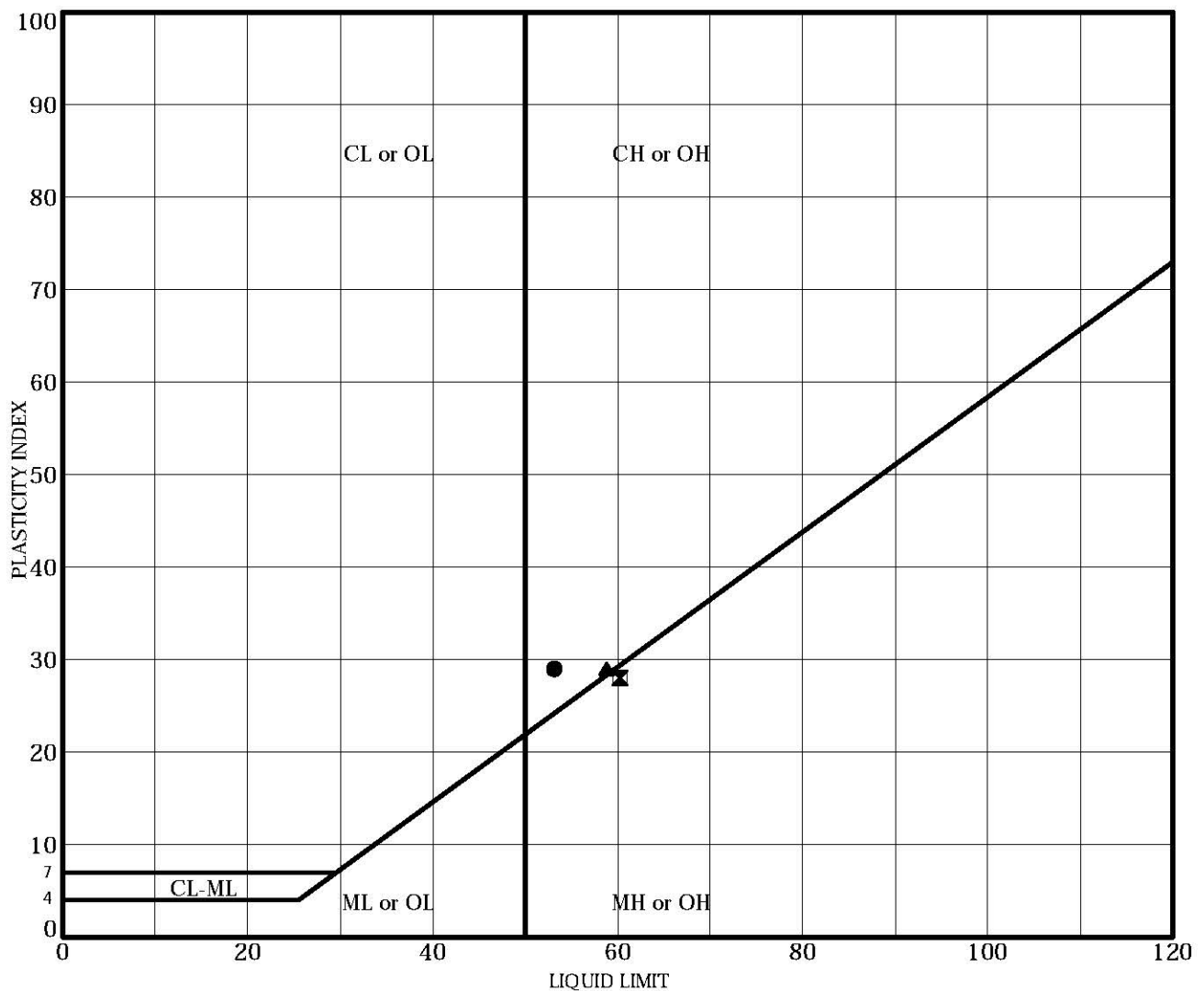




	Sample	Depth (ft)	LL	PL	PI	Description
●	B-3	21.5-23.5	53	24	29	Brown silty clay (CH) w/ some sand & a little gravel
⊠	B-4	21.0-22.5	60	32	28	Brown w/ reddish brown mottling clayey silt (MH) w/ some sand & a little gravel
▲	B-6	1.5-3.0	59	30	29	Brown silty clay (CH) with a little cobbles

NP = NON-PLASTIC

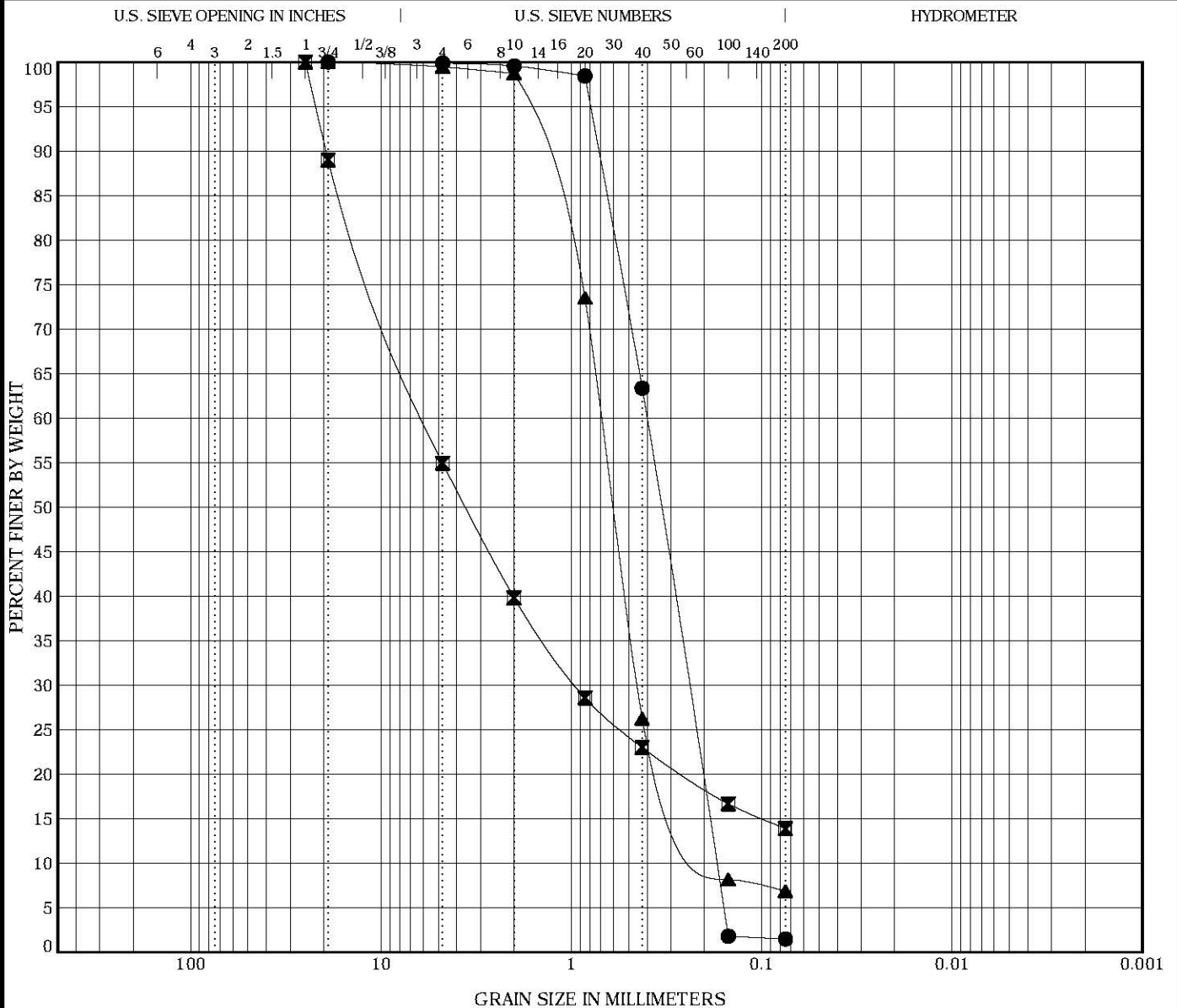


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 W.O. 7651-00(A)

ATTERBERG LIMITS TEST RESULTS - ASTM D4318

KAMEHAMEHA HIGHWAY DRAINAGE
 AND SAFETY IMPROVEMENTS
 VICINITY OF MP 3.06 TO MP 3.54
 WAIALUA, OAHU, HAWAII

Plate
 B - 1



Location	Depth (feet)	Soil Description	Dry Density (pcf)	Moisture Contents			Ring Swell (%)
				Initial (%)	Air-Dried (%)	Final (%)	

B-6**	1.5 - 3.0	Brown silty clay (CH) with a little cobbles	87.8	28.5	24.8	39.9	9.3
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NOTE: Samples tested were either relatively undisturbed or remolded in 2.4-inch diameter by 1-inch high rings. They were air-dried overnight and then saturated for 24 hours under a surcharge pressure of 55 psf.

* Relatively Undisturbed

** Remolded



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SUMMARY OF RING SWELL TESTS

KAMEHAMEHA HIGHWAY DRAINAGE
AND SAFETY IMPROVEMENTS
VICINITY OF MP 3.06 TO MP 3.54
WAIALUA, OAHU, HAWAII

Plate
B - 3

Location	Depth	Length	Diameter	Length/ Diameter Ratio	Density	Load	Compressive Strength
	(feet)	(inches)	(inches)		(pcf)	(lbs)	(psi)
B-3	31.5 - 36.5	6.580	3.240	2.03	163.0	105,700	12,820
B-3	51.5 - 56.5	6.570	3.240	2.03	151.7	70,050	8,500
B-4	22.5 - 26	6.620	3.230	2.05	165.1	85,700	10,460
B-4	46.4 - 51	6.630	3.230	2.05	176.4	197,270	24,070
B-4	51 - 56	6.670	3.240	2.06	171.1	109,460	13,280
B-4	61 - 66	6.570	3.240	2.03	175.9	212,120	25,730

ASTM D7012 (METHOD C)

Note: Samples were not prepared in accordance with ASTM D4543. Therefore, results reported may differ from results obtained from a test specimen that meets the requirements of Practice D4543

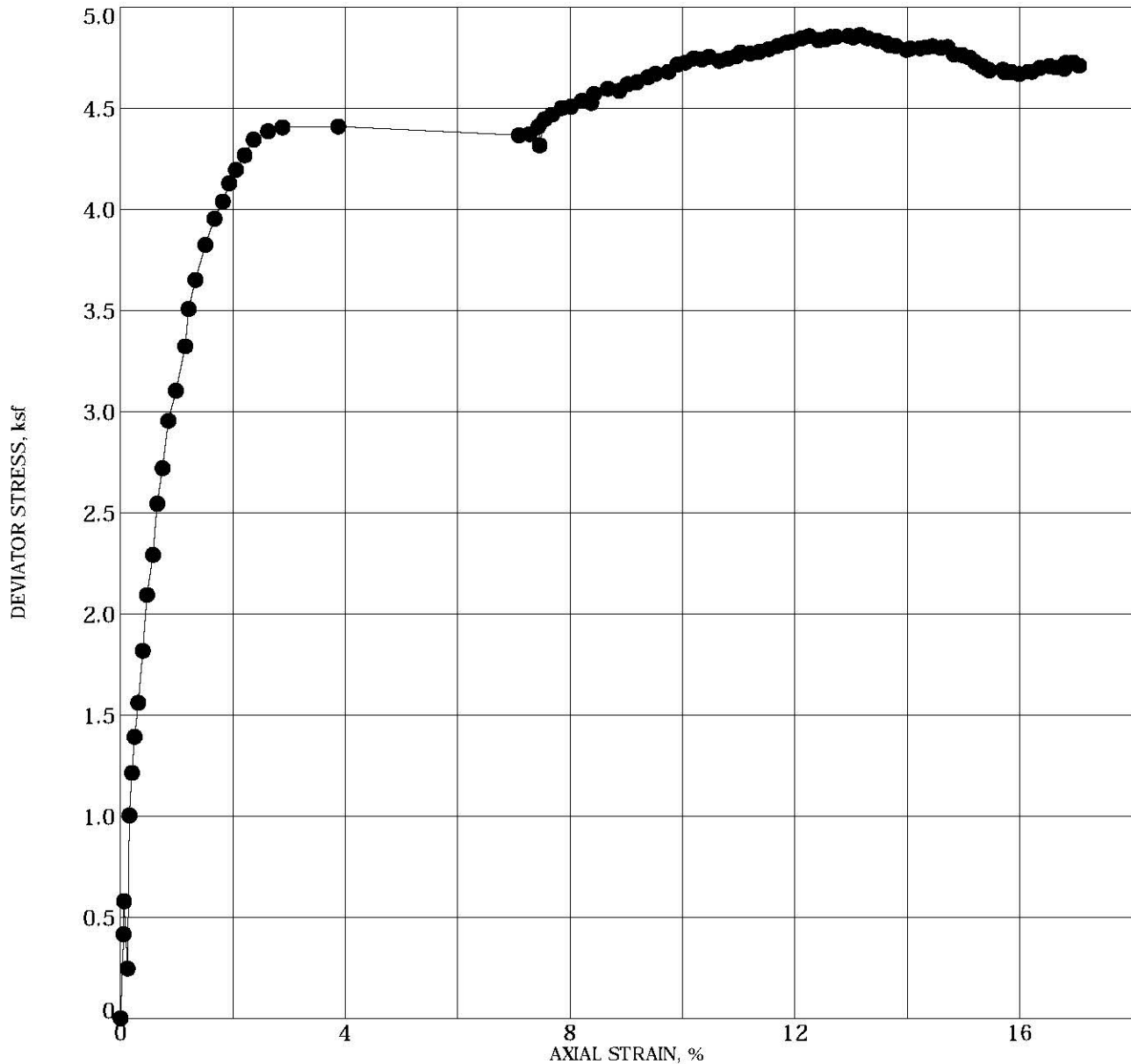


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UNIAXIAL COMPRESSIVE STRENGTH TEST

KAMEHAMEHA HIGHWAY DRAINAGE
AND SAFETY IMPROVEMENTS
VICINITY OF MP 3.06 TO MP 3.54
WAIALUA, OAHU, HAWAII

Plate
B - 4



Max. Deviator Stress (ksf): 4.9

Confining Stress (ksf): 0.6

Location: B-4

Depth: 6.0 - 7.5 feet

Description: Tan poorly graded sand with a little silt and traces of gravel

Test Date: 6/27/2022

Dry Density (pcf)	115.9	Sample Diameter (inches)	2.413
Moisture (%)	15.4	Sample Height (inches)	4.250
Axial Strain at Failure (%)	13.2	Strain Rate (% / minute)	0.42

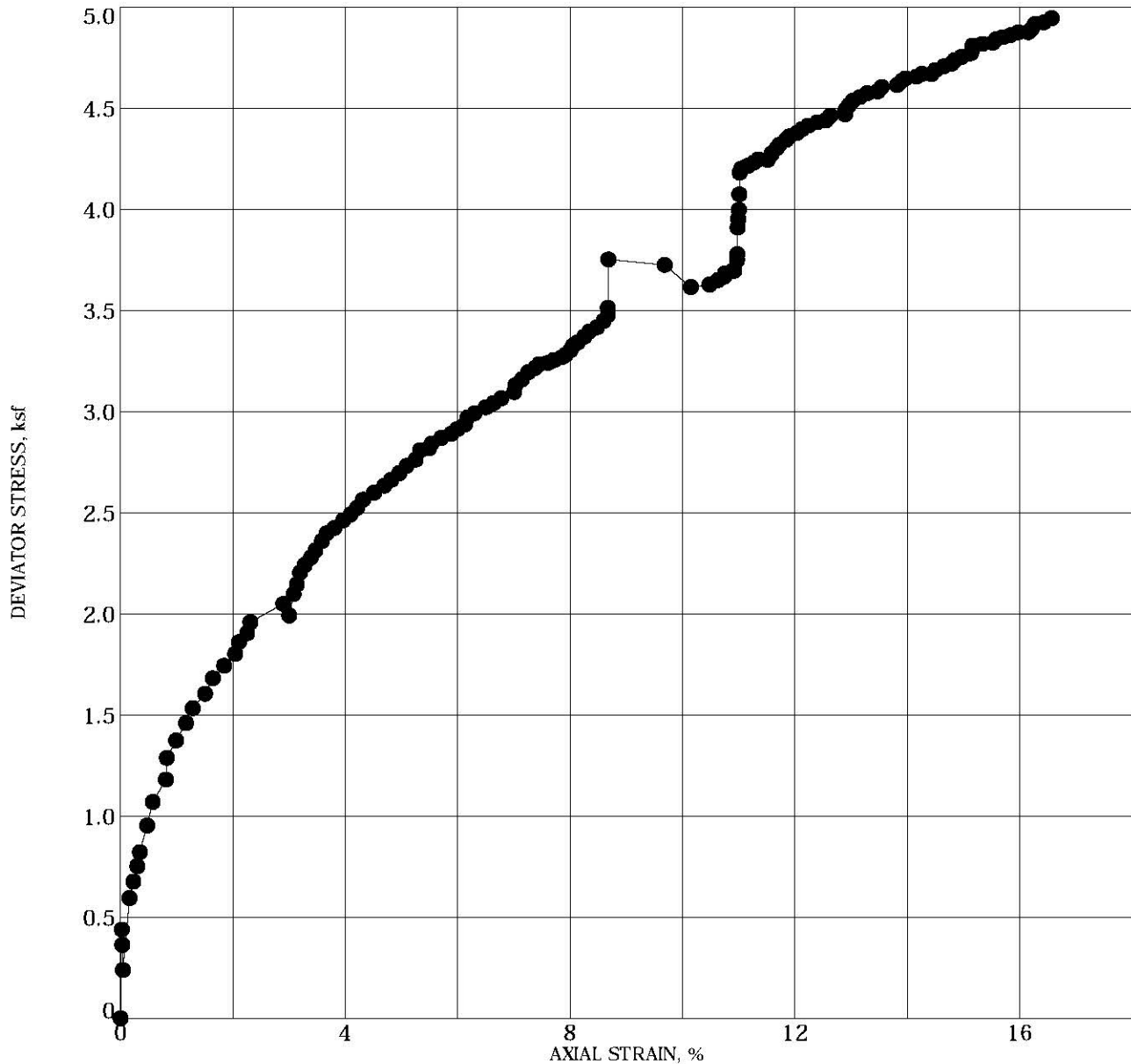


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TRIAXIAL UU COMPRESSION TEST - ASTM D2850

KAMEHAMEHA HIGHWAY DRAINAGE
AND SAFETY IMPROVEMENTS
VICINITY OF MP 3.06 TO MP 3.54
WAIALUA, OAHU, HAWAII

Plate
B - 5



Max. Deviator Stress (ksf): 4.8

Confining Stress (ksf): 1.4

Location: B-4

Depth: 21.0 - 22.5 feet

Description: Brown w/ reddish brown mottling clayey silt (MH) w/ some sand & a little gravel

Test Date: 6/27/2022

Dry Density (pcf)	67.4	Sample Diameter (inches)	2.413
Moisture (%)	59.9	Sample Height (inches)	5.067
Axial Strain at Failure (%)	15.0	Strain Rate (% / minute)	0.34

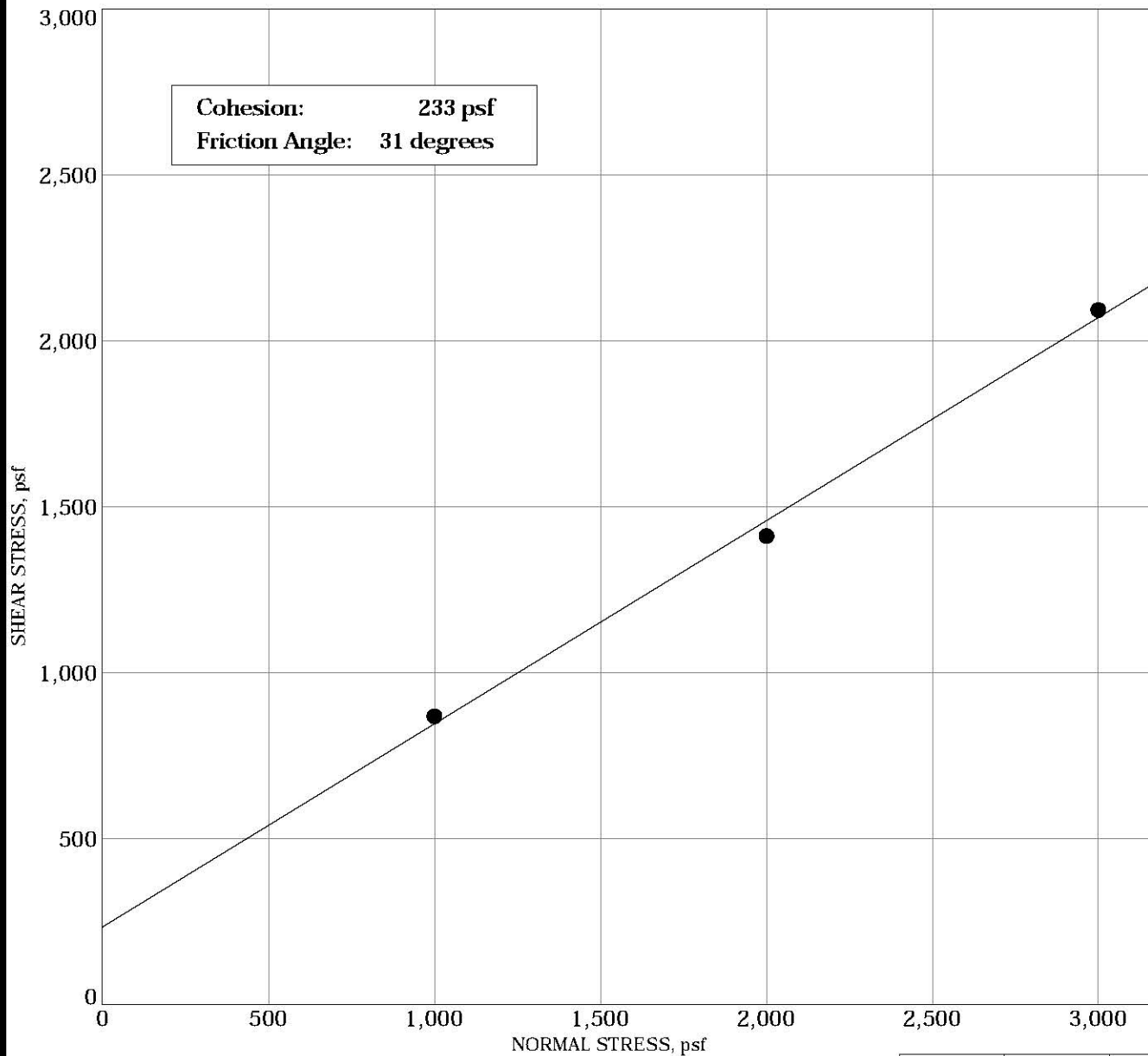


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TRIAXIAL UU COMPRESSION TEST - ASTM D2850

KAMEHAMEHA HIGHWAY DRAINAGE
AND SAFETY IMPROVEMENTS
VICINITY OF MP 3.06 TO MP 3.54
WAIALUA, OAHU, HAWAII

Plate
B - 6



Sample: B-3
Depth: 6.5 - 8.0 feet
Description: Light tan poorly graded fine sand with a little silt

		Sample #1	Sample #2	Sample #3
INITIAL	Moisture Content, %	22.3	28.0	27.0
	Dry Density, pcf	76.6	74.9	75.1
	Height, inches	1.00	1.00	1.00
FINAL	Moisture Content, %	29.1	28.4	28.9
	Dry Density, pcf	75.7	76.3	76.3
	Height, inches	1.012	0.982	0.984
	Diameter, inches	2.42	2.42	2.42
	Deformation Rate, inch/minute	0.0024	0.0022	0.0023
	Normal Stress, psf	1000	2000	3000
	Peak Shear Stress, psf	868	1411	2092
	Shear Displacement, inches	0.43	0.41	0.42

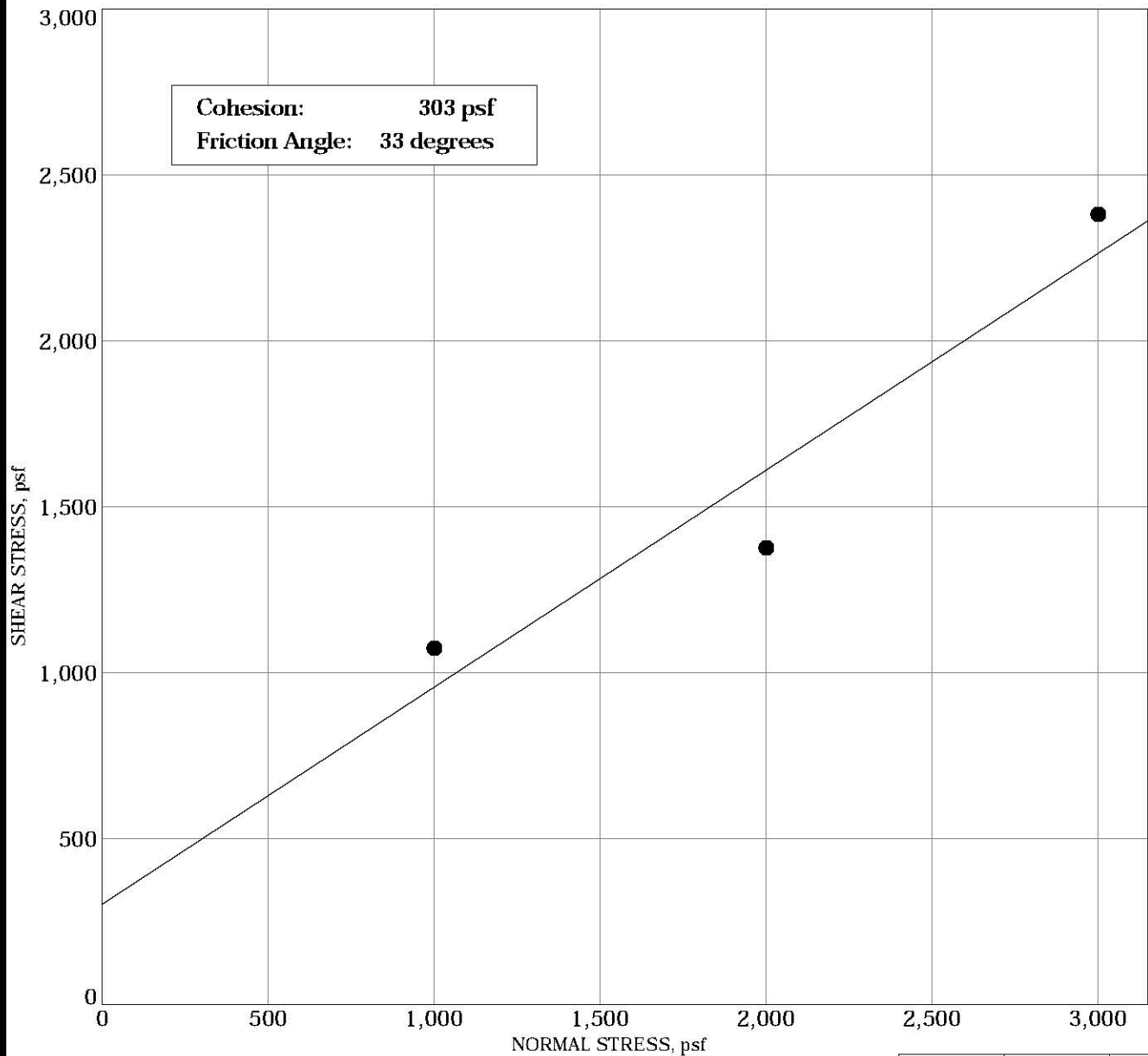


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DIRECT SHEAR TEST - ASTM D3080

KAMEHAMEHA HIGHWAY DRAINAGE
AND SAFETY IMPROVEMENTS
VICINITY OF MP 3.06 TO MP 3.54
WAIALUA, OAHU, HAWAII

Plate
B - 7



Sample: B-4
 Depth: 6.0 - 7.5 feet
 Description: Tan poorly graded sand with a little silt and traces of gravel

		Sample #1	Sample #2	Sample #3
INITIAL	Moisture Content, %	20.9	21.2	21.0
	Dry Density, pcf	91.4	87.7	87.7
	Height, inches	1.00	1.00	1.00
FINAL	Moisture Content, %	22.1	21.6	21.5
	Dry Density, pcf	90.4	88.8	88.6
	Height, inches	1.011	0.988	0.990
	Diameter, inches	2.42	2.42	2.42
	Deformation Rate, inch/minute	0.0025	0.0023	0.0022
	Normal Stress, psf	1000	2000	3000
	Peak Shear Stress, psf	1073	1376	2381
	Shear Displacement, inches	0.43	0.41	0.41



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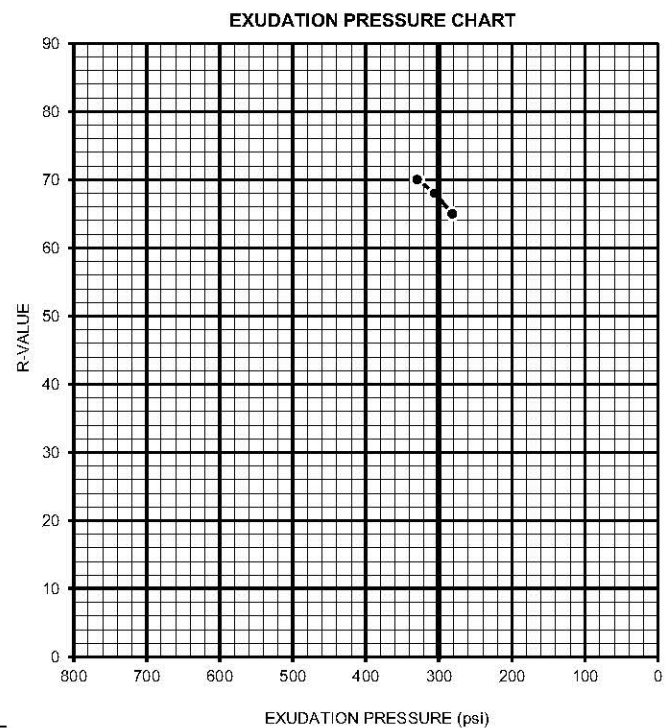
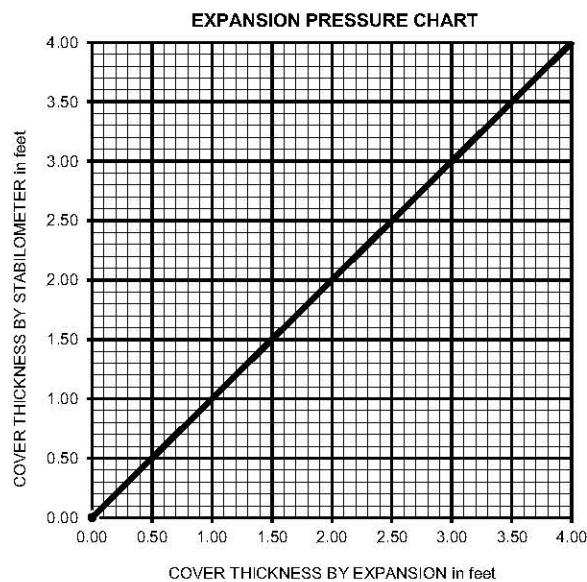
DIRECT SHEAR TEST - ASTM D3080

KAMEHAMEHA HIGHWAY DRAINAGE
 AND SAFETY IMPROVEMENTS
 VICINITY OF MP 3.06 TO MP 3.54
 WAIALUA, OAHU, HAWAII

Plate
B - 8

TEST SPECIMEN	a	b	c
MOISTURE AT COMPACTION, %	15.1	15.4	15.8
HEIGHT OF SAMPLE, inches	2.56	2.55	2.52
DRY DENSITY, pcf	104.9	103.6	102.3
COMPACTOR AIR PRESSURE, psi	75	75	75
EXUDATION PRESSURE, psi	330	306	282
EXPANSION, inches x 10 ^{exp-4}	0	0	0
STABILITY Ph 2,000 lbs (160 psi)	28	30	33
TURNS DISPLACEMENT	5.13	5.16	5.20
R-VALUE UNCORRECTED	70	68	65
R-VALUE CORRECTED	70	68	65

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT NEEDED, ft.	0.00	0.00	0.00
TRAFFIC INDEX	0.0		
STABILOMETER THICKNESS, ft.	#DIV/0!	#DIV/0!	#DIV/0!
EXPANSION PRESSURE THICKNESS, ft.	0.00	0.00	0.00



R-VALUE BY EXPANSION: NOT APPLICABLE

R-VALUE BY EXUDATION: 67

Sample Location	Job No.	Description	Equilibrium R-Value
BULK #1 @ B2	7651-00A	SAND	67

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 2844/CT 301

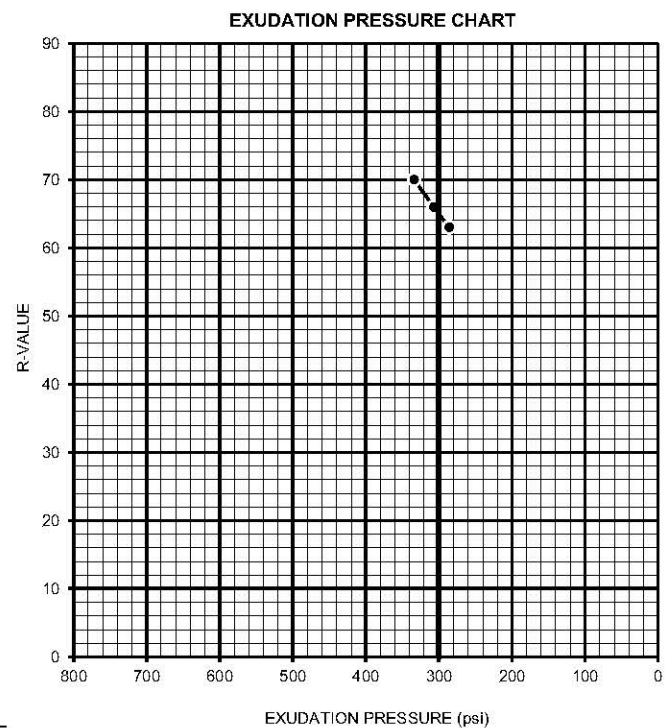
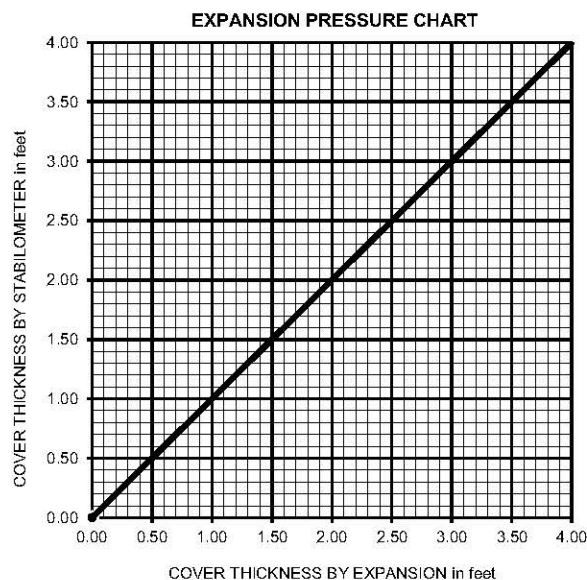
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R-VALUE TEST RESULTS
GEOLABS INC.
KAMEHAMEHA HIGHWAY REALIGNMENT
108026001 7/22

TEST SPECIMEN	a	b	c
MOISTURE AT COMPACTION, %	16.2	16.5	16.8
HEIGHT OF SAMPLE, inches	2.44	2.56	2.54
DRY DENSITY, pcf	92.0	90.5	89.7
COMPACTOR AIR PRESSURE, psi	75	75	75
EXUDATION PRESSURE, psi	334	307	286
EXPANSION, inches x 10exp-4	0	0	0
STABILITY Ph 2,000 lbs (160 psi)	28	32	35
TURNS DISPLACEMENT	5.17	5.20	5.22
R-VALUE UNCORRECTED	70	66	63
R-VALUE CORRECTED	70	66	63

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT NEEDED, ft.	0.00	0.00	0.00
TRAFFIC INDEX	0.0		
STABILOMETER THICKNESS, ft.	#DIV/0!	#DIV/0!	#DIV/0!
EXPANSION PRESSURE THICKNESS, ft.	0.00	0.00	0.00



R-VALUE BY EXPANSION: NOT APPLICABLE

R-VALUE BY EXUDATION: 65

Sample Location	Job No.	Description	Equilibrium R-Value
BULK #2 @ B6	7651-00A	SAND	65

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 2844/CT 301

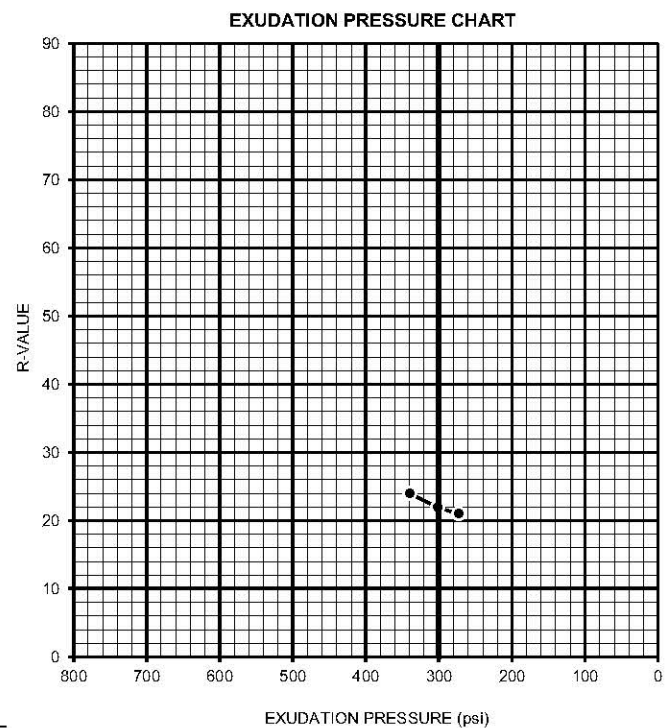
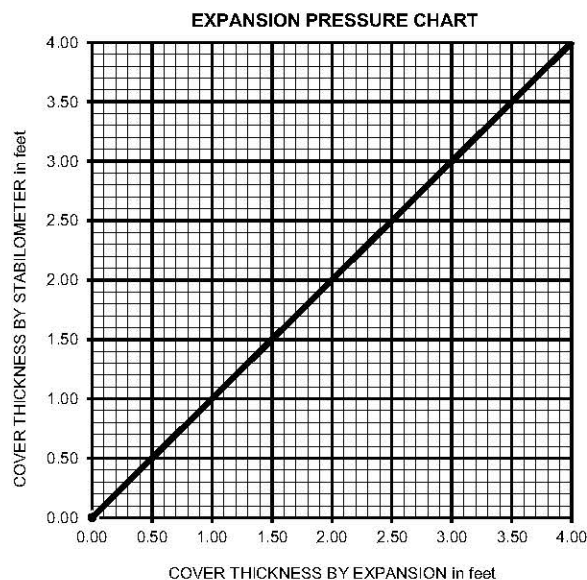
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R-VALUE TEST RESULTS
GEOLABS INC.
KAMEHAMEHA HIGHWAY REALIGNMENT
108026001 7/22

TEST SPECIMEN	a	b	c
MOISTURE AT COMPACTION, %	32.1	32.6	33.1
HEIGHT OF SAMPLE, inches	2.44	2.56	2.54
DRY DENSITY, pcf	92.2	91.2	90.8
COMPACTOR AIR PRESSURE, psi	50	50	50
EXUDATION PRESSURE, psi	340	302	273
EXPANSION, inches x 10 ^{exp-4}	0	0	0
STABILITY Ph 2,000 lbs (160 psi)	99	102	104
TURNS DISPLACEMENT	5.01	5.05	5.12
R-VALUE UNCORRECTED	24	22	21
R-VALUE CORRECTED	24	22	21

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT NEEDED, ft.	0.00	0.00	0.00
TRAFFIC INDEX	0.0		
STABILOMETER THICKNESS, ft.	#DIV/0!	#DIV/0!	#DIV/0!
EXPANSION PRESSURE THICKNESS, ft.	0.00	0.00	0.00



R-VALUE BY EXPANSION: NOT APPLICABLE

R-VALUE BY EXUDATION: 22

Sample Location	Job No.	Description	Equilibrium R-Value
BULK #3 @ B5	7651-00A	Sandy CLAY	22

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 2844/CT 301

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R-VALUE TEST RESULTS
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