bedded sandstone, beds dip ~50 to 70º, medium light gray to brownish gray, intensely weathered, very soft to soft, very slightly fractured to unfractured, below EL. 368.5 ft. is incipient bedding		C68			100	48						PTS
374.18	324														
	325														

(continued)

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DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		**5-7-09**	**11 of 15**

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
	325		plane fracture dipping 50° (slightly rough surface); truncated bedding at EL 371.8 ft. (possibly erosional); bioturbated; weakly to moderately calcite cemented (partly SILTY SAND (SM) interbeds).		C68			100	48						See note at end of log regarding RQD
372.18	326				C69			78	0						
	327														
370.18	328														
	329														
368.18	330				C70			113	75						UU
	331														
366.18	332		SEDIMENTARY ROCK, (SANDSTONE, fine sand, moderately bedded, medium light gray to brownish gray, moderately hard, unfractured, predominantly moderately hard to minor very soft; predominantly strongly to minor weakly calcite cemented (minor SILTY SAND (SM) interbeds).												
	333														
364.18	334		SEDIMENTARY ROCK, (CLAYSTONE/SILTSTONE) (65%) interlaminated with SANDSTONE (35%), fine sand; laminae dip 70°, medium light gray to brownish gray, soft to very soft; slightly fractured; at EL 364.5 ft fracture dips 30° (smooth surface); at EL 363.8 ft incipient bedding plane fracture dips 60°; some penecontemporaneous faulting with minor offsets (soft sediment deformation); [moderately to weakly calcite cemented (partly SILTY SAND (SM) to Poorly graded SAND with SILT (SP-SM))].		C71			119	60						
	335														
362.18	336														
	337														
360.18	338		SEDIMENTARY ROCK, (SANDSTONE) (94%), fine sand, interbedded with CLAYSTONE/SHALE (6%); moderately bedded to laminated; moderately hard to moderately soft, minor very soft weakly cemented sandstone between EL 363.2 to 362.5 ft, medium light gray to brownish gray, unfractured, strongly to weakly cemented (partly SILTY SAND (SM)).		C72			37	0						
	339														
358.18	340														
	341		SEDIMENTARY ROCK, (MUDSTONE/CLAYSTONE) (75%) interbedded with SANDSTONE (25%), fine sand; laminated to very thinly bedded, beds dip ~70°, dark gray to brownish gray, very soft to soft, very slightly fractured to unfractured, at EL 359.5 ft incipient fracture dips 50°; weakly calcite cemented (predominantly Lean CLAY with SAND (CL) interbedded with little SILTY SAND (SM); very stiff to hard clay (PP=3.0 to>4.5 tsf).												
356.18	342				C73			86	0						
	343														
354.18	344		SEDIMENTARY ROCK, (SANDSTONE) (80%), fine to medium sand, interbedded with MUDSTONE/CLAYSTONE (20%), dominantly moderately to thinly bedded, minor laminated, moderately hard to very soft;, medium light gray to brownish gray, moderately fractured, below EL 353.3 ft fracture sets dip 20 and 70° and are totally healed with calcite; between EL 353.3 to 352.8 ft small scale faulting/slippage at truncated mudstone and sandstone beds; weakly to strongly calcite cemented (SILTY SAND (SM)).												
	345				C74			56	42						
352.18	346														
	347														
350.18	348		SEDIMENTARY ROCK, (MUDSTONE/CLAYSTONE/SILTSTONE) (85%) very thinly interbedded with SANDSTONE (15%), fine sand; also laminated mudstone (5 to 10 mm thick), beds dip ~75°, very soft, at EL 350.1 ft calcite cemented laminations in siltstone (Lean CLAY with SAND (CL) interbedded with SILT (ML) and minor SILTY SAND (SM); very stiff to hard clay and silt (PP=3.0 to>4.5 tsf).												
	349				C75			123	0	3	143				UW, EM
348.18	350														
	351														
346.18	352		SEDIMENTARY ROCK, (SANDSTONE) (50%), fine sand, thinly interbedded with laminated (MUDSTONE/CLAYSTONE) (50%), medium light gray to brownish gray, very soft, unfractured, between EL 348 to 347.4 ft black coal seams and patches; uncemented to weakly cemented (SILTY SAND (SM) interbedded with Poorly graded SAND with SILT (SP-SM) and Lean CLAY with SAND (CL); very stiff to hard clay (PP=3.0 to>4.5 tsf)).												
	353				C76			120	33						CR
344.18	354														
	355														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED JOE - CALTRANS WITH REV Z3B2 Z3B5 Z3B7 ONLY SR-710TUNLS CT BORING LOGS11_23_09JPCOPY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B5**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		**5-7-09**	**12 of 15**

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
	355		SEDIMENTARY ROCK, (SANDSTONE), fine sand, hard, intensely to moderately fractured, intensely weathered feldspar grains; strongly calcite cemented.		C76			120	33						See note at end of log regarding RQD
342.18	356		SEDIMENTARY ROCK, (SANDSTONE) (80%), fine to medium sand, interbedded with MUDSTONE/SILTSTONE/CLAYSTONE (20%), moderately bedded to laminated, beds dip ~70°, medium light gray to brownish gray, very soft to soft, unfractured, predominantly weakly to minor moderately calcite cemented (mostly Poorly graded SAND with SILT (SP-SM) interbedded with minor SILTY SAND (SM)).											
	357				C77			108	12						
340.18	358														
	359														
338.18	360														
	361														
336.18	362		SEDIMENTARY ROCK, (SANDSTONE)(85%),fine sand, interbedded with MUDSTONE/CLAYSTONE (15%), moderately bedded to very thinly bedded and laminated, beds dip ~65°, moderately soft to soft (soft to very soft below EL 331.1 ft), light brownish gray to brownish gray, intensely to moderately weathered, intensely to moderately fractured, unfractured above EL 335 ft, below EL 335 ft very thin (0.5 to 1 mm) totally calcite healed fractures dip 60°,40° & 25°; one continuous fracture dips 75° below EL 331.1 ft with moderately rough surface; predominantly strongly to minor weakly calcite [cemented (little Poorly graded SAND with SILT (SP-SM))].		C78			98	84						
	363														
334.18	364														
	365														
332.18	366														
	367				C79			100	48						
330.18	368														
	369														
328.18	370		SEDIMENTARY ROCK, (MUDSTONE/CLAYSTONE) (50%) interbedded with SANDSTONE (50%), fine sand; moderately bedded to laminated, dominantly moderately hard to moderately soft (minor soft above EL328.2 ft), light brownish gray to brownish gray, slightly fractured, incipient bedding plane fractures are clay lined, predominantly weakly to minor strongly calcite cemented (predominantly SILTY SAND (SM)).							6	119			EM
	371														
326.18	372				C80			96	26						
	373		SEDIMENTARY ROCK, (SANDSTONE) (85%), fine sand, interbedded with MUDSTONE/CLAYSTONE (15%), moderately to thinly bedded (minor laminated), irregular beds dip ~60 to 45°, light brownish gray to medium light gray, intensely to moderately weathered, very soft to soft, very slightly fractured to unfractured, below EL 324 ft irregular black coal laminations are offset and show minor slippage (small scale faulting); sporadic black coal/tar patches; predominantly weakly to minor moderately cemented (mostly Poorly graded SAND with SILT (SP-SM) grading to [SILTY SAND (SM))].											
324.18	374														
	375														
322.18	376														
	377		SEDIMENTARY ROCK, (CLAYSTONE) interbedded with SANDSTONE, fine sand; laminated (8 mm thick), irregular beds dip ~40 to 60°, brownish gray to medium light gray, very soft, moderately fractured, incipient bedding plane fracture dips 40° with slickensides rake angle 75° on fracture plane (small scale 5 to 10 mm offsets of laminations and 1 to 2 mm thick coal seams, mostly dip-slip); slightly rough to smooth surfaces; weakly cemented (SILTY SAND [(SM))].		C81			100	42						
320.18	378														
	379														
318.18	380														
	381		SEDIMENTARY ROCK, (SANDSTONE), fine sand, moderately bedded, light brownish gray to medium light gray, intensely to moderately weathered, very soft to soft, unfractured, contains irregular mudstone seams (1 to 2 mm thick); predominantly weakly to minor moderately calcite cemented (SILTY SAND (SM) grading to Poorly graded SAND with SILT (SP-SM)).											
316.18	382				C82			100	6						
	383														
314.18	384		SEDIMENTARY ROCK, (SANDSTONE) (65%), fine sand, interbedded with MUDSTONE/CLAYSTONE (35%), thinly bedded to laminated (20 to 5 mm thick),												
	385														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED JOE - CALTRANS WITH REV Z3B2 Z3B5 Z3B7 ONLY SR-710TUNLS CT BORING LOGS11_23_09JPCOPY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B5**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		**5-7-09**	**13 of 15**

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
	385		beds dip ~70º, light brownish gray to medium light gray, intensely to moderately weathered, very soft to soft, irregular beds show ripple crosslaminations and possible bioturbation; above EL 319.6 ft mudstone laminations are truncated (possibly by soft sediment deformation, erosion, or slippage of soft beds); weakly to moderately calcite cemented (Poorly graded [SAND with SILT (SP-SM))].		C82			100	6						See note at end of log regarding RQD
312.18	386														
	387				C83			98	28						
310.18	388		SEDIMENTARY ROCK, (MUDSTONE/SHALE) (50%) interbedded with SEDIMENTARY BRECCIA (35%) and SANDSTONE (15%), fine sand; breccia layers with mudstone clasts and sand and mudstone matrix; laminated to thinly bedded, beds dip ~60 to 70º, brownish gray to light brownish gray, very soft to soft, moderately to slightly fractured, between EL 316.9 to 316.1 ft laminations are truncated and offset 10-20 mm on small shears (healed with silica) which dip from 50 to 60º and show reverse movement; probable debris flow breccias with flat and elongated angular siliceous mudstone clasts; [weakly to moderately cemented sandstone and matrix (SILTY SAND (SM))].											
	389														
308.18	390														
	391														
306.18	392				C84			100	24						UC
	393														
			SEDIMENTARY ROCK, (MUDSTONE/SILTSTONE/CLAYSTONE) (65%) interbedded with SANDSTONE (35%), fine sand; laminated to moderately bedded, laminations dip ~55º, brownish gray to brownish black, moderately weathered, very soft to soft, moderately fractured, above EL 315.3 ft fractures dip 75 to 80º in sandstone and are partly healed with calcite and infilled with clay; below are incipient fractures on clay lined smooth bedding plane surfaces; bioturbated and ripple crosslaminated; predominantly weakly to [minor moderately calcite cemented (mostly Lean CLAY with SAND (CL) interbedded with SILT (ML) and Poorly graded SAND with SILT (SP-SM), hard clay and silt (PP>4.5 tsf))].							5	136			
304.18	394														
	395														
302.18	396														
	397				C85			98	34						
300.18	398														
	399		SEDIMENTARY ROCK, (SANDSTONE) (90%), fine sand, interbedded with MUDSTONE/CLAYSTONE (10%), thinly bedded to laminated, beds dip ~50 to 70º, medium light gray to light brownish gray, very soft to soft, moderately fractured, fractures dip 40º with slickensides rake angle 40º on fracture surface, calcite and chlorite lined fractures - partly healed; sporadic trace black organic material below EL 311.9 ft, predominantly weakly to minor moderately calcite cemented (mostly Poorly [graded SAND with SILT (SP-SM) grading to SILTY SAND (SM))].											
298.18	400														
	401														
296.18	402														
	403		SEDIMENTARY ROCK, (SANDSTONE) (60%), fine sand, interbedded with MUDSTONE (40%), beds dip ~60º, medium light gray to light brownish gray, very soft to soft, unfractured, between EL 308.1 to 307.7 ft is sporadic coal; flame structures in mudstone (depositional shear); weakly to minor moderately calcite cemented (mostly Poorly graded SAND with SILT (SP-SM)).											
294.18	404														
	405														
292.18	406														
	407		SEDIMENTARY ROCK, (SANDSTONE) (90%), fine sand, interbedded with MUDSTONE/SILTSTONE (10%), moderately bedded to laminated, beds dip ~70º, very soft to soft, unfractured, predominantly weakly to minor moderately calcite cemented (Poorly graded SAND with SILT (SP-SM) interbedded with minor silt (ML), hard silt (PP>4.5 tsf)).											
290.18	408														
	409														
			SEDIMENTARY ROCK, (MUDSTONE/CLAYSTONE/SILTSTONE) (60%) interbedded with SANDSTONE (40%), fine sand; thinly bedded (0.2 ft) to laminated (5 to 10 mm thick), beds dip ~65º, brownish gray to light brownish gray, moderately weathered, very soft to soft, slightly fractured, incipient fractures on bedding planes dip 65º; weakly cemented (mostly Lean CLAY with SAND (CL) interbedded with SILT (ML) and Poorly graded SAND with SILT (SP-SM); hard clay and silt (PP>4.5 tsf)).											
288.18	410														
	411														
286.18	412														
	413														
			SEDIMENTARY ROCK, (SANDSTONE) (97%), fine sand, with trace MUDSTONE/CLAYSTONE laminations (3%); dominantly moderately bedded (0.5 ft thick) and minor laminations (1 to 2 mm), beds dip ~ 70 to 55º.											
284.18	414														
	415														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B5**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, M. Islam		**5-7-09**	**14 of 15**

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
	415		light brownish gray, very soft to soft, slightly fractured, (parallel to bedding); between EL 299.3 to 298.9 ft incipent fracture parallel to bedding dips 55º with faint slickensides rake angle 45º on fracture surface; thin clay seams; predominantly weakly to minor moderately calcite cemented (mostly Poorly [graded SAND with SILT (SP-SM) and SILTY SAND (SM))].										
282.18	416												
	417												
280.18	418												
	419												
278.18	420												
	421												
276.18	422												
	423												
274.18	424												
	425												
272.18	426												
	427												
270.18	428												
	429												
268.18	430												
	431												
266.18	432												
	433												
264.18	434												
	435												
262.18	436												
	437												
260.18	438												
	439												
258.18	440												
	441												
256.18	442												
	443												
254.18	444												
	445												

RQD values provided on the boring logs are based on intact core pieces obtained between two natural discontinuities.
The majority of core obtained from this boring is typically very weak to weak and does not meet the "sound core" definition provided in the standard test method for RQD (ASTM D 6032). These RQD values should not be used to evaluate rock mass quality.
Bottom of borehole at 402.1 ft bgs
Borehole was converted to piezometer at the completion of drilling.

CALTRANS BORING RECORD MET+ENG FIXED JOE - CALTRANS WITH REV Z3B2 Z3B5 Z3B7 ONLY SR-710TUNLS CT BORING LOGS11_23_09JPCOPY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B5**
DIST. **07**	COUNTY **LA**	ROUTE **710**	POSTMILE **T/T**	EA **07-07-187900**
PROJECT OR BRIDGE NAME **SR-710 TUNNEL TECHNICAL STUDY**				
BRIDGE NUMBER	PREPARED BY **J. Pratt, M. Islam**		DATE **5-7-09**	SHEET **15 of 15**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Torsiello	2-17-09	3-11-09	34° 7' 31.5588" / 118° 8' 54.6144" NAD83	R-09-Z3B6
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Cascade Drilling Inc.			' Lt Sta (State St. e/o Railroad St. w/o SR-110)	750.0 ft NAVD 88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wash			Ingersoll Rand A400	6 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT(1.4"), Cal (2.4"), PQ core (3.2")			Automatic Hammer 140 lb. 30 inch drop	75%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer Installed on Completion			NM	51.2 ft on07/01/09	326.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		ASPHALT 6" thick.												This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007), except as noted in Appendix A.1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
	1		CONCRETE 6" thick.												
748.00	2		Poorly graded SAND (SP); very dark grayish brown; dry to moist; coarse to medium SAND; trace fines [OLDER ALLUVIUM].												
	3														
746.00	4														Hand Auger to 5'
	5		SILTY SAND (SM); medium dense; very dark brown; dry to moist; 4% fine GRAVEL, 61% predominantly fine SAND, 35% low plasticity fines.		S01	4 5 6	11	100		6					PA VOC = 0.0 ppm
744.00	6														
	7														
742.00	8														
	9														
740.00	10		SILTY SAND with GRAVEL (SM); very dense; very dark brown; 28% coarse to fine GRAVEL, 56% coarse to fine SAND, 16% low plasticity fines.		S02	17 38 50/1"		92		8	128				PA VOC = 0.0 ppm
	11		SEDIMENTARY ROCK, (SANDSTONE), decomposed (well-graded SAND (SW); very dense, light gray, moist, trace fine gravel, fine to coarse sand) **[TOPANGA FORMATION]**												
738.00	12														
	13														
736.00	14														
	15				S03	50/3"		17							VOC = 0.0 ppm
734.00	16														
	17														
732.00	18														
	19														
730.00	20		Gray.		S04	50/3"		17							VOC = 0.0 ppm
	21														
728.00	22														
	23														
726.00	24														
	25														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z3B6
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	D/D	07-187900
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	D. Jankly		7-13-09	1 of 12

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method / Casing Depth	Remarks
	25		No Recovery. *(continued)*.		S05	50/2.5"		0						See note at end of log regarding RQD.
724.00	26													
	27													
722.00	28													
	29													
720.00	30		No Recovery.		S06	50/2.5"		0						
	31													
718.00	32													
	33													
716.00	34													
	35		No Recovery.		C07			0	0					
714.00	36													
	37													
712.00	38				C08			0	0					
	39													
710.00	40													
	41													
708.00	42													
	43		SEDIMENTARY ROCK, (CONGLOMERATE), granule to cobble, fine to coarse sand, light gray, moderately weathered, soft to moderately soft, majority of matrix washed out, predominantly granule to pebble sized clasts observed.		C09			5	0					
706.00	44													
	45													
704.00	46													
	47													
702.00	48		At EL. 702.0 ft, observed Isolated calcite-cementation, moderately hard zones recovered.		C10			5	0					
	49													
700.00	50													
	51													
698.00	52													
	53				C11			0	0					
696.00	54													
	55													

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B6**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**7-13-09**	**2 of 12**

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
	55				C11			0	0						See note at end of log regarding RQD.
694.00	56														
	57														
692.00	58		At EL. 692.0 ft, becomes moderately to slightly weathered, soft to moderately hard. Matrix is fine to coarse grained sand. No visible structure. Granule to cobble sized clasts composed of hard to very hard intrusive rock (generally dioritic in nature), subangular to rounded.		C12			30	0						
	59														VOC = 0.0 ppm
690.00	60														
	61														
688.00	62														
	63				C13			7	0						
686.00	64														
	65														
684.00	66														
	67														
682.00	68		At EL. 682.0 ft, becomes slightly weathered.		C14			18	13						
	69														
680.00	70														
	71														
678.00	72														
	73														
676.00	74														
	75														
674.00	76														
	77														
672.00	78		At EL. 672.0 ft, becomes slightly weathered to fresh, clasts are hard.		C15			15	5						
	79														VOC = 0.0 ppm
670.00	80														
	81														
668.00	82														
	83														
666.00	84														
	85														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B6**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**7-13-09**	**3 of 12**

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
	85				C15			15	5						See note at end of log regarding RQD.
664.00	86														
	87														
662.00	88		At EL. 662.0 ft, becomes medium gray.		C16			8	3						VOC = 0.0 ppm
	89														
660.00	90														
	91														
658.00	92														
	93														
656.00	94														
	95														
654.00	96														
	97														
652.00	98				C17			7	0						
	99														
650.00	100														
	101														
648.00	102														
	103														
646.00	104														
	105														
644.00	106														
	107														
642.00	108		At EL. 642.0 ft, with coarse grained sand matrix.		C18			13	0						VOC = 0.0 ppm
	109														
640.00	110														
	111														
638.00	112														
	113				C19			18	0						
636.00	114		At EL. 636.0 ft, observed intersected clasts up to 3".												
	115														

(continued)

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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B6**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**7-13-09**	**4 of 12**

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
	115				C19			18	0						See note at end of log regarding RQD.
634.00	116														
	117														
632.00	118		At EL. 632' to 627' Pressuremeter test.												
	119														
630.00	120														
	121														
628.00	122														
	123				C20			0	0						
626.00	124														
	125														
624.00	126				C21			0	0						
	127														
622.00	128		At EL. 622' to 617' Pressuremeter test.												
	129														
620.00	130														
	131														
618.00	132														
	133		At EL. 617.0 ft, becomes greenish gray.		C22			20	8						
616.00	134		At EL. 616.4 ft, observed incipient joint, dipping 0°.												
	135														VOC = 0.0 ppm
614.00	136														
	137														
612.00	138														
	139														
610.00	140														
	141														
608.00	142														
	143		At EL. 607.0 ft, observed slightly weathered, soft, incipient joint, dipping 70°, very hard clasts up to 8" intersected.		C23			47	13						
606.00	144														
	145														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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BORING RECORD				**R-09-Z3B6**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**7-13-09**	**5 of 12**

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
	145				C23			47	13						See note at end of log regarding RQD. VOC = 0.0 ppm
604.00	146														
	147														
602.00	148		At EL. 602.0 ft, becomes medium gray, slightly weathered to fresh, very soft to soft.		C24			27	0						VOC = 0.0 ppm
	149														
600.00	150														
	151														
598.00	152														
	153		At EL. 597.0 ft, observed very soft matrix, clasts are very hard. Intact sand matrix up to 7" thick observed.		C25			45	12						
596.00	154														
	155														VOC = 0.0 ppm
594.00	156														
	157														
592.00	158				C26			45	17						
	159														
590.00	160		At EL. 590.0 ft, observed intact coarse grained sand matrix up to 5.5" thick, moderately soft. Very hard diorite clasts up to 5" observed.												
	161														VOC = 0.0 ppm
588.00	162														
	163		At EL. 587.0 ft, becomes fresh, very soft, granule and pebble sized clasts within fine to medium grained sand matrix. At EL. 587' to 580' Pressuremeter test.												
586.00	164														VOC = 0.0 ppm
	165														
584.00	166														
	167														
582.00	168														
	169														
580.00	170				C27			44	0						
	171														VOC = 0.0 ppm
			At EL. 579.0 ft, observed roughly 6 inches of reddish brown aphanitic igneous rocks.												
578.00	172														
	173		At EL. 577.0 ft, observed greenish gray, slightly weathered to fresh, hard granule, pebble and cobble sized clasts within fine to coarse grained very soft sand matrix.		C28			67	7	11					PA
576.00	174														VOC = 0.0 ppm
	175														

(continued)

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07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**7-13-09**	**6 of 12**

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
	175		Very weak.		C28			67	7						See note at end of log regarding RQD.
574.00	176														PL
	177														
572.00	178		At EL. 572.0 ft, becomes light bluish gray to greenish gray, slightly weathered.		C29			30	12						
	179														VOC = 0.0 ppm
570.00	180														
	181														
568.00	182														
	183														
			At EL. 566.8 ft, observed joint, dipping 20°.		C30			100	0						VOC = 0.0 ppm
566.00	184		At EL. 566.0 ft, becomes slightly weathered to fresh, intensely fractured, with pebble sized clasts, white, very hard, subangular.												
	185		At EL. 565.5' to 557' Pressuremeter test.												
564.00	186														
	187														
562.00	188														
	189														
560.00	190		At EL. 560.0 ft, observed abundant pebbles between EL. 560' to 559'.												
	191		At EL. 559.0 ft, observed roughly 4" thick medium to coarse grained sandstone lens, greenish gray.												
558.00	192		At EL. 558.0 ft, observed some polished surfaces, possible gouge zone.												
	193		At EL. 557.0 ft, observed SANDSTONE bed, roughly 1' thick, medium-grained to granule, medium gray, slightly weathered, moderately fractured, bedding plane separation, dipping 30°, seven joints observed between EL. 557' to 555', dips range from 10 to 20 degrees.		C31			98	30						
556.00	194		At EL. 556.0 ft, becomes intensely fractured.												
	195		At EL. 554.5 ft, observed joint, dipping 60 to 20°, three joints observed between EL. 554.5' to 554'.												
554.00	196		PTS - Quartz Diorite clast: Plutonic rock with allotriomorphic-granular texture.												PTS
	197		At EL. 554.0 ft, becomes poorly indurated conglomerate.												CAI
552.00	198		At EL. 552.5 ft, observed incipient joint, dipping 60°, 1' thick coarse grained sandstone bed, easily friable.		C32			100	29						VOC = 0.0 ppm
	199		At EL. 552.0 ft, becomes massive, greenish gray, clasts up to 7" intersected. Very weak.												PL
550.00	200		At EL. 551.0 ft, observed three rough to moderately rough joints observed between EL. 551.3' to 550.7'.		C33			78	0						VOC = 0.0 ppm
	201		At EL. 550.0 ft, observed numerous joints observed between EL. 550' to 548', dipping 0 degrees.												
548.00	202		At EL. 548.2 ft, observed random fracture, dipping 50°.												VOC = 0.0 ppm
	203		At EL. 547.0 ft, observed shear, dipping 75°, clay lined, slickensided.		C34			90	72						
546.00	204		At EL. 546.9 ft, observed shear, dipping 75°.												
	205		At EL. 545.5 ft, observed shear, dipping 50°.												

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BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**7-13-09**	**7 of 12**

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
	205		At EL. 545.0 ft, becomes very thickly bedded, moderately fractured, bedding joint, dipping 30°.		C34			90	72						See note at end of log regarding RQD.
544.00	206		At EL. 543.7 ft, observed random fracture, dipping 40°.												VOC = 0.0 ppm
	207		At EL. 543.3 ft, observed joint, dipping 40 to 30°, two joints observed.												
542.00	208		At EL. 542.5 ft, observed joint, dipping 20°.												
	209		At EL. 541.0 ft, observed bedding joint, dipping 35°, . Weak.							4	146				UC, PL
540.00	210		At EL. 540.0 ft, observed joint, dipping 0°.												
	211		At EL. 539.5 ft, observed incipient joint, dipping 0°. At EL. 539.3 ft, observed incipient joint, dipping 0°.												
538.00	212		At EL. 538.8 ft, observed joint, dipping 0°.												
	213				C35			98	87						
536.00	214		At EL. 536.5 ft, observed joint.												
	215		At EL. 535.9 ft, observed joint, dipping 0°. At EL. 535.6 ft, becomes very thinly bedded, bedding joint, dipping 45°.												VOC = 0.0 ppm
534.00	216		At EL. 535.5 ft, observed joint, dipping 0°. At EL. 535.0 ft, becomes very thickly bedded, slightly weathered, light gray, coarse angular sand matrix.												PL
	217		At EL. 534.5 ft, observed joint, dipping 0°, . Very weak. At EL. 534.0 ft, observed joint, dipping 0°.												
532.00	218		At EL. 533.8 ft, observed joint, dipping 0°. At EL. 533.5 ft, observed joint, dipping 0°, . Very weak. At EL. 533.0 ft, observed joint, dipping 0°.												UC
	219		At EL. 532.5 ft, observed joint, dipping 0°. At EL. 531.8 ft, observed joint, dipping 0°, Weak.							2	149				
530.00	220		At EL. 531.0 ft, observed 6" thick lens with medium grained sand matrix. At EL. 530.5 ft, observed joint, dipping 0°.												
	221		At EL. 529.0 ft, becomes very weak, moderately soft, bedding joint, dipping 40°.												UC, PL
528.00	222		At EL. 528.1 ft, observed joint, dipping 0°. At EL. 527.7 ft, observed joint, dipping 0°, . Very weak.							3	142				PL
	223		At EL. 527.2 ft, observed joint, dipping 0°. At EL. 527.0 ft, observed granule to cobble sized clasts.		C36			57	13						VOC = 0.0 ppm
526.00	224														
	225														
524.00	226				C37			67	32						VOC = 0.0 ppm
	227		At EL. 523.0 ft, observed bedding joint, dipping 35°, . Very weak to weak.												UC, PL
522.00	228		At EL. 522.0 ft, observed Sandstone lens, light gray, fine to coarse grained, friable.							2	152				
	229														
520.00	230		At EL. 520.5 ft, observed Sandstone lens, gray, fine to medium grained.		C38			83	83						VOC = 0.0 ppm
	231		At EL. 519.5 ft, observed pebble to gravel sized clasts, subangular to angular, local slickensided surfaces.		C39			63	22						VOC = 0.1 ppm
518.00	232														
	233		SEDIMENTARY ROCK, (SANDSTONE), medium to coarse grained, angular, friable, possibly sheared.		C40			19	0						VOC = 0.0 ppm
516.00	234														
	235														

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B6**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**7-13-09**	**8 of 12**

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
	235		*(continued).*		C40			19	0						See note at end of log regarding RQD.
514.00	236														
	237														
512.00	238														
	239														
510.00	240														
	241														
508.00	242		SEDIMENTARY ROCK, (CONGLOMERATE), slightly weathered to fresh, moderately hard, pebble sized clasts within well indurated sandstone matrix.		C41			100	0						VOC = 0.0 ppm
	243				C42			13	0						VOC = 0.0 ppm
506.00	244		At EL. 506.0 ft, observed random fracture, dipping 70°, dark gray slickensided surfaces.												
	245														
504.00	246														
	247														
502.00	248														
	249														
500.00	250														
	251														
498.00	252				C43			59	19						
	253		At EL. 497.5 ft, observed joint, dipping 65°, slickensided. At EL. 497.0 ft, observed calcite veins.												
496.00	254														PL VOC = 0.0 ppm
	255		At EL. 495.7 ft, observed joint, dipping 70°, slickensided. Weak.												
494.00	256														
	257				C44			50/	32						
492.00	258		At EL. 492.7 ft, observed joint, dipping 0°. Weak to medium strong. At EL. 492.2: PTS - coarse grained arkosic conglomerate with grains cemented by calcite.							3 2	 154				SD, PL PTS UC
	259		At EL. 492.0 ft, observed Intersected 3" clast. At EL. 491.2 ft, observed joint, dipping 0°.												VOC = 0.0 ppm
490.00	260														
	261														
488.00	262				C45			0	0						
	263														
486.00	264														
	265														

(continued)

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07	**LA**	**710**	**D/D**	**07-187900**
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BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**7-13-09**	**9 of 12**

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
	265		*(continued).*		C45			0	0						See note at end of log regarding RQD.
484.00	266														
	267		At EL. 483.0 ft, becomes slightly weathered, Clasts are 1/2" to 1" dia., diorite pebbles, very hard, some slickensided surfaces.		C46			32	10						VOC = 0.0 ppm
482.00	268		At EL. 482.0 ft, observed joint, dipping 70°, slickensided.												
	269		At EL. 481.9 ft, observed Intersected 6" clast.												
480.00	270														
	271														
478.00	272				C47			27	0						
	273		SEDIMENTARY ROCK, (SANDSTONE), dark bluish gray, moderately soft, fine to medium grained, subangular to angular, poorly cemented.												VOC = 0.0 ppm
476.00	274														
	275														
474.00	276														
	277		At EL. 473.0 ft, observed Sandstone as above with few diorite derived pebbles.		C48			38	0						
472.00	278		SEDIMENTARY ROCK, (CONGLOMERATE), pebble sized clasts within sand matrix.												VOC = 0.2 ppm
	279		At EL. 471.4 ft, observed bedding joint, dipping 35°.												
470.00	280														
	281														
468.00	282		At EL. 468.0 ft, observed joint, dipping 35°.		C49			45	19						
	283		At EL. 467.8 ft, observed joint, dipping 70°, Well cemented, fine grained matrix.												VOC = 0.0 ppm
466.00	284		At EL. 467.0 ft, observed decreased cementation, moderately soft.												PL
	285		At EL. 466.0 ft, observed Intersected 4" clast. Very weak.												
464.00	286														
	287		SEDIMENTARY ROCK, (SANDSTONE), soft, fine to medium grained, poorly cemented.		C50			20	0						
462.00	288		At EL. 462.3 ft, observed some angular to subangular pebbles.												VOC = 0.0 ppm
	289														
460.00	290														
	291														
458.00	292		At EL. 458.0 ft, becomes moderately soft, joint, dipping 75°, slickensided.		C51			15	0						VOC = 0.0 ppm
	293														
456.00	294														
	295														

(continued)

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DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
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SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**7-13-09**	**10 of 12**

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
	295				C51			15	0						See note at end of log regarding RQD.
454.00	296														
	297		**SHEAR ZONE AT El. 453' to El. 424'**		C52			46	24						
452.00	298		At EL. 452.8 ft, becomes massive, bluish gray, moderately to slightly weathered, extremely weak, very soft to soft, mostly fine to medium sand. Little fine to coarse, angular gravel. Little fines.												PL
	299									6					PA
450.00	300		At EL. 450.0 ft, observed sheared and friable bedrock.												VOC = 0.0 ppm
	301														
448.00	302														
	303				C53			100	87						VOC = 0.4 ppm
446.00	304		At EL. 446.3 ft, observed bedding joint, dipping 20°, Sandstone, white with black minerals, appears decomposed due to shearing.												
	305									12					PA
444.00	306		At EL. 444.0 ft, observed joint, dipping 77°, slickensided.												
	307														
442.00	308		At EL. 442.0 ft, observed joint, dipping 80°. Unit is friable, highly sheared, black gouge within joints.		C54			100	48						
	309		At EL. 441.0 ft, observed bedding joint, dipping 25°.												
440.00	310														
	311		At EL. 439.0 ft, observed bedding joint, dipping 25°, Unit is sheared, continuing from El. 453'.												
438.00	312		At EL. 438.0 ft, becomes very soft and friable, pebbles within sandstone are decomposed and easily friable, numerous slickensided surfaces.												VOC = 0.2 ppm
	313		At EL. 437.0 ft, becomes moderately to slightly weathered, soft, sandstone to siltstone, numerous near vertical slickensided surfaces 80 to 90 degree dip.		C55			100	72						
436.00	314		At EL. 435.5 ft, observed bedding joint, dipping 25°, Local 3/8" thick beds of sandstone and siltstone.												
	315		At EL. 434.8 ft, observed Possibly decomposed diorite, very dark gray. Numerous gray, clay lined slickensided surfaces which are friable.												
434.00	316														VOC = 0.6 ppm
	317		At EL. 433.0 ft, observed joint, dipping 40°, Likely continuation of shear zone from El. 453'.												
432.00	318		At EL. 432.8 ft, observed joint, dipping 10°.		C56			69	63						
	319		At EL. 432.5 ft, observed joint. At EL. 432.0 ft, observed Sandstone with some pebbles, gray to dark gray, friable, numerous slickensided surfaces.												
430.00	320		At EL. 431.0 ft, becomes moderately soft.												
	321		At EL. 429.0 ft, observed bedding joint, dipping 30°, Likely continuation of shear zone from El. 453'.												
428.00	322		At EL. 428.5 ft, becomes soft.												VOC = 0.9 ppm
	323														
426.00	324														
	325														

(continued)

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N/A	**D. Jankly**		**7-13-09**	**11 of 12**

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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
	325				C56			69	63						
424.00	326		Bottom of borehole at 326.0 ft bgs Borehole terminated at planned depth. Borehole converted to piezometer at the completion of drilling. RQD values provided on the boring logs are based on intact core pieces obtained between two natural discontinuities. The majority of core obtained from this boring is typically very weak to weak and does not meet the "sound core" definition provided in the standard test method for RQD (ASTM D 6032). These RQD values should not be used to evaluate rock mass quality.											
	327														
422.00	328														
	329														
420.00	330														
	331														
418.00	332														
	333														
416.00	334														
	335														
414.00	336														
	337														
412.00	338														
	339														
410.00	340														
	341														
408.00	342														
	343														
406.00	344														
	345														
404.00	346														
	347														
402.00	348														
	349														
400.00	350														
	351														
398.00	352														
	353														
396.00	354														
	355														

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Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B6**
DIST. **07**	COUNTY **LA**	ROUTE **710**	POSTMILE **D/D**	EA **07-187900**
PROJECT OR BRIDGE NAME **SR-710 TUNNEL TECHNICAL STUDY**				
BRIDGE NUMBER **N/A**	PREPARED BY **D. Jankly**		DATE **7-13-09**	SHEET **12 of 12**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
A. Tsegie/J. Pratt	1-29-09	2-20-09	1866180.3 ft / 6510341.9 ft NAD83	R-09-Z3B7
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Caltrans In-House			' Lt Sta San Pasqual & Comet St.	596.7 ft NAVD88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wash			CME85	3.7 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT (1.4"), Punch Core (2.5"), HQ Core			CME Automatic, 140 lb., 30 inch drop	87%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer Installed on Completion			NM	14.5 ft on 7-9-09	326.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		SILTY SAND with GRAVEL (SM); brown; moist; few GRAVEL; (Alluvium).		D01			100							This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007), except as noted in Appendix A.1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
594.69	2														
592.69	4		COBBLES AND BOULDERS.												
	5		Well-graded SAND with GRAVEL (SW); very dense; light gray; coarse gravel (up to 2 in. diameter), fresh hard granitic rock fragments.												
590.69	6				S02	12 21 35	56			7					
588.69	8		COBBLES AND BOULDERS cobbles intersected core lengths up to 9 in. diameter.		C03			0							
586.69	10														
	11				C04			20							
584.69	12														
582.69	14														
580.69	16		Poorly graded SAND (SP); dense; light gray; moist; rounded coarse sand.		S05	14 11 11	22								
	17		SANDY SILT (ML); light brown; contains 10% cobbles; hard granitic rock fragments.												
578.69	18				C06										
576.69	20														
	21		SILTY, CLAYEY SAND (SC-SM); very dense; light brown to yellowish brown; moist; mostly fine SAND.		O07			48		13	123				UW, PA
574.69	22														
572.69	24														
	25														

(continued)

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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z3B7
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	T/T	07-07-187900
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, A. Mehrazar		5-8-09	1 of 12

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		SILTY, CLAYEY SAND (SC-SM) *(continued)*.		S08	9 24 22	46								
570.69	26														
	27		SANDY SILT (ML); light brown to yellowish brown; low plasticity fines.		C09										
568.69	28														
	29														
566.69	30														
	31		SANDY lean CLAY (CL); yellowish orange; low plasticity fines; estimated hard to very stiff.		O10			48		14	120				UW
564.69	32														
	33														
562.69	34				C11										
	35														
560.69	36				S12	18 13 18	31								PI, PA
	37														
558.69	38		Lean CLAY (CL); yellowish brown; moist; low plasticity fines; contains 10% cobbles (up to 4 in. diameter).		C13			100							
	39														
556.69	40														
	41				O14			68		16	117				UW
554.69	42		SILTY SAND (SM); very dense; yellowish brown to light brown; fine SAND; nonplastic fines.												
	43														
552.69	44				C15										
	45														
550.69	46				S16	9 16 40	56								
	47														
548.69	48		CLAYEY SAND (SC); medium plasticity fines; interbedded with Sandy Clay, contains few gravel.		C17										
	49														
546.69	50														
	51		SANDY SILT (ML); some medium to fine SAND; mostly fines.		O18			48		14	121				UW, PA
544.69	52														
	53														
542.69	54				C19										
	55														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B7**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, A. Mehrazar		**5-8-09**	**2 of 12**

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
	55														
	56		Poorly graded GRAVEL with SAND (GP); very dense; light gray; contains cobbles (decomposed), angular gravel (up to 3 in. length).		C19										
540.69					S20	21 50/4"									
	57		CLAYEY SAND (SC); very dense; yellowish brown. SILTY SAND (SM); yellowish brown; moist; trace Gravel and Cobbles (elongated).		C21										
538.69	58														
	59		SEDIMENTARY ROCK, (SANDSTONE (65%), fine sand, interbedded with MUDSTONE/SILTSTONE (33%) and SHALE/SANDY CLAYSTONE (2%); thinly to moderately bedded (0.1 to 0.5 ft), beds dip ~40 to 35°, moderate yellowish brown to dark yellowish orange, moderately weathered, unfractured, very soft to soft (minor moderately soft interbeds); FeO stain on bedding planes; weakly calcite and possible feldspar cemented to uncemented (few moderately to minor strongly cemented thin to moderate interbeds); (mostly Poorly graded SAND (SP) and [SILTY SAND (SM) interbedded with some SILT (ML) and SANDY Lean CLAY (CL); mostly very dense sand and some very stiff to hard silt and clay (PP=4.0 tsf) **[TOPANGA FORMATION]**		C22			100	0						See note at end of log regarding RQD.
536.69	60														
	61				S23	18 50/3"				15					PA
534.69	62				C24			100	0						
	63														
532.69	64														
	65														
530.69	66				S25	21 50/5"									
	67				C26			78	0						
528.69	68														
	69														
526.69	70														
	71				S27	17 27 38	65			15 14					PI, PA
524.69	72														
	73				C28			91	0						
522.69	74														
	75														
520.69	76		SEDIMENTARY ROCK, (MUDSTONE/CLAYSTONE) (75%) interbedded with SANDSTONE (25%), fine to coarse sand; thinly to moderately bedded (0.2 to 0.5 ft thick), medium dark gray to light gray, intensely weathered, predominantly very soft to soft (minor moderately hard); unfractured; weakly cemented (minor moderately to strongly calcite cemented); below EL 516 ft pale brown (mostly Lean CLAY with SAND (CL) interbedded with little Poorly graded SAND (SP) grading to [SILTY SAND (SM); very stiff to hard clay (PP=4.0 to >4.5 tsf) interbedded with very dense sand)].		S29	20 50/4"								
	77				C30			84	0						
518.69	78														
	79														
516.69	80														
	81				C31			90	14						
514.69	82														
	83		SEDIMENTARY ROCK, (MUDSTONE/CLAYSTONE/SILTSTONE), contains few to little gravel (composed of calcite cemented sandstone rock fragments), medium gray, very soft to soft, burrow mottled; (SANDY Lean CLAY (CL) to SILT												
512.69	84														
	85														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B7**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, A. Mehrazar		**5-8-09**	**3 of 12**

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
	85		(ML); very stiff to hard clay and silt (PP=4.0 to >4.5 tsf).		C31			90	14						See note at end of log regarding RQD.
510.69	86		SEDIMENTARY ROCK, (SANDSTONE), fine to medium sand, pale brown, moderately hard, intensely fractured, very thin (0.5 to 1 mm thick) totally calcite healed fractures dip 65º; strongly calcite cemented.		C32			100	24						UW
	87		SEDIMENTARY ROCK, (MUDSTONE/CLAYSTONE/SILTSTONE) (80%) interbedded with SANDSTONE (20%), fine sand; thinly bedded, dark yellowish brown to brownish gray, very soft to soft, unfractured, (mostly SANDY Lean CLAY (CL) interbedded with little SILTY SAND (SM) grading to Poorly graded SAND (SP); hard clay (PP>4.5 tsf). *(continued)*.										
508.69	88														
	89														
506.69	90									9	134				
	91		SEDIMENTARY ROCK, (SANDSTONE), fine to medium sand, thinly to moderately bedded, dark yellowish brown, mostly very soft to little hard (below EL 509 ft); intensely fractured; below EL 508.4 ft closely spaced totally calcite healed fractures dip 65º; mostly weakly to little strongly calcite cemented (mostly Poorly graded SAND (SP)).		C33			100	36					
504.69	92														
	93														
502.69	94		SEDIMENTARY ROCK, (MUDSTONE/CLAYSTONE/SILTSTONE), thinly bedded, brownish gray, very soft to soft, unfractured, (mostly Lean CLAY with SAND (CL) interbedded with SANDY SILT (ML); very stiff clay and silt (PP=4.0 tsf)).											
	95														
500.69	96		SEDIMENTARY ROCK, (SANDSTONE) (70%), fine sand, interbedded with CLAYSTONE/SILTSTONE (30%), thinly to moderately interbedded (0.2 to 0.5 ft thick), beds dip 40º, medium light gray to brownish gray, slightly weathered, moderately fractured, dominantly very soft to soft (minor moderately soft sandstone intervals); moderately fractured; moderately spaced (0.3 to 0.6 ft) incipient bedding plane fractures are clay lined and dip ~40º; at EL 504.2 ft are lenticular beds; some moderately to some [weakly cemented sandstone (some Poorly graded SAND with SILT (SP-SM) interbedded with some SANDY Fat CLAY (CH) and SANDY SILT (ML); very stiff to hard clay and silt (PP=3.0 to >4.5 tsf))].		C34			100	54	7	134				UW, PA
	97														
498.69	98														
	99														
496.69	100														
	101		SEDIMENTARY ROCK, (SANDSTONE), fine sand; mostly moderately to little thickly bedded (0.3 to 1.5 ft thick), beds dip ~50º, light gray to medium light gray, moderately soft and very soft; mostly unfractured, intensely fractured between EL 498.5 ft to 498.2 - fractures dip 80º and slickensides 50º rake; below EL 495.6 ft fractures dip 65º totally calcite healed [mostly strongly to moderately calcite cemented, some weakly cemented between EL 498.2 to 495.5 ft (some Poorly graded SAND with SILT (SP-SM))].		C35			100	38						
494.69	102														
	103														
492.69	104														
	105		SEDIMENTARY ROCK, (SANDSTONE) (80%), fine sand, moderately interbedded with MUDSTONE/CLAYSTONE/SILTSTONE (20%), beds dip 40 to 50º, medium light gray to brownish gray, mostly very soft (some hard); unfractured; smooth waxy clay lined bedding plane surfaces; mostly weakly to some strongly cemented sandstone (mostly Poorly graded SAND with SILT (SP-SM) interbedded with SANDY Fat CLAY (CH) and SANDY SILT (ML); hard clay [and silt (PP>4.5 tsf))].		C36			100	50						
490.69	106														
	107														
488.69	108														
	109		SEDIMENTARY ROCK, (PEAT/COAL); black; organic, very soft.												
486.69	110		SEDIMENTARY ROCK, (MUDSTONE/CLAYEY SILTSTONE) (65%) interbedded with SANDSTONE (35%), fine sand; moderately bedded (1.0 to 0.3 ft) to laminated (5 mm), brownish gray to medium light gray, very soft to soft, some moderately hard and moderately soft; unfractured; below EL 487.7 ft penecontemporaneous faulting (soft sediment deformation) in laminated section (high sedimentation rates); (some SILT (ML) interbedded with little Poorly graded SAND with SILT (SP-SM) [; some hard silt (PP>4.5 tsf))].		C37			100	44						
	111														
484.69	112														
	113														
482.69	114		SEDIMENTARY ROCK, (SANDSTONE), fine sand, moderately bedded, medium light gray, moderately hard.												
	115														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B7**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, A. Mehrazar		**5-8-09**	**4 of 12**

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
	115		to hard, unfractured, strongly calcite cemented.		C37			100	44						See note at end of log regarding RQD.
480.69	116		SEDIMENTARY ROCK, (SANDSTONE) (80%), medium to fine sand, interbedded with MUDSTONE/CLAYSTONE/SILTSTONE (20%), moderately to thinly interbedded (0.5 to 0.1 ft thick), beds dip ~40 to 50º, medium light gray to brownish gray, very soft to soft, some moderately soft; very slightly fractured to unfractured; between EL 483.8 to 481.5 ft rare bedding plane fractures calcite lined; above EL 484.2 ft bioturbated; some weakly to some strongly calcite cemented sandstone (some Poorly graded SAND with [SILT (SP-SM) interbedded with SILTY SAND (SM) and little SANDY Fat CLAY (CH) and SANDY SILT (ML); very stiff clay and silt (PP=4.0 tsf)].		C38			100	52						UW, PA
478.69	117														
	118														
	119														
476.69	120									6	136				
	121		*(continued)*.												
			SEDIMENTARY ROCK, (MUDSTONE/SANDY CLAYSTONE/SILTSTONE) (70%) thinly to moderately (0.2 to 0.6ft) interbedded with SANDSTONE (30%), fine to medium sand, brownish gray to medium light gray, mostly soft to some very soft; unfractured to slightly fractured; dominantly weakly to moderately cemented sand (some SANDY Lean CLAY (CL) interbedded with SILT (ML) and little Poorly graded SAND with SILT (SP-SM); hard clay (PP>4.5 tsf)).		C39			100	54						
474.69	122														
	123														
472.69	124														
	125		SEDIMENTARY ROCK, (SANDSTONE) (85%), medium to fine sand, interbedded with MUDSTONE/CLAYEY SILTSTONE (15%), dominantly moderately to thinly bedded (1.0 to 0.1 ft thick), minor laminated, beds dip ~40 to 50º, medium light gray to brownish gray, mostly soft to moderately soft sandstone; mudstone very soft to soft; very slightly fractured to unfractured; possible incipient clay lined fractures dip 80º with faint slickensides; above EL 473.6 ft lenticular bedding; weakly to moderately calcite [cemented (some SILTY SAND (SM) and Poorly graded SAND with SILT (SP-SM) interbedded with few SILT (ML); very stiff to hard silt (PP=3.5 to 4.5 tsf)].											
470.69	126				C40			100	22						
	127														
468.69	128														
	129														
	130		SEDIMENTARY ROCK, (SANDSTONE) (80%), fine to medium sand, interbedded with MUDSTONE/CLAYSTONE/CLAYEY SILTSTONE (20%), thinly bedded (0.1 to 0.3 ft), beds dip ~40º, medium light gray to brownish gray, mostly very soft (little moderately hard); unfractured; bioturbated and possible ball and pillow structures; mostly weakly to little strongly cemented (mostly SILTY SAND (SM) and Poorly graded SAND with SILT (SP-SM) interbedded with few SANDY Lean CLAY [(CL) and SILT (ML); hard clay and silt (PP>4.5 tsf))].											
466.69	131				C41			98	28						
464.69	132														
	133														
462.69	134														
	135		SEDIMENTARY ROCK, (SANDSTONE) (95%), fine to coarse, interbedded with MUDSTONE/CLAYSTONE (5%), thinly to moderately bedded (0.2 to 0.8 ft), few laminations and irregular seams (3 to 8 mm thick), medium light gray to brownish gray, mostly very soft to some moderately soft to moderately hard; moderately to slightly fractured; moderately fractured between EL 463.5 to 462.5 ft with totally calcite healed continuous fractures dip 60º; below EL 460.7 ft fractures dip 60º and 20 to 30º [and generally moderately fractured; mostly weakly to some strongly calcite cemented (mostly Poorly graded SAND with SILT (SP-SM) grading to SILTY SAND (SM) interbedded with few Lean CLAY with SAND (CL); hard clay (PP>4.5 tsf))].											
460.69	136				C42			100	54						
	137														
458.69	138														
	139														
456.69	140		SEDIMENTARY ROCK, (MUDSTONE/CLAYEY SILTSTONE/CLAYSTONE) thinly interbedded with SANDSTONE, very soft, uncemented sandstone (mostly SILT (ML) interbedded with Fat CLAY (CH) and some SILTY SAND (SM); hard silt and clay (PP>4.5 tsf)).											
	141				C43			100	50						UU
454.69	142														
	143		SEDIMENTARY ROCK, (SANDSTONE) (92%), fine to medium sand, interbedded with MUDSTONE/CLAYSTONE; dominantly moderately bedded, beds dip ~40º, medium light gray to brownish gray, moderately hard to very soft; intensely to moderately fractured; between EL 455.3 to 454.2 ft 60											
452.69	144									4	144				
	145														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B7**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, A. Mehrazar		**5-8-09**	**5 of 12**

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
	145		to 70º dip clay lined fractures and between EL 453.9 to 453.3 ft 60 to 70º clay lined and 20 to 30º unlined fractures; (minor unfractured above EL 455.3 ft [and between EL 454.2 to 453.9 ft); some strongly to some weakly calcite cemented (some Poorly graded SAND (SP) and SILTY SAND (SM) interbedded with few SANDY Lean CLAY (CL); hard clay (PP>4.5 tsf))].		C43			100	50						See note at end of log regarding RQD.
450.69	146				C44			90	54						
	147														
448.69	148		SEDIMENTARY ROCK, (SANDSTONE) (85%), fine to medium sand, interbedded with MUDSTONE/CLAYSTONE (15%); dominantly moderately bedded to minor thickly bedded (0.4 to 1.5 ft), medium light gray to brownish gray, very weak, mostly moderately hard to moderately soft (little very soft mudstone); slightly fractured above EL 451.8 ft with incipient clay lined fractures; unfractured below; bioturbated below EL 450 ft; mostly moderately to some weakly calcite cemented (some [Poorly graded SAND with SILT (SP-SM) and SILTY SAND (SM) interbedded with little Lean CLAY with SAND (CL); hard clay (PP>4.5 tsf))]. *(continued)*.											
	149														
446.69	150														
	151				C45			98	76						
444.69	152														
	153														
442.69	154		SEDIMENTARY ROCK, (SANDSTONE), fine to medium sand, moderately bedded (0.3 to 0.9 ft), medium light gray, mostly moderately soft (very soft below EL 446.7 ft); moderately fractured; above EL 447.9 ft fractures dip 85º and are moderately thin (2 mm thick) and not healed (clay lined); unfractured below; mostly moderately to little weakly cemented (little Poorly [graded SAND (SP))].											EM, UC
	155									5	142				
440.69	156				C46			100	80						
	157		SEDIMENTARY ROCK, (SANDSTONE) (95%), fine to medium sand, interbedded with MUDSTONE/SILTSTONE (5%), thickly to moderately bedded (2.5 to 0.3 ft), minor thin wavey bedding below EL 443 ft, medium light gray to brownish gray, slightly weathered, mostly moderately hard to hard, little very soft; moderately fractured above EL 443 ft, unfractured below; mostly strongly to little weakly calcite cemented (little Poorly graded SAND (SP)).											
438.69	158														
	159														
436.69	160		SEDIMENTARY ROCK, (SANDSTONE) (95%), fine to medium sand, interbedded with MUDSTONE/CLAYSTONE (5%), moderately bedded to minor laminated, medium light gray to brownish gray, very weak, moderately hard above EL 438.5 ft, soft below; moderately fractured above EL 439.5 ft; between EL 441.5 to 441 ft discontinuous fracture dips 70º with 15º rake angle for slickensides; incipient fractures dip 60 to 55º between EL 441 to 439.5 ft; [unfractured below; moderately to strongly calcite cemented above EL 438 ft, little weakly cemented sand interbeds (little Poorly graded SAND (SP))].											
	161				C47			100	10						
434.69	162														
	163														
432.69	164														
	165		SEDIMENTARY ROCK, (SANDSTONE) (98%), fine to medium sand, interbedded with MUDSTONE/CLAYSTONE (2%), thinly to moderately bedded (minor laminated), beds dip ~40 to 50º, medium light gray to medium gray, intensely weathered, mostly soft to very soft (few to little moderately hard); unfractured; mostly weakly to few to little strongly calcite cemented (mostly Poorly graded SAND with SILT (SP-SM) grading to SILTY SAND (SM)).											
430.69	166				C48			100	36						
	167														
428.69	168														
	169		SEDIMENTARY ROCK, (SANDSTONE) (92%), fine to medium sand, interbedded with MUDSTONE/SILTSTONE (8%), moderately to thinly bedded, minor laminated (1 mm), beds dip ~40 to 50º, medium light gray to brownish gray, intensely to moderately weathered, mostly moderately soft to very soft (little moderately hard); moderately to slightly fractured; incipient very thin clay lined fractures above EL 429.6 ft; continuous fracture with rough surface dips 60º between 427.1 to 426.8 ft; @ EL 425.6 ft rough [fracture dips 40º with raised ridges rake 10º; incipient clay lined fractures dip 70º (EL 425 to 423 ft); mostly moderately to weakly cemented (little strongly cemented); (some Poorly graded SAND with SILT (SP-SM))].											
426.69	170														
	171				C49			100	54						
424.69	172														
	173														
422.69	174									6	138				EM, UC
	175														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B7**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, A. Mehrazar		**5-8-09**	**6 of 12**

CALTRANS BORING RECORD MET+ENG FIXED JOE - CALTRANS WITH REV Z3B2 Z3B5 Z3B7 ONLY SR-710TUNLS CT BORING LOGS11_23_09JPCOPY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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
	175		*(continued).*		C49			100	54						See note at end of log regarding RQD.
420.69	176				C50			100	44						
	177		SEDIMENTARY ROCK, (BRECCIA) with mudstone matrix interbedded with SANDSTONE, fine sand, thinly bedded to laminated, contains soft sandstone clasts,												
418.69	178		brownish gray to light gray, extremely weak, mostly very soft breccia and some hard sandstone interbeds; intensely fractured; sandstone between EL 419.3 to												
	179		418.9 ft with continuous fractures dip 80º closely spaced and slickensides 40º rake; breccia may												
416.69	180		possibly represent debris flow; mostly strongly [to weakly cemented (some SILTY SAND (SM) to Poorly graded SAND (SP))].												
	181		SEDIMENTARY ROCK, (SANDSTONE) (98%), fine to medium sand, interbedded with CLAYSTONE (2%),		C51			96	58						
414.69	182		moderately to thinly bedded, minor irregular laminations, medium light gray to brownish gray,												
	183		mostly moderately hard to little very soft; moderately fractured; incipient clay lined fractures dip 75 to 80º;												
412.69	184		mostly moderately to little weakly cemented (little SILTY SAND (SM) interbedded with trace Fat CLAY (CH); hard clay (PP>4.5 tsf)).												
	185		SEDIMENTARY ROCK, (SANDSTONE) (95%), fine to medium sand, interbedded with MUDSTONE/CLAYSTONE (5%) with soft sandstone												
410.69	186		clasts, thinly to thickly (0.1 to 2.0 ft) bedded, medium light gray to brownish gray, mostly moderately hard to		C52			100	0						UU
	187		some very soft; very slightly fractured to unfractured; irregular subvertical claystone seams are closely to		C53			83	0	7	135				
408.69	188		moderately spaced; mostly moderately to some weakly cemented (some Poorly graded SAND with SILT (SP-SM) interbedded with [few Lean CLAY with SAND (CL), hard clay (PP>4.5 tsf))].												
	189		SEDIMENTARY ROCK, (SANDSTONE) (95%), fine to medium sand, interbedded with MUDSTONE (5%),												
406.69	190		thinly to moderately bedded, medium gray to medium light gray, very weak, soft to moderately soft, , little		C54			100	0						
	191		very soft; moderately thin to thin claystone seams (1 to 4 mm) dip 60 to 70º, and 20º; mostly moderately to												
404.69	192		little weakly calcite cemented (little Poorly graded SAND with SILT (SP-SM).												
	193		SEDIMENTARY ROCK, (SANDSTONE), fine to medium sand, light gray, intensely weathered, very soft, no claystone seams; uncemented (Poorly graded SAND with SILT (SP-SM) grading to SILTY SAND (SM)).												
402.69	194		SEDIMENTARY ROCK, (SANDSTONE) (95%), fine to medium sand, interbedded with MUDSTONE/CLAYSTONE (5%), thinly to moderately bedded (minor laminations), light gray to brownish gray, very soft, contains thin claystone seams; mostly weakly cemented to uncemented, few moderately cemented; *between EL 407 to 402.5 ft rotten seaweed or rotten egg odor (mostly SILTY SAND (SM) interbedded with Poorly graded SAND with SILT (SP-SM) and few Lean CLAY [with SAND (CL); very stiff to hard clay (PP=2.75 to >4.5 tsf))].					0							
	195														
400.69	196				C55			6	0						
	197														
398.69	198														
	199														
396.69	200														
	201														
394.69	202		SEDIMENTARY ROCK, (SANDSTONE) (95%), fine to medium sand, interbedded with MUDSTONE/SILTSTONE (5%), thinly to moderately bedded, minor very thinly bedded (15 to 20 mm), beds dip ~40º, medium light gray to greenish black, mostly very soft to little moderately hard; unfractured above EL 393.2 ft, slightly fractured below; @ EL 393.1 ft discontinuous fracture dips 85º; @ EL 391.5 ft fractures dip 50º with slickensides 40º rake angle; mostly weakly to moderately calcite [cemented, little strongly cemented		C56			90	40						
	203														
392.69	204				C57			100	20						
	205		*(continued)*												

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SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, A. Mehrazar		**5-8-09**	**7 of 12**

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
	205		(mostly Poorly graded SAND with SILT (SP-SM) interbedded with SILTY SAND (SM) and few SILT		C57			100	20						See note at end of log regarding RQD.
390.69	206		(ML); PP>4.5 tsf))]. *(continued)*.		C58			100	100						EM, UC
	207		SEDIMENTARY ROCK, (SANDSTONE) (95%), fine to coarse sand, interbedded with		C59			100	15	6	138				
388.69	208		MUDSTONE/CLAYSTONE (5%), thinly to moderately bedded, medium light gray to brownish gray, extremely												
	209		weak, mostly moderately soft to little very soft; unfractured; little sandstone above EL 390.7 ft is												
386.69	210		uncemented, mostly strongly calcite cemented below (little Poorly graded SAND with SILT (SP-SM) and few SANDY Lean CLAY (CL); hard clay (PP>4.5 tsf)).		C60			89	9						
	211		SEDIMENTARY ROCK, (SANDSTONE), fine to coarse sand, light gray, intensely weathered, very soft, unfractured, weakly calcite cemented to uncemented; *between EL 388 to 387.5 ft smells like rotten eggs												
384.69	212		(SILTY SAND (SM) grading to Poorly graded SAND with SILT (SP-SM)).												
	213		SEDIMENTARY ROCK, (SANDSTONE), fine to medium sand, light gray, soft to moderately soft, unfractured, mostly moderately to few strongly calcite												
382.69	214		cemented.												
	215		SEDIMENTARY ROCK, (SANDSTONE), fine to medium sand; moderately to thickly bedded, beds dip ~35 to 40°, light gray to medium light gray, very soft to		C61			100	0						
380.69	216		soft, unfractured above EL 380.9 ft, intensely fractured below; mostly uncemented to weakly calcite cemented above EL 380.9 ft, some moderately to weakly												
	217		cemented between EL 383.9 to 383.5 ft and below EL 380.9 ft (mostly Poorly graded SAND with SILT												
378.69	218		(SP-SM) [interbedded with SILTY SAND (SM))].												
	219		SEDIMENTARY ROCK, (SANDSTONE) (95%), fine to medium sand, interbedded with		C62			100	60						UW, PL
376.69	220		MUDSTONE/CLAYSTONE (5%), moderately to thinly bedded, minor clay lamination and seams (3 to 5 mm),												
	221		beds dip 40°, medium light gray to brownish gray, mostly moderately soft to moderately hard (some very soft); moderately to slightly fractured, incipient bedding							1	148				
374.69	222		fractures and claystone seams dip 75 to 90° above EL 378.1 ft and between EL 376.1 to 375.8 ft; @ EL 376.6		C63			100	47						
	223		ft [slickensides on clay lined bedding planes with rake angle 80 to 90°; mostly strongly to moderately calcite cemented (some weakly cemented)].												
	224		SEDIMENTARY ROCK, (SANDSTONE) (55%), fine sand, interbedded with												
372.69	225		MUDSTONE/SILTSTONE/CLAYSTONE (45%), thinly bedded to laminated, beds dip 40°, convoluted bedding below EL 374.6 ft, medium light gray to		C64			100	60						
	226		brownish gray, very soft to soft, very slightly fractured to unfractured, irregular claystone seams/incipient												
370.69	227		fractures (1 to 5 mm thick) dip 50 to 60°; sporadically bioturbated; few soft sandstone clasts at base of unit; moderately to weakly calcite cemented (little Poorly graded SAND with SILT (SP-SM) interbedded with little SANDY Lean CLAY (CL) and SILT (ML); hard clay												
368.69	228		and silt (PP>4.5 tsf)). SEDIMENTARY ROCK, (SANDSTONE) (80%), fine sand, interbedded with MUDSTONE/SILTSTONE		C65			86	71						
	229		(20%), thinly bedded to laminated (0.1 to 0.3 ft, 5 to 1 mm), medium light gray to brownish gray, very soft to soft, moderately to slightly fractured, incipient fractures												
366.69	230		clay lined and subparallel to bedding planes; sandstone mostly moderately to weakly cemented; uncemented below EL 369.5 ft (SILTY SAND (SM)).												
	231		SEDIMENTARY ROCK, (SANDSTONE) (90%), fine to coarse sand, interbedded with		C66			98	62						EM, UC
364.69	232		MUDSTONE/SILTSTONE/CLAYSTONE (10%), thinly to moderately bedded, minor laminations, beds dip							6	143				
	233		~40°, medium light gray to brownish gray, intensely weathered, extremely weak, soft to very soft above EL 365.7 ft, moderately hard to moderately soft below;												
362.69	234		moderately to slightly fractured, incipient fractures (claystone seams) dip 40 to 80° and increase below EL 363.5 ft; mostly moderately to little weakly												
	235		cemented												

(continued)

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BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, A. Mehrazar		**5-8-09**	**8 of 12**

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
	235		above [EL 365.7 ft, moderately to strongly calcite cemented below (little SILTY SAND (SM) interbedded with few SILT (ML) and Lean CLAY with SAND (CL); hard silt and clay (PP>4.5 tsf))].		C66			98	62						See note at end of log regarding RQD.
360.69	236				C67			100	68						
	237		SEDIMENTARY ROCK, (SANDSTONE) (95%), fine to coarse sand, interbedded with MUDSTONE/CLAYSTONE (5%), moderately to thinly bedded (1 to 0.1 ft), minor laminated, beds dip ~40°, medium light gray to brownish gray, intensely weathered, mostly moderately hard, few claystone laminations very soft; very slightly fractured to unfractured, incipient fractures (claystone seams) dip 60°; contains a cobble (6 in. diameter) below EL 361.7 ft (subrounded hard granitic rock fragment); [mostly moderately to strongly calcite cemented, some weakly cemented (some Poorly graded SAND with SILT (SP-SM) interbedded with few Lean CLAY with SAND (CL), hard clay)]. *(continued)*.											
358.69	238														
	239														
356.69	240														
	241				C68			94	60						EM, UC
354.69	242									4	147				
	243		SEDIMENTARY ROCK, (SANDSTONE) (90%), fine to coarse sand, interbedded with MUDSTONE/CLAYSTONE (10%), thinly bedded (50 to 60 mm), beds dip ~40°, contains a cobble (10 in diameter) and coarse gravel below EL 354.3 ft, light gray to brownish gray, very weak, moderately soft to moderately hard, slightly fractured to unfractured; @ EL 356.9 ft incipient bedding plane fracture dips 40°, slickenside rake 30°; @ EL 357.2 ft penecontemporaneous faulting (soft sediment deformation) with minor offset [subrounded hard quartz diorite rock fragments; mostly moderately to some strongly calcite cemented].											
352.69	244														
	245														
350.69	246				C69			100							
	247				C70			97	47						
348.69	248		SEDIMENTARY ROCK, (SANDSTONE) (90%), fine to medium, interbedded with MUDSTONE/CLAYSTONE (10%), thinly to moderately bedded, minor laminated, beds dip ~50°, light gray to brownish gray, intensely weathered, mostly moderately soft to little moderately hard above EL 350.1 ft, very soft to moderately soft below; very slightly fractured to unfractured; incipient fractures dip 60 to 70°; penecontemporaneous faulting (soft sediment deformation) between EL 350.7 to [350.1 ft, moderately to strongly calcite cemented above EL 350.1 ft, moderately to weakly cemented below (below EL 350.1 ft, some SILTY SAND (SM) interbedded with Lean CLAY with SAND (CL); hard silt (PP>4.5 tsf))].											
	249														
346.69	250				C71			100	40						UU, CR
	251									5	145				
344.69	252														
	253		SEDIMENTARY ROCK, (SANDSTONE) (90%), fine to medium sand, interbedded with MUDSTONE/SILTSTONE (10%), contains a boulder (35%, 14 in. diameter) below EL 345.7 ft, thinly to moderately bedded, light gray to brownish gray, very weak, mostly very soft to some moderately hard; unfractured; subrounded very soft decomposed quartz diorite rock fragment (weathered to clays, medium dark gray); mostly weakly to some strongly calcite cemented (mostly Poorly graded SAND with SILT (SP-SM) [interbedded with SILT (ML)].		C72			97	50						
342.69	254														
	255														
340.69	256				C73			98	36						
	257		SEDIMENTARY ROCK, (SANDSTONE) (90%), fine to medium sand, interbedded with MUDSTONE/SILTSTONE (10%), thinly to moderately bedded, medium gray to brownish gray, mostly very soft above EL 342.2 ft, moderately hard below; unfractured; minor oil/tar @ EL 341.1 ft; mostly weakly calcite cemented above EL 342.2 ft, strongly to moderately calcite cemented below (above EL 342.2 ft mostly Poorly graded SAND with SILT [(SP-SM) grading to SILTY SAND (SM) interbedded with few SILT (ML); hard silt (PP>4.5 tsf))].											
338.69	258														
	259														
336.69	260														
	261				C74			100	74	4	144				
334.69	262		SEDIMENTARY ROCK, (SANDSTONE) (92%), fine to coarse sand, interbedded with MUDSTONE/SILTSTONE (8%); moderately to thinly bedded 0.2 to 1.0 ft), minor laminated; beds dip ~50°, light brownish gray to medium light gray, mostly very soft to some moderately hard; unfractured; weakly to moderately calcite cemented (little strongly cemented); (mostly Well graded SAND with SILT (SW-SM) interbedded with few SILT (ML); hard silt (PP>4.5 tsf)).													PTS, EM, PL, UC
	263														
332.69	264														
	265														

(continued)

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	J. Pratt, A. Mehrazar		**5-8-09**	**9 of 12**

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
	265		SEDIMENTARY ROCK, (SANDSTONE) (92%), fine to coarse sand, interbedded with MUDSTONE/SILTSTONE (8%), moderately to thinly bedded, minor laminated (2 mm), beds dip ~40°, light brownish gray to medium light gray, very weak, mostly moderately hard to hard, little very soft; very slightly fractured to unfractured; @ 331.3 ft bioturbated beds; mostly strongly to moderately calcite cemented, little weakly cemented (little Well graded SAND with SILT (SW-SM) interbedded with few [SILT (ML); hard silt (PP>4.5 tsf))]. *(continued)*.		C74			100	74						See note at end of log regarding RQD.
330.69	266				C75			100	100						
	267				C76			90	23						
328.69	268														
	269														
326.69	270		SEDIMENTARY ROCK, (SANDSTONE) (92%), fine to medium sand, interbedded with MUDSTONE/SILTSTONE (8%), moderately to thinly bedded (0.7 to 0.1 ft), beds dip ~40°, light gray to brownish gray, very soft to moderately soft interbeds; unfractured; weakly to moderately cemented (mostly SILTY SAND (SM) grading to Poorly graded SAND with SILT (SP-SM) interbedded with few SILT (ML)).		C77			93	0						
	271														
324.69	272				C78			100	59						
	273		SEDIMENTARY ROCK, (SANDSTONE) (92%), medium to coarse sand, interbedded with MUDSTONE/SILTSTONE (8%), thinly to moderately bedded, light gray to brownish gray, very soft, unfractured, bioturbated below EL 324.7 ft; mostly weakly to little moderately cemented (mostly Poorly graded SAND with SILT (SP-SM) interbedded with few SILT (ML); hard silt (PP>4.5 tsf)).											
322.69	274														
	275														
320.69	276				C79			100	74						
	277		SEDIMENTARY ROCK, (SANDSTONE) (96%), fine to medium sand, interbedded with MUDSTONE/SILTSTONE (4%); moderately bedded (0.3 to 0.5 ft), minor laminations and irregular seams, beds dip 30 to 40°, medium light gray to brownish gray, moderately soft to very soft; very slightly fractured to unfractured; between EL 324.1 to 323.8 ft incipient clay lined fractures (irregular seams) dip 70 to 80°; mostly moderately to weakly calcite cemented (some Poorly graded SAND with SILT (SP-SM) interbedded with SILT (ML); hard silt (PP>4.5 tsf))].											
318.69	278														
	279														
316.69	280														
	281		SEDIMENTARY ROCK, Boulder/Cobble (CONGLOMERATE); contains 14 to 10 in. diameter boulders and cobbles, medium gray, unfractured, subrounded moderately soft to moderately hard (intensely to moderately weathered) quartz diorite rock fragments; no matrix apparent.		C80			98	44	7	147				EM, PL, UC
314.69	282														
	283		SEDIMENTARY ROCK, (SANDSTONE) (95%), medium sand, interbedded with MUDSTONE/SILTSTONE (5%), thin siltstone seams, medium gray to brownish gray, soft, unfractured, mostly moderately to little strongly cemented.											
312.69	284														
	285		SEDIMENTARY ROCK, Gravel (CONGLOMERATE) with mudstone matrix, medium gray to brownish gray, soft, unfractured, rounded soft intensely weathered medium sandstone clasts in a soft mudstone/siltstone matrix, probable depositional conglomerate.											
310.69	286				C81			100	38						
	287		SEDIMENTARY ROCK, (SANDSTONE) (95%), medium to fine sand, interbedded with MUDSTONE/SILTSTONE (5%), contains a thin (0.2 ft thick) Gravel CONGLOMERATE layer below EL 315.9 ft, thinly to moderately bedded, beds dip ~35 to 50°, medium gray to brownish gray, intensely weathered, extremely weak, mostly moderately soft to moderately hard, little very soft; unfractured; gravel conglomerate has a medium sandstone matrix; contains few laminations; mostly moderately to little strongly calcite cemented, little uncemented to weakly cemented (little [Poorly graded SAND with SILT (SP-SM) interbedded with few SILT (ML); hard silt (PP>4.5 tsf))].											
308.69	288														
	289														
306.69	290														
	291				C82			100	50	5	142				UU
304.69	292		SEDIMENTARY ROCK, Cobble (CONGLOMERATE), contains 7 in. diameter cobbles, no matrix apparent, very light gray, contains subangular to subrounded hard (slightly weathered) to moderately hard (intensely weathered) quartz diorite rock fragments; unfractured; upper cobble is slightly foliated; uncemented (cobbles).											
	293														
302.69	294														
	295		SEDIMENTARY ROCK, (SANDSTONE) (96%), fine to												

(continued)

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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
	295		medium sand, interbedded with MUDSTONE/CLAYSTONE (4%), dominantly thinly to		C82			100	50						See note at end of log regarding RQD.
300.69	296		moderately bedded (30 to 110 mm), minor laminated (1 to 7 mm), beds dip ~30 to 50°, very light gray to		C83			98	32						
	297		brownish gray, moderately soft, intensely to moderately fractured, closely to moderately spaced incipient fractures (claystone seams) cross each other,												
298.69	298		moderately to weakly calcite cemented (some Poorly graded SAND with SILT (SP-SM) interbedded with trace Lean CLAY with SAND (CL); hard clay (PP>4.5												
	299		tsf)).												
296.69	300		SEDIMENTARY ROCK, Boulder (CONGLOMERATE), boulder 22 in. diameter, (may be just singular boulder isolated in sandstone above and below), subrounded soft (intensely weathered) quartz diorite rock fragment.												
	301		SEDIMENTARY ROCK, (SANDSTONE) (96%), fine to coarse sand, interbedded with		C84			100	32						
294.69	302		MUDSTONE/CLAYSTONE (4%), moderately to thinly bedded, beds dip ~40 to 55°, medium light gray to brownish gray, very weak, mostly moderately soft to												
	303		some very soft, little moderately hard; intensely to moderately fractured; incipient clay lined fractures (mudstone seams) dip from 40 to 75° and cross each												
292.69	304		other; mostly moderately to some weakly calcite cemented, little [strongly cemented (some Well graded SAND with SILT (SW-SM) interbedded with trace Lean												
	305		CLAY with SAND (CL); hard clay (PP>4.5 tsf))].												
290.69	306		SEDIMENTARY ROCK, Coarse Gravel and Cobble (CONGLOMERATE) (50%) thinly to moderately interbedded with (SANDSTONE) (50%), cobbles (4 in.		C85			98	32						
	307		diameter) and gravel (2 in. diameter), fine sand, medium light gray, very soft to moderately soft sandstone; cobbles and gravel are composed of												
288.69	308		subrounded moderately hard (intensely weathered) quartz diorite rock fragments; weakly to moderately cemented (some cobbles and gravel interbedded with												
	309		few Poorly graded SAND with [SILT (SP-SM))].												
286.69	310		SEDIMENTARY ROCK, (SANDSTONE) (85%), fine to coarse sand, interbedded with MUDSTONE/CLAYSTONE (7%) and Coarse Gravel CONGLOMERATE (8%, below EL 296.3 ft), thinly to												
	311		moderately bedded, medium light gray to brownish		C86			94	36						
284.69	312		gray, intensely weathered, soft to very soft; unfractured; coarse gravel composed of moderately hard quartz diorite rock fragments; trace thin shelled												
	313		pelecypod (clam) debris (composed of high Mg calcite or aragonite-fizzes vigorously with HCL) is scattered between EL 298.9 to [296.3 ft; mostly moderately to												
282.69	314		weakly cemented, little strongly cemented (Well graded SAND with SILT (SW-SM) interbedded with few Poorly graded Gravel (GP) and few Lean CLAY												
	315		with SAND (CL); hard clay (PP>4.5 tsf))].												
280.69	316		SEDIMENTARY ROCK, (SANDSTONE) (92%), fine sand, interbedded with MUDSTONE/SILTSTONE (8%); thinly bedded to laminated, medium light gray to		C87			98	38						
	317		brownish gray, very soft to soft, unfractured, contains irregular thin siltstone laminations; mostly weakly to some moderately cemented (mostly Poorly graded												
278.69	318		SAND with SILT (SP-SM) interbedded with few SILT (ML), very stiff to hard silt (PP=3.75 to >4.5 tsf)).												
	319		SEDIMENTARY ROCK, (SANDSTONE), medium sand, thinly to moderately bedded, medium light gray, vuggy, mostly moderately hard to little very soft;												
276.69	320		unfractured; mostly strongly to little weakly calcite cemented, pelecypod shell debris below EL 292.7 ft (little Poorly graded SAND with SILT (SP-SM)).												
	321		SEDIMENTARY ROCK, (SANDSTONE) (96%), fine to medium sand, interbedded with		C88			100	78						EM, UC
274.69	322		MUDSTONE/CLAYSTONE (4%), moderately to thinly bedded, beds dip 45 to 55°, medium light gray to							3	150				
	323		brownish gray, vuggy, very soft to soft; unfractured; pelecypod debris @ EL 288.8 ft; weakly to moderately calcite cemented (mostly Poorly graded SAND with												
272.69	324		SILT (SP-SM) interbedded with trace Lean CLAY with SAND (CL); hard clay (PP>4.5 tsf)).												
	325		SEDIMENTARY ROCK, (SANDSTONE) (96%),												

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B7**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, A. Mehrazar		**5-8-09**	**11 of 12**

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
	325		medium sand, interbedded with MUDSTONE/SILTSTONE (4%), moderately to thinly bedded, beds dip ~45 to 60º, medium light gray to brownish gray, mostly moderately soft to little very soft; mostly moderately to little strongly calcite cemented, little weakly cemented; calcite nodules just above basal contact (little Poorly graded SAND with SILT (SP-SM) interbedded with trace SILT (ML)).		C88			100	78						See note at end of log regarding RQD.
270.69	326														
	327														
268.69	328		SEDIMENTARY ROCK, Gravel (BRECCIA) with sandstone and mudstone matrix; contains coarse gravel and trace cobbles (5 in length), thinly to moderately bedded, brownish gray to medium light gray, vuggy, very soft to soft intensely weathered matrix; unfractured; angular hard sandstone rock fragments (dominantly coarse gravel to trace cobble size); may represent cataclastic breccia with gouge; weakly to moderately cemented (Poorly graded GRAVEL with SILT [and SAND and COBBLES (GP-GM) grading to Poorly graded gravel with CLAY and SAND (GP-GC)].												
	329														
266.69	330														
	331														
264.69	332														
	333		SEDIMENTARY ROCK, (SANDSTONE) (64%), fine to medium sand, interbedded with Cobble-Gravel CONGLOMERATE (33%) and MUDSTONE/SILTSTONE (3%); cobbles (30%, up to 6 in. diameter) and trace coarse gravel, thinly to moderately bedded, medium light gray to brownish gray, slightly weathered, some moderately hard to some very soft; very soft below EL 279.9 ft; unfractured; contains sporadic subrounded hard (slightly weathered) quartz diorite rock fragments; mostly moderately to weakly calcite cemented, some uncemented conglomerate; very hard [drilling (mostly Poorly graded SAND with SILT (SP-SM) interbedded with some cobbles and gravel and trace SILT (ML))].												
262.69	334														
	335														
260.69	336														
	337														
258.69	338		SEDIMENTARY ROCK, (SANDSTONE), medium sand; moderately to thinly bedded (0.3 to 0.6 ft), light gray to medium light gray, moderately hard to hard, very intensely to intensely fractured, very closely spaced (10 to 30 mm) moderately thin (2 to 3 mm) discontinuous totally calcite healed fractures dip 70 to 75º; strongly calcite cemented.												
	339														
256.69	340														
	341		SEDIMENTARY ROCK, (SANDSTONE) (96%), fine to medium sand, interbedded with MUDSTONE/SILTSTONE (4%), thinly to moderately bedded, minor laminated (2 mm), light gray to brownish gray, mostly very soft to some moderately hard interbeds; contains a thin calcite layer @ EL 277.7 ft; mostly weakly to some strongly calcite cemented (mostly Poorly graded SAND with SILT (SP-SM) interbedded with trace SILT (ML); very stiff silt (PP=3.75 tsf)).												
254.69	342														
	343														
252.69	344														
	345		SEDIMENTARY ROCK, (SANDSTONE) (96%), medium sand, interbedded with MUDSTONE/CLAYSTONE (4%), thinly to thickly bedded, beds dip ~40 to 55º, medium gray to light gray, weak, mostly hard to little very soft; moderately to slightly fractured (0.7 to 1.9 ft), clay lined fractures dip 60 to 75º; crosslaminated between EL 274.5 to 273.3 ft; minor fossil debris; clean; clay seams cross eachother; mostly strongly to little weakly [calcite cemented (little Poorly graded SAND with SILT (SP-SM) interbedded with trace Lean CLAY with SAND (CL); hard clay (PP>4.5 tsf))].												
250.69	346														
	347														
248.69	348														
	349														
246.69	350		RQD values provided on the boring logs are based on intact core pieces obtained between two natural discontinuities. The majority of core obtained from this boring is typically very weak to weak and does not meet the "sound core" definition provided in the standard test method for RQD (ASTM D 6032). These RQD values should not be used to evaluate rock mass quality. Bottom of borehole at 326.0 ft bgs Borehole was converted to piezometer at the completion of drilling.												
	351														
244.69	352														
	353														
242.69	354														
	355														

CALTRANS BORING RECORD MET+ENG FIXED JOE - CALTRANS WITH REV Z3B2 Z3B5 Z3B7 ONLY SR-710TUNLS CT BORING LOGS11_23_09JPCOPY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B7**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Pratt, A. Mehrazar		**5-8-09**	**12 of 12**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Salisbury	**3-11-09**	**3-25-09**	**34° 6' 21.59" / 118° 9' 24.5" NAD83**	**R-09-Z3B8**
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Caltrans In-House			**' Lt Sta Meridian Ave. n\o Oak St.**	**594.3 ft NAVD88**
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wire-Line			**CME 85**	**4 in**
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
Bulk,SPT (1.4"),Punch Core(2.5"),HQ Core			**CME Automatic, 140 lb., 30 inch drop**	**87%**
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer Installed on Completion			**NM** / **Well unaccessible**	**275.0 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method / Casing Depth	Remarks
	0		ASPHALT (6").											This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007), except as noted in Appendix A.1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
	1		SANDY SILTY CLAY (CL-ML); soft to medium stiff; light brown; moist; some SAND; mostly nonplastic fines; weak cementation; **[ALLUVIUM]**		B1									
592.27	2													
	3													
590.27	4													
	5		SANDY SILTY CLAY (CL-ML); soft to medium stiff; strong brown; moist; some SAND; mostly nonplastic to low plasticity fines; weak to moderate cementation.		S2	3 4 4	8	100						Hand Auger from 0.5' - 5' VOC=16.8 ppm
588.27	6													
	7													
586.27	8													
	9													
584.27	10		SANDY SILTY CLAY (CL-ML); soft; strong brown; moist to wet; some SAND; mostly nonplastic to low plasticity fines; weak cementation.		C3			78		25				UW VOC=15.1 ppm
	11													
582.27	12													
	13													
580.27	14													
	15		SANDY SILT (ML); soft; light brown; moist; some fine SAND; mostly nonplastic to low plasticity fines; weak cementation.		S4	3 2 3	5	100						VOC=17.3 ppm
578.27	16													
	17													
576.27	18													
	19													
574.27	20		Fat CLAY (CH); soft; light brown; moist; few fine SAND; mostly nonplastic to low plasticity fines; weak cementation.		C5			78		23	104			UW, PI
	21		SANDY SILT (ML); medium stiff to stiff; light brown; moist; few fine SAND; mostly nonplastic to low plasticity fines; weak cementation.											
572.27	22													
	23													
570.27	24													
	25													

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B8**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**1 of 11**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		SANDY SILT (ML); medium stiff to stiff; light brown; moist; few fine SAND; mostly nonplastic to low plasticity fines; weak cementation; Siltstone; moderately hard [BEDROCK].		S6	12 14 14	28	100							VOC=11.4 ppm
568.27	26														
	27		SEDIMENTARY ROCK, (MUDSTONE), thinly to moderately bedded, moderate olive brown, moderately weathered, soft, moderately fractured, **[TOPANGA FORMATION]**		C07			100	43						**See note at the end of log regarding RQD.**
566.27	28														
	29									25	96				UW, PI
564.27	30		Intensely to moderately fractured, random fracture (CL), with some fine sand.		C08			100	70						VOC=21.4 ppm
	31		Bedding plane separation dipping 35°.												
562.27	32		Bedding joint dipping 25°. Bedding joint dipping 15°.												
	33		Bedding joint dipping 52°. Bedding joint dipping 62°.												
560.27	34														
	35		Very thickly bedded, light brown to grayish orange, moderately soft to moderately hard, intensely fractured, with sand and clay, fine sand.		C09			100	20						VOC=15.2 ppm
558.27	36		Bedding joint (CL), dipping 45°.												
	37		Very thickly bedded, light brown mottled with greenish gray, moderately soft to moderately hard, intensely fractured.												
556.27	38														
	39														
554.27	40		SEDIMENTARY ROCK, (CLAYSTONE), thickly bedded, pale yellowish orange, moderately hard, intensely to moderately fractured, sandy, with silt, poorly graded, fine sand.		C10			100	40						VOC=16.3 ppm
	41														
552.27	42		SEDIMENTARY ROCK, (SILTSTONE), very thickly bedded to massive, pale yellowish orange, moderately hard, intensely to moderately fractured, with fine sand, poorly graded.												
	43														
550.27	44		Very thickly bedded to massive, bedding plane separation dipping 42°. Bedding plane separation dipping 39°.												
	45		Olive gray, intensely to moderately fractured, with fine sand.		C11			100	32						VOC=17.4 ppm
548.27	46		Bedding plane separation dipping 35°.												
	47		Bedding plane separation dipping 32°.												
546.27	48		Bedding joint dipping 67°.												
	49		Bedding plane separation dipping 18°.												
			Bedding plane separation dipping 29°.												
544.27	50		Bedding joint (ML), dipping 45°.		C12			100	40						VOC=15.6 ppm
	51		SEDIMENTARY ROCK, (SANDSTONE), thickly bedded, moderate yellowish brown, moderately hard, intensely to moderately fractured, silty, fine sand.												
542.27	52		Bedding plane separation dipping 32°.												
	53		SEDIMENTARY ROCK, (SILTSTONE), thickly bedded, light brown, moderately hard, slightly fractured, with some fine sand.							22	102				UW, PI
			Random fracture (ML), dipping 90°.												
540.27	54		SEDIMENTARY ROCK, (CLAYSTONE), moderately to thickly bedded, moderate brown, moderately soft, slightly fractured, shear (CL), dipping 32°												
	55														

(continued)

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
	55		SEDIMENTARY ROCK, (SILTSTONE), moderately bedded, moderate brown, moderately soft, slightly fractured, bedding plane separation dipping 31°.		C13			100	50						VOC=16.4 ppm **See note at the end of log regarding RQD.**
538.27	56		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, moderate brown, moderately soft, slightly fractured. Bedding plane separation dipping 31°. *(continued)*.												
536.27	57		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, moderate brown, very to extremely hard, slightly fractured.												
534.27	58		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, moderate brown, soft, slightly fractured, shear (CL), dipping 25°.		C14			100	43						VOC=18.3 ppm
	59		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, moderate brown, very to extremely hard, slightly fractured.												
532.27	60		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, moderate brown, soft, slightly fractured, shear (CL), dipping 40°.												
	61		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, moderate brown, very to extremely hard, slightly fractured, bedding plane separation dipping 15°, laminated silty fine sand lens.												
530.27	62		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, moderate brown, soft, slightly fractured, shear (CL), dipping 25°.		C15			100	40						VOC=18.7 ppm
	63		SEDIMENTARY ROCK, (SANDSTONE), thinly to moderately bedded, moderate yellowish brown, soft, slightly fractured, bedding plane separation dipping 22°, silty, medium sand.												
528.27	64		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, moderate brown, soft, slightly fractured, shear (CL), dipping 25°. Thinly to moderately bedded, moderate brown, soft, very slightly fractured to unfractured, shear (CL), dipping 25°.												
	65		SEDIMENTARY ROCK, (SANDSTONE), thinly to moderately bedded, olive gray, moderately soft to moderately hard, very slightly fractured to unfractured, bedding plane separation dipping 22°, silty fine sand.		C16			90	20						VOC=24.6 ppm
526.27	66		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, moderate brown, soft, very slightly fractured to unfractured. Bedding joint (CL), dipping 39°. Bedding joint (CL), dipping 39°.												
	67		Thinly to moderately bedded, moderate brown, soft, very slightly fractured to unfractured, shear dipping 25°.												
524.27	68		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, moderate brown, soft, very slightly fractured to unfractured. Shear dipping 30°.		C17			100	10						VOC=22.4 ppm
	69		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, moderate brown, soft, very slightly fractured to unfractured. Shear dipping 15°.												
522.27	70		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, moderate brown, hard to very hard, very slightly fractured to unfractured. Moderately hard, shear (clay), dipping 19°.												
	71		Thinly to moderately bedded, moderate brown, very hard, very slightly fractured to unfractured. SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, olive gray, very hard, very slightly fractured to unfractured, dipping 28°, silty, fine sand. Moderate brown, shear (clay), dipping 25°.		C18			100	42						VOC=14.1 ppm
520.27	72		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, very hard, very slightly fractured to unfractured, slightly weathered.												
	73		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, very slightly fractured to unfractured, shear (clay), dipping 22°.		C19			71	25						
518.27	74														
	75														
516.27	76														
	77														
514.27	78														
	79														
512.27	80														
	81														
510.27	82														
	83														
	84														
	85														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B8**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**3 of 11**

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
	85		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, very hard, very slightly fractured to unfractured.		C20			93	67						VOC=17.0 ppm **See note at the end of log regarding RQD.**
508.27	86		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, very hard, very slightly fractured to unfractured.												
	87														
506.27	88		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured, sandy, fine sand. Olive gray, dipping 35°. Moderate brown. *(continued)*. Very intensely to intensely fractured, dipping 15°.							13	117			UW
	89														
504.27	90				C21			92	0						VOC=16.4 ppm
	91		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, very intensely to intensely fractured, shear.												
502.27	92		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, very intensely to intensely fractured. Intensely to moderately fractured, trace fine sand. Dipping 15°.												
	93														
500.27	94		Moderate brown to light gray, sandy, find sand. Moderate brown, slightly fractured. Thinly bedded, light gray, dipping 10°.												
	95		Moderate brown.		C22			100	0						VOC=24.1 ppm
498.27	96		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, soft to moderately soft, slightly fractured, dipping 25°.												
	97		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, soft to moderately soft, slightly fractured. Laminated to very thinly bedded, hard, dipping 25°.												
496.27	98		Moderately hard, shear (clay), dipping 25°.												
	99		SEDIMENTARY ROCK, (SILTSTONE), laminated to very thinly bedded, moderate brown, moderately hard, slightly fractured.												
494.27	100		Bedding joint dipping 25°, with some fine sand. Trace fine sand. With some fine sand.		C23			100	0						VOC=21.0 ppm
	101		SEDIMENTARY ROCK, (CLAYSTONE), laminated to very thinly bedded, moderate brown, moderately hard, slightly fractured.												
492.27	102		SEDIMENTARY ROCK, (SILTSTONE), laminated to very thinly bedded, moderate brown, moderately hard, intensely fractured.												
	103														
490.27	104		SEDIMENTARY ROCK, (SANDSTONE), laminated to very thinly bedded, moderate brown, very to extremely hard, intensely fractured, dipping 10°, silty, fine sand.		C24			100	89						
	105		SEDIMENTARY ROCK, (CLAYSTONE), laminated to very thinly bedded, moderate brown, very to extremely hard, slightly fractured, dipping 10°.												VOC=22.1ppm
488.27	106		SEDIMENTARY ROCK, (SILTSTONE), laminated to very thinly bedded, moderate brown, very to extremely hard, slightly fractured.												
	107		Laminated to very thinly bedded, hard, bedding joint dipping 20°.		C25			100	50						
486.27	108		Intensely to moderately fractured. Joint (clay), dipping 48°.												
	109		Dipping 17°. Joint dipping 30°.												
484.27	110		SEDIMENTARY ROCK, (CLAYSTONE), laminated to very thinly bedded, moderate brown, moderately hard, intensely to moderately fractured. Joint dipping 30°.		C26			100	0						VOC=23.2 ppm
	111														
482.27	112		SEDIMENTARY ROCK, (SILTSTONE), laminated to very thinly bedded, moderate brown, moderately hard, intensely to moderately fractured. Moderate brown mottled with light gray, hard, trace fine sand. Joint dipping 50°. Bedding joint dipping 25°. With fine sand.												
	113														
480.27	114														
	115				C27			93	18						

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B8**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**4 of 11**

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
	115		SEDIMENTARY ROCK, (CLAYSTONE), laminated to very thinly bedded, moderate brown, hard, intensely to moderately fractured.		C27			93	18						VOC=15.9 ppm **See note at the end of log regarding RQD.**
478.27	116		SEDIMENTARY ROCK, (SILTSTONE), laminated to very thinly bedded, moderate brown, hard, intensely to moderately fractured. Dipping 25°.							10	129				UW
	117				C28			100	22						
476.27	118		SEDIMENTARY ROCK, (SANDSTONE), laminated to very thinly bedded, moderate brown, hard, intensely to moderately fractured, dipping 24°.												
	119														
474.27	120		SEDIMENTARY ROCK, (SILTSTONE), laminated to very thinly bedded, moderate brown, hard, intensely to moderately fractured, dipping 25°, excellent bedding contact.		C29			100	45						VOC=24.2 ppm
	121		SEDIMENTARY ROCK, (CLAYSTONE), laminated to very thinly bedded, moderate brown, hard, intensely to moderately fractured.												
472.27	122		SEDIMENTARY ROCK, (SILTSTONE), laminated to very thinly bedded, moderate brown, hard, intensely to moderately fractured.												
	123														
470.27	124		SEDIMENTARY ROCK, (CLAYSTONE), laminated to very thinly bedded, moderate brown, hard, intensely to moderately fractured, dipping 25°.												
	125		SEDIMENTARY ROCK, (SILTSTONE), laminated to very thinly bedded, moderate brown, hard, intensely to moderately fractured.		C30			98	0						VOC=26.9 ppm
468.27	126		Dipping 18°, trace fine sand. Moderate brown to light gray, hard, intensely to moderately fractured.												
	127		SEDIMENTARY ROCK, (CLAYSTONE), laminated to very thinly bedded, moderate brown, hard, intensely to moderately fractured, random fracture (moderately healed), dipping 90°.												
466.27	128														
	129		SEDIMENTARY ROCK, (SILTSTONE), laminated to very thinly bedded, moderate brown, hard, intensely to moderately fractured.												
464.27	130		SEDIMENTARY ROCK, (CLAYSTONE), laminated to very thinly bedded, moderate brown, hard, intensely to moderately fractured.		C31			100	20						VOC=23.5 ppm
	131														
462.27	132		SEDIMENTARY ROCK, (SILTSTONE), laminated to very thinly bedded, moderate brown, hard, intensely to moderately fractured. Laminated, moderate brown to light gray, sandy, fine sand.												
	133		Dipping 16°. Dipping 18°.												
460.27	134		Thinly bedded, moderate brown.												
	135		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured.		C32			100	33						VOC=23.9 ppm
458.27	136		SEDIMENTARY ROCK, (SILTSTONE), laminated, moderate brown, hard, intensely to moderately fractured, dipping 18°, with fine sand.												
	137		SEDIMENTARY ROCK, (CLAYSTONE), laminated, moderate brown, hard, intensely to moderately fractured.												
456.27	138														
	139		SEDIMENTARY ROCK, (SILTSTONE), laminated, moderate brown, hard, intensely to moderately fractured, dipping 28°, sandy.												
454.27	140		SEDIMENTARY ROCK, (CLAYSTONE), laminated, moderate brown, hard, intensely to moderately fractured.		C33			77	64						UW, SD VOC=19.5ppm
	141		SEDIMENTARY ROCK, (SILTSTONE), laminated, moderate brown, hard, intensely to moderately fractured.							9					
452.27	142		SEDIMENTARY ROCK, (CLAYSTONE), laminated, moderate brown, hard, intensely to moderately fractured.		C34			100	48						
	143														
450.27	144		SEDIMENTARY ROCK, (SILTSTONE), moderately bedded, moderate brown, hard, intensely to moderately fractured, with fine sand, grayish brown mudstone clasts.												
	145														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B8**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**5 of 11**

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
	145		Dipping 22°. Bedding joint dipping 17°.												VOC=18.4 ppm
448.27	146		SEDIMENTARY ROCK, (SANDSTONE), laminated, olive gray, hard, moderately fractured, dipping 22°, silty, fine sand.		C35			100	58						**See note at the end of log regarding RQD.**
	147														
446.27	148		SEDIMENTARY ROCK, (SILTSTONE), moderately bedded, olive gray, hard, moderately fractured, dipping 25°. Moderate brown, dipping 28°.												
	149		Laminated, olive gray, dipping 17°, sandy. Moderate brown.												
444.27	150		SEDIMENTARY ROCK, (CLAYSTONE), laminated, moderate brown, hard, moderately fractured.												
	151		SEDIMENTARY ROCK, (SILTSTONE), laminated, moderate brown, hard, moderately fractured.		C36			96	18						
442.27	152		SEDIMENTARY ROCK, (CLAYSTONE), laminated, moderate brown, hard, moderately fractured.												
	153		SEDIMENTARY ROCK, (SILTSTONE), laminated, moderate brown, hard, moderately fractured. Thinly bedded, light olive gray, dipping 28°.												
440.27	154		Moderately bedded, moderate brown, intensely fractured. *(continued)*. Dipping 25°.												
	155		Light olive gray, dipping 25°. Moderate brown.												VOC=20.7 ppm
438.27	156		Joint (clay, partially healed), dipping 48°. Bedding joint dipping 20°.		C37			100	21	8					UW, PL
	157		Thinly bedded, dipping 14°, sandy. Dipping 10°.												
436.27	158		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, moderate brown, hard, intensely fractured. Dipping 39°.		C38			100	0						
	159		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, very intensely fractured, with fine sand.												
434.27	160		Dipping 29°.		C39			87	0						VOC=26.0.6ppm
	161		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard, very intensely fractured, shear dipping 25°.												
432.27	162		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, very intensely fractured.												
	163		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, moderate brown, hard, very intensely fractured, dipping 45°.												
430.27	164		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, very intensely fractured.												
	165		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, moderate brown, soft, very intensely fractured, dipping 28°.		C40			100	10						
428.27	166		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, moderately fractured, parallel to bedding (shale parting).												PL
	167		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, moderate brown, very hard, moderately fractured, joint dipping 45°.												
426.27	168		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, very hard, moderately fractured.												
	169		Dipping 23°.		C41			100	100						
424.27	170				C42			100	60						
	171														
422.27	172		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, moderate brown, very hard, moderately fractured, dipping 17 to 22°.												
	173														
420.27	174		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, very weak, very hard, moderately fractured, bedding joint (silt, not healed), dipping 32°. Incipient fracture (not healed), dipping 60°.							7	137				UC EM
	175														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV 22B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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Division of Engineering Services
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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B8**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**6 of 11**

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
	175		Laminated to very thinly bedded, dipping 22°, sandy, fine sand. *(continued)*.		C43			100	32						**See note at the end of log regarding RQD.**
418.27	176														
	177		SEDIMENTARY ROCK, (CLAYSTONE), laminated to very thinly bedded, moderate brown, very hard, moderately fractured, dipping 15°.												
416.27	178		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, olive gray, very hard, moderately fractured, joint (clay, partially healed), dipping 38°.												
	179		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured.												
414.27	180		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, intensely fractured.		C44			95	35						
	181		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, intensely fractured. No sand.												
412.27	182														
	183		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, intensely fractured, bedding joint.												
410.27	184														
	185		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, intensely fractured, with fine sand.		C45			100	20						
408.27	186														
	187		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, intensely fractured.												
406.27	188		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, intensely fractured.												
	189		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, intensely fractured.												
404.27	190		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, intensely fractured.		C46			100	75						
	191		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, olive gray, moderately soft, intensely fractured, dipping 15°, silty, fine sand.												
402.27	192		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, intensely fractured, with fine sand.							11					SD, CR
	193		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately soft to moderately hard, intensely fractured.		C47			100	50						
400.27	194		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately soft to moderately hard, intensely fractured.												
	195		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately soft to moderately hard, intensely fractured, dipping 22°.		C48			100	32						EM
398.27	196		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately soft to moderately hard, intensely fractured.												UC
	197		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, olive gray, moderately soft, intensely fractured, dipping 17°, silty, fine sand.							8	131				
396.27	198		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, intensely fractured.												
	199		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, olive gray, moderately soft, intensely fractured, dipping 21°.		C49			94	19						
394.27	200		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately soft, moderately fractured.												
	201		SEDIMENTARY ROCK, (SANDSTONE), laminated, olive gray, very weak, very hard, slightly fractured, dipping 25°, fine sand.												
392.27	202		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately soft, moderately fractured.		C50			67	50						
	203		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, very hard, moderately fractured.												
390.27	204														
	205														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B8**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**7 of 11**

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
	205		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, very hard, moderately fractured.		C51			100	42	8	133				SD, EM UC **See note at the end of log regarding RQD.**
388.27	206		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, very hard, moderately fractured.												
	207		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, very hard, moderately fractured.												
386.27	208		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, very hard, moderately fractured.												
	209		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, brownish gray, very hard, intensely fractured, fine sand.												
384.27	210		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, very hard, intensely fractured, dipping 17°.		C52			95	33						
	211		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, olive gray, very hard, intensely fractured, dipping 20°, fine sand.												
382.27	212		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, very hard, intensely fractured.												
	213		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, olive gray, very hard, intensely fractured, dipping 19°, fine sand.		C53			100	89						
380.27	214		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, weak, hard, intensely to moderately fractured.												
	215		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, olive gray, moderately hard, intensely to moderately fractured, dipping 19°.		C53			100	42						PTS
378.27	216		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured.												
	217		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured.		C54			100	21						
376.27	218		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, olive gray, moderately soft, intensely to moderately fractured, dipping 21°.		C55			100	50						
	219		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured.		C55			100	75						
374.27	220		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, olive gray, soft, intensely to moderately fractured.												
	221		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured.												
372.27	222		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, olive gray, hard, intensely to moderately fractured.												
	223		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured.		C56			100	83						SD
370.27	224		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured.												
	225		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured, with fine sand.							9					
368.27	226		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured.		C56			100	100						
	227		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, moderately fractured.		C56			100	83						
366.27	228		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard, moderately fractured.												
	229		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, moderately fractured.												
364.27	230		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, moderate brown, hard, moderately fractured.		C57			100	81						
	231		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, moderately fractured, sandy, fine sand.												
362.27	232														
	233														
360.27	234														
	235														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B8**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**8 of 11**

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
	235		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard, moderately fractured.		C57			100	81						
358.27	236		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, moderately fractured.		C58			100	92	6	135				UC **See note at the end of log regarding RQD.** EM
	237		Thinly bedded, moderate brown, moderately soft, moderately fractured, dipping 10°.												
356.27	238		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, moderately fractured.												
	239		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately soft, moderately fractured, dipping 10°.												
354.27	240		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately soft, moderately		C59			100	94						
	241		Dark gray, sandy, fine sand.												
			SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, olive gray, moderately soft, moderately fractured, dipping 25°.												
352.27	242														
	243		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, moderately fractured, fracture zone dipping 50°.												
350.27	244		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, moderate brown, hard, moderately fractured.		C60			100	83						
	245		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, moderately fractured. Olive gray, hard, intensely fractured.		C60			100	56						
348.27	246		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard, intensely fractured.												
	247		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, intensely fractured.												
346.27	248		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard to hard, intensely fractured.		C61			100	0						
	249		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard to hard, intensely fractured.												
344.27	250		SEDIMENTARY ROCK, (SANDSTONE), very thinly bedded, olive gray, moderately hard to hard, intensely fractured, dipping 22°, silty, fine sand.		C61			100	92						
	251														
342.27	252		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard to hard, intensely fractured.		C62			100	90						
	253		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard to hard, intensely fractured.												
340.27	254		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, medium strong, very hard, slightly fractured, bedding joint. Hard, dipping 15°.												
	255														
338.27	256		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, moderate brown, hard, slightly fractured, dipping 20°.		C63			100	100	7	132				EM, UC
	257		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, slightly fractured. Dipping 10°.												
336.27	258		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, moderate brown, hard, slightly fractured, dipping 10°.												
	259		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, slightly fractured.												
334.27	260		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, moderate brown, hard, slightly fractured, dipping 10°.		C64			100	87						
	261		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, slightly fractured.												
332.27	262		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, moderate brown, very hard, slightly fractured. Dipping 20°. Dipping 15°.												
	263		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, very hard, slightly fractured.												
330.27	264		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, moderate brown, very hard, slightly fractured.												
	265														

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CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV 22B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B8**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**9 of 11**

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
	265		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, weak, hard to very hard, intensely to moderately fractured. Dipping 8°. Incipient fracture (clay, partially healed), dipping 72°.		C65			100	81						PL **See note at the end of log regarding RQD.**
328.27	266														
	267														
			SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, moderate brown, hard to very hard, intensely to moderately fractured, dipping 22°, silty, fine sand.												
326.27	268														
			SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard to very hard, intensely to moderately fractured. Incipient fracture (not healed), dipping 90°. Sandy, fine sand.												
	269				C66			100	40						
324.27	270														
			SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, moderate brown, hard to very hard, intensely to moderately fractured, dipping 18°.												
	271														
322.27	272		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard to very hard, intensely to moderately fractured.												
	273		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard to very hard, intensely to moderately fractured, bedding joint dipping 18°.		C67			100	100						
320.27	274														
	275		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard to very hard, intensely to moderately fractured, dipping 21°.												
318.27	276		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard to very hard, intensely to moderately fractured. Dipping 20°.												
	277														
			SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, olive gray, hard, intensely to moderately fractured, fine sand.												
316.27	278														
	279		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured. Dipping 25°.												
314.27	280		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured, dipping 22°.												
	281														
312.27	282		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured.												
	283		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured, dipping 20°.												
310.27	284		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured.												
	285		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured.												
308.27	286		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured, with fine sand.												
	287		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured.												
306.27	288		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured.												
	289		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured. Incipient fracture (not healed), dipping 90°.												
304.27	290		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured. Incipient fracture (not healed), dipping 90°.												
	291		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, olive gray, hard, intensely to moderately fractured, dipping 22°.												
302.27	292														
	293														
300.27	294														
	295														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B8**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**10 of 11**

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
	295		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, intensely to moderately fractured.										
298.27	296		Bottom of borehole at 275.0 ft bgs Borehole was converted to piezometer at the completion of drilling.										
	297												
296.27	298		RQD values provided in the boring logs are based on intact core pieces obtained between two natural discontinuities. Majority of cores obtained in this boring are weak and does not meet the "sound core" definition provided in standard test method for RQD ASTM D 6032. These RQD values should not be used to evaluate the rock mass quality.										
	299												
294.27	300												
	301												
292.27	302												
	303												
290.27	304												
	305												
288.27	306												
	307												
286.27	308												
	309												
284.27	310												
	311												
282.27	312												
	313												
280.27	314												
	315												
278.27	316												
	317												
276.27	318												
	319												
274.27	320												
	321												
272.27	322												
	323												
270.27	324												
	325												

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B8**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**11 of 11**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Salisbury	**3-26-09**	**4-10-09**	**34° 6' 53.83" / 118° 10' 5.51" NAD83**	**R-09-Z3B9**
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Caltrans In-House			**' Lt Sta Arroyo Dr. ne/o Pasadena Avenue**	**624.3 ft NAVD88**
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wire-Line			**CME 85**	**4 in**
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
Bulk,SPT (1.4"),Punch Core(2.5"),HQ Core			**CME Automatic, 140 lb., 30 inch drop**	**87%**
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer Installed on Completion			**NM** / **73.9 ft on 7-1-09**	**300.0 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method / Casing Depth	Remarks
	0		ASPHALT strong cementation; (4").											This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007), except as noted in Appendix A.1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
	1		Well-graded GRAVEL with SILT (GW-GM); medium dense; greenish gray; dry; mostly coarse, subrounded GRAVEL, max. 2 in. dia.; little fines; weak cementation; (Aggregate Base = 8").		D01			83						
622.25	2		SILTY GRAVEL (GM); medium dense; light brown to light gray; dry to moist; mostly coarse, subrounded GRAVEL, max. 2 in. dia.; little fines; weak cementation; **[ALLUVIUM]**											
620.25	4													
	5		Poorly graded SAND with GRAVEL (SP); medium dense; light brown to light gray; dry to moist; little coarse to fine, subangular to subrounded GRAVEL, max. 2 in. dia.; mostly SAND; weak cementation.		S02	9 10 13	23	100						Hand Auger from 1' - 5'
618.25	6													
616.25	8													
614.25	10		Poorly graded SAND with SILT (SP-SM); very dense; light brown to light gray; dry to moist; mostly coarse SAND; few fines; weak cementation.		S03	24 50		100						VOC=7.5 ppm
	11		Well-graded GRAVEL with SILT and SAND (GW-GM); dense; olive to light brown; moist; mostly coarse, subrounded GRAVEL, max. 2 in. dia.; trace SAND; trace fines; weak cementation.											
612.25	12													
610.25	14													
	15		Poorly graded SAND with SILT and GRAVEL (SP-SM); loose; light brown; moist; some coarse to fine, subrounded GRAVEL, max. 2 in. dia.; mostly coarse to fine SAND; few fines; weak cementation.		S04			100		9	133			UW, PA
608.25	16													
	17		At EL. 606.8 ft, contains about 10 to 25% COBBLES.											
606.25	18													
604.25	20		COBBLES very dense; light brown to light bluish gray; moist; about 20% little coarse GRAVEL, max. 3 in. dia.; coarse SAND; weak cementation; Diorite Porphyry, extremely hard.		S05	44 49 50	99	100						VOC=9.4 ppm VOC=3.5 ppm
	21													
602.25	22													
600.25	24													
	25													

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B9**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**1 of 11**

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		COBBLES *(continued)*.		S06	42 50		100							VOC=13.1 ppm
598.25	26														
	27														
596.25	28														
	29														
594.25	30				S07	50		100							VOC=8.8 ppm
	31														
592.25	32														
	33														
590.25	34														
	35		SILTY GRAVEL with SAND (GM); very dense; brown; dry to moist; mostly coarse to fine, subrounded GRAVEL, max. 3 in. dia.; few coarse to medium SAND; some fines; weak cementation.												VOC=7.0 ppm
588.25	36														
	37														
586.25	38														
	39														
584.25	40		SILTY SAND (SM); very dense; brown; moist; mostly SAND; some fines; weak cementation.		S08	33 42 37	79	100							VOC=5.6 ppm
	41														
582.25	42														
	43														
580.25	44														
	45		Well-graded SAND with GRAVEL (SW); very dense; brown to light brown; moist; few coarse to fine, subrounded GRAVEL, max. 3 in. dia.; mostly coarse SAND; weak cementation. At EL. 577.3 ft, contains medium SAND.												VOC=8.9 ppm
578.25	46														
	47														
576.25	48														
	49														
574.25	50		Well-graded SAND with SILT (SW-SM); very dense; light brown; moist; mostly fine SAND; little fines; weak cementation.		S09	21 46 45	91	100							VOC=11.0 ppm
	51														
572.25	52														
	53														
570.25	54														
	55														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
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Office of Geotechnical Design - South 1

REPORT TITLE: **BORING RECORD**

HOLE ID: **R-09-Z3B9**

DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**

PROJECT OR BRIDGE NAME: **SR-710 TUNNEL TECHNICAL STUDY**

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
	M.Salisbury		**2 of 11**

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
	55		Yellowish brown. Well-graded SAND with SILT (SW-SM) *(continued)*.											VOC=15.9 ppm
568.25	56													
	57													
566.25	58													
	59													
564.25	60		SILTY SAND (SM); very dense; yellowish brown to olive brown; moist; mostly fine SAND; some fines; weak cementation.		S10	13 19 27	46	100		20				PA VOC=7.0 ppm
	61													
562.25	62													
	63													
560.25	64													
	65		Poorly graded SAND with SILT (SP-SM); very dense; yellowish brown; moist; mostly fine SAND; few fines; weak cementation.											VOC=9.3 ppm
558.25	66													
	67													
556.25	68													
	69		Poorly graded SAND (SP); very dense; yellowish brown; moist; mostly coarse SAND; weak cementation.											
554.25	70				S11	34 49 45	94	100						VOC=8.0 ppm
	71													
552.25	72													
	73													
550.25	74													
	75													VOC=15.4 ppm
548.25	76													
	77													
546.25	78													
	79													
544.25	80				S12	33 35 43	78	100						VOC=19.2 ppm
	81													
542.25	82		SILTY SAND (SM); dense; light brown; moist; mostly SAND; some fines; weak cementation.											
	83		Poorly graded SAND (SP); dense; light brown; moist; mostly coarse SAND; weak cementation.											
540.25	84													
	85													

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B9**
DIST. **07**	COUNTY **LA**	ROUTE **710**	POSTMILE **T/T**	EA **07-07-187900**
PROJECT OR BRIDGE NAME **SR-710 TUNNEL TECHNICAL STUDY**				
BRIDGE NUMBER	PREPARED BY **M.Salisbury**		DATE	SHEET **3 of 11**

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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
	85		Poorly graded SAND (SP) *(continued)*.											VOC=20.9 ppm
538.25	86													
	87		SILTY SAND (SM); dense; yellowish brown; moist; mostly fine SAND; some fines; weak cementation.											
536.25	88													
	89													
534.25	90				S13	17 21 26	47	100		21				PA VOC=6.4 ppm
	91													
532.25	92													
	93													
530.25	94													
	95		Well-graded SAND with GRAVEL (SW); very dense; yellowish brown to brown; moist; little coarse, subrounded GRAVEL, max. 1 in. dia.; mostly coarse SAND; weak cementation.											VOC=10.6 ppm
528.25	96													
	97													
526.25	98													
	99													
524.25	100				S14	34 34 30	64	100						VOC=5.1 ppm
	101													
522.25	102													
	103													
520.25	104													
	105													VOC=4.2 ppm
518.25	106													
	107		SILTY SAND (SM); very dense; yellowish brown; moist; mostly fine SAND; some fines; weak cementation.											
516.25	108													
	109													
514.25	110		Well-graded SAND with GRAVEL (SW); very dense; yellowish brown; dry to moist; few coarse, subrounded GRAVEL, max. 3 in. dia.; mostly fine SAND; weak cementation.		S15	50		100						VOC=4.5 ppm
	111													
512.25	112													
	113													
510.25	114													
	115													

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B9**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**4 of 11**

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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
	115		Well-graded SAND with GRAVEL (SW) *(continued)*.												VOC=4.2 ppm
508.25	116														
	117														
506.25	118														
	119														
504.25	120		SILTY SAND (SM); very dense; yellowish brown to dark yellowish brown; dry to moist; mostly fine SAND; some fines; weak cementation.		S16	50		100							VOC=4.6 ppm
	121														
502.25	122														
	123														
500.25	124														
	125		Well-graded SAND with GRAVEL (SW); very dense; yellowish brown; dry to moist; few coarse, subrounded GRAVEL, max. 3 in. dia.; mostly fine SAND; weak cementation.												VOC=9.6 ppm
498.25	126														
	127														
496.25	128														
	129														
494.25	130		SILTY SAND (SM); very dense; yellowish brown; moist; mostly fine SAND; some fines; weak cementation.		S17	50 38 42	80	100		20					VOC=10.8 ppm
	131														
492.25	132		SANDY SILT (ML); stiff; yellowish brown; moist; some fine SAND; some nonplastic to low plasticity fines; weak cementation.												
	133														
490.25	134														
	135		Well-graded SAND with SILT and GRAVEL (SW-SM); dense to very dense; yellowish brown to light brown; moist; few coarse, subrounded GRAVEL, max. 3 in. dia.; mostly coarse to fine SAND; few fines; weak cementation.												VOC=7.4 ppm
488.25	136														
	137														
486.25	138														
	139														
484.25	140		Well-graded SAND with GRAVEL (SW); dense to very dense; yellowish brown; moist; few coarse, subrounded GRAVEL, max. .75 in. dia.; mostly coarse to fine SAND; weak cementation.		S18	38 50		100							VOC=15.3 ppm
	141														
482.25	142														VOC=20.9 ppm
	143														
480.25	144														
	145														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B9**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**5 of 11**

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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
	145		Well-graded SAND with GRAVEL (SW) *(continued)*.											
478.25	146													
	147													
476.25	148													
	149													
474.25	150		CLAYEY SAND (SC); very dense; reddish brown; moist; mostly medium to fine SAND; some low plasticity fines; weak cementation.		S19	17 27 30	57	100		14				PI, PA VOC=1.8 ppm
	151													
472.25	152													
	153													
470.25	154													
	155		At EL. 469.3 ft, grades to olive gray.											VOC=10.8 ppm
468.25	156													
	157													
466.25	158													
	159													
464.25	160		At EL. 464.3 ft, grades to reddish brown; moist.		S20	15 50		100						VOC=14.9 ppm
	161		IGNEOUS ROCK, (DIORITE), pale reddish brown to grayish orange, decomposed, soft, very intensely fractured, fracture zone dipping 36°, **[WILSON QUARTZ DIORITE]**		C21			100	70					
462.25	162													
	163													
460.25	164													
	165		Pale reddish brown, fracture zone dipping 35°.		C22			100	100	11	121			VOC=1.8 ppm
458.25	166													
	167		Pale yellowish brown, fracture zone dipping 36°.											UW, PA
456.25	168													
	169													
454.25	170		Grayish orange, random fracture dipping 42°.		C23			83	83					
	171		Pale yellowish brown, fracture zone dipping 28°.											
452.25	172													
	173		Fracture zone dipping 60°.											
450.25	174													
	175													

(continued)

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV 2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B9**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**6 of 11**

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
	175		CLAYEY SAND (SC) *(continued)*. *(continued)*.		C24			100	100						
448.25	176		Fracture zone dipping 70°.												
	177		Fracture zone dipping 45°.												
446.25	178		Fracture zone dipping 38°.												
	179		Fracture zone dipping 35°.												
444.25	180				C25			100	100	11	118				VOC=12.4 ppm
	181		Shear dipping 45°.												
442.25	182		Shear dipping 45°												
	183		Fracture zone dipping 90°.												
440.25	184		Shear dipping 45°.												
	185				C26			100	100						VOC=2.9 ppm
438.25	186														
	187		Fracture zone dipping 51°.												UW, PA
436.25	188		Fracture zone dipping 42°.												
	189		Fracture zone dipping 45°.												
434.25	190				C27			100	80						
	191														
432.25	192														
	193		Fracture zone dipping 35°.												
430.25	194		Fracture zone dipping 25°.												
	195		Grayish brown.		C28			97	85						VOC=0.2 ppm
428.25	196		Fracture zone dipping 45°.												
	197		Fracture zone dipping 40°.												
426.25	198		Fracture zone dipping 42°.												
	199		Fracture zone dipping 60°.												
424.25	200				C29			72	60						VOC=0.7 ppm
	201		Fracture zone dipping 30°.												
422.25	202														
	203														
420.25	204														
	205														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B9**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**7 of 11**

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
	205							0	0						VOC=4.3 ppm
418.25	206														
	207														
416.25	208														
	209														
414.25	210				C30			50	42						
	211														
412.25	212		Light olive gray, fracture zone dipping 45°, soft clay matrix.												
	213														
410.25	214														
	215		Light bluish gray, moderately soft to moderately hard.		C31			100	0						VOC=3.6 ppm
408.25	216														
	217		Fracture zone dipping 62°.												
406.25	218		Fracture zone dipping 50°. Fracture zone dipping 50°.												
	219				C32			44	0						
404.25	220				C33			63	0						VOC=5.7 ppm
	221														
402.25	222														
	223														
400.25	224														
	225		Hard to very hard.		C34			81	10						VOC=6.7 ppm
398.25	226														
	227														
396.25	228														
	229				C35			100	75						
394.25	230				C36			100	14						VOC=1.1 ppm
	231														
392.25	232														
	233		Extremely hard.		C37			100	0						
390.25	234														
	235														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV 22B2 23B8 23B9 23B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B9**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**8 of 11**

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
	235		Very hard.		C38			50	15						VOC=4.2 ppm
388.25	236														
	237		Fracture zone dipping 45°. Fracture zone dipping 45°.												VOC=14.0ppm
386.25	238														
	239														
384.25	240				C39			60	8						
	241														
382.25	242														
	243														
380.25	244														
	245				C40			90	0						VOC=11.6 ppm
378.25	246														
	247														
376.25	248														
	249														
374.25	250		With soft clay matrix.		C41			83	0						VOC=7.1 ppm
	251														
372.25	252														
	253														
370.25	254														
	255				C42			77	15						VOC=7.0 ppm
368.25	256														
	257		Fracture zone dipping 51°.												
366.25	258		Fracture zone dipping 45°.												
	259														
364.25	260				C43			70	0						VOC=6.9 ppm
	261														
362.25	262														
	263														
360.25	264														
	265														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B9**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**9 of 11**

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
	265				C44			95	15						VOC=7.2 ppm
358.25	266														
	267		Fracture zone dipping 60°.												
356.25	268														
	269		Fracture zone dipping 60°. Fracture zone dipping 60°.												
354.25	270		Fracture zone dipping 43°.		C45			83	15						UW, PL VOC=3.0 ppm
	271														
352.25	272									3	129				
	273														
350.25	274														
	275				C46			75	0						VOC=3.0 ppm
348.25	276														
	277														
346.25	278														
	279														
344.25	280		Some vertical fractures.		C47			96	0						VOC=4.0ppm
	281														
342.25	282														
	283														PTS
340.25	284				C48			100	0						
	285				C49			82	8						VOC=11.0 ppm
338.25	286		Fracture zone dipping 45°. Moderately fractured.												
	287		Fracture zone dipping 45°. Fracture zone dipping 90°.												
336.25	288		Moderately hard.												
	289														
334.25	290				C50			100	0						VOC=6.5 ppm
	291														
332.25	292														
	293									1	152				UW, PL
330.25	294														
	295														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV 22B2 23B8 23B9 23B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B9**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**10 of 11**

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
	295				C51			100	0						VOC=8.0 ppm
328.25	296														
	297														
326.25	298														
	299														
324.25	300														VOC=6.4 ppm
	301		Bottom of borehole at 300.0 ft bgs Borehole was converted to piezometer at the completion of drilling.												
322.25	302														
	303														
320.25	304														
	305														
318.25	306														
	307														
316.25	308														
	309														
314.25	310														
	311														
312.25	312														
	313														
310.25	314														
	315														
308.25	316														
	317														
306.25	318														
	319														
304.25	320														
	321														
302.25	322														
	323														
300.25	324														
	325														

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B9**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**11 of 11**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Salisbury	**2-23-09**	**3-11-09**	**34° 6' 26.07" / 118° 10' 53" NAD83**	**R-09-Z3B10**
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Caltrans In-House			**' Lt Sta Pine Crest Dr. n/o E. Ebey Dr.**	**626.8 ft NAVD88**
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wire-Line			**CME 85**	**4 in**
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
Bulk,SPT (1.4"),Punch Core(2.5"),HQ Core			**CME Automatic, 140 lb., 30 inch drop**	**87%**
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer Installed on Completion			**NM**	**48.5 ft on 7-1-09**	**375.0 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		ASPHALT strong cementation; (6").		B01			100							This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007), except as noted in Appendix A.1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
	1		Poorly graded GRAVEL (GP); medium dense to dense; brown; dry; mostly coarse, angular to subangular GRAVEL, max. 2 in. dia.; weak cementation; (Aggregate Base = 6").												
624.80	2		SANDY SILT (ML); medium stiff; brown; dry to moist; some fine SAND; mostly nonplastic fines; weak cementation; **[ALLUVIUM]**												
	3														
622.80	4														
	5		SILTY CLAY (CL-ML); medium stiff; yellowish brown; dry to moist; nonplastic fines; weak cementation.		S02	3 3 2	5	100							Hand Auger from 1' - 5' VOC=3.5 ppm
620.80	6														
	7														
618.80	8														
	9														
616.80	10		SILTY CLAY with SAND (CL-ML); soft to medium stiff; yellowish brown; moist; few fine SAND; mostly nonplastic to low plasticity fines; weak cementation.		P03			100		23	107				UW VOC=1.1 ppm
	11														
614.80	12														
	13														
612.80	14														
	15				S04	4 7 10	17	100							VOC=6.0ppm
610.80	16														
	17														
608.80	18														
	19														
606.80	20		SANDY SILT (ML); medium stiff; yellowish brown; dry to moist; few fine SAND; mostly nonplastic fines; weak cementation.		P05			33							VOC=3.5 ppm
	21														
604.80	22														
	23														
602.80	24														
	25														

(continued)

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Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B10**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**1 of 13**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25														
600.80	26		Fat CLAY with SAND (CH); soft to medium stiff; yellowish brown; moist; mostly low plasticity fines; weak cementation.		S06	5 8 11	19	100		24					PI, PA VOC=4.1 ppm
	27														
598.80	28		SILTY CLAY with GRAVEL (CL-ML); medium stiff; yellowish brown mottled with dark gray; moist; about 25% few fine, subangular GRAVEL, max. 1 in. dia.; about 10% medium SAND; mostly nonplastic to low plasticity fines; weak cementation.												
	29														
596.80	30		CLAYEY SAND with GRAVEL (SC); medium stiff; yellowish brown mottled with dark gray; moist; about 20% few fine, subangular GRAVEL, max. 1 in. dia.; about 45% mostly fine SAND; some fines; weak cementation.		P07			100							VOC=0.8 ppm
	31														
594.80	32														
	33		SILTY CLAY (CL-ML); soft to medium stiff; olive gray; moist; mostly nonplastic to low plasticity fines; weak cementation; wood fragments.												
592.80	34														
	35														
590.80	36		SILTY CLAY with SAND (CL-ML); medium stiff; yellowish brown; dry to moist; few fine SAND; mostly nonplastic to low plasticity fines; weak cementation.		S08	6 7 12	19	100							VOC=0.8 ppm
	37		About 15% fine GRAVEL, max. 3/4 in. dia..												
588.80	38														
	39														
586.80	40		SANDY SILTY CLAY (CL-ML); medium stiff; yellowish brown mottled with dark gray; moist; little medium SAND; mostly nonplastic to low plasticity fines; weak cementation; wood fragments.		P09			100							VOC=0.8 ppm
	41														
584.80	42														
	43														
582.80	44														
	45		SILTY CLAY with SAND (CL-ML); medium stiff to stiff; brownish yellow; moist; few fine SAND; mostly nonplastic to low plasticity fines; weak cementation.		S10	6 6 7	13	100				PP = 3.5			VOC=0.7 ppm
580.80	46														
	47														
578.80	48														
	49														
576.80	50		Lean CLAY (CL); hard; yellowish brown; dry to moist; few fine SAND; mostly nonplastic to low plasticity fines; weak cementation; >4.0 TSF.		P11			100		24	107	PP = 4			UW, PI VOC=0.7 ppm
	51														
574.80	52														
	53		1.5 TSF.												
572.80	54														
	55														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B10**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**2 of 13**

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
	55													
570.80	56		Lean CLAY with SAND (CL); very stiff; yellowish brown; dry; few fine SAND; mostly nonplastic to low plasticity fines; weak cementation; 3.5 TSF, fragments of strongly cemented olive gray silty fine sandstone.		S12	6 5 5	10	100				PP = 3		
	57													
568.80	58		SANDY SILT (ML); hard; yellowish brown; dry; some fine SAND; mostly nonplastic fines; weak cementation; >4 TSF.											
	59													
566.80	60				P13			100						VOC=0.3 ppm
	61													
564.80	62													
	63													
562.80	64													
	65		SEDIMENTARY ROCK, (MUDSTONE), moderately bedded, moderate yellowish brown and dark gray, slightly weathered, moderately hard, slightly fractured, sandy, fine sand. **[TOPANGA FORMATION]**		C14			100	100					**See note at the end of log regarding RQD.**
560.80	66													
	67													
558.80	68				C15			100	100					
	69													
556.80	70		Very thinly bedded, pale yellowish brown, dipping 22°. Dark gray.		C16			100	100					
	71									10	128			UW, PI, PA
554.80	72													
	73		Laminated, olive gray, dipping 18°.											
552.80	74		Moderately bedded, dark gray, incipient fracture (not healed), dipping 90°.											
	75		Moderate brown.		C17			100	80					VOC=1.7.6ppm
550.80	76		Joint (CL, not healed), dipping 25°.											
	77		Joint (CL, not healed), dipping 24°. Joint (CL, not healed), dipping 32°. Joint (CL, not healed), dipping 29°, bedding dipping 18°.											
548.80	78		Joint (CL, not healed), dipping 35°. Joint (CL, not healed), dipping 31°.											
	79		Very thinly interbedded lenses of weakly cemented silty fine sandstone.											
546.80	80		Joint (CL, not healed), dipping 31°. SEDIMENTARY ROCK, (SANDSTONE), moderately bedded, light gray, hard, slightly fractured, silty.		C18			100	92					VOC=1.5 ppm
	81		Very to extremely hard.											
544.80	82		Wet. SEDIMENTARY ROCK, (SILTSTONE), moderately bedded, moderate brown to dusky brown, very to extremely hard, slightly fractured, dipping 17°.											
	83													
542.80	84		SEDIMENTARY ROCK, (CLAYSTONE), moderately bedded, light brown, moderately hard, slightly fractured,											
	85													

(continued)

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Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B10**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**3 of 13**

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
	85		dipping 18°, sandy, fine sand. Moderate brown, moderately soft. *(continued)*.		C19			100	0						VOC=1.4 ppm **See note at the end of log regarding RQD.**
540.80	86														
	87		SEDIMENTARY ROCK, (SILTSTONE), moderately bedded, moderate brown, moderately soft, slightly fractured, sandy, fine sand.												
538.80	88		Light gray.												
	89		Moderate brown.												
536.80	90		SEDIMENTARY ROCK, (CLAYSTONE), moderately bedded, moderate brown, moderately soft, slightly fractured, sandy, fine sand.		C20			63	20						VOC=2.9 ppm
	91		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, light brown, moderately soft, slightly fractured, dipping 12°.												
534.80	92		SEDIMENTARY ROCK, (CLAYSTONE), moderately bedded, moderate brown, moderately soft, slightly fractured, sandy, fine sand.												
	93														
532.80	94														
	95				C21			100	70						VOC=2.0 ppm
530.80	96		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light gray, very hard, slightly fractured, dipping 47°, fine sand, some medium sand.												
	97		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard, slightly fractured, bedding joint (clay), dipping 42°.												
528.80	98		SEDIMENTARY ROCK, (SANDSTONE), moderately bedded, moderate brown, moderately hard, slightly fractured, medium sand, moderately graded. Silty, fine sand.												
	99														
526.80	100		SEDIMENTARY ROCK, (SILTSTONE), moderately bedded, moderate brown to light brown, moderately hard, slightly fractured, sandy, fine sand.		C22			100	100						VOC=1.1 ppm
	101		SEDIMENTARY ROCK, (SANDSTONE), moderately bedded, moderate brown, moderately hard, slightly fractured, dipping 28°, fine sand.												
524.80	102									16	112				UW
	103		SEDIMENTARY ROCK, (SILTSTONE), moderately bedded, moderate brown, moderately hard, slightly fractured.												
522.80	104		SEDIMENTARY ROCK, (SANDSTONE), moderately bedded, moderate brown, moderately hard, slightly fractured, dipping 27°.												
	105		SEDIMENTARY ROCK, (SILTSTONE), moderately bedded, moderate brown, moderately hard, slightly fractured.		C23			100	100						VOC=0.5 ppm
520.80	106		SEDIMENTARY ROCK, (CLAYSTONE), moderately bedded, moderate brown, moderately hard, slightly fractured.												
	107		SEDIMENTARY ROCK, (SILTSTONE), moderately bedded, moderate brown, moderately hard, slightly fractured.												
518.80	108		SEDIMENTARY ROCK, (SANDSTONE), very thinly bedded, light gray, very to extremely hard, slightly fractured.												
	109														
516.80	110		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, moderate brown, moderately hard, slightly fractured.		C24			100	100						VOC=3.9 ppm
	111		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, moderate brown, moderately hard, slightly fractured, with fine sand.												
514.80	112		SEDIMENTARY ROCK, (SANDSTONE), thinly to moderately bedded, light gray, moderately hard, slightly fractured, silty with some clay, fine sand,.												
	113		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, moderate brown, very hard, slightly												
512.80	114														
	115														

(continued)

Department of Transportation
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Office of Geotechnical Design - South 1

REPORT TITLE: **BORING RECORD**

HOLE ID: **R-09-Z3B10**

DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	T/T	07-07-187900

PROJECT OR BRIDGE NAME: **SR-710 TUNNEL TECHNICAL STUDY**

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
	M.Salisbury		4 of 13

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
	115		fractured, bedding joint (CL, not healed), dipping 28°.		C25			100	100						VOC=1.5 ppm
510.80	116		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, moderate brown, very hard, slightly fractured, sandy, fine sand. Light gray, dipping 18°, with fine sand.												**See note at the end of log regarding RQD.**
	117		SEDIMENTARY ROCK, (SANDSTONE), moderate brown.												
508.80	118		SEDIMENTARY ROCK, (CLAYSTONE), laminated, dark gray, moderately hard, slightly fractured, dipping 18°, fine sand.												
	119														
506.80	120		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, moderate brown, moderately hard, slightly fractured, with some fine sand. *(continued)*.		C26			100	100						VOC=1.3 ppm
	121		SEDIMENTARY ROCK, (SANDSTONE), thinly to moderately bedded, moderate brown, hard, slightly fractured, sandy, fine sand.												
504.80	122		SEDIMENTARY ROCK, (CLAYSTONE), thinly to moderately bedded, light gray, soft, slightly fractured, fine sand.		C27			113	93						
	123														
502.80	124		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, moderate brown, hard, slightly fractured.												UW, PI, PA
	125		Thinly to moderately bedded, moderate brown, hard, slightly fractured. Dark gray, dipping 25°.		C28			94	39	13	116				VOC=0.9 ppm
500.80	126		Moderate brown. Bedding joint (CL, not healed), dipping 17°.												
	127		SEDIMENTARY ROCK, (SANDSTONE), laminated, light gray, hard, slightly fractured, silty, fine sand.												
498.80	128		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, slightly fractured.		C29			167	58						VOC=1.3 ppm
	129		SEDIMENTARY ROCK, (SANDSTONE), very thinly bedded, light gray, hard, slightly fractured, dipping 38°, silty, fine sand.												
496.80	130		SEDIMENTARY ROCK, (SILTSTONE), thinly to moderately bedded, moderate brown, hard, slightly fractured.		C30			100	0						
	131		SEDIMENTARY ROCK, (SANDSTONE), laminated, light gray, hard, slightly fractured, dipping 26°, silty, fine sand.												
494.80	132		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, slightly fractured.												
	133		SEDIMENTARY ROCK, (SANDSTONE), laminated, light gray, hard, slightly fractured, dipping 25°, silty, fine sand.		C31			88	75						
492.80	134		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, slightly fractured.												
	135		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard, slightly fractured, bedding joint dipping 24°.		C32			100	100						VOC=0.8 ppm
490.80	136		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light gray, hard, slightly fractured.												
	137		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, slightly fractured.												
488.80	138		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light gray, moderately hard, slightly fractured, silty, fine sand.												
	139		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, slightly fractured, bedding joint dipping 17°.		C33			93	90						VOC=0.8 ppm
486.80	140		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, very slightly fractured. Dipping 12°.												
	141		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, very slightly fractured, shear (CL), dipping 18°.												
484.80	142		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, very slightly												
	143														
482.80	144														
	145														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV 22B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
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Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B10**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**5 of 13**

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
	145		fractured.		C34			100	100					VOC=0.8 ppm
480.80	146		SEDIMENTARY ROCK, (SANDSTONE), very thinly bedded, light gray, moderately hard, very slightly fractured, dipping 24°.											**See note at the end of log regarding RQD.**
	147		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard, slightly fractured.											
478.80	148		SEDIMENTARY ROCK, (SANDSTONE), laminated to very thinly bedded, light gray, hard, slightly fractured, fine sand.											
	149		Dipping 17°. Laminated, bedding joint dipping 42°.											
476.80	150		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, slightly fractured, sandy, fine sand.		C35			100	100					VOC=1.0 ppm
	151		Bedding joint dipping 29°. Very hard, bedding joint dipping 29°.											
474.80	152		SEDIMENTARY ROCK, (SANDSTONE), laminated to very thinly bedded, moderate brown to light gray, hard, slightly fractured, fine sand.							11	116			UW
	153		Dipping 27°. Dipping 26°.											
472.80	154		SEDIMENTARY ROCK, (CLAYSTONE), laminated to very thinly bedded, moderate brown, hard, slightly fractured, shear (CL, not healed), dipping 32°, slightly plastic.											
	155				C36			75	75					VOC=0.8 ppm
470.80	156		SEDIMENTARY ROCK, (SANDSTONE), laminated to very thinly bedded, moderate brown, hard, slightly fractured.											
	157		SEDIMENTARY ROCK, (CLAYSTONE), laminated to very thinly bedded, moderate brown, hard, slightly fractured.		C37			100	100					
468.80	158		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, olive gray, moderately hard to hard, slightly fractured, fine sand.											
	159													
466.80	160		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, slightly fractured, sandy, fine sand.		C38			97	97					VOC=0.4 ppm
	161		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light gray, moderately hard to hard, slightly fractured, dipping 42°, silty, fine sand, poorly graded.											
464.80	162		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, slightly fractured.											
	163		Thinly bedded, moderate brown, hard, slightly fractured, sandy, fine sand, poorly graded. Hard to very hard, bedding joint dipping 36°.											
462.80	164		SEDIMENTARY ROCK, (SANDSTONE), laminated, light gray to olive gray, hard, slightly fractured, dipping 52°, fine sand.											
	165				C39			92	92					VOC=0.6 ppm
460.80	166		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately soft to moderately hard, slightly fractured.											
	167		SEDIMENTARY ROCK, (SILTSTONE), laminated, moderate brown, moderately soft to moderately hard, slightly fractured, dipping 36°, sandy, fine sand.											
458.80	168		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, slightly fractured.		C40			100	100					
	169		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, light gray mottled with moderate brown, hard to very hard, slightly to very slightly fractured, sandy, fine											
456.80	170		Moderate brown. Incipient fracture dipping 90°.		C41			100	94					VOC=0.6 ppm
	171									10	121			UW
454.80	172		SEDIMENTARY ROCK, (SANDSTONE), laminated, light gray, moderately hard, slightly to very slightly fractured, bedding joint (gypsum, not healed), dipping 12°.											
	173				C42			108	100					
452.80	174		SEDIMENTARY ROCK, (SILTSTONE), laminated, moderate brown, hard, slightly to very slightly fractured.											
	175		SEDIMENTARY ROCK, (SANDSTONE), laminated,											

(continued)

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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B10**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**6 of 13**

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
	175		light gray, moderately hard, slightly to very slightly fractured, dipping 10°.		C43			100	100						VOC=1.4 ppm
450.80	176		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, slightly to very slightly fractured, sandy, fine sand, poorly graded.												**See note at the end of log regarding RQD.**
	177		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light gray, hard, slightly to very slightly fractured, dipping 12°, silty, fine sand.												
448.80	178		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard to very hard, slightly to very slightly fractured, sandy, fine sand.		C44			183	0						
	179		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, slightly to very slightly fractured.		C45			111	100						VOC=2.5 ppm
446.80	180		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, slightly to very slightly fractured.												
	181		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, slightly to very slightly fractured.												
444.80	182		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, slightly to very slightly fractured.		C46			117	67						
	183		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, slightly to very slightly fractured.												
442.80	184		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard to very hard, slightly to very slightly fractured.		C47			108	63						VOC=3.4 ppm
	185		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, slightly to very slightly fractured.												
440.80	186		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, slightly to very slightly fractured.							17	110				UW
	187		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, slightly to very slightly fractured.		C48			100	100						
438.80	188		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, slightly to very slightly fractured.		C49			111	26						VOC=2.5 ppm
	189		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, slightly to very slightly fractured.												
436.80	190		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, slightly to very slightly fractured, gradational contact.												
	191		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, slightly to very slightly fractured.												
434.80	192		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, slightly to very slightly fractured.		C50			114	33						VOC=1.8 ppm
	193		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, dark gray, very to extremely hard, slightly to very slightly fractured, incipient fracture (gypsum), silty, fine sand.												
432.80	194		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, slightly to very slightly fractured, with some fine sand.		C51			125	58						
	195		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, very hard, slightly to very slightly fractured, incipient fracture (CL, not healed), dipping 28°.												
430.80	196		Incipient fracture (CL, not healed), dipping 36°. Incipient fracture (CL, not healed), dipping 39°.		C52			133	53						VOC=1.7 ppm
	197		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, very hard, slightly to very slightly fractured.												
428.80	198		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, very hard, slightly to very slightly fractured, sandy, fine sand, poorly graded.		C53			100	100						
	199		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, very hard, slightly to very slightly fractured, with some fine sand.												
426.80	200														
	201														
424.80	202														
	203														
422.80	204														
	205														

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BORING RECORD				**R-09-Z3B10**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**7 of 13**

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
	205		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, very hard, slightly to very slightly fractured.		C54			100	100						VOC=2.8 ppm **See note at the end of log regarding RQD.**
420.80	206		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, olive gray, very hard, slightly to very slightly fractured.												
	207		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, very hard, intensely fractured, sandy, fine sand, poorly graded.												
418.80	208		Joint (CL, not healed), dipping 10°.		C55			92	92						
	209		Joint (CL, not healed), dipping 45°. Joint (CL, not healed), dipping 45°. Joint (CL, not healed), dipping 42°.												
416.80	210		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, intensely fractured.		C56			100	100						VOC=2.3 ppm
	211		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, intensely fractured.												
414.80	212		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, intensely fractured.												
	213		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, moderate brown to dark gray, moderately hard, intensely fractured, dipping 27°, silty, fine sand.												
412.80	214		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, intensely fractured, sandy, fine sand.												
	215		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, intensely fractured.		C57			100	100						VOC=1.4 ppm
410.80	216		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, intensely fractured.												
	217		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, intensely fractured.												
408.80	218		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, intensely fractured.												
	219		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, intensely fractured.												
406.80	220		SEDIMENTARY ROCK, (SILTSTONE), laminated, moderate brown, moderately hard, intensely fractured. Dipping 60°.		C58			93	93						VOC=2.9 ppm
	221		SEDIMENTARY ROCK, (CLAYSTONE), laminated, moderate brown, moderately hard, intensely fractured.												
404.80	222		SEDIMENTARY ROCK, (SILTSTONE), laminated, moderate brown, moderately hard, intensely fractured.												
	223		SEDIMENTARY ROCK, (CLAYSTONE), laminated, moderate brown, moderately hard, intensely fractured.												
402.80	224		SEDIMENTARY ROCK, (SILTSTONE), laminated, moderate brown, moderately hard, intensely fractured.		C59			100	100						
	225		SEDIMENTARY ROCK, (SANDSTONE), laminated, olive gray, moderately hard, intensely fractured, silty, fine sand.												EM, UC
400.80	226		SEDIMENTARY ROCK, (CLAYSTONE), laminated, moderate brown, moderately hard, intensely fractured.							13	123				VOC=1.8 ppm
	227		SEDIMENTARY ROCK, (SANDSTONE), laminated, olive gray to light gray, moderately hard, intensely fractured, silty, fine sand.												
398.80	228		Shear (CL, not healed), dipping 90°, moderately plastic, multiple planes that merge into vertical from bedding orientation.												
	229		Dipping 50°. *(continued).*		C60			100	100						
396.80	230		Light brown, moderately fractured, incipient fracture dipping 65°.												VOC=1.9 ppm
	231		Light gray, incipient fracture (ML, not healed), dipping 45°.												
394.80	232		Incipient fracture (ML, not healed), dipping 40°. Incipient fracture (ML, not healed), dipping 40°. Incipient fracture (ML, not healed), dipping 10 to 30°, multiple planes at different strikes.												
	233		Incipient fracture (ML, not healed), dipping 45°. Incipient fracture (ML, not healed), dipping 5 to 15°, multiple planes with similar strikes.												VOC=2.3 ppm
392.80	234		Incipient fracture (ML, not healed), dipping 10°. Incipient fracture (ML, not healed), dipping 10°.		C61			86	67						
	235														

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07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**8 of 13**

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
	235		Incipient fracture (ML, not healed), dipping 20°. Incipient fracture (ML, not healed), dipping 15°.		C61			86	67						See note at the end of log regarding RQD.
390.80	236		Incipient fracture (ML, not healed), dipping 45°. Incipient fracture (ML, not healed), dipping 60°. Joint dipping 45°.												
	237		Shear dipping 75°. Shear dipping 25°.		C62			108	83						
388.80	238		Shear dipping 50°. Shear (CL, not healed), dipping 80°.												
	239		Moderate brown, shear (CL, not healed), dipping 40°. Shear (CL, not healed), dipping 45°. Shear (CL, not healed), dipping 30 to 45°.												
386.80	240		Light gray, extremely weak. Fine sand, some medium sand. Incipient fracture dipping 90°.		C63			100	68						VOC=14.1 ppm
	241		Joint (ML, not healed), dipping 45°. Laminated, dipping 50°.												
384.80	242		Thinly bedded, joint (CL, not healed), dipping 50°. Joint (CL, not healed), dipping 40°. Incipient fracture dipping 70°.												
	243		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured, dipping 30°, with some fine sand, poorly graded.												
382.80	244														
	245		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured.		C64			90	87						VOC=0.2 ppm
380.80	246		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured.												
	247		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, light olive gray, moderately hard, moderately fractured, incipient fracture dipping 45°.												
378.80	248		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, light olive gray, moderately hard, moderately fractured, sandy, fine sand.												
	249		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, light brown, soft, moderately fractured.		C65			97	87						VOC=0.1 ppm
376.80	250		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light gray, moderately hard, moderately fractured, dipping 30°, Silty, fine sand.												
	251		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, moderately fractured, sandy, fine sand.												
374.80	252		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard, moderately fractured.												
	253		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, moderately fractured.												
372.80	254		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard, moderately fractured.		C66			107	0	16	110				VOC=0.2 ppm UW, CR
	255		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, moderately fractured.												
370.80	256		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light gray, moderately hard, moderately fractured, dipping 20°, medium sand, moderately graded.												
	257		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured, dipping 20°.												
368.80	258		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured, sandy, fine sand, poorly graded.		C67			100	72						VOC=0.1 ppm
	259		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured.												
366.80	260		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured, sandy, fine sand, poorly graded.												
	261		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured.												
364.80	262		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured, sandy, fine sand, poorly graded.												
	263		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured.												
362.80	264		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded,												
	265														

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07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**9 of 13**

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
	265		moderate brown, moderately hard, moderately fractured, sandy, fine sand.		C68			100	80						VOC=0.2 ppm **See note at the end of log regarding RQD.**
360.80	266		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light gray to dark gray, extremely hard, moderately fractured, incipient fracture dipping 45°, fine sand.												
	267		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, moderately fractured, dipping 21°, with some fine sand.												
358.80	268		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured, dipping 30°.												
	269		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, moderately fractured.		C69			100	92						VOC=0.1 ppm
356.80	270		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured.												
	271		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured.												
354.80	272		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured.												
	273		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured.												
352.80	274		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured.		C70			100	0						VOC=0.0 ppm
	275		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured.												
350.80	276		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured.												
	277		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured.												
348.80	278		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured, dipping 35°.		C71			75	0						
	279		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light brown, moderately hard, moderately fractured, silty, fine sand.		C72			100	87						VOC=0.3 ppm
346.80	280		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured.												
	281		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured, with fine sand.												
344.80	282		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured.												
	283		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured, sandy, fine sand.		C73			100	79						VOC=0.2 ppm
342.80	284		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured. Dipping 10°. Incipient fracture dipping 90°.												
	285		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured, sandy, fine sand. Shear (ML, not healed), dipping 15°. Patches of petroleum?.		C73			111	83	11	127				SD, EM, UC
340.80	286		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured, dipping 40°.		C74			100	90						VOC=0.3 ppm
	287		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light gray, moderately hard, moderately fractured.												
338.80	288		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured, dipping 60°, clasts of light brown to dark gray silty fine sandstone and moderate brown claystone.												
	289		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light gray, moderately hard, moderately fractured, medium sand with some fine sand.												
336.80	290														
	291														
334.80	292														
	293														
332.80	294														
	295														

(continued)

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07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
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BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**10 of 13**

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
	295		Incipient fracture (gypsum, not healed), dipping 40°. Incipient fracture (gypsum, not healed), dipping 50°, silty, fine sand.		C75			100	100						VOC=0.0 ppm **See note at the end of log regarding RQD.**
330.80	296		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured.												
	297														
328.80	298		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, light olive, moderately hard, moderately fractured, sandy, fine sand, with lenses of moderate brown claystone.												
	299														
326.80	300		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured, dipping 40°.		C76			100	80						VOC=0.8 ppm
	301		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured, sandy, fine sand.												
324.80	302		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, moderately hard, moderately fractured.												
	303														
322.80	304		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, moderately fractured, dipping 70°. Laminated, dipping 40°.												
	305		SEDIMENTARY ROCK, (CLAYSTONE), laminated, moderate brown, hard, moderately fractured.		C77			100	100						VOC=0.6 ppm
320.80	306		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, light gray, hard, moderately fractured, sandy, fine sand.												
	307		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard, moderately fractured, dipping 25°.												PTS
318.80	308		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard, moderately fractured.												
	309		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light brown, hard, moderately fractured, fine sand. Incipient fracture (ML), dipping 10°.												
316.80	310		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, very hard, moderately fractured, bedding joint dipping 40°.		C78			87	0						VOC=0.0 ppm
	311		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, very hard, moderately fractured.												
314.80	312		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, very hard, moderately fractured, fine sand.												
	313														
312.80	314		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light gray, very hard, moderately fractured, bedding joint dipping 30°.												
	315		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, very hard, moderately fractured.		C79			124	0						VOC=1.0 ppm
310.80	316		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, very hard, moderately fractured. Incipient fracture (ML), dipping 30°.							9	133				EM, UC
	317		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light brown, weak, very hard, moderately fractured.												
308.80	318		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, very hard, moderately fractured.												
	319		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, moderate brown, very hard, moderately fractured, dipping 50°, fine sand.		C80			110	0						
306.80	320		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, very hard, moderately fractured, bedding joint dipping 50°.												VOC=0.5 ppm
	321		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, moderate brown, very hard, moderately fractured, fault dipping 20°.												
304.80	322		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, very hard, moderately fractured.		C81			100	0						
	323		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, moderate brown, very hard, moderately fractured, fault dipping 45°.												
302.80	324		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded,		C82			100	0						
	325														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED MIKE - 12-7-09SR-710 CALTRANS BORING LOGS W REV Z2B2 Z3B8 Z3B9 Z3B10 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B10**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**11 of 13**

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
	325		moderate brown, very hard, moderately fractured.		C82			100	0						VOC=0.8 ppm
300.80	326		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, moderate brown, very hard, moderately fractured, dipping 40°.												**See note at the end of log regarding RQD.**
	327		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, very hard, moderately fractured.												
298.80	328		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light gray, very hard, moderately fractured. Joint dipping 30°, fine sand, some medium.												
	329		Dipping 70°. Shear (ML, not healed), dipping 60°.												
296.80	330		Incipient fracture (ML, not healed), dipping 15°. Extremely hard, incipient fracture dipping 70°. Bedding joint dipping 45°.		C83			100	95						VOC=0.2 ppm
	331		Moderately hard. Very to extremely hard, intensely fractured. Incipient fracture dipping 60°. Unit is very weak.							12	121				
294.80	332		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, very to extremely hard, intensely fractured, dipping 20°.												SD, EM, UC
	333		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, pale olive, very to extremely hard, intensely fractured, sandy, fine sand.												
292.80	334		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, pale olive, very to extremely hard, intensely fractured.		C84			95	100						VOC=0.6 ppm
	335		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, pale olive, very to extremely hard, intensely fractured.												
290.80	336		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, dark gray, very to extremely hard, intensely fractured, dipping 15°.												
	337		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, very to extremely hard, intensely fractured, dipping 45°.												
288.80	338		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light brown, moderately hard, intensely fractured, dipping 30°.												
	339		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, extremely weak, hard, intensely fractured. Shear (CL), dipping 40°. Shear (CL), dipping 60°. Shear (CL), dipping 40°.		C85			100	50						VOC=0.3 ppm
286.80	340														
	341														
284.80	342														
	343		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light gray to light olive, moderately hard, intensely fractured, dipping 25°.												
282.80	344		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard to very hard, intensely fractured.												
	345		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light gray to light olive, hard to very hard, intensely fractured, dipping 20°.		C86			120	0						VOC=0.2 ppm
280.80	346		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard to very hard, intensely fractured.												
	347		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard to very hard, intensely fractured, with fine sand.		C87			120	0						
278.80	348		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, hard to very hard, intensely fractured. Light olive.												
	349		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, light olive mottled with dark greenish gray, hard to very hard, intensely fractured, dipping 12°, with fine sand.		C88			98	75						VOC=1.5 ppm
276.80	350		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, light olive mottled with dark greenish gray, hard to very hard, intensely fractured. Light olive. Moderately soft to moderately hard, shear (CL), dipping 50°.												
	351														
274.80	352														
	353		Hard. Very hard.												
272.80	354		Sandy, medium sand with some fine sand. Light gray.		C89			100	75						
	355														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B10**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**12 of 13**

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
	355		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light gray, very weak, extremely hard, intensely fractured, silty, medium sand with some Moderately hard.		C89			100	75					VOC=0.1 ppm **See note at the end of log regarding RQD.**
270.80	356									8	134			EM, UC
	357													
268.80	358				C90			100	50					
	359		SEDIMENTARY ROCK, (CLAYSTONE), thinly bedded, moderate brown, hard, intensely fractured, dipping 15°, with fine sand.											
266.80	360													VOC=0.2 ppm
	361													
264.80	362		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, grayish brown, very hard, intensely fractured, bedding joint dipping 50°, with silt, fine sand. Light gray, moderately hard.		C91			100	83					
	363													
262.80	364													
	365				C92			89	64					
260.80	366		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown, moderately hard, intensely fractured.											
	367													
258.80	368				C93			100	63					
	369		Incipient fracture dipping 50°.											
256.80	370		Joint (CL, not healed), dipping 45°.											
	371		SEDIMENTARY ROCK, (SANDSTONE), thinly bedded, light gray, extremely hard, intensely fractured, dipping 20°, fine sand.											
254.80	372		SEDIMENTARY ROCK, (SILTSTONE), thinly bedded, moderate brown to light olive, extremely hard, intensely fractured, dipping 40°, sandy, fine sand. Dipping 25°.		C94			131	67					
	373													
252.80	374		Joint (CL, not healed), dipping 40°.											
	375		Dipping 20°.											
250.80	376		Bottom of borehole at 375.0 ft bgs Borehole was converted to piezometer at the completion of drilling.											
	377		RQD values provided in the boring logs are based on intact core pieces obtained between two natural discontinuities. Majority of cores obtained in this boring are weak and does not meet the "sound core" definition provided in standard test method for RQD ASTM D 6032. These RQD values should not be used to evaluate the rock mass quality.											
248.80	378													
	379													
246.80	380													
	381													
244.80	382													
	383													
242.80	384													
	385													

Department of Transportation
Division of Engineering Services
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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B10**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M.Salisbury			**13 of 13**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
K. Barker	1-13-09	1-21-09	34° 5' 52" / 118° 8' 47" NAD83	R-09-Z3B11
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Caltrans Drilling Services			' Lt Sta N. Palm Ave. s/o W. Alhambra Rd.	533.1 ft NAVD88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wire-Line			CME 85	4 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
Bulk,SPT(1.4"),Punch Core(2.5"),HQ Core			CME Automatic, 140 lb., 30 inch drop	87%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer Installed on Completion			NM	158.0 ft on 7-1-09	275.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		ASPHALT (6").		D01			100							This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007), except as noted in Appendix A.1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
	1		SILTY, CLAYEY SAND (SC-SM); medium dense; very dark brown; dry; few fine GRAVEL; medium to fine SAND; **[ALLUVIUM]**												
531.11	2														
	3														
529.11	4														
	5														
	6		CLAYEY SAND (SC); medium dense; olive brown; moist; medium to fine SAND.		S02	8 14 15	29	100							Hand Auger from 0.5' - 5' VOC=2.4 ppm
527.11	7														
	8														
525.11	9														
	10														
523.11	11														VOC=2.3 ppm
	12		SILTY SAND (SM); medium dense; olive brown; moist; trace fine GRAVEL; mostly medium to fine SAND.		O03			17		13	113				UW, PA
521.11	13														
	14														
519.11	15														
	16														VOC=2.4 ppm
517.11	17		At EL. 516.1 ft, observed 0.5' lens of (Poorly graded SAND) (SP); coarse SAND.		S04	6 13 13	26	100							VOC=3.4 ppm
	18														
515.11	19														
	20														
513.11	21		At EL. 512.1 ft, contains few fine, subangular GRAVEL.		O05			33							UW, PI
	22														
511.11	23														
	24									11	107				
509.11	25														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z3B11
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	T/T	07-07-187900
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K. Barker			1 of 10

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method / Casing Depth	Remarks
	25		At EL. 508.1 ft, with 0.5' to 1' interbeds of (SANDY SILT) (ML/SM); fine SAND. SILTY SAND (SM) *(continued)*.											VOC=1.7 ppm
507.11	26				S06	11 15 18	33	100						
	27													
505.11	28													
	29													
503.11	30													VOC=1.5 ppm
	31				O07			33						UW
501.11	32													
	33													
499.11	34									14	102			
	35													
497.11	36				S08	6 9 10	19	100						
	37													
495.11	38													
	39													
493.11	40													VOC=3.3 ppm
	41		Poorly graded SAND with SILT (SP-SM); medium dense; olive brown; moist; mostly medium to fine SAND.		O09			17						UW, PA
491.11	42													
	43													
489.11	44									22	98			
	45													
487.11	46				S10	7 7 9	16	100						
	47													
485.11	48													
	49													
483.11	50		SILTY SAND with GRAVEL (SM); medium dense; olive brown; moist; little fine GRAVEL; fine SAND.											VOC=3.1 ppm
	51				O10A			0						
481.11	52													No Recovery
	53													
479.11	54													
	55													

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
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Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B11**
DIST. **07**	COUNTY **LA**	ROUTE **710**	POSTMILE **T/T**	EA **07-07-187900**
PROJECT OR BRIDGE NAME **SR-710 TUNNEL TECHNICAL STUDY**				
BRIDGE NUMBER	PREPARED BY **K. Barker**		DATE	SHEET **2 of 10**

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
	55		SILTY SAND with GRAVEL (SM) *(continued)*.		O10A			0							
477.11	56		Well-graded SAND with SILT and GRAVEL (SW-SM); very dense; olive brown; moist; fine GRAVEL; coarse to fine SAND; weak cementation.		S11	23 31 25	56	100							
	57														
475.11	58														VOC=1.1 ppm
	59														
473.11	60		At EL. 473.1 ft, contains 1' lens of trace coarse GRAVEL; moderate cementation.												
	61		At EL. 472.1 ft, becomes dense; little coarse to fine GRAVEL; mostly coarse to fine SAND; few low plasticity fines.		O12			33							UW, PA
471.11	62														
	63														VOC=8.1 ppm
469.11	64									10	138				
	65														
467.11	66				S13	22 19 27	46	100							
	67														
465.11	68		SANDY elastic SILT (MH); very stiff; olive brown; moist; some fine SAND; medium plasticity, low dry strength, low toughness fines.												
	69														
463.11	70		SILTY SAND (SM); dense; olive brown; moist; fine GRAVEL; mostly fine SAND; some low plasticity fines; weak cementation.												
	71				O14			17							UW, PA VOC=7.3 ppm
461.11	72														
	73														VOC=4.1 ppm
459.11	74		SANDY elastic SILT (MH); very stiff; olive brown; moist; some fine SAND; medium plasticity, low dry strength, low toughness fines.							21	101				
	75														
457.11	76				S15	11 12 14	26	100							
	77														
455.11	78														
	79														
453.11	80														
	81		Poorly graded SAND (SP); medium dense; olive brown; moist; medium to fine SAND; few fines.		O16			50		18	112				UW
451.11	82														
	83														VOC=1.4 ppm
449.11	84														
	85														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
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Office of Geotechnical Design - South 1

REPORT TITLE: **BORING RECORD**
HOLE ID: **R-09-Z3B11**

DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	T/T	07-07-187900

PROJECT OR BRIDGE NAME: **SR-710 TUNNEL TECHNICAL STUDY**

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
	K. Barker		3 of 10

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
	85		Poorly graded SAND (SP) *(continued)*.											
447.11	86		SANDY SILT (ML); very stiff; dark yellowish brown; moist; some fine SAND; mostly low to medium plasticity fines.		S17	28 14 14	28	100		17				PI
	87													
445.11	88													VOC=1.4 ppm
	89													
443.11	90													
	91				O18			17		20	101			UW, PA
441.11	92													VOC=1.4 ppm
	93													
439.11	94													
	95													
437.11	96				S19	12 17 18	35	100						
	97													
435.11	98													
	99													
433.11	100		CLAYEY SAND (SC); dense; dark yellowish brown; moist; trace fine GRAVEL; some fine SAND; medium plasticity, very high dry strength, high toughness fines.											VOC=2.1 ppm
	101				O20			67		10	101			UW, PI
431.11	102		SILTY SAND with GRAVEL (SM); dense to very dense; dark yellowish brown mottled with very pale brown and moderate yellowish brown; moist; some coarse to fine, subangular GRAVEL; weak cementation; gravels are granodiorite, fine to medium grained, dark yellowish brown, intensely weathered, hard.		C21			10						VOC=20.1 ppm
	103													VOC=2.5 ppm
429.11	104													
	105													
427.11	106				C22			10						VOC=2.5 ppm
	107													
425.11	108													
	109													
423.11	110													
	111		At EL. 422.1 ft, becomes about 10% COBBLES; about 20 to 30% GRAVEL.		C23			33						VOC=3.0 ppm
421.11	112													
	113													
419.11	114													
	115													

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE **BORING RECORD**				HOLE ID **R-09-Z3B11**
DIST. **07**	COUNTY **LA**	ROUTE **710**	POSTMILE **T/T**	EA **07-07-187900**
PROJECT OR BRIDGE NAME **SR-710 TUNNEL TECHNICAL STUDY**				
BRIDGE NUMBER	PREPARED BY **K. Barker**		DATE	SHEET **4 of 10**

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
	115		SILTY SAND with GRAVEL (SM) *(continued)*.		C23			33							
417.11	116		At EL. 417.1 ft, observed little coarse to fine GRAVEL; mostly coarse to fine SAND.		C24			67		12					PI, PA
	117														
415.11	118														
	119														
413.11	120														
	121				C25			100							PA
411.11	122		SILTY SAND (SM); dense; yellowish brown; moist; trace fine GRAVEL; mostly medium to fine SAND; little fines; weak cementation.												
	123														
409.11	124		At EL. 409.1 ft, contains trace fine, subangular GRAVEL.												VOC=1.9 ppm
	125									11					PA
407.11	126		At EL. 407.1 ft, observed no gravel.		C26			95							
	127														
405.11	128														
	129		SANDY lean CLAY (CL); stiff; yellowish brown; moist; trace fine GRAVEL; some medium to fine SAND; mostly medium plasticity fines.												
403.11	130														
	131				C27			20		26					PI, PA
401.11	132														
	133														
399.11	134														
	135		CLAYEY SAND (SC); dense to very dense; dark yellowish brown; moist; trace fine, subangular GRAVEL; coarse to medium SAND.												
397.11	136				C28			0							VOC=2.1 ppm
	137														
395.11	138														
	139														
393.11	140														
	141		Poorly graded SAND with SILT and GRAVEL (SP-SM); dense; dark yellowish brown mottled with yellowish brown and pale orange; moist; few coarse to fine, subangular GRAVEL; fine SAND; few fines.		C29			100							
391.11	142														VOC=2.0 ppm
	143														
389.11	144														
	145														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE: **BORING RECORD**
HOLE ID: **R-09-Z3B11**

DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	T/T	07-07-187900

PROJECT OR BRIDGE NAME: **SR-710 TUNNEL TECHNICAL STUDY**

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
	K. Barker		5 of 10

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
	145		At EL. 388.1 ft, contains trace fine GRAVEL. Poorly graded SAND with SILT and GRAVEL (SP-SM) *(continued)*.		C29			100							
387.11	146				C30			100							
	147														
385.11	148		At EL. 384.6 ft, observed 6" lens cobbles.												
	149														
383.11	150														
	151		Well-graded SAND with SILT (SW-SM); dense; dark yellowish brown mottled with yellowish brown and pale orange; moist; few fine GRAVEL; mostly medium to fine SAND.		C31			100		14					PA VOC=18.2 ppm
381.11	152		At EL. 380.6 ft, becomes some coarse to fine GRAVEL.												
	153		At EL. 380.1 ft, becomes trace GRAVEL; coarse SAND.												
379.11	154		At EL. 379.1 ft, becomes about 10 to 15% coarse to fine GRAVEL.												
	155		At EL. 378.1 ft, becomes trace GRAVEL.												
377.11	156		Poorly graded SAND with GRAVEL and COBBLES (SP); dense; dark yellowish brown; moist; about 20% COBBLES; coarse SAND; COBBLES consist of.		C32			60							VOC=20.1 ppm
	157														
375.11	158														
	159														
373.11	160		Elastic SILT (MH); very stiff; brown and dark yellowish brown; moist; medium plasticity fines.									PP = 2.5			
	161		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, laminated, dark yellowish brown, intensely weathered, moderately soft to moderately hard, intensely fractured, shear (silt, moderately healed), dipping 20 to 45°, **[TOPANGA FORMATION]**		C33			100	35						VOC=0.4 ppm **See note at the end of log regarding RQD.**
371.11	162														
	163														
369.11	164		At EL. 369.6 ft, becomes soft to moderately soft.												
	165														
367.11	166				C34			100	40						VOC=13.4 ppm
	167														
365.11	168		At EL. 365.1 ft, becomes very intensely fractured, moderately healed.												
	169														
363.11	170														
	171				C35			100	80						
361.11	172		At EL. 361.1 ft, becomes slightly mottled with greenish gray, extremely weak, moderately soft, slightly fractured, shear, dipping 45°.							25	101				PI, PA, UU, CR
	173														
359.11	174														
	175		At EL. 358.6 ft, contains fine sandstone lenses.												

(continued)

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE: **BORING RECORD**

HOLE ID: **R-09-Z3B11**

DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	T/T	07-07-187900

PROJECT OR BRIDGE NAME: **SR-710 TUNNEL TECHNICAL STUDY**

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
	K. Barker		6 of 10

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

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
	175		Poorly graded SAND with GRAVEL and COBBLES (SP) *(continued)*.		C35			100	80						VOC=8.4 ppm
357.11	176		Elastic SILT (MH) *(continued)*. *(continued)*.		C36			100	70						**See note at the end of log regarding RQD.** VOC=3.3 ppm
	177		At EL. 357.1 ft, becomes moderately to slightly fractured, dipping 90 to 20°.												
355.11	178		At EL. 355.1 ft, contains 6" fracture zone.												
	179														
353.11	180														
	181		At EL. 352.1 ft, contains 6" fracture zone.		C37			110	100						VOC=20.4 ppm
351.11	182		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, with fine sandstone lenses, massive, moderate yellowish brown mottled with olive gray, moderately weathered, soft to moderately soft, slightly fractured, fault (moderately healed), dipping 40°.												VOC=20.6 ppm
	183														
349.11	184		At EL. 349.6 ft, contains 4" fracture zone. SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, laminated, moderate yellowish brown, intensely weathered, extremely weak, moderately soft, moderately fractured, (carbonate), dipping 40°.												
	185									22	103				UC
347.11	186		At EL. 348.2 ft, contains 5" fracture zone. At EL. 347.1 ft, becomes moderately soft to moderately hard, incipient joint.		C38			80	70						
	187														VOC=1.8 ppm
345.11	188														
	189														
343.11	190														
	191		At EL. 342.8 ft, contains 6" shear/fault zone, dipping 55°. At EL. 342.1 ft, becomes soft to moderately soft, slightly fractured, partially healed, dipping 45°.		C39			100	95						UW
341.11	192														VOC=4.0 ppm
	193														
339.11	194		At EL. 339.1 ft, contains 4" lens hard.												
	195														
337.11	196				C40			100	95						
	197		At EL. 336.7 ft, contains 4" lens hard.												
335.11	198														
	199		At EL. 334.1 ft, becomes moderately hard, unfractured.												
333.11	200														
	201				C41			100	100						VOC=3.6 ppm
331.11	202		At EL. 331.3 ft, contains 2" lens hard. At EL. 331.1 ft, becomes dark brown.												VOC=2.7 ppm
	203														
329.11	204														
	205														

(continued)

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B11**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K. Barker			**7 of 10**

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
	205		*(continued).*		C41			100	100						**See note at the end of log regarding RQD.**
327.11	206		At EL. 327.1 ft, becomes slightly fractured, dipping 50 to 45°.		C42			100	100						VOC=1.0 ppm
	207														
325.11	208														
	209														
323.11	210		At EL. 323.6 ft, contains lenses of fine sandstone, 1-3" thick. Unit is extremely weak. At EL. 323.1 ft, observed shear, dipping 45°.							21	112				PTS, SD, EM, UC
	211		At EL. 322.3 ft, observed shear/fault zone, dipping 50°. At EL. 322.1 ft, contains 6" slightly weathered, hard, fracture zone, not healed.		C43			100	90						UW
321.11	212		At EL. 321.6 ft, becomes moderately soft, slightly fractured, dipping 45°.												
	213		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, massive, dark reddish brown, intensely weathered, moderately soft, unfractured.												
319.11	214														
	215		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, laminated, dark reddish brown, intensely weathered, moderately soft, slightly fractured.												
317.11	216				C44			100	100						UU VOC=0.9 ppm
	217		At EL. 316.3 ft, becomes intensely weathered, moderately soft, moderately to slightly fractured, incipient fracture, dipping 60 to 30°, with lenses of fine sandstone.												
315.11	218									22	101				PI, UC
	219		At EL. 314.3 ft, contains 2" slightly weathered, hard, fracture zone, not healed. Unit is extremely weak.												
313.11	220		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, laminated, dusky yellowish brown and dark greenish gray, intensely weathered, moderately hard, very intensely to intensely fractured, (moderately healed), dipping 40 to 80°, swells when excavated.												
	221				C45			110	80						VOC=2.8 ppm
311.11	222														
	223														
309.11	224														
	225														
307.11	226		At EL. 307.1 ft, becomes totally healed, Unit is extremely weak.		C46			110	50						EM, UC VOC=4.2 ppm
	227									15	119				
305.11	228														
	229		At EL. 304.1 ft, becomes fresh, hard, intensely fractured, random fracture, totally healed, dipping 30°.												
303.11	230		At EL. 303.3 ft, becomes intensely weathered, moderately hard, very intensely fractured, incipient joint.												
	231		At EL. 302.1 ft, becomes intensely fractured, partially healed, with light gray sandstone lenses, 1-2" thick, 1' spacing.		C47			110	80						VOC=5.7 ppm
301.11	232														PTS
	233														
299.11	234														
	235														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B11**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K. Barker			**8 of 10**

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
	235		At EL. 298.3 ft, contains 3" lens of fresh, very hard. *(continued)*.		C47			110	80						**See note at the end of log regarding RQD.**
297.11	236				C48			110	60						VOC=5.5 ppm
	237														
295.11	238														
	239														
293.11	240														
	241				C49			120	90						VOC=1.1 ppm
291.11	242		At EL. 290.8 ft, contains 6" fracture zone, not healed, dipping 45 to 30°.												
	243		At EL. 290.3 ft, becomes moderately soft, intensely fractured, shear, moderately healed.												
289.11	244														
	245		Unit is extremely weak.												SD, EM, PI, UC
287.11	246				C50			110	80	13	124				VOC=2.5 ppm
	247														
285.11	248														
	249														
283.11	250		At EL. 283.1 ft, observed												
	251		At EL. 282.1 ft, becomes soft, unfractured.		C51			100	60						VOC=1.6, 3.8 ppm
281.11	252		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, massive, medium gray, intensely weathered, very soft.												
	253		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, thickly to very thickly bedded, dark greenish gray, intensely weathered, moderately soft, unfractured, incipient joint.												
279.11	254														
	255		At EL. 278.1 ft, contains 3" lens of fine-grained sandstone.												
277.11	256				C52			100	90						
	257														
275.11	258		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, massive, light gray, slightly weathered, hard, unfractured.												
	259				C53			100	100						UU, PI
273.11	260		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, dark greenish gray, intensely weathered, moderately soft.												
	261		SEDIMENTARY ROCK, (SANDSTONE), fine-grained, light gray, fresh, very hard.		C54			115	80						
271.11	262		SEDIMENTARY ROCK, (SILTSTONE)/MUDSTONE, laminated, dark greenish gray, intensely weathered, extremely weak, moderately soft, very intensely fractured, shear (totally healed), with fine-grained sandstone laminations.												
	263		At EL. 272.1 ft, contains 3" lens of fracture zone.												SD, EM, UC
269.11	264		At EL. 271.9 ft, becomes extremely weak, soft, slightly fractured, moderately healed, dipping 45 to 0°.							14	119				
	265														

(continued)

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B11**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K. Barker			**9 of 10**

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
	265		*(continued).*		C54			115	80						**See note at the end of log regarding RQD.**
267.11	266		At EL. 267.1 ft, becomes moderately soft, very intensely fractured, moderately healed, dipping 45°.		C55			120	75						
	267														
265.11	268														
	269														
263.11	270														
	271		At EL. 262.6 ft, becomes moderately hard.												
			At EL. 262.1 ft, becomes very intensely fractured, totally healed.		C56			138	100						
261.11	272														
	273														
259.11	274														
	275		Bottom of borehole at 275.0 ft bgs												
257.11	276		Borehole was converted to piezometer at the completion of drilling.												
	277		RQD values provided in the boring logs are based on intact core pieces obtained between two natural discontinuities. Majority of cores obtained in this boring are weak and does not meet the "sound core" definition provided in standard test method for RQD ASTM D 6032. These RQD values should not be used to evaluate the rock mass quality.												
255.11	278														
	279														
253.11	280														
	281														
251.11	282														
	283														
249.11	284														
	285														
247.11	286														
	287														
245.11	288														
	289														
243.11	290														
	291														
241.11	292														
	293														
239.11	294														
	295														

CALTRANS BORING RECORD MET+ENG FIXED KRIS - SR-710 CALTRANS BORING LOGS WITH REV Z1B4 Z1B8 Z2B3 Z2B4 Z2B5 AND Z3B11 ONLY.GPJ CALTRANS LIBRARY 040808.GLB 3/10/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B11**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**T/T**	**07-07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	K. Barker			**10 of 10**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
R. Chavez	1-6-09	1-13-09	34° 5' 32.8014" / 118° 9' 34.1424" NAD83	R-09-Z3B12
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Cascade Drilling Inc.			' Lt Sta (Westmont Dr. s/o Sherwood Ave.)	501.0 ft NAVD 88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wash			Ingersoll Rand A400	6 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT(1.4"), Cal (2.4"), PQ core (3.2")			Automatic Hammer 140 lb., 30 inch drop	75%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer Installed on Completion			NM	12.8 ft on7/1/09	275.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		ASPHALT 6" thick.												This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007), except as noted in Appendix A.1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
			Road base material, 6" thick.												
499.00	1		SANDY lean CLAY (CL); dark yellowish brown to olive brown; moist; fine SAND; medium plasticity fines [OLDER ALLUVIUM].		D1										
	2														
	3														
497.00	4														
	5														Hand Auger from 1' - 7.5'
495.00	6														
	7														
493.00	8														
	9														
491.00	10		Stiff; brown.		S2	3 3 4	7								VOC = 0.4 ppm
	11														
489.00	12														
	13		SILTY SAND (SM); very dense; light yellowish brown; moist; trace fine GRAVEL; medium to fine SAND; low plasticity fines.												
487.00	14														
	15				S3	29 26 41	67								VOC = 0.2 ppm
485.00	16														
	17														
483.00	18		SILT (ML); hard; light olive brown; moist; trace fine, rounded GRAVEL; nonplastic fines.												
	19														
481.00	20				S4	10 20 40	60								VOC = 0.3 ppm
	21														
479.00	22														
	23		SILTY SAND (SM); dense; light olive brown; moist; medium to fine SAND; trace mica.												
477.00	24														
	25														

(continued)

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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z3B12
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	D/D	07-187900
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	D. Jankly		3-16-09	1 of 10

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/11/10

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		SILTY SAND (SM) *(continued)*.		S5	15 22 29	51								See note at end of log regarding RQD. VOC = 0.2 ppm
475.00	26														
	27														
473.00	28		Elastic SILT (MH); very stiff; dark brown; moist; trace mica.												
	29														
471.00	30				S6	4 6 14	20								VOC = 0.2 ppm
	31														
469.00	32														
	33		SILT with SAND (ML); hard; dark brown; moist; fine SAND.												
467.00	34														
	35		25% fine SAND, 75% fines.		S7	7 14 28	42								VOC = 0.3 ppm Other lab tests = PI, PA
465.00	36														
	37														
463.00	38														
	39														
461.00	40		8" Silty Sand layer between 40' and 40.7'.		S8	14 15 19	34								VOC = 0.2 ppm
	41														
459.00	42														
	43		SILTY SAND (SM); very dense; olive brown; moist; fine SAND; micaceous.												
457.00	44														
	45		78% fine SAND, 22% low plasticity fines.		S9	18 34 41	75								VOC = 0.0 ppm Other Lab tests = PA
455.00	46														
	47														
453.00	48														
	49														
451.00	50		Light olive brown.		S10	12 21 28	49								VOC = 0.0 ppm
	51														
449.00	52														
	53														
447.00	54														
	55														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/11/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B12**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-16-09**	**2 of 10**

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
	55		SILTY SAND (SM) *(continued)*.		S11	17 39 50/4"								See note at end of log regarding RQD.
445.00	56													
	57													
443.00	58		SILTY CLAY (CL-ML); very stiff; brown to reddish brown; moist; low to medium plasticity fines; trace mica.											
	59													
441.00	60		5" thick interbed of silt between 60.4' and 60.8'.		S12	6 9 15	24							VOC = 0.4 ppm
	61													
439.00	62													
	63		Poorly graded SAND (SP); dense; brown; moist; fine SAND.											
437.00	64													
	65				S13	16 24 29	53							VOC = 0.4 ppm
435.00	66													
	67													
433.00	68													
	69		SEDIMENTARY ROCK: (MUDSTONE/CLAYSTONE), massive, dark olive brown with white specs, intensely weathered, soft, unfractured. (lean CLAY with SAND, hard, moist, medium plasticity fines) **[FERNANDO or PUENTE FORMATION]**											Driller notes faster rod drop at 68.5'
431.00	70				S14	5 9 15	24							VOC = 1.2 ppm
	71													
429.00	72													
	73													
427.00	74													
	75		At EL. 426.0 ft, becomes yellowish brown, 1% fine GRAVEL, 16% coarse to fine SAND, 83% fines.		S15	12 20 36	56							VOC = 1.7 ppm Other lab tests = PI, PA
425.00	76													
	77													
423.00	78													
	79													
421.00	80				S16	8 14 20	34							VOC = 0.1 ppm
	81													
419.00	82		At EL. 419.5 ft, becomes light olive brown and, dark grayish brown, very soft, trace fine gravel, white carbonate stringers with weak reaction to diluted HCL.		C17			100	100					
	83				C18			100	100					
417.00	84		At EL. 417.0 ft, becomes dark grayish brown, sandy (fine grained).											
	85													

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/11/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B12**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-16-09**	**3 of 10**

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
	85		SEDIMENTARY ROCK, (CLAYSTONE), massive, light olive brown and, dark grayish brown, intensely weathered, very soft, trace fine gravel, trace sand, white carbonate stringers with weak reaction to diluted HCL. (lean CLAY with trace SAND, hard, moist, mostly low plastic fines). *(continued)*.		C18			100	100						See note at end of log regarding RQD.
415.00	86														
	87														
413.00	88		At EL. 413.5 ft, grades to thickly bedded, light olive brown and dark yellowish brown, medium plasticity with trace fine to coarse sand.		C19			100	100						VOC = 0.1 ppm
	89														
411.00	90		At EL. 411.5 ft, becomes sandy and gravelly 91.5'.												
	91														
409.00	92		At EL. 409.5 ft, becomes very dark gray, very thickly bedded.												
	93		At EL. 408.5 ft, becomes moderately weathered, soft.		C20			100	100						
407.00	94		At EL. 406.9 ft, observed approximately 0.4' thick bed with abundant siltstone fragments.												
	95														VOC = 0.2 ppm
405.00	96														
	97				C21			100	100						
403.00	98		At EL. 403.5 ft, becomes massive, dark grayish brown with trace angular gravel, no reaction to diluted HCL.												VOC = 0.2 ppm
	99														
401.00	100														VOC = 0.1 ppm
	101														PI, PA
399.00	102				C22			100	100						
	103		At EL. 398.5 ft, becomes oxidized, strong brown.												
397.00	104		At EL. 397.5 ft, becomes dark grayish brown and light olive gray, unfractured, low plasticity with trace fine gravel.												
	105														
395.00	106														
	107		At EL. 394.5 ft, becomes thickly bedded, with occasional olive brown, thin beds of coarse grained sandstone, unfractured.		C23			100	100						VOC = 0.1 ppm
393.00	108														
	109		At EL. 392.0 ft, observed bedding joint, dipping 30°, 2" thick coarse grained clayey sandstone bed with some well rounded gravel. Extremely weak.												PI, UU
391.00	110		At EL. 391.0 ft, observed 1" thick, fine to coarse grained, clayey sandstone interbed, dipping 20 to 30 degrees.												
	111		At EL. 390.0 ft, observed 1" thick, fine to coarse grained clayey sandstone bed.		C24			60	60						
389.00	112		At EL. 389.5 ft, becomes dark grayish brown, lacks sand and gravel, no reaction to diluted HCL.												VOC = 0.2 ppm
	113														
387.00	114		At EL. 387.5 ft, observed 2" thick sandstone bed, brown, fine grained with some gravel.												
	115														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/11/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B12**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-16-09**	**4 of 10**

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
	115				C24			60	60					See note at end of log regarding RQD.
385.00	116		At EL. 384.8 ft, becomes slightly weathered, very dark gray with scattered well rounded gravel, highly plastic, unfractured.		C25			100	100					VOC = 0.1 ppm
	117													
383.00	118													
	119													
381.00	120													
	121		At EL. 380.5 ft, becomes fresh.											VOC = 0.1 ppm
379.00	122				C26			100	100					
	123													
377.00	124													
	125													PI, PA
375.00	126		Extremely weak.		C27			100	100					UU VOC = 0 ppm
	127		At EL. 374.5 ft, becomes moderately weathered, olive brown, low plasticity, with few elongated gravel.											
373.00	128													
	129													
371.00	130													
	131		At EL. 370.0 ft, contains white calcareous gravel. Unit is massive.		C28			91	91					
369.00	132													
	133													
367.00	134													
	135													
365.00	136													
	137				C29			84	84					VOC = 0.0 ppm
363.00	138													
	139		SEDIMENTARY ROCK, (SILTSTONE), thickly bedded, pale olive mottled with white, moderately weathered, extremely weak, moderately soft, unfractured, mostly non plastic; moderate reaction to diluted HCL. **[PUENTE FORMATION]**												
361.00	140		At EL. 362.6 ft, observed bedding joint, dipping 30°, roughly 2" thick calcareous bed with strong reaction to HCL solution.											PA, UU
	141													
359.00	142		SEDIMENTARY ROCK, (SHALE) with interbedded SILTSTONE, DIATOMACEOUS SILTSTONE, and CALCAREOUS SILTSTONE, laminated to very thinly bedded, pale olive to olive gray, fresh, very slightly fractured, calcareous interbeds are white and hard. Bedding dipping 40 degrees.		C30			94	94					VOC = 0 ppm
	143													
357.00	144		At EL. 359.5 ft, observed joint, dipping 80°, tight.											
	145													

(continued)

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
	145		SHALE with interbedded SILTSTONE, DIATOMACEOUS SILTSTONE, and CALCAREOUS SILTSTONE, laminated to very thinly bedded, pale olive to olive gray, fresh, very slightly fractured, calcareous interbeds are white and hard. *(continued)*.		C30			94	94					See note at end of log regarding RQD.
355.00	146		At EL. 354.7 ft, becomes soft with hard SHALE beds.		C31			96	72					VOC = 0.1 ppm
	147													
353.00	148													
	149													
351.00	150													
	151													
					C32			77	77					VOC = 0.2 ppm
349.00	152		At EL. 349.0 ft, becomes soft, unfractured, bedding joint, dipping 45°, breaks along bedding plane, slightly calcareous.											
	153													
347.00	154													
	155													VOC = 0.1 ppm
345.00	156													
	157		At EL. 344.4 ft, becomes very slightly fractured.		C33			91	91					
343.00	158		At EL. 343.0 ft, observed bedding joint, dipping 50°.											
	159													VOC = 0.0 ppm
341.00	160													
	161		At EL. 340.4 ft, observed joint, dipping 30°, tight, smooth.											
339.00	162		At EL. 339.9 ft, observed joint, dipping 40°, tight, smooth.		C34			100	100					
	163													
337.00	164		At EL. 337.4 ft, observed bedding joint, dipping 60°.											
	165		SEDIMENTARY ROCK, (SILTSTONE) and DIATOMACEOUS SILTSTONE, joint dipping 60°, tight, smooth.											CR
335.00	166		At EL. 335.0 ft, becomes soft to hard, with hard, interval with calcareous/dolomitic interbeds, unfractured.		C35			76	0					VOC = 0.0 ppm
	167													
333.00	168				C36			82	0					VOC = 0.0 ppm
	169													
331.00	170													
	171		At EL. 330.2 ft, becomes yellowish brown, oxidized, intensely weathered, soft, very intensely fractured (between 170.8' to 172'). Possible faulted zone.		C37			100	70					VOC = 0 ppm
329.00	172		At EL. 329.0 ft, observed bedding joint, dipping 60°, on hard, siliceous interbed.											
	173		At EL. 328.5 ft, becomes slightly fractured, joint, dipping 30°, moderately rough.											
327.00	174													
	175													

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/11/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE: **BORING RECORD**

HOLE ID: **R-09-Z3B12**

DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	D/D	07-187900

PROJECT OR BRIDGE NAME: **SR-710 TUNNEL TECHNICAL STUDY**

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
N/A	D. Jankly	3-16-09	6 of 10

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
	175		*(continued)*.		C37			100	70						See note at end of log regarding RQD.
325.00	176		At EL. 325.9 ft, observed joint, dipping 70°, tight, iron oxide stained, slightly rough.		C38			92	92						VOC = 0 ppm
	177		SEDIMENTARY ROCK, (SHALE), very thinly to thinly bedded, olive gray and light gray, fresh, soft, very slightly fractured, oxidized bedding plane joints, no clay seams.												
323.00	178		At EL. 323.0 ft, observed bedding joint, dipping 60°.												
	179														
321.00	180		At EL. 321.7 ft, observed color change to very dark gray with gray banding. At EL. 321.0 ft, observed syndepositional erosional features to 180.2'.												
	181		At EL. 320.0 ft, becomes laminated to very thinly bedded, black, moderately fractured, low plasticity.		C39			50	0						VOC = 0 ppm
319.00	182														
	183		At EL. 318.0 ft, observed bedding joint, dipping 50°.												
317.00	184														
	185														
315.00	186		At EL. 315.2 ft, becomes black and light greenish gray, extremely weak, unfractured, unoxidized, with thin interbeds hard, siliceous material, weak reaction to diluted HCL.		C40			72	50						VOC = 1.1 ppm UC
	187														
313.00	188		At EL. 312.8 ft, observed bedding joint, dipping 70°.												
	189														
311.00	190														
	191		At EL. 310.2 ft, becomes moderately soft, well bedded. At EL. 309.5 ft, observed phosphatic nodule, strong brown.		C41			100	100						VOC = 0.4 ppm SD
309.00	192														
	193		At EL. 308.5 ft, observed bedding joint, dipping 60°, weak reaction to diluted HCL, breaks along bedding.												
307.00	194				C42			79	79						VOC = 1.3 ppm
	195														
305.00	196		At EL. 305.5 ft, observed bedding joint, dipping 60°, Scattered 1/8" thick phosphate nodules. At EL. 305.2 ft, becomes moderately soft to moderately hard, moderately fractured.		C43			83	61						VOC = 2.5 ppm
	197														
303.00	198		At EL. 302.9 ft, observed three joints dipping 10 degrees, tight, stepped.												
	199		At EL. 302.7 ft, observed bedding joint, dipping 60°.												
301.00	200				C44			100	100						VOC = 1.1 ppm
	201														
299.00	202		At EL. 299.3 ft, observed bedding joint, dipping 55°, fish scales present. Extremely weak.												UC
	203														
297.00	204		At EL. 297.0 ft, observed bedding joint, dipping 60°, weak reaction to diluted HCL, scattered 1/8" dia.		C45			100	100						VOC = 1.7 ppm
	205														

(continued)

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B12**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-16-09**	**7 of 10**

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/11/10

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
	205		phosphatic nodules.		C45			100	100					See note at end of log regarding RQD.
295.00	206		SHALE, laminated to very thinly bedded, black and light greenish gray, fresh, moderately soft to moderately hard, moderately to slightly fractured. *(continued)*.											
	207		At EL. 294.0 ft, observed bedding joint, dipping 60°.											
293.00	208													
	209				C46			100	100					VOC = 0.9 ppm
291.00	210		At EL. 291.5 ft, with scattered 1/8" dia. phosphate nodules.											
	211													
289.00	212													
	213		At EL. 288.6 ft, observed bedding joint, dipping 60°, on 1/2" thick CLAY seam, along bedding, highly plastic, smooth, tight.											VOC = 5.8 ppm
287.00	214				C47			61	61					UC
	215		At EL. 286.5 ft, observed bedding joint, dipping 60°, Very weak.											
285.00	216													
	217		At EL. 284.3 ft, observed bedding joint, dipping 60°.											
283.00	218		At EL. 283.2 ft, observed two joints dipping 30 and 40 degrees, tight, smooth.											
	219				C48			83	37					VOC = 38 ppm
281.00	220		At EL. 280.8 ft, observed bedding joint, dipping 60°.											
	221													
279.00	222				C49			52	52					VOC = 2.5 ppm
	223		At EL. 277.8 ft, observed bedding joint, dipping 60°.											
277.00	224				C50			80	0					
	225													
			At EL. 275.8 ft, becomes very slightly fractured to unfractured.		C51			89	62					VOC = 0.4 ppm
275.00	226		At EL. 275.2 ft, observed bedding joint, dipping 65°, tight, smooth.											
	227													
273.00	228													
	229		At EL. 272.7 ft, observed bedding joint, dipping 65°, tight, smooth.											CR
271.00	230		At EL. 271.0 ft, becomes olive gray to light olive gray.		C52			68	68					VOC = 3.4 ppm
	231													
269.00	232		At EL. 269.0 ft, observed 4" thick siliceous bed, hard, very intensely fractured, no reaction to HCL solution.											
	233		At EL. 268.3 ft, observed bedding joint, dipping 65°.											
267.00	234		At EL. 267.8 ft, observed joint, dipping 30°, tight, calcite lined, slightly rough.											
	235													

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B12**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-16-09**	**8 of 10**

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/11/10

ELEVATION (ft)	DEPTH (ft)	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
	235	SHALE, laminated to very thinly bedded, olive gray and light gray, fresh, moderately soft to moderately hard, very slightly fractured to unfractured.		C53			68	68						VOC = 2.4 ppm See note at end of log regarding RQD.
265.00	236													
	237	At EL. 263.8 ft, observed bedding joint, dipping 60°.												
263.00	238													
	239	PTS - Fine-grained shale or siltstone, planar bedded at the millimeter scale..												PTS
261.00	240			C54			100	100						VOC = 2.2 ppm
	241	At EL. 259.5 ft, observed bedding joint, dipping 60°.												
259.00	242													SD
	243													
257.00	244	At EL. 257.0 ft, observed joint, dipping 90°, tight moderately rough, approximately 1' long.		C55			100	100						VOC = 0.4 ppm
	245	At EL. 256.3 ft, observed bedding joint, dipping 60°.												
255.00	246	At EL. 254.7 ft, observed bedding joint, dipping 60°.												
	247													
253.00	248			C56			76	60						VOC = 0.2 ppm
	249	At EL. 252.2 ft, observed bedding joint, dipping 60°, . Very weak.												UC
251.00	250													
	251	At EL. 250.0 ft, observed bedding joint, dipping 60°.												
249.00	252	At EL. 249.5 ft, observed shear/fault zone, 3" thick, highly plastic, clay infilling, intensely fractured, parallel to bedding.												
	253			C57			63	63						VOC = 0.0 ppm
247.00	254													
	255													
245.00	256													
	257			C58			56	56						
243.00	258	At EL. 243.2 ft, observed bedding joint, dipping 60°.												
	259			C59			100	100						VOC = 0.9 ppm
241.00	260	At EL. 241.2 ft, observed bedding joint, dipping 60°.												
	261	At EL. 240.5 ft, observed bedding joint, dipping 60°.												
239.00	262			C60			100	90						
	263													
237.00	264													
	265	At EL. 236.5 ft, observed bedding joint, dipping 60°.												

(continued)

Department of Transportation
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Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B12**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-16-09**	**9 of 10**

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/11/10

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
	265		SHALE, laminated to very thinly bedded, olive gray and light gray, fresh, moderately soft to moderately hard, very slightly fractured to unfractured.		C60			100	90						See note at end of log regarding RQD.
235.00	266		At EL. 235.9 ft, observed bedding joint, dipping 60°.												
	267		At EL. 235.2 ft, observed fault, dipping 80°, 1/8" thick, soft clay lining, rough, 7" offset.		C61			98	98						VOC = 1.3 ppm
233.00	268		At EL. 233.0 ft, observed fine grained sandstone lamination, friable. Very weak.												UC
	269														
231.00	270														
	271														
229.00	272				C62			100	100						VOC = 0.5 ppm
	273														SD
227.00	274		At EL. 227.5 ft, observed bedding joint, dipping 70°.												
	275		At EL. 226.7 ft, observed joint, dipping 40°, tight, polished and striated with clay film.												
			Bottom of borehole at 275.0 ft bgs Borehole terminated at planned depth.												
225.00	276		Borehole converted to piezometer at the completion of drilling.												
	277														
223.00	278		RQD values provided on the boring logs are based on intact core pieces obtained between two natural discontinuities. The majority of core obtained from this boring is typically very weak to weak and does not meet the "sound core" definition provided in the standard test method for RQD (ASTM D 6032). These RQD values should not be used to evaluate rock mass quality.												
	279														
221.00	280														
	281														
219.00	282														
	283														
217.00	284														
	285														
215.00	286														
	287														
213.00	288														
	289														
211.00	290														
	291														
209.00	292														
	293														
207.00	294														
	295														

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/11/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z3B12**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**3-16-09**	**10 of 10**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
D. Jankly	3-10-09	3-16-09	34° 4' 51.5958" / 118° 9' 20.7936" NAD83	R-09-Z4B4
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Cascade Drilling Inc.			' Lt Sta (Westminster Ave. n/o W. Mission Rd.)	454.4 ft NAVD 88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wash			Speedstar 30k	6 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT(1.4"), Cal (2.4"), PQ core (3.2")			Automatic Hammer 140 lb. 30 inch drop	70%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer Installed on Completion			NM	46.3 ft on7/1/09	277.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		ASPHALT 4" thick.												This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification and Presentation Manual (June, 2007), except as noted in Appendix A.1 of the Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California, dated April, 2010.
	1		Road base material, 6" thick.												
452.40	2		SILTY SAND (SM); reddish brown; dry to moist; few coarse to fine, subangular to subrounded GRAVEL; mostly coarse to fine SAND; some low plasticity fines [FILL].		D01										
	3														
450.40	4														
	5		SILTY SAND (SM); dense; light brown; moist; trace coarse to fine, subrounded GRAVEL; mostly coarse to fine SAND; some low plasticity fines [OLDER ALLUVIUM].												Hand Auger to 5'
448.40	6														
	7														
446.40	8														
	9														
444.40	10				S02	7 10 20	30	61							
	11														
442.40	12														
	13														
440.40	14		SANDY SILTY CLAY (CL-ML); very stiff; dark yellowish brown; moist; 31% medium to fine SAND, 69% fines.												
	15				S03	5 18 14	32	100		18	113				PI, PA
438.40	16														
	17														
436.40	18														
	19														
434.40	20		Hard.		S04	6 12 14	26	100							
	21														
432.40	22														
	23														
430.40	24														
	25														

(continued)

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				R-09-Z4B4
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	LA	710	D/D	07-187900
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	D. Jankly		4-13-09	1 of 10

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/11/10

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		SANDY SILTY CLAY (CL-ML) *(continued)*. Hard.		S05	9 16 25	41	100		21	103				
428.40	26														
	27														
426.40	28														
	29														
424.40	30		Very stiff; brown.		S06	5 8 13	21	100							
	31														
422.40	32														
	33														
420.40	34														
	35		43% predominantly fine SAND, 57% fines.		S07	6 13 18	31	100		20	110				PI, PA
418.40	36														
	37														
416.40	38														
	39														
414.40	40				S08	10 18 29	47	72							
	41		Poorly graded SAND (SP); very dense; light yellowish brown; moist; coarse to fine SAND.												
412.40	42														
	43														
410.40	44														
	45				S09	50/3"		0							
408.40	46														
	47														
406.40	48														
	49														
404.40	50		SILTY SAND with GRAVEL (SM); very dense; dark yellowish brown; moist; 15% coarse to fine GRAVEL, 69% coarse to fine SAND, 16% low plasticity fines.		S10	33 30 24	54	78		12					PA
	51														
402.40	52														
	53														
400.40	54														
	55														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/11/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE **BORING RECORD**				HOLE ID **R-09-Z4B4**
DIST. **07**	COUNTY **LA**	ROUTE **710**	POSTMILE **D/D**	EA **07-187900**
PROJECT OR BRIDGE NAME **SR-710 TUNNEL TECHNICAL STUDY**				
BRIDGE NUMBER **N/A**	PREPARED BY **D. Jankly**		DATE **4-13-09**	SHEET **2 of 10**

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
	55		At EL. 399.4 ft, with coarse GRAVEL.		S11	50/5"		40							
398.40	56		SILTY SAND with GRAVEL (SM) *(continued)*.												
	57														
396.40	58														
	59														
394.40	60		SILTY SAND (SM); very dense; reddish brown; moist; mostly coarse to fine SAND; little low plasticity fines.		S12	19 50/5"		80							
	61														
392.40	62														
	63														
390.40	64														
	65		1% fine GRAVEL (subangular), 61% predominantly fine SAND, 38% low plasticity fines.		S13	18 31 44	75	100							PA
388.40	66														
	67														
386.40	68														
	69														
384.40	70				S14	18 38 56	94	89							
	71														
382.40	72														
	73														
380.40	74														
	75		At EL. 379.4 ft, becomes mostly coarse to fine SAND; little low plasticity fines.		S15	50/6"		33							
378.40	76														
	77														
376.40	78														
	79														
374.40	80				S16	24 33 47	80	72							
	81														
372.40	82														
	83														
370.40	84		SEDIMENTARY ROCK, (CLAYSTONE), massive, strong brown, decomposed, soft, moist, oxidized, no reaction to diluted HCL. (fat CLAY (CH), moist, very												
	85														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/11/10

Department of Transportation
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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z4B4**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-13-09**	**3 of 10**

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
	85		stiff). **[FERNANDO FORMATION]** *(continued)*.		S17	13 19 23	42	100	100	28					See note at end of log regarding RQD. PI
368.40	86														
	87		SEDIMENTARY ROCK, (CLAYSTONE TO SILTSTONE), massive, light greenish gray and dark yellowish brown, moderately weathered, soft, unfractured, iron oxide staining.		C18										
366.40	88														
	89														
364.40	90				C19			100	100						
	91														
362.40	92														
	93		At EL. 361.9 ft, observed bedding joint, faint, subhorizontal.												
360.40	94		At EL. 360.5 ft, observed 7" thick Siltstone bed, strong brown with black stained remnant fractures, subhorizontal.												
	95														
358.40	96		At EL. 358.6 ft, observed shear, dipping 75°, polished, paperthin clay lining, faint shear surface extended from 95.8 feet to 96.5 feet.												
	97		At EL. 357.9 ft, observed faint subhorizontal bedding plane. Extremely weak.							27	95				PI, PA, CR, UU
356.40	98														
	99		At EL. 355.4 ft, observed bedding joint, dipping 20 to 10°, 3/8" to 1/2" thick Siltstone bed with iron oxide stained halo, undulatory.												
354.40	100				C20			100	100						
	101		At EL. 353.4 ft, observed bedding joint, dipping 10°.												
352.40	102														VOC = 32.6 ppm
	103		At EL. 351.4 ft, observed joint, dipping 60°, very faint, non-continuous, black lined joint.												
350.40	104		At EL. 350.4 ft, observed undulatory bedding, rolls over, dipping up to 20 degrees in opposite direction, soft sediment deformation present.												
	105		At EL. 349.4 ft, observed shear, dipping 25 to 20°, four shears observed between 105' to 106.5'. Shears are tight, up to 1/16" thick, black lined, truncate siltstone laminations.												
348.40	106														
	107		At EL. 347.9 ft, observed joint, dipping 30 to 25°, numerous black lined joints, iron oxide stained, some iron oxide stained Siltstone lenses.		C21			100	100						
346.40	108		At EL. 347.4 ft, becomes light brownish gray, very slightly fractured.												
	109		At EL. 346.4 ft, observed shear, dipping 60°, faintly polished shear, bedding is undulatory, subhorizontal.												VOC = 51.5 ppm
344.40	110		At EL. 345.3 ft, observed shear, dipping 40°, 1mm aperture, moderately rough.												
	111		At EL. 345.0 ft, observed bedding joint, dipping 10°, 3/8" thick iron oxide stained bed with abundant black staining.												
342.40	112		At EL. 344.4 ft, observed bedding joint, dipping 10 to 5°.		C22			78	78						
	113		At EL. 343.6 ft, observed bedding joint, dipping 25°, bedding is undulatory, locally folded, soft sediment deformation.												
340.40	114		At EL. 343.5 ft, observed shear, dipping 45°.												
	115		At EL. 342.0 ft, observed bedding joint, dipping 40°, local faint laminations.												VOC = 49.2 ppm
			At EL. 341.8 ft, observed joint, dipping 70°, tight.												

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z4B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-13-09**	**4 of 10**

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/11/10

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
	115		At EL. 341.6 ft, observed bedding joint, dipping 45°, possible bedding on strong brown and light brown gray contact. At EL. 341.4 ft, becomes greenish black, contact between light greenish gray above and greenish black dipping 60 degree. *(continued)*.		C22			78	78						See note at end of log regarding RQD.
338.40	116														
	117														
336.40	118		At EL. 338.6 ft, observed shear, dipping 70 to 45°, two very faint shears. At EL. 337.9 ft, observed joint, dipping 60 to 50°, aperture 2mm, moderately rough. At EL. 336.9 ft, observed bedding joint, dipping 25°, bedding on contact between strong brown and light brownish gray beds.												
	119														
334.40	120		At EL. 336.4 ft, observed joint, dipping 50°.		C23			100	80						
	121		At EL. 334.4 ft, grades to unoxidized. Unit is micaceous, no reaction to HCL solution.												VOC = 25.6 ppm
332.40	122		At EL. 334.0 ft, observed bedding joint, dipping 40°, local iron oxide stained bed. At EL. 333.8 ft, observed shear, dipping 70°.												
	123		At EL. 332.9 ft, observed irregular gradational contact from 121' to 122.1' dipping 65 degrees to vertical, greenish black above, light gray below.		C24			100	100						
330.40	124		At EL. 332.1 ft, observed shear, dipping 70°, iron oxide stained below shear, light brownish gray above.												
	125		At EL. 331.5 ft, observed bedding joint, dipping 60°, 1" diameter concretionary nodule, beds folded around nodule.												VOC = 26.5 ppm
328.40	126		SEDIMENTARY ROCK, (SILTSTONE), massive, greenish black to black, slightly weathered to fresh, moderately soft, unfractured, with scattered rip-up clasts, micaceous, unoxidized.												
	127									20	102				PI, UC
326.40	128		At EL. 329.9 ft, observed 8" thick strong brown zone. Very weak.												
	129		At EL. 325.4 ft, observed scattered black rip-up clasts, randomly oriented, bedding unknown.												
324.40	130														
	131				C25			100	100						
322.40	132														
	133		At EL. 321.4 ft, observed 1.5' thick zone with very faint black siltstone rip-up clasts and very faint laminations indicating possible subhorizontal bedding (<10 degrees).												VOC = 21.8 ppm
320.40	134														
	135		At EL. 319.4 ft, becomes fresh, micaceous.												
318.40	136														
	137		At EL. 317.9 ft, observed charcoal fragment, 1/8"x3/8".		C26			90	83						VOC = 31.7 ppm
316.40	138														
	139									18	102				UU
314.40	140		Very weak.												
	141														
312.40	142		At EL. 312.4 ft, observed shear, dipping 70°, polished, tight, faint clay lining.												
	143		At EL. 311.4 ft, observed shear, dipping 70°, tight shear with 1/16" clay lining, black.		C27			100	100						
310.40	144		At EL. 310.2 ft, contains black siltstone rip-up clasts.												
	145														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z4B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-13-09**	**5 of 10**

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
	145		SILTSTONE, massive, greenish black to black, fresh, moderately soft to moderately hard, unfractured, with scattered rip-up clasts, micaceous, unoxidized. *(continued)*.		C27			100	100						See note at end of log regarding RQD.
308.40	146		At EL. 307.9 ft, observed shear, dipping 65°, tight shear with 1/16" clay lining, faint.												VOC = 15.4 ppm
	147		At EL. 306.9 ft, observed 2" thick soft zone, no visible shearing observed.												
306.40	148														
	149														
304.40	150				C28			100	100	17					SD
	151		At EL. 303.4 ft, observed shear, dipping 70 to 50°, two shears, tight, very faint, 1/16" thick clay lining.												
302.40	152		At EL. 302.4 ft, observed shear, dipping 75 to 70°, tight, 1/16"-1/8" thick, fat clay lining.												
	153														
300.40	154														
	155		At EL. 299.9 ft, observed black siltstone rip-up clasts. At EL. 299.6 ft, observed shear, dipping 60°, Aperture 1mm, clay lined, moderately rough.												
298.40	156														
	157		Very weak.							17	105				UC
296.40	158				C29			100	100						
	159														
294.40	160														
	161														
292.40	162														VOC = 25.1 ppm
	163														
290.40	164														
	165														
288.40	166		At EL. 289.1 ft, observed abundant rip-up clasts, randomly oriented.												
	167		At EL. 287.9 ft, observed possible 10 degree bedding on numerous similarly oriented rip-up clasts.												
286.40	168				C30			95	95						
	169														
			At EL. 285.2 ft, observed charcoal fleck 1/8"x3/8".												
284.40	170														
	171														
282.40	172		At EL. 282.4 ft, observed fine, white lined nodules up to 1/8" thick and 3/8" long. Possible shells/shell fragments.												
	173														
280.40	174				C31			100	100						VOC = 15.1 ppm
	175														

(continued)

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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z4B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-13-09**	**6 of 10**

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
	175		SILTSTONE, massive, greenish black to black, fresh, moderately soft to moderately hard, unfractured, with scattered rip-up clasts, micaceous, unoxidized.		C31			100	100						See note at end of log regarding RQD.
278.40	176		At EL. 278.9 ft, observed scattered charcoal flecks <1/8" diameter and scattered white lined nodules as El. 282.4 ft.												
	177														
276.40	178														
	179		At EL. 275.4 ft, observed 1/4" x 1-1/2" bluish gray, subhorizontal lens.												
274.40	180		At EL. 274.8 ft, observed 3/8" x 5" laminated lens dipping 50 degrees, non-continuous around core.		C32			100	100						
	181		At EL. 274.2 ft, observed 3/8" diameter concretionary nodule.		C33			100	100						
272.40	182		At EL. 273.4 ft, observed abundant rip-up clasts, randomly oriented, from 181' to 185'.												
	183														
270.40	184														
	185														VOC = 35.8 ppm PI
268.40	186														
	187														
266.40	188														
	189		At EL. 265.9 ft, observed white lined nodules as El. 282.4 ft.		C34			100	100						
264.40	190														
	191														VOC = 15.7 ppm
262.40	192														
	193														
260.40	194														
	195														
258.40	196				C35			100	100						
	197		At EL. 257.4 ft, observed faint white lens, 4" long x 1/8" thick, dipping 60 degrees, non-continuous around core.												
256.40	198														
	199									14	106				SD, UC
254.40	200		At EL. 254.9 ft, observed black siltstone rip-up clasts. Very weak.												
	201		PTS - Siltstone with red-brown iron oxide rich matrix (86%).												PTS VOC = 28.2 ppm
252.40	202		At EL. 253.7 ft, observed 1" long x 1/8" thick white nodule.												
	203		At EL. 252.4 ft, observed scattered charcoal flecks <1/8" diameter, from 201.3' to 205'.												
250.40	204		At EL. 251.9 ft, observed 1" x 3/4" stone in center of core, polished, rectangular.												
	205														

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z4B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-13-09**	**7 of 10**

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/11/10

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
	205		SILTSTONE, massive, greenish black to black, fresh, moderately soft, unfractured, with scattered rip-up clasts, micaceous, unoxidized.		C36			100	100						See note at end of log regarding RQD.
248.40	206		At EL. 249.3 ft, observed possible bedding dip of 10 degrees, scarce charcoal flecks <1/8" dia.												
	207														
246.40	208														VOC = 48.4 ppm
	209		At EL. 245.9 ft, observed 1" x 1/2" lens of fine to medium grained silty sandstone, dipping 10 degrees.												
244.40	210				C37			100	100						
	211														
242.40	212		At EL. 242.2 ft, observed siltstone rip-up clasts.												
	213														VOC = 46.2 ppm
240.40	214														
	215		At EL. 239.6 ft, observed irregular lenses of bluish gray silt, subhorizontal.												
238.40	216		At EL. 239.4 ft, observed some fine white lined nodules as El. 282.4 ft.												
	217														
236.40	218				C38			100	100						
	219														
234.40	220														
	221		At EL. 234.2 ft, observed scarce siltstone rip-up clasts. Scattered charcoal flecks at 220.5 to 222.5'. Very weak.							20	101				CR, UU
232.40	222														
	223		At EL. 231.4 ft, observed 3/4" x 3/8" bluish gray rip-up clast, internally laminated, subhorizontal.												
230.40	224				C39			100	100						VOC = 22.2 ppm
	225														
228.40	226		At EL. 228.3 ft, observed siltstone rip-up clasts.												
	227														
226.40	228		At EL. 226.4 ft, observed white lined nodules as El. 282.4 ft, generally subhorizontally dipping.												
	229		At EL. 226.1 ft, observed 3/8" x 1/8" charcoal fleck.												
224.40	230		At EL. 224.8 ft, contains siltstone rip-up clasts.												
	231		At EL. 223.9 ft, observed faint, 3" x 3/8" sandy lens dipping 20 degrees, dips against faint 10 degree fabric in rock (possible bedding dipping 10 degrees).												
222.40	232		At EL. 223.4 ft, observed dark greenish gray, hard, 4" thick limestone bed, highly reactive to HCL solution, some very tight internal fractures with possible calcite lining. Upper contact dipping 20 degrees, lower contact is undulatory, subhorizontal.		C40			100	100						
	233														
220.40	234		At EL. 221.4 ft, observed bluish gray siltstone rip-up clast. Unit is very weak.							14					SD
	235														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/11/10

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REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z4B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-13-09**	**8 of 10**

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
	235		SILTSTONE, massive, greenish black to black, fresh, moderately soft to moderately hard, unfractured, with scattered rip-up clasts, micaceous, unoxidized.		C40			100	100						See note at end of log regarding RQD.
218.40	236		At EL. 218.1 ft, observed 1-1/2" x 3/8" charcoal/remnant wood fragment.												VOC = 43.2 ppm
	237		At EL. 216.9 ft, observed scattered charcoal flecks.												
216.40	238		At EL. 216.4 ft, observed faint siltstone fabric indicates possible subhorizontal bedding.												
	239														
214.40	240														
	241														
212.40	242				C41			100	100						
	243		At EL. 211.4 ft, observed possible subhorizontal bedding based on siltstone rip-up clast orientation.												
210.40	244														
	245				C42			97	97						VOC = 3.6 ppm
208.40	246		At EL. 208.9 ft, observed faint siltstone fabric, possible subhorizontal bedding.												
	247		At EL. 207.4 ft, observed shear, dipping 60°, tight, paperthin clay lining, polished.												
206.40	248		At EL. 206.4 ft, with scattered fine (<1/16" diameter) white flecks at 248' to 254'.												
	249														
204.40	250														VOC = 2.4 ppm
	251		At EL. 203.4 ft, observed scarce charcoal flecks up to 1/8" dia.												
202.40	252		At EL. 201.9 ft, observed siltstone rip-up clast.												
	253														
200.40	254		At EL. 200.4 ft, observed local fabric dipping 50 degrees, adjacent and parallel to 1/16" to 1/8" thick very fine sand lens, possible soft sediment deformation.												
	255				C43			100	100						
198.40	256		As 123.5' with trace fine sand. Siltstone fabric indicates subhorizontal bedding.												
	257		At EL. 197.9 ft, observed siltstone rip-up clasts.												
196.40	258		At EL. 197.4 ft, observed scattered charcoal flecks between 257' and 265'.												
	259														
194.40	260														VOC = 22.4 ppm
	261														
192.40	262														
	263									21	102				UU
190.40	264		Very weak.												
	265														

(continued)

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/11/10

Department of Transportation
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Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z4B4**
DIST.	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-13-09**	**9 of 10**

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
	265		SILTSTONE, massive, greenish black to black, fresh, moderately soft to moderately hard, unfractured, with scattered rip-up clasts, micaceous, unoxidized.		C44			100	100						See note at end of log regarding RQD.
188.40	266		At EL. 187.9 ft, observed 1/8" - 1/4" thick bluish gray silt lens.												
	267														
186.40	268		At EL. 185.6 ft, observed bedding joint, dipping 5 to 0°, 1" thick section with bluish gray, very fine sand lenses, subhorizontal.												
	269														
184.40	270														
	271		At EL. 183.4 ft, observed shear, dipping 70°, polished, faint clay lining.												
182.40	272				C45			100	100						
	273														
180.40	274		At EL. 181.1 ft, observed siltstone rip-up clast and bluish gray very fine sand lens.												VOC = 18.3 ppm
	275														
178.40	276		At EL. 178.9 ft, observed shear, dipping 65°, very tight, 1/16" thick clay lining.												
	277		Bottom of borehole at 277.0 ft bgs Borehole terminated at planned depth.												
176.40	278		Borehole converted to piezometer at the completion of drilling.												
	279														
174.40	280		RQD values provided on the boring logs are based on intact core pieces obtained between two natural discontinuities. The majority of core obtained from this boring is typically very weak to weak and does not meet the "sound core" definition provided in the standard test method for RQD (ASTM D 6032). These RQD values should not be used to evaluate rock mass quality.												
	281														
172.40	282														
	283														
170.40	284														
	285														
168.40	286														
	287														
166.40	288														
	289														
164.40	290														
	291														
162.40	292														
	293														
160.40	294														
	295														

CALTRANS BORING RECORD MET+ENG FIXED SR-710 CH2M HILL BORINGS.GPJ CALTRANS LIBRARY 040808.GLB 3/11/10

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - South 1

REPORT TITLE				HOLE ID
BORING RECORD				**R-09-Z4B4**
DIST	COUNTY	ROUTE	POSTMILE	EA
07	**LA**	**710**	**D/D**	**07-187900**
PROJECT OR BRIDGE NAME				
SR-710 TUNNEL TECHNICAL STUDY				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
N/A	**D. Jankly**		**4-13-09**	**10 of 10**