

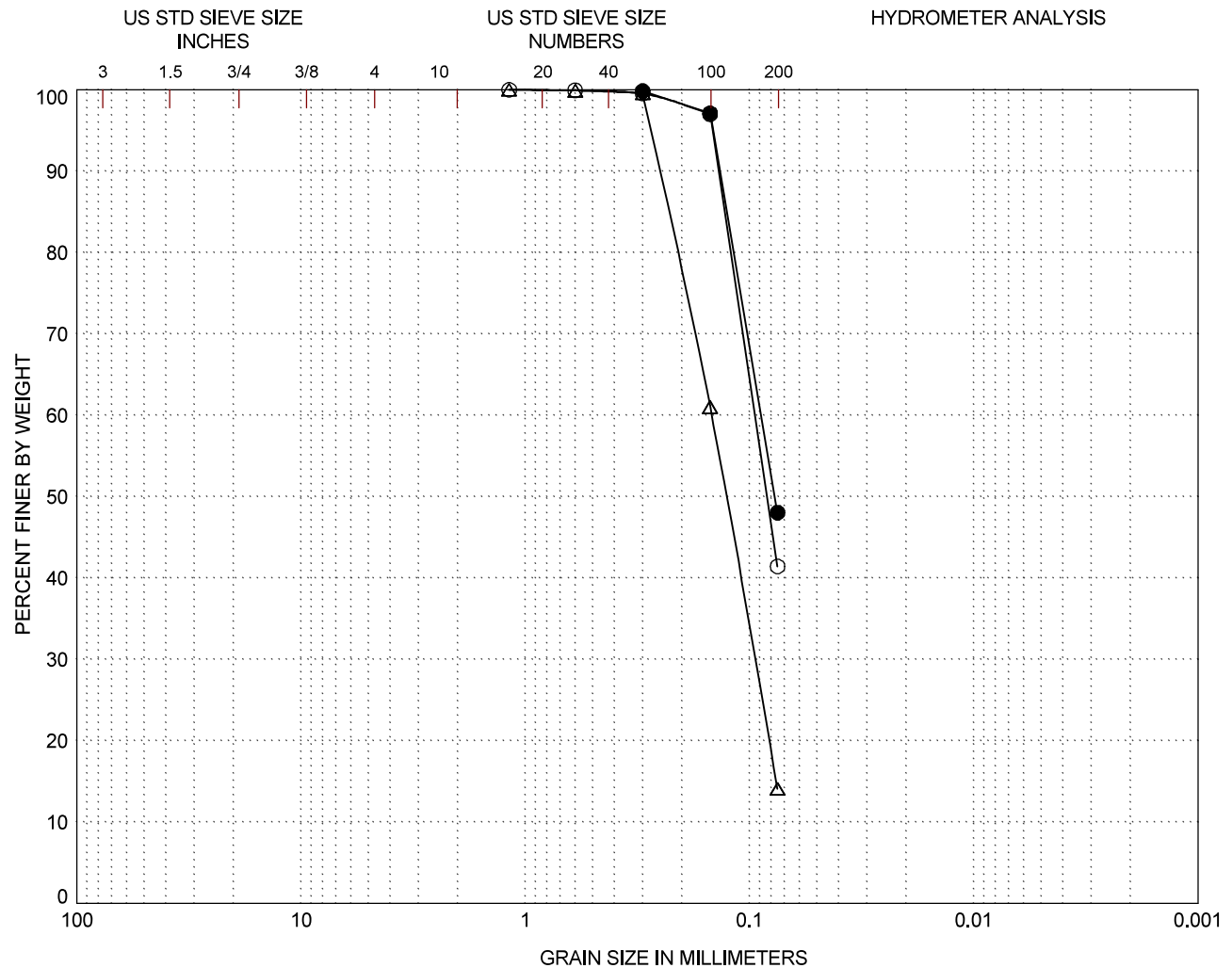
DOCKETED

Docket Number:	23-AFC-03
Project Title:	Black Rock Geothermal Project (BRGP)
TN #:	252492-4
Document Title:	Black Rock Geothermal Project Data Request Response Set 1 Part 4
Description:	N/A
Filer:	Jerry Salamy
Organization:	Jacobs
Submitter Role:	Applicant Consultant
Submission Date:	10/2/2023 8:45:46 PM
Docketed Date:	10/3/2023

SUMMARY OF LABORATORY TEST RESULTS

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE B-1d



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

LEGEND		
	(location)	(depth, ft)
○	RW-03	10.0
●	RW-05	20.0
△	RW-07	45.0

CLASSIFICATION

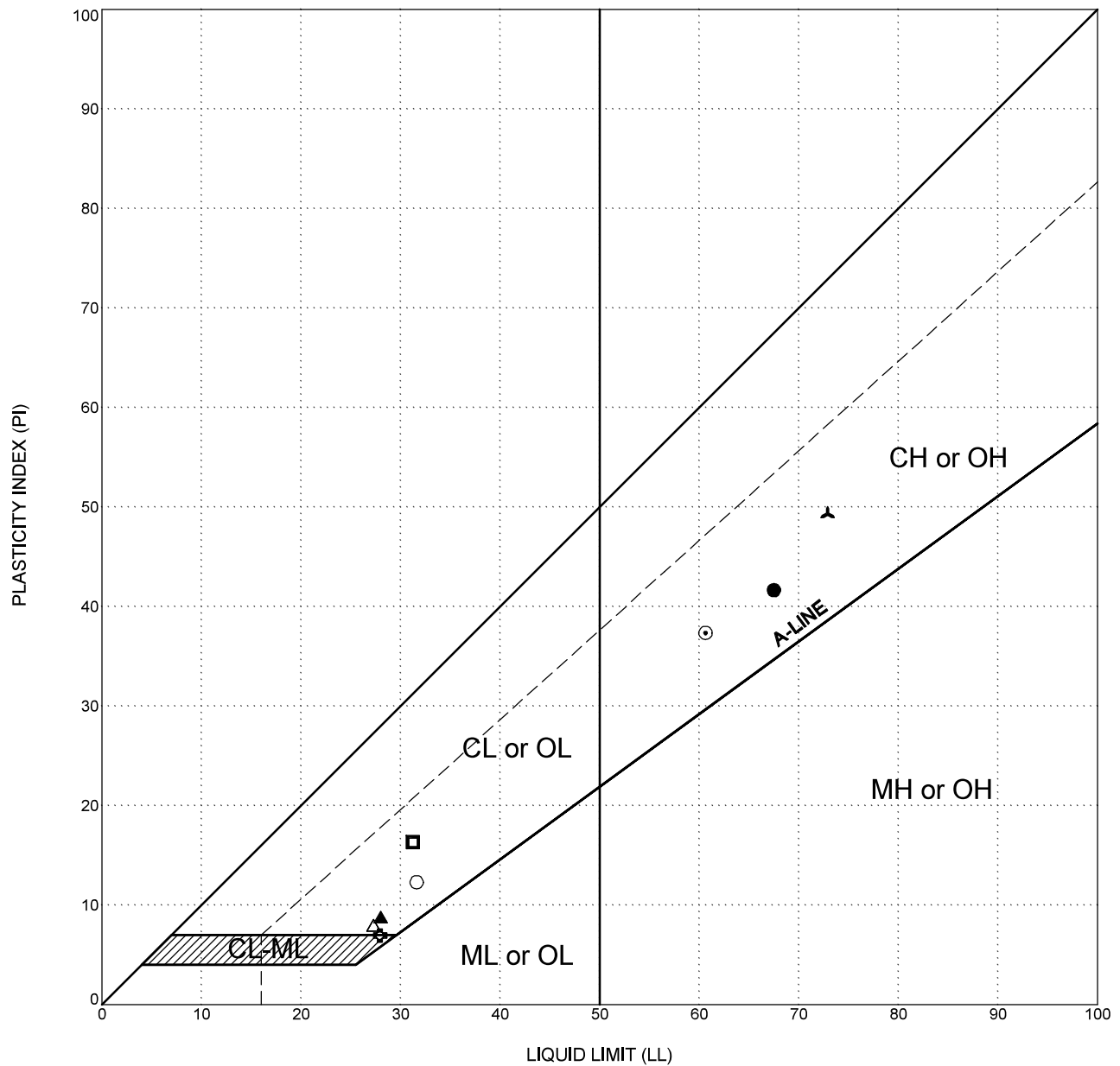
Silty Fine SAND (SM)
Silty Fine SAND (SM)
Silty Fine SAND (SM)

C_c

C_u

GRAIN SIZE CURVES
Black Rock Units 1, 2 & 3
Calipatria, California

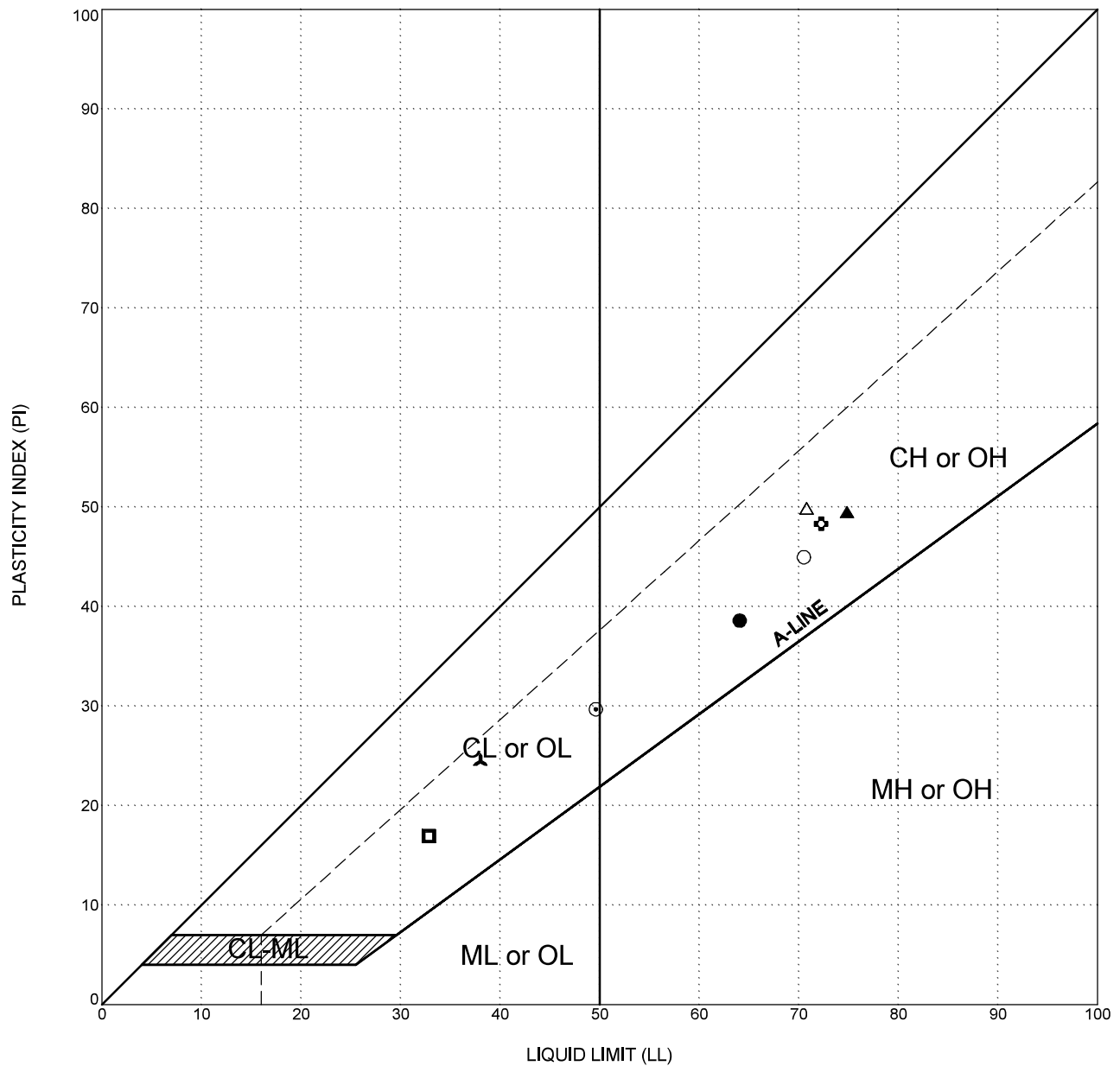
FIGURE B-2



LEGEND			CLASSIFICATION			ATTERBERG LIMITS TEST RESULTS		
	location	depth, ft				LIQUID LIMIT (LL)	PLASTIC LIMIT (PL)	PLASTICITY INDEX (PI)
○	RW-01	30.0	Lean CLAY (CL)			32	19	13
●	RW-01	50.0	Fat CLAY (CH)			67	26	41
△	RW-02	6.0	Lean CLAY (CL)			27	19	8
▲	RW-02	16.0	Lean CLAY (CL)			28	19	9
⊙	RW-02	30.0	Fat CLAY (CH)			61	23	38
⊕	RW-03	36.0	Lean CLAY (CL)			28	21	7
▲	RW-04	50.5	Fat CLAY (CH)			73	23	50
■	RW-04	75.0	Lean CLAY (CL)			31	15	16

PLASTICITY CHART
Black Rock Units 1, 2 & 3
Calipatria, California

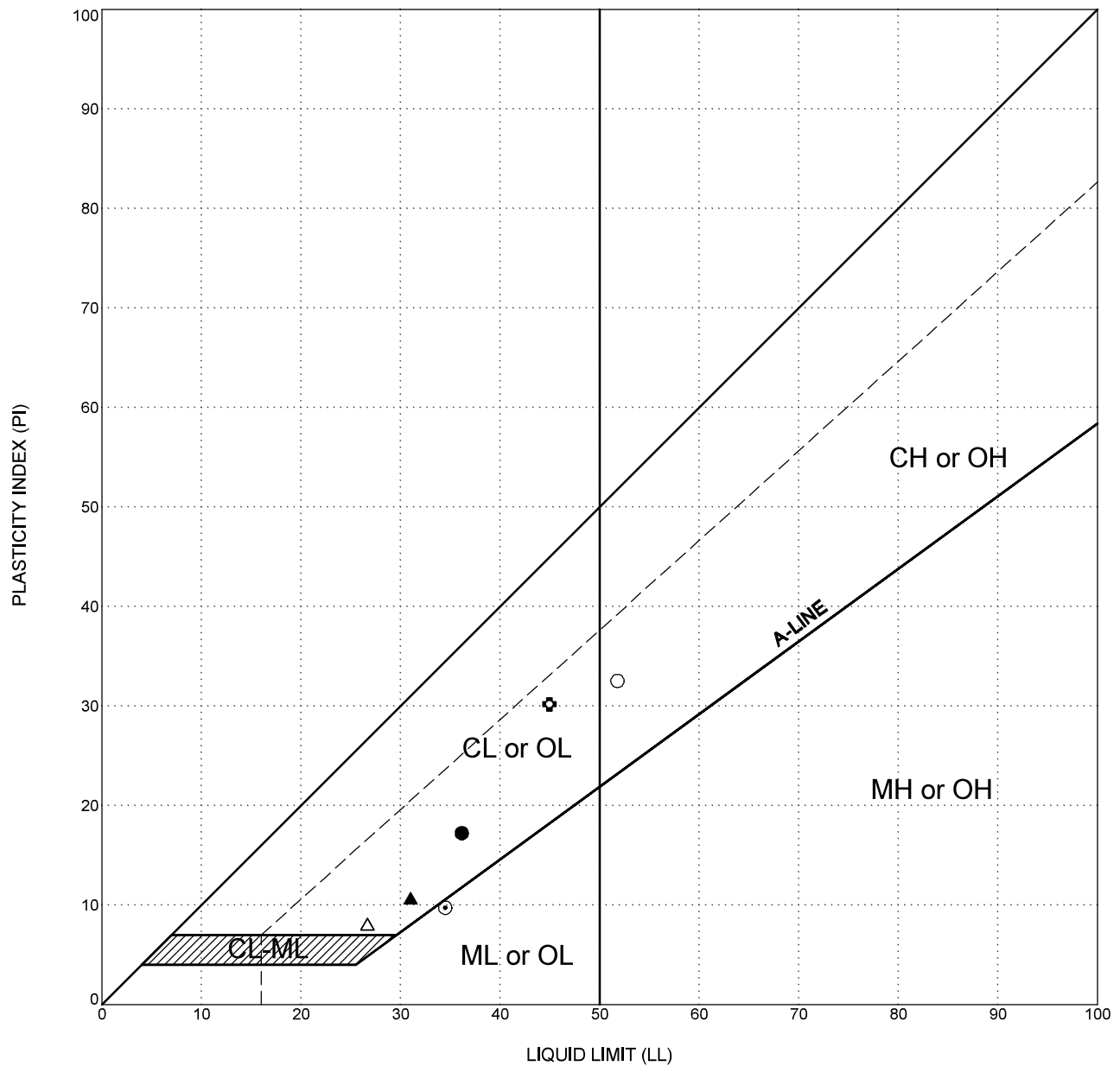
FIGURE B-3a



LEGEND			CLASSIFICATION			ATTERBERG LIMITS TEST RESULTS		
	location	depth, ft				LIQUID LIMIT (LL)	PLASTIC LIMIT (PL)	PLASTICITY INDEX (PI)
○	RW-04	85.0		Fat CLAY (CH)		71	26	45
●	RW-05	50.0		Fat CLAY (CH)		64	25	39
△	RW-06	16.0		Fat CLAY (CH)		71	21	50
▲	RW-06	65.0		Fat CLAY (CH)		75	25	50
⊙	RW-07	15.0		Lean CLAY (CL)		50	20	30
⊕	RW-07	51.0		Fat CLAY (CH)		72	24	48
⤴	HSA-03	0.0		Lean CLAY (CL)		38	13	25
■	HSA-04	0.0		Lean CLAY (CL)		33	16	17

PLASTICITY CHART
Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE B-3b



LEGEND			CLASSIFICATION			ATTERBERG LIMITS TEST RESULTS		
	location	depth, ft				LIQUID LIMIT (LL)	PLASTIC LIMIT (PL)	PLASTICITY INDEX (PI)
○	HSA-10	0.0	Fat CLAY (CH)			52	19	33
●	HSA-11	0.0	Lean CLAY (CL)			36	19	17
△	HSA-14	0.0	SILT (ML)			27	19	8
▲	HSA-16	10.0	Lean CLAY (CL)			31	20	11
⊙	HSA-19	11.4	SILT (ML)			34	25	9
⊕	HSA-22	0.0	Lean CLAY (CL)			45	15	30

PLASTICITY CHART
Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE B-3c

Job No.	3652.001	Job Name:	Black Rock	Date:	11/20/08
Lab ID:	4124	Client:		Pg. 1 of	

SAMPLE DATA

Boring No.:		Sample No.:	HSA-14	Depth (ft):		Reporting Depth (ft):	
Description of Soil / Material						Brown Fat Clay	

TEST DATA

TOTAL SAMPLE Wt. (g):	Wt RETAINED ON 3/4in. (19.0mm) SIEVE (g) :		% RETAINED ON 3/4in. (19.0mm) SIEVE (g) :	BLOWS PER LAYER :	25
12,985	Wt RETAINED ON 3/8in. (9.5mm) SIEVE (g) :		% RETAINED ON 3/8in. (9.5mm) SIEVE (g) :	No. OF LAYERS :	5
	Wt RETAINED ON No. 4 (4.75mm) SIEVE (g) :		% RETAINED ON No 4 (4.75mm) SIEVE (g) :	VOLUME OF MOLD :	0.03332
ASTM METHOD USED (SEE NOTE 1) :	A	INITIAL M/CONTENT :	PREPARATION METHOD USED	RAMMER :	Hand

Test No.	1	2	3	4	5
Wt. Of Wet Soil (lb)	8.490	8.810	8.810	8.840	8.830
Wt. Of Mold (lb)	4.380	4.380	4.380	4.380	4.380
Wet Unit Weight (lb/ft³)	123.3	133.0	133.0	133.9	133.6
Tare No.	LPT-52	YO-22	YO-22	YO-11	LPT-46
Wt. of Wet Soil + Tare (g)	605.50	606.30	606.30	603.70	601.40
Wt. of Dry Soil + Tare(g)	565.20	545.40	545.40	533.00	533.10
Wt. of Water (g)	40.30	60.90	60.90	70.70	68.30
Wt. of Tare (g)	38.60	38.30	38.30	38.30	38.40
Wt. of Dry Soil (g)	526.60	507.10	507.10	494.70	494.70
Moisture Content (%)	7.7	12.0	12.0	14.3	13.8
Dry Unit Weight (lb/ft³)	114.6	118.7	118.7	117.1	117.4

MAX. DRY DENSITY (lb/ft³)	119.0	OPT. MOISTURE CONTENT (%)	12
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CORRECTED MDD	119.0	CORRECTED MOISTURE CONTENT	12
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REMARKS : Assumed density of 2.700 kg/m³ used for Air voids calculations

NOTE 1 ASTM METHODS AS FOLLOWS :-

METHOD A - < 20 % RET. No.4 (4.75mm) SIEVE
4in MOLD.

METHOD B - > 20 % RET. No.4 (4.75mm) &
< 20 % RET. 3/8in (9.5mm) SIEVE
4in MOLD.

METHOD C - > 20 % RET. 3/8in (9.5mm) &
< 30 % RET. 3/4in (19mm) SIEVE
6in MOLD.

IF 30% OR MORE IS RET. ON THE 3/4in (19mm) SIEVE THEN NONE OF THE METHODS DETAILED ABOVE MAY BE USED. (INFORM THE LABORATORY SUPERVISOR)

VOLUME OF MOLD :-

6in mold - 0.0750
4in mold - 0.0333

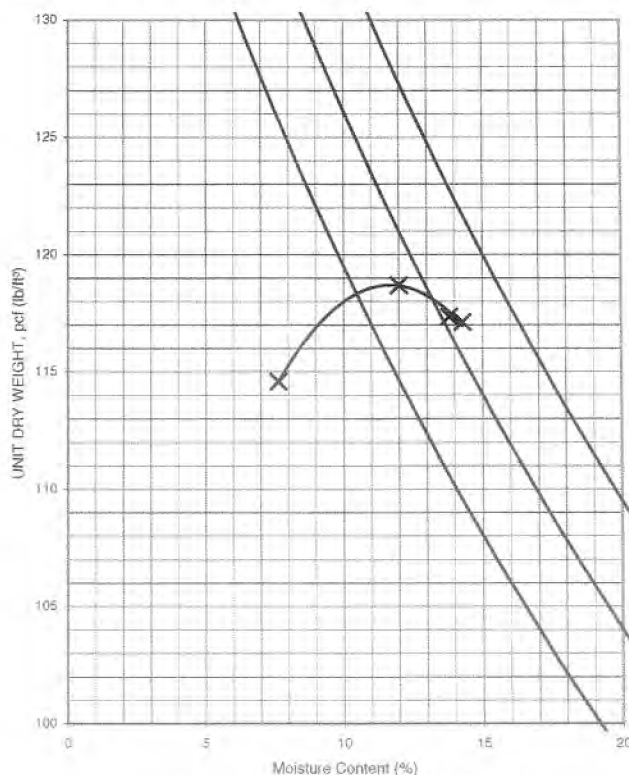


FIGURE B-4a

Tested by :		Date :		Calculated by :		Checked by :	
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COMPACTION



Job No. 3652.001	Job Name: Black Rock	Date: 11/20/08
Lab ID: 4124	Client:	Pg. 1 of

SAMPLE DATA					
Boring No.:		Sample No.:	HSA-22	Depth (ft):	
Description of Soil / Material			Brown Fat Clay		

TEST DATA					
TOTAL SAMPLE Wt. (g):	Wt RETAINED ON 3/4in. (19.0mm) SIEVE (g) :		% RETAINED ON 3/4in. (19.0mm) SIEVE (g) :		BLOWS PER LAYER :
	Wt RETAINED ON 3/8in. (9.5mm) SIEVE (g) :		% RETAINED ON 3/8in. (9.5mm) SIEVE (g) :		No. OF LAYERS :
8,798	Wt RETAINED ON No. 4 (4.75mm) SIEVE (g) :		% RETAINED ON No. 4 (4.75mm) SIEVE (g) :		VOLUME OF MOLD :
ASTM METHOD USED (SEE NOTE 1) :	A	INITIAL M/CONTENT :		PREPARATION METHOD USED	RAMMER :
					Hand

Test No.	1	2	3	4	5
Wt. Of Wet Soil (lb)	8.700	8.700	8.790	8.700	8.700
Wt. Of Mold (lb)	4.380	4.380	4.380	4.380	4.380
Wet Unit Weight (lb/ft³)	129.7	129.7	132.4	129.7	129.7
Tare No.	LPT-68	LPT-68	LPT-31	YO-16	YO-16
Wt. of Wet Soil + Tare (g)	620.80	620.80	609.50	603.20	603.20
Wt. of Dry Soil + Tare(g)	552.00	552.00	533.50	517.90	517.90
Wt. of Water (g)	68.80	68.80	76.00	85.30	85.30
Wt. of Tare (g)	38.40	38.40	38.20	38.40	38.40
Wt. of Dry Soil (g)	513.60	513.60	495.30	479.50	479.50
Moisture Content (%)	13.4	13.4	15.3	17.8	17.8
Dry Unit Weight (lb/ft³)	114.3	114.3	114.7	110.1	110.1
MAX. DRY DENSITY (lb/ft³)	115.5	OPT. MOISTURE CONTENT (%)			15
CORRECTED MDD	115.5	CORRECTED MOISTURE CONTENT			15

NOTE 1 ASTM METHODS AS FOLLOWS :-

METHOD A - < 20 % RET. No.4 (4.75mm) SIEVE 4in MOLD.

METHOD B - > 20 % RET. No.4 (4.75mm) & < 20 % RET. 3/8in (9.5mm) SIEVE 4in MOLD.

METHOD C - > 20 % RET. 3/8in (9.5mm) & < 30 % RET. 3/4in (19mm) SIEVE 6in MOLD.

IF 30% OR MORE IS RET. ON THE 3/4in (19mm) SIEVE THEN **NONE** OF THE METHODS DETAILED ABOVE MAY BE USED. (INFORM THE LABORATORY SUPERVISOR)

VOLUME OF MOLD :-
 6in mold - 0.0750
 4in mold - 0.0333

REMARKS : Assumed density of 2.700 kg/m³ used for Air voids calculations

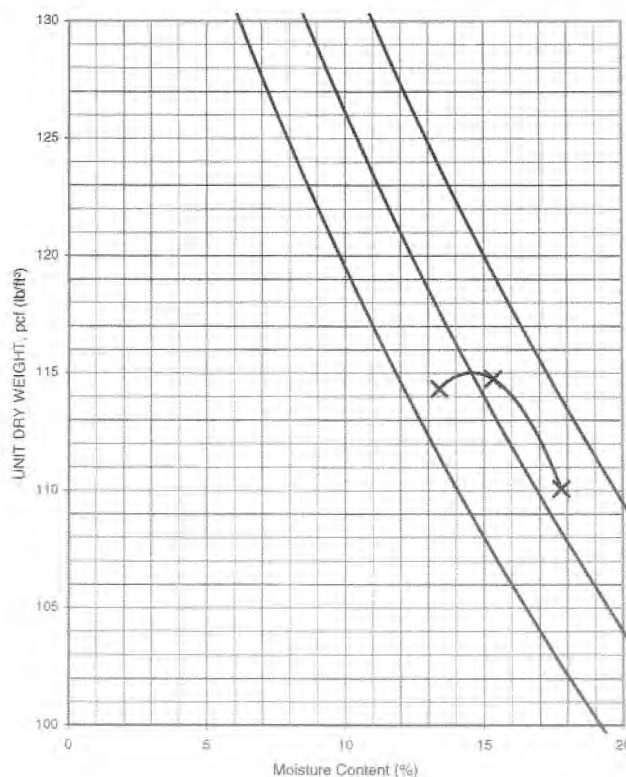


FIGURE B-4b

Tested by : HSA-22	Date :	Calculated by :	Checked by :
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Pg. 1 of

SAMPLE DATA							
Boring No.:		Sample No.:	HSA-4	Depth (ft):		Reporting Depth (ft):	
Description of Soil / Material						Brown Fat Clay	

TEST DATA						
TOTAL SAMPLE Wt. (g):	Wt RETAINED ON 3/4in. (19.0mm) SIEVE (g) :		% RETAINED ON 3/4in. (19.0mm) SIEVE (g) :		BLOWS PER LAYER :	25
8,253	Wt RETAINED ON 3/8in. (9.5mm) SIEVE (g) :		% RETAINED ON 3/8in. (9.5mm) SIEVE (g) :		No. OF LAYERS :	5
	Wt RETAINED ON No. 4 (4.75mm) SIEVE (g) :		% RETAINED ON No 4 (4.75mm) SIEVE (g) :		VOLUME OF MOLD :	0.03320
ASTM METHOD USED (SEE NOTE 1) :	A	INITIAL M/CONTENT :		PREPARATION METHOD USED	RAMMER :	Hand

NOTE 1 ASTM METHODS AS FOLLOWS :-

METHOD A - < 20 % RET. No.4 (4.75mm) SIEVE
 4in MOLD.

METHOD B - > 20 % RET. No.4 (4.75mm) &
 < 20 % RET. 3/8in (9.5mm) SIEVE
 4in MOLD.

METHOD C - > 20 % RET. 3/8in (9.5mm) &
 < 30 % RET. 3/4in (19mm) SIEVE
 6in MOLD.

IF 30% OR MORE IS RET. ON THE 3/4in (19mm)
SIEVE THEN **NONE** OF THE METHODS DETAILED ABOVE
MAY BE USED. (INFORM THE LABORATORY
SUPERVISOR)

VOLUME OF MOLD :-

 6in mold - 0.0750
 4in mold - 0.0333

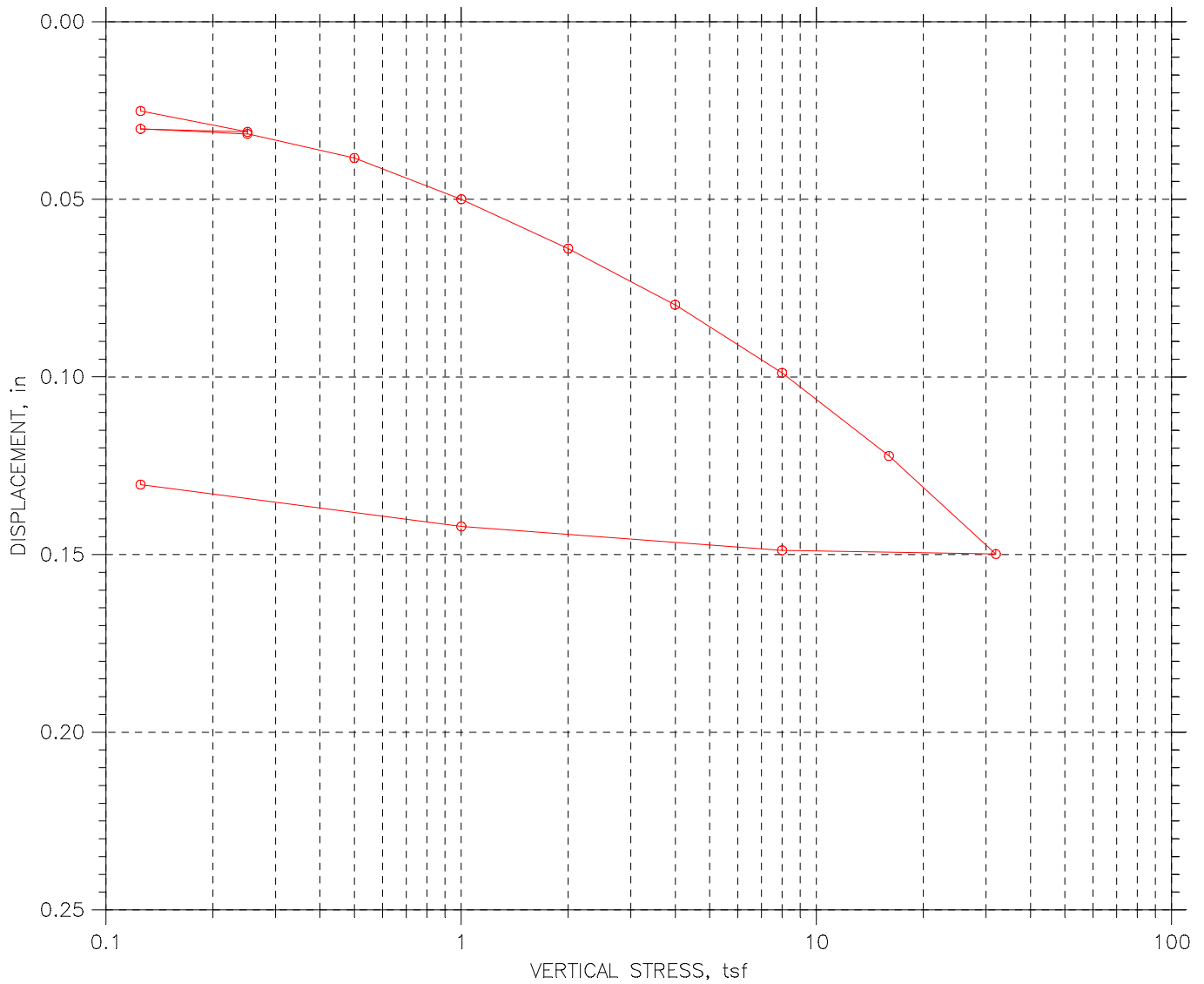
The graph plots Unit Dry Weight (pcf) against Moisture Content (%). The y-axis is labeled 'UNIT DRY WEIGHT, pcf (lb/ft³)' and ranges from 100 to 130 in increments of 5. The x-axis is labeled 'Moisture Content (%)' and ranges from 0 to 20 in increments of 5. Three parallel, downward-sloping lines are drawn across the graph. A curved line with three 'x' marks is also plotted, representing a specific data series. The 'x' marks are located at approximately (8.5, 116), (11.5, 116.5), and (13.5, 115.5).

Moisture Content (%)	Unit Dry Weight (pcf)
8.5	116.0
11.5	116.5
13.5	115.5

Tested by :	Date :	Calculated by :	Checked by :
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CONSOLIDATION TEST DATA

SUMMARY REPORT



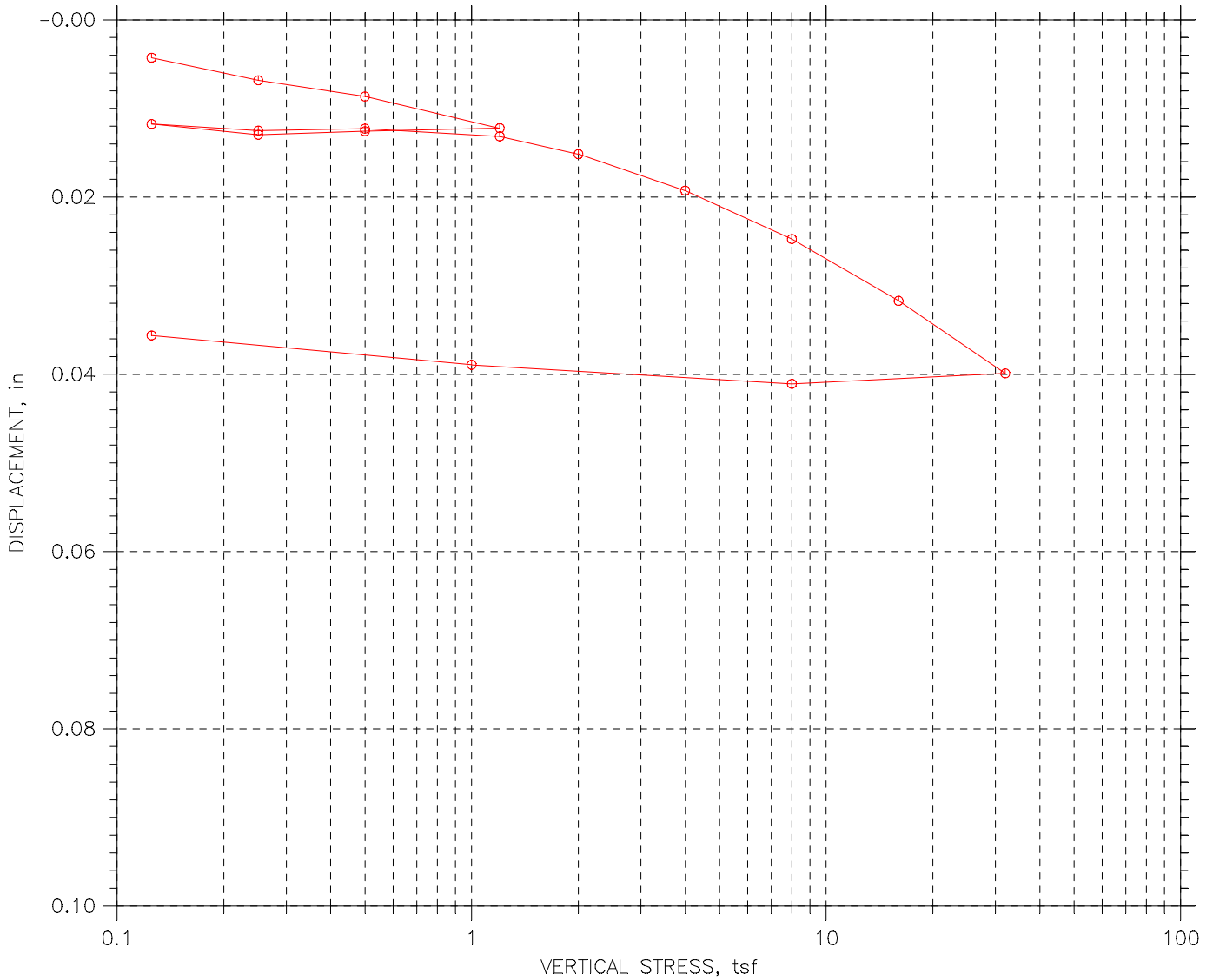
				Before Test	After Test	
Overburden Pressure: 0 tsf			Water Content, %	30.62	24.96	
Preconsolidation Pressure: 0 tsf			Dry Unit Weight, pcf	93.88	108.	
Compression Index: 3.81959e-313			Saturation, %	91.06	100.00	
Diameter: 2.4 in		Height: 1 in		Void Ratio	1.02	0.76
LL: ---	PL: ---	PI: ---	GS: 3.04			

	Project: Black Rock Units 1,2,3	Location: Calipatria, CA	Project No.: 3652.001
	Boring No.: RW-01	Tested By: NJD	Checked By: NJD
	Sample No.: #1	Test Date: 11/7/08	Depth: 6.0ft
	Test No.: D	Sample Type: Ring	Elevation: N/A
	Description: Clayey SILT (ML): brown, wet		
	Remarks: 3652.001_RW-01_#1_6.0ft_Node65_Black Rock Units 1,2,3		

FIGURE B-5a

CONSOLIDATION TEST DATA

SUMMARY REPORT



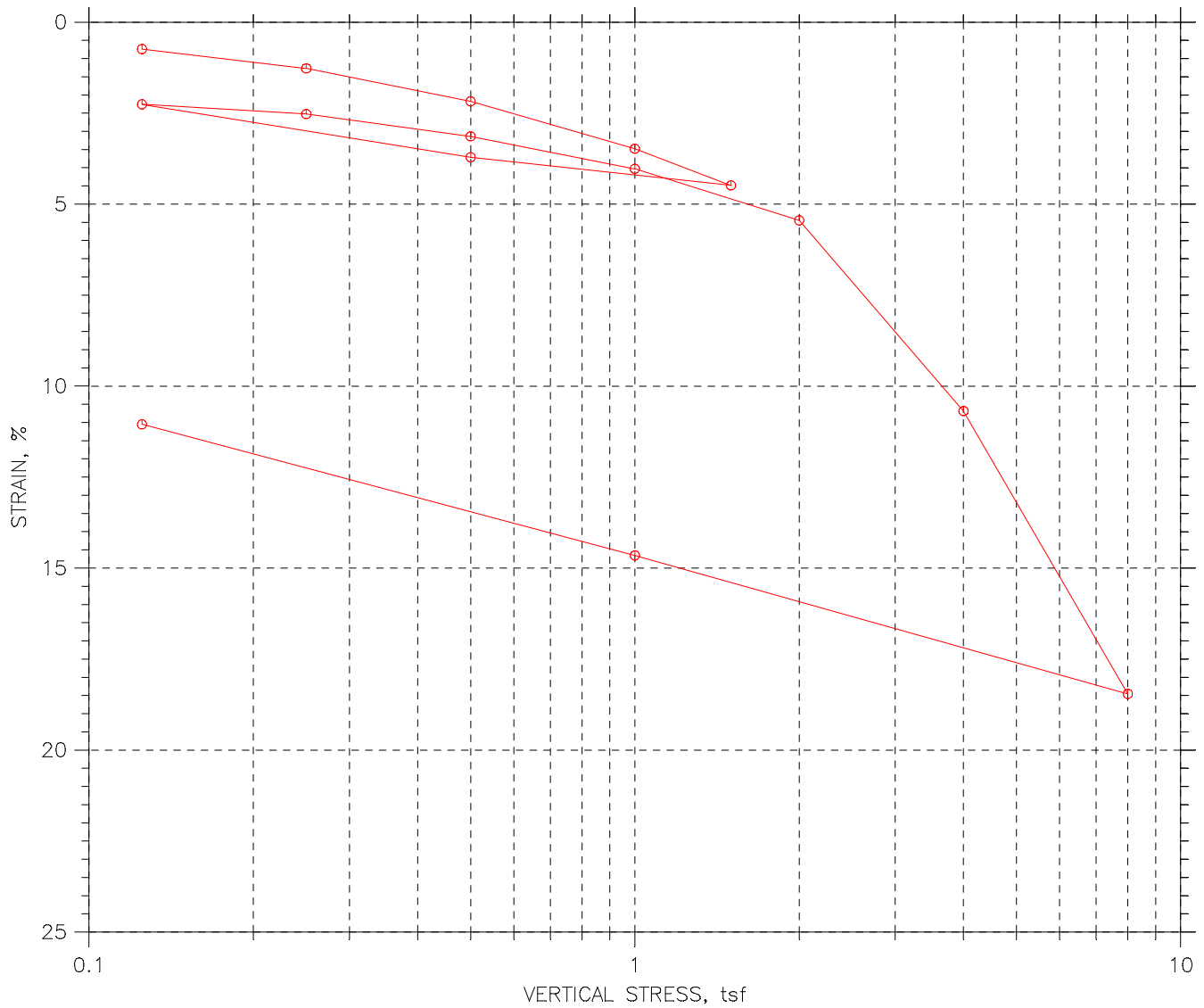
				Before Test	After Test	
Overburden Pressure: 0 tsf			Water Content, %	24.67	22.37	
Preconsolidation Pressure: 0 tsf			Dry Unit Weight, pcf	101.6	105.4	
Compression Index: 3.81959e-313			Saturation, %	101.17	100.79	
Diameter: 2.42 in		Height: 1 in		Void Ratio	0.66	0.60
LL: ---	PL: ---	PI: ---	GS: 2.70			

	Project: Black Rock Units 1,2,3	Location: Calipatria, CA	Project No.: 3652.001
	Boring No.: RW-03	Tested By: NJD	Checked By: NJD
	Sample No.: #7	Test Date: 11/10/08	Depth: 36.0ft
	Test No.: E	Sample Type: Ring	Elevation: N/A
	Description: Silty SAND (SM): brown, moist, fine sand		
	Remarks: 3652.001_RW-03_#7_36.0ft_Node65_Black Rock Units 1,2,3.dat		

FIGURE B-5b

CONSOLIDATION TEST DATA

SUMMARY REPORT



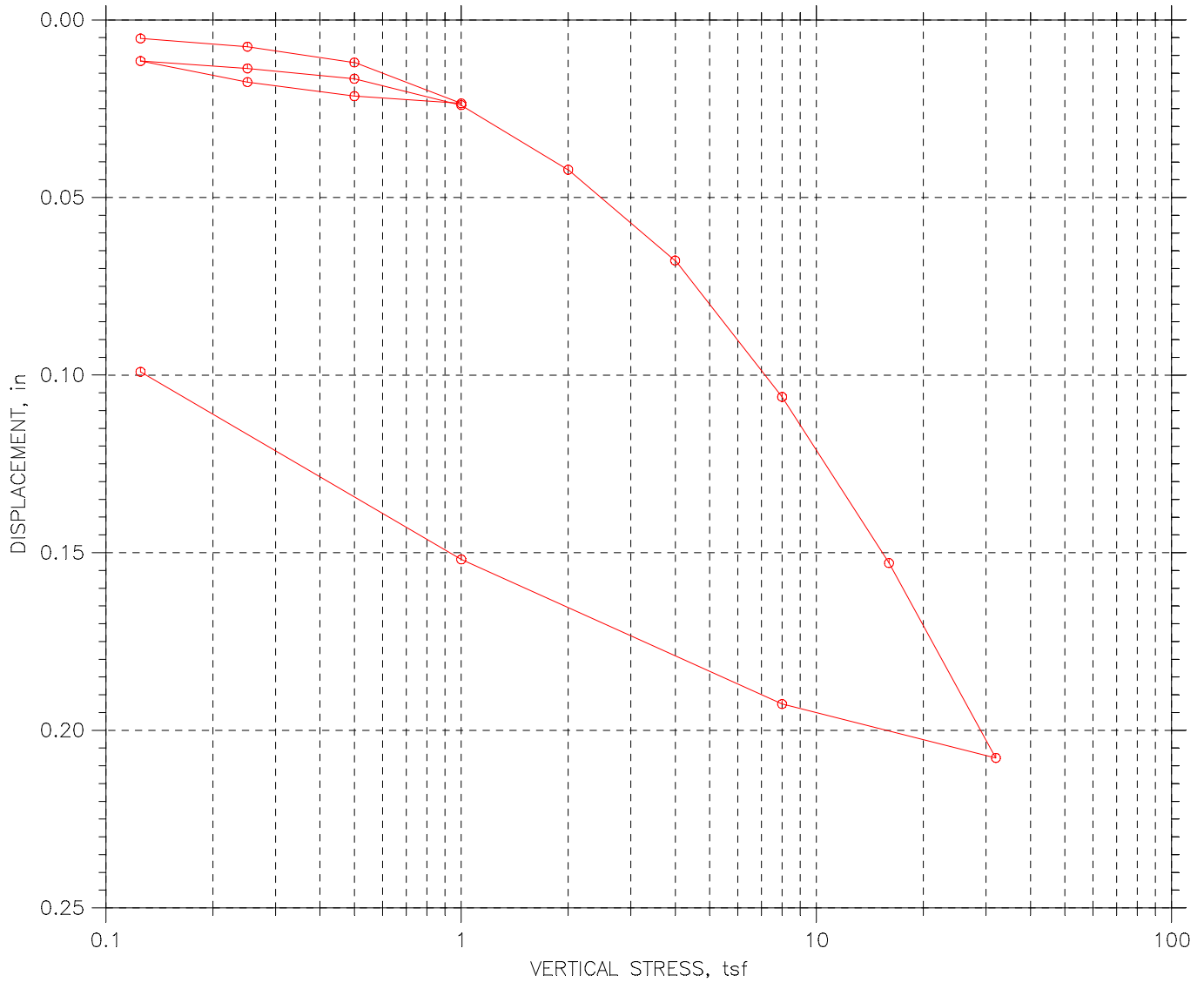
				Before Test	After Test	
Overburden Pressure: 0 tsf			Water Content, %	48.36	40.47	
Preconsolidation Pressure: 0 tsf			Dry Unit Weight, pcf	77.66	87.31	
Compression Index: 3.81959e-313			Saturation, %	111.56	117.41	
Diameter: 2.4 in		Height: 1 in		Void Ratio	1.17	0.93
LL: ---	PL: ---	PI: ---	GS: 2.70			

	Project: Black Rock Units 1,2,3	Location: Calipatria, CA	Project No.: 3652.001
	Boring No.: RW-4	Tested By: NJD	Checked By: NJD
	Sample No.: #10	Test Date: 11/3/08	Depth: 50.5ft
	Test No.: A	Sample Type: Shelby	Elevation: N/A
	Description: Fat CLAY (CH): brown, wet		
	Remarks: 3652.001_RW-04_#10_50.5ft_Node66_Black Rock Units 1,2,3.dat		

FIGURE B-5c

CONSOLIDATION TEST DATA

SUMMARY REPORT



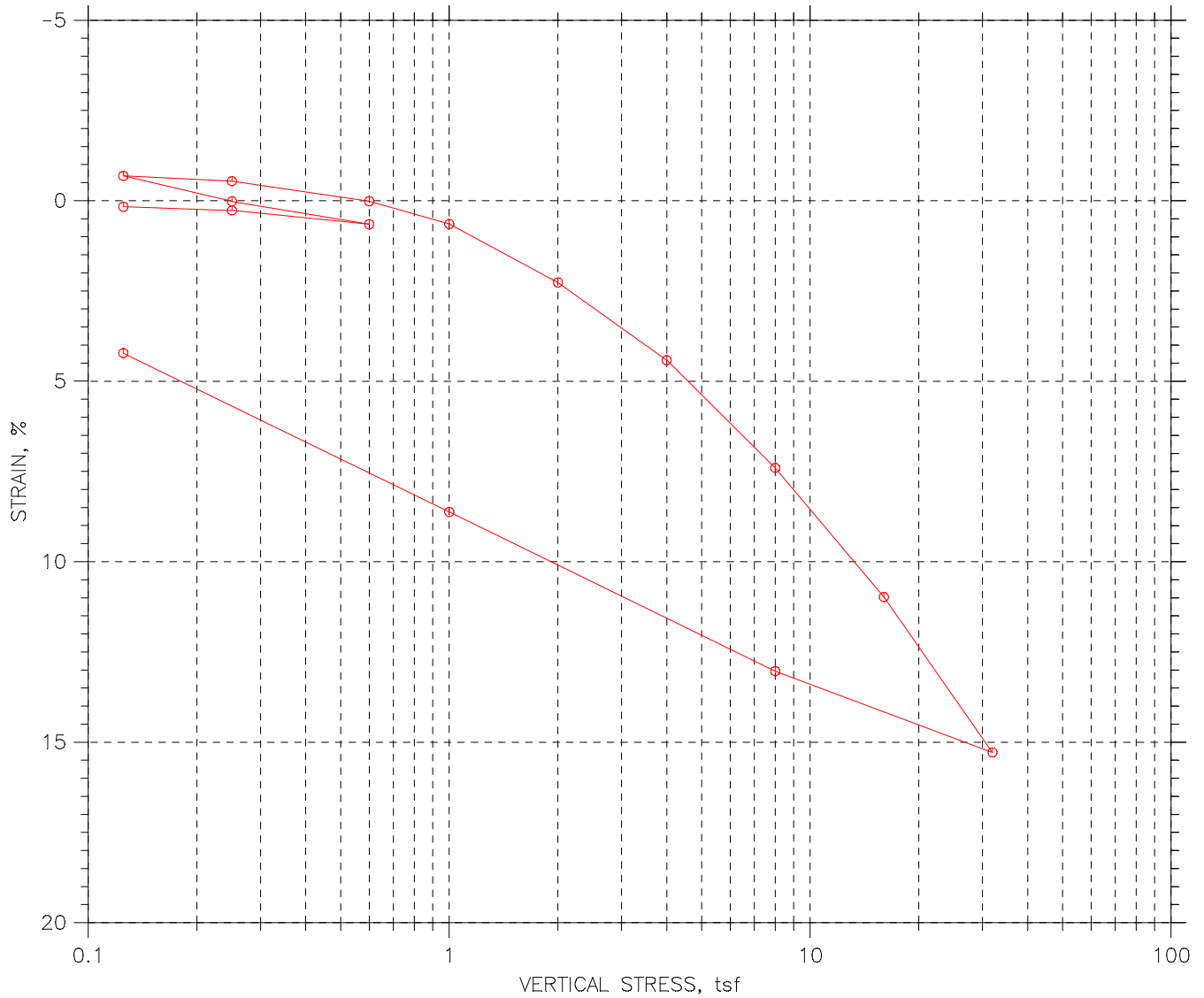
				Before Test	After Test	
Overburden Pressure: 0 tsf			Water Content, %	35.02	30.32	
Preconsolidation Pressure: 0 tsf			Dry Unit Weight, pcf	87.89	97.56	
Compression Index: 3.81959e-313			Saturation, %	93.75	100.00	
Diameter: 2.42 in		Height: 1 in		Void Ratio	1.11	0.90
LL: ---	PL: ---	PI: ---	GS: 2.97			

	Project: Black Rock Units 1,2,3	Location: Calipatria, CA	Project No.: 3652.001
	Boring No.: RW-05	Tested By: NJD	Checked By: NJD
	Sample No.: #6	Test Date: 11/11/08	Depth: 31.5ft
	Test No.: N/A	Sample Type: Shelby	Elevation: N/A
	Description: Fat CLAY (CH): brown, wet		
	Remarks: 3652.001_RW-05_#6_31.5ft_Node65_Black Rock Units 1,2,3.dat		

FIGURE B-5d

CONSOLIDATION TEST DATA

SUMMARY REPORT



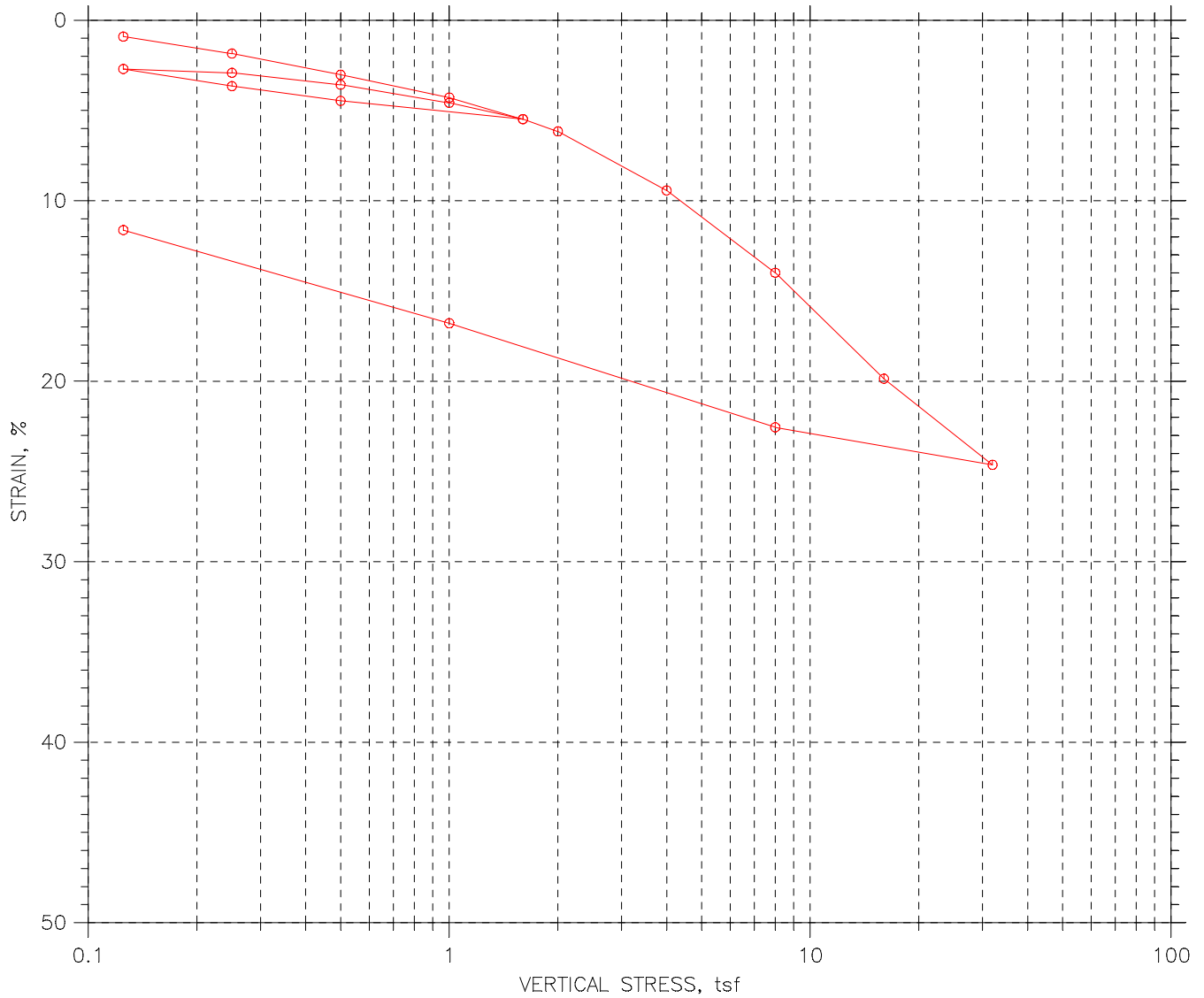
				Before Test	After Test	
Overburden Pressure: 0 tsf			Water Content, %	29.94	28.39	
Preconsolidation Pressure: 0 tsf			Dry Unit Weight, pcf	94.34	98.5	
Compression Index: 3.81959e-313			Saturation, %	102.77	107.76	
Diameter: 2.42 in		Height: 1 in		Void Ratio	0.79	0.71
LL: ---	PL: ---	PI: ---	GS: 2.70			

	Project: Black Rock Units 1,2,3		Location: Calipatria, CA	Project No.: 3652.001
	Boring No.: RW-6		Tested By: NJD	Checked By: NJD
	Sample No.: #3		Test Date: 11/7/08	Depth: 16.0ft
	Test No.: C		Sample Type: Shelby	Elevation: N/A
	Description: Fat CLAY (CH): brown, wet			
	Remarks: 3652.001_RW-06_#3_16.0ft_Node66_Black Rock Units 1,2,3.dat			

FIGURE B-5e

CONSOLIDATION TEST DATA

SUMMARY REPORT

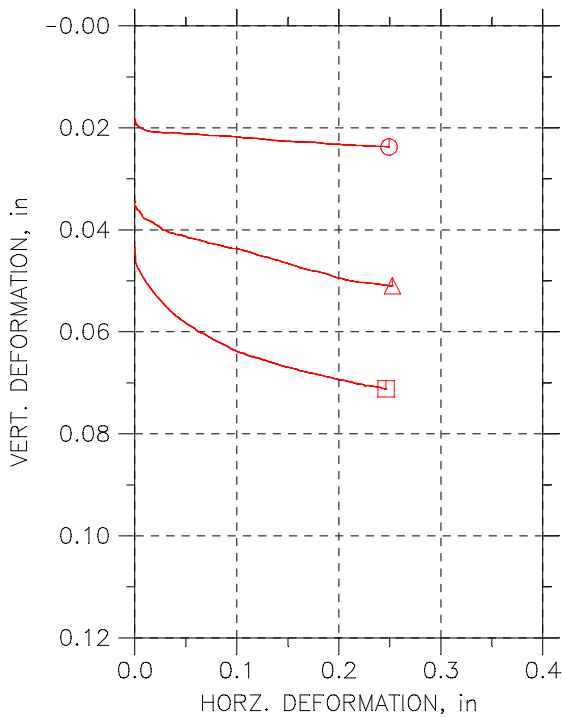
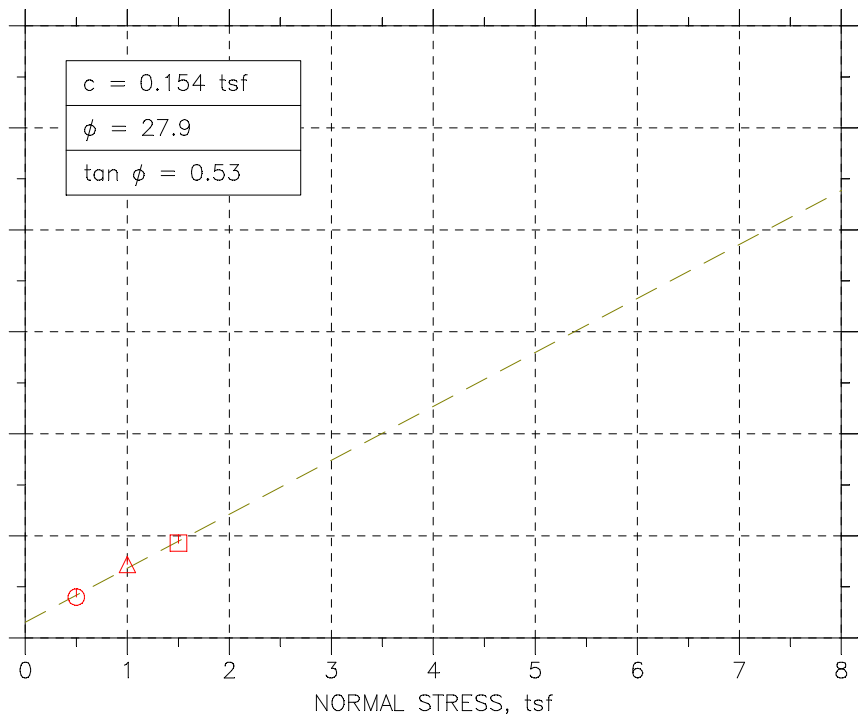
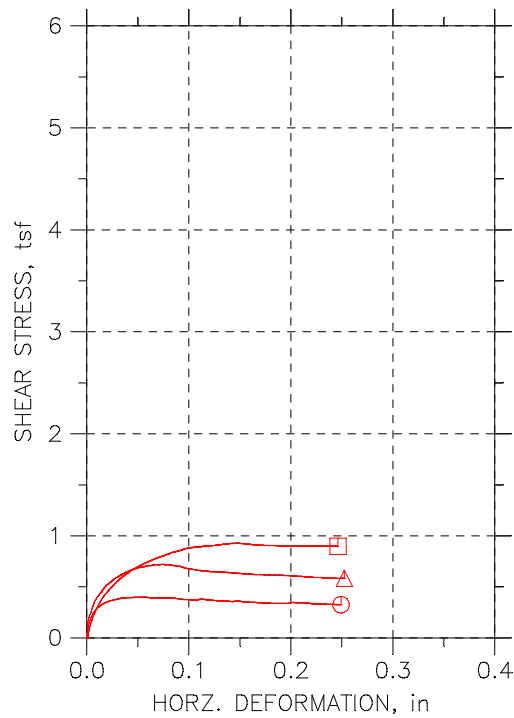


				Before Test	After Test	
Overburden Pressure: 0 tsf			Water Content, %	38.33	33.13	
Preconsolidation Pressure: 0 tsf			Dry Unit Weight, pcf	84.19	95.27	
Compression Index: 3.81959e-313			Saturation, %	103.29	116.29	
Diameter: 2.42 in		Height: 1 in		Void Ratio	1.00	0.77
LL: ---	PL: ---	PI: ---	GS: 2.70			

	Project: Black Rock Units 1,2,3	Location: Calipatria, CA	Project No.: 3652.001
	Boring No.: RW-7	Tested By: NJD	Checked By: NJD
	Sample No.: #10	Test Date: 11/11/08	Depth: 51.0ft
	Test No.: N/A	Sample Type: Ring	Elevation: N/A
	Description: Fat CLAY (CH): brown, wet		
	Remarks: 3652.001_RW-07_#10_51.0ft_Node66_Black Rock Units 1,2,3.dat		

FIGURE B-5f

DIRECT SHEAR TEST REPORT



Symbol	⊖	△	□	
Test No.	A	B	C	
Sample No.	#2	#2	#2	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2	2	2
	Area, in ²	3.1416	3.1416	3.1416
	Height, in	1	1	1
	Water Content, %	28.74	28.74	28.73
	Dry Density, pcf	95.104	96.817	94.489
	Saturation, %	98.17	102.23	96.73
	Void Ratio	0.80515	0.77321	0.8169
Consol. Height, in		0.98258	0.96705	0.95798
Consol. Void Ratio		0.7737	0.71479	0.74056
Final	Water Content, %	31.23	27.10	31.42
	Dry Density, pcf	97.419	102.02	101.73
	Saturation, %	112.66	109.16	125.66
	Void Ratio	0.76226	0.68283	0.68754
Normal Stress, tsf		0.49995	0.99967	1.4999
Max. Shear Stress, tsf		0.39963	0.72021	0.92855
Ult. Shear Stress, tsf		0.3244	0.58309	0.89799
Time to Failure, min		350	490	919
Disp. Rate, in/min		0.00017	0.00017	0.00017
Estimated Specific Gravity		2.75	2.75	2.75
Liquid Limit		---	---	---
Plastic Limit		---	---	---
Plasticity Index		---	---	---

Project: Black Rock Units 1,2,3
 Location: Calipatria, CA
 Project No.: 3652.001
 Boring No.: HSA-19
 Sample Type: Ring
 Description: Fat CLAY (CH): brown, moist
 Remarks: 3652.001_HSA-19_#2_6.0ft_0.5tsf_STA_Black Rock Units 1,2,3

FIGURE B-6

-R- VALUE TEST RESULT

PROJECT NO: 3652.001

PROJECT NAME: BLACK ROCK UNITS 1 - 2 & 3

SAMPLE NO. HSA - 8 @ 0 - 3' SOURCE: Onsite

DESCRIPTION: Brown lean to fat CLAY with sand (CL-CH)

TESTED BY: JA DATE: 11-10-08

ATTENTION: Jon Everett

COPY TO: Jim Bruss

* * * * * RESISTANCE VALUE DATA SUMMARY * * * * *

INITIAL MOISTURE CONTENT: 20 %

DRY DENSITY (pcf)	WATER CONTENT (%)	EXUDATION PRESSURE (psi)	EXPANSION PRESSURE (psf)	* R * VALUE
99.3	23.8	231	0	2
99.8	23.2	326	35	4
100	22.6	446	39	6

AT EXUDATION PRESSURE OF 300 PSI:

99.6	23.4	300	31	4
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-R- VALUE TEST RESULT

PROJECT NO: 3652.001

PROJECT NAME: BLACK ROCK UNITS 1 - 2 & 3

SAMPLE NO. HSA - 12 @ 0 - 3' SOURCE: Onsite

DESCRIPTION: Brown lean to fat CLAY with sand (CL-CH)

TESTED BY: JC DATE: 11/10/08

ATTENTION: Jon Everett

COPY TO: Jim Bruss

* * * * * RESISTANCE VALUE DATA SUMMARY * * * * *

INITIAL MOISTURE CONTENT: 23 %

DRY DENSITY (pcf)	WATER CONTENT (%)	EXUDATION PRESSURE (psi)	EXPANSION PRESSURE (psf)	* R * VALUE
96.1	26.1	215	0	1
98.6	24.9	310	9	2
100.8	23.8	390	83	5

AT EXUDATION PRESSURE OF 300 PSI:

98.4	25	300	8	2
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-R- VALUE TEST RESULT

PROJECT NO: 3652.001

PROJECT NAME: BLACK ROCK UNITS 1 - 2 & 3

SAMPLE NO. HSA - 20 @ 0' - 3' SOURCE: Onsite

DESCRIPTION: Brown lean CLAY with sand (CL)

TESTED BY: GB DATE: 11-10-08

ATTENTION: Jon Everett

COPY TO: Jim Bruss

* * * * * RESISTANCE VALUE DATA SUMMARY * * * * *

INITIAL MOISTURE CONTENT: 16 %

DRY DENSITY (pcf)	WATER CONTENT (%)	EXUDATION PRESSURE (psi)	EXPANSION PRESSURE (psf)	* R * VALUE
106.7	17.4	199	0	16
108.5	16.9	310	0	29
108.1	16.3	358	0	31

AT EXUDATION PRESSURE OF 300 PSI:

107.9	16.8	300	0	28
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EXPANSION INDEX

ASTM D4829-03 / UBC 29-1

Project Name: Black Rock Unit 1,2 3
 Sample Source: HSA-3 @ 0-3'
 Sample Description: Brown lean CLAY with sand (CL).

Project Number: 3652.001
 Tested By: DC
 Date Tested: 11/7/2008

Test Data:

Expansion: Load-Expanded: ☒ Expanded-Load: ☐ Other: ☐

MOISTURE CONTENT	BEFORE TEST	AFTER TEST	REMOLDING DATA			
Ring Number			Water content, %	11.1	Desired Density	105.0
Weight of Wet Soil + Ring (gms)	385.0	472.4				
Weight of Dry Soil + Ring (gms)	346.5	385.1				
Weight of Ring (gms)	0.0	38.6	Total Dry Soil, gms.			
Weight of Dry Soil (gms)	346.5	346.5	Water Added, gms.			
Weight of Water (gms)	38.5	87.3				
Volume of Soil (ft ³)	0.0073	0.0077				
Water Content, %	11.1	25.2				
Dry Density (pcf)	105.0	98.9				

SPECIMEN DATA:

Height 1.00 inches Diameter: 4.00 inches
 $G_s = \underline{2.7}$ estimate $V_0 = \underline{0.0073}$ inch.³
 $\delta_d = \underline{105.0}$
 $\delta_f = \underline{98.9}$

EXPANSION INDEX	<u>62</u>
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SPECIMEN HEIGHT (inches)	$H_0 - H_f$	$(w/c)(G_s)(\delta_d)$ (x)	$(G_s)(62.4) - \delta_d$ (y)	S% x / y	
1.000		3151.26	63.44	50	Initial
1.062	0.0619	6729.06	69.56	97	Final

Date:	Time:	Reading:	Remarks:
11/10/08	3:30	0.3435	
11/10/08	3:56	0.3200	
11/10/08	4:18	0.3003	
11/11/08	8:10	0.2814	
11/11/08	11:50	0.2816	
11/11/08	1:10	0.2816	

FIGURE B-8a



EXPANSION INDEX

ASTM D4829-03 / UBC 29-1

Project Name: Black Rock Unit 1,2,3
Sample Source: HSA-10 @ 0-3'
Sample Description: Brown fat CLAY with sand (CH).

Project Number: 3652.001
Tested By: DC
Date Tested: 11/7/2008

Test Data:

Expansion: Load-Expanded: ☒ Expanded-Load: ☐ Other: ☐

MOISTURE CONTENT	BEFORE TEST	AFTER TEST	REMOLDING DATA			
Ring Number			Water content, %	13.5	Desired Density	97.5
Weight of Wet Soil + Ring (gms)	365.0	461.1				
Weight of Dry Soil + Ring (gms)	321.6	360.4				
Weight of Ring (gms)	0.0	38.8				
Weight of Dry Soil (gms)	321.6	321.6				
Weight of Water (gms)	43.4	100.7				
Volume of Soil (ft ³)	0.0073	0.0078				
Water Content, %	13.5	31.3				
Dry Density (pcf)	97.5	90.8				

SPECIMEN DATA:

Height 1.00 inches **Diameter:** 4.00 inches
G_s = 2.7 estimate **V₀** = 0.0073 inch.³
δ_d = 97.5
δ_f = 90.8

EXPANSION INDEX	<u>74</u>
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SPECIMEN HEIGHT (inches)	H ₀ -H _f	(w/c)(G _s)(δ _d) (x)	(G _s)(62.4)-δ _d (y)	S% x / y	
1.000		3552.33	70.99	50	Initial
1.074	0.0740	7674.48	77.70	99	Final

Date:	Time:	Reading:	Remarks:
11/10/08	3:56	0.3225	
11/10/08	4:02	0.3000	
11/10/08	4:13	0.2800	
11/11/08	8:10	0.2480	
11/11/08	11:50	0.2484	
11/11/08	1:10	0.2485	

FIGURE B-8b



EXPANSION INDEX

ASTM D4829-03 / UBC 29-1

Project Name: Black Rock Unit 1,2 3
 Sample Source: HSA-22 @ 0-3'
 Sample Description: Brown lean CLAY with sand (CL).

Project Number: 3652.001
 Tested By: DC
 Date Tested: 11/7/2008

Test Data:

Expansion: Load-Expanded: ☒ Expanded-Load: ☐ Other: ☐

MOISTURE CONTENT	BEFORE TEST	AFTER TEST	REMOULDING DATA			
Ring Number			Water content, %	12.3	Desired Density	100.4
Weight of Wet Soil + Ring (gms)	372.0	512.3				
Weight of Dry Soil + Ring (gms)	331.3	417.8				
Weight of Ring (gms)	0.0	86.5				
Weight of Dry Soil (gms)	331.3	331.3				
Weight of Water (gms)	40.7	94.5				
Volume of Soil (ft ³)	0.0073	0.0078				
Water Content, %	12.3	28.5				
Dry Density (pcf)	100.4	94.1				

SPECIMEN DATA:

Height 1.00 inches Diameter: 4.00 inches
 $G_s = \frac{2.7}{\text{estimate}} \quad V_0 = \frac{0.0073}{\text{inch}^3}$
 $\delta_d = \frac{100.4}{\text{inch}^3}$
 $\delta_r = \frac{94.1}{\text{inch}^3}$

EXPANSION INDEX	<u>68</u>
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SPECIMEN HEIGHT (inches)	$H_0 - H_f$	$(w/c)(G_s)(\delta_d)$ (x)	$(G_s)(62.4) - \delta_d$ (y)	S% x / y	
1.000		3331.33	68.05	49	Initial
1.067	0.0672	7247.86	74.37	97	Final

Date:	Time:	Reading:	Remarks:
11/11/08	2:03	0.3389	
11/11/08	3:15	0.3010	
11/11/08	4:35	0.2815	
11/12/08	7:55	0.2715	
11/12/08	10:25	0.2717	
11/12/08	1:50	0.2717	

FIGURE B-8c



25 November 2008

Job No.0811051

Cust. No.11608

1100 Willow Pass Court, Suite A

Concord, CA 94520-1006

925 462 2771 Fax: 925 462 2775

www.cercoanalytical.com

Mr. Kim Yee
Fugro West, Inc.
1000 Broadway, Suite 440
Oakland, CA 94607

Subject: Project No.: 3652.001
Project Name: Black Rock Units 1, 2, 3
Corrosivity Analysis – ASTM Test Methods with Brief Evaluation

Dear Mr. Yee:

Pursuant to your request, CERCO Analytical has analyzed the soil samples submitted on November 07, 2008. Based on the analytical results, a brief corrosivity evaluation is enclosed for your consideration.

Based upon the resistivity measurements, all samples are classified as "severely corrosive". All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

The chloride ion concentrations range from 630 to 1,500 mg/kg. Because the chloride ion concentrations are greater than 300 mg/kg, they are determined to be sufficient to attack steel embedded in a concrete mortar coating.

The sulfate ion concentrations range from 1,200 to 2,800 mg/kg and are determined to be sufficient to damage reinforced concrete structures and cement mortar-coated steel at these locations. Therefore, concrete that comes into contact with this soil should use sulfate resistant cement such as Type II, in accordance with the Uniform building Code requirements.

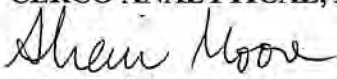
The pH of the soils range from 7.9 to 8.4 which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

The redox potentials range from 460 to 470-mV, which are indicative of aerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific long-term corrosion control design recommendations or consultation, please call JDH Corrosion Consultants, Inc. at (925) 927-6630.

We appreciate the opportunity of working with you on this project. If you have any questions, or if you require further information, please do not hesitate to contact us.

Very truly yours,
CERCO ANALYTICAL, INC.

for, 
J. Darby Howard, Jr., P.E.
President

JDH/jdl
Enclosure

FIGURE B-9a



1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax: 925 462 2775
www.cercoanalytical.com

Client: Fugro West
Client's Project No.: 3652.001
Client's Project Name: Black Rock Units 1, 2, 3
Date Sampled: Not Indicated
Date Received: 7-Nov-08
Matrix: Soil
Authorization: Signed Chain of Custody

Date of Report: 25-Nov-2008

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)*	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
0811051-001	HSA-3 @ 0-3'	470	8.2	-	270	-	1,500	2,800 ⁽¹⁾
0811051-002	HSA-10 @ 0-3'	460	7.9	-	280	-	800	1,300
0811051-003	HSA-11 @ 0-3'	470	7.9	-	310	-	630	1,200
0811051-004	HSA-14 @ 0-3'	460	7.9	-	400	-	970	1,200
0811051-005	HSA-20 @ 0-3"	460	8.4	-	260	-	970	1,600

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Detection Limit:	-	-	10	-	50	15	15
Date Analyzed:	21-Nov-2008	21-Nov-2008	-	25-Nov-2008	-	21-Nov-2008	21-Nov-2008 & 24-Nov-2008

* Results Reported on "As Received" Basis

N.D. - None Detected

⁽¹⁾ Detection limit is elevated to 75 mg/kg due to dilution

Cheryl McMillen
Laboratory Director

Quality Control Summary - All laboratory quality control parameters were found to be within established limits

Page No. 1

APPENDIX C
LIQUEFACTION ANALYSES

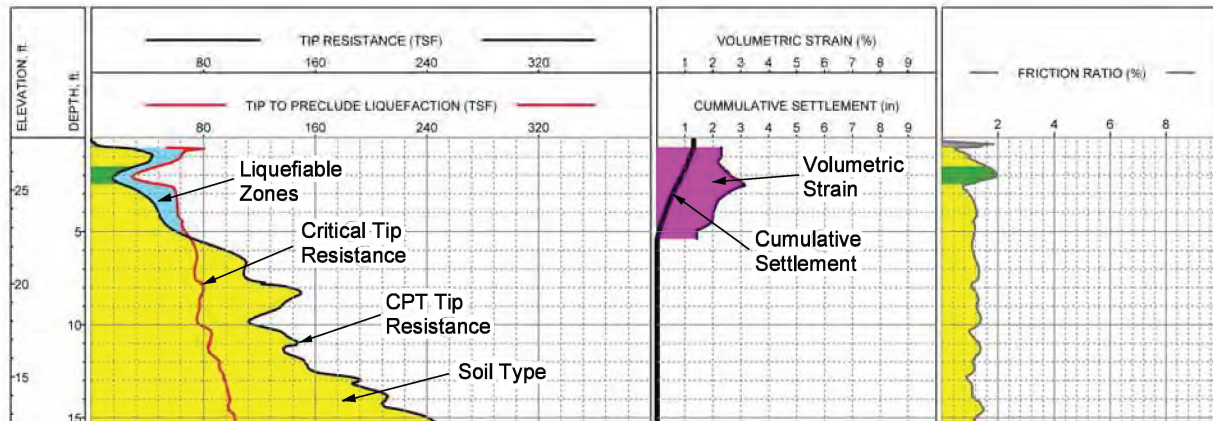
APPENDIX C

LIQUEFACTION ANALYSES

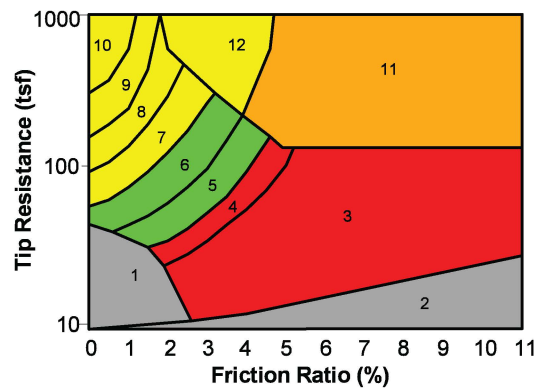
Appendix C presents the results of the CPT liquefaction assessments for the Design Level Earthquake (DLE) event in accordance with the criteria presented in Section 6 of this report. For the analyses, the DLE event is defined as having a moment magnitude (M) of 6.5 and a PGA of 0.40g.

The susceptibility of granular soils to liquefaction is a function of gradation, density, and type of fines content of the soil. The susceptibility in general decreases with respective increases in: 1) distribution of grain size, and 2) soil density. The detailed liquefaction susceptibility was based on the CPT-based empirical procedures recommended by Youd et. al., (2001) and used typical CPT tip resistance data that are representative of the soils at the project site. It should be noted that all zones susceptible to liquefaction are shown to the base of each exploration, and cumulative settlement commences with the deepest encountered liquefiable zones; however, past research has suggested that in most cases liquefaction does not occur at depths greater than about 50 feet below ground surface.

Figure C-1 provides a key for the interpretation of the liquefaction analyses based on the CPT data. Figures C-2 through C-22 present the CPT liquefaction assessments for the DLE event. The CPT plots show zones of materials susceptible to liquefaction in pink, and cumulative settlements along with volumetric strains.



COLOR LEGEND FOR FRICTION RATIO TRACES

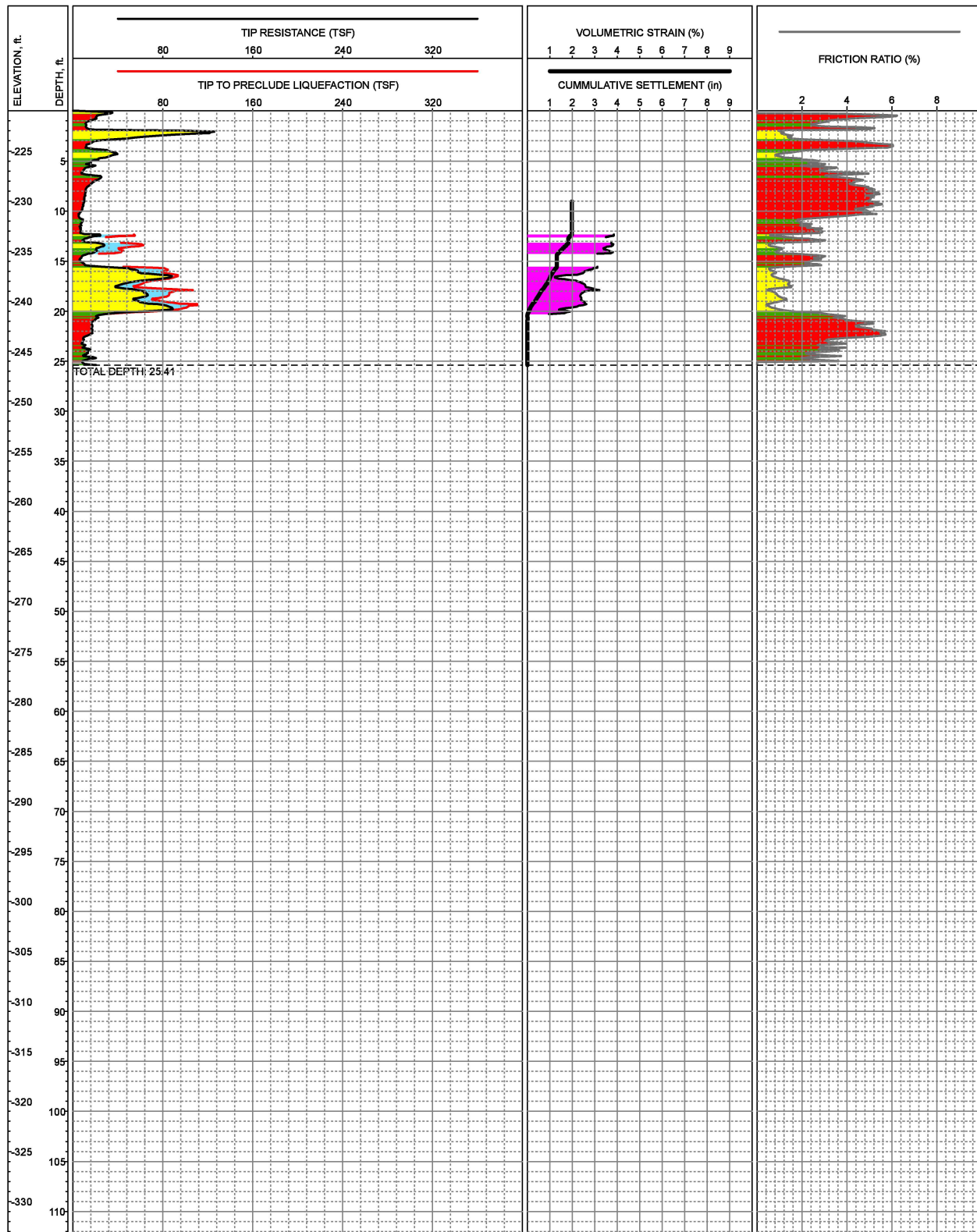


Zone	Soil Behavior Type	U.S.C.S.
1	Sensitive Fine-grained	OL-CH
2	Organic Material	OL-OH
3	Clay	CH
4	Silty Clay to Clay	CL-CH
5	Clayey Silt to Silty Clay	MH-CL
6	Sandy Silt to Clayey Silt	ML-MH
7	Silty Sand to Sandy Silt	SM-ML
8	Sand to Silty Sand	SM-SP
9	Sand	SW-SP
10	Gravelly Sand to Sand	SW-GW
11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

*overconsolidated or cemented

CPT CORRELATION CHART (Robertson and Campanella, 1984)

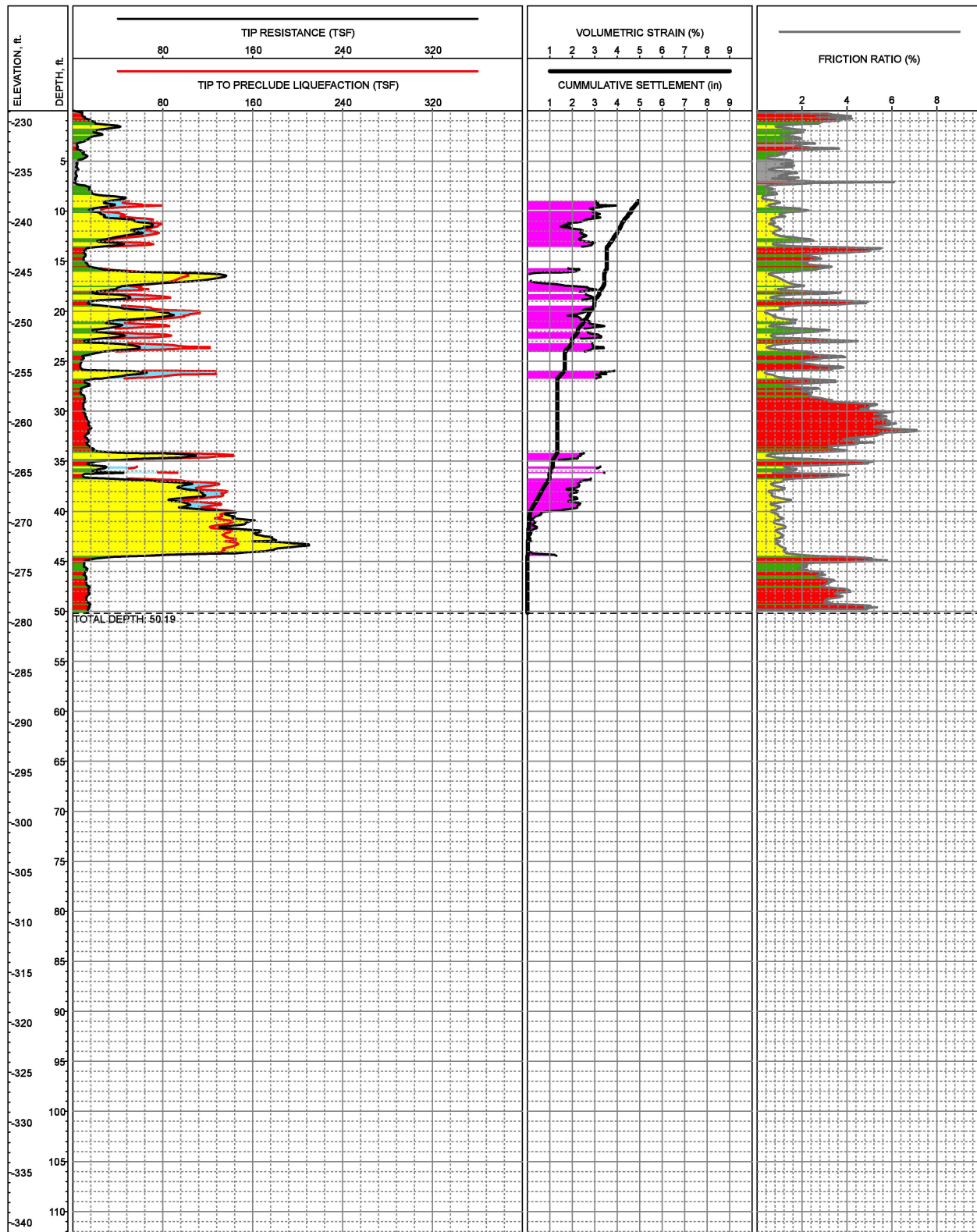
KEY TO LIQUEFACTION LOGS Black Rock Units 1, 2, & 3 Calipatria, California



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

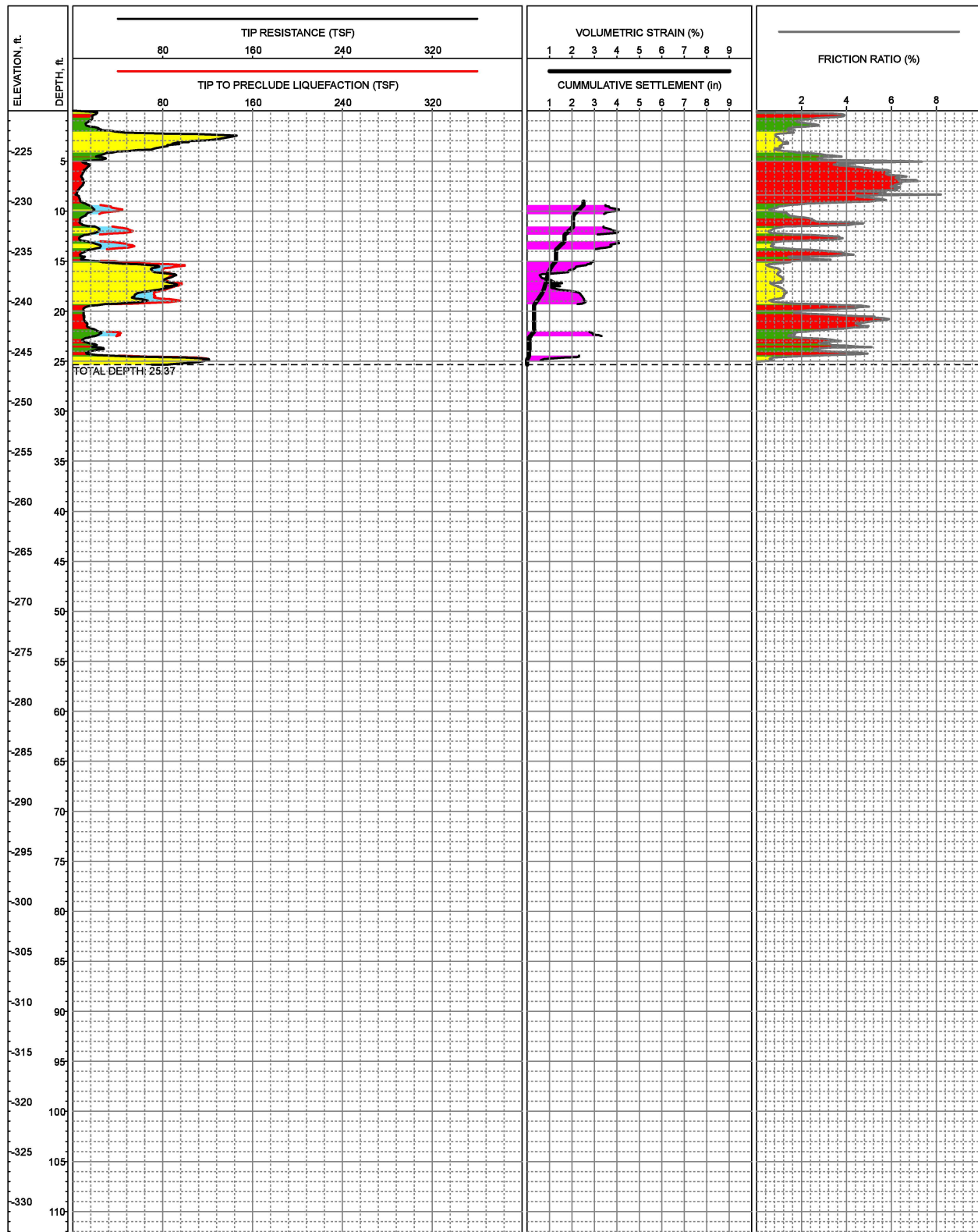
LIQUEFACTION LOG OF CPT NO: C-101
P.G.A. = 0.40g and $M_w = 6.5$
Black Rock Units 1, 2 & 3
Calipatria, California



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

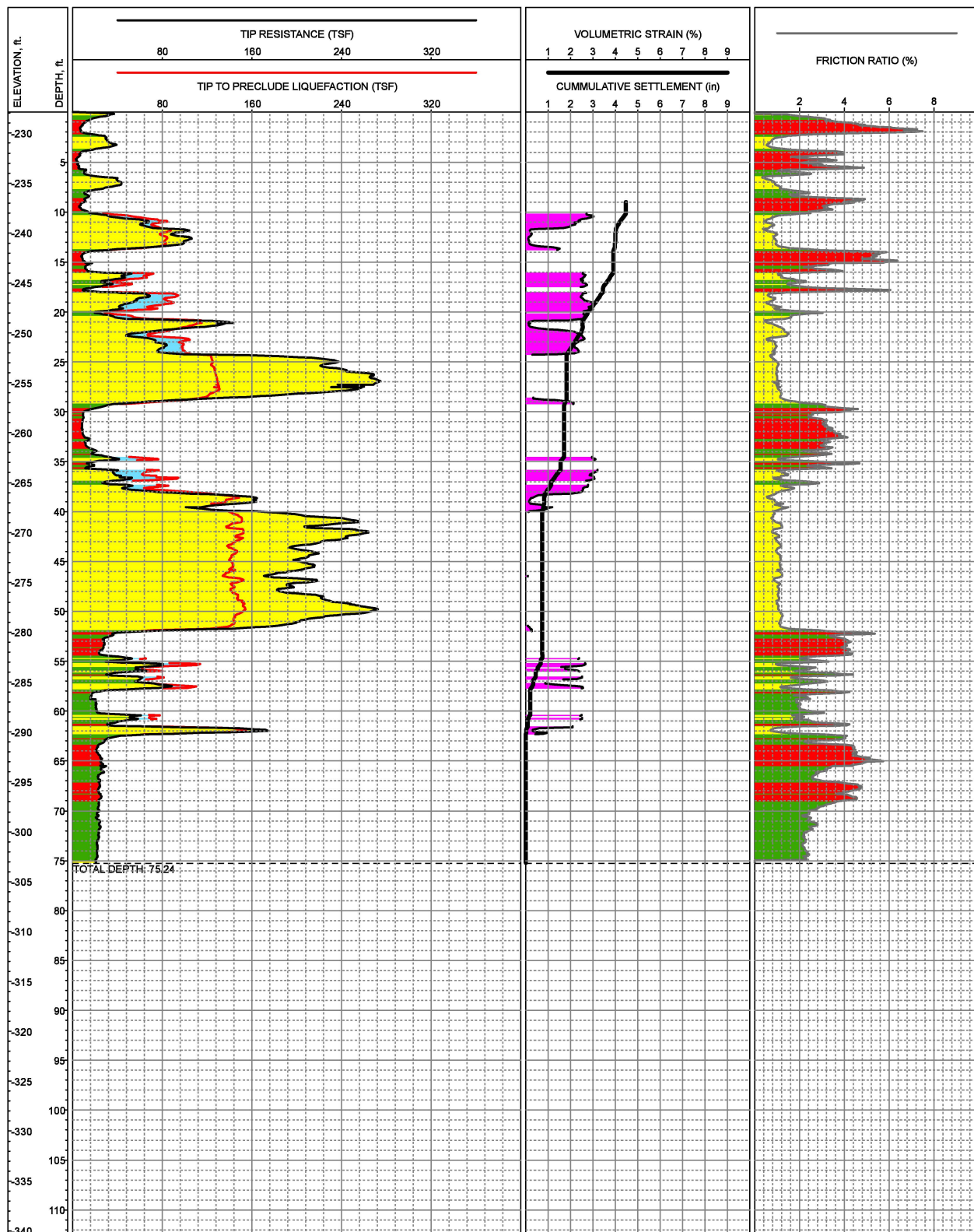
LIQUEFACTION LOG OF CPT NO: C-102
P.G.A. = 0.40g and $M_w = 6.5$
Black Rock Units 1, 2 & 3
Calipatria, California



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

LIQUEFACTION LOG OF CPT NO: C-103
P.G.A. = 0.40g and Mw = 6.5
Black Rock Units 1, 2 & 3
Calipatria, California



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

LIQUEFACTION LOG OF CPT NO: C-104
P.G.A. = 0.40g and $M_w = 6.5$
Black Rock Units 1, 2 & 3
Calipatria, California