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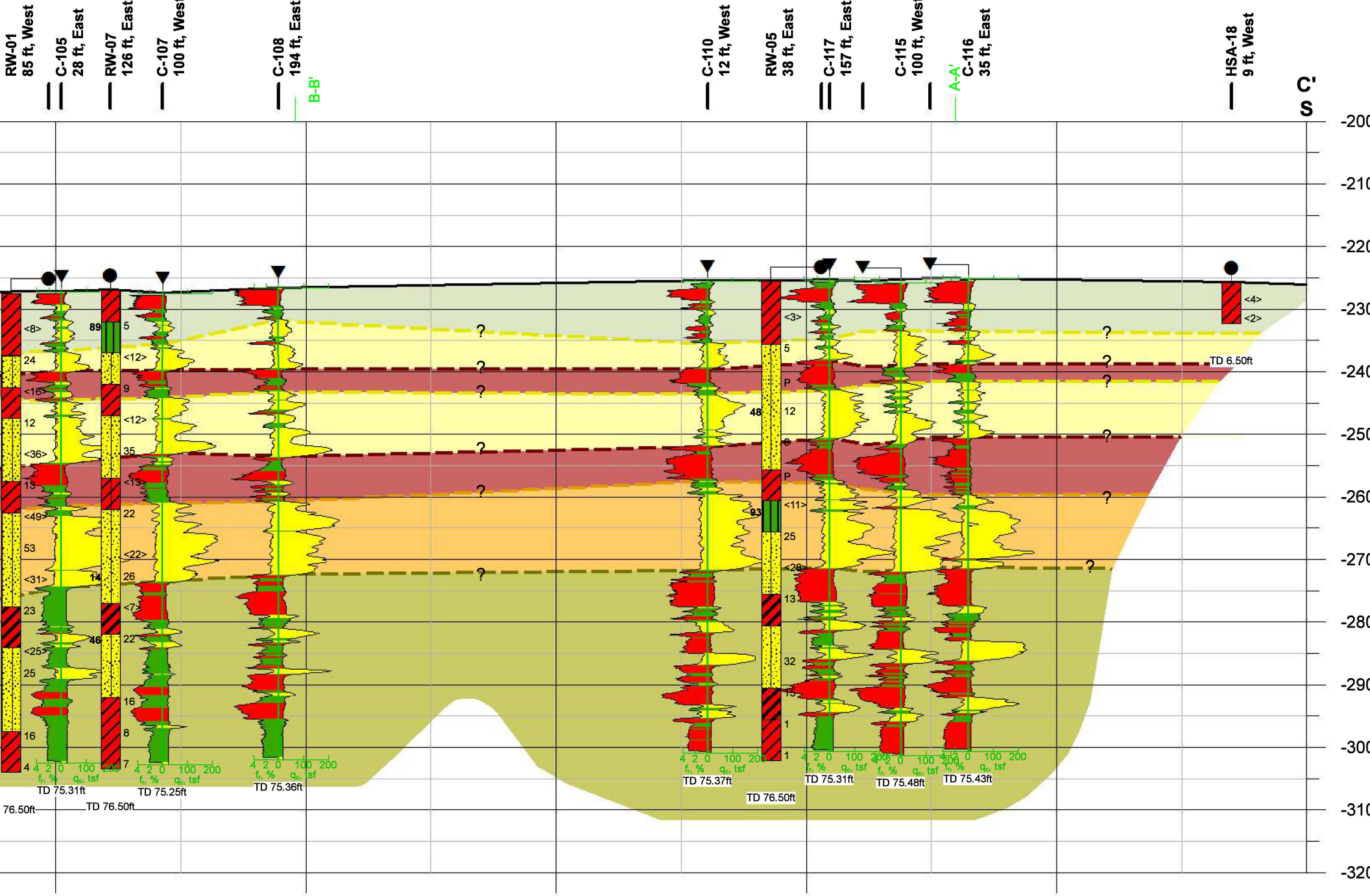


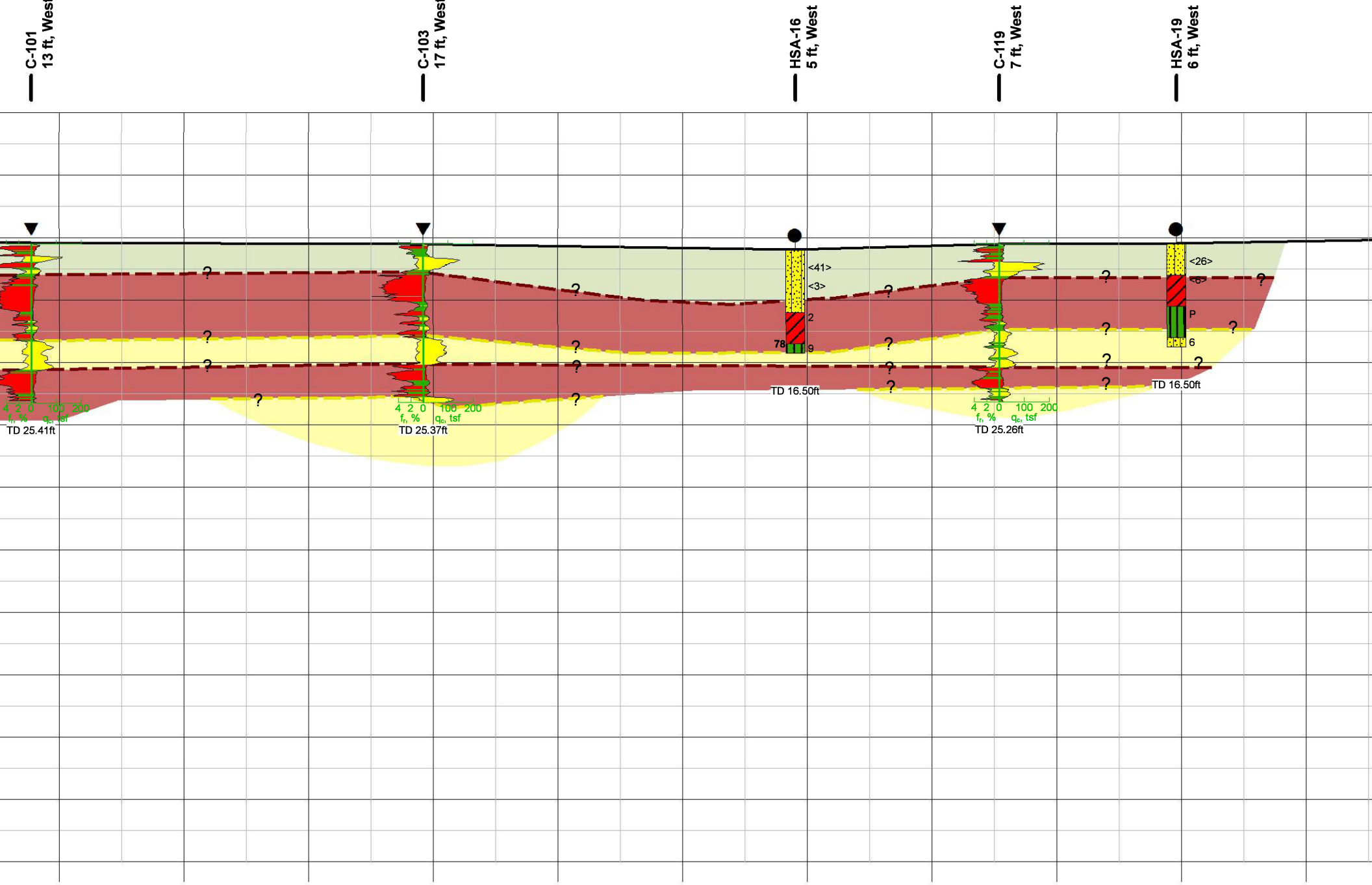
nterbedded Clays, Silts and Sands

Medium Dense to Dense Silty Sands

Medium Dense Silty Sands

Clays and Silts Interbedded with Sand Layers

SUBSU



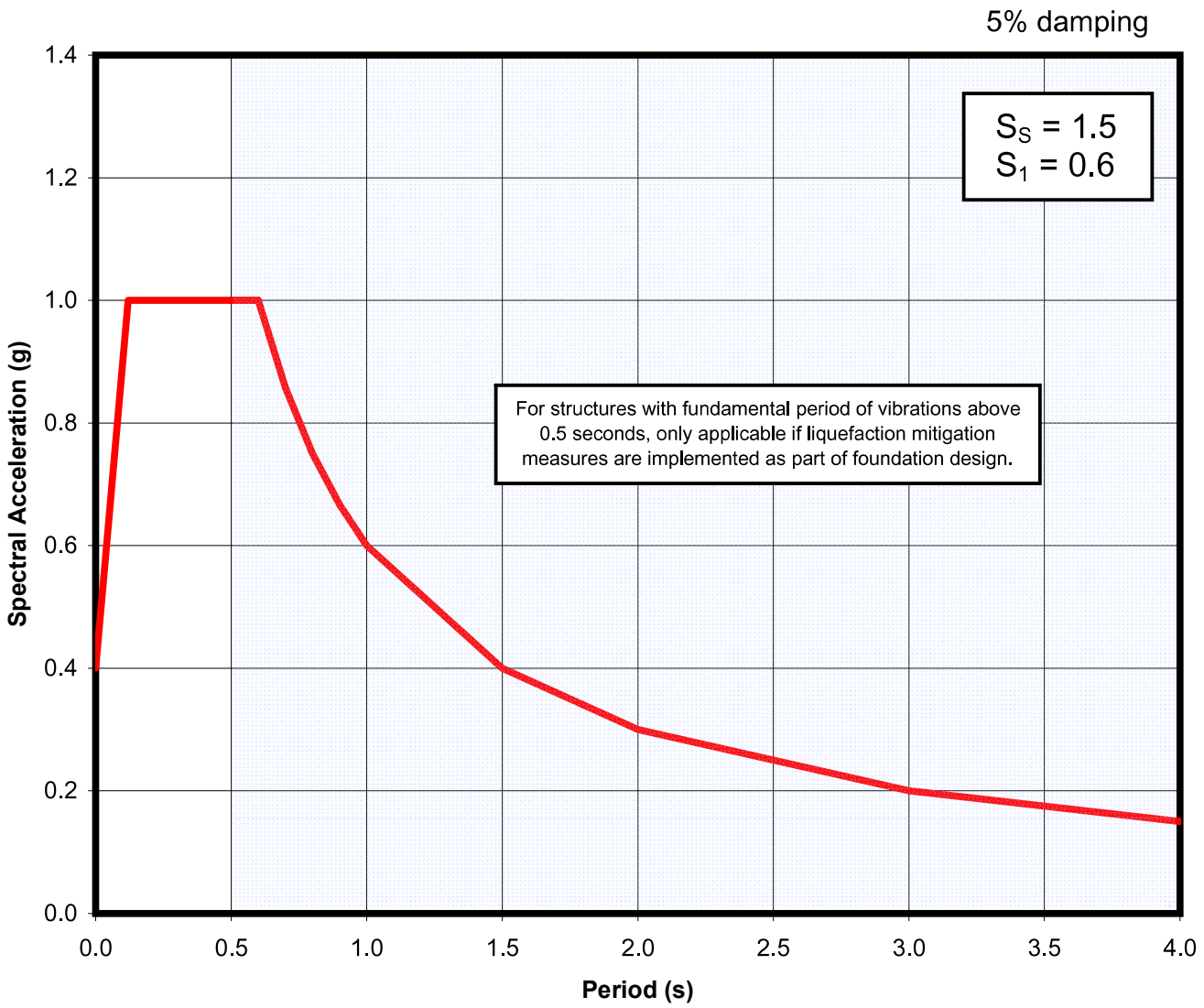
nterbedded Clays, Silts and Sands

Medium Dense Silty Sands

Medium Dense to Dense Silty Sands

Clays and Silts Interbedded with Sand Layers

SUBSU

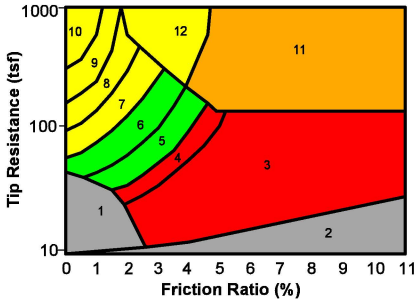


HORIZONTAL DESIGN SPECTRUM BASED ON CBC 2007
Black Rock Units 1, 2 a 3
Calipatria, California

FIGURE 6-1

SOIL TYPES

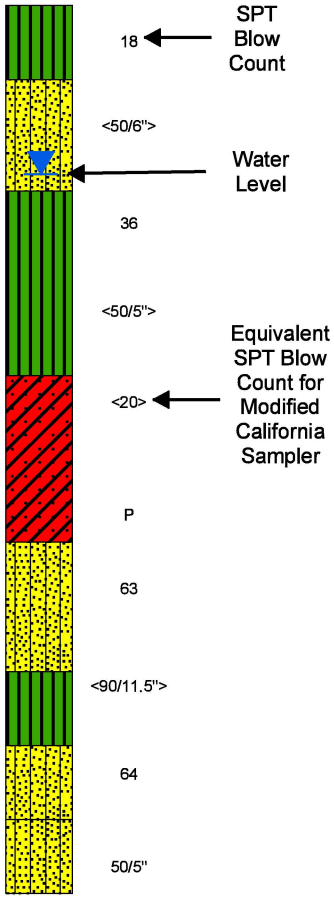
- Well graded GRAVEL (GW)
- Poorly graded GRAVEL (GP)
- GRAVEL with sand (GP or GW)
- GRAVEL with clay (GP or GW)
- Clayey GRAVEL (GC)
- GRAVEL with silt (GP or GW)
- Silty GRAVEL (GM)
- Well graded SAND (SW)
- Poorly graded SAND (SP)
- SAND with gravel (SP or SW)
- SAND with clay (SP-SC)
- Clayey SAND (SC)
- Silty SAND (SM)
- SAND with silt (SP-SM)
- Fat CLAY (CH)
- Sandy fat CLAY (CH)
- Lean CLAY (CL)
- Sandy lean CLAY (CL)
- Silty CLAY (CL-ML)
- Elastic SILT (MH)
- SILT (ML)
- Sandy SILT (ML)
- Clayey SILT (ML/CL)
- Highly plastic ORGANICS (OH)
- Low plasticity ORGANICS (OL)
- SANDSTONE (Rx)
- SILTSTONE (Rx)
- CLAYSTONE (Rx)
- Conglomerate (Rx)
- Interbedded Rock Strata (Rx)
- Pavement



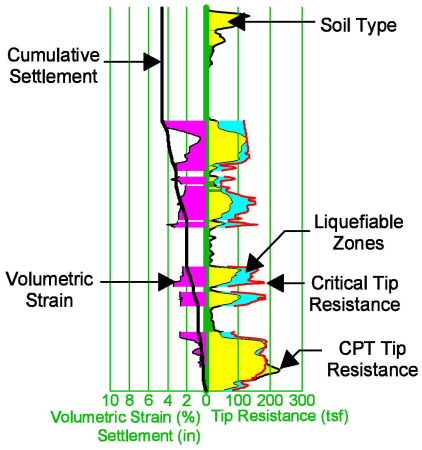
Zone	Soil Behavior Type	U.S.C.S.
1	Sensitive Fine-grained	OL-CH
2	Organic Material	OL-OH
3	Clay	CH
4	Silty Clay to Clay	CL-CH
5	Clayey Silt to Silty Clay	MH-CL
6	Sandy Silt to Clayey Silt	ML-MH
7	Silty Sand to Sandy Silt	SM-ML
8	Sand to Silty Sand	SM-SP
9	Sand	SW-SP
10	Gravelly Sand to Sand	SW-GW
11	Very Stiff Fine-grained *	CH-CL
12	Sand to Clayey Sand *	SC-SM

*overconsolidated or cemented

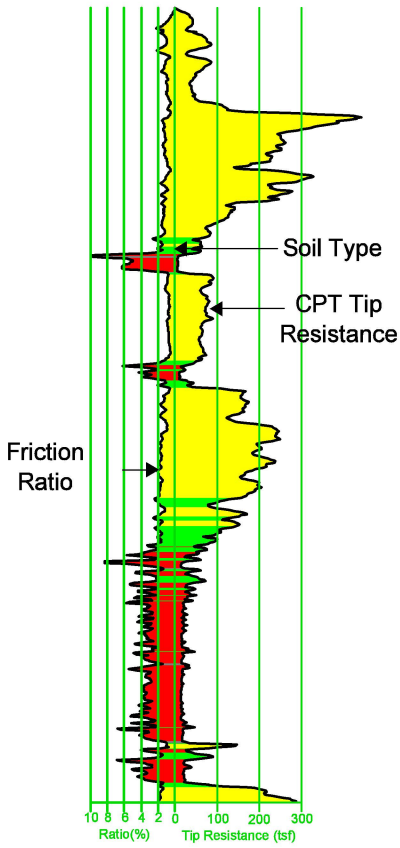
CPT CORRELATION CHART
(Robertson and Campanella, 1984)



SOIL BORING LITHOLOGY



CPT SOUNDING WITH LIQUEFACTION EVALUATION



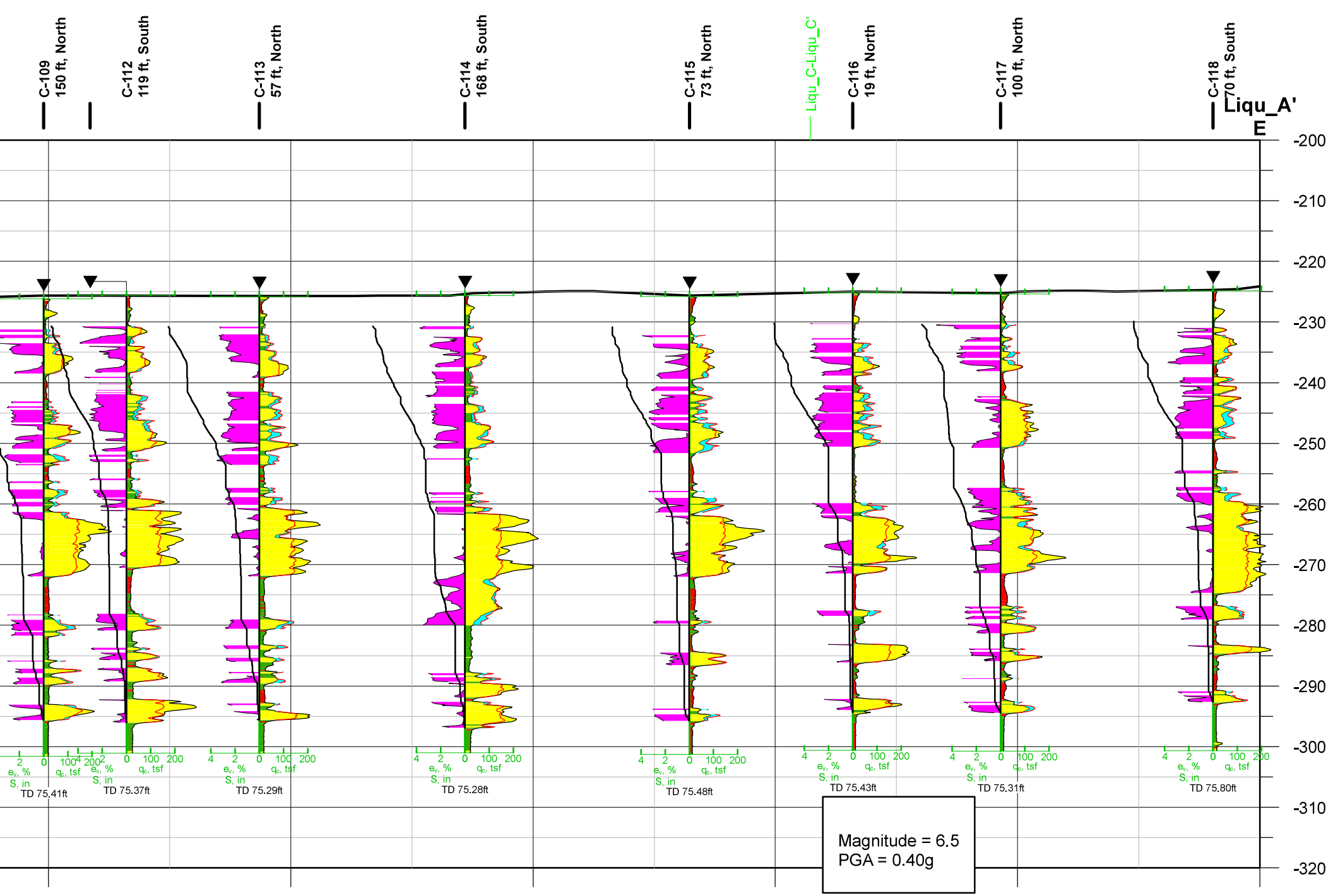
CPT SOUNDING WITH INTERPRETED LITHOLOGY

KEY TO LIQUEFACTION CROSS SECTIONS

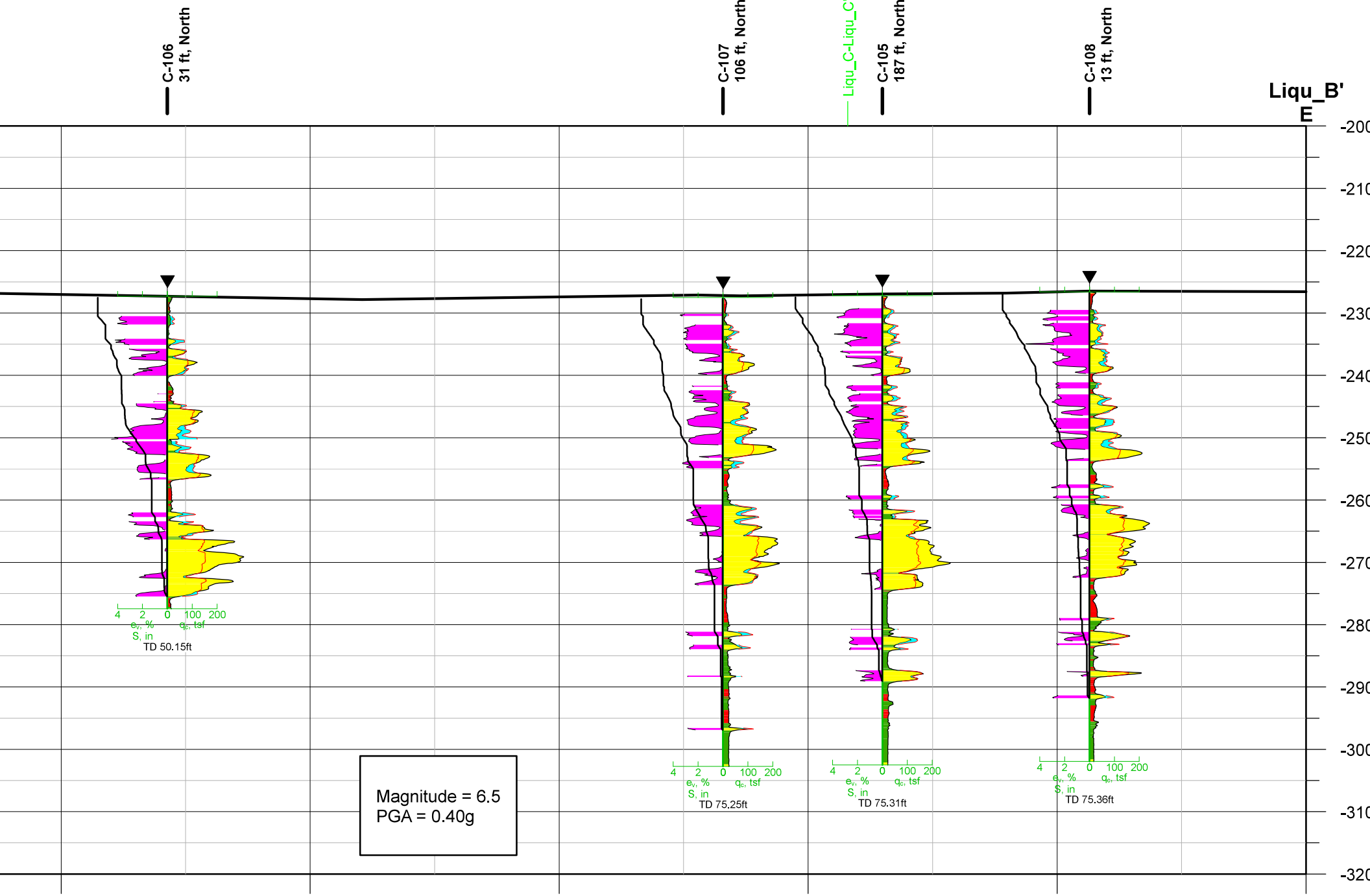
P.G.A. = 0.40g and M_w = 6.5
Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE 6-2

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Outputs\Final_Report\mxd\Fig6-2_liqxsectkey.mxd, 12/18/08, dpase

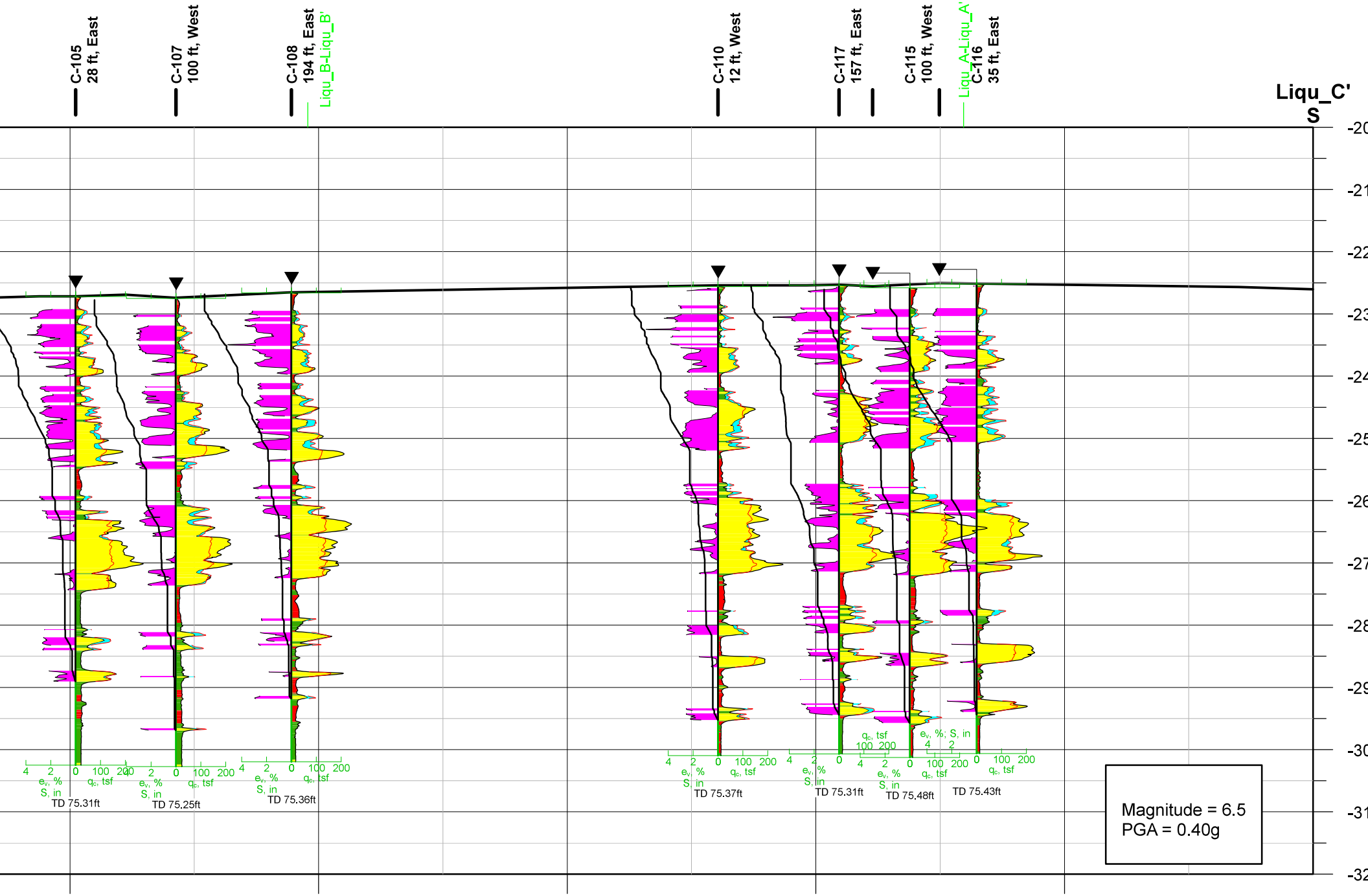

C-109
150 ft, North
C-112
119 ft, South
C-113
57 ft, North
C-114
168 ft, South
C-115
73 ft, North
Liqu_C-Liqu_C'
C-116
19 ft, North
C-117
100 ft, North
C-118
70 ft, South
Liqu_A'
E
-200
-210
-220
-230
-240
-250
-260
-270
-280
-290
-300
-310
-320
TD 75.41ft
TD 75.37ft
TD 75.29ft
TD 75.28ft
TD 75.48ft
TD 75.43ft
TD 75.31ft
TD 75.80ft
Magnitude = 6.5
PGA = 0.40g

SUB

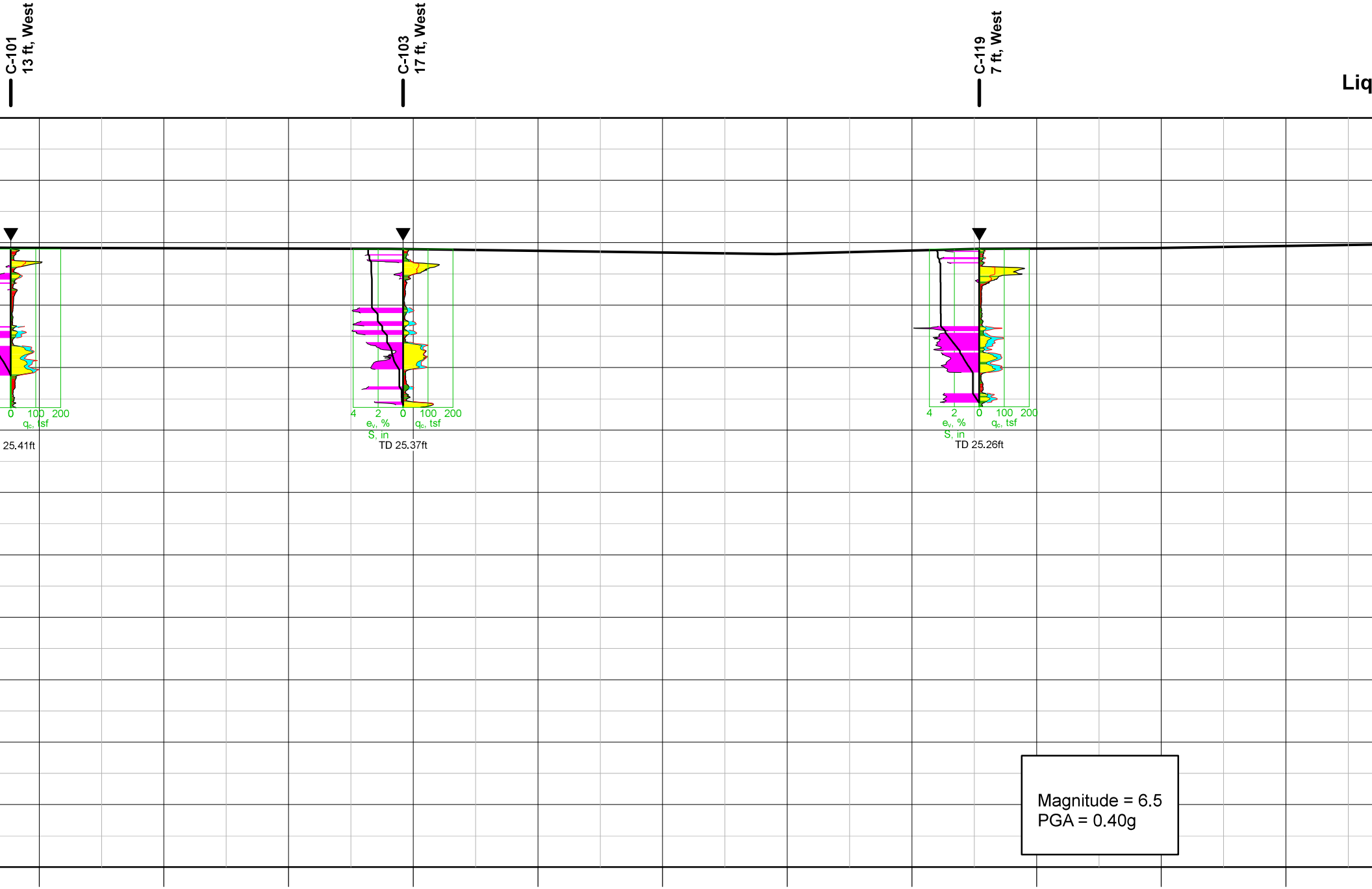

C-106
31 ft, North
C-107
106 ft, North
Liqu_C-Liqu_C'
C-105
187 ft, North
C-108
13 ft, North
Liqu_B'
E
-200
-210
-220
-230
-240
-250
-260
-270
-280
-290
-300
-310
-320
4 2 0 100 200
e_v, %
q_c, tsf
S, in
TD 50.15ft
TD 75.25ft
TD 75.31ft
TD 75.36ft
Magnitude = 6.5
PGA = 0.40g

SUB

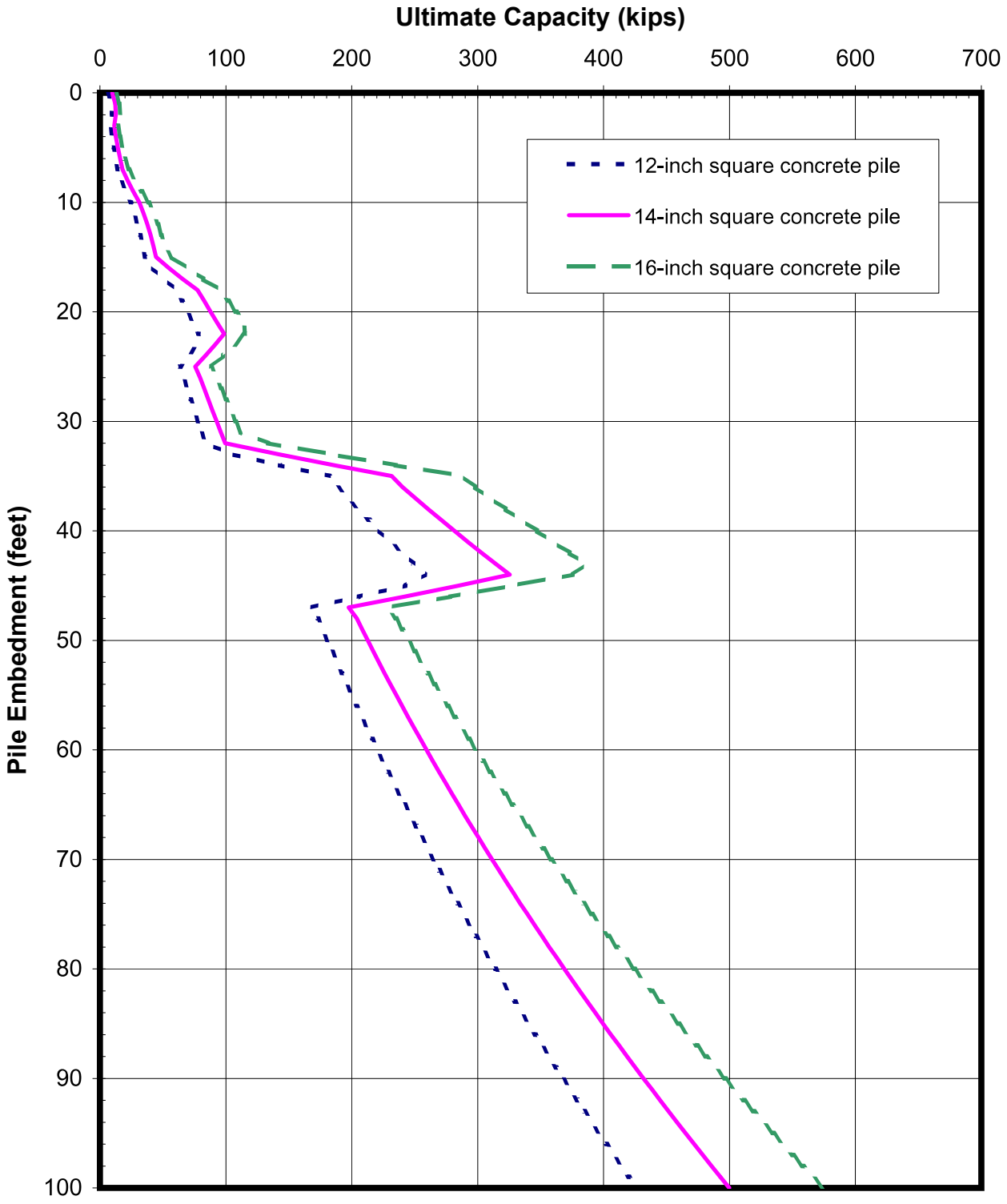
P


C-105
28 ft, East
C-107
100 ft, West
C-108
194 ft, East
Liqu_B-Liqu_B'
C-110
12 ft, West
C-117
157 ft, East
C-115
100 ft, West
Liqu_A-Liqu_A'
C-116
35 ft, East
Liqu_C'
S
-20
-21
-22
-23
-24
-25
-26
-27
-28
-29
-30
-31
-32
TD 75.31ft
TD 75.25ft
TD 75.36ft
TD 75.37ft
TD 75.31ft
TD 75.48ft
TD 75.43ft
Magnitude = 6.5
PGA = 0.40g

SUB

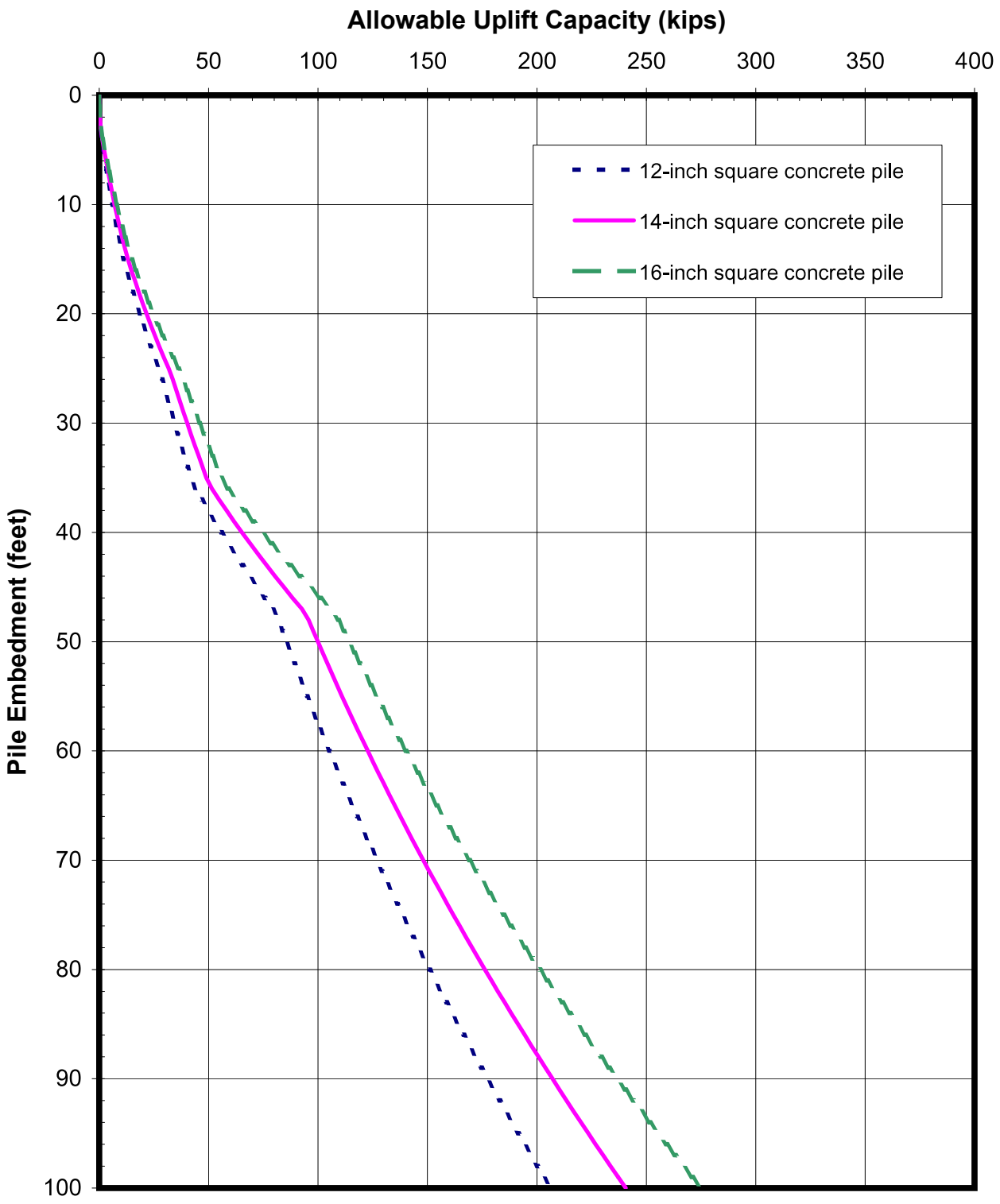

C-101
13 ft, West
C-103
17 ft, West
C-119
7 ft, West
Liq
0 100 200
q_c, tsf
25.41ft
4 2 0 100 200
e_v, %
S, in
q_c, tsf
TD 25.37ft
4 2 0 100 200
e_v, %
S, in
q_c, tsf
TD 25.26ft
Magnitude = 6.5
PGA = 0.40g

SUB



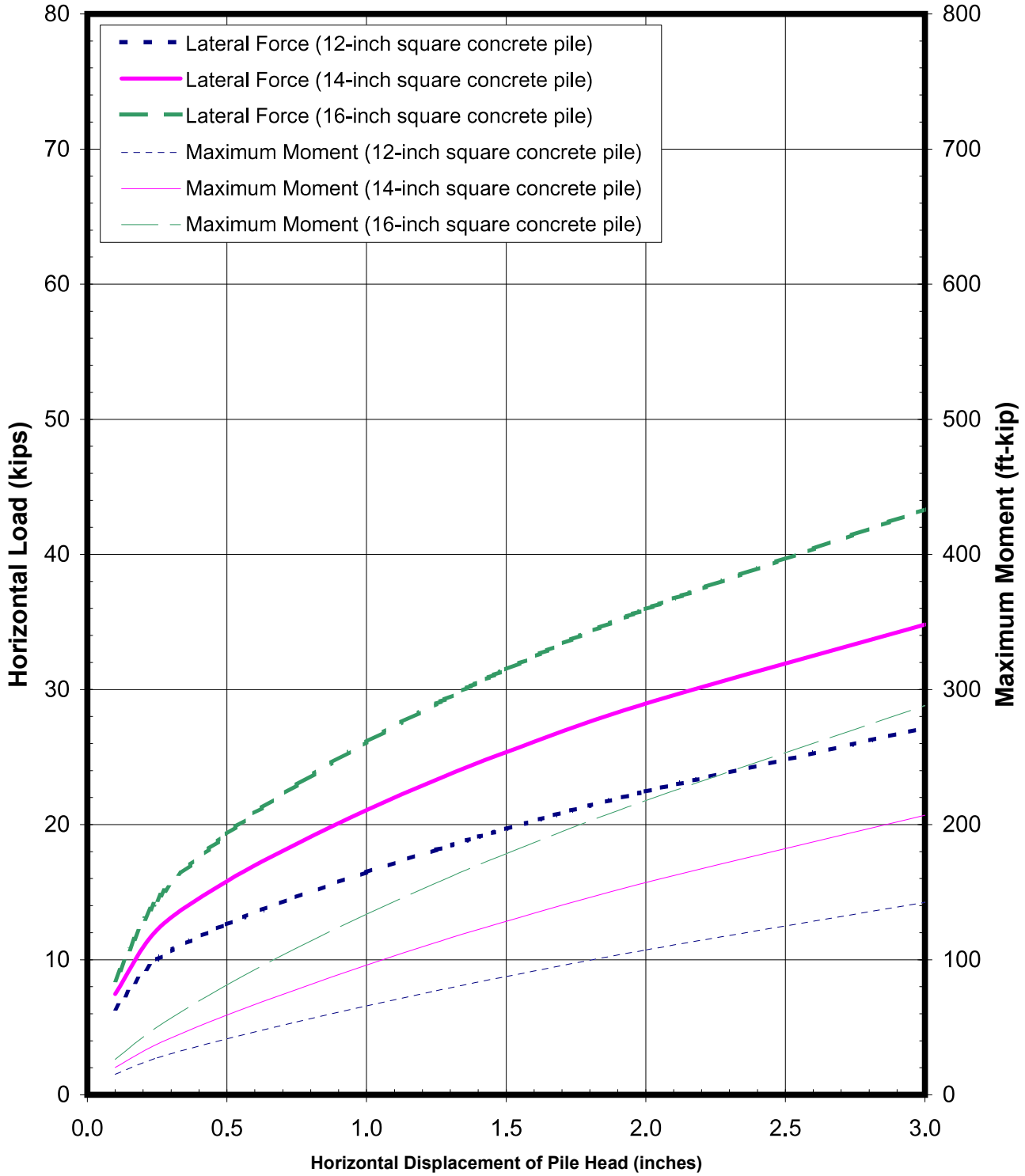
ULTIMATE AXIAL PILE CAPACITY
Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE 7-1



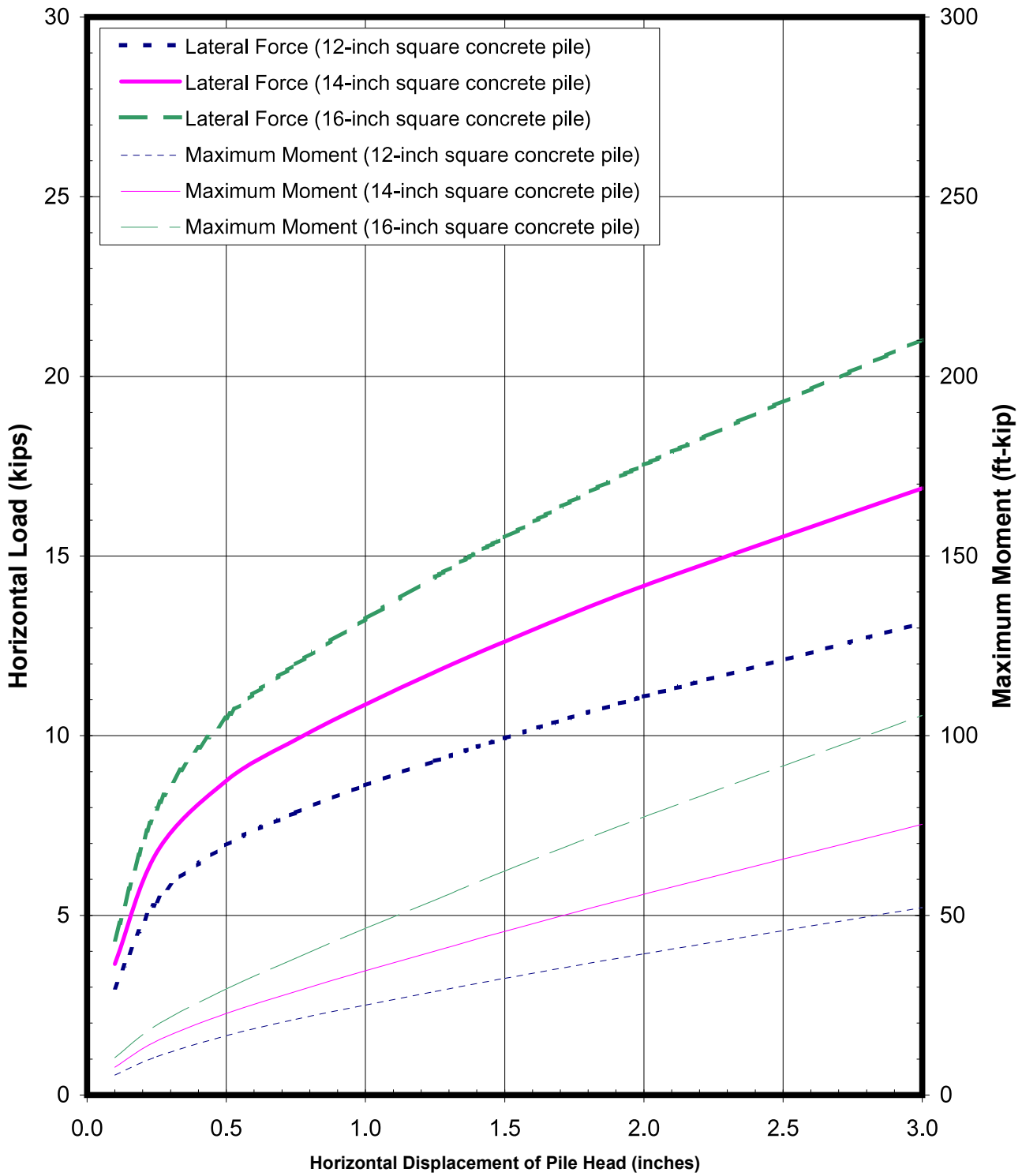
ALLOWABLE UPLIFT PILE CAPACITY
Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE 7-2



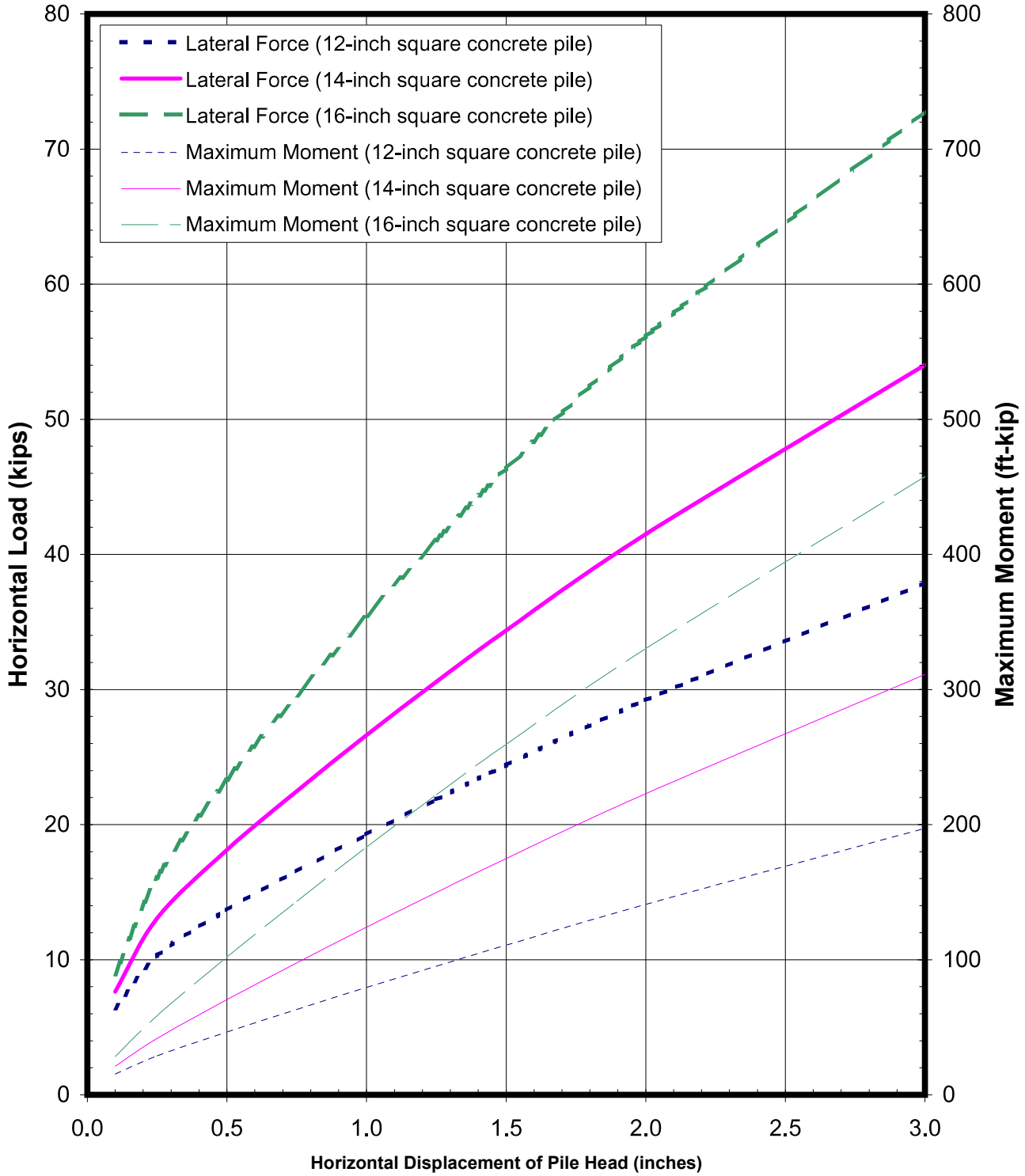
LATERAL PILE LOAD - DISPLACEMENT CURVE
Fixed Pile Head / Without Ground Improvement
Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE 7-3



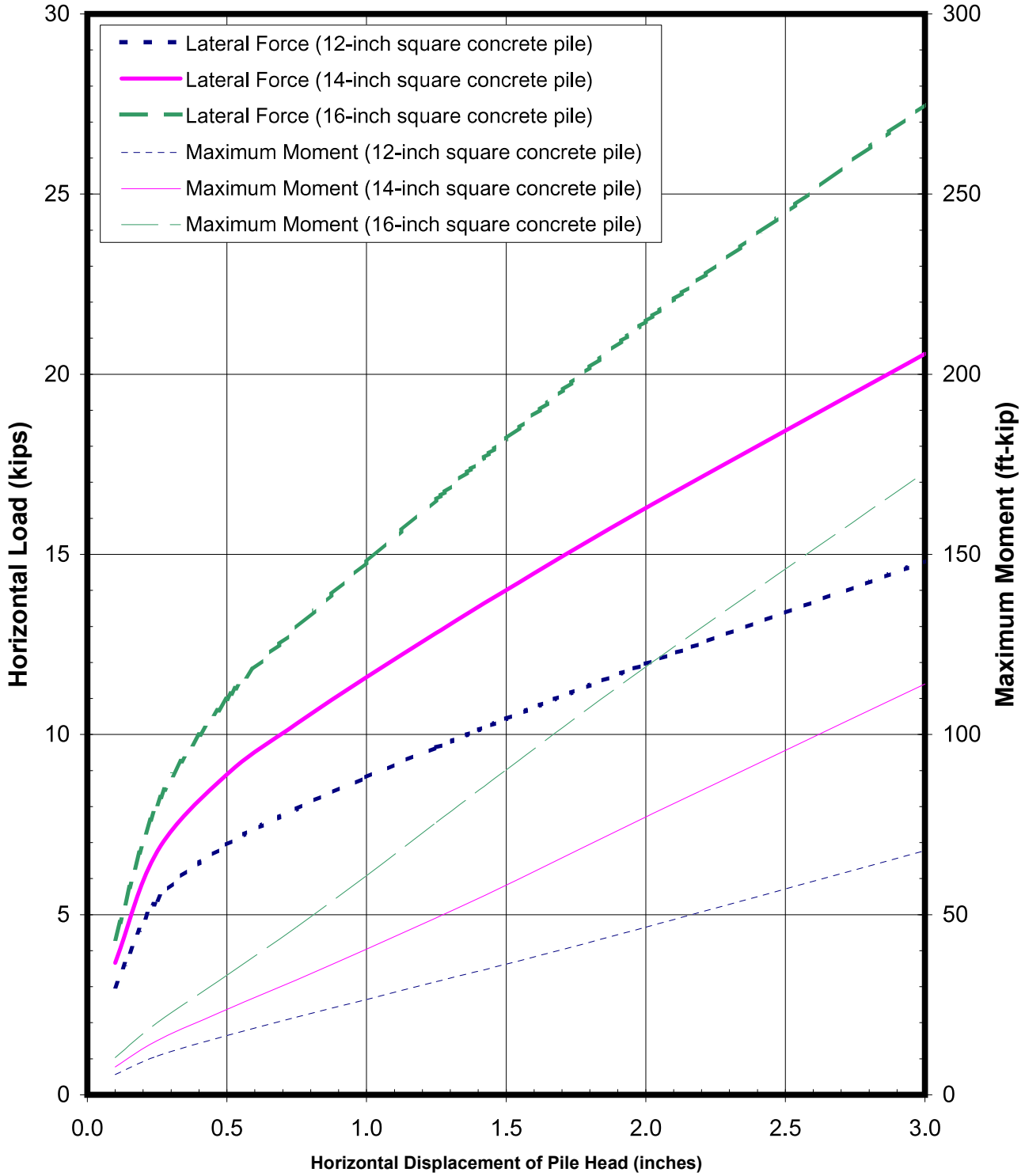
LATERAL PILE LOAD - DISPLACEMENT CURVE
Free Pile Head / Without Ground Improvement
Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE 7-4



LATERAL PILE LOAD - DISPLACEMENT CURVE
Fixed Pile Head / With Ground Improvement
Black Rock Units 1, 2 & 3
Calipatria, California

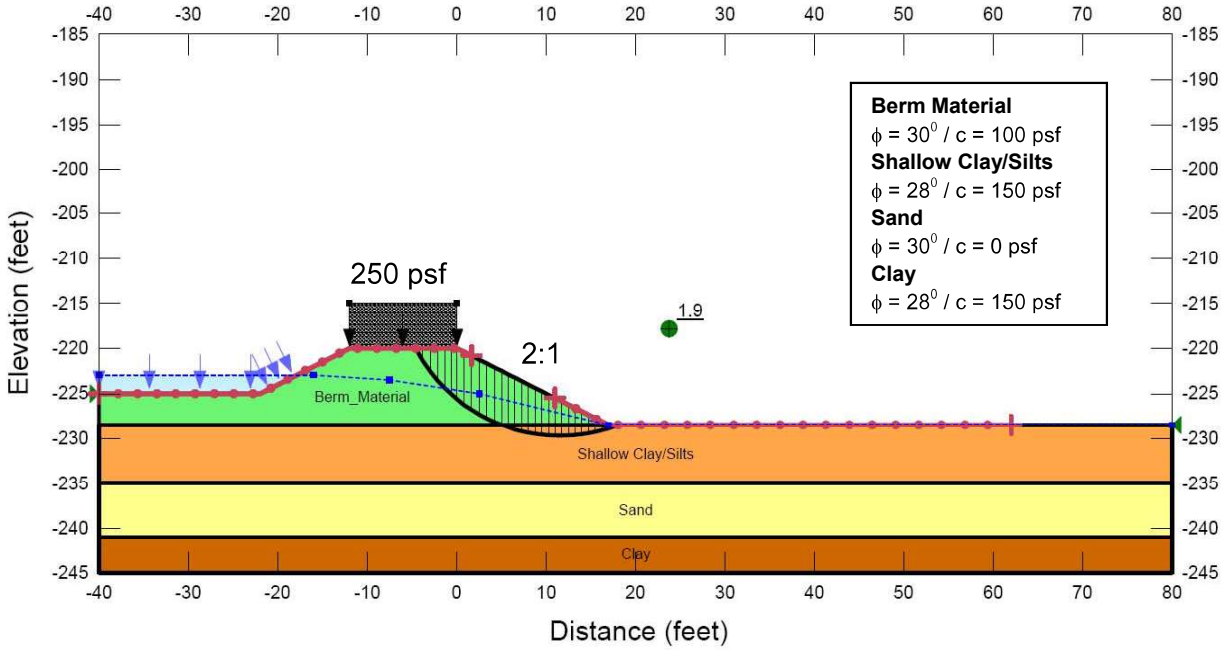
FIGURE 7-5



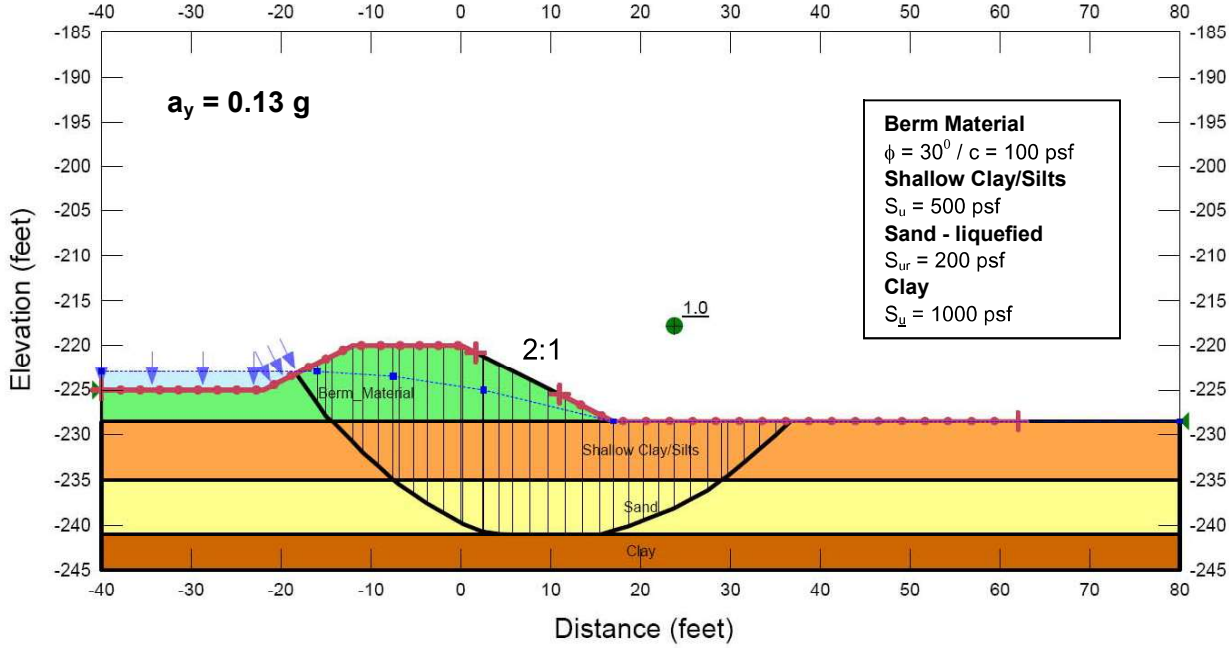
LATERAL PILE LOAD - DISPLACEMENT CURVE
Free Pile Head / With Ground Improvement
Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE 7-6

a) Static Stability Evaluation



b) Pseudo-static Stability Evaluation



BERM STABILITY EVALUATIONS
Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE 7-7

APPENDIX A
SUBSURFACE EXPLORATIONS

APPENDIX A - SUBSURFACE EXPLORATIONS

Introduction

The subsurface exploration program for the Black Rock Units 1, 2 and 3 project consisted of drilling 30 borings and advancing 21 Cone Penetration Tests (CPTs). The field exploration program was completed between October 7, 2008 and October 17, 2008. This appendix provides general information on the drilling and CPT equipment and soil sampling methods. Boring and CPT logs are also included in this appendix.

Exploration Locations and Elevations

The boring locations were selected prior to commencement of the field exploration program and located in the field by Fugro using a handheld GPS system. The horizontal datum for this project is California State Plane North American Datum 83 (NAD83), Zone 6, Feet.

Ground elevations at boring locations were estimated using the site topographic map provided by CalEnergy. The vertical datum reference for this project is North American Vertical Datum 88 (NAVD88).

Summary of Subsurface Exploration Program

A tabulation of the borings and CPTs completed during the field exploration program is presented in Table A-1. Table A-1 presents the coordinates, completion date, approximate ground surface elevation, and completion depth of the borings and CPTs for this phase of the project.

Drilling Methods and Equipment

Drilling services for the borings were provided by Gregg Drilling. Gregg Drilling's drilling equipment consisted of a truck-mounted Mobile B-53 D-1 drill rig and a support truck with a trailer-mounted water tank. Drilling operations were conducted under the technical guidance and observation of a Fugro geologist who also logged the soils in accordance with ASTM D2488 and packaged the recovered samples.

Both hollow-stem auger and rotary wash drilling methods were used during the field exploration program. Twenty-three (23) borings were drilled using 8-inch diameter hollow-stem augers. Seven (7) rotary wash borings were drilled using wet/rotary procedures that utilized a 4-inch diameter drag bit attached to a drill string of Mayhew Junior drill pipes. The rotary wash borings were advanced using non-toxic, bentonite-based drilling fluid to suspend and remove drill cuttings and to provide lateral support to the sides of the boreholes.

Following the completion of the drilling and sampling, all borings were backfilled with a soil-cement grout consisting of soil cuttings mixed with Portland cement. Bentonite chips were used to complete the backfilling in the top 3 to 5 feet. Excess drilling fluids, soil cuttings and grout mix were placed in a dumpster that was put on site by CalEnergy for our use. At the

completion of the exploration activities, CalEnergy removed the dumpster for disposal of the drilling wastes in accordance with their facility permit requirements.

Geotechnical Samples and Sampling Equipment.

Samples were generally taken at 5-foot intervals for the full boring depth. The nominal 5-foot spacing was occasionally adjusted to sample site-specific intervals. The sampling methods included driven sampling techniques using standard penetration test (SPT) and Modified California samplers (with rings). These samplers were driven using an out-of-hole, 140-pound automatic trip hammer falling 30 inches. When soft soil was encountered, selected samples were collected using the push method in place of the driven method.

Further details regarding the sampling and drilling procedures and the subsurface conditions are presented in Figure A1-1 – Key to Terms and Symbols used on logs and in Figures A1-2 through A1-31, Logs of Borings.

Descriptions of the procedures used for each sampling method are described in the following table:

Type of Sampling	Sampler Description	Description of Sampling Method
SPT Samples	2-inch-OD, 1-3/8-inch-ID	The SPT sampler was attached to an exploratory rod drill pipe that was lowered to the sample depth. The sampler was driven with a 140-pound automatic trip hammer attached to the top of the drill rod. The test was performed in general conformance with standard test method ASTM D1586. The number of blows required to drive the samplers the last 12 inches of the 18-inch penetration are shown on the boring logs.
Modified California Samples (California Liner Samples)	3-inch-OD, 2-3/8-inch-ID	The Modified California or California Liner test sampler was attached to an exploratory rod drill pipe that was lowered to the sample depth. The sampler was driven with a 140-pound automatic trip hammer attached to the top of the drill rod. The number of blows required to drive the samplers the last 12 inches of the 18-inch penetration are shown on the boring logs.
Push Samples	3-inch-OD, 2.83-inch-ID	Push samples were obtained by pushing a thin walled tube into the soil with the weight of the drill string. After the boring is drilled to the desired depth, the drill bit is raised from the borehole bottom and the sampler is lowered through the drill string until it rests on a catch ring above the drill bit. The sampler is then pushed about 24 to 30 inches into the formation by lowering the drill string. The sampler is retrieved by pulling it from the formation with the drill string and raising it with an overshot retrieving device attached to a wire line. The boring is then advanced to the next sampling interval.

Cone Penetrometer Testing Equipment.

CPT services were provided by Kehoe Testing & Engineering (Kehoe). Kehoe's CPT equipment is mounted on a 30-ton truck and consists of a steel rod with a 15-square-centimeter cone at the tip. The cone is equipped with electronic load cells that measure the point resistance on the tip and frictional resistance on a 225-square-centimeter sleeve (located behind the cone tip) and a transducer that measures pore pressures as the cone is hydraulically pushed through subsurface earth materials. The cone is pushed at a velocity of about 0.8 inches per second. Point resistance, frictional resistance, and pore pressure are recorded every second (i.e., about every 0.8 inches of penetration).

CPT soundings were terminated at depths of about 25, 50 or 75 feet, depending on location at the site. Abandonment of CPT soundings was performed by grouting each CPT sounding hole.

Figure A2-1 provides a key for the interpretation of soil classification based on the CPT tip resistance and friction ratio. Logs of the CPT soundings, which graphically present the CPT sleeve friction (f), CPT tip resistance (q_c), the ratio of sleeve friction to tip resistance (friction ratio or f/q_c), and pore pressure (u) at depth are provided on Figures A2-2 through A2-22 in this appendix.

During CPTs C-102, C-106, and C-118 shear wave measurements were obtained at approximately 5-foot intervals. The shear wave was generated using an air-actuated hammer, which is located inside the front jack of the CPT rig. The cone has a triaxial geophone, which recorded the shear wave signal generated by the air hammer. The cone was stopped to record the arrival of the shear waves from the excitation source at the surface. Interpreted shear wave velocity data are shown on Table A-2.

Table A-1. Subsurface Explorations Summary

Boring / CPT	Estimated Ground Surface Elevation (feet, NAVD88)	Completion Depth (ft)	Start Date	Completion Date	Coordinates (feet) California State Zone 6, NAD 83	
					Northing	Easting
Rotary Wash Borings						
RW-01	-227.5	76.5	10/7/2008	10/8/2008	2004839	6752288
RW-02	-228.0	51.5	10/10/2008	10/10/2008	2004568	6751983
RW-03	-226.0	76.5	10/14/2008	10/14/2008	2004120	6751781
RW-04	-225.9	86.5	10/14/2008	10/14/2008	2004092	6751986
RW-05	-225.6	76.5	10/13/2008	10/13/2008	2004222	6752411
RW-06	-225.0	76.5	10/10/2008	10/10/2008	2004172	6752610
RW-07	-227.0	76.5	10/8/2008	10/8/2008	2004790	6752499
Hollow Stem Auger Borings						
HSA-08	-223.0	6.5	10/17/2008	10/17/2008	2005823	6755553
HSA-09	-227.5	26.5	10/15/2008	10/15/2008	2004753	6751236
HSA-10	-227.0	6.5	10/15/2008	10/15/2008	2004617	6751677
HSA-11	-227.0	11.5	10/15/2008	10/15/2008	2004291	6751165
HSA-12	-223.0	6.5	10/17/2008	10/17/2008	2004491	6752434
HSA-13	-219.0	6.5	10/17/2008	10/17/2008	2005204	6753571
HSA-14	-226.0	16.5	10/16/2008	10/16/2008	2004317	6751970
HSA-15	-226.2	11.5	10/15/2008	10/15/2008	2003996	6751182
HSA-16	-222.0	16.5	10/16/2008	10/16/2008	2004195	6750966
HSA-17	-226.0	6.5	10/16/2008	10/16/2008	2003936	6751586
HSA-18	-225.8	6.5	10/16/2008	10/16/2008	2003894	6752364
HSA-19	-221.0	16.5	10/18/2008	10/18/2008	2003583	6750967
HSA-20	-224.6	26.5	10/16/2008	10/16/2008	2003443	6752397
HSA-21	-225.8	6.5	10/16/2008	10/16/2008	2003288	6751504
HSA-22	-225.5	11.5	10/16/2008	10/16/2008	2003352	6751853
HSA-23	-225.8	6.5	10/16/2008	10/16/2008	2003270	6752135
HSA-01	-228.5	6.5	10/15/2008	10/15/2008	2005752	6752870
HSA-02	-228.3	6.5	10/15/2008	10/15/2008	2005656	6752525
HSA-03	-228.9	26.5	10/15/2008	10/15/2008	2005555	6752124
HSA-04	-228.8	6.5	10/15/2008	10/15/2008	2005469	6751158
HSA-05	-224.0	6.5	10/17/2008	10/17/2008	2005837	6754161
HSA-06	-228.1	6.5	10/15/2008	10/15/2008	2005027	6752048
HSA-07	-228.0	6.5	10/15/2008	10/15/2008	2004934	6751075

Table A-1. Subsurface Explorations Summary - cont.

Boring / CPT	Estimate Ground Surface Elevation (feet, NAVD88)	Completion Depth (ft)	Start Date	Completion Date	Coordinates (feet) California State Zone 6, NAD 83	
					Northing	Easting
Cone Penetration Tests (CPTs)						
C-101	-221.0	25.41	10/8/2008	10/8/2008	2005421	6750956
C-102	-228.9	50.19	10/8/2008	10/8/2008	2005697	6752117
C-103	-221.0	25.37	10/8/2008	10/8/2008	2004791	6750954
C-104	-227.9	75.24	10/7/2008	10/7/2008	2004966	6752229
C-105	-227.2	75.31	10/7/2008	10/7/2008	2004829	6752401
C-106	-227.3	50.15	10/7/2008	10/7/2008	2004673	6751827
C-107	-227.5	75.25	10/7/2008	10/7/2008	2004748	6752273
C-108	-226.6	75.36	10/7/2008	10/7/2008	2004655	6752567
C-109	-226.2	75.41	10/8/2008	10/8/2008	2004265	6751740
C-110	-225.6	75.37	10/9/2008	10/9/2008	2004312	6752361
C-111	-226.2	75.34	10/8/2008	10/8/2008	2004119	6751643
C-112	-225.7	75.37	10/8/2008	10/8/2008	2003996	6751779
C-113	-225.8	75.29	10/8/2008	10/8/2008	2004171	6751918
C-114	-225.7	75.28	10/8/2008	10/8/2008	2003947	6752088
C-115	-225.8	75.48	10/9/2008	10/9/2008	2004188	6752273
C-116	-225.2	75.43	10/8/2008	10/8/2008	2004134	6752408
C-117	-225.4	75.31	10/9/2008	10/9/2008	2004215	6752530
C-118	-224.9	75.8	10/9/2008	10/9/2008	2004045	6752706
C-119	-221.0	25.26	10/8/2008	10/8/2008	2003867	6750965
C-120	-224.9	50.33	10/8/2008	10/8/2008	2003460	6752247
C-121	-225.9	50.38	10/8/2008	10/8/2008	2004311	6752168

Table A-2. Seismic CPT Shear Wave Measurements

CPT-102

Depth (ft)	Travel Distance (ft)	S-Wave Arrival (msec)	S-Wave Velocity from Surface (ft/sec)	Interval S-Wave Velocity (ft/sec)
10.12	11.29	29.38	384.20	
21.20	21.78	48.93	445.16	536.77
30.06	30.47	65.52	465.09	523.89
40.17	40.48	83.19	486.60	566.33
50.19	50.44	100.09	503.93	589.26

CPT-106

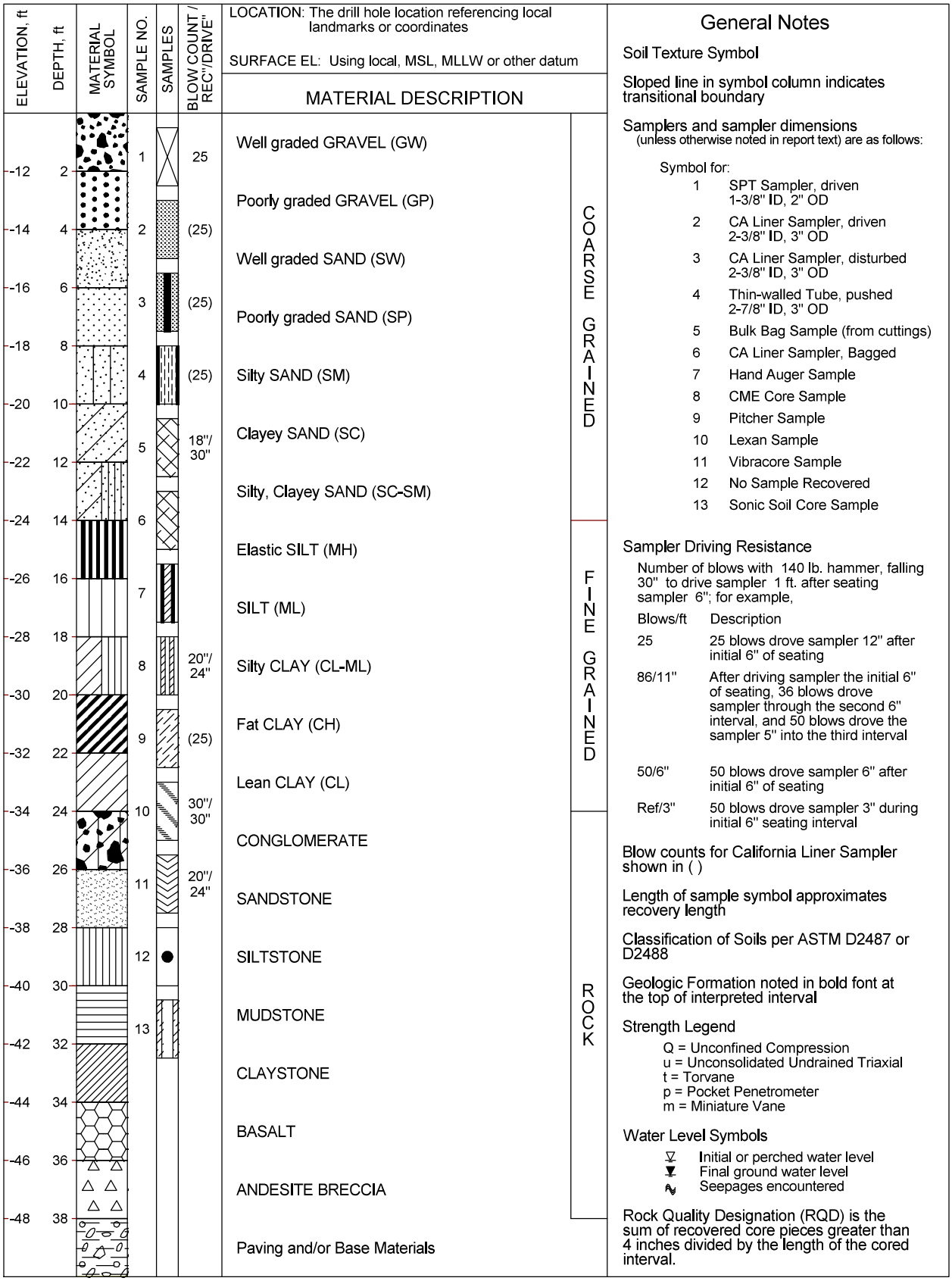
Depth (ft)	Travel Distance (ft)	S-Wave Arrival (msec)	S-Wave Velocity from Surface (ft/sec)	Interval S-Wave Velocity (ft/sec)
11.93	12.94	32.26	400.97	
20.25	20.86	47.82	436.18	509.17
30.14	30.55	63.30	482.65	626.21
40.16	40.47	80.87	500.43	564.49
50.19	50.44	94.98	531.04	706.48

CPT-118

Depth (ft)	Travel Distance (ft)	S-Wave Arrival (msec)	S-Wave Velocity from Surface (ft/sec)	Interval S-Wave Velocity (ft/sec)
10.15	11.31	30.01	377.03	
20.35	20.96	48.90	428.53	510.35
30.37	30.78	71.09	432.96	442.70
40.33	40.64	87.07	466.74	617.02
50.26	50.51	100.15	504.32	754.54
60.25	60.46	117.15	516.07	585.24
70.34	70.52	134.34	524.92	585.25

Shear Wave Source Offset = 5 ft

S-Wave Velocity from Surface = Travel Distance/S-Wave Arrival
Interval S-Wave Velocity = (Travel Dist2-Travel Dist1)/(Time2-Time1)



General Notes

Soil Texture Symbol

Sloped line in symbol column indicates transitional boundary

Samplers and sampler dimensions
(unless otherwise noted in report text) are as follows:

Symbol for:

1	SPT Sampler, driven 1-3/8" ID, 2" OD
2	CA Liner Sampler, driven 2-3/8" ID, 3" OD
3	CA Liner Sampler, disturbed 2-3/8" ID, 3" OD
4	Thin-walled Tube, pushed 2-7/8" ID, 3" OD
5	Bulk Bag Sample (from cuttings)
6	CA Liner Sampler, Bagged
7	Hand Auger Sample
8	CME Core Sample
9	Pitcher Sample
10	Lexan Sample
11	Vibracore Sample
12	No Sample Recovered
13	Sonic Soil Core Sample

Sampler Driving Resistance

Number of blows with 140 lb. hammer, falling 30" to drive sampler 1 ft. after seating sampler 6"; for example,

Blows/ft	Description
25	25 blows drove sampler 12" after initial 6" of seating
86/11"	After driving sampler the initial 6" of seating, 36 blows drove sampler through the second 6" interval, and 50 blows drove the sampler 5" into the third interval
50/6"	50 blows drove sampler 6" after initial 6" of seating
Ref/3"	50 blows drove sampler 3" during initial 6" seating interval

Blow counts for California Liner Sampler shown in ( )

Length of sample symbol approximates recovery length

Classification of Soils per ASTM D2487 or D2488

Geologic Formation noted in bold font at the top of interpreted interval

Strength Legend

Q = Unconfined Compression
u = Unconsolidated Undrained Triaxial
t = Torvane
p = Pocket Penetrometer
m = Miniature Vane

Water Level Symbols

- Initial or perched water level
- Final ground water level
- Seepages encountered

Rock Quality Designation (RQD) is the sum of recovered core pieces greater than 4 inches divided by the length of the cored interval.

KEY TO TERMS & SYMBOLS USED ON LOGS

FIGURE A1-1

LOCATION: N 2,004,839 E 6,752,288 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -227.5 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
-228						Lean CLAY (CL): - moderate yellowish brown and dry at 0.0'							
-230	2												
-232	4												
-234	6		1		(13)	- medium stiff, moderate brown, and wet, with a trace of sand and some rootlets at 5.0'	123	95	30				
-236	8												
-238	10		2		24	Silty Fine SAND (SM): medium dense, moderate yellowish brown, wet, with a trace of clay							
-240	12												
-242	14												
-244	16		3		(26)	Lean CLAY (CL): very stiff, moderate brown, wet, with a trace of sand	122	95	29				
-246	18												
-248	20		4		12	Silty Fine SAND (SM): moderate yellowish brown, wet - medium dense, with a trace of clay at 20.0'							
-250	22												
-252	24												
-254	26		5		(58)	- dense at 25.0'	125	103	22				
-256	28												
-258	30		6		13	Lean CLAY (CL): stiff, dark yellowish brown, wet					32	13	
-260	32												
-262	34												
-264	36		7		(78)	Silty Fine SAND (SM): dense, wet - dark yellowish brown at 35.0'	126	103	22				
-266	38												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 76.5 ft

BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 8, 2008

DRILLING METHOD: 4-inch-dia. Mud Rotary Wash
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. RW-01

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-2a

LOCATION: N 2,004,839 E 6,752,288 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -227.5 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
-268			8		53	- very dense and light reddish brown at 40.0'				21			
-270	42												
-272	44												
-274	46		9		(49)	- with a trace of clay, 35.0' to 45.0' - dense and light reddish brown to dark yellowish brown at 45.0'	127	103	23				
-276	48												
-278	50		10		23	Fat CLAY (CH): very stiff, light brown, wet					67	41	
-280	52												
-282	54		NR		19								
-284	56		11		(40)	Silty Fine SAND (SM): medium dense, light reddish brown, wet - with a trace of clay at 56.5'	127	103	23				
-286	58												
-288	60		12		25	- interlayered with Lean CLAY (CL) below 60.0'							
-290	62												
-292	64		NR		22								
-294	66												
-296	68												
-298	70		13		16	Lean CLAY (CL): light reddish brown, wet, with a trace of sand - very stiff at 70.0'							
-300	72												
-302	74		14		4	- soft at 75.0'							
-304	76												
-306	78												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 76.5 ft

BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 8, 2008

DRILLING METHOD: 4-inch-dia. Mud Rotary Wash
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. RW-01

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-2b

LOCATION: N 2,004,568 E 6,751,983 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -228 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	SAMPLE NO.	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
				Lean CLAY (CL): - moderate yellowish brown and dry at 0.0'							
-230	2										
-232	4										
-234	6	1	(10)	- medium stiff, light reddish brown, and wet, with a trace of sand at 5.0'	123	97	27		27	8	
-236	8										
-238	10	2	13	Silty Fine SAND (SM): medium dense, light reddish brown, wet							
-240	12										
-242	14										
-244	16	3	(11)	Lean CLAY (CL): medium stiff, light reddish brown, wet	121	94	30		28	9	
-246	18										
-248	20	4	10	Silty Fine SAND (SM): loose, dark yellowish brown to light reddish brown, wet							
-250	22										
-252	24										
-254	26	5	(10)	SILT with sand (ML): firm, light reddish brown, wet, with some clay	122	94	29	76			
-256	28										
-258	30	6	6	Fat CLAY (CH): medium stiff, dark yellowish brown, wet					61	38	
-260	32										
-262	34										
-264	36	7	(20)	Silty Fine SAND (SM): wet - medium dense and light reddish brown at 35.0'	127	102	24				
-266	38										

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 51.5 ft

BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 10, 2008

DRILLING METHOD: 4-inch-dia. Mud Rotary Wash
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. RW-02

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-3a

LOCATION: N 2,004,568 E 6,751,983 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -228 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
			8		38	- dense and dark yellowish brown to light reddish brown at 40.0'				21			
-270	42												
-272	44												
-274	46		9		(94)	- very dense and dark yellowish brown at 45.0'	125	102	23				
-276	48												
-278	50		10		10	Fat CLAY (CH): stiff, dark yellowish brown, wet							
-280	52												
-282	54												
-284	56												
-286	58												
-288	60												
-290	62												
-292	64												
-294	66												
-296	68												
-298	70												
-300	72												
-302	74												
-304	76												
-306	78												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 51.5 ft

BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 10, 2008

DRILLING METHOD: 4-inch-dia. Mud Rotary Wash
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. RW-02

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-3b

LOCATION: N 2,004,120 E 6,751,781 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -226 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
					Lean CLAY (CL): - pale yellowish brown and dry at 0.0'							
-228	2											
-230	4											
-232	6	1		(2)	- very soft, moderate yellowish brown, and wet at 5.0'	121	93	30				
-234	8											
-236	10	2		6	Silty Fine SAND (SM): loose, moderate to dark yellowish brown, wet, with a trace of clay				41			
-238	12											
-240	14											
-242	16	3		(13)	Lean CLAY (CL): medium stiff, dark yellowish brown, wet	119	90	33				
-244	18											
-246	20	4		2	SILT (ML): soft, moderate yellowish brown, with some sand							
-248	22											
-250	24											
-252	26	5		(15)	Silty Fine SAND (SM): loose, moderate yellowish brown, wet	126	103	23				
-254	28											
-256	30	6		8	Lean CLAY (CL): wet - medium stiff and moderate to dark yellowish brown at 30.0' - with some sand at 31.0'							
-258	32											
-260	34											
-262	36	7		(27)	- very stiff and dark yellowish brown at 35.0' - with some sand at 36.0'	127	104	23		28	7	
-264	38											

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 76.5 ft

BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 14, 2008

DRILLING METHOD: 4-inch-dia. Mud Rotary Wash
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. RW-03

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-4a

LOCATION: N 2,004,120 E 6,751,781 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -226 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
		8		9	Silty Fine SAND (SM): wet - loose and moderate yellowish brown at 40.0'							
-268	42											
-270	44											
-272	46	9		(32)	- medium dense and moderate to dark yellowish brown at 45.0'	121	94	29				
					Lean CLAY (CL): wet - very stiff and dark brown at 46.3'							
-274	48											
-276	50	10			- moderate yellowish brown at 50.0'	121	92	32				
-278	52											
-280	54											
-282	56	11		(11)	- medium stiff and dark yellowish brown at 55.0'	108	73	48				
-284	58											
-286	60	12		9	SILT with sand (ML): stiff, dark yellowish brown, wet							
-288	62											
-290	64											
-292	66	13		8	Lean CLAY (CL): wet - medium stiff and moderate to dark yellowish brown to 75.0'							
-294	68											
-296	70	14		5								
-298	72											
-300	74											
-302	76	15		1	- very soft and dark yellowish brown to dark grayish brown at 75.0'							
-304	78											

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 76.5 ft

BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 14, 2008

DRILLING METHOD: 4-inch-dia. Mud Rotary Wash
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. RW-03

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-4b

LOCATION: N 2,004,092 E 6,751,986 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -225.9 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
						Lean CLAY (CL): pale yellowish brown, dry							
-228	2												
-230	4												
-232	6		1		2	SILT with sand (ML): soft, light reddish brown, wet, fine-grained sand				84			
-234	8												
-236	10		2		(15)	Silty Fine SAND (SM): loose, light reddish brown, wet	126	103	23				
-238	12												
-240	14												
-242	16		3		7	Lean CLAY (CL): medium stiff, dark yellowish brown, wet, with a trace of sand							
-244	18												
-246	20		4		(9)	Silty Fine SAND (SM): loose, light reddish brown, wet	121	96	26				
-248	22												
-250	24												
-252	26		5		9								
-254	28												
-256	30		6		(18)	Lean CLAY (CL): stiff, dark yellowish brown, wet	115	84	37				
-258	32												
-260	34												
-262	36		7		22	Silty Fine SAND (SM): dark yellowish brown, wet - medium dense at 35.0'							
-264	38												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 86.5 ft

BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 14, 2008

DRILLING METHOD: 4-inch-dia. Mud Rotary Wash
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. RW-04

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-5a

LOCATION: N 2,004,092 E 6,751,986 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -225.9 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	SAMPLE NO.	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
		8	(51)	- dense at 40.0'	122	104	17				
-268	42										
-270	44										
-272	46	9	8	Lean CLAY (CL): medium stiff, dark yellowish brown, wet, with a trace of sand							
-274	48										
-276	50	10		Fat CLAY (CH): dark yellowish brown, wet	115	78	48		73	50	
-278	52										
-280	54										
-282	56	11	6	- medium stiff at 55.0'							
-284	58										
-286	60	12	14	SILT (ML): stiff, light reddish brown, wet, with a trace of sand							
-288	62			- with a 2" silty clay seam at 61.5'							
-290	64										
-292	66	13	(12)	Fat CLAY (CH): stiff, moderate to dark yellowish brown, wet							
-294	68										
-296	70	14		Lean CLAY (CL): wet - moderate yellowish brown at 70.0'							
-298	72				128	103	24				
-300	74										
-302	76	15	1	- very soft and dark yellowish brown below 75.0'					31	16	
-304	78										

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 86.5 ft

BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 14, 2008

DRILLING METHOD: 4-inch-dia. Mud Rotary Wash
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. RW-04

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-5b

LOCATION: N 2,004,092 E 6,751,986 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -225.9 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
			16		1								
-308	82												
-310	84												
			17		16	Fat CLAY (CH): very stiff, dark yellowish brown, wet					71	45	
-312	86												
-314	88												
-316	90												
-318	92												
-320	94												
-322	96												
-324	98												
-326	100												
-328	102												
-330	104												
-332	106												
-334	108												
-336	110												
-338	112												
-340	114												
-342	116												
-344	118												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 86.5 ft

BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 14, 2008

DRILLING METHOD: 4-inch-dia. Mud Rotary Wash
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. RW-04

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-5c

LOCATION: N 2,004,222 E 6,752,411 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -225.6 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
-226					Lean CLAY (CL): - pale yellowish brown and dry at 0.0'							
-228	2											
-230	4											
-232	6	1		(5)	- soft, dark yellowish brown, and wet at 5.0'	111	87	28				
-234	8											
-236	10	2		5	Silty Fine SAND (SM): moderate yellowish brown, wet - very loose at 10.0'							
-238	12											
-240	14											
-242	16	3			- with a trace of clay at 15.0'	125	98	27				
-244	18											
-246	20	4		12	- medium dense at 20.0'				48			
-248	22											
-250	24											
-252	26	5		6	- loose, with a trace of clay at 25.0'							
-254	28											
-256	30	6			Lean CLAY (CL): moderate yellowish brown, wet							
-258	32					119	88	35				
-260	34											
-262	36	7		(18)	SILT (ML): stiff, moderate yellowish brown, wet	117	92	27	93			
-264	38											

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 76.5 ft

BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 13, 2008

DRILLING METHOD: 4-inch-dia. Mud Rotary Wash
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. RW-05

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-6a

LOCATION: N 2,004,222 E 6,752,411 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -225.6 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
-266			8		25	Silty Fine SAND (SM): medium dense, wet - moderate to dark yellowish brown with some iron-oxide staining at 40.0'							
-268	42												
-270	44												
-272	46		9		(45)	- dark yellowish brown at 45.0'	123	101	22				
-274	48												
-276	50		10		13	Fat CLAY (CH): stiff, dark yellowish brown, wet					64	39	
-278	52												
-280	54												
-282	56		11		(28)	Silty Fine SAND (SM): wet - medium dense and dark yellowish brown at 55.0'	117	93	25				
-284	58												
-286	60		12		32	- with a 2" clay seam at 60.0' - dense and moderate yellowish brown at 60.0'							
-288	62												
-290	64												
-292	66		13		15	Fat CLAY (CH): stiff, moderate to dark yellowish brown, wet							
-294	68												
-296	70		14		1	Lean CLAY (CL): very soft, wet - dark yellowish brown at 70.0'							
-298	72												
-300	74												
-302	76		15		1	- moderate to dark yellowish brown at 75.0'							
-304	78												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 76.5 ft

BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 13, 2008

DRILLING METHOD: 4-inch-dia. Mud Rotary Wash
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. RW-05

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-6b

LOCATION: N 2,004,172 E 6,752,610 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -225 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
-226	2					Lean CLAY (CL): moderate yellowish brown, dry							
-228	4												
-230	6		1		5	SILT (ML): medium stiff, light reddish brown, wet, with a trace of sand							
-232	8												
-234	10		2		(14)	Sandy SILT (ML): stiff, light reddish brown, wet	118	94	25	58			
-236	12												
-238	14												
-240	16		3			Fat CLAY (CH): light reddish brown, wet	123	94	30		71	50	
-242	18												
-244	20		4		9	Sandy SILT (ML): wet - stiff and dark yellowish brown to light reddish brown, with some clay at 20.0'				55			
-246	22												
-248	24												
-250	26		NS		(7)	- light reddish brown at 25.0'							
-252	28												
-254	30		5		10	Lean CLAY (CL): stiff, dark yellowish brown, wet							
-256	32												
-258	34												
-260	36		6		8	Silty Fine SAND (SM): dark yellowish brown, wet - loose, with a trace of clay at 35.0'							
-262	38												
-264													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 76.5 ft

BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 10, 2008

DRILLING METHOD: 4-inch-dia. Mud Rotary Wash
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. RW-06

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-7a

LOCATION: N 2,004,172 E 6,752,610 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -225 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
-266	42		7		26	- medium dense at 40.0'							
-268	44												
-270	46		8		33	- dense at 45.0'							
-272	48												
-274	50												
-276	52		9		6	Fat CLAY (CH): medium stiff, moderate yellowish brown to dark yellowish brown, wet							
-278	54												
-280	56		10		5	Lean CLAY (CL): medium stiff, dark yellowish brown, wet, with some iron oxide staining and dark gray banding							
-282	58												
-284	60												
-286	62		11		16	Silty Fine SAND (SM): medium dense, dark yellowish brown, wet - with a 2" silty clay seam at 61.5'							
-288	64												
-290	66		12		13	Fat CLAY (CH): stiff, dark yellowish brown, wet					75	50	
-292	68												
-294	70												
-296	72		13		1	Lean CLAY (CL): dark yellowish brown, wet - very soft, with some iron oxide staining at 70.0'							
-298	74												
-300	76		14		5	- medium stiff, with a trace of sand and rock fragments at 75.0'							
-302	78												
-304													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 76.5 ft

BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 10, 2008

DRILLING METHOD: 4-inch-dia. Mud Rotary Wash
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. RW-06

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-7b

LOCATION: N 2,004,790 E 6,752,499 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -227 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
-228	2					Lean CLAY (CL): moderate yellowish brown, dry							
-230	4												
-232	6		1		5	SILT (ML): medium stiff, dark yellowish brown, wet				89			
-234	8												
-236	10		2		(20)	Silty Fine SAND (SM): medium dense, dark yellowish brown, wet	121	98	24				
-238	12												
-240	14												
-242	16		3		9	Lean CLAY (CL): stiff, light reddish brown, wet					50	30	
-244	18												
-246	20		4		(19)	Silty Fine SAND (SM): medium dense, light reddish brown, wet	123	99	24				
-248	22												
-250	24												
-252	26		5		35								
-254	28												
-256	30		6		(21)	Lean CLAY (CL): stiff, dark yellowish brown to light reddish brown, wet, 1" clayey silt seam at 31.5'	118	88	34				
-258	32												
-260	34												
-262	36		7		22	Silty Fine SAND (SM): medium dense, light reddish brown, wet							
-264	38												
-266													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 76.5 ft

BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 8, 2008

DRILLING METHOD: 4-inch-dia. Mud Rotary Wash
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. RW-07

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-8a

LOCATION: N 2,004,790 E 6,752,499 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -227 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
-268			NR		35								
	42		8		(35)		133	110	21				
-270													
	44												
-272			9		26					14			
	46												
-274													
	48												
-276													
	50		10		(11)	Fat CLAY (CH): medium stiff, light reddish brown, wet, with a trace of silt	116	85	38		72	48	
-278													
	52												
-280													
	54												
-282			11		22	Silty Fine SAND (SM): medium dense, light reddish brown, wet				46			
	56												
-284													
	58												
-286													
	60		NR		83								
-288													
	62												
-290													
	64												
-292			12		16	Lean CLAY (CL): wet - dark yellowish brown to 75.0' - very stiff at 65.0'							
	66												
-294													
	68												
-296													
	70		13		8	- medium stiff below 70.0'							
-298													
	72												
-300													
	74												
-302			14		7	- dark yellowish brown to light reddish brown at 75.0'							
	76												
-304													
	78												
-306													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 76.5 ft

BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 8, 2008

DRILLING METHOD: 4-inch-dia. Mud Rotary Wash
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. RW-07

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-8b

LOCATION: N 2,005,752 E 6,752,870 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -228.5 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
-230	2		1		(4)	Lean CLAY (CL): - pale yellowish brown and dry at 0.0' - soft, light brown, and slightly moist to moist at 2.0'							
-232	4						123	96	28				
-234	6		2		2	Silty Fine SAND (SM): very loose, moderate yellowish brown, very moist							
-236	8												
-238	10												
-240	12												
-242	14												
-244	16												
-246	18												
-248	20												
-250	22												
-252	24												
-254	26												
-256	28												
-258	30												
-260	32												
-262	34												
-264	36												
-266	38												
-268													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 6.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 15, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-01

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-9

LOCATION: N 2,005,656 E 6,752,525 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -228.3 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
						Lean CLAY (CL): - pale yellowish brown and dry at 0.0'							
-230	2		1		(3)	- very soft, moderate yellowish brown, and very moist to wet at 2.0'							
-232	4						116	91	28				
-234	6		2		(2)	SILT (ML): very soft, moderate yellowish brown, very moist to wet, with a trace of sand	119	94	27				
-236	8												
-238	10												
-240	12												
-242	14												
-244	16												
-246	18												
-248	20												
-250	22												
-252	24												
-254	26												
-256	28												
-258	30												
-260	32												
-262	34												
-264	36												
-266	38												
-268													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 6.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 15, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-02

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-10

LOCATION: N 2,005,555 E 6,752,124 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -228.9 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
		B		BULK	Lean CLAY (CL): pale yellowish brown, dry				96	38	25	
-230	2	1		(6)	SILT (ML): moderate to dark yellowish brown, very moist to wet - soft at 2.0'	117	92	28				
-232	4											
-234	6	2		(3)	- very soft at 5.0'	122	98	24				
-236	8											
-238	10	3		5	Silty Fine SAND (SM): loose, moderate yellowish brown, wet							
-240	12											
-242	14											
-244	16	4		8	Lean CLAY (CL): medium stiff, dark yellowish brown, wet							
-246	18											
-248	20	5		4	Silty Fine SAND (SM): very loose, dark yellowish brown, wet							
-250	22											
-252	24											
-254	26	6		7	Silty Fine SAND (SM) to Sandy SILT (ML): loose, dark yellowish brown, wet							
-256	28											
-258	30											
-260	32											
-262	34											
-264	36											
-266	38											
-268												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 26.5 ft
DEPTH TO WATER: 5.0 ft
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 15, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-03

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-11

LOCATION: N 2,005,469 E 6,751,158 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -228.8 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
			B		BULK	Lean CLAY (CL): - pale yellowish brown and dry at 0.0'				98	33	17	
-230	2		1		(2)	- soft, moderate yellowish brown, and moist at 2.0'							
-232	4						117	89	31				
-234	6		2		(4)	Silty Fine SAND (SM) to Sandy SILT (ML): very loose, moderate yellowish brown, very moist to wet	126	101	25				
-236	8												
-238	10												
-240	12												
-242	14												
-244	16												
-246	18												
-248	20												
-250	22												
-252	24												
-254	26												
-256	28												
-258	30												
-260	32												
-262	34												
-264	36												
-266	38												
-268													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 6.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 15, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-04

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-12

LOCATION: N 2,005,837 E 6,754,161 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -224 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
			B		BULK	Lean CLAY with sand (CL): pale yellowish brown, dry - with a 6" silty sand layer at 0.0' (dirt road)				75			
-226	2		1		(8)	SILT (ML): medium stiff, moderate yellowish brown, very moist to wet	118	94	26				
-228	4												
-230	6		2		(5)	Silty Fine SAND (SM): very loose, moderate yellowish brown, very moist to wet	120	97	23				
-232	8												
-234	10												
-236	12												
-238	14												
-240	16												
-242	18												
-244	20												
-246	22												
-248	24												
-250	26												
-252	28												
-254	30												
-256	32												
-258	34												
-260	36												
-262	38												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 6.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 17, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-05

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-13

LOCATION: N 2,005,027 E 6,752,048 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -228.1 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
						Lean CLAY (CL): pale yellowish brown, dry							
-230	2		1		(8)	Silty Fine SAND (SM) to Sandy SILT (ML): loose, moderate yellowish brown, moist to very moist	115	92	26				
-232	4												
-234	6		2		(2)	Lean CLAY (CL): very soft, moderate yellowish brown, moist to very moist	115	88	31				
-236	8												
-238	10												
-240	12												
-242	14												
-244	16												
-246	18												
-248	20												
-250	22												
-252	24												
-254	26												
-256	28												
-258	30												
-260	32												
-262	34												
-264	36												
-266	38												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 6.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 15, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-06

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-14

LOCATION: N 2,004,934 E 6,751,075 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -228 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
						Lean CLAY (CL): - pale yellowish brown and dry at 0.0'							
-230	2		1		(3)	- very soft, moderate yellowish brown, and moist at 2.0'							
							114	88	30				
-232	4												
			2		(10)	Silty Fine SAND (SM): loose, moderate yellowish brown, very moist to wet							
-234	6						121	98	23				
-236	8												
-238	10												
-240	12												
-242	14												
-244	16												
-246	18												
-248	20												
-250	22												
-252	24												
-254	26												
-256	28												
-258	30												
-260	32												
-262	34												
-264	36												
-266	38												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 6.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 15, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-07

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-15

LOCATION: N 2,005,823 E 6,755,553 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -223 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
			B		BULK	Lean CLAY (CL): pale yellowish brown, dry - with a 6" silty sand layer at 0.0' (dirt road)				98			
-224	2		1		(2)	Sandy SILT (ML): very soft, moderate yellowish brown, moist	107	83	29				
-226	4												
-228	6		2		(7)	Silty Fine SAND (SM): loose, moderate yellowish brown, very moist to wet	115	92	25				
-230	8												
-232	10												
-234	12												
-236	14												
-238	16												
-240	18												
-242	20												
-244	22												
-246	24												
-248	26												
-250	28												
-252	30												
-254	32												
-256	34												
-258	36												
-260	38												
-262													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 6.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 17, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-08

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-16

LOCATION: N 2,004,753 E 6,751,236 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -227.5 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
-228		B		BULK	Lean CLAY (CL): pale yellowish brown, dry							
-230	2	1		(6)	Silty Fine SAND (SM): very loose, moderate yellowish brown, very moist to wet	108	83	30				
-232	4											
-234	6	2		(6)	SILT (ML): soft, moderate yellowish brown, very moist to wet	115	91	26				
-236	8											
-238	10	3		10	Silty Fine SAND (SM): loose, moderate yellowish brown, wet							
-240	12											
-242	14											
-244	16	4		1	Lean CLAY (CL): very soft, moderate yellowish brown, wet, with a trace of sand							
-246	18											
-248	20	5		1	Silty Fine SAND (SM): moderate yellowish brown, wet - very loose at 20.0'							
-250	22											
-252	24											
-254	26	6		11	- medium dense at 25.0'							
-256	28											
-258	30											
-260	32											
-262	34											
-264	36											
-266	38											

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 26.5 ft
DEPTH TO WATER: 5.0 ft
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 15, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-09

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-17

LOCATION: N 2,004,617 E 6,751,677 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -227 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
			B		BULK	Fat CLAY (CH): pale yellowish brown, dry					52	33	
-228	2		1		(7)	Lean CLAY (CL): moderate yellowish brown, very moist to wet							
-230	4					- medium stiff at 2.0'	114	90	27				
-232	6		2		(2)	- very soft at 5.0'	115	89	29				
-234	8												
-236	10												
-238	12												
-240	14												
-242	16												
-244	18												
-246	20												
-248	22												
-250	24												
-252	26												
-254	28												
-256	30												
-258	32												
-260	34												
-262	36												
-264	38												
-266													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 6.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 15, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-10

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-18

LOCATION: N 2,004,291 E 6,751,165 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -227 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
-228			B		BULK	Lean CLAY (CL): - pale yellowish brown and dry at 0.0'					36	17	
	2		1		(2)	- very soft, moderate yellowish brown, and very moist at 2.0'							
-230							116	87	34				
	4												
-232			2		(7)	Silty Fine SAND (SM) to Sandy SILT (ML): loose, moderate yellowish brown, very moist to wet							
	6						121	98	24				
-234													
	8												
-236													
	10		3		5	Silty Fine SAND (SM): loose, moderate yellowish brown, wet							
-238													
	12												
-240													
	14												
-242													
	16												
-244													
	18												
-246													
	20												
-248													
	22												
-250													
	24												
-252													
	26												
-254													
	28												
-256													
	30												
-258													
	32												
-260													
	34												
-262													
	36												
-264													
	38												
-266													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 11.5 ft
DEPTH TO WATER: 8.5 ft
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 15, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-11

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-19

LOCATION: N 2,004,491 E 6,752,434 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -223 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
			B		BULK	Lean CLAY (CL): - with a 6" silty sand layer at 0.0' (dirt road) - pale yellowish brown and dry at 0.5' - medium stiff, moderate yellowish brown, and moist at 2.0'				100			
-224	2		1		(12)								
-226	4						119	94	27				
-228	6		2		(3)	SILT (ML): very soft, moderate yellowish brown, very moist to wet	115	89	29				
-230	8												
-232	10												
-234	12												
-236	14												
-238	16												
-240	18												
-242	20												
-244	22												
-246	24												
-248	26												
-250	28												
-252	30												
-254	32												
-256	34												
-258	36												
-260	38												
-262													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 6.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 17, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-12

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-20

LOCATION: N 2,005,204 E 6,753,571 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -219 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
			B		BULK	Lean CLAY (CL):				87			
-220						- with a 6" silty sand layer at 0.0' (dirt road)							
	2		1		(8)	- pale yellowish brown and dry at 0.5'							
-222						- medium stiff at 2.0'							
						- moderate yellowish brown and moist below 2.0'	110	86	29				
	4												
-224			2		(4)	- soft at 5.0'							
	6						115	86	34				
-226													
	8												
-228													
	10												
-230													
	12												
-232													
	14												
-234													
	16												
-236													
	18												
-238													
	20												
-240													
	22												
-242													
	24												
-244													
	26												
-246													
	28												
-248													
	30												
-250													
	32												
-252													
	34												
-254													
	36												
-256													
	38												
-258													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 6.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 17, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-13

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-21

LOCATION: N 2,004,317 E 6,751,970 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -226 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
			B		BULK	Lean CLAY (CL): pale yellowish brown, dry, with some clay				91	27	8	
-228	2		1		(9)	Silty Fine SAND (SM) to Sandy SILT (ML): loose, moderate yellowish brown, very moist to wet	115	91	27				
-230	4												
			2		(8)								
-232	6						129	97	33				
-234	8												
-236	10		3		10	Silty Fine SAND (SM): loose, moderate yellowish brown, wet							
-238	12												
-240	14												
-242	16		4		3	Lean CLAY (CL): soft, moderate yellowish brown, wet							
-244	18												
-246	20												
-248	22												
-250	24												
-252	26												
-254	28												
-256	30												
-258	32												
-260	34												
-262	36												
-264	38												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 16.5 ft
DEPTH TO WATER: 5.0 ft
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 16, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-14

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-22

LOCATION: N 2,003,996 E 6,751,182 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -226.2 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
						Lean CLAY (CL): - pale yellowish brown and dry at 0.0'							
-228	2		1		(4)	- soft, moderate yellowish brown, and very moist to wet at 2.0'							
-230	4						118	89	33				
-232	6		2		(2)	Silty Fine SAND (SM) to Sandy SILT (ML): very loose, moderate yellowish brown, very moist to wet	116	89	30				
-234	8												
-236	10		3		3	Silty Fine SAND (SM): very loose, moderate yellowish brown, wet							
-238	12												
-240	14												
-242	16												
-244	18												
-246	20												
-248	22												
-250	24												
-252	26												
-254	28												
-256	30												
-258	32												
-260	34												
-262	36												
-264	38												
-266													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 11.5 ft
DEPTH TO WATER: 8.0 ft
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 15, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-15

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-23

LOCATION: N 2,004,195 E 6,750,966 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -222 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
			B		BULK	Silty SAND (SM): (0.0' to 0.5': dirt road) - pale yellowish brown and dry to 2.0'							
-224	2		1		(65)	- dense, moderate yellowish brown, wet, fine- to coarse-grained, with some gravel and gray sand below 2.0'			14				
-226	4												
			NS		(5)								
-228	6												
-230	8												
-232	10		2		2	Lean CLAY (CL): soft, moderate yellowish brown, very moist					31	11	
-234	12												
-236	14												
-238	16		3		9	SILT with sand (ML): stiff, moderate yellowish brown, wet, with a trace of clay				78			
-240	18												
-242	20												
-244	22												
-246	24												
-248	26												
-250	28												
-252	30												
-254	32												
-256	34												
-258	36												
-260	38												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 16.5 ft
DEPTH TO WATER: 11.0 ft
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 16, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-16

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-24

LOCATION: N 2,003,936 E 6,751,586 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -226 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
						Lean CLAY (CL): pale yellowish brown, dry							
-228	2		1		(4)	Silty Fine SAND (SM) to Sandy SILT (ML): very loose, moderate yellowish brown, very moist to wet	118	91	29				
-230	4												
-232	6		2		(4)	SILT (ML): soft, moderate yellowish brown, very moist to wet, with a trace of sand	117	93	26				
-234	8												
-236	10												
-238	12												
-240	14												
-242	16												
-244	18												
-246	20												
-248	22												
-250	24												
-252	26												
-254	28												
-256	30												
-258	32												
-260	34												
-262	36												
-264	38												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 6.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 16, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-17

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-25

LOCATION: N 2,003,894 E 6,752,364 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -225.8 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
-226						Lean CLAY (CL): - pale yellowish brown and damp at 0.0'							
-228	2		1		(6)	- moist at 2.0' - soft and moderate yellowish brown below 2.0'	117	91	29				
-230	4												
-232	6		2		(4)	- very moist to wet at 5.0'	119	95	26				
-234	8												
-236	10												
-238	12												
-240	14												
-242	16												
-244	18												
-246	20												
-248	22												
-250	24												
-252	26												
-254	28												
-256	30												
-258	32												
-260	34												
-262	36												
-264	38												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 6.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 16, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-18

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-26

LOCATION: N 2,003,583 E 6,750,967 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -221 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
-222			B		BULK	Silty SAND (SM): (0.0' to 0.5': dirt road) - pale yellowish brown and dry to 2.0'							
	2		1		(42)	- medium dense, moderate yellowish brown, moist, fine- to coarse-grained, with some gravel at 2.0'							
-224									13				
	4												
-226			2		(9)	Lean CLAY (CL): medium stiff, dark yellowish brown, moist							
	6								29				
-228													
	8												
-230													
	10		3			SILT (ML): moderate yellowish brown, moist							
-232													
	12						118	88	34		34	9	
-234													
	14												
-236			4		6	Silty Fine SAND (SM) to Sandy SILT (ML): loose, moderate yellowish brown, wet, with some clay							
	16												
-238													
	18												
-240													
	20												
-242													
	22												
-244													
	24												
-246													
	26												
-248													
	28												
-250													
	30												
-252													
	32												
-254													
	34												
-256													
	36												
-258													
	38												
-260													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 16.5 ft
DEPTH TO WATER: 15.0 ft
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 18, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-19

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-27

LOCATION: N 2,003,443 E 6,752,397 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -224.6 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
			B		BULK	Lean CLAY (CL): - pale yellowish brown and dry at 0.0'				94			
-226	2		1		(5)	- very loose, moderate yellowish brown, and very moist to wet at 2.0'							
-228	4						115	90	28				
-230	6		2		(5)	Silty Fine SAND (SM) to Sandy SILT (ML): very loose, moderate yellowish brown, very moist to wet	116	92	26				
-232	8												
-234	10		3		21	Silty Fine SAND (SM): medium dense, moderate to dark yellowish brown, wet							
-236	12												
-238	14												
-240	16		4		5	Lean CLAY (CL): medium stiff, moderate yellowish brown, very moist to wet, with a trace of sand							
-242	18												
-244	20		5		5	Silty Fine SAND (SM): loose, moderate yellowish brown, wet							
-246	22												
-248	24												
-250	26		6		7								
-252	28												
-254	30												
-256	32												
-258	34												
-260	36												
-262	38												
-264													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 26.5 ft
DEPTH TO WATER: 7.0 ft
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 16, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-20

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-28

LOCATION: N 2,003,288 E 6,751,504 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -225.8 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
-226						Lean CLAY (CL): - pale yellowish brown and dry at 0.0'							
-228	2		1		(7)	- medium stiff, moderate yellowish brown, and very moist to wet at 2.0'	111	85	30				
-230	4												
-232	6		2		(12)		118	95	24				
-234	8												
-236	10												
-238	12												
-240	14												
-242	16												
-244	18												
-246	20												
-248	22												
-250	24												
-252	26												
-254	28												
-256	30												
-258	32												
-260	34												
-262	36												
-264	38												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 6.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 16, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-21

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-29

LOCATION: N 2,003,352 E 6,751,853 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -225.5 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
-226			B		BULK	Lean CLAY (CL): - pale yellowish brown and dry at 0.0'				99	45	30	
-228	2		1		(5)	- moist at 2.0' - soft and moderate yellowish brown below 2.0'	116	88	31				
-230	4												
-232	6		2		(4)	- very moist to wet at 5.0'	118	92	28				
-234	8												
-236	10		3		7	Silty Fine SAND (SM): loose, moderate yellowish brown, wet							
-238	12												
-240	14												
-242	16												
-244	18												
-246	20												
-248	22												
-250	24												
-252	26												
-254	28												
-256	30												
-258	32												
-260	34												
-262	36												
-264	38												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 11.5 ft
DEPTH TO WATER: 8.0 ft
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 16, 2008

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-22

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-30

LOCATION: N 2,003,270 E 6,752,135 California State Plane, Zone 6, NAD83, Feet

SURFACE EL: -225.8 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
-226						Lean CLAY (CL): - pale yellowish brown and dry at 0.0'							
-228	2		1		(4)	- soft, moderate yellowish brown, and very moist to wet at 2.0'	114	88	29				
-230	4												
-232	6		2		(13)	Silty Fine SAND (SM) to Sandy SILT (ML): loose, moderate yellowish brown, very moist to wet	119	96	24				
-234	8												
-236	10												
-238	12												
-240	14												
-242	16												
-244	18												
-246	20												
-248	22												
-250	24												
-252	26												
-254	28												
-256	30												
-258	32												
-260	34												
-262	36												
-264	38												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 6.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Grout with Bentonite Chips
DRILLING DATE: October 16, 2008

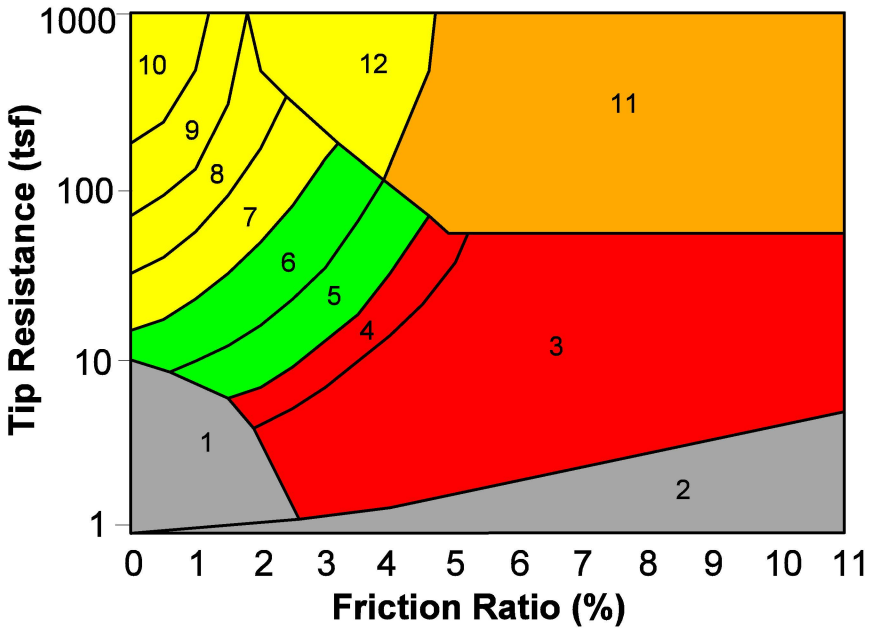
DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: Gregg Drilling
LOGGED BY: S Varnell
CHECKED BY: J Everett

LOG OF BORING NO. HSA-23

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE A1-31

COLOR LEGEND FOR FRICTION RATIO TRACES



Zone	Soil Behavior Type	U.S.C.S.
1	Sensitive Fine-grained	OL-CH
2	Organic Material	OL-OH
3	Clay	CH
4	Silty Clay to Clay	CL-CH
5	Clayey Silt to Silty Clay	MH-CL
6	Sandy Silt to Clayey Silt	ML-MH
7	Silty Sand to Sandy Silt	SM-ML
8	Sand to Silty Sand	SM-SP
9	Sand	SW-SP
10	Gravelly Sand to Sand	SW-GW
11	Very Stiff Fine-grained *	CH-CL
12	Sand to Clayey Sand *	SC-SM

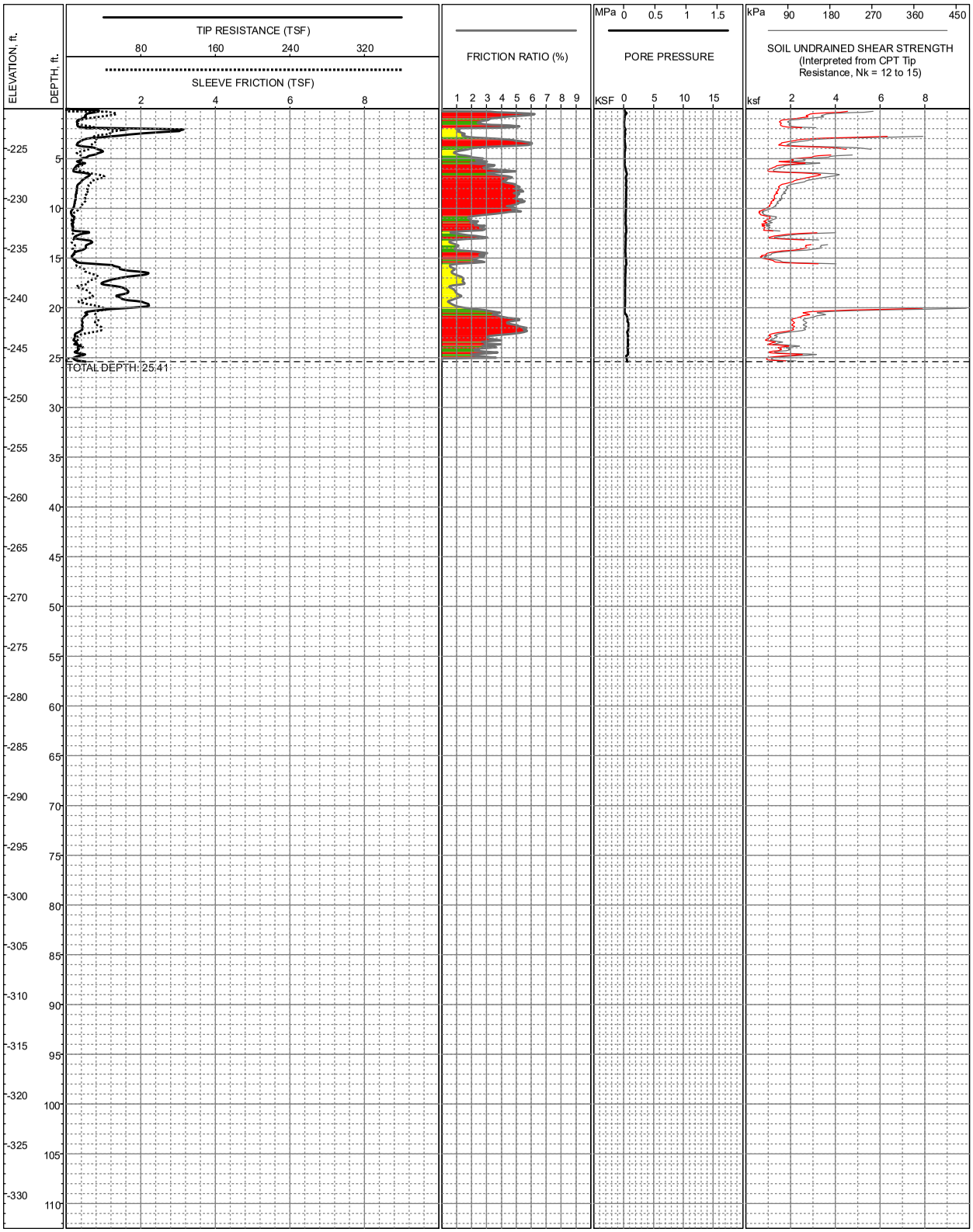
*overconsolidated or cemented

CPT CORRELATION CHART
(Robertson and Campanella, 1984)

KEY TO CPT LOGS
Black Rock Units 1, 2 & 3
Calpatria, California

FIGURE A2-1

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\A2-22_KeytoCPT-RC88.mxd, 01/16/09, CDean



LOCATION: E6,750,956, N2,005,421, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -221.0ft +/- (NAVD88)
COMPLETION DEPTH: 25.41ft
TESTDATE: 10/8/2008

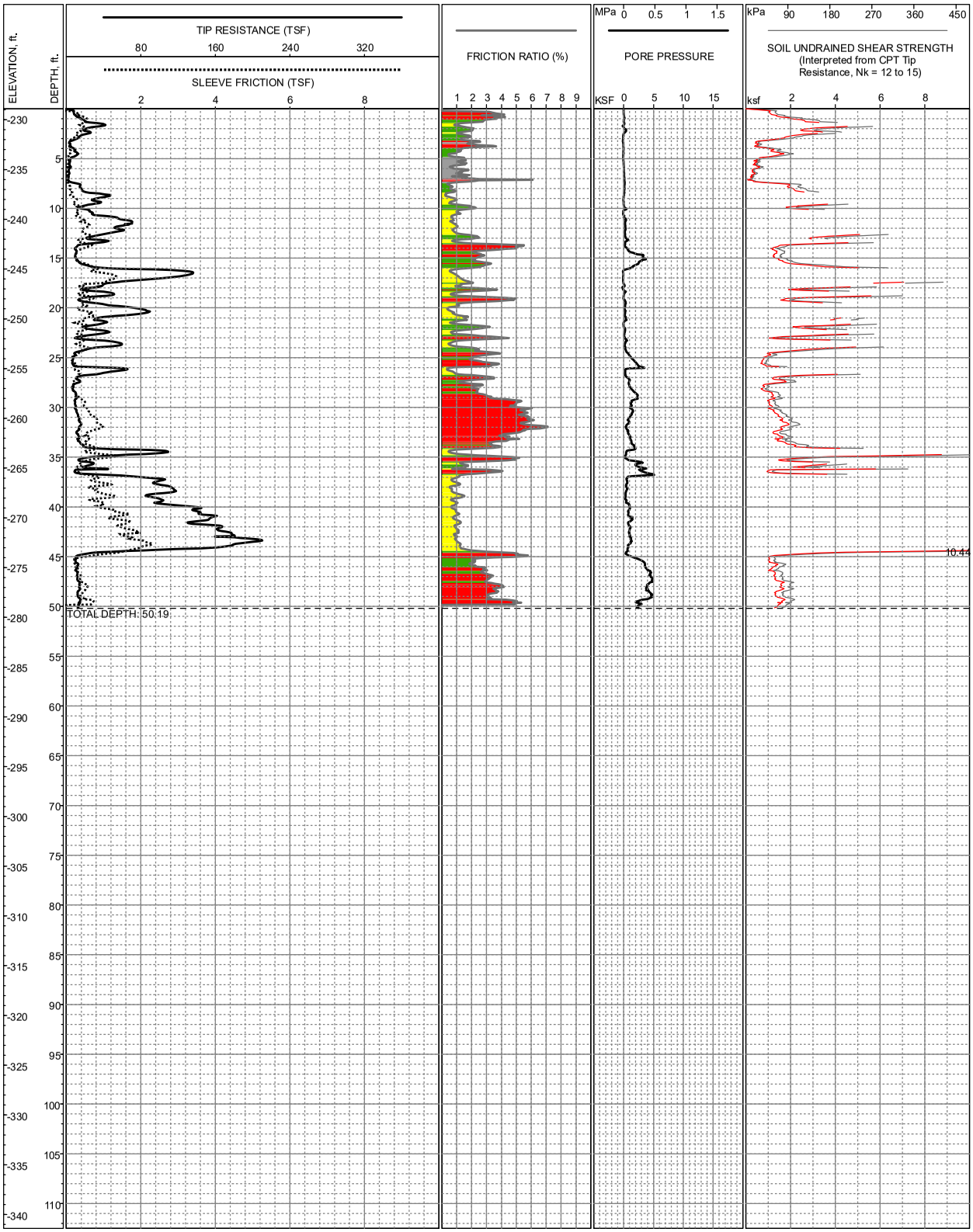
EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LOG OF C-101

Black Rock Units 1,2 & 3
Calipatria, California

FIGURE A2-2

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\CPTLogs_Su.mxd,01/16/2009,CDean



LOCATION: E6,752,117, N2,005,697, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -228.9ft +/- (NAVD88)
COMPLETION DEPTH: 50.19ft
TESTDATE: 10/8/2008

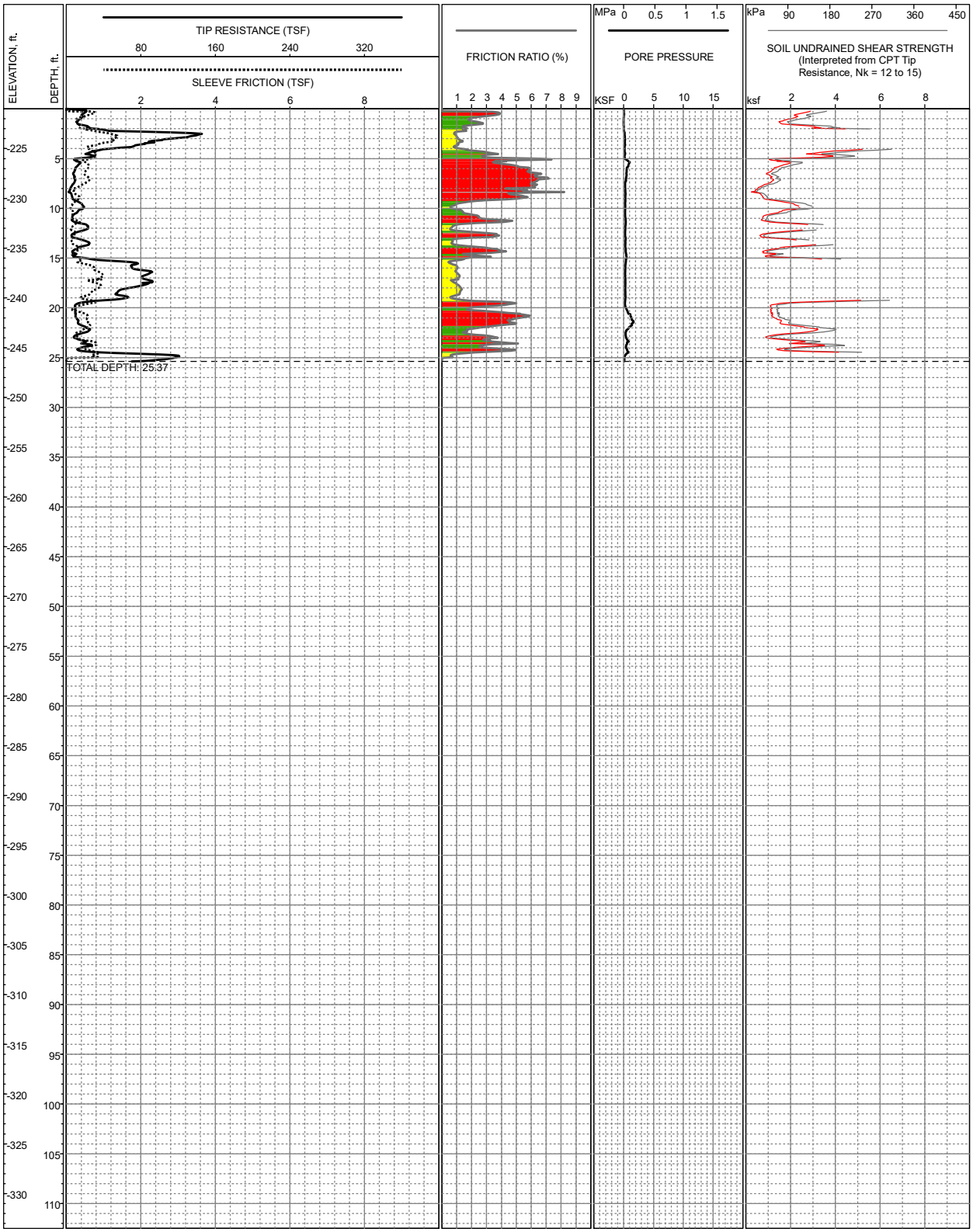
EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LOG OF C-102

Black Rock Units 1,2 & 3
Calipatria, California

FIGURE A2-3

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\CPTLogs_Su.mxd,01/16/2009,CDean



LOCATION: E6,750,954, N2,004,791, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -221.0ft +/- (NAVD88)
COMPLETION DEPTH: 25.37ft
TESTDATE: 10/8/2008

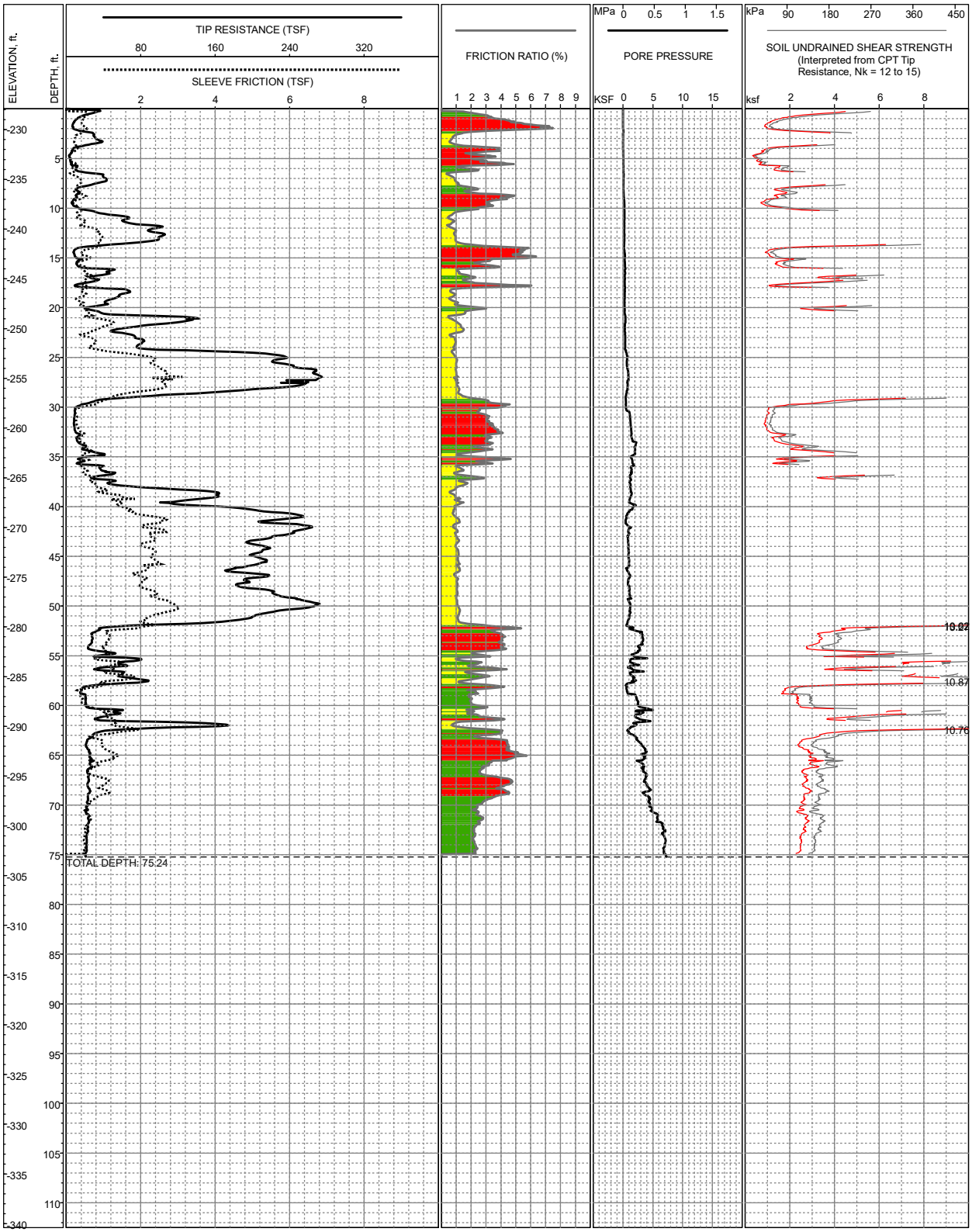
EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LOG OF C-103

Black Rock Units 1,2 & 3
Calipatria, California

FIGURE A2-4

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\CPTLogs_Su.mxd,01/16/2009,CDean



LOCATION: E6,752,229, N2,004,966, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -227.9ft +/- (NAVD88)
COMPLETION DEPTH: 75.24ft
TESTDATE: 10/7/2008

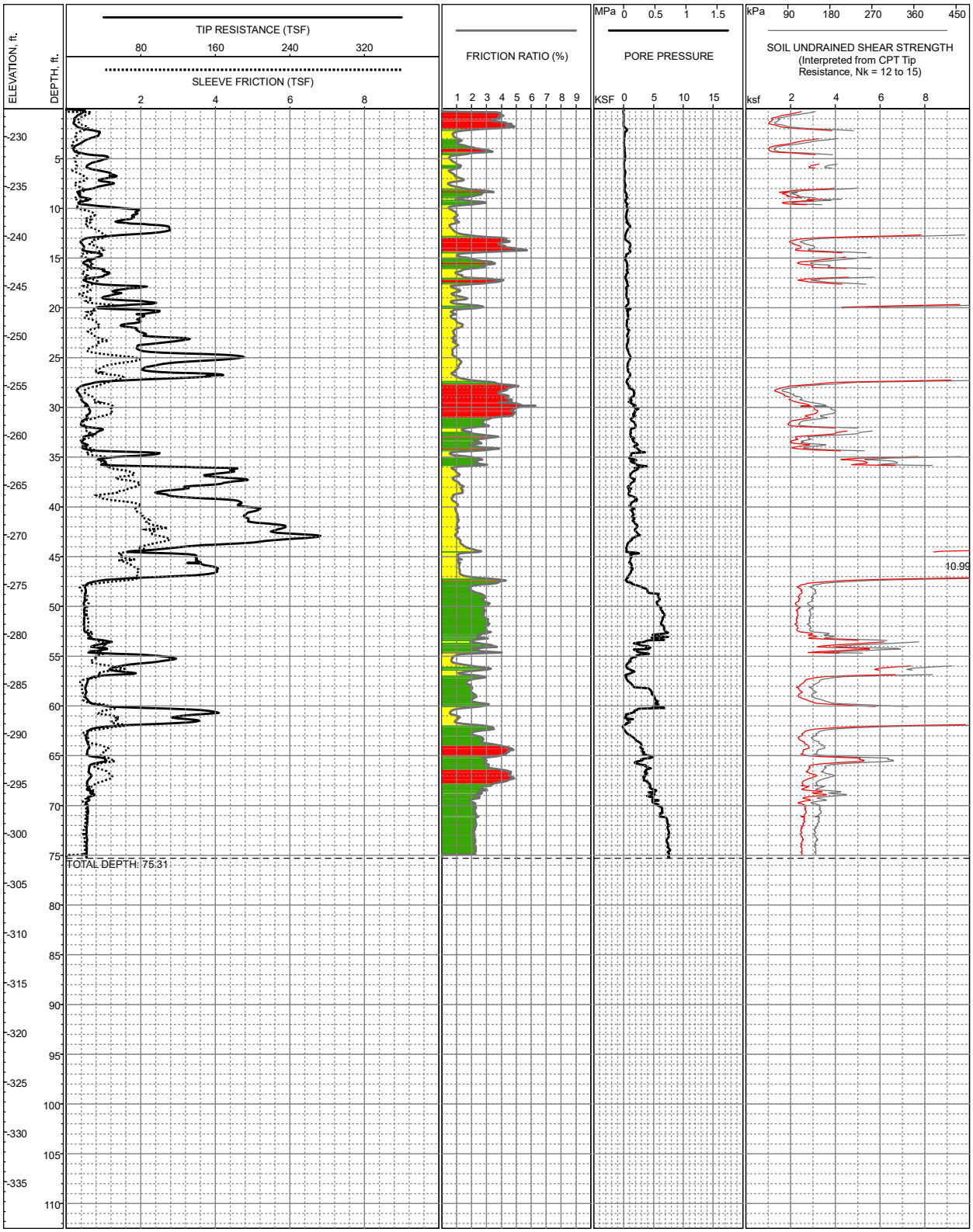
EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LOG OF C-104

Black Rock Units 1,2 & 3
Calipatria, California

FIGURE A2-5

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\CPTLogs_Su.mxd,01/16/2009,CDean



LOCATION: E6,752,401, N2,004,829, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -227.2ft +/- (NAVD88)
COMPLETION DEPTH: 75.31ft
TESTDATE: 10/7/2008

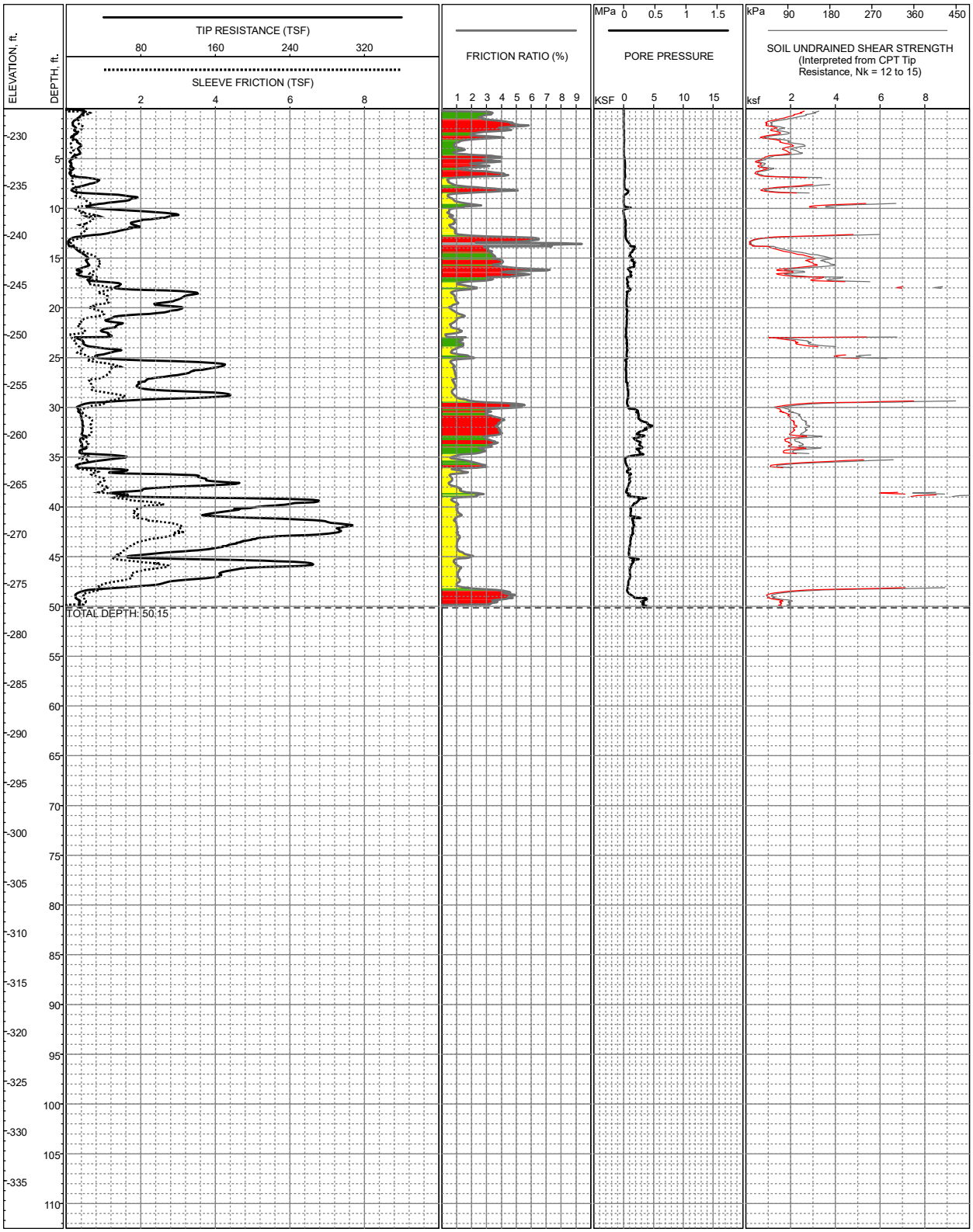
EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LOG OF C-105

Black Rock Units 1,2 & 3
Calipatria, California

FIGURE A2-6

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\CPTLogs_Su.mxd,01/16/2009,CDean



LOCATION: E6,751,827, N2,004,673, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -227.3ft +/- (NAVD88)
COMPLETION DEPTH: 50.15ft
TESTDATE: 10/7/2008

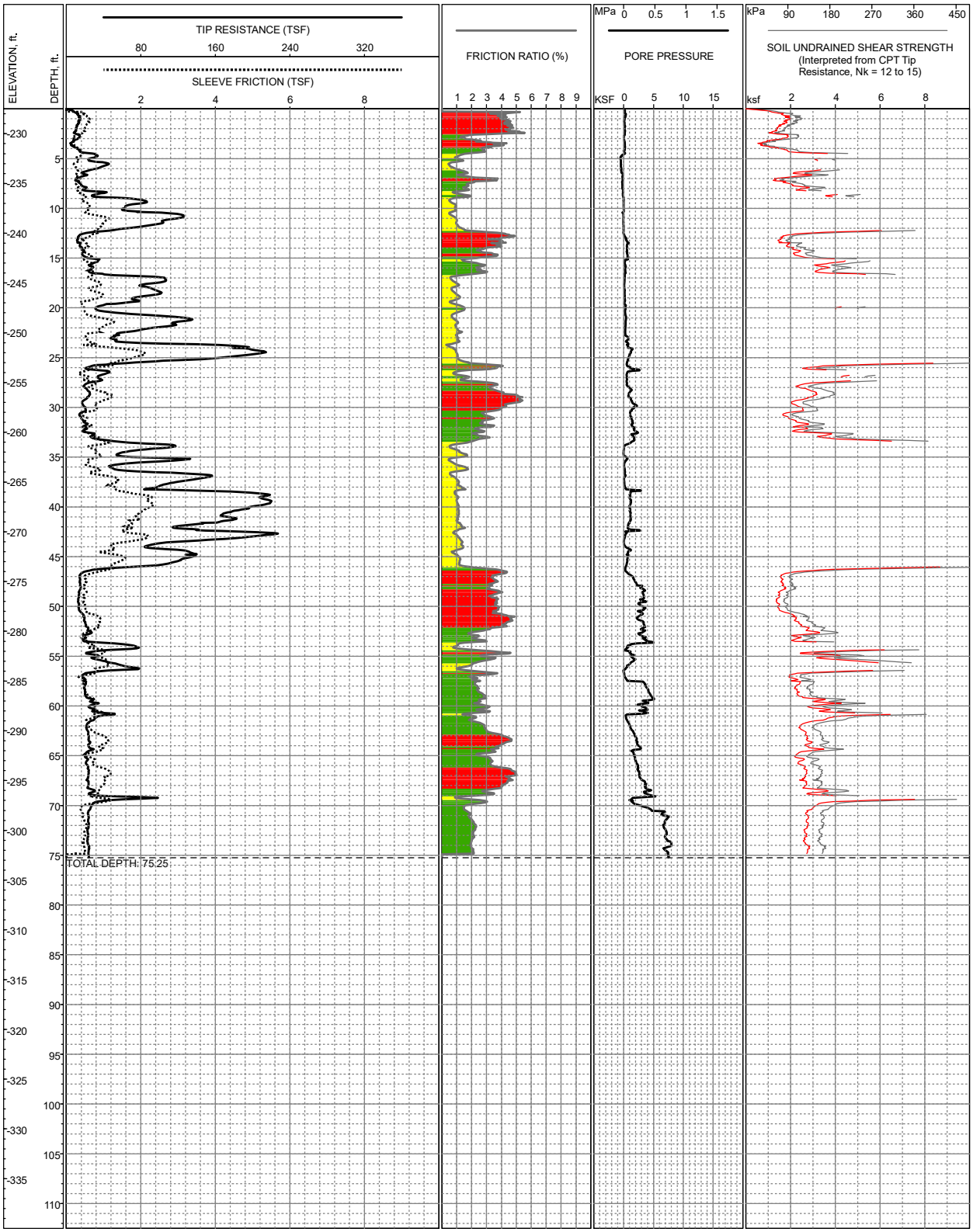
EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LOG OF C-106

Black Rock Units 1,2 & 3
Calipatria, California

FIGURE A2-7

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\CPTLogs_Su.mxd,01/16/2009,CDean



LOCATION: E6,752,273, N2,004,748, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -227.5ft +/- (NAVD88)
COMPLETION DEPTH: 75.25ft
TESTDATE: 10/7/2008

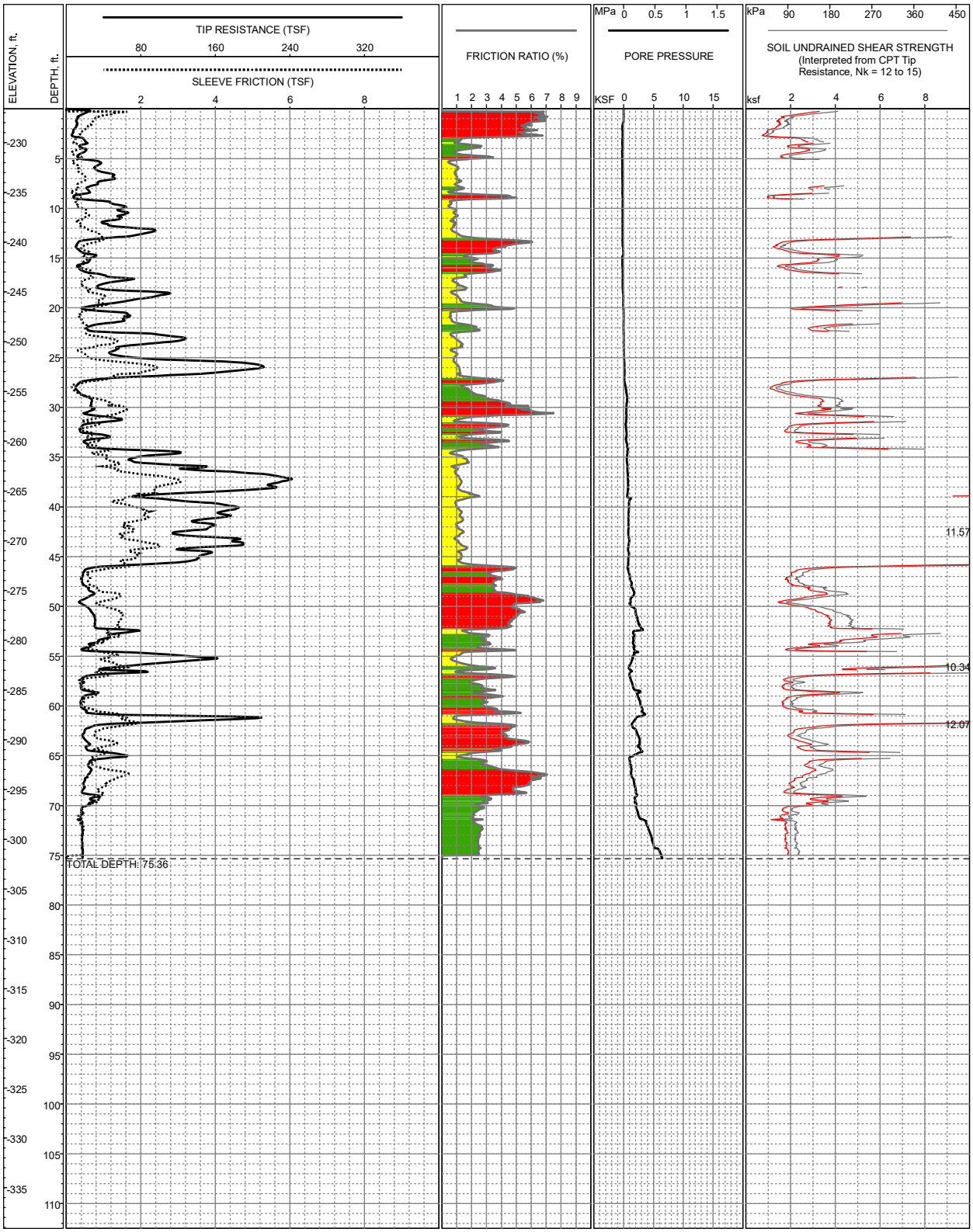
EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LOG OF C-107

Black Rock Units 1,2 & 3
Calipatria, California

FIGURE A2-8

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\CPTLogs_Su.mxd,01/16/2009,CDean



LOCATION: E6,752,567, N2,004,655, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -226.6ft +/- (NAVD88)
COMPLETION DEPTH: 75.36ft
TESTDATE: 10/7/2008

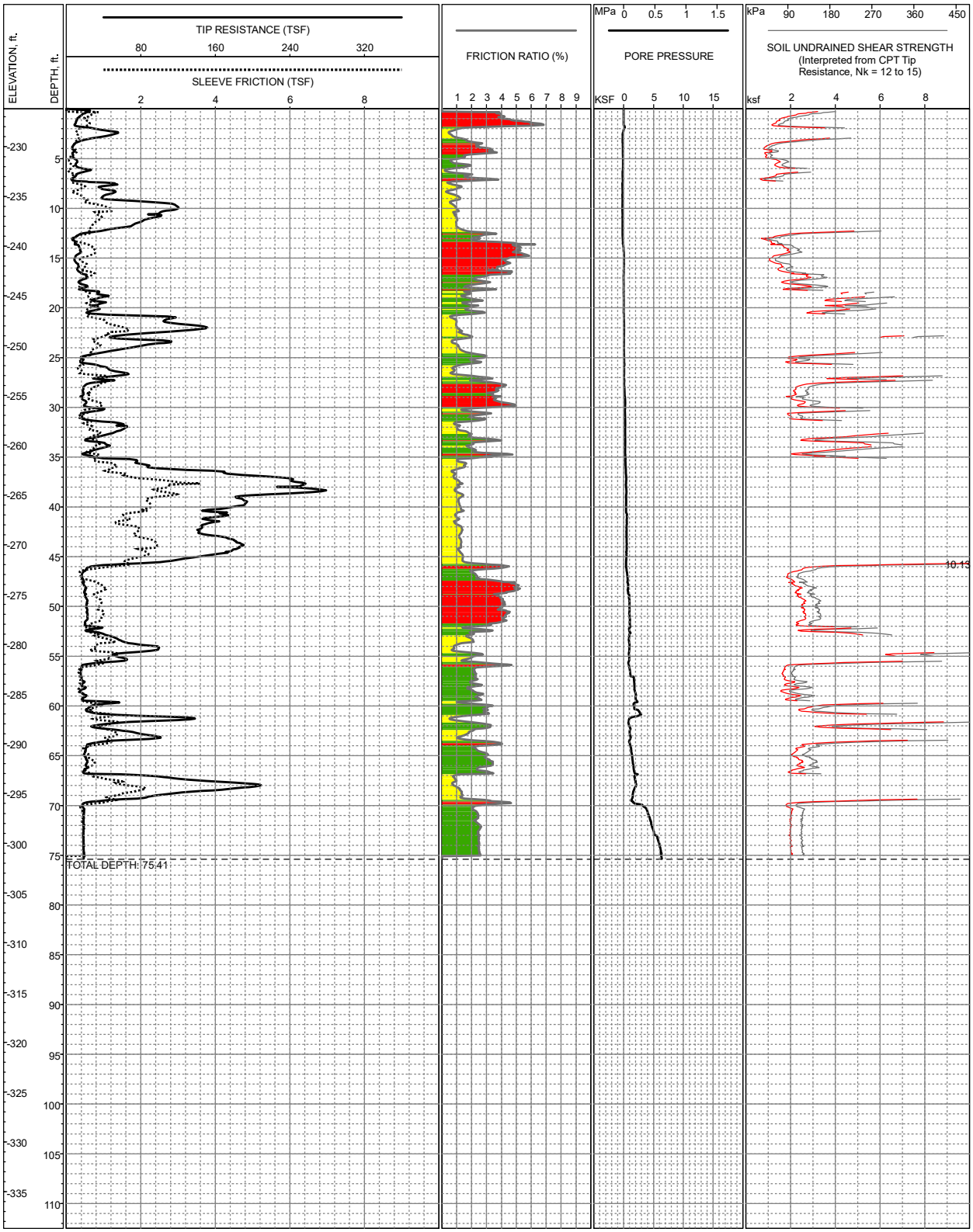
EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LOG OF C-108

Black Rock Units 1,2 & 3
Calipatria, California

FIGURE A2-9

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\CPTLogs_Su.mxd,01/16/2009,CDean



LOCATION: E6,751,740, N2,004,265, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -226.2ft +/- (NAVD88)
COMPLETION DEPTH: 75.41ft
TESTDATE: 10/8/2008

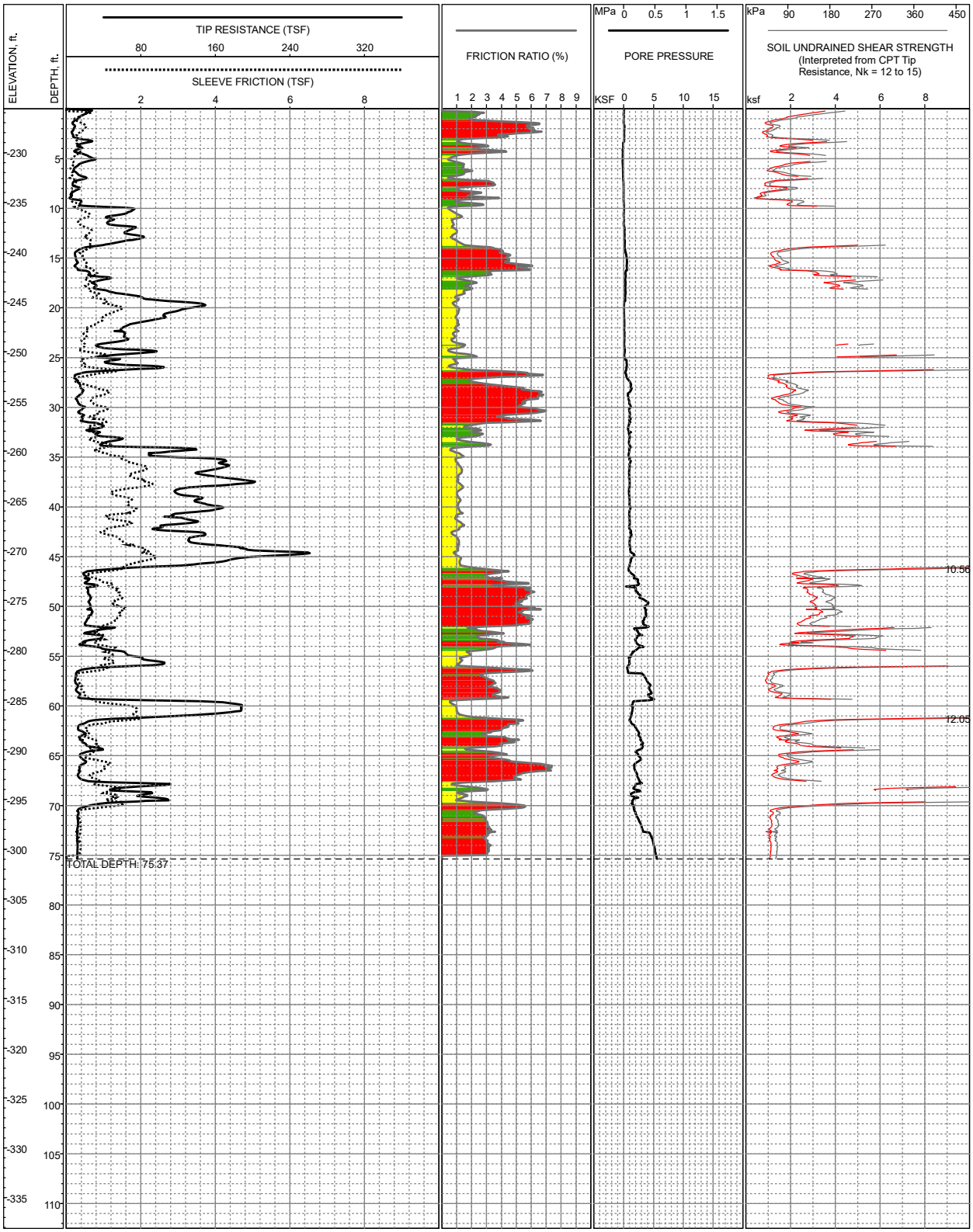
EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LOG OF C-109

Black Rock Units 1,2 & 3
Calipatria, California

FIGURE A2-10

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\CPTLogs_Su.mxd,01/16/2009,CDean



LOCATION: E6,752,361, N2,004,312, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -225.6ft +/- (NAVD88)
COMPLETION DEPTH: 75.37ft
TESTDATE: 10/9/2008

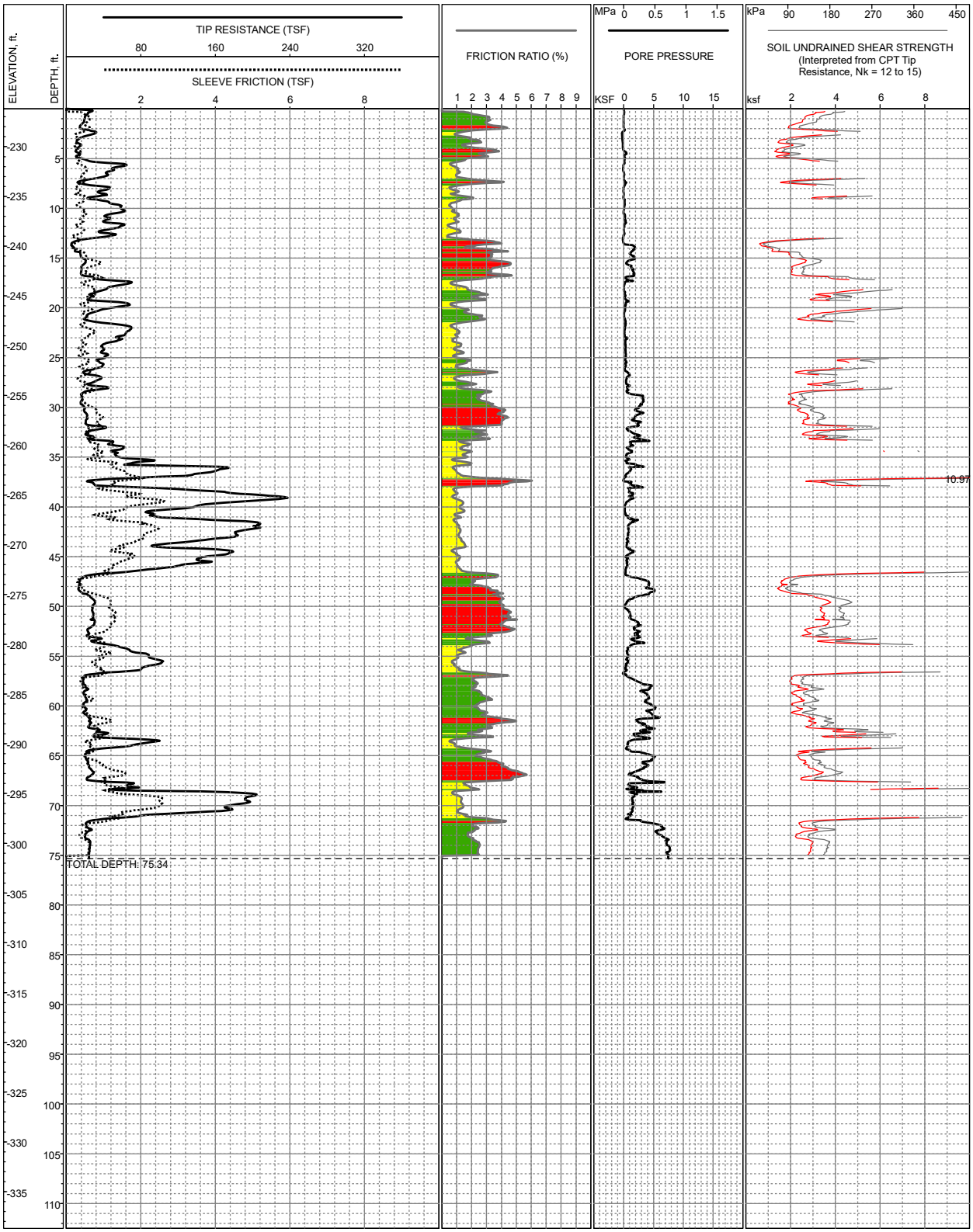
EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LOG OF C-110

Black Rock Units 1,2 & 3
Calipatria, California

FIGURE A2-11

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\CPTLogs_Su.mxd,01/16/2009,CDean



LOCATION: E6,751,643, N2,004,119, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -226.2ft +/- (NAVD88)
COMPLETION DEPTH: 75.34ft
TESTDATE: 10/8/2008

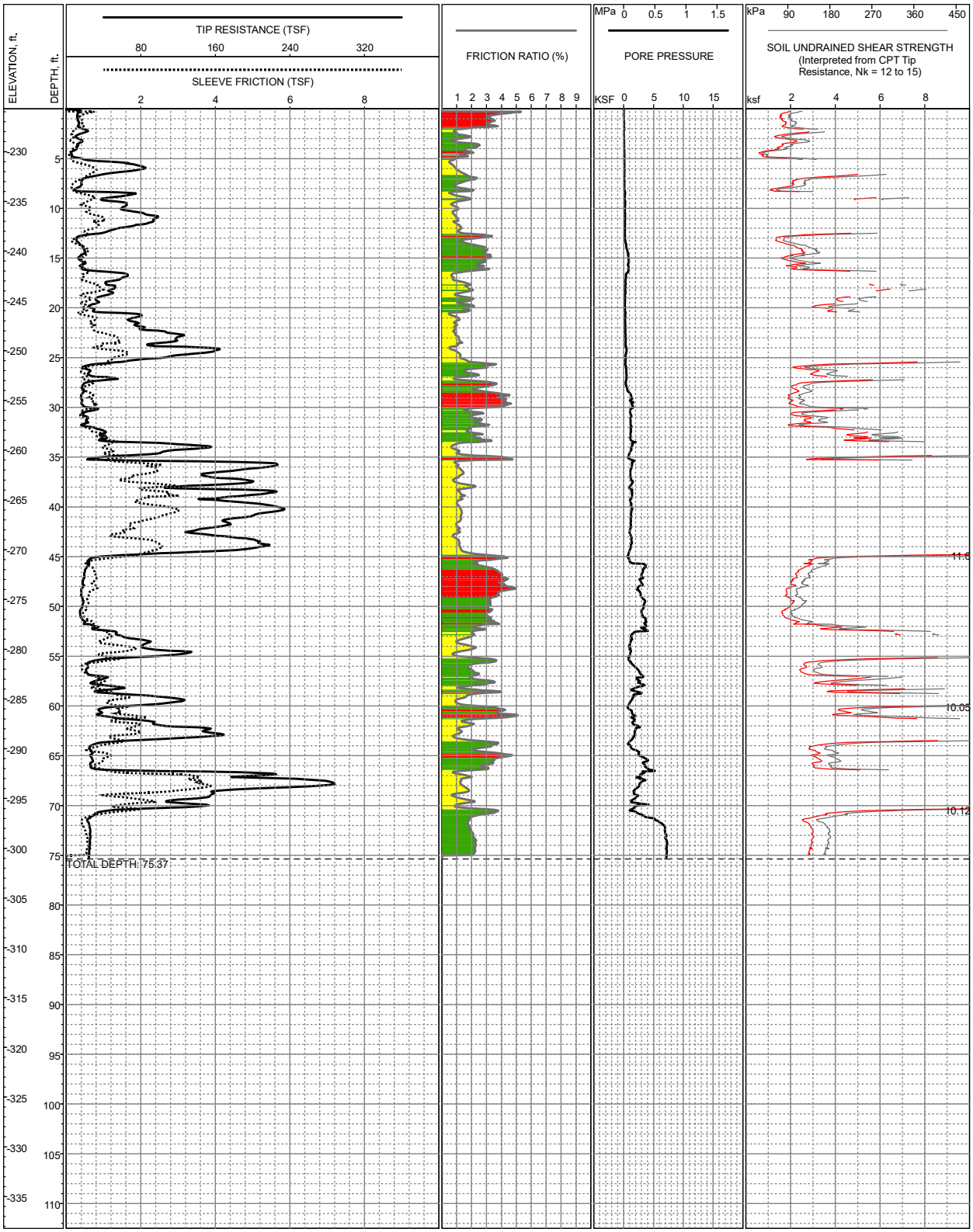
EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LOG OF C-111

Black Rock Units 1,2 & 3
Calipatria, California

FIGURE A2-12

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\CPTLogs_Su.mxd,01/16/2009,CDean



LOCATION: E6,751,779, N2,003,996, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -225.7ft +/- (NAVD88)
COMPLETION DEPTH: 75.37ft
TESTDATE: 10/8/2008

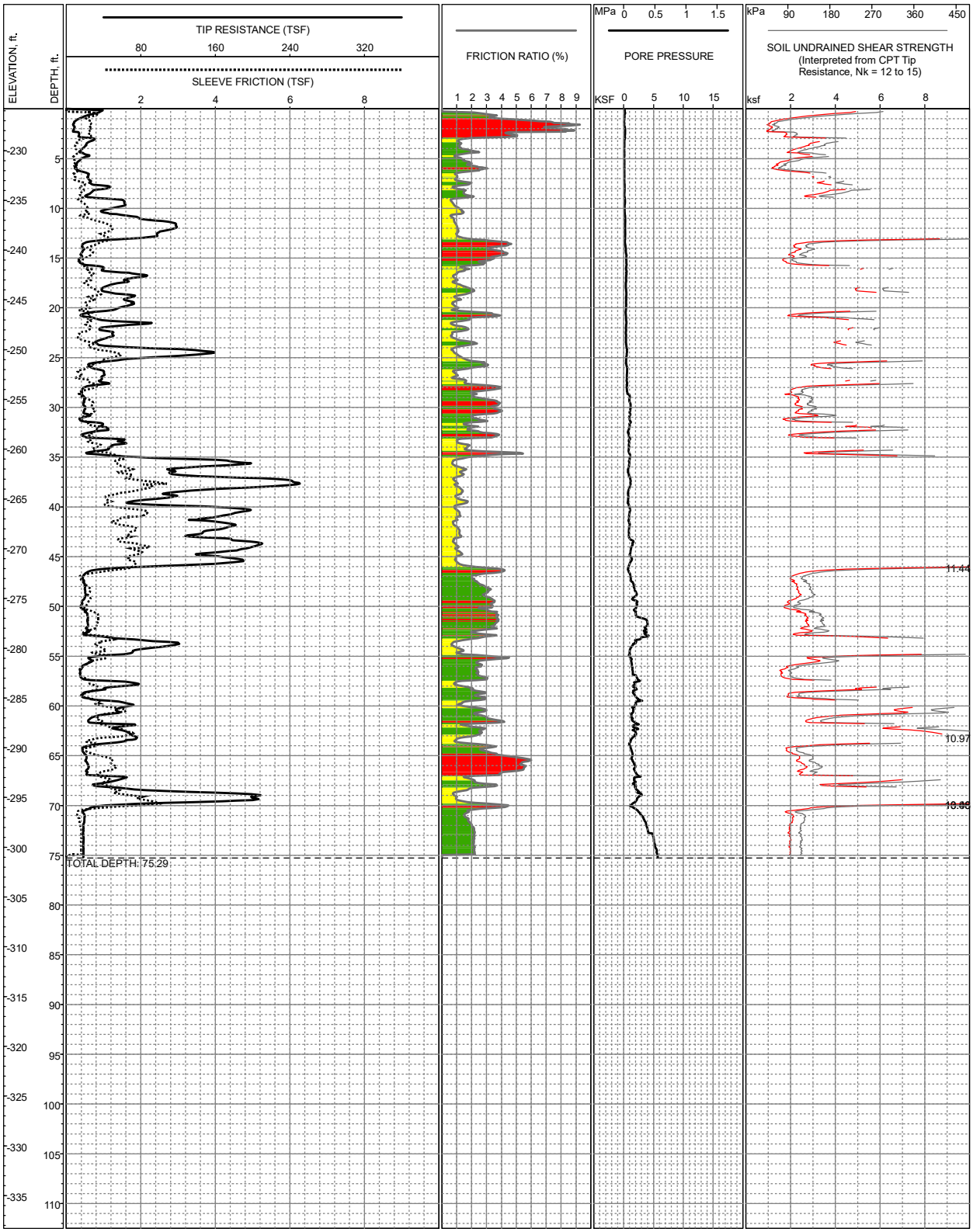
EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LOG OF C-112

Black Rock Units 1,2 & 3
Calipatria, California

FIGURE A2-13

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\CPTLogs_Su.mxd,01/16/2009,CDean



LOCATION: E6,751,918, N2,004,171, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -225.8ft +/- (NAVD88)
COMPLETION DEPTH: 75.29ft
TESTDATE: 10/8/2008

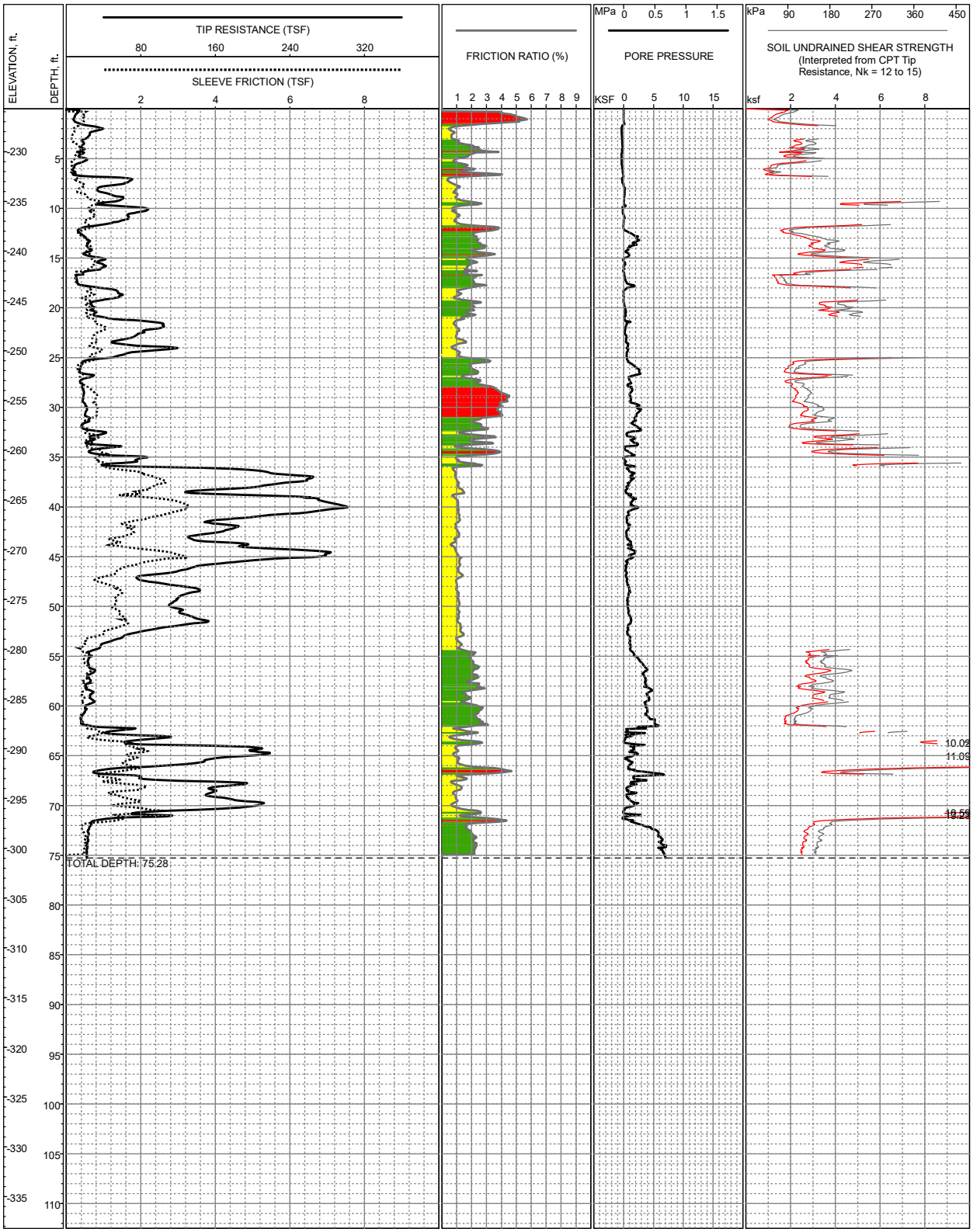
EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LOG OF C-113

Black Rock Units 1,2 & 3
Calipatria, California

FIGURE A2-14

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\CPTLogs_Su.mxd,01/16/2009,CDean



LOCATION: E6,752,088, N2,003,947, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -225.7ft +/- (NAVD88)
COMPLETION DEPTH: 75.28ft
TESTDATE: 10/8/2008

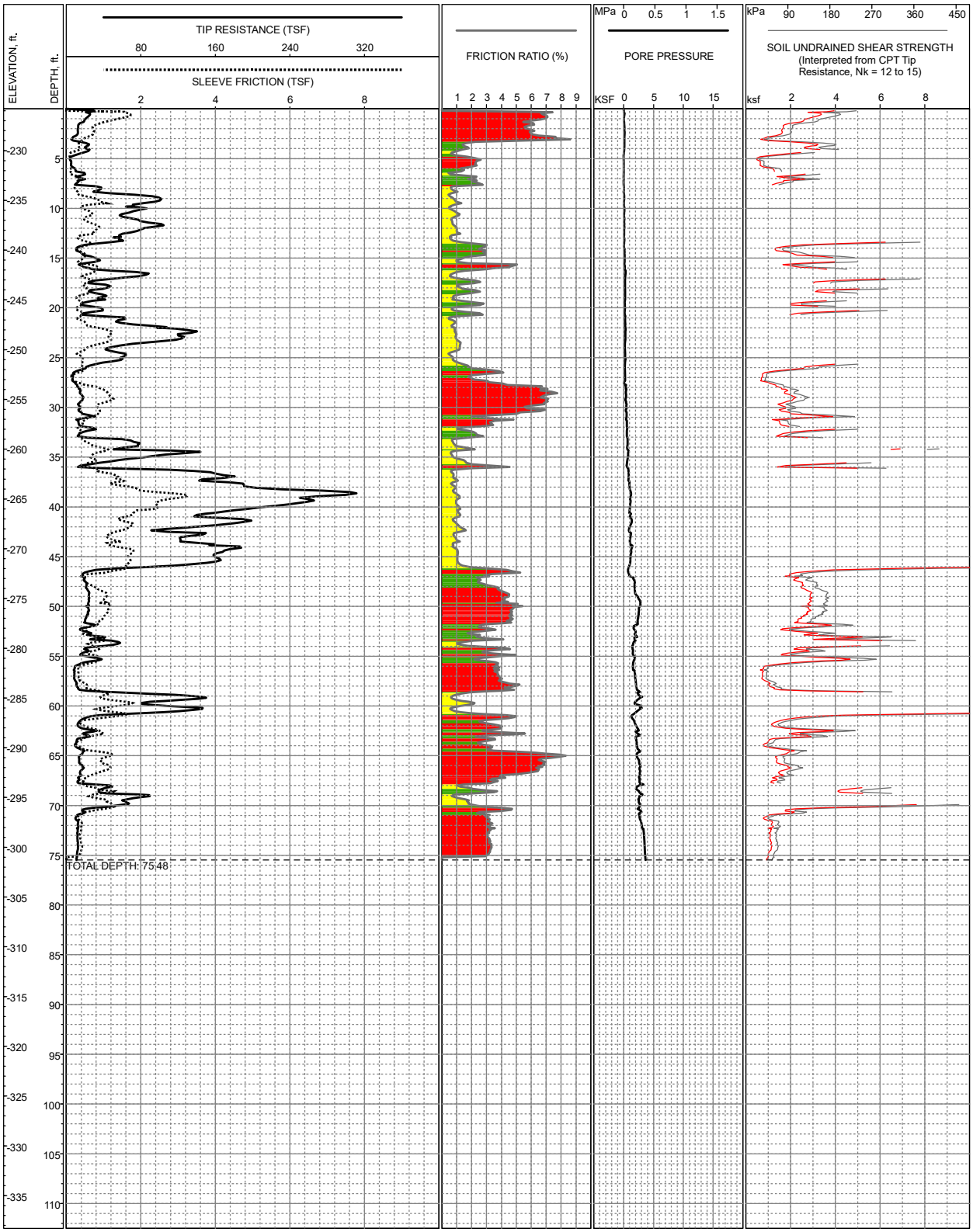
EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LOG OF C-114

Black Rock Units 1,2 & 3
Calipatria, California

FIGURE A2-15

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\CPTLogs_Su.mxd,01/16/2009,CDean



LOCATION: E6,752,273, N2,004,188, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -225.8ft +/- (NAVD88)
COMPLETION DEPTH: 75.48ft
TESTDATE: 10/9/2008

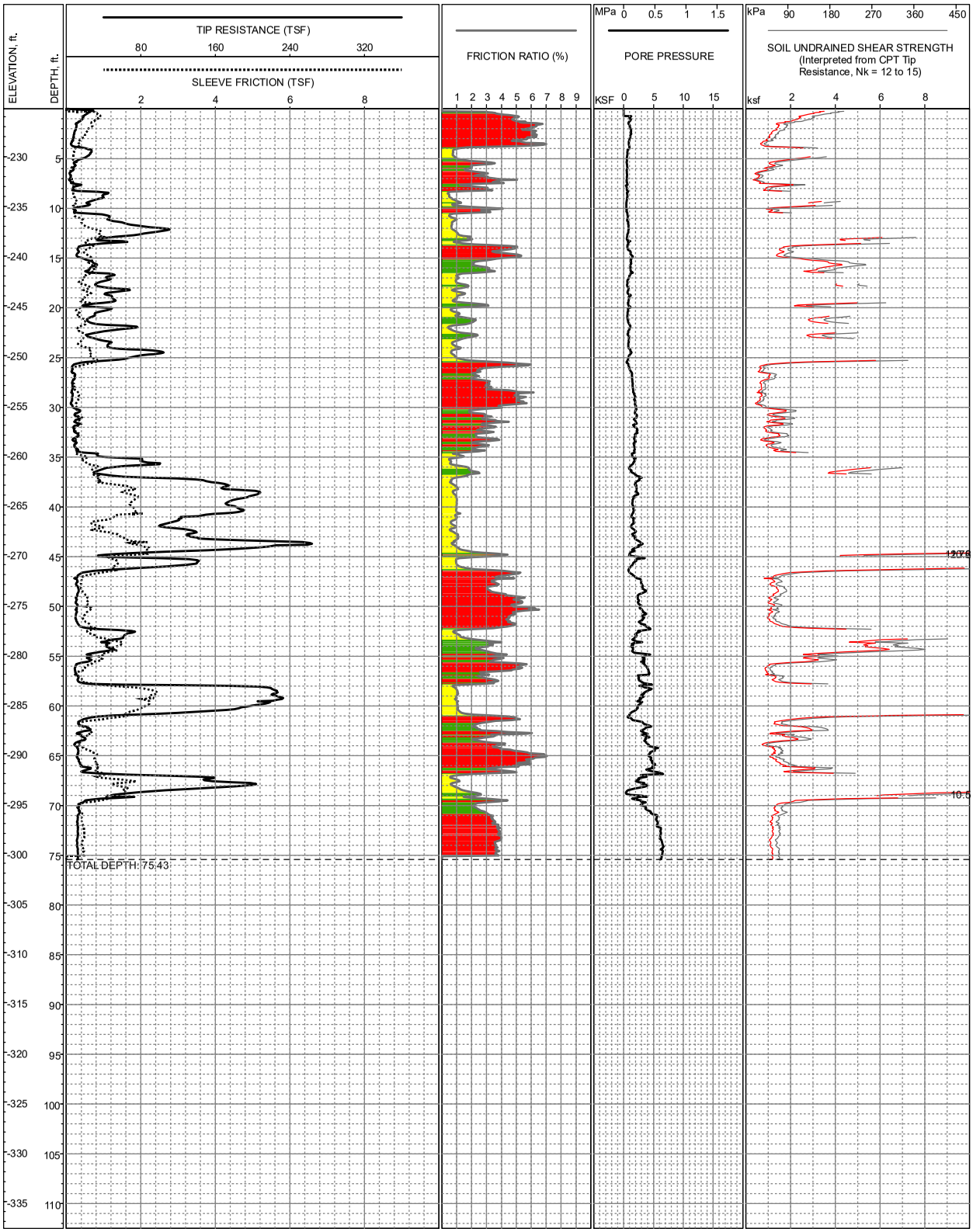
EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LOG OF C-115

Black Rock Units 1,2 & 3
Calipatria, California

FIGURE A2-16

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\CPTLogs_Su.mxd,01/16/2009,CDean



LOCATION: E6,752,408, N2,004,134, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -225.2ft +/- (NAVD88)
COMPLETION DEPTH: 75.43ft
TESTDATE: 10/8/2008

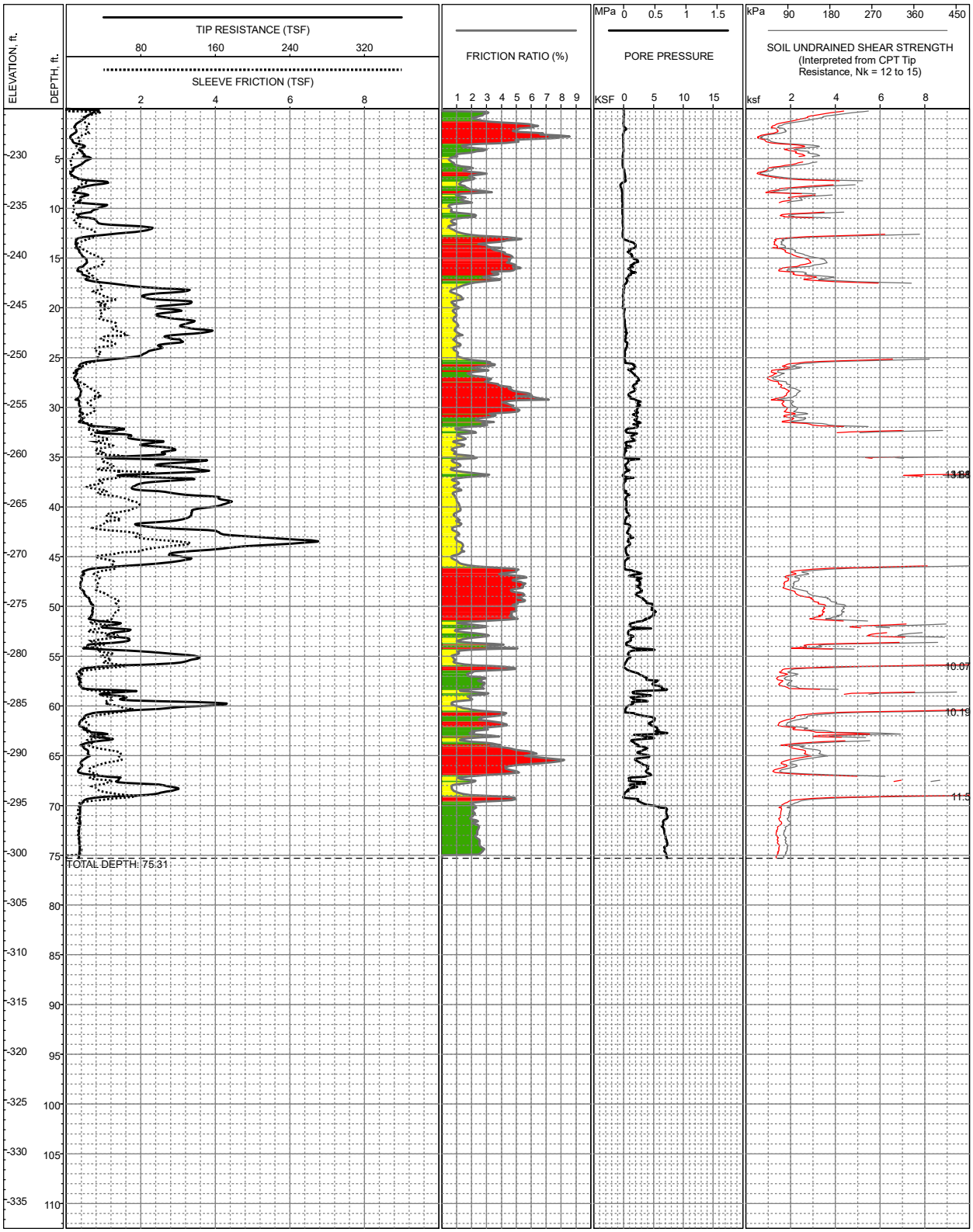
EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LOG OF C-116

Black Rock Units 1,2 & 3
Calipatria, California

FIGURE A2-17

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\CPTLogs_Su.mxd,01/16/2009,CDean



LOCATION: E6,752,530, N2,004,215, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -225.4ft +/- (NAVD88)
COMPLETION DEPTH: 75.31ft
TESTDATE: 10/9/2008

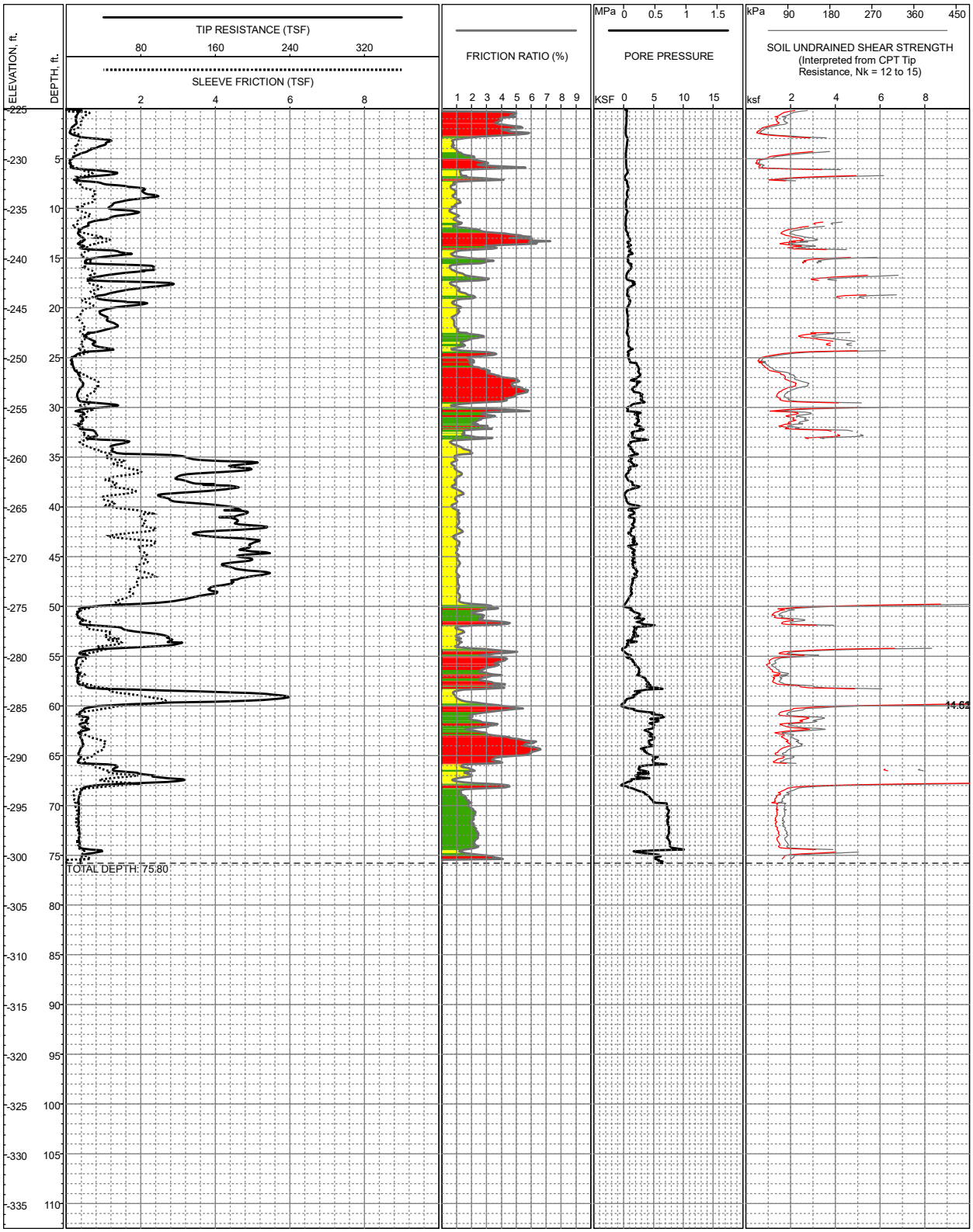
EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LOG OF C-117

Black Rock Units 1,2 & 3
Calipatria, California

FIGURE A2-18

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\CPTLogs_Su.mxd,01/16/2009,CDean



LOCATION: E6,752,706, N2,004,045, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -224.9ft +/- (NAVD88)
COMPLETION DEPTH: 75.80ft
TESTDATE: 10/9/2008

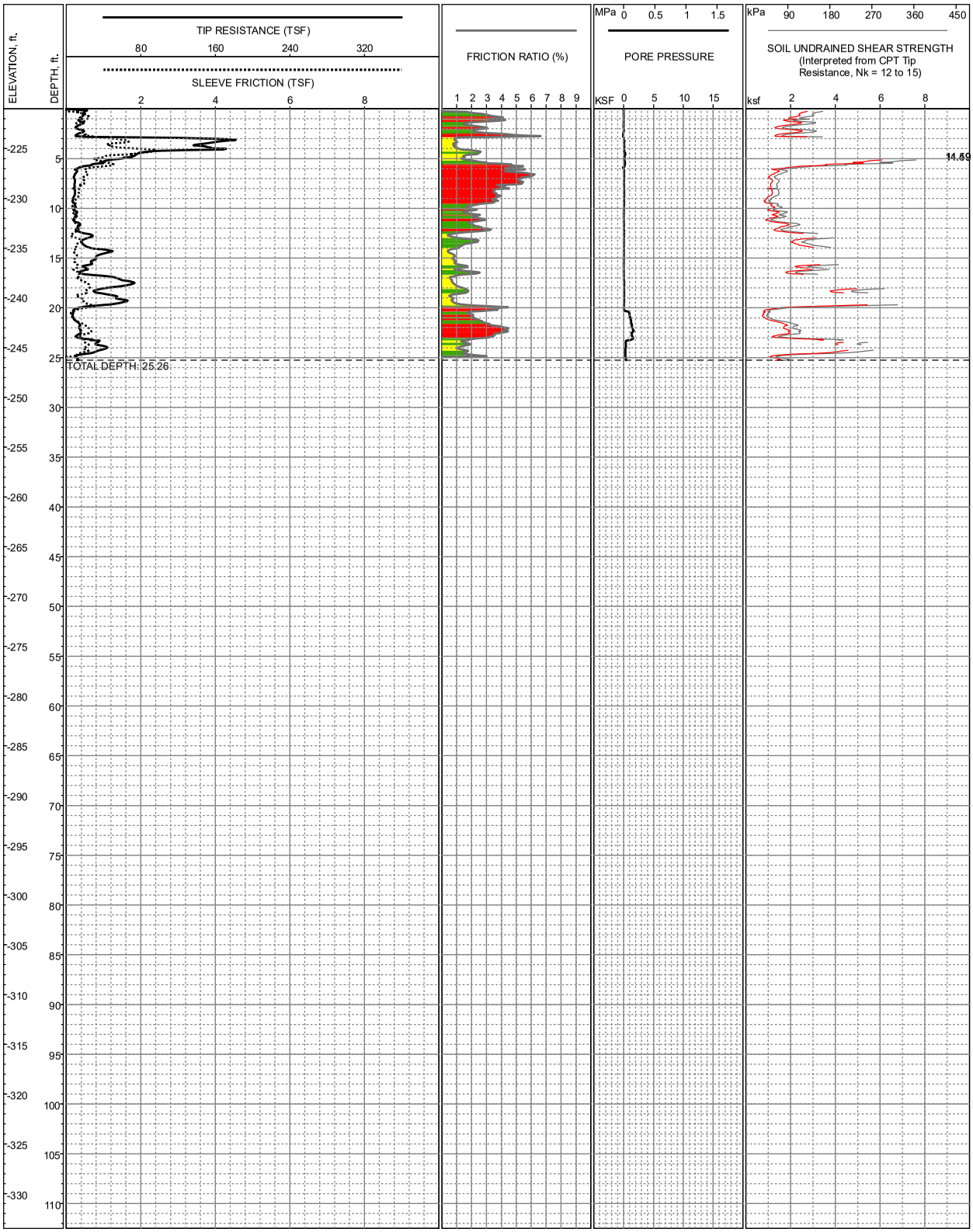
EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LOG OF C-118

Black Rock Units 1,2 & 3
Calipatria, California

FIGURE A2-19

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\CPTLogs_Su.mxd,01/16/2009,CDean



LOCATION: E6,750,965, N2,003,867, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -221.0ft +/- (NAVD88)
COMPLETION DEPTH: 25.26ft
TESTDATE: 10/8/2008

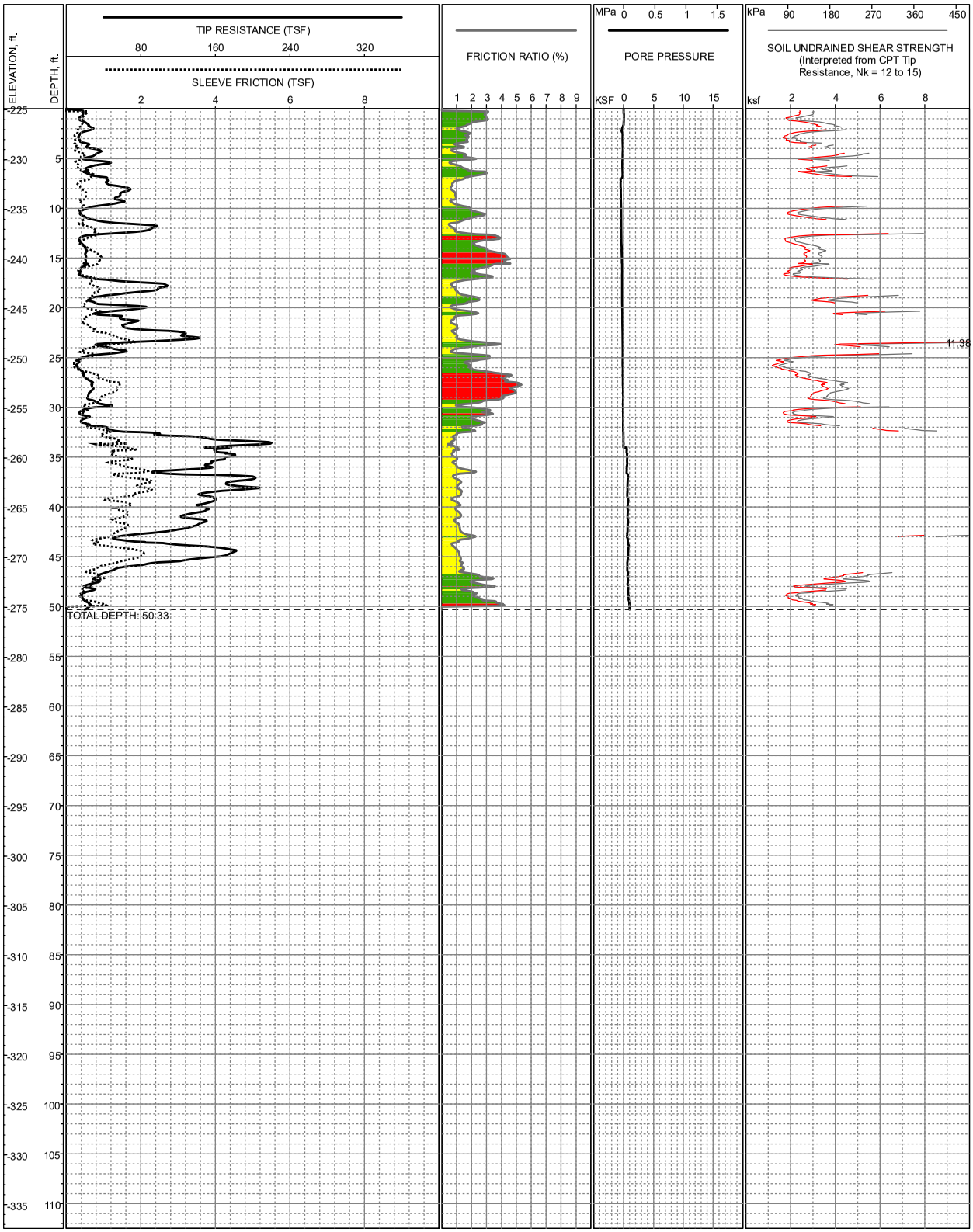
EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LOG OF C-119

Black Rock Units 1,2 & 3
Calipatria, California

FIGURE A2-20

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\CPTLogs_Su.mxd,01/16/2009,CDean



LOCATION: E6,752,247, N2,003,460, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -224.9ft +/- (NAVD88)
COMPLETION DEPTH: 50.33ft
TESTDATE: 10/8/2008

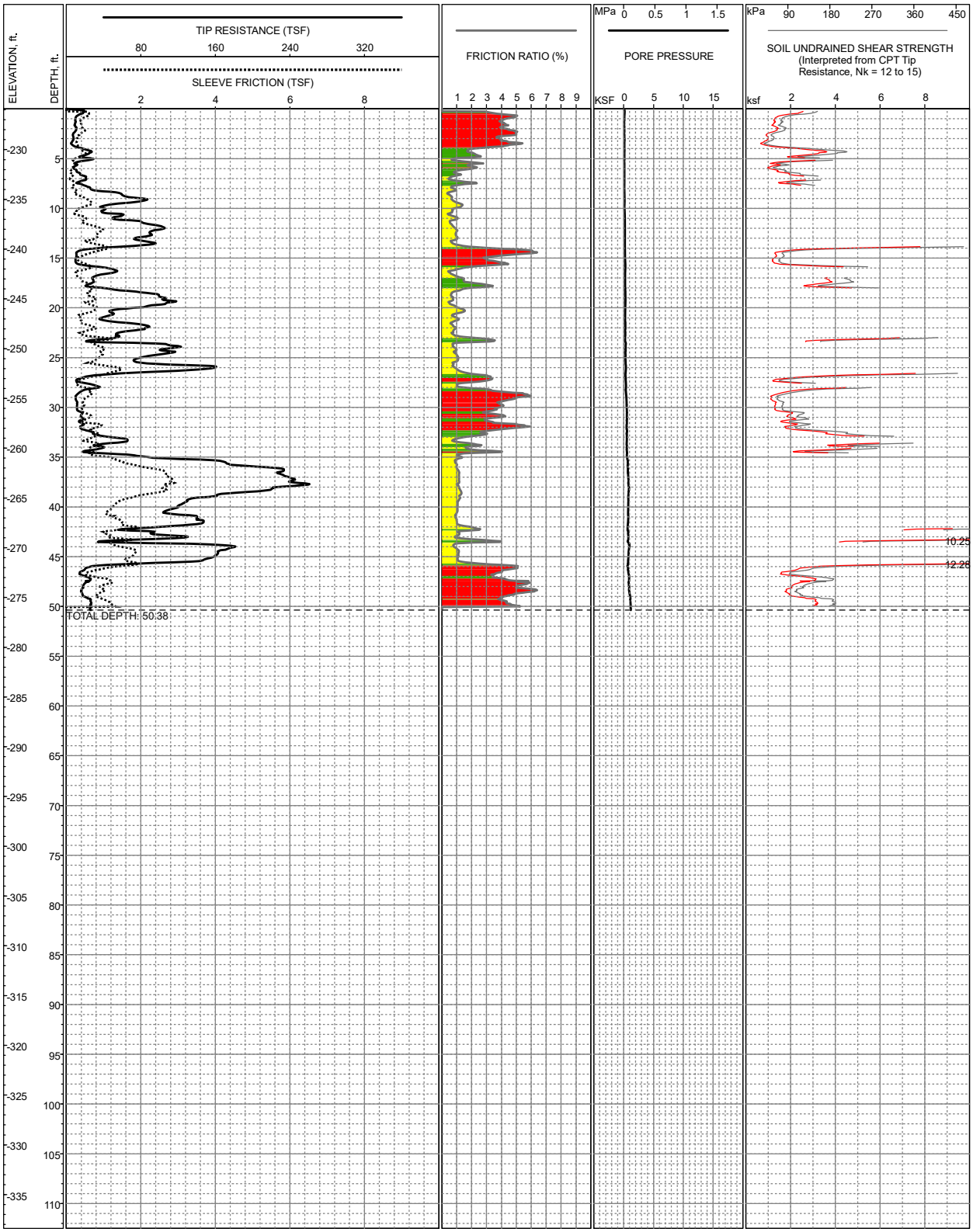
EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LOG OF C-120

Black Rock Units 1,2 & 3
Calipatria, California

FIGURE A2-21

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\CPTLogs_Su.mxd,01/16/2009,CDean



LOCATION: E6,752,168, N2,004,311, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -225.9ft +/- (NAVD88)
COMPLETION DEPTH: 50.38ft
TESTDATE: 10/8/2008

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LOG OF C-121

Black Rock Units 1,2 & 3
Calipatria, California

FIGURE A2-22

N:\Projects\3652_CalEnergy\3652-001_Black_Rock\Explorations\CPT\2008\Logs\Logs_Su_2008_10_28\MXD\CPTLogs_Su.mxd,01/16/2009,CDean

APPENDIX B
LABORATORY TEST RESULTS

APPENDIX B - GEOTECHNICAL LABORATORY TESTING

Introduction

Laboratory testing was performed on samples obtained from the field exploration program described in Appendix A to define pertinent classification and engineering properties of site soils. The majority of the testing was performed at Fugro's soil mechanics laboratories in Oakland, San Luis Obispo and Ventura, California. Corrosivity testing was performed by a subcontractor laboratory specializing in corrosion analyses. A summary of the soil testing program is shown in Table B-1.

Table B-1: Summary of Sample Testing Program

Laboratory Test	Quantity	Testing Standard
Water Content	82	ASTM D2216
Density	79	ASTM D2937
Grain Size Distribution	3	ASTM D422
Percent Fines #200 Sieve	19	ASTM D1140
Atterberg Limits	22	ASTM D4318
Compaction	3	Cal. 216A
Consolidation (Incremental Load Control)	6	ASTM D2435
Direct Shear	1	ASTM D3080
R-Value	3	ASTM D2435
Expansion Index	3	ASTM D4828
Corrosivity	5	ASTM D1498 ASTM D4972 ASTM G57 ASTM D4327

The results of the soil laboratory testing are presented at the conclusion of this appendix. A short description of individual test types is presented in the following paragraphs.

Moisture Content and Dry Density

The in situ moisture content for selected bulk and ring samples recovered from the borings was evaluated in accordance with ASTM Test Designation D2116. These results are recorded on the Logs of Borings in Appendix A and in Figure B-1 - Summary of Soil Laboratory Data.

Dry density determinations were performed on ring and push samples of the subsurface soils to aid in evaluating their physical properties. The results of these tests are presented on the Logs of Borings in Appendix and in Figure B-1 - Summary of Soil Laboratory Data.

Gradation Tests

Gradation tests were performed on samples of the subsurface soils in accordance with ASTM 422. These tests were performed to assist in the classification of the soils and to determine their grain size distribution. The results of these tests are presented in Figure B-2 - Grain Size Curves.

Percent Passing #200 Sieve

The percent passing the #200 sieve was determined for selected samples to aid in the classification of these soils. This is a key index property because it separates coarse-grained soils from fine-grained soils. These tests were performed in accordance with ASTM Designation D-1140. The results of these tests are presented on the Logs of Borings in Appendix A and in Figure B-1 - Summary of Soil Laboratory Data.

Atterberg Limits

Atterberg Limits tests were performed on samples of selected samples of fine-grained soils to evaluate the range of water content over which these materials exhibit plasticity. The Atterberg Limits were determined in accordance with ASTM D-4318. These values are also used to classify the soil in accordance with the Unified Soil Classification System and as indications of a soil's compressibility and expansion potential. The results of these tests are presented on the Logs of Borings in Appendix, in Figure B-1 - Summary of Soil Laboratory Data, and in Figure B-3 - Plasticity Chart.

Compaction

Compaction tests were performed on bulk soil samples collected from the upper three feet to assist in evaluating the compaction characteristics of onsite soils. The compaction tests were performed in accordance with ASTM D1557. The results of the tests are presented in Table B-1 - Summary of Soil Laboratory Data, and in Figure B-4 - Compaction Curves.

Consolidation Tests (Incremental Load Control)

Consolidation tests were performed on relatively undisturbed samples of the subsurface clays to assist in evaluating the compressibility characteristics of these materials under anticipated foundation loads. The consolidation tests were performed in accordance with ASTM D-4186. The results of these tests are presented in Figure B-5 - Consolidation Test Data.

Direct Shear Test

Direct shear testing was performed to evaluate the drained shear strength of a sample of soil from the existing road embankment/berm along the west side of the site. The testing was conducted according to the testing procedure described in ASTM D3080. The samples were sheared at three different vertical stresses, approximately 1, 2, and 4 kips per square foot. The results of the test are presented in Figure B-1 - Summary of Soil Laboratory Data and in Figure B-6 - Direct Shear Test Report.

R-Value

R-value tests were performed on bulk soil samples collected from the upper three feet in areas where it is expected that pavement will be constructed. The R-value test measures the response of a compacted sample of soil to a vertically applied pressure under specific conditions. This test is typically used by many public agencies, such as Caltrans, as the basis for pavement design. The results of these tests are presented in Figure B-1 - Summary of Soil Laboratory Data and in Figure B-7 - R-Value Test Results.

Expansion Index

Expansion Index tests were performed on bulk soil samples collected from the upper 3 feet to evaluate the expansion potential of the onsite soils when inundated with water. The Expansion Index tests were performed in general accordance with ASTM D4828. The results of these tests are presented in Figure B-1 - Summary of Soil Laboratory Data and in Figure B-8 - Expansion Index.

Corrosivity Test

Corrosivity tests were performed at the specialty laboratory of Cerco Analytical, Inc. in Concord, California. A suite of tests was performed on selected samples to evaluate soil resistivity, redox potential, pH value and the chloride and sulfate ion concentrations. These findings are useful in the evaluating the corrosion potential that site soils may pose to buried concrete and ferrous metals. The findings of the corrosivity tests are presented in Figure B-9 - Cerco Analytical Corrosivity Analysis.

DRILL HOLE	DEPTH, ft	SAMPLE NUMBER	MATERIAL DESCRIPTION	UWW pcf	UDW pcf	MC %	FINES %	ATTERBERG LIMITS		COMPACTION TEST		DIRECT SHEAR		COMPRESSIVE STRENGTH TESTS		CORROSIVITY TESTS				R-VALUE	EXPANSION INDEX	SAND EQUIVALENT (SE)	SPECIFIC GRAVITY
								LL	PI	MAX DD pcf	OPT MC %	C ksf	PHI deg	Qu, ksf	S_u (Cell Prs.) ksf	R	pH	Cl	So_4 (%)				
RW-01	6.0	1	Lean CLAY (CL)	123	95	30																	
RW-01	16.0	3	Lean CLAY (CL)	122	95	29																	
RW-01	26.0	5	Silty Fine SAND (SM)	125	103	22																	
RW-01	30.0	6	Lean CLAY (CL)					32	13														
RW-01	36.0	7	Silty Fine SAND (SM)	126	103	22																	
RW-01	40.0	8	Silty Fine SAND (SM)				21																
RW-01	46.0	9	Silty Fine SAND (SM)	127	103	23																	
RW-01	50.0	10	Fat CLAY (CH)					67	41														
RW-01	57.5	11	Silty Fine SAND (SM)	127	103	23																	
RW-02	6.0	1	Lean CLAY (CL)	123	97	27		27	8														
RW-02	16.0	3	Lean CLAY (CL)	121	94	30		28	9														
RW-02	26.0	5	SILT with sand (ML)	122	94	29	76																
RW-02	30.0	6	Fat CLAY (CH)					61	38														
RW-02	36.0	7	Silty Fine SAND (SM)	127	102	24																	
RW-02	40.0	8	Silty Fine SAND (SM)				21																
RW-02	46.0	9	Silty Fine SAND (SM)	125	102	23																	
RW-03	6.0	1	Lean CLAY (CL)	121	93	30																	
RW-03	10.0	2	Silty Fine SAND (SM)				41																
RW-03	16.0	3	Lean CLAY (CL)	119	90	33																	
RW-03	26.0	5	Silty Fine SAND (SM)	126	103	23																	
RW-03	36.0	7	Lean CLAY (CL)	127	104	23		28	7														
RW-03	46.0	9	Lean CLAY (CL)	121	94	29																	
RW-03	51.0	10	Lean CLAY (CL)	121	92	32																	
RW-03	56.0	11	Lean CLAY (CL)	108	73	48																	
RW-04	5.0	1	SILT with sand (ML)				84																
RW-04	11.0	2	Silty Fine SAND (SM)	126	103	23																	
RW-04	21.0	4	Silty Fine SAND (SM)	121	96	26																	
RW-04	31.0	6	Lean CLAY (CL)	115	84	37																	
RW-04	41.0	8	Silty Fine SAND (SM)	122	104	17																	
RW-04	50.5	10	Fat CLAY (CH)	115	78	48		73	50														

SUMMARY OF LABORATORY TEST RESULTS

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE B-1a