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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-04	71.8	14	Lean CLAY (CL)	128	103	24																	
RW-04	75.0	15	Lean CLAY (CL)					31	16														
RW-04	85.0	17	Fat CLAY (CH)					71	45														
RW-05	6.0	1	Lean CLAY (CL)	111	87	28																	
RW-05	16.4	3	Silty Fine SAND (SM)	125	98	27																	
RW-05	20.0	4	Silty Fine SAND (SM)				48																
RW-05	31.5	6	Lean CLAY (CL)	119	88	35																	
RW-05	36.0	7	SILT (ML)	117	92	27	93																
RW-05	46.0	9	Silty Fine SAND (SM)	123	101	22																	
RW-05	50.0	10	Fat CLAY (CH)					64	39														
RW-05	56.0	11	Silty Fine SAND (SM)	117	93	25																	
RW-06	11.0	2	Sandy SILT (ML)	118	94	25	58																
RW-06	16.0	3	Fat CLAY (CH)	123	94	30		71	50														
RW-06	20.0	4	Sandy SILT (ML)				55																
RW-06	65.0	12	Fat CLAY (CH)					75	50														
RW-07	5.0	1	SILT (ML)				89																
RW-07	11.0	2	Silty Fine SAND (SM)	121	98	24																	
RW-07	15.0	3	Lean CLAY (CL)					50	30														
RW-07	21.0	4	Silty Fine SAND (SM)	123	99	24																	
RW-07	31.0	6	Lean CLAY (CL)	118	88	34																	
RW-07	42.0	7	Silty Fine SAND (SM)	133	110	21																	
RW-07	45.0	9	Silty Fine SAND (SM)				14																
RW-07	51.0	10	Fat CLAY (CH)	116	85	38		72	48														
RW-07	55.0	11	Silty Fine SAND (SM)				46																
HSA-01	3.0	1	Lean CLAY (CL)	123	96	28																	
HSA-02	3.0	1	Lean CLAY (CL)	116	91	28																	
HSA-02	6.0	2	SILT (ML)	119	94	27																	
HSA-03	0.0	B	Lean CLAY (CL)				96	38	25												62		
HSA-03	3.0	1	SILT (ML)	117	92	28																	
HSA-03	6.0	2	SILT (ML)	122	98	24																	

SUMMARY OF LABORATORY TEST RESULTS
Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE B-1b

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 (%)				
HSA-04	0.0	B	Lean CLAY (CL)				98	33	17	116.5	10.5												
HSA-04	3.0	1	Lean CLAY (CL)	117	89	31																	
HSA-04	6.0	2	Silty Fine SAND (SM) to Sandy SILT (ML)	126	101	25																	
HSA-05	0.0	B	Lean CLAY with sand (CL)				75																
HSA-05	3.0	1	SILT (ML)	118	94	26																	
HSA-05	6.0	2	Silty Fine SAND (SM)	120	97	23																	
HSA-06	3.0	1	Silty Fine SAND (SM) to Sandy SILT (ML)	115	92	26																	
HSA-06	6.0	2	Lean CLAY (CL)	115	88	31																	
HSA-07	3.0	1	Lean CLAY (CL)	114	88	30																	
HSA-07	6.0	2	Silty Fine SAND (SM)	121	98	23																	
HSA-08	0.0	B	Lean CLAY (CL)				98													4			
HSA-08	3.0	1	Sandy SILT (ML)	107	83	29																	
HSA-08	6.0	2	Silty Fine SAND (SM)	115	92	25																	
HSA-09	3.0	1	Silty Fine SAND (SM)	108	83	30																	
HSA-09	6.0	2	SILT (ML)	115	91	26																	
HSA-10	0.0	B	Fat CLAY (CH)					52	33												74		
HSA-10	3.0	1	Lean CLAY (CL)	114	90	27																	
HSA-10	6.0	2	Lean CLAY (CL)	115	89	29																	
HSA-11	0.0	B	Lean CLAY (CL)					36	17														
HSA-11	3.0	1	Lean CLAY (CL)	116	87	34																	
HSA-11	6.0	2	Silty Fine SAND (SM) to Sandy SILT (ML)	121	98	24																	
HSA-12	0.0	B	Lean CLAY (CL)				100													2			
HSA-12	3.0	1	Lean CLAY (CL)	119	94	27																	
HSA-12	6.0	2	Lean CLAY (CL)	115	89	29																	
HSA-13	0.0	B	Lean CLAY (CL)				87																
HSA-13	3.0	1	Lean CLAY (CL)	110	86	29																	
HSA-13	6.0	2	Lean CLAY (CL)	115	86	34																	
HSA-14	0.0	B	SILT (ML)				91	27	8	119.0	12.0												
HSA-14	3.0	1	Silty Fine SAND (SM) to Sandy SILT (ML)	115	91	27																	
HSA-14	6.0	2	Silty Fine SAND (SM) to Sandy SILT (ML)	129	97	33																	

SUMMARY OF LABORATORY TEST RESULTS

Black Rock Units 1, 2 & 3
Calipatria, California

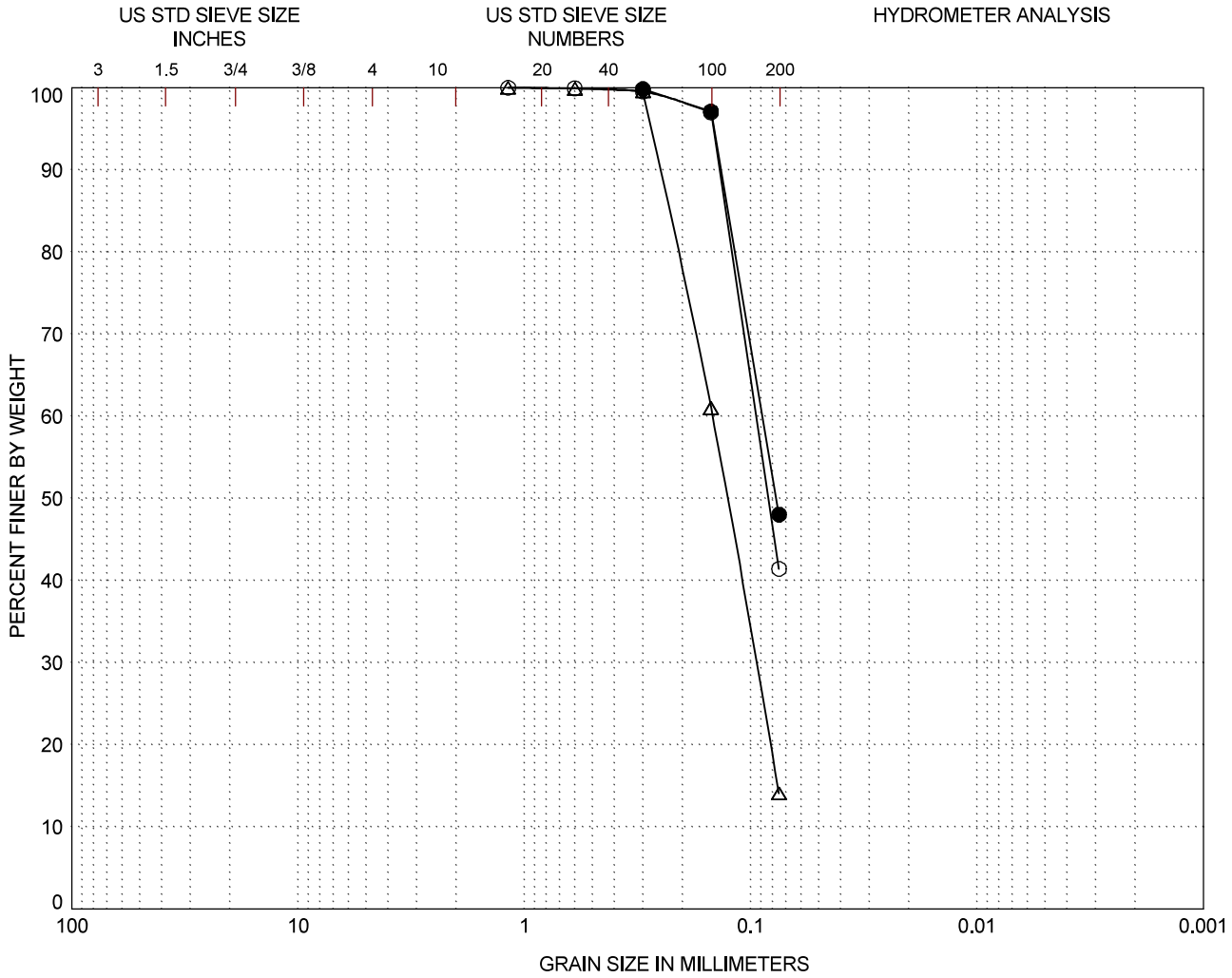
FIGURE B-1c

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 (%)				
HSA-15	3.0	1	Lean CLAY (CL)	118	89	33																	
HSA-15	6.0	2	Silty Fine SAND (SM) to Sandy SILT (ML)	116	89	30																	
HSA-16	3.0	1	Silty SAND (SM)			14																	
HSA-16	10.0	2	Lean CLAY (CL)					31	11														
HSA-16	15.0	3	SILT with sand (ML)				78																
HSA-17	3.0	1	Silty Fine SAND (SM) to Sandy SILT (ML)	118	91	29																	
HSA-17	6.0	2	SILT (ML)	117	93	26																	
HSA-18	3.0	1	Lean CLAY (CL)	117	91	29																	
HSA-18	6.0	2	Lean CLAY (CL)	119	95	26																	
HSA-19	3.0	1	Silty SAND (SM)			13																	
HSA-19	6.0	2	Lean CLAY (CL)			29						0.3	28										
HSA-19	11.4	3	SILT (ML)	118	88	34		34	9														
HSA-20	0.0	B	Lean CLAY (CL)				94													28			
HSA-20	3.0	1	Lean CLAY (CL)	115	90	28																	
HSA-20	6.0	2	Silty Fine SAND (SM) to Sandy SILT (ML)	116	92	26																	
HSA-21	3.0	1	Lean CLAY (CL)	111	85	30																	
HSA-21	6.0	2	Lean CLAY (CL)	118	95	24																	
HSA-22	0.0	B	Lean CLAY (CL)				99	45	30	115.5	15.0										68		
HSA-22	3.0	1	Lean CLAY (CL)	116	88	31																	
HSA-22	6.0	2	Lean CLAY (CL)	118	92	28																	
HSA-23	3.0	1	Lean CLAY (CL)	114	88	29																	
HSA-23	6.0	2	Silty Fine SAND (SM) to Sandy SILT (ML)	119	96	24																	

SUMMARY OF LABORATORY TEST RESULTS

Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE B-1d

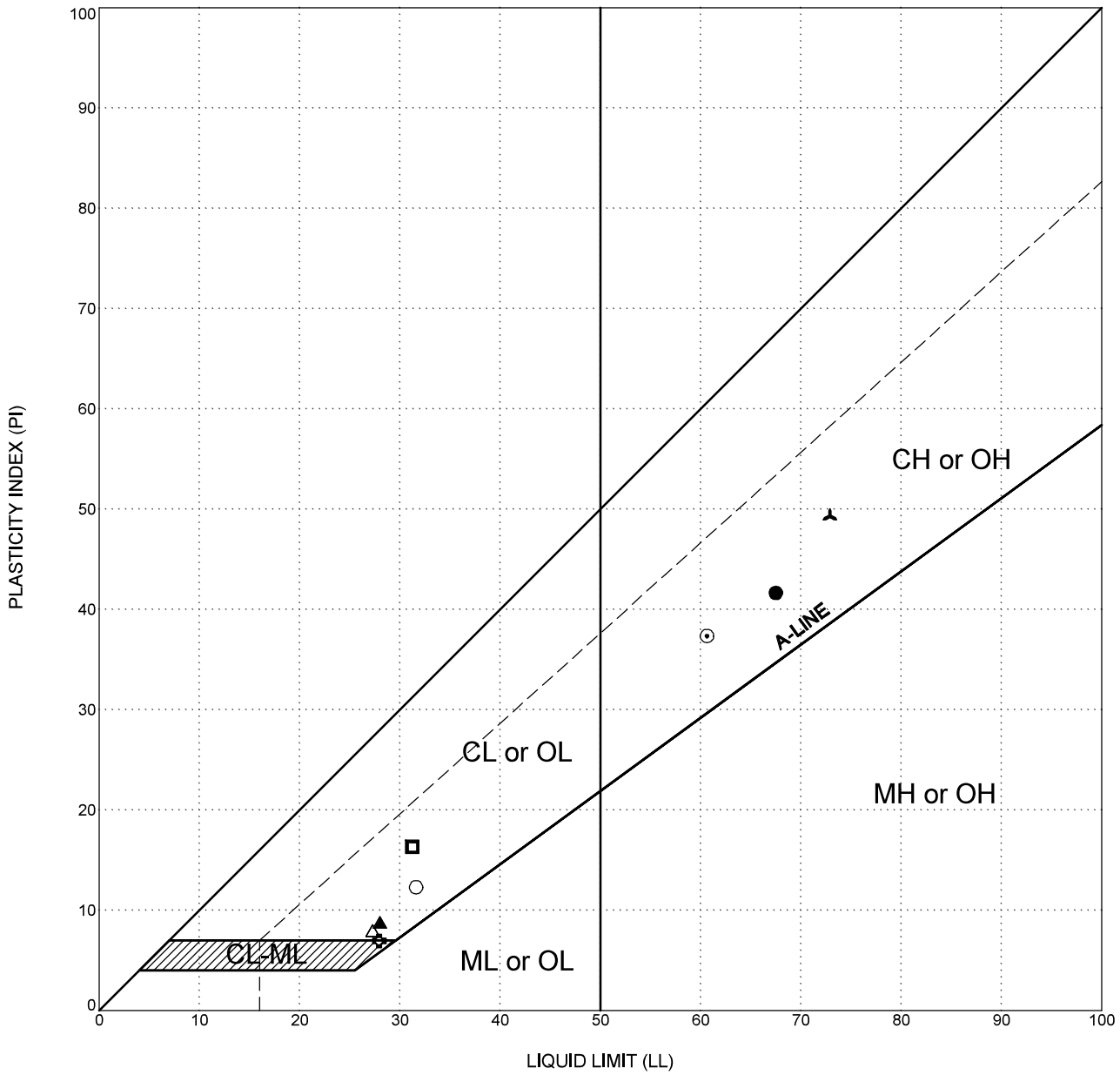


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

LEGEND	(location)	(depth,ft)	CLASSIFICATION	Cc	Cu
○	RW-03	10.0	Silty Fine SAND (SM)		
●	RW-05	20.0	Silty Fine SAND (SM)		
△	RW-07	45.0	Silty Fine SAND (SM)		

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

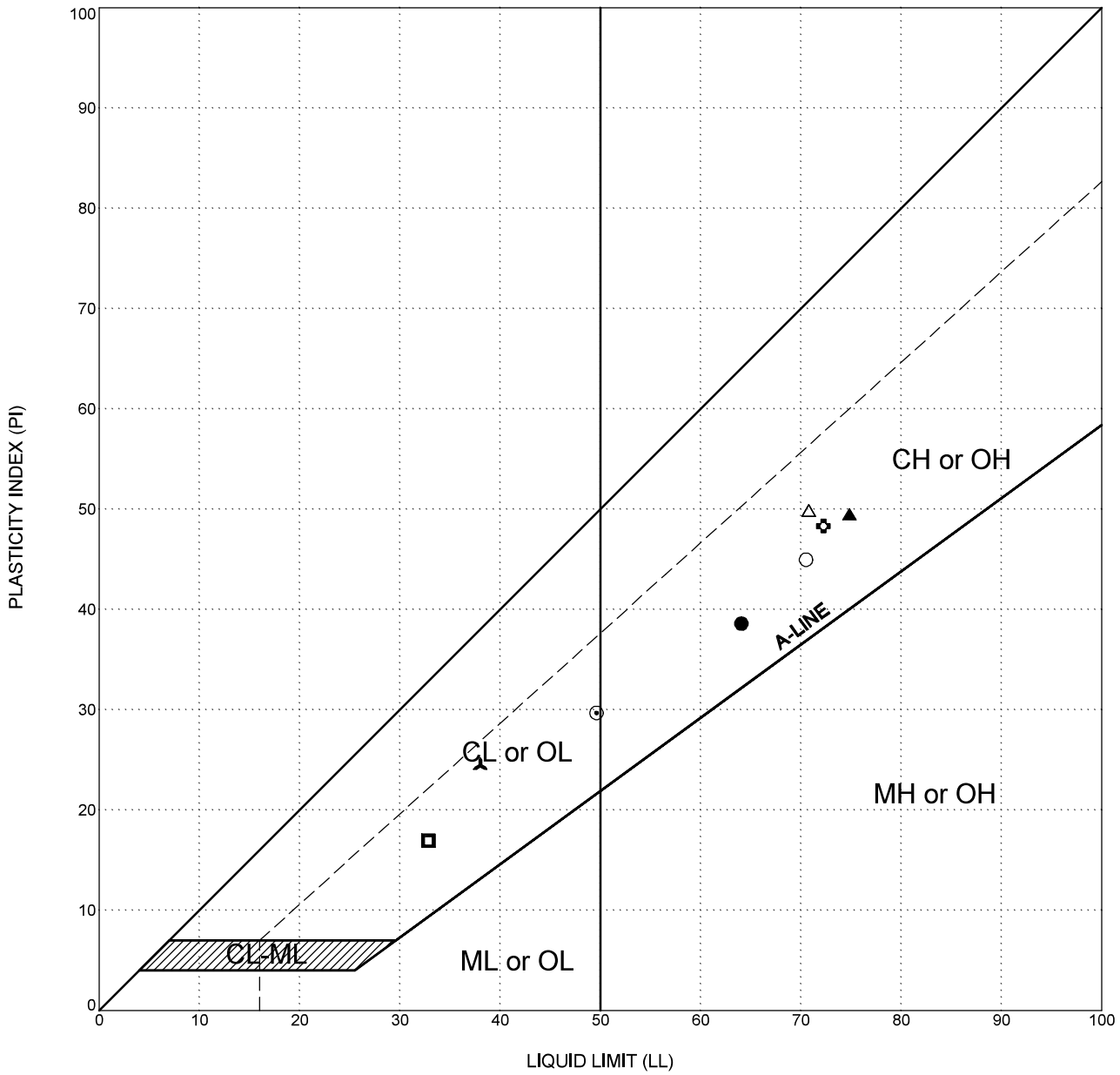
FIGURE B-2



LEGEND	location	depth, ft	CLASSIFICATION	ATTERBERG LIMITS TEST RESULTS 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

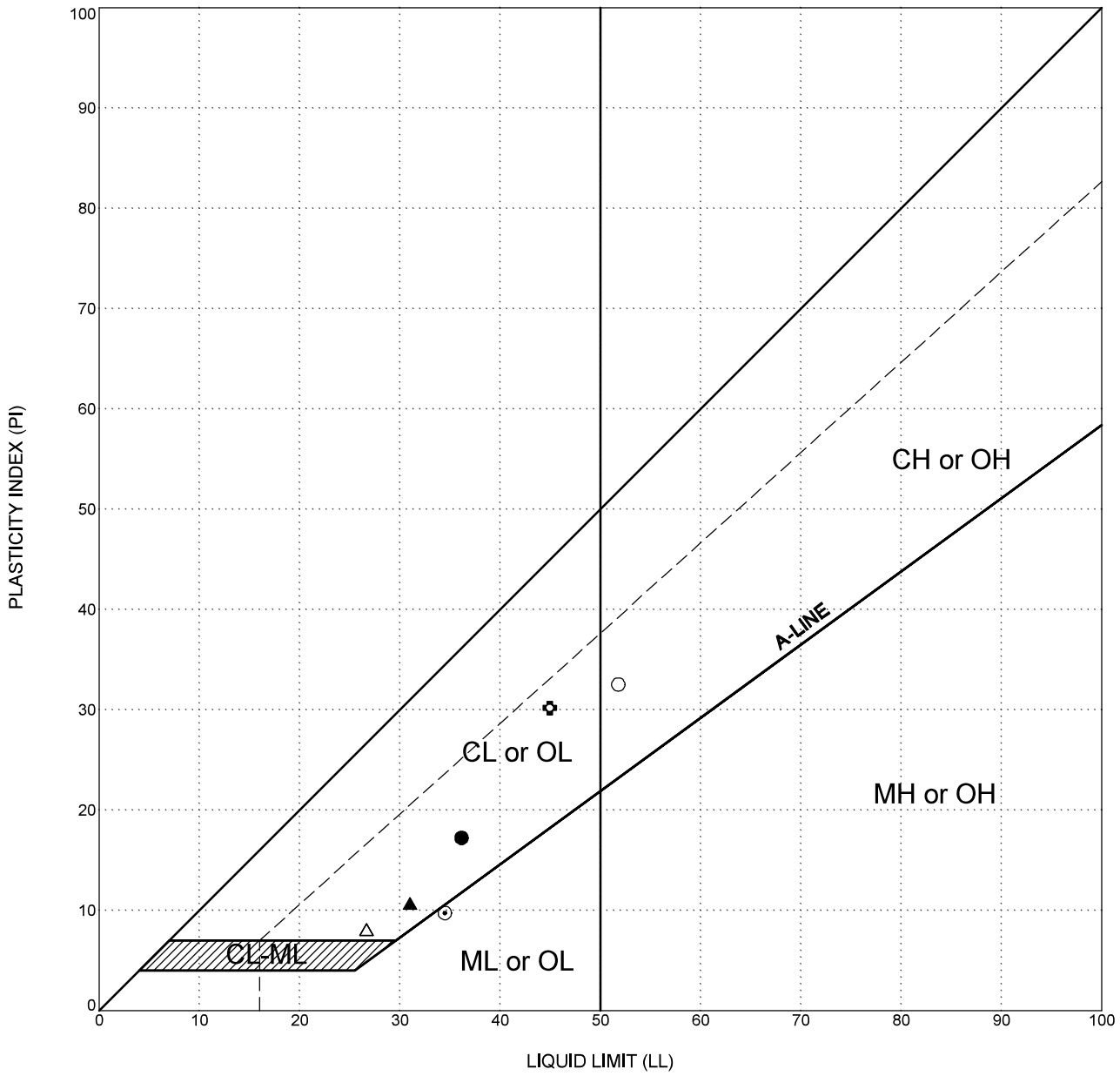
FIGURE B-3a



LEGEND	location	depth, ft	CLASSIFICATION	ATTERBERG LIMITS TEST RESULTS 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

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-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**
CORRECTED MDD	**119.0**	**CORRECTED MOISTURE CONTENT**	**12**

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

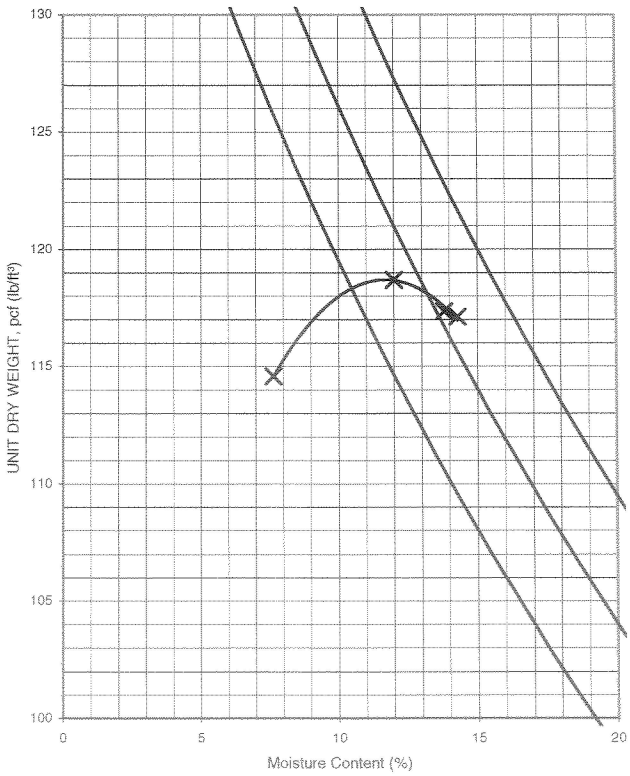


FIGURE B-4a

Tested by :		Date :		Calculated by :		Checked by :	

HSA-14

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):		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
8,798	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)	8.700	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**

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

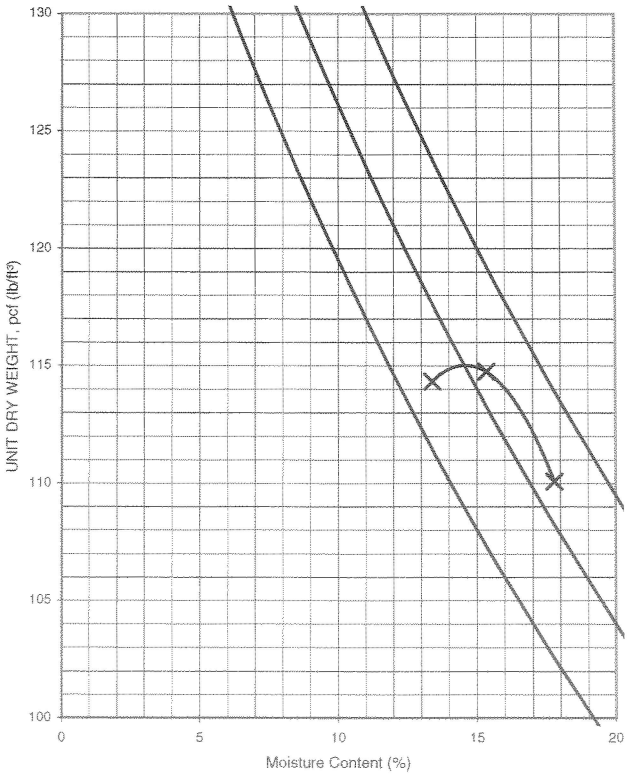


FIGURE B-4b

Tested by :		Date :		Calculated by :		Checked by :	

HSA-22

COMPACTION

Job No.	3652.001	Job Name:	Black Rock	Date:	11/24/08
Lab ID:	4124	Client:			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

Test No.	1	2	3	4	5
Wt. Of Wet Soil (lb)	8.570	8.570	8.670	8.710	8.710
Wt. Of Mold (lb)	4.380	4.380	4.380	4.380	4.380
Wet Unit Weight (lb/ft³)	126.2	126.2	129.2	130.4	130.4
Tare No.	LPT-52	LPT-52	LPT-31	YO-16	YO-16
Wt. of Wet Soil + Tare (g)	611.70	611.70	607.60	608.30	608.30
Wt. of Dry Soil + Tare(g)	565.60	565.60	551.20	542.90	542.90
Wt. of Water (g)	46.10	46.10	56.40	65.40	65.40
Wt. of Tare (g)	38.60	38.60	38.20	38.40	38.40
Wt. of Dry Soil (g)	527.00	527.00	513.00	504.50	504.50
Moisture Content (%)	8.7	8.7	11.0	13.0	13.0
Dry Unit Weight (lb/ft³)	116.1	116.1	116.4	115.5	115.5

MAX. DRY DENSITY (lb/ft³)	**116.5**	**OPT. MOISTURE CONTENT (%)**	**10.5**
CORRECTED MDD	**116.5**	**CORRECTED MOISTURE CONTENT**	**10.5**

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

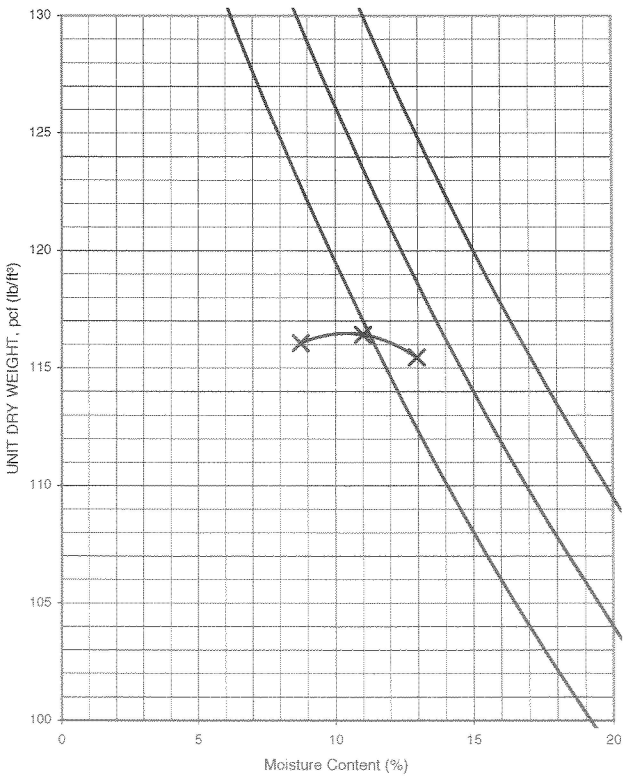


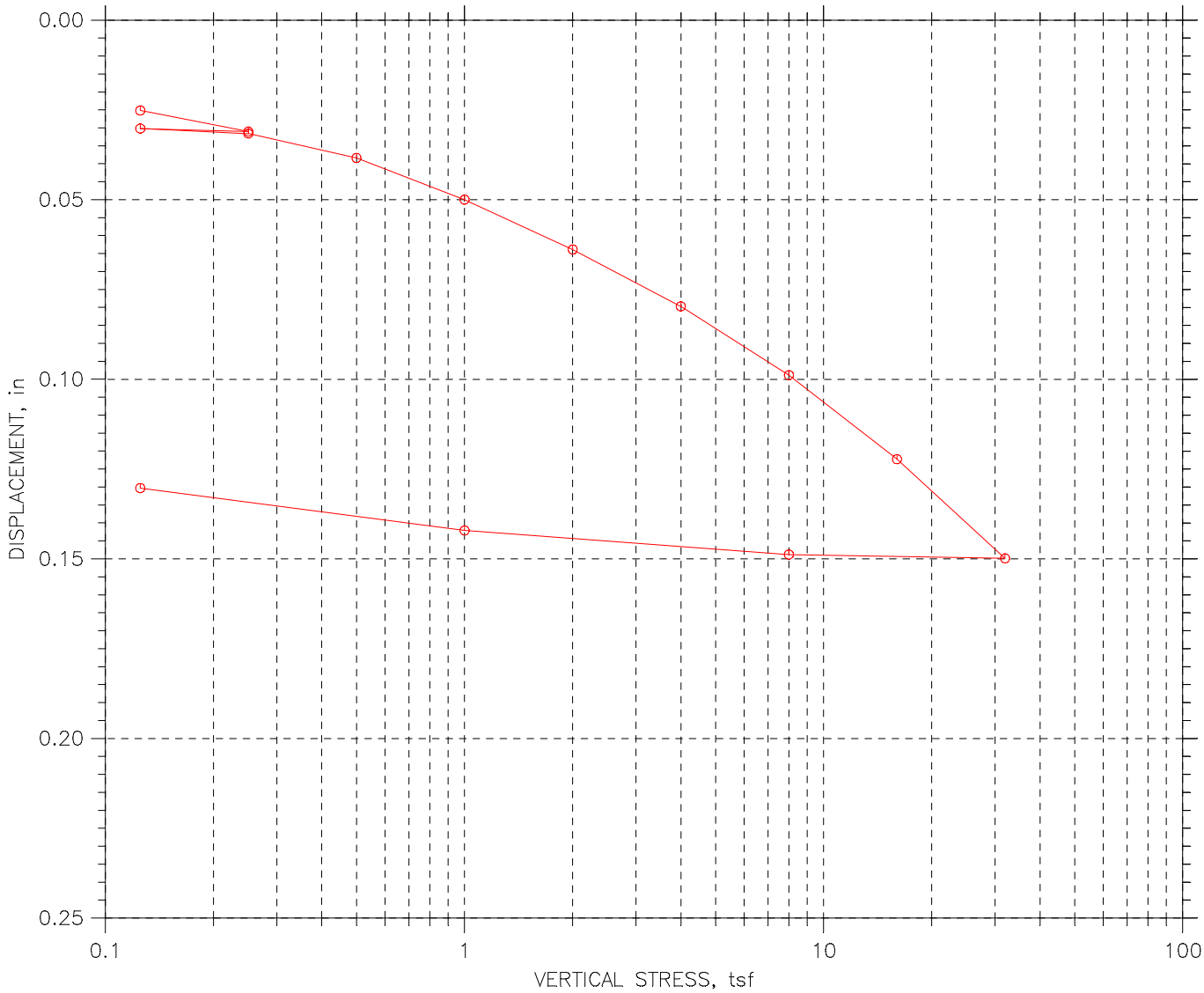
FIGURE B-4c

Tested by :		Date :		Calculated by :		Checked by :	

HSA-4

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			

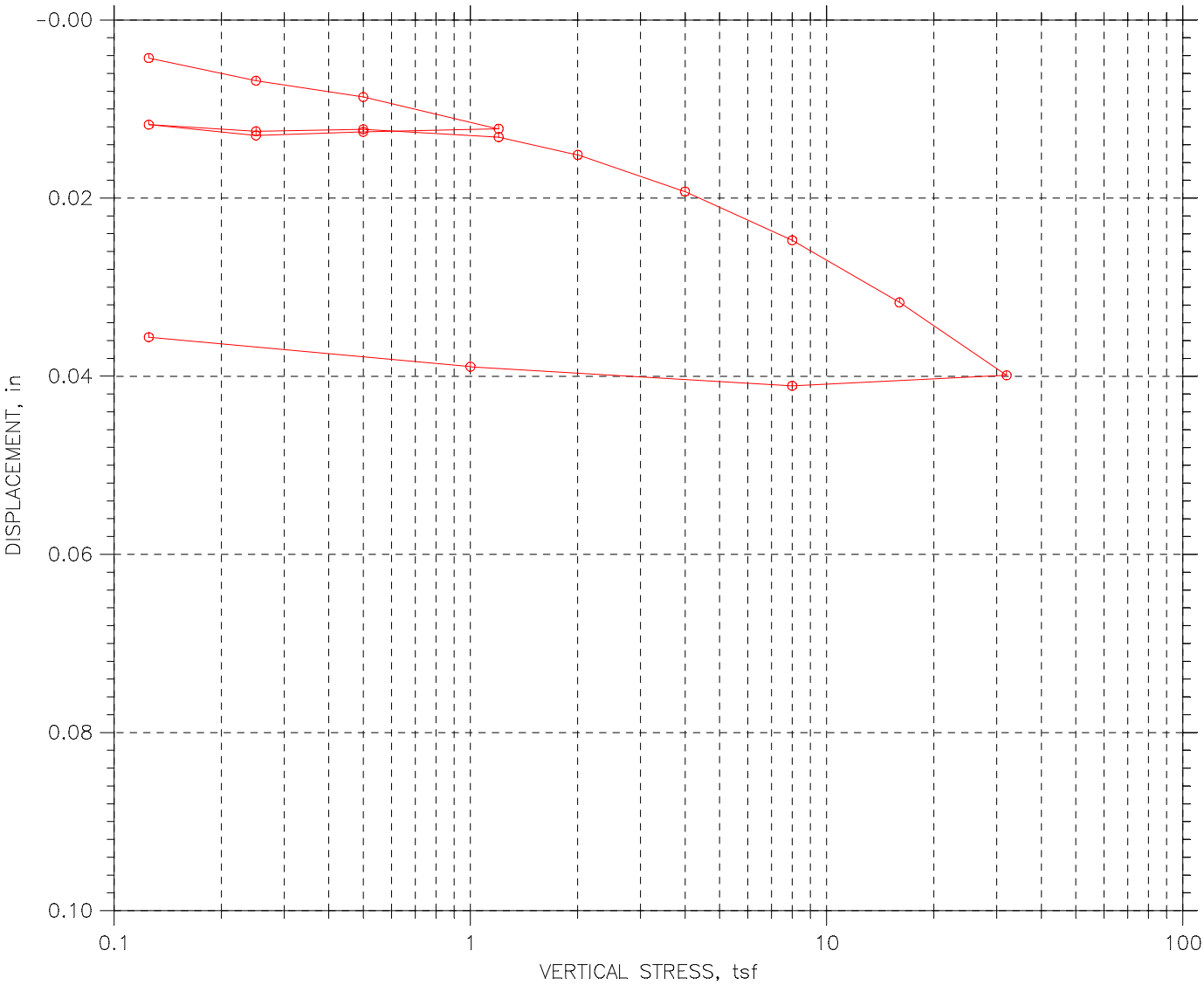
	Project: Black Rock Units 1,2,3	Location: Calipatria, CA	Project No.: 3652.001
	Boring No.: RW-01	Tested By: NJD	Checked By: NJD
	Sample No.: #1	Test Date: 11/7/08	Depth: 6.0ft
	Test No.: D	Sample Type: Ring	Elevation: N/A
	Description: Clayey SILT (ML): brown, wet		
	Remarks: 3652.001_RW-01_#1_6.0ft_Node65_Black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

FIGURE B-5a

Thu, 04-DEC-2008 09:35:39

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			

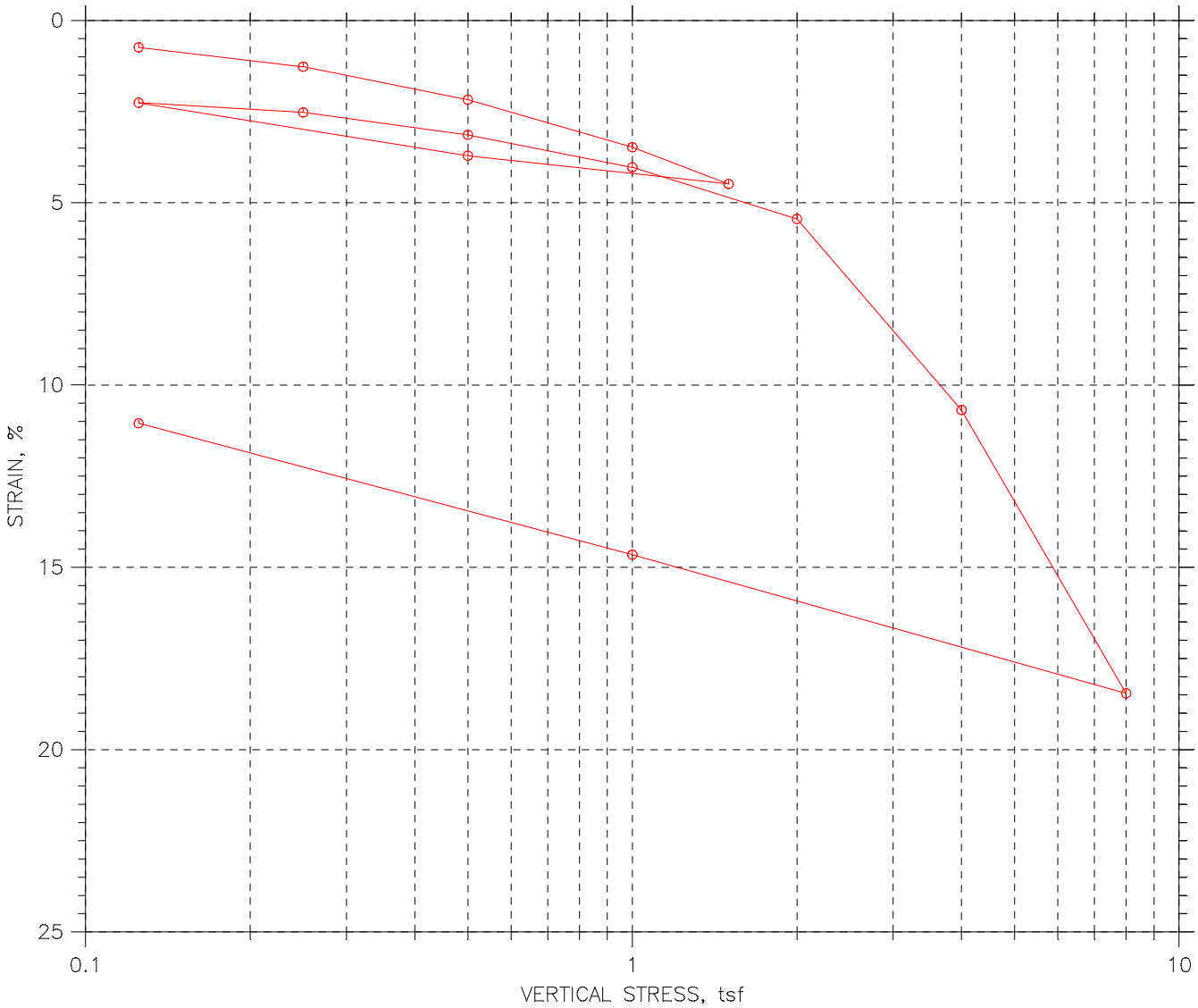
Project: Black Rock Units 1,2,3	Location: Calipatria, CA	Project No.: 3652.001
Boring No.: RW-03	Tested By: NJD	Checked By: NJD
Sample No.: #7	Test Date: 11/10/08	Depth: 36.0ft
Test No.: E	Sample Type: Ring	Elevation: N/A
Description: Silty SAND (SM): brown, moist, fine sand		
Remarks: 3652.001_RW-03_#7_36.0ft_Node65_Black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

FIGURE B-5b

Thu, 04-DEC-2008 09:37:06

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			

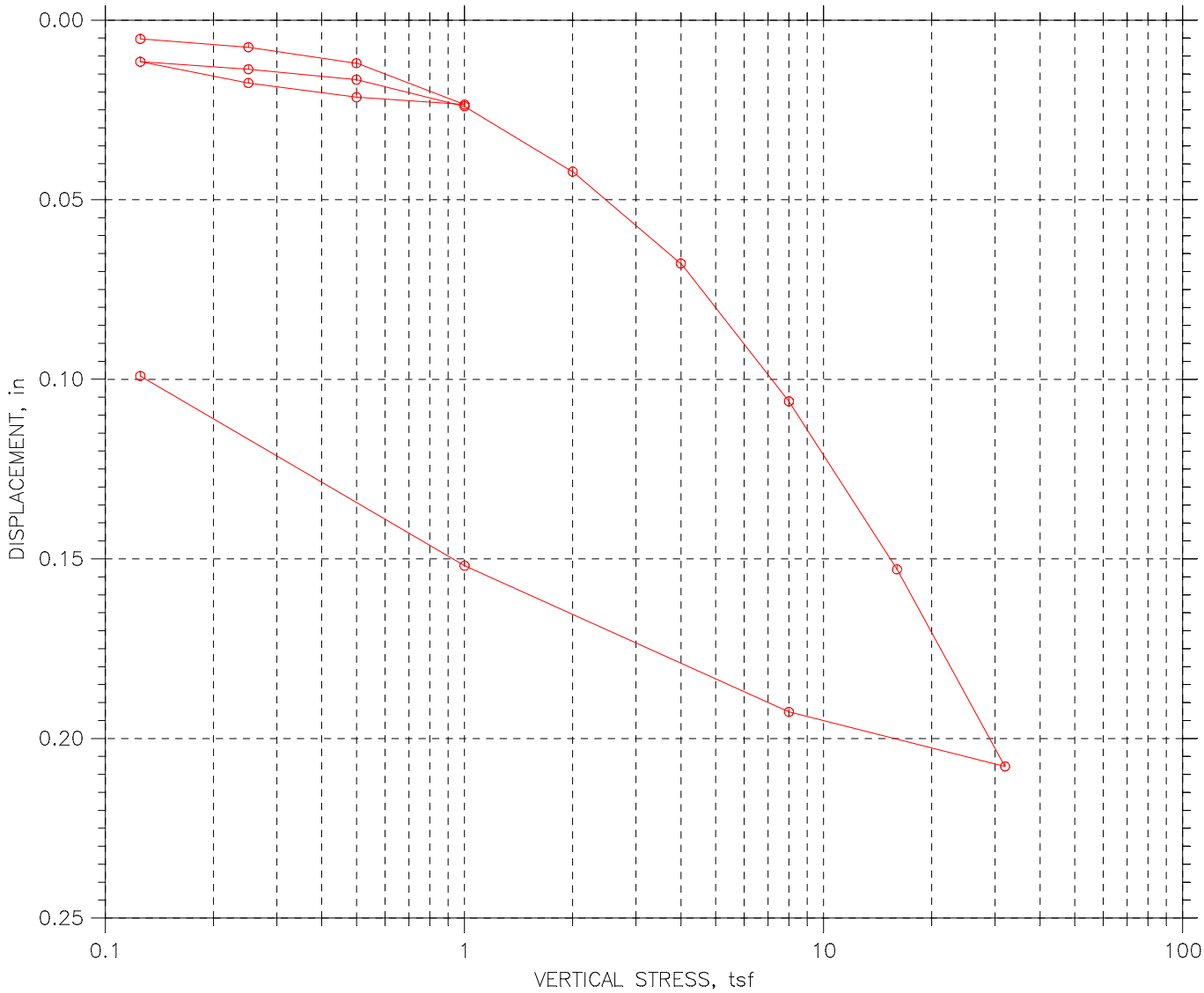
	Project: Black Rock Units 1,2,3	Location: Calipatria, CA	Project No.: 3652.001
	Boring No.: RW-4	Tested By: NJD	Checked By: NJD
	Sample No.: #10	Test Date: 11/3/08	Depth: 50.5ft
	Test No.: A	Sample Type: Shelby	Elevation: N/A
	Description: Fat CLAY (CH): brown, wet		
	Remarks: 3652.001_RW-04_#10_50.5ft_Node66_Black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

FIGURE B-5c

Thu, 04-DEC-2008 09:27:01

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			

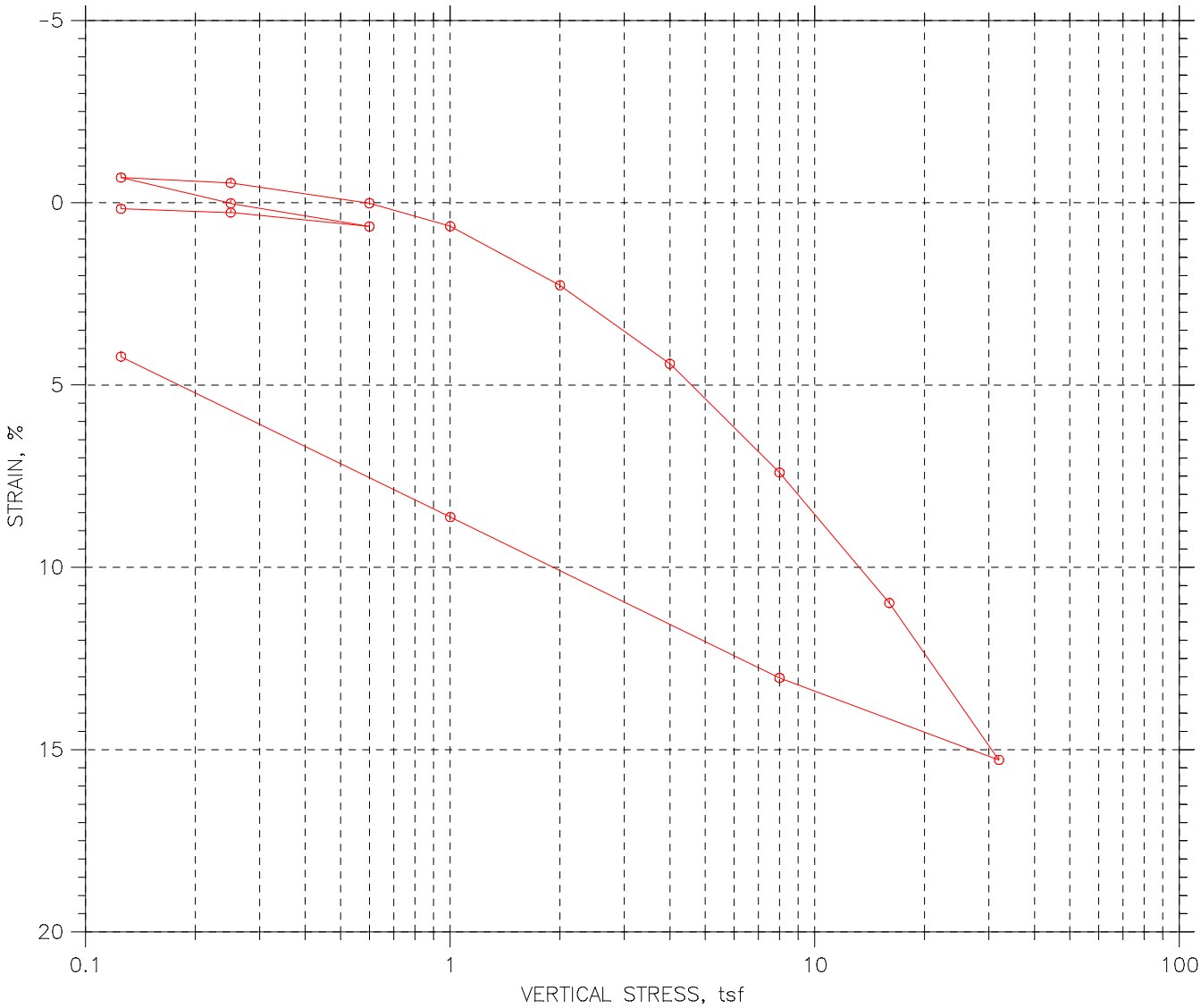
	Project: Black Rock Units 1,2,3	Location: Calipatria, CA	Project No.: 3652.001
	Boring No.: RW-05	Tested By: NJD	Checked By: NJD
	Sample No.: #6	Test Date: 11/11/08	Depth: 31.5ft
	Test No.: N/A	Sample Type: Shelby	Elevation: N/A
	Description: Fat CLAY (CH): brown, wet		
	Remarks: 3652.001_RW-05_#6_31.5ft_Node65_Black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

FIGURE B-5d

Thu, 04-DEC-2008 09:38:19

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			

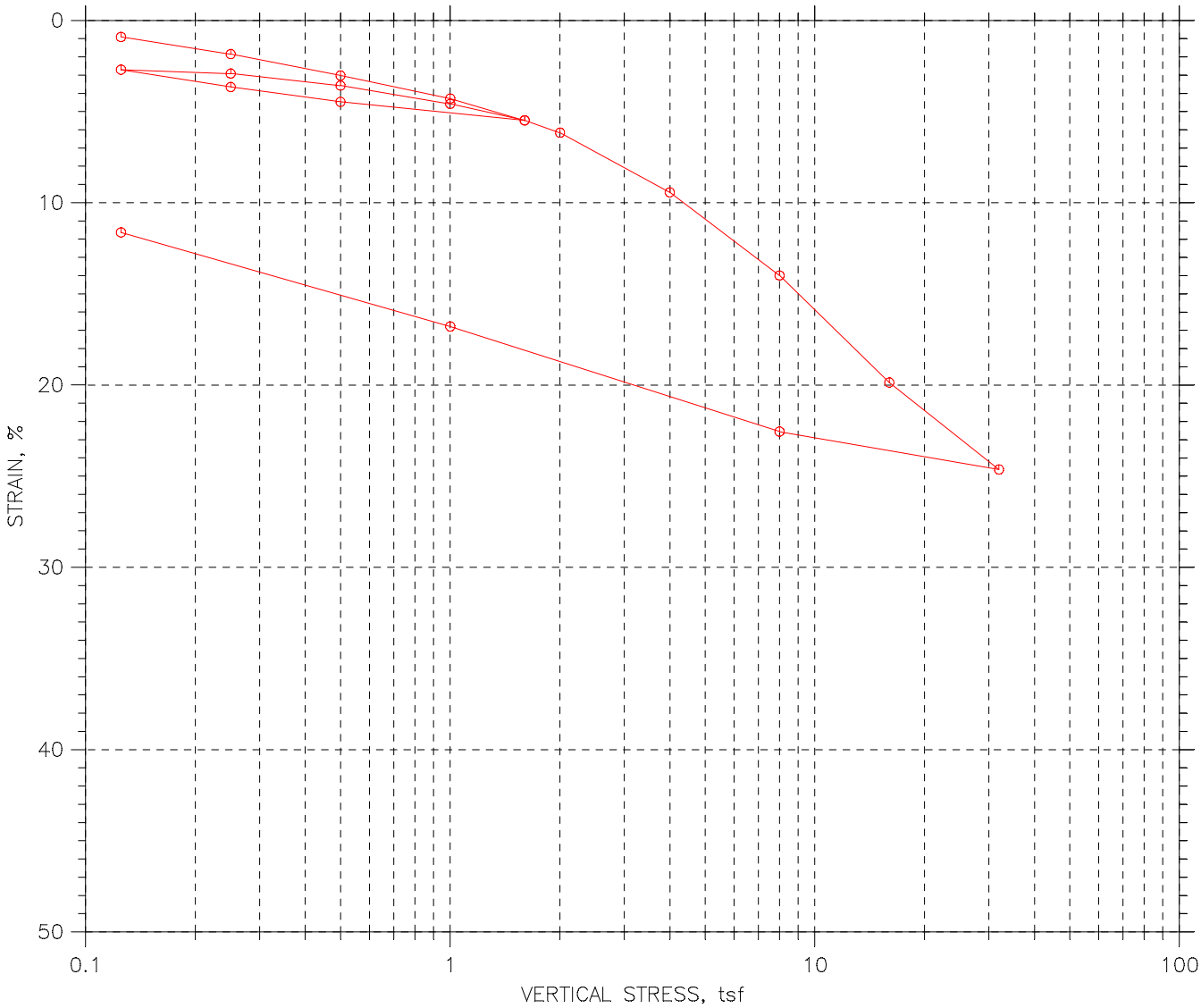
	Project: Black Rock Units 1,2,3	Location: Calipatria, CA	Project No.: 3652.001
	Boring No.: RW-6	Tested By: NJD	Checked By: NJD
	Sample No.: #3	Test Date: 11/7/08	Depth: 16.0ft
	Test No.: C	Sample Type: Shelby	Elevation: N/A
	Description: Fat CLAY (CH): brown, wet		
	Remarks: 3652.001_RW-06_#3_16.0ft_Node66_Black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

FIGURE B-5e

Thu, 04-DEC-2008 09:22:23

CONSOLIDATION TEST DATA

SUMMARY REPORT



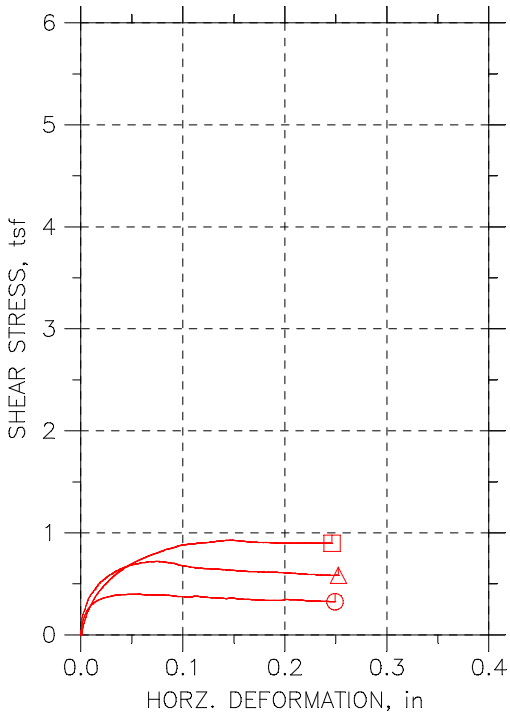
					Before Test	After Test
Overburden Pressure: 0 tsf				Water Content, %	38.33	33.13
Preconsolidation Pressure: 0 tsf				Dry Unit Weight, pcf	84.19	95.27
Compression Index: 3.81959e-313				Saturation, %	103.29	116.29
Diameter: 2.42 in		Height: 1 in		Void Ratio	1.00	0.77
LL: ---	PL: ---	PI: ---	GS: 2.70			

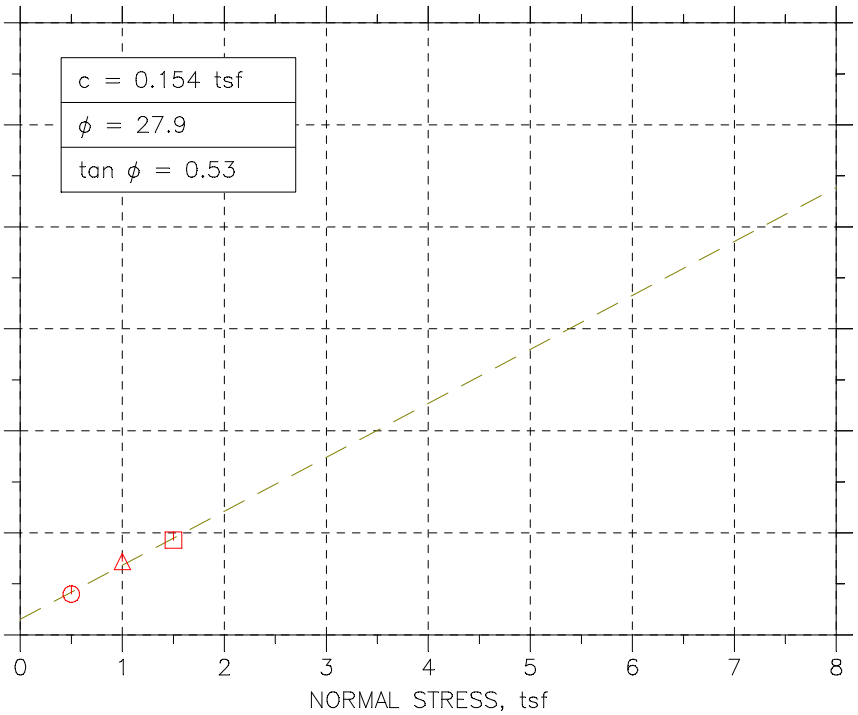
Project: Black Rock Units 1,2,3	Location: Calipatria, CA	Project No.: 3652.001
Boring No.: RW-7	Tested By: NJD	Checked By: NJD
Sample No.: #10	Test Date: 11/11/08	Depth: 51.0ft
Test No.: N/A	Sample Type: Ring	Elevation: N/A
Description: Fat CLAY (CH): brown, wet		
Remarks: 3652.001_RW-07_#10_51.0ft_Node66_Black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

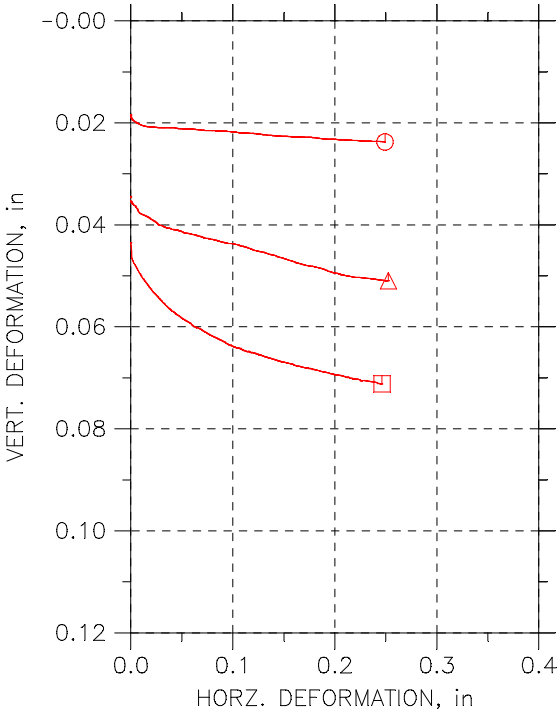
FIGURE B-5f

Thu, 04-DEC-2008 09:20:15

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

Fri, 12-DEC-2008 11:27:47

-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

FIGURE B-7a

-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

FIGURE B-7b

-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

FIGURE B-7c

EXPANSION INDEX

ASTM D4829-03 / UBC 29-1

Project Name: Black Rock Unit 1,2 3 **Project Number:** 3652.001
Sample Source HSA-3 @ 0-3' **Tested By:** DC
Sample Description: Brown lean CLAY with sand (CL). **Date Tested:** 11/7/2008

Test Data:

Expansion: Load-Expanded: [x] Expanded-Load: [ ] Other: [ ]

MOISTURE CONTENT	BEFORE TEST	AFTER TEST
Ring Number		
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
Weight of Dry Soil (gms)	346.5	346.5
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

REMOLDING DATA			
Water content, %	11.1	Desired Density	105.0
Total Dry Soil, gms.			
Water Added, gms.			

SPECIMEN DATA:

Height 1.00 **inches** **Diameter:** 4.00 **inches**
Gs = 2.7 **estimatec** **V_0 =** 0.0073 **inch.^{3}**
δ_d = 105.0
δ_f = 98.9

EXPANSION INDEX	62

SPECIMEN HEIGHT (inches)	H_0-H_f	(w/c)(Gs)(δ_d) (x)	(Gs)(62.4)-δ_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 **Project Number:** 3652.001
Sample Source HSA-10 @ 0-3' **Tested By:** DC
Sample Description: Brown fat CLAY with sand (CH). **Date Tested:** 11/7/2008

Test Data:

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

MOISTURE CONTENT	BEFORE TEST	AFTER TEST
Ring Number		
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

REMOLDING DATA			
Water content, %	13.5	Desired Density	97.5
Total Dry Soil, gms.			
Water Added, gms.			

SPECIMEN DATA:

Height 1.00 **inches** **Diameter:** 4.00 **inches**
Gs = 2.7 **estimatec** V_0 = 0.0073 **inch.^{3}**
δ_d = 97.5
δ_f = 90.8

EXPANSION INDEX	74

SPECIMEN HEIGHT (inches)	H_0-H_f	(w/c)(Gs)(δ_d) (x)	(Gs)(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 **Project Number:** 3652.001
Sample Source HSA-22 @ 0-3' **Tested By:** DC
Sample Description: Brown lean CLAY with sand (CL). **Date Tested:** 11/7/2008

Test Data:

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

MOISTURE CONTENT	BEFORE TEST	AFTER TEST
Ring Number		
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

REMOLDING DATA			
Water content, %	12.3	Desired Density	100.4
Total Dry Soil, gms.			
Water Added, gms.			

SPECIMEN DATA:

Height 1.00 **inches** **Diameter:** 4.00 **inches**
Gs = 2.7 **estimatec** V_0 = 0.0073 **inch.^{3}**
δ_d = 100.4
δ_f = 94.1

EXPANSION INDEX	68

SPECIMEN HEIGHT (inches)	H_0-H_f	(w/c)(Gs)(δ_d) (x)	(Gs)(62.4)-δ_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

California State Certified Laboratory No. 2153

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

25 November 2008

Job No.0811051
Cust. No.11608

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 Sherri Moore
J. Darby Howard, Jr., P.E.
President

JDH/jdl
Enclosure

FIGURE B-9a

California State Certified Laboratory No. 2153

CERCO analytical
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

Cheryl McMillen
Laboratory Director

* Results Reported on "As Received" Basis
N.D. - None Detected
(1) Detection limit is elevated to 75 mg/kg due to dilution

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

FIGURE B-9b

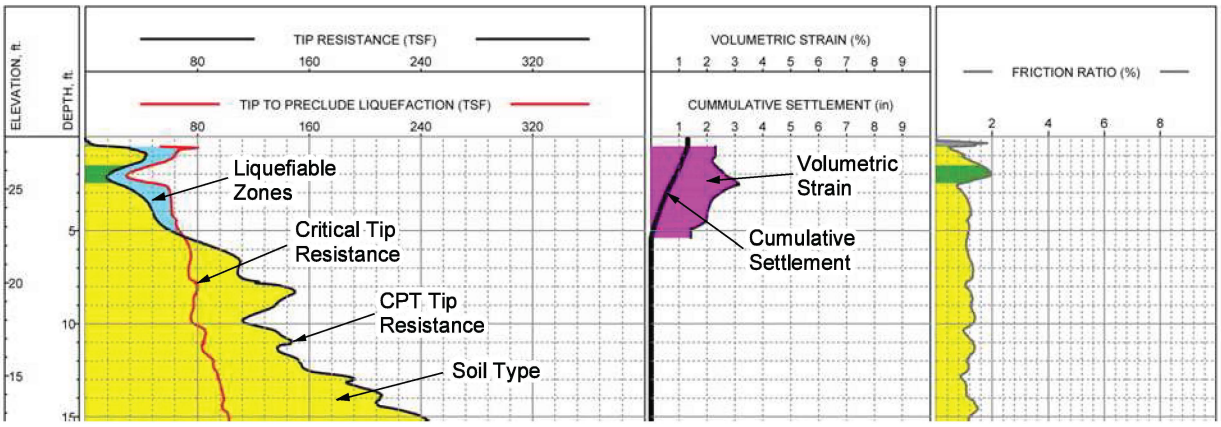
APPENDIX C
LIQUEFACTION ANALYSES

APPENDIX C
LIQUEFACTION ANALYSES

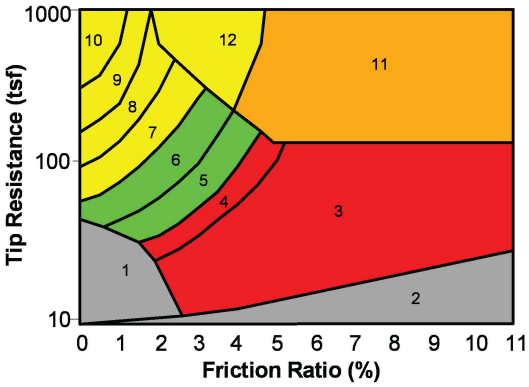
Appendix C presents the results of the CPT liquefaction assessments for the Design Level Earthquake (DLE) event in accordance with the criteria presented in Section 6 of this report. For the analyses, the DLE event is defined as having a moment magnitude (M) of 6.5 and a PGA of 0.40g.

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

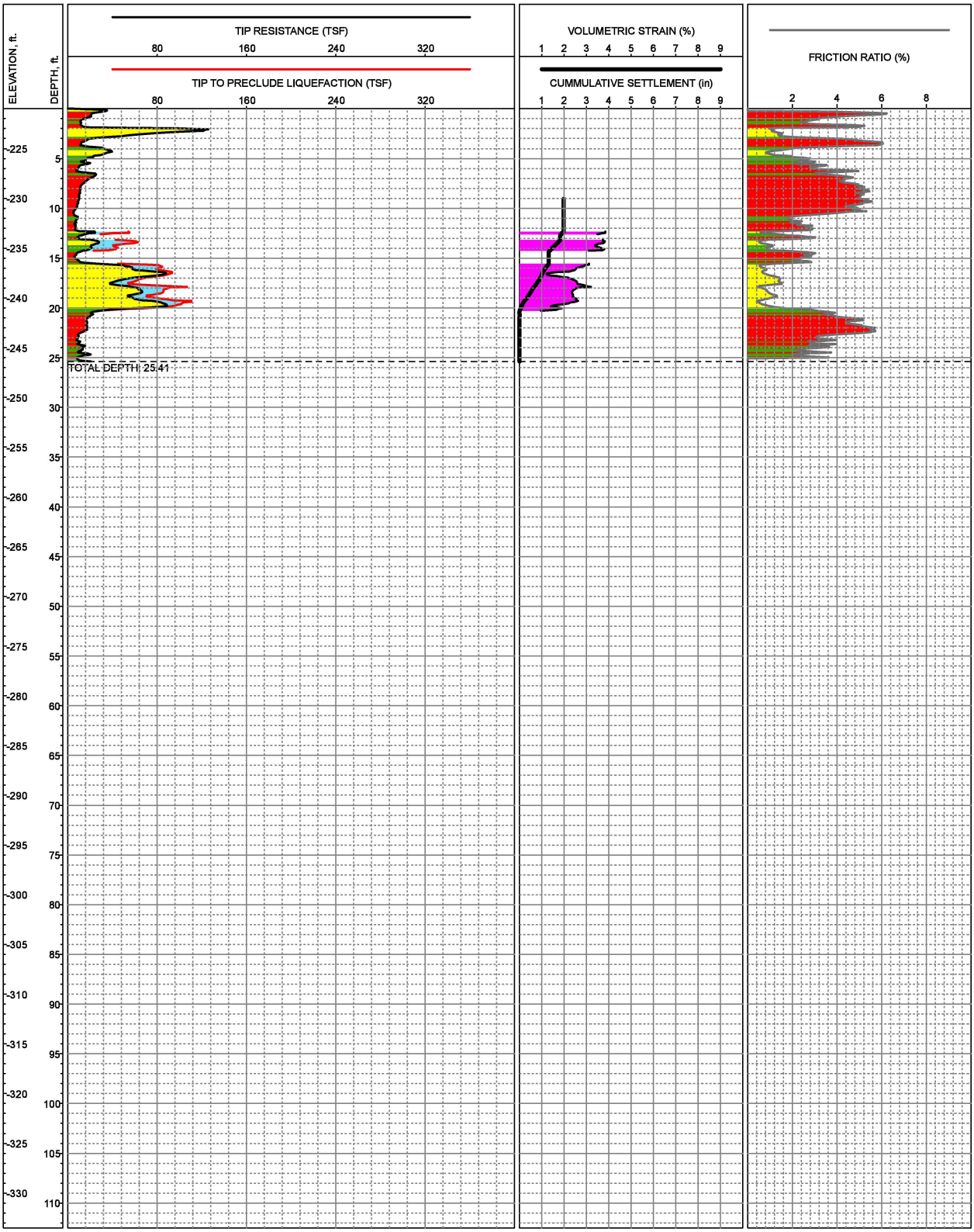
CPT CORRELATION CHART

(Robertson and Campanella, 1984)

KEY TO LIQUEFACTION LOGS

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

FIGURE C-1



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 Mw = 6.5
Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE C-2