Mueser Rutledge
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MEMORANDUM

To: Office
From: Jim Tantalla
Re: Phase 2 and Geotechnical Characterization Lab Testing Summary
File: 10587
Date: 11/13/07

Mueser Rutledge Consulting Engineers has previously provided results for most of the Phase 2 laboratory testing. Contained herein is the complete package of testing for the Phase 2 investigation, along with the geotechnical characterization laboratory test results.

The testing performed included water content determinations, Atterberg limits, specific gravity, gradation, strength, permeability, and consolidation testing. Tests were performed in accordance with the following ASTM standards:

Test	ASTM Specification	Standard test method for:
Water content	D2216	Laboratory determination of water content of soil and rock
Atterberg limit	D4318	Liquid limit, plastic limit, and plasticity index of soils
Specific gravity	D854	Specific gravity of soils
Gradation	D422	Particle size analysis of soils
UU strength	D2850	Unconsolidated undrained triaxial compression test on cohesive soils
CU strength	D4767	Consolidated undrained triaxial compression test for cohesive soils
UNC strength	D2166	Unconfined compressive strength of cohesive soil
Permeability	D5084	Hydraulic conductivity of saturated porous materials using a flexible wall permeameter
Consolidation	D2435	One-dimensional consolidation properties of soil using incremental loading

Phase 2 Laboratory testing

The Phase 2 testing included 12 specific gravity tests, 21 strength tests (including 15 unconsolidated undrained, 3 consolidated undrained, and 3 unconfined tests), and 7 permeability tests. Samples for borings INC-1800, INC-1500, MPB-1 and MPB-2 were undisturbed samples taken during drilling. The remaining samples from TT-1 S22 and TT-1 S30 were block samples taken from a test trench that were hand trimmed to cylindrical specimens for strength and permeability testing.

Results of Phase 2 testing are included in Appendix A.

Geotechnical characterization testing

Tests were also performed on samples from 13 undisturbed tubes taken in the natural deposits below

the COPR at the site for assistance in modeling the behavior of these soils numerically. 12 Atterberg limit tests, 5 specific gravity tests, 9 gradations, 8 consolidated undrained and 4 unconsolidated undrained strength tests, and 5 consolidation tests were performed, with results provided in Appendix B.

APPENDIX A

Phase 2 Laboratory Test Results

TABLE NO. 1

SUMMARY OF LABORATORY TEST DATA - PHASE 2 INVESTIGATION

SAMPLE IDENTIFICATION					CLASSIFICATION PROPERTIES								PHYSICAL PROPERTIES												
										UNIFIED SOIL CLASSIFICATION SYSTEM			STRENGTH												
BORING NUMBER	SAMPLE NUMBER	DEPTH, FT.	STRATUM DESIGNATION	SOIL TYPE	AVERAGE NATURAL WATER CONTENT, W_n, %	LIQUID LIMIT, W_L, %	PLASTICITY INDEX, I_P, %	NATURAL WATER CONTENT OF LIMIT SAMPLE, W_n, %	SPECIFIC GRAVITY OF SOILIDS, G_s	GROUP SYMBOL	% SAND (< #4 > #200 SIEVE)	% FINES (< #200 SIEVE)	TYPE OF TEST	COMPRESSIVE STRENGTH ($\sigma_1 - \sigma_3$), TSF	CONFINING PRESSURE σ_3, TSF	STRAIN AT FAILURE, %	NATURAL WATER CONTENT, W_n, %	WATER CONTENT AT END OF TEST, W_f, %	DRY UNIT WEIGHT, pcf	IN SITU UNIT WEIGHT, pcf					
INC-1800	039041	3.9-4.1		SM	18				2.72																
	041047	4.1-4.7		SM									UU	9.47	0.21	1.2	20.8	20.3							
	049051	4.9-5.1		SM	22				3.14																
	053056	5.3-5.6		SM																					
	065067	6.5-6.7		SM	34				2.67																
	069070	6.9-7.0		SM	26				2.80																
	070076	7.0-7.6		SM									UU	4.90	0.34	6.06	25.7	26.9							
	087089	8.7-8.9		SM	25				2.54																
	090096	90-9.6		SM									UU	4.08	0.41	5.7	27.4	27.5							
	096101	9.6-10.1		SM	28								UU	3.43	0.56	7.3	27.5	28.2	90.4	115.3					
	107111	10.7-11.1		SM	29								UU	2.16	0.60	6.9	29.1	28.9	89.9	116.1					
	114118	11.4-11.8		SM	25				2.59																
	118122	11.8-12.2		SM									UU	4.01	0.51	3.8	23.0	24.0	102.9	126.6					
INC-1500	120126	12.0-12.6		SM									UU	1.68	0.67	14.7	22.1	21.2	107.5	131.2					
	130133	13.0-13.3		SM									DS												
	142144	14.2-14.4		SM	15				2.88																
	151155	15.1-15.5		SM									UU	6.28	0.75	3.75	16.0	16.1	107.6	124.9					
	159161	15.9-16.1		SM	22				3.12																
	177179	17.7-17.9		SM	17				2.67																
TT1-S22	055060	5.5-6.0		SM	29				2.89				CU	11.04	0.28	6.6	37.5	27.6	84.0	107.2					
													UNC	6.64	0.00	1.6	27.3	26.8	69.0	87.9					
	060067	6.0-6.7		SM	29				2.88				CU	8.14	0.28	2.3	24.7	31.8	87.5	109.2					
													UNC	4.52	0.00	1.3	23.8	23.4	92.8	114.9					
TT1-S30	055062	5.5-6.2		SM	26				2.95				CU	8.39	0.28	10.1	27.9	31.1	89.1	113.9					
													UNC	10.53	0.00	2.2	26.8	26.5	95.7	121.3					
MPB-1	8.5-9.4	8.5-9.4			28								UU	3.26	0.46	7.1	28.3	28.3	106.1	136.1					
	10.0-10.6	10.0-10.6			24								UU	2.60	0.50	8.4	23.8	23.4	104.3	129.1					
MPB-2	7.3-8.1	7.3-8.1			31								UU	6.60	0.38	3.7	30.7	30.0	93.7	122.4					
	8.1-9.0	8.1-9.0			33								UU	1.82	0.38	9.7	32.5	31.0	94.2	124.8					
	10.5-11.5	10.5-11.5			27								UU	6.19	0.48	4.1	26.5	26.6	90.9	115					
	12.4-13.2	12.4-13.2			30								UU	3.13	0.52	6.5	30.2	30.2	94.1	125.1					
	13.2-14.1	13.2-14.1			28								UU	2.91	0.50	7.4	27.6	27.1	95.8	122.3					

STRATA DESIGNATIONS

O - Organic Silty Clay and Peat

V - Varved Silt and Clay

C - Raritan Clay

NOTES

1. All tests summarized were performed in the laboratory of Mueser Rutledge Consulting Engineers.
2. The sample elevation is the average of the sampling interval.
3. Ground surface elevations at borings are:

BORING NO.	BORING ELEVATION	BORING NO.	BORING ELEVATION

4. "Average natural water content" is a weighted average of all material tested.
5. Strength tests performed were:

   UU - Unconsolidated Undrained Triaxial Compression
   CU - Consolidated Undrained Triaxial Compression

6. Strength tests were performed on a specimen 2.8 inches in diameter with a height to diameter ratio of approximately 2 at at a rate of strain of approximately 1% per minute.
7. Confining pressure for UU and CU compression tests is equivalent to 80 percent of estimated vertical effective overburden overburden stress, unless otherwise noted.
8. Compression Index, Cc = slope of the virgin compression portion of the e-log p curve.
9. Swelling Index, Cs = slope of the rebound portion of the e-log p curve.
10. Most probable preconsolidation stress, Pc is determined by the Cassagrande method of construction.

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DATE: 11/13/2007 FILE NO. 10587 SHEET 1 OF 1 TABLE NO.1

11. Minimmum preconsolidation stress, P_{min}, is the pressure ordinate at the intersection of the extension of the virgin compression portion of the e-log p curve with the initial void ratio.

TABLE NO. K - 1

SUMMARY OF PERMEABILITY TEST RESULTS

BORING NO.	SAMPLE NO.	INITIAL SPECIMEN PROPERTIES				FINAL SPECIMEN PROPERTIES						TOTAL [2] BACK PRESSURE	EFFECTIVE [3] CONSOLIDATION STRESS		HYDRAULIC GRADIENT		PERMEABILITY
		DIMENSIONS		WATER CONTENT	DRY UNIT WT.	DIMENSIONS		WATER CONTENT	DRY UNIT WT.	SATU-RATION [4]	B-VALUE						
		DIA.	LENGTH			DIA.	LENGTH						MAX.	MIN.	MAX.	MIN.	
		in.	in.	%	pcf.	in.	in.	%	pcf.	%	%	psi	psi	psi			cm / sec
TTI-522	055-060	2.407	3.015	32.5	74.9	2.412	3.075	44.4	73.1	86.3	97	80	4	3.8	1.4	1	1.35×10^{-5}
TTI-530	055-062	3.004	3.443	29.3	92.6	3.004	3.56	30.7	89.6	85.9	98	80	4	3.7	2	1.6	1.20×10^{-4}

NOTES:

1. Permeability tests were performed in accordance with ASTM D 5084, "Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter".

2. Total back pressure is the maximum pressure applied during back pressure saturation of the test specimen.

3. The maximum effective consolidation stress exists at the effluent end of the test specimen. The minimum effective consolidation stress exists at the influent end of the test specimen.

4. Final degree of saturation was calculated from the final dimensions and soil properties of the test specimen.

5. All tests used New York City tap water as the permeant liquid.

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DUNDALK MARINE TERMINAL

BALTIMORE **MARYLAND**

DATE: September 6, 2007 FILE NO. 10587 SHEET 1 OF 1 TABLE K # 1

MRCE Form TK-1

TABLE NO. K - 1

SUMMARY OF PERMEABILITY TEST RESULTS

BORING NO.	SAMPLE NO.	INITIAL SPECIMEN PROPERTIES				FINAL SPECIMEN PROPERTIES						TOTAL [2] BACK PRESSURE	EFFECTIVE [3] CONSOLIDATION STRESS		HYDRAULIC GRADIENT		PERMEABILITY
		DIMENSIONS		WATER CONTENT	DRY UNIT WT.	DIMENSIONS		WATER CONTENT	DRY UNIT WT.	SATU-RATION [4]	B-VALUE		MAX.	MIN.	MAX.	MIN.	
		DIA. in.	LENGTH in.	%	pcf.	DIA. in.	LENGTH in.	%	pcf.	%	%	psi	psi	psi			cm / sec
MPB-1	10-10.6	2.867	3.137	22.5	110.2	2.856	3.074	21.9	113.3	103.4	98	60	6.6	5.8	6.8	6.4	9.27×10^{-7}
MPB-2	7.3-8.1	2.77	2.648	33.7	85.2	2.786	2.558	34.2	87.2	90.8	100	60	5.1	4.4	7.9	6.9	1.62×10^{-5}
MPB-2	10.5-11.5	2.853	3.054	33.2	83.5	2.852	2.894	33.9	88.2	92	96	60	6.2	5.5	7.2	3.4	4.52×10^{-5}
MPB-2	12.4-13.2	2.874	2.953	38.6	86.8	2.826	2.912	33.0	91	95	95	60	6.9	6.1	7.2	4.8	1.52×10^{-5}
MPB-2	13.2-14.1	2.884	3.417	23.5	90.9	2.88	3.356	28.8	93	86.8	100	60	7.1	6.3	6.3	5.6	2.28×10^{-6}

NOTES:

1. Permeability tests were performed in accordance with ASTM D 5084, "Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter".

2. Total back pressure is the maximum pressure applied during back pressure saturation of the test specimen.

3. The maximum effective consolidation stress exists at the effluent end of the test specimen. The minimum effective consolidation stress exists at the influent end of the test specimen.

4. Final degree of saturation was calculated from the final dimensions and soil properties of the test specimen.

5. All tests used New York City tap water as the permeant liquid.

MUESER RUTLEDGE CONSULTING ENGINEERS
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DUNDALK MARINE TERMINAL PHASE 2

BALTIMORE **MARYLAND**

DATE: 108-8-07 FILE NO. 10587 SHEET 1 OF 1 TABLE K-1

MRCE Form TK-1

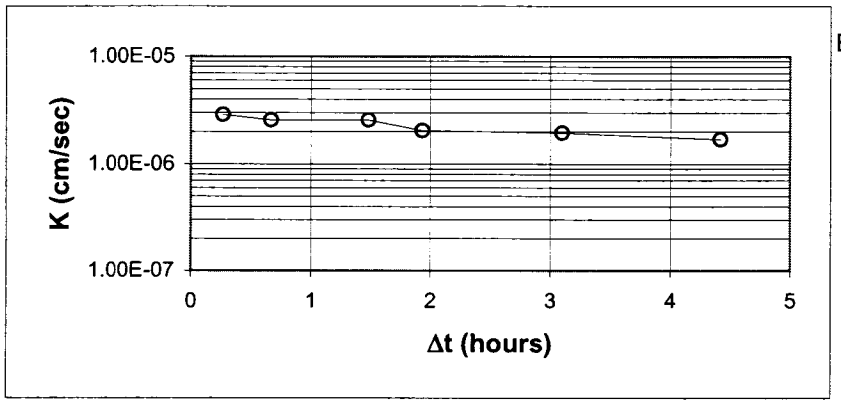
MUESER RUTLEDGE CONSULTING ENGINEERS

File No.	10587
Boring No.	MPB-2
Sample No.	13.2-14.1

CONSTANT HEAD PERMEABILITY TEST
with superimposed air pressure

Setup by:	FW	Date	10/2/07
Calc by:	FW	Date	10/2/07
Chk'd by:		Date	

PROJECT DMT Phase 2



Cell Pres=	67.1	psi	Initial Gradient
Back Pres=	60.0	psi	
Eff Stress=	7.1	psi	

SAMPLE DIMENSIONS

INITIAL	
FINAL	X

$$K = \frac{Q \cdot L}{A \cdot h \cdot \Delta t_{sec}} \cdot R_T$$

Avg. Sample Length, L =	8.53	cm
Avg. Sample Dia., D =	7.31	cm
Sample Area, A =	41.97	cm^2
Standpipe Area, a =	2.6	cm^2

READING DATE	CLOCK TIME	ELAP. TIME Dt (hours)	TEMP (˚C)	VOL in Read (cc)	VOL out Read (cc)	Super-imposed Pressure P_{air} (cm)	ΔVOL in (cc)	ΔVOL out (cc)	AVG. WATER HEAD (cm)	TOTAL HEAD H= h + P_{air} (cm)	Σ Vol out (cc)	PERMEABILITY K (cm/sec)	RATIO ΔVOL out / ΔVOL in
10/2/07	10:23		23.0	49.8	0.8	35.2							
10/2/07	10:30	0.27	23.0	49.0	[illegible]	[illegible]	0.8	0.8	18.5	53.7	0.8	**2.88E-06**	**1.00**
[illegible]	[illegible]	0.67	23.0	48.0	[illegible]	[illegible]	1.0	1.1	17.8	53.0	1.9	**2.56E-06**	**1.10**
10/2/07	[illegible]	1.48	23.8	45.9	[illegible]	[illegible]	2.1	2.1	16.6	51.8	4.0	**2.56E-06**	**1.00**
10/2/07	[illegible]	1.93	23.8	45.0	5.7	[illegible]	0.9	0.9	15.5	50.7	4.9	**2.04E-06**	**1.00**
10/2/07	[illegible]	3.10	23.3	42.8	7.6	[illegible]	2.2	2.1	14.3	49.5	7.0	**1.94E-06**	**0.95**
10/2/07	[illegible]	4.42	23.3	40.7	9.6	[illegible]	2.1	2.0	12.7	47.9	9.0	**1.70E-06**	**0.95**
			Avg K =	2.28E-06	cm/sec								

ALL TEST METHODS / RESULTS CONFORM TO ASTM STANDARD D 5084:
"STANDARD TEST METHODS FOR MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS USING A FLEXIBLE WALL PERMEAMETER"

MRCE Form K2-1

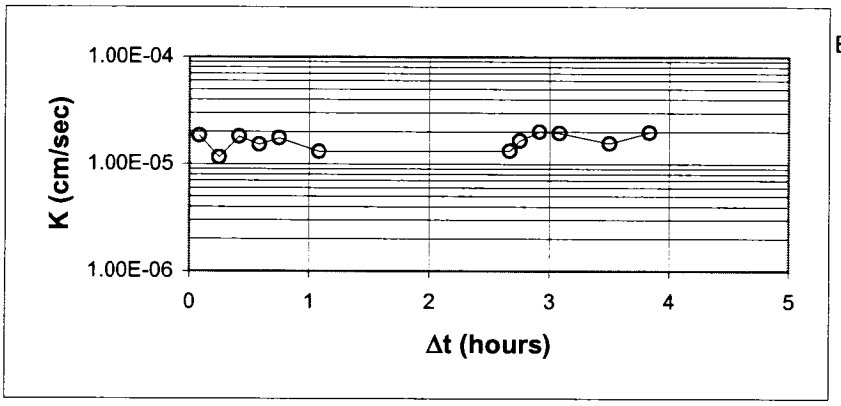
MUESER RUTLEDGE CONSULTING ENGINEERS

File No.	10587
Boring No.	MPB-2
Sample No.	12.4-13.2

CONSTANT HEAD PERMEABILITY TEST
with superimposed air pressure

Setup by:	FW	Date	9/12/07
Calc by:	FW	Date	9/26/07
Chk'd by:		Date	

PROJECT DMT PHASE 2



Cell Pres=	66.9	psi
Back Pres=	60.0	psi
Eff Stress=	6.9	psi

Initial Gradient

SAMPLE DIMENSIONS

INITIAL	
FINAL	X

$$K = \frac{Q \cdot L}{A \cdot h \cdot \Delta t_{sec}} \cdot R_T$$

Avg. Sample Length, L =	7.4	cm
Avg. Sample Dia., D =	7.18	cm
Sample Area, A =	40.49	cm^2
Standpipe Area, a =	2.6	cm^2

READING DATE	CLOCK TIME	ELAP. TIME Dt (hours)	TEMP (˚C)	VOL in Read (cc)	VOL out Read (cc)	Super-imposed Pressure P_{air} (cm)	ΔVOL in (cc)	ΔVOL out (cc)	AVG. WATER HEAD (cm)	TOTAL HEAD H= h + P_{air} (cm)	Σ Vol out (cc)	PERMEABILITY K (cm/sec)	RATIO ΔVOL out / ΔVOL in
9/17/07	13:50		24.8	50.0	0.0	35.2							
9/17/07	13:55	0.08	24.8	48.4	2.0	35.2	1.6	2.0	18.5	53.6	2.0	**1.84E-05**	1.25
9/17/07	14:05	0.25	24.8	46.8	4.2	35.2	2.2	2.2	17.0	52.2	4.2	**1.15E-05**	1.00
9/17/07	14:15	0.42	24.8	44.5	7.5	35.2	3.3	3.3	14.9	50.1	7.5	**1.80E-05**	1.00
9/17/07	14:25	0.58	24.8	42.3	10.1	35.2	2.7	2.6	12.6	47.8	10.1	**1.51E-05**	0.96
9/17/07	14:35	0.75	24.8	39.5	12.9	35.2	3.0	2.8	10.5	45.7	12.9	**1.74E-05**	0.93
9/17/07	15:35	1.08	24.8	35.3	16.9	35.2	4.2	4.0	7.8	43.0	16.9	**1.30E-05**	0.95
9/17/07	16:30	2.67	24.8	18.8	32.8	35.2	16.5	15.9	0.1	35.2	32.8	**1.32E-05**	0.96
9/18/07	14:50		24.0	50.0	0.0	35.2							
9/18/07	14:55	2.75	24.0	48.6	1.8	35.2	1.4	1.8	18.5	53.7	1.8	1.65E-05	1.29
9/18/07	15:05	2.92	24.0	46.9	4.9	35.2	4.4	3.1	16.8	52.0	4.9	2.00E-05	0.70
9/18/07	15:15	3.08	24.0	44.6	9.4	35.2	2.3	4.5	13.4	48.5	9.4	1.94E-05	1.96
9/18/07	15:40	3.50	24.0	39.9	15.5	35.2	6.7	6.1	10.2	45.3	15.5	1.56E-05	0.91
9/18/07	16:00	3.83	24.0	34.8	21.6	35.2	5.4	6.1	5.2	40.4	21.6	1.97E-05	1.13

ALL TEST METHODS / RESULTS CONFORM TO ASTM STANDARD D 5084:
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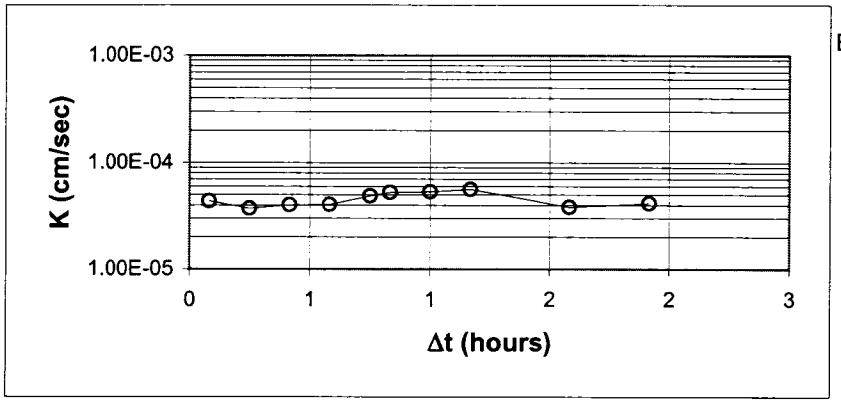
MUESER RUTLEDGE CONSULTING ENGINEERS

File No.	10587
Boring No.	MPB-2
Sample No.	10.5-11.5

CONSTANT HEAD PERMEABILITY TEST
with superimposed air pressure

Setup by:	FW	Date	9/12/07
Calc by:	FW	Date	9/26/07
Chk'd by:		Date	

PROJECT DMT PHASH 2



Cell Pres=	66.2	psi
Back Pres=	60.0	psi
Eff Stress=	6.2	psi

Initial Gradient

SAMPLE DIMENSIONS

INITIAL	
FINAL	x

$$K = \frac{Q \cdot L}{A \cdot h \cdot \Delta t_{sec}} \cdot R_T$$

Avg. Sample Length, L =	7.35	cm
Avg. Sample Dia., D =	7.244	cm
Sample Area, A =	41.21	cm^2
Standpipe Area, a =	2.6	cm^2

READING DATE	CLOCK TIME	ELAP. TIME Dt (hours)	TEMP (˚C)	VOL in Read (cc)	VOL out Read (cc)	Super-imposed Pressure P_{air} (cm)	ΔVOL in (cc)	ΔVOL out (cc)	AVG. WATER HEAD (cm)	TOTAL HEAD H= h + P_{air} (cm)	Σ Vol out (cc)	PERMEABILITY K (cm/sec)	RATIO ΔVOL out / ΔVOL in
[illegible]	[illegible]		24.6	50.0	0.0	35.2							
[illegible]	[illegible]	0.08	[illegible]	[illegible]	[illegible]	35.2	4.1	4.5	17.5	52.7	4.5	**4.35E-05**	1.10
[illegible]	[illegible]	0.25	[illegible]	[illegible]	[illegible]	35.2	6.5	7.0	13.2	48.4	11.5	**3.72E-05**	1.08
[illegible]	[illegible]	0.42	24.6	[illegible]	18.2	35.2	6.4	6.7	8.2	43.4	18.2	**4.03E-05**	1.05
[illegible]	[illegible]	0.58	24.6	27.0	23.9	35.2	6.0	5.7	3.5	38.7	23.9	**4.03E-05**	0.95
[illegible]	[illegible]	0.75	24.6	[illegible]	30.0	35.2	6.3	6.1	-1.2	34.0	30.0	**4.86E-05**	0.97
[illegible]	[illegible]												
[illegible]	[illegible]		24.0	[illegible]	0.0	35.2							
[illegible]	[illegible]	0.83	[illegible]	[illegible]	[illegible]	35.2	5.4	4.8	17.4	52.5	4.8	**5.25E-05**	0.89
[illegible]	[illegible]	1.00	24.0	[illegible]	[illegible]	35.2	8.8	9.6	11.6	46.8	14.4	**5.32E-05**	1.09
[illegible]	[illegible]	1.17	[illegible]	[illegible]	21.4	35.2	9.9	7.0	5.5	40.7	21.4	**5.62E-05**	0.71
[illegible]	[illegible]	1.58	[illegible]	[illegible]	[illegible]	35.2	11.7	11.4	-2.7	32.5	32.8	**3.84E-05**	0.97
[illegible]	[illegible]	1.92	[illegible]	[illegible]	[illegible]	35.2	7.0	8.3	-10.3	24.8	41.1	**4.16E-05**	1.19

ALL TEST METHODS / RESULTS CONFORM TO ASTM STANDARD D 5084:
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MRCE Form K2-1

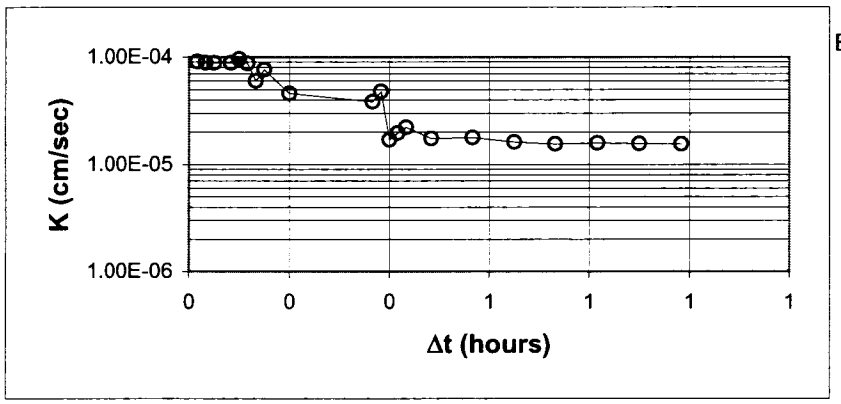
MUESER RUTLEDGE CONSULTING ENGINEERS

File No.	10587
Boring No.	MPB-2
Sample No.	7.3-8.1

CONSTANT HEAD PERMEABILITY TEST
with superimposed air pressure

Setup by:	FW	Date	10/1/07
Calc by:	FW	Date	10/1/07
Chk'd by:		Date	

PROJECT DMT Phase 2



Cell Pres=	65.1	psi
Back Pres=	60.0	psi
Eff Stress=	5.1	psi

Initial Gradient

SAMPLE DIMENSIONS

INITIAL	7.4
FINAL	X

$$K = \frac{Q \cdot L}{A \cdot h \cdot \Delta t_{sec}} \cdot R_T$$

Avg. Sample Length, L =	6.5	cm
Avg. Sample Dia., D =	7.08	cm
Sample Area, A =	39.37	cm^2
Standpipe Area, a =	2.6	cm^2

READING DATE	CLOCK TIME	ELAP. TIME Dt (hours)	TEMP (°C)	VOL in Read (cc)	VOL out Read (cc)	Super-imposed Pressure P_{air} (cm)	ΔVOL in (cc)	ΔVOL out (cc)	AVG. WATER HEAD (cm)	TOTAL HEAD H= h + P_{air} (cm)	Σ Vol out (cc)	PERMEABILITY K (cm/sec)	RATIO ΔVOL out / ΔVOL in
10/2/07	10:30		23.0	40.0	1.5	35.2							
10/2/07	10:32	0.02	23.0	39.0	3.0	35.2	1.9	1.9	17.4	52.6	1.9	9.08E-05	1.00
10/2/07	10:33	0.03	23.0	38.0	4.2	35.2	1.8	1.8	16.0	51.2	3.7	8.84E-05	1.00
10/2/07	10:34	0.05	23.0	37.0	5.6	35.2	1.7	1.8	14.6	49.8	5.5	8.84E-05	1.06
10/2/07	10:35	0.08	23.0	34.0	10.1	35.2	3.3	3.4	12.7	47.9	8.9	8.81E-05	1.03
10/2/07	10:36	0.10	23.0	32.3	12.0	35.2	1.8	1.7	10.7	45.9	10.6	9.58E-05	0.94
10/2/07	10:37	0.12	23.0	30.8	13.7	35.2	1.5	1.6	9.4	44.6	12.2	8.74E-05	1.07
10/2/07	16:25		23.0	40.0	1.5	35.2							
10/2/07	16:26	0.13	23.0	38.7	2.7	35.2	1.3	1.2	17.6	52.8	1.2	6.03E-05	0.92
10/2/07	16:27	0.15	23.0	37.2	4.3	35.2	1.5	1.6	16.5	51.7	2.8	7.63E-05	1.07
10/2/07	16:30	0.20	23.0	34.6	7.1	35.2	2.6	2.8	14.8	50.0	5.6	4.58E-05	1.08
10/2/07	16:40	0.37	23.0	28.5	13.4	35.2	6.1	7.8	10.8	46.0	13.4	3.84E-05	1.28
10/5/07	14:23		23.0	40.0	1.5	35.2							
10/5/07	14:24	0.38	23.0	38.4	3.1	35.2	1.6	0.4	18.3	53.5	0.4	4.79E-05	0.25
10/5/07	14:25	0.40	23.0	38.0	3.6	35.2	0.4	0.3	17.6	52.8	0.7	1.70E-05	0.75
10/5/07	14:26	0.42	23.0	37.5	4.2	35.2	0.5	0.3	17.3	52.5	1.0	1.95E-05	0.60
10/5/07	14:27	0.43	23.0	37.1	4.7	35.2	0.4	0.5	16.9	52.1	1.5	2.21E-05	1.25
10/5/07	14:30	0.48	23.0	35.0	7.3	35.2	1.0	1.1	16.3	51.5	2.6	**1.74E-05**	**1.10**
10/5/07	14:35	0.57	23.0	33.1	9.4	35.2	1.9	1.6	15.3	50.5	4.2	**1.77E-05**	**0.84**
10/5/07	14:40	0.65	23.0	31.6	11.0	35.2	1.5	1.6	14.0	49.2	5.8	**1.61E-05**	**1.07**
10/5/07	14:45	0.73	23.0	30.1	12.5	35.2	1.4	1.5	12.8	48.0	7.3	**1.55E-05**	**1.07**
10/5/07	14:50	0.82	23.0	28.7	13.9	35.2	1.5	1.4	11.8	47.0	8.7	**1.58E-05**	**0.93**
10/5/07	14:55	0.90	23.0	27.4	15.2	35.2	1.5	1.3	10.7	45.9	10.0	**1.56E-05**	**0.87**
10/5/07	15:00	0.98	23.0	26.2	16.6	35.2	1.3	1.4	9.6	44.8	11.4	**1.54E-05**	**1.08**
			Avg K =	1.62E-05	cm/sec								

ALL TEST METHODS / RESULTS CONFORM TO ASTM STANDARD D 5084:
"STANDARD TEST METHODS FOR MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS USING A FLEXIBLE WALL PERMEAMETER"

MRCE Form K2-1

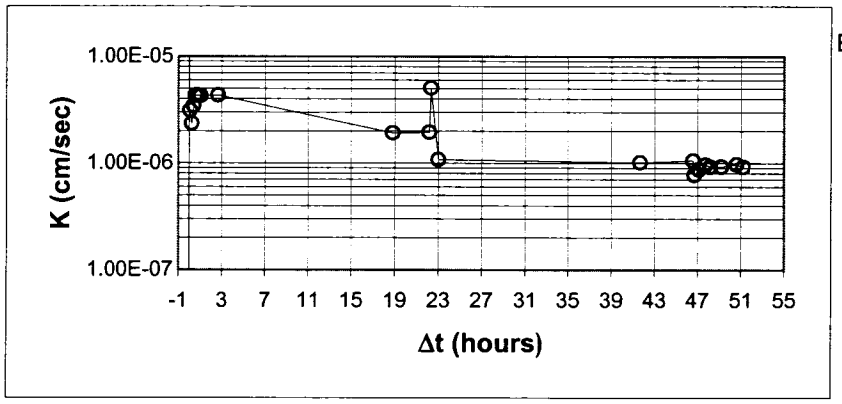
MUESER RUTLEDGE CONSULTING ENGINEERS

File No.	10587
Boring No.	MPB-1
Sample No.	10-10.6

CONSTANT HEAD PERMEABILITY TEST
with superimposed air pressure

Setup by:	FW	Date	9/12/07
Calc by:	FW	Date	9/26/07
Chk'd by:		Date	

PROJECT DMT PHASE 2



Cell Pres=	66.6	psi	Initial Gradient
Back Pres=	60.0	psi	
Eff Stress=	6.6	psi	

SAMPLE DIMENSIONS

INITIAL	
FINAL	X

$$K = \frac{Q \cdot L}{A \cdot h \cdot \Delta t_{sec}} \cdot R_T$$

Avg. Sample Length, L =	7.81	cm
Avg. Sample Dia., D =	7.25	cm
Sample Area, A =	41.28	cm^2
Standpipe Area, a =	2.6	cm^2

READING DATE	CLOCK TIME	ELAP. TIME Dt (hours)	TEMP (˚C)	VOL in Read (cc)	VOL out Read (cc)	Super-imposed Pressure P_{air} (cm)	ΔVOL in (cc)	ΔVOL out (cc)	AVG. WATER HEAD (cm)	TOTAL HEAD H= h + P_{air} (cm)	Σ Vol out (cc)	PERMEABILITY K (cm/sec)	RATIO ΔVOL out / ΔVOL in
9/17/07	11:50		24.6	0.0	0.0	35.2							
[illegible]	[illegible]	0.08	24.6	[illegible]	[illegible]	[illegible]	0.3	0.3	19.1	54.3	0.3	3.13E-06	1.00
[illegible]	[illegible]	0.25	24.6	[illegible]	[illegible]	35.2	0.3	0.6	18.8	53.9	0.9	2.36E-06	2.00
[illegible]	[illegible]	0.42	24.6	[illegible]	1.7	35.2	0.5	0.8	18.3	53.5	1.7	3.44E-06	1.60
[illegible]	[illegible]	0.58	24.6	[illegible]	2.6	35.2	0.7	0.9	17.8	53.0	2.6	4.27E-06	1.29
[illegible]	[illegible]	0.75	24.6	[illegible]	3.5	35.2	0.7	0.9	17.2	52.3	3.5	4.32E-06	1.29
[illegible]	[illegible]	1.08	24.6	[illegible]	5.2	35.2	1.4	1.7	16.3	51.4	5.2	4.26E-06	1.21
[illegible]	[illegible]	2.67	24.6	[illegible]	13.1	35.2	6.0	7.9	12.7	47.8	13.1	4.33E-06	1.32
[illegible]	[illegible]	18.83	23.1	[illegible]	38.9	35.2	19.3	25.8	0.5	35.6	38.9	1.91E-06	1.34
[illegible]	[illegible]	22.17	24.1	[illegible]	42.2	35.2	4.0	3.3	-8.2	26.9	42.2	1.94E-06	0.83
[illegible]	[illegible]												
[illegible]	[illegible]		24.0	[illegible]	0.0	35.2							
[illegible]	[illegible]	22.33	23.0	[illegible]	1.0	35.2	0.9	1.0	18.8	54.0	1.0	5.05E-06	1.11
[illegible]	[illegible]	23.00	24.1	[illegible]	1.7	35.2	0.9	0.7	18.2	53.4	1.7	1.07E-06	0.78
[illegible]	[illegible]	41.67	24.0	[illegible]	19.9	35.2	18.2	18.2	10.9	46.0	19.9	1.01E-06	1.00
[illegible]	[illegible]	46.58	24.0	[illegible]	24.4	35.2	3.6	4.5	2.2	37.3	24.4	1.06E-06	1.25
[illegible]	[illegible]												
9/20/07	[illegible]		23.7	[illegible]	0.7	35.2							
9/20/07	[illegible]	46.70	23.7	[illegible]	0.8	35.2	0.1	0.1	18.5	53.6	0.1	7.70E-07	1.00
9/20/07	11:26	47.12	23.6	[illegible]	1.2	35.2	0.4	0.4	18.3	53.4	0.5	**8.67E-07**	**1.00**
9/20/07	12:03	47.73	23.6	[illegible]	1.9	35.2	0.6	0.7	17.8	53.0	1.2	**9.60E-07**	**1.17**
9/20/07	12:27	48.13	23.6	[illegible]	2.3	35.2	0.4	0.4	17.5	52.6	1.6	**9.17E-07**	**1.00**
9/20/07	13:30	49.18	23.6	[illegible]	3.3	35.2	1.1	1.0	16.9	52.1	2.6	**9.27E-07**	**0.91**
9/20/07	14:53	50.57	23.0	[illegible]	4.7	35.2	1.4	1.4	16.0	51.1	4.0	**9.69E-07**	**1.00**
9/20/07	15:31	51.20	23.0	[illegible]	5.3	35.2	0.6	0.6	15.2	50.3	4.6	**9.21E-07**	**1.00**
			Avg K =	9.27E-07	(cm/sec)								

ALL TEST METHODS / RESULTS CONFORM TO ASTM STANDARD D 5084:
"STANDARD TEST METHODS FOR MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS USING A FLEXIBLE WALL PERMEAMETER"

MRCE Form K2-1

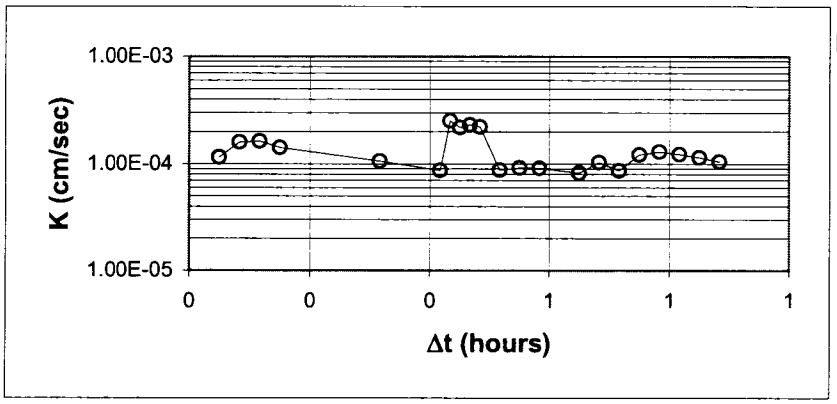
MUESER RUTLEDGE CONSULTING ENGINEERS

File No.	10587
Boring No.	TTI-530
Sample No.	055-062

CONSTANT HEAD PERMEABILITY TEST
with superimposed air pressure

Setup by:	FW	Date	8/29/07
Calc by:	FW	Date	8/29/07
Chk'd by:		Date	

PROJECT DUNDALK MARINE TERMINAL



Cell Pres=	84.0	psi	Initial Gradient
Back Pres=	80.0	psi	
Eff Stress=	4.0	psi	

SAMPLE DIMENSIONS

INITIAL	
FINAL	X

$$K = \frac{Q \cdot L}{A \cdot h \cdot \Delta t_{sec}} \cdot R_T$$

Avg. Sample Length, L =	9.04	cm
Avg. Sample Dia., D =	7.63	cm
Sample Area, A =	45.72	cm^2
Standpipe Area, a =	2.6	cm^2

READING DATE	CLOCK TIME	ELAP. TIME Dt (hours)	TEMP (˚C)	VOL in Read (cc)	VOL out Read (cc)	Super-imposed Pressure P_{air} (cm)	ΔVOL in (cc)	ΔVOL out (cc)	AVG. WATER HEAD (cm)	TOTAL HEAD H= h + P_{air} (cm)	Σ Vol out (cc)	PERMEABILITY K (cm/sec)	RATIO ΔVOL out / ΔVOL in
9/4/07	10:35		22.8	49.7	[illegible]	0.0							
9/4/07	[illegible]	0.05	22.8	[illegible]	[illegible]	0.0	2.0	1.9	17.3	17.3	1.9	1.16E-04	0.95
9/4/07	[illegible]	0.08	22.8	45.0	[illegible]	0.0	1.7	1.6	16.0	16.0	3.5	1.59E-04	0.94
9/4/07	[illegible]	0.12	22.8	45.6	[illegible]	0.0	1.5	1.6	14.7	14.7	5.1	1.63E-04	1.07
9/4/07	[illegible]	0.15	22.8	44.2	[illegible]	0.0	1.3	1.2	13.7	13.7	6.3	1.41E-04	0.92
9/4/07	[illegible]	0.32	22.8	38.2	[illegible]	0.0	4.0	4.0	11.6	11.6	10.3	1.06E-04	1.00
9/4/07	[illegible]	0.42	22.8	36.6	[illegible]	0.0	1.6	1.6	9.5	9.5	11.9	8.69E-05	1.00
9/4/07	[illegible]		22.8	[illegible]	[illegible]	35.2							
9/4/07	[illegible]	0.43	22.8	[illegible]	[illegible]	35.2	4.5	4.0	16.7	51.9	4.0	2.52E-04	0.89
9/4/07	[illegible]	0.45	22.8	[illegible]	[illegible]	35.2	3.2	3.7	13.6	48.8	7.7	2.18E-04	1.16
9/4/07	[illegible]	0.47	22.8	[illegible]	[illegible]	35.2	3.4	3.5	11.0	46.2	11.2	2.30E-04	1.03
9/4/07	[illegible]	0.48	22.8	35.[illegible]	[illegible]	35.2	3.3	3.0	8.5	43.7	14.2	2.22E-04	0.91
9/4/07	[illegible]		22.6	[illegible]	[illegible]	0.0							
9/4/07	[illegible]	0.52	22.6	[illegible]	[illegible]	0.0	1.0	1.0	17.7	17.7	1.0	8.77E-05	1.00
9/4/07	[illegible]	0.55	22.6	46.3	[illegible]	0.0	1.0	1.0	16.9	16.9	2.0	9.17E-05	1.00
9/4/07	[illegible]	0.58	22.6	45.3	[illegible]	0.0	1.0	0.9	16.2	16.2	2.9	9.11E-05	0.90
9/4/07	[illegible]	0.65	22.6	43.8	[illegible]	0.0	1.5	1.7	15.1	15.1	4.6	8.20E-05	1.13
9/4/07	14:32	0.68	22.6	42.[illegible]	[illegible]	0.0	1.1	0.8	14.2	14.2	5.4	1.03E-04	0.73
9/4/07	14:34	0.72	22.6	42.0	7.6	0.0	0.7	0.8	13.5	13.5	6.2	8.60E-05	1.14
9/4/07	14:53		22.6	49.4	1.6	0.0							
9/4/07	14:55	0.75	22.6	48.0	3.0	0.0	1.4	1.4	17.8	17.8	1.4	**1.21E-04**	**1.00**
9/4/07	14:57	0.78	22.6	46.6	4.4	0.0	1.4	1.4	16.8	16.8	2.8	**1.29E-04**	**1.00**
9/4/07	14:59	0.82	22.6	45.3	5.6	0.0	1.3	1.2	15.8	15.8	4.0	**1.23E-04**	**0.92**
9/4/07	15:01	0.85	22.6	44.2	6.7	0.0	1.1	1.1	14.8	14.8	5.1	**1.15E-04**	**1.00**
9/4/07	15:03	0.88	22.6	43.2	7.6	0.0	1.0	0.9	14.1	14.1	6.0	**1.04E-04**	**0.90**
			Avg K=	1.2E-04	cm/sec								

ALL TEST METHODS / RESULTS CONFORM TO ASTM STANDARD D 5084:
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MRCE Form K2-1

MUESER RUTLEDGE CONSULTING ENGINEERS

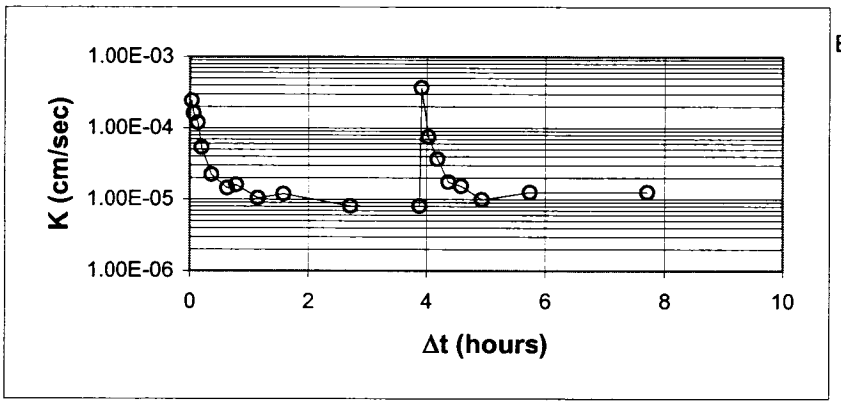
File No.	10587
Boring No.	TTI-522
Sample No.	055-060

CONSTANT HEAD PERMEABILITY TEST

with superimposed air pressure

Setup by:	FW	Date	8/29/07
Calc by:	FW	Date	8/29/07
Chk'd by:		Date	

PROJECT DUNDALK MARINE TERMINAL



Cell Pres=	84.0	psi
Back Pres=	80.0	psi
Eff Stress=	4.0	psi

Initial Gradient

SAMPLE DIMENSIONS

INITIAL	
FINAL	X

$$K = \frac{Q \cdot L}{A \cdot h \cdot \Delta t_{sec}} \cdot R_T$$

Avg. Sample Length, L =	7.61	cm
Avg. Sample Dia., D =	6.13	cm
Sample Area, A =	29.51	cm^2
Standpipe Area, a =	2.6	cm^2

READING DATE	CLOCK TIME	ELAP. TIME Dt (hours)	TEMP (°C)	VOL in Read (cc)	VOL out Read (cc)	Super-imposed Pressure P_{air} (cm)	ΔVOL in (cc)	ΔVOL out (cc)	AVG. WATER HEAD (cm)	TOTAL HEAD H= h + P_{air} (cm)	Σ Vol out (cc)	PERMEABILITY K (cm/sec)	RATIO ΔVOL out / ΔVOL in
8/29/07	10:47		22.8	[illegible]	[illegible]	[illegible]							
[illegible]	10:48	0.03	22.8	[illegible]	[illegible]	[illegible]	2.1	2.1	18.0	18.0	2.1	2.40E-04	1.00
[illegible]	[illegible]	0.07	22.8	[illegible]	[illegible]	[illegible]	1.3	1.3	16.7	16.7	3.4	1.60E-04	1.00
8/29/07	10:55	0.13	22.8	[illegible]	[illegible]	[illegible]	1.9	1.7	15.6	15.6	5.1	1.19E-04	0.89
[illegible]	[illegible]	0.20	22.8	[illegible]	[illegible]	[illegible]	0.6	0.9	14.5	14.5	6.0	5.33E-05	1.50
8/29/07	[illegible]	0.37	22.8	[illegible]	[illegible]	[illegible]	0.8	0.7	14.0	14.0	6.7	2.21E-05	0.88
[illegible]	[illegible]	0.63	22.8	[illegible]	[illegible]	[illegible]	0.8	0.7	13.4	13.4	7.4	1.44E-05	0.88
[illegible]	[illegible]	0.78	22.8	[illegible]	[illegible]	[illegible]	0.4	0.5	12.9	12.9	7.9	1.60E-05	1.25
[illegible]	[illegible]	1.15	22.8	[illegible]	[illegible]	[illegible]	0.8	0.6	12.5	12.5	8.5	1.05E-05	0.75
[illegible]	[illegible]	1.58	22.8	[illegible]	[illegible]	[illegible]	1.0	0.8	11.9	11.9	9.3	1.20E-05	0.80
[illegible]	[illegible]	2.72	22.8	[illegible]	[illegible]	[illegible]	1.2	1.7	10.9	10.9	11.0	8.08E-06	1.42
[illegible]	[illegible]	3.88	22.8	[illegible]	[illegible]	[illegible]	1.4	1.3	9.9	9.9	12.3	8.02E-06	0.93
8/30/07	8:54		23.1	[illegible]	[illegible]	[illegible]							
8/30/07	8:58	3.92	23.1	[illegible]	[illegible]	[illegible]	2.5	2.4	13.7	13.7	2.4	3.67E-04	0.96
8/30/07	10:03	4.03	23.1	[illegible]	[illegible]	[illegible]	1.5	1.6	12.1	12.1	4.0	7.49E-05	1.07
8/30/07	10:12	4.18	23.1	[illegible]	[illegible]	[illegible]	0.9	0.9	11.2	11.2	4.9	3.66E-05	1.00
8/30/07	10:28	4.37	23.1	[illegible]	[illegible]	[illegible]	0.5	0.5	10.7	10.7	5.4	**1.75E-05**	**1.00**
8/30/07	10:36	4.58	23.1	[illegible]	[illegible]	[illegible]	0.5	0.5	10.3	10.3	5.9	**1.53E-05**	**1.00**
8/30/07	10:57	4.93	23.1	[illegible]	[illegible]	[illegible]	0.5	0.5	9.9	9.9	6.4	**9.87E-06**	**1.00**
8/30/07	11:45	5.73	23.1	[illegible]	[illegible]	[illegible]	1.4	1.3	9.2	9.2	7.7	**1.25E-05**	**0.93**
8/30/07	13:44	7.72	22.9	[illegible]	[illegible]	[illegible]	2.8	2.7	7.6	7.6	10.4	**1.25E-05**	**0.96**
			Avg K=	1.35E-05	cm/sec								

ALL TEST METHODS / RESULTS CONFORM TO ASTM STANDARD D 5084:

"STANDARD TEST METHODS FOR MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS USING A FLEXIBLE WALL PERMEAMETER"

MRCE Form K2-1

MUESER RUTLEDGE CONSULTING ENGINEERS

SPECIFIC GRAVITY OF SOLIDS, Gs

PROJECT DUNDALK MARINE TERMINAL (DMT) REMEDIATION

FILE NO. 10587
SUBCODE

Perf. by	YO	DATE	07-31-07
Calc. by	YO	DATE	08-06-07
Checked by	ZY	DATE	08-06-07

Boring No.	INC-1501	INC-1501	INC-1501	INC-1501	INC-1501
Sample No.	177-179	177-179	177-179	177-179	177-179
Bottle No.	25	25	25	25	25
M_p	170	170	170	170	170
Temp., T °C	23.8	24	24	24	24
$M_{pws,t}$	698.1	698.1	698.1	698.1	698.1
$M_{pw,t}$	668.63	668.60	668.60	668.60	668.60
Tare No.	3	3	3	3	3
Dry Soil + Tare	63	63	63	63	63
Tare	15.9	15.9	15.9	15.9	15.9
M_s, Dry Soil	47.1	47.1	47.1	47.1	47.1
$G_{s\ @\ 20\ C}$	2.670	2.674	2.659	2.674	2.674

SPECIFIC GRAVITY = **2.670** CK'Kd by:

Boring No.	INC-1800	INC-1800	INC-1800	INC-1800	INC-1800
Sample No.	039-041	039-041	039-041	039-041	039-041
Bottle No.	27	27	27	27	27
M_p	161.7	161.7	161.7	161.7	161.7
Temp., T °C	23.8	24	24	24	24
$M_{pws,t}$	686.5	686.4	686.4	686.4	686.4
$M_{pw,t}$	659.69	659.66	659.66	659.66	659.66
Tare No.	4	4	4	4	4
Dry Soil + Tare	58.3	58.3	58.3	58.3	58.3
Tare	16	16	16	16	16
M_s, Dry Soil	42.3	42.3	42.3	42.3	42.3
$G_{s\ @\ 20\ C}$	2.729	2.733	2.716	2.716	2.716

SPECIFIC GRAVITY = **2.722** CHECKED BY:

M_p = weight of bottle

$M_{pw,t}$ = weight of bottle + water (including temperature correction)

$M_{pws,t}$ = weight of bottle + water + soil

M_s = dry weight of soil

K = temperature coefficient

$$G_{s\ @\ 20\ C} = \frac{K \cdot M_s}{M_{pw,t} - (M_{pws,t} - M_s)}$$

ALL TEST METHODS/RESULTS CONFORM TO ASTM STANDARD D 854:
"SPECIFIC GRAVITY OF SOILS"

MUESER RUTLEDGE CONSULTING ENGINEERS

SPECIFIC GRAVITY OF SOLIDS, Gs

PROJECT DUNDALK MARINE TERMINAL (DMT) REMEDIATION

FILE NO. 10587
SUBCODE

Perf. by	YO	DATE	07-31-07
Calc. by	YO	DATE	08-06-07
Checked by	ZY	DATE	08-22-07

Boring No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sample No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Bottle No.	2	2	2	2	2
M_p	165.7	165.7	165.7	165.7	165.7
Temp., T °C	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
$M_{pws,t}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
$M_{pw,t}$	663.64	663.61	663.61	663.61	663.61
Tare No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Dry Soil + Tare	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Tare	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
M_s, Dry Soil	41.5	41.5	41.5	41.5	41.5
$G_{s\ @\ 20\ C}$	2.872	2.877	2.877	2.877	2.877

SPECIFIC GRAVITY = **2.876** CK'Kd by:

Boring No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sample No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Bottle No.	21	21	21	21	21
M_p	170.9	170.9	170.9	170.9	170.9
Temp., T °C	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
$M_{pws,t}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
$M_{pw,t}$	668.94	668.91	668.91	668.91	668.91
Tare No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Dry Soil + Tare	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Tare	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
M_s, Dry Soil	47.1	47.1	47.1	47.1	47.1
$G_{s\ @\ 20\ C}$	3.130	3.114	3.114	3.135	3.114

SPECIFIC GRAVITY = **3.121** CHECKED BY:

M_p = weight of bottle

$M_{pw,t}$ = weight of bottle + water (including temperature correction)

$M_{pws,t}$ = weight of bottle + water + soil

M_s = dry weight of soil

K = temperature coefficient

$$G_{s\ @\ 20\ C} = \frac{K \cdot M_s}{M_{pw,t} - (M_{pws,t} - M_s)}$$

ALL TEST METHODS/RESULTS CONFORM TO ASTM STANDARD D 854: "SPECIFIC GRAVITY OF SOILS"

MRCE Form GS-1

MUESER RUTLEDGE CONSULTING ENGINEERS

SPECIFIC GRAVITY OF SOLIDS, Gs

PROJECT DUNDALK MARINE TERMINAL (DMT) REMEDIATION

FILE NO. 10587
SUBCODE

Perf. by	YO	DATE	08-16-07
Calc. by	YO	DATE	08-21-07
Checked by	ZY	DATE	08-22-07

Boring No.	TT1S30	TT1S30	TT1S30	TT1S30	TT1S30
Sample No.	055-062	055-062	055-062	055-062	055-062
Bottle No.	5	5	5	5	5
M_p	170.1	170.1	170.1	170.1	170.1
676.3	22.1	22.1	22.1	22.1	22.1
$M_{pws,t}$	683.8	683.7	683.8	683.7	683.8
$M_{pw,t}$	668.23	668.22	668.23	668.23	668.23
Tare No.	MM	MM	MM	MM	MM
Dry Soil + Tare	265.4	265.4	265.4	265.4	265.4
Tare	241.9	241.9	241.9	241.9	241.9
M_s, Dry Soil	23.5	23.5	23.5	23.5	23.5
$G_{s\ @\ 20\ C}$	2.963	2.930	2.963	2.926	2.963

SPECIFIC GRAVITY = **2.949** CK'Kd by:

Boring No.	INC-1800	INC-1800	INC-1800	INC-1800	INC-1800
Sample No.	114-118	114-118	114-118	114-118	114-118
Bottle No.	27	27	27	27	27
M_p	161.7	161.7	161.7	161.7	161.7
Temp., T °C	22.1	22.1	22.1	22.1	22.1
$M_{pws,t}$	688.1	688.1	688.1	688.1	688.1
$M_{pw,t}$	659.89	659.89	659.89	659.89	659.89
Tare No.	100	100	100	100	100
Dry Soil + Tare	61.6	61.6	61.6	61.6	61.6
Tare	15.7	15.7	15.7	15.7	15.7
M_s, Dry Soil	45.9	45.9	45.9	45.9	45.9
$G_{s\ @\ 20\ C}$	2.594	2.594	2.594	2.594	2.594

SPECIFIC GRAVITY = **2.594** CHECKED BY:

M_p = weight of bottle

$M_{pw,t}$ = weight of bottle + water (including temperature correction)

$M_{pws,t}$ = weight of bottle + water + soil

M_s = dry weight of soil

K = temperature coefficient

$$G_{s\ @\ 20\ C} = \frac{K \cdot M_s}{M_{pw,t} - (M_{pws,t} - M_s)}$$

ALL TEST METHODS/RESULTS CONFORM TO ASTM STANDARD D 854: "SPECIFIC GRAVITY OF SOILS"

MRCE Form GS-1

MUESER RUTLEDGE CONSULTING ENGINEERS

SPECIFIC GRAVITY OF SOLIDS, Gs

PROJECT DUNDALK MARINE TERMINAL (DMT) REMEDIATION

FILE NO. 10587
SUBCODE

Perf. by	YO	DATE	08-16-07
Calc. by	YO	DATE	08-21-07
Checked by	ZY	DATE	08-22-07

Boring No.	TT1S22	TT1S22	TT1S22	TT1S22	TT1S22
Sample No.	060-067	060-067	060-067	060-067	060-067
Bottle No.	2	2	2	2	2
M_p	165.8	165.8	165.8	165.8	165.8
676.3	22.1	22.1	22.1	22.1	22.1
$M_{pws,t}$	676.3	676.2	676.3	676.3	676.3
$M_{pw,t}$	663.94	663.93	663.94	663.94	663.94
Tare No.	AA	AA	AA	AA	AA
Dry Soil + Tare	246.1	246.1	246.1	246.1	246.1
Tare	227.2	227.2	227.2	227.2	227.2
M_s, Dry Soil	18.9	18.9	18.9	18.9	18.9
$G_{s\ @\ 20\ C}$	2.890	2.851	2.890	2.890	2.890

SPECIFIC GRAVITY = **2.882** CK'Kd by:

Boring No.	TT1S22	TT1S22	TT1S22	TT1S22	TT1S22
Sample No.	050-060	050-060	050-060	050-060	050-060
Bottle No.	4	4	4	4	4
M_p	163.7	163.7	163.7	163.7	163.7
Temp., T °C	22.1	22.1	22.1	22.1	22.1
$M_{pws,t}$	665.4	665.4	665.4	665.4	665.4
$M_{pw,t}$	661.52	661.51	661.52	661.52	661.52
Tare No.	W1	W1	W1	W1	W1
Dry Soil + Tare	311.7	311.7	311.7	311.7	311.7
Tare	275.2	275.2	275.2	275.2	275.2
M_s, Dry Soil	36.5	36.5	36.5	36.5	36.5
$G_{s\ @\ 20\ C}$	2.892	2.894	2.892	2.892	2.892

SPECIFIC GRAVITY = **2.892** CHECKED BY:

M_p = weight of bottle

$M_{pw,t}$ = weight of bottle + water (including temperature correction)

$M_{pws,t}$ = weight of bottle + water + soil

M_s = dry weight of soil

K = temperature coefficient

$$G_{s\ @\ 20\ C} = \frac{K \cdot M_s}{M_{pw,t} - (M_{pws,t} - M_s)}$$

ALL TEST METHODS/RESULTS CONFORM TO ASTM STANDARD D 854: "SPECIFIC GRAVITY OF SOILS"

MRCE Form GS-1

MUESER RUTLEDGE CONSULTING ENGINEERS

SPECIFIC GRAVITY OF SOLIDS, Gs

PROJECT DUNDALK MARINE TERMINAL (DMT) REMEDIATION

FILE NO. 10587
SUBCODE

Perf. by YO DATE 07-31-07
Calc. by YO DATE 08-06-07
Checked by ZY DATE 08-06-07

Boring No.	INC-1800	INC-1800	INC-1800	INC-1800	INC-1800
Sample No.	069-070	069-070	069-070	069-070	069-070
Bottle No.	7	7	7	7	7
M_p	160.1	160.1	160.1	160.1	160.1
Temp., T °C	23.8	24	24	24	24
$M_{pws,t}$	682.6	682.6	682.6	682.6	682.6
$M_{pw,t}$	657.79	657.76	657.76	657.76	657.76
Tare No.	7	7	7	7	7
Dry Soil + Tare	54.4	54.4	54.4	54.4	54.4
Tare	15.8	15.8	15.8	15.8	15.8
M_s, Dry Soil	38.6	38.6	38.6	38.6	38.6
$G_{s\ @\ 20\ C}$	2.797	2.782	2.802	2.802	2.802

SPECIFIC GRAVITY = **2.797** CK'Kd by:

Boring No.	INC-1800	INC-1800	INC-1800	INC-1800	INC-1800
Sample No.	087-089	087-089	087-089	087-089	087-089
Bottle No.	4	4	4	4	4
M_p	163.8	163.8	163.8	163.8	163.8
Temp., T °C	23.8	24	24	24	24
$M_{pws,t}$	686.9	686.9	686.9	686.8	686.8
$M_{pw,t}$	661.42	661.39	661.39	661.39	661.39
Tare No.	8	8	8	8	8
Dry Soil + Tare	57.8	57.8	57.8	57.8	57.8
Tare	15.8	15.8	15.8	15.8	15.8
M_s, Dry Soil	42	42	42	42	42
$G_{s\ @\ 20\ C}$	2.541	2.544	2.544	2.529	2.529

SPECIFIC GRAVITY = **2.537** CHECKED BY:

M_p = weight of bottle
$M_{pw,t}$ = weight of bottle + water (including temperature correction)
$M_{pws,t}$ = weight of bottle + water + soil
M_s = dry weight of soil
K = temperature coefficient

$$G_{s\ @\ 20\ C} = \frac{K \cdot M_s}{M_{pw,t} - (M_{pws,t} - M_s)}$$

ALL TEST METHODS/RESULTS CONFORM TO ASTM STANDARD D 854:
"SPECIFIC GRAVITY OF SOILS"

MUESER RUTLEDGE CONSULTING ENGINEERS

SPECIFIC GRAVITY OF SOLIDS, Gs

PROJECT DUNDALK MARINE TERMINAL (DMT) REMEDIATION

FILE NO. 10587
SUBCODE

Perf. by	YO	DATE	07-31-07
Calc. by	YO	DATE	08-06-07
Checked by	ZY	DATE	08-06-07

Boring No.	INC-1800	INC-1800	INC-1800	INC-1800	INC-1800
Sample No.	049-061	049-061	049-061	049-061	049-061
Bottle No.	34	34	34	34	34
M_p	171.6	171.6	171.6	171.6	171.6
Temp., T °C	23.8	24	24	24	24
$M_{pws,t}$	698	697.9	697.9	697.9	697.9
$M_{pw,t}$	669.47	669.44	669.44	669.44	669.44
Tare No.	5	3	3	3	3
Dry Soil + Tare	57.6	57.6	57.6	57.6	57.6
Tare	15.7	15.7	15.7	15.7	15.7
M_s, Dry Soil	41.9	41.9	41.9	41.9	41.9
$G_{s\ @\ 20\ C}$	3.132	3.114	3.114	3.114	3.114

SPECIFIC GRAVITY = **3.118** CK'Kd by:

Boring No.	INC-1800	INC-1800	INC-1800	INC-1800	INC-1800
Sample No.	065-067	065-067	065-067	065-067	065-067
Bottle No.	27	27	27	27	27
M_p	161.7	161.7	161.7	161.7	161.7
Temp., T °C	23.8	24	24	24	24
$M_{pws,t}$	695.9	695.8	695.8	695.8	695.8
$M_{pw,t}$	659.69	659.66	659.66	659.66	659.66
Tare No.	6	6	6	6	6
Dry Soil + Tare	73.5	73.5	73.5	73.5	73.5
Tare	15.8	15.8	15.8	15.8	15.8
M_s, Dry Soil	57.7	57.7	57.7	57.7	57.7
$G_{s\ @\ 20\ C}$	2.671	2.674	2.674	2.661	2.674

SPECIFIC GRAVITY = **2.671** CHECKED BY:

M_p = weight of bottle

$M_{pw,t}$ = weight of bottle + water (including temperature correction)

$M_{pws,t}$ = weight of bottle + water + soil

M_s = dry weight of soil

K = temperature coefficient

$$G_{s\ @\ 20\ C} = \frac{K \cdot M_s}{M_{pw,t} - (M_{pws,t} - M_s)}$$

ALL TEST METHODS/RESULTS CONFORM TO ASTM STANDARD D 854:
"SPECIFIC GRAVITY OF SOILS"

MRCE Form GS-1

MUESER RUTLEDGE CONSULTING ENGINEERS

FILE NO. 10587
SUBCODE

WATER CONTENTS

TEST NO.

PROJECT DUNDALK MARINE TERMINAL

Perf. by YO Date 08-09-07
Calc. by YO Date 08-21-07
Chk'd by YO Date 08-22-07

Used a constant tare weight =

BORING NO.	[illegible]	[illegible]	[illegible]					
SAMPLE NO.	[illegible]	[illegible]	[illegible]					
TARE NO.	[illegible]	[illegible]	[illegible]					
WET + TARE	287.70	[illegible]	[illegible]					
DRY + TARE	250.30	[illegible]	[illegible]					
WATER	37.40	23.90	66.90					
TARE	120.70	120.30	101.00					
SAMPLE DRY	129.60	91.70	232.10					
WATER CONTENT	28.9%	26.1%	28.8%					

BORING NO.								
SAMPLE NO.								
TARE NO.								
WET + TARE								
DRY + TARE								
WATER								
TARE								
SAMPLE DRY								
WATER CONTENT								

BORING NO.								
SAMPLE NO.								
TARE NO.								
WET + TARE								
DRY + TARE								
WATER								
TARE								
SAMPLE DRY								
WATER CONTENT								

BORING NO.								
SAMPLE NO.								
TARE NO.								
WET + TARE								
DRY + TARE								
WATER								
TARE								
SAMPLE DRY								
WATER CONTENT								

ALL TEST METHODS / RESULTS CONFORM TO ASTM STANDARD D 2216:
"TEST METHOD FOR LABORATORY DETERMINATION OF WATER (MOISTURE) CONTENT OF SOIL AND ROCK"

MUESER RUTLEDGE CONSULTING ENGINEERS

FILE NO. 10587
SUBCODE

WATER CONTENTS

TEST NO.

PROJECT DUNDALK MARINE TERMINAL

Perf. by YO Date 07-31-07
Calc. by YO Date 08-06-07
Chk'd by ZY Date 08-06-07

Used a constant tare weight =

BORING NO.	INC-1501	INC-1501	INC-1500	INC-1800	INC-1800	INC-1800	INC-1800	INC-1800
SAMPLE NO.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TARE NO.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
WET + TARE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DRY + TARE	29.40	30.50	31.60	22.00	26.30	16.40	39.90	35.40
WATER	4.30	6.40	4.50	3.80	5.50	5.10	10.20	8.40
TARE	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
SAMPLE DRY	28.10	29.20	30.30	20.70	25.00	15.10	38.60	34.10
WATER CONTENT	15.3%	21.9%	14.9%	18.4%	22.0%	33.8%	26.4%	24.6%

BORING NO.	INC-1800							
SAMPLE NO.	[illegible]							
TARE NO.	[illegible]							
WET + TARE	52.20							
DRY + TARE	41.90							
WATER	10.30							
TARE	1.30							
SAMPLE DRY	40.60							
WATER CONTENT	25.4%							

BORING NO.								
SAMPLE NO.								
TARE NO.								
WET + TARE								
DRY + TARE								
WATER								
TARE								
SAMPLE DRY								
WATER CONTENT								

BORING NO.								
SAMPLE NO.								
TARE NO.								
WET + TARE								
DRY + TARE								
WATER								
TARE								
SAMPLE DRY								
WATER CONTENT								

ALL TEST METHODS / RESULTS CONFORM TO ASTM STANDARD D 2216:

"TEST METHOD FOR LABORATORY DETERMINATION OF WATER (MOISTURE) CONTENT OF SOIL AND ROCK"

MRCE Form WC-1

MUESER RUTLEDGE CONSULTING ENGINEERS

FILE NO. 10587
SUBCODE

WATER CONTENTS

TEST NO.

PROJECT DUNDALK MARINE TERMINAL

Perf. by RF Date 10-27-06
Calc. by BEE Date 10-30-06
Chk'd by RF Date 10-30-06

Used a constant tare weight =

BORING NO.	INC-11	INC-11		INC-13	INC-13		INC-15	
SAMPLE NO.	12 TO 14'	25 TO 27		7.2 TO 8.8	15 TO 16		14 TO 15	
TARE NO.	#1	#2		#3			#5	
WET + TARE	24.43	39.86		34.62	28.73		26.27	
DRY + TARE	18.47	28.11		20.29	28.98		21.76	
WATER	5.96	11.75		14.33	20.75		4.51	
TARE	1.30	1.29		1.28	1.28		1.29	
SAMPLE DRY	17.17	26.82		19.01	27.70		20.47	
WATER CONTENT	34.7%	43.8%		75.4%	74.9%		22.0%	

BORING NO.	INC-16		INC-17	INC-17		INC-21	INC-21	
SAMPLE NO.	5 TO 6		4.5 TO 6	12.5 TO 14		10 TO 11	13.5 TO 15	
TARE NO.	#6			#8			#10	
WET + TARE	56.92		53.18	64.46		74.37	68.16	
DRY + TARE	46.20		41.03	42.04		56.46	52.28	
WATER	10.72		12.16	22.42		18.12	15.78	
TARE	1.31		1.29	1.32		1.29	1.31	
SAMPLE DRY	44.89		39.74	40.73		55.17	50.98	
WATER CONTENT	23.9%		30.6%	55.0%		32.8%	31.0%	

BORING NO.	INC-22							
SAMPLE NO.	0 TO 2.5							
TARE NO.	#14							
WET + TARE	74.20							
DRY + TARE	64.28							
WATER	9.92							
TARE	1.30							
SAMPLE DRY	62.98							
WATER CONTENT	15.8%							

BORING NO.								
SAMPLE NO.								
TARE NO.								
WET + TARE								
DRY + TARE								
WATER								
TARE								
SAMPLE DRY								
WATER CONTENT								

ALL TEST METHODS / RESULTS CONFORM TO ASTM STANDARD D 2216:

"TEST METHOD FOR LABORATORY DETERMINATION OF WATER (MOISTURE) CONTENT OF SOIL AND ROCK"

MRCE Form WC-1

MUESER RUTLEDGE CONSULTING ENGINEERS

FILE NO. 10587
SUBCODE

WATER CONTENTS

TEST NO.

PROJECT DUNDALK MARINE TERMINAL

Perf. by YO Date 10-27-06
Calc. by MM Date 11-10-06
Chk'd by FW Date 11-10-06

Used a constant tare weight =

BORING NO.	INC-16	INC-15	INC-15	INC-15				
SAMPLE NO.	[illegible]	[illegible]	[illegible]	[illegible]				
TARE NO.	[illegible]	[illegible]	[illegible]	[illegible]				
WET + TARE	[illegible]	[illegible]	[illegible]	[illegible]				
DRY + TARE	[illegible]	[illegible]	[illegible]	[illegible]				
WATER	10.82	8.03	3.98	9.79				
TARE	[illegible]	[illegible]	[illegible]	[illegible]				
SAMPLE DRY	43.52	34.70	20.95	33.56				
WATER CONTENT	24.9%	23.1%	19.0%	29.2%				

BORING NO.								
SAMPLE NO.								
TARE NO.								
WET + TARE								
DRY + TARE								
WATER								
TARE								
SAMPLE DRY								
WATER CONTENT								

BORING NO.								
SAMPLE NO.								
TARE NO.								
WET + TARE								
DRY + TARE								
WATER								
TARE								
SAMPLE DRY								
WATER CONTENT								

BORING NO.								
SAMPLE NO.								
TARE NO.								
WET + TARE								
DRY + TARE								
WATER								
TARE								
SAMPLE DRY								
WATER CONTENT								

ALL TEST METHODS / RESULTS CONFORM TO ASTM STANDARD D 2216:

"TEST METHOD FOR LABORATORY DETERMINATION OF WATER (MOISTURE) CONTENT OF SOIL AND ROCK"

MRCE Form WC-1

MUESER RUTLEDGE CONSULTING ENGINEERS

FILE NO. 10587
SUBCODE

WATER CONTENTS

TEST NO.

PROJECT DUNDALK MARINE TERMINAL

Perf. by YO Date 12-12-06
Calc. by MM Date 12-13-06
Chk'd by YO Date 12/20/06

Used a constant tare weight =

BORING NO.	INC-1	[illegible]	INC-1	[illegible]	[illegible]	INC-3	[illegible]	INC-4
SAMPLE NO.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TARE NO.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
WET + TARE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DRY + TARE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
WATER	2.66	4.90	6.39	3.31	5.87	6.34	1.41	5.15
TARE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SAMPLE DRY	12.37	25.00	28.40	11.90	25.56	26.11	6.66	21.89
WATER CONTENT	21.5%	19.6%	22.5%	27.8%	22.9%	24.3%	21.1%	23.5%

BORING NO.	INC-5	[illegible]	INC-8	INC-9	INC-10	[illegible]	[illegible]	INC-12
SAMPLE NO.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TARE NO.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
WET + TARE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DRY + TARE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
WATER	12.70	3.72	7.18	9.73	7.15	1.19	5.61	3.13
TARE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SAMPLE DRY	30.39	17.36	25.94	30.04	23.31	2.69	24.63	13.30
WATER CONTENT	41.8%	21.4%	27.7%	32.4%	30.7%	44.4%	22.8%	23.5%

BORING NO.	INC-16	[illegible]	[illegible]	[illegible]				
SAMPLE NO.	[illegible]	[illegible]	[illegible]	[illegible]				
TARE NO.	[illegible]	[illegible]	[illegible]	[illegible]				
WET + TARE	[illegible]	[illegible]	[illegible]	[illegible]				
DRY + TARE	[illegible]	[illegible]	[illegible]	[illegible]				
WATER	1.65	5.71	2.97	10.72				
TARE	[illegible]	[illegible]	[illegible]	[illegible]				
SAMPLE DRY	20.32	11.36	8.99	30.02				
WATER CONTENT	8.1%	50.3%	33.1%	35.7%				

BORING NO.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SAMPLE NO.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TARE NO.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
WET + TARE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DRY + TARE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
WATER								
TARE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SAMPLE DRY								
WATER CONTENT								

ALL TEST METHODS / RESULTS CONFORM TO ASTM STANDARD D 2216:

"TEST METHOD FOR LABORATORY DETERMINATION OF WATER (MOISTURE) CONTENT OF SOIL AND ROCK"

MRCE Form WC-1

MUESER RUTLEDGE CONSULTING ENGINEERS

FILE NO. 10587
SUBCODE

WATER CONTENTS

TEST NO.

PROJECT DUNDALK MARINE TERMINAL

Perf. by FW Date 12-11-06
Calc. by MM Date 12-14-06
Chk'd by YO Date 12/20/06

Used a constant tare weight =

BORING NO.	INC-1	[illegible]	[illegible]	[illegible]	[illegible]	INC-12	[illegible]	[illegible]
SAMPLE NO.	25-27 TOP	[illegible]	[illegible]	[illegible]	[illegible]	2 BOT	[illegible]	[illegible]
TARE NO.	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
WET + TARE	42.53	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DRY + TARE	24.06	[illegible]	[illegible]	[illegible]	[illegible]	32.73	[illegible]	[illegible]
WATER	18.47	10.77	10.53	8.55	16.18	17.39		
TARE	1.27	[illegible]	[illegible]	1.20	[illegible]	1.31	[illegible]	[illegible]
SAMPLE DRY	22.78	20.66	44.11	26.71	32.88	31.42		
WATER CONTENT	81.1%	52.1%	23.9%	32.0%	49.2%	55.3%		

BORING NO.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SAMPLE NO.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TARE NO.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
WET + TARE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DRY + TARE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
WATER								
TARE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SAMPLE DRY								
WATER CONTENT								

BORING NO.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SAMPLE NO.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TARE NO.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
WET + TARE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DRY + TARE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
WATER								
TARE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SAMPLE DRY								
WATER CONTENT								

BORING NO.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SAMPLE NO.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TARE NO.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
WET + TARE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DRY + TARE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
WATER								
TARE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SAMPLE DRY								
WATER CONTENT								

ALL TEST METHODS / RESULTS CONFORM TO ASTM STANDARD D 2216:

"TEST METHOD FOR LABORATORY DETERMINATION OF WATER (MOISTURE) CONTENT OF SOIL AND ROCK"

MRCE Form WC-1

MUESER RUTLEDGE CONSULTING ENGINEERS

UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION

File	10587
Boring No.	M. P. B-2
Sample No.	10.5-11.5

Perf by:	ZY	Date:	09-07-07
Calc by:	MM	Date:	09-20-07
Ch'kd by:	YO	Date:	09-21-07

TEST SUMMARY

Compressive Strength =	6.19 tsf	86.0 psi	
Strain at Failure =	4.1 %		
Cell Pressure =	6.71 psi	0.48 tsf	46 kPa
Dry Density =	90.87 pcf		

USC Group Symbol =

In Situ Density = 114.99 pcf

SAMPLE DATA

Initial Height = 5.79 in

Initial Diameter = 2.88 in

Initial Area = 6.51 sq in

STRENGTH CORRECTIONS

Thickness of membrane = 0.012 in

Weight of piston+gage+clamp = 354.10 gm

Weight of end cap+porous stone = 559.20 gm

Correction for membrane = -0.007 tsf

Correction for end cap+assembly = 0.014 tsf

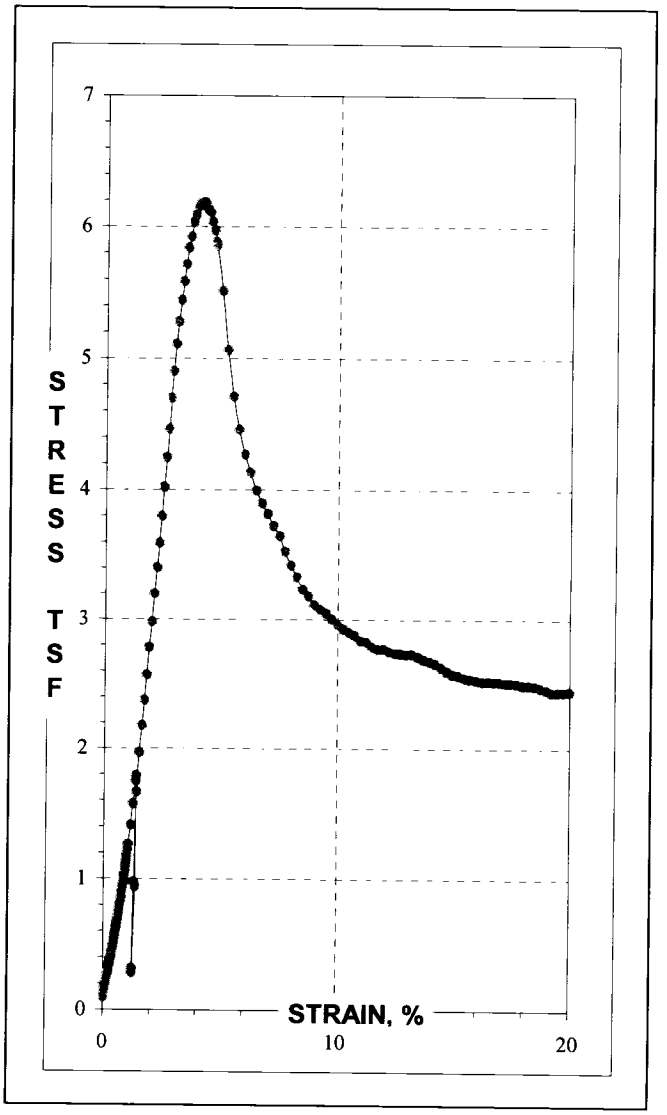
TEST CONSTANTS

Strain Rate = 1.00 %/min

WATER CONTENT

	START	END
Tare No.		BBB
Wet + Tare	1137.10	1238.20
Dry + Tare		999.60
Water	238.50	238.60
Tare		101.00
Sample Dry	898.60	898.60
Water Content	26.5%	26.6%

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.00	16.60	0.00	0.00	0.09
0.02	20.46	0.00	0.03	0.14
0.05	22.50	0.00	0.05	0.16
0.07	24.36	0.00	0.07	0.18
0.10	26.34	0.01	0.11	0.20
0.13	28.34	0.01	0.13	0.22
0.15	30.48	0.01	0.16	0.25
0.18	32.70	0.01	0.18	0.27
0.20	34.64	0.01	0.21	0.29
0.23	36.69	0.01	0.24	0.32
0.27	38.93	0.02	0.27	0.34
0.28	41.18	0.02	0.29	0.36
0.32	43.24	0.02	0.31	0.39
0.33	45.35	0.02	0.34	0.41
0.37	47.68	0.02	0.36	0.44
0.38	50.26	0.02	0.40	0.46
0.42	52.55	0.02	0.42	0.49
0.43	55.04	0.03	0.45	0.52
0.47	57.58	0.03	0.47	0.54
0.50	60.29	0.03	0.50	0.57
0.52	62.84	0.03	0.52	0.60
0.55	65.19	0.03	0.55	0.63
0.57	68.28	0.03	0.58	0.66
0.60	70.64	0.04	0.61	0.69
0.62	73.42	0.04	0.63	0.72
0.65	75.88	0.04	0.65	0.74
0.67	78.66	0.04	0.68	0.78
0.70	81.15	0.04	0.70	0.80
0.73	83.54	0.04	0.74	0.83
0.75	86.78	0.04	0.76	0.86
0.78	89.58	0.05	0.79	0.89
0.80	92.72	0.05	0.81	0.93
0.83	95.69	0.05	0.83	0.96
0.85	98.84	0.05	0.86	1.00
0.88	102.05	0.05	0.89	1.03
0.92	105.05	0.05	0.92	1.06



ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.93	108.34	0.05	0.94	1.10
0.97	112.05	0.06	0.97	1.14
0.98	115.70	0.06	0.99	1.18
1.02	119.41	0.06	1.02	1.22
1.05	123.42	0.06	1.05	1.26
1.15	137.08	0.07	1.15	1.41
1.25	152.23	0.07	1.25	1.57
1.35	168.27	0.08	1.35	1.75
1.38	172.36	0.08	1.38	1.79
1.45	94.22	0.08	1.34	0.94
1.55	36.95	0.07	1.23	0.32
1.55	34.10	0.07	1.22	0.28
1.65	97.21	0.07	1.29	0.97
1.75	160.73	0.08	1.40	1.66
1.85	188.72	0.09	1.49	1.97
1.95	208.18	0.09	1.60	2.18
2.05	226.25	0.10	1.69	2.37
2.15	244.54	0.10	1.80	2.57
2.25	264.32	0.11	1.89	2.78
2.35	282.88	0.12	2.00	2.98
2.45	303.48	0.12	2.10	3.20
2.55	322.79	0.13	2.20	3.40
2.65	340.54	0.13	2.30	3.59
2.75	359.82	0.14	2.40	3.80
2.85	380.86	0.14	2.50	4.02
2.95	402.28	0.15	2.60	4.25
3.05	422.84	0.16	2.70	4.46
3.15	445.15	0.16	2.80	4.70
3.27	464.53	0.17	2.90	4.90
3.37	484.37	0.17	3.01	5.11
3.47	500.75	0.18	3.10	5.28
3.57	516.31	0.19	3.21	5.44
3.67	530.15	0.19	3.30	5.58
3.77	542.68	0.20	3.41	5.71
3.87	555.34	0.20	3.51	5.84
3.97	563.75	0.21	3.61	5.92
4.07	574.54	0.21	3.71	6.03
4.17	580.67	0.22	3.81	6.09
4.27	587.01	0.23	3.91	6.15
4.37	589.96	0.23	4.02	6.18
4.47	591.36	0.24	4.11	6.19
4.57	591.55	0.24	4.22	6.18
4.67	587.66	0.25	4.31	6.13
4.77	585.99	0.26	4.42	6.11
4.87	579.76	0.26	4.51	6.04
4.97	574.12	0.27	4.62	5.97
5.03	566.29	0.27	4.68	5.88
5.07	563.53	0.27	4.72	5.85
5.32	532.58	0.29	4.97	5.51
5.57	491.10	0.30	5.21	5.06
5.82	458.47	0.32	5.47	4.71
6.07	435.57	0.33	5.71	4.46
6.32	418.60	0.35	5.97	4.27
6.57	406.41	0.36	6.21	4.13
6.82	394.13	0.37	6.47	3.99
7.07	385.73	0.39	6.71	3.90
7.32	379.02	0.40	6.97	3.82

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
7.57	371.03	0.42	7.21	3.72
7.82	364.45	0.43	7.47	3.65
8.07	353.66	0.45	7.71	3.53
8.32	344.14	0.46	7.97	3.42
8.57	336.03	0.48	8.21	3.33
8.82	327.76	0.49	8.47	3.24
9.07	323.18	0.50	8.71	3.18
9.32	317.36	0.52	8.97	3.11
9.57	314.80	0.53	9.21	3.08
9.82	312.54	0.55	9.47	3.05
10.07	309.14	0.56	9.71	3.01
10.32	305.77	0.58	9.97	2.96
10.57	302.84	0.59	10.21	2.93
10.82	301.05	0.61	10.47	2.90
11.07	299.62	0.62	10.71	2.88
11.32	295.88	0.63	10.97	2.83
11.57	295.67	0.65	11.21	2.82
11.82	292.91	0.66	11.47	2.79
12.07	291.93	0.68	11.71	2.77
12.32	292.84	0.69	11.97	2.77
12.57	291.46	0.71	12.21	2.75
12.82	290.96	0.72	12.47	2.74
13.07	291.55	0.74	12.71	2.74
13.32	291.68	0.75	12.97	2.73
13.57	292.56	0.76	13.21	2.73
13.82	291.43	0.78	13.47	2.71
14.07	290.06	0.79	13.71	2.69
14.32	289.37	0.81	13.97	2.68
14.57	288.24	0.82	14.21	2.66
14.82	286.02	0.84	14.47	2.63
15.07	283.81	0.85	14.71	2.60
15.32	281.86	0.87	14.97	2.57
15.57	281.61	0.88	15.21	2.56
15.82	280.54	0.90	15.47	2.55
16.07	280.64	0.91	15.71	2.54
16.32	280.34	0.92	15.97	2.53
16.57	280.27	0.94	16.21	2.52
16.82	281.31	0.95	16.47	2.52
17.07	281.65	0.97	16.71	2.52
17.32	282.46	0.98	16.97	2.52
17.58	282.04	1.00	17.22	2.51
17.83	282.87	1.01	17.47	2.51
18.08	283.22	1.03	17.72	2.50
18.33	282.82	1.04	17.97	2.49
18.58	283.71	1.05	18.22	2.49
18.83	283.89	1.07	18.48	2.49
19.08	283.01	1.08	18.72	2.47
19.33	282.42	1.10	18.98	2.46
19.58	280.91	1.11	19.22	2.44
19.83	282.03	1.13	19.48	2.44
20.08	283.01	1.14	19.72	2.44
20.33	284.39	1.16	19.98	2.45
20.37	283.04	1.16	20.01	2.43

MUESER RUTLEDGE CONSULTING ENGINEERS

File	10587
Boring No.	M. P. B-1
Sample No.	8.5-9.4

UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION

Perf by:	ZY	Date:	09-07-07
Calc by:	MM	Date:	09-20-07
Ch'kd by:	YO	Date:	09-21-07

TEST SUMMARY

Compressive Strength =	3.26 tsf	45.3 psi	
Strain at Failure =	7.1 %		
Cell Pressure =	6.41 psi	0.46 tsf	44 kPa
Dry Density =	106.10 pcf		

USC Group Symbol =

In Situ Density = 136.09 pcf

SAMPLE DATA

Initial Height = 5.14 in

Initial Diameter = 2.83 in

Initial Area = 6.28 sq in

STRENGTH CORRECTIONS

Thickness of membrane = 0.012 in

Weight of piston+gage+clamp = 354.10 gm

Weight of end cap+porous stone = 558.20 gm

Correction for membrane = -0.011 tsf

Correction for end cap+assembly = 0.014 tsf

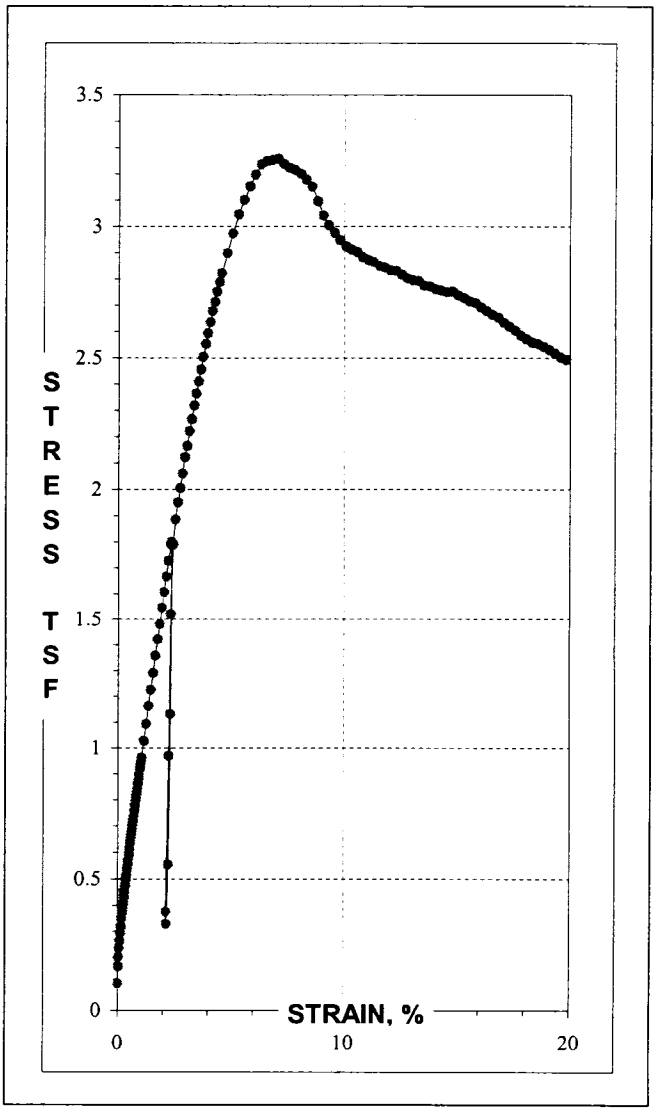
TEST CONSTANTS

Strain Rate = 1.00 %/min

WATER CONTENT

	START	END
Tare No.		2
Wet + Tare	1154.20	1251.00
Dry + Tare		996.70
Water	254.30	254.30
Tare		96.80
Sample Dry	899.90	899.90
Water Content	28.3%	28.3%

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.00	8.81	0.00	0.00	0.10
0.02	14.39	0.00	0.03	0.17
0.05	17.53	0.00	0.05	0.20
0.07	20.37	0.00	0.07	0.24
0.10	23.00	0.01	0.10	0.27
0.13	25.33	0.01	0.12	0.29
0.15	27.67	0.01	0.16	0.32
0.18	30.31	0.01	0.18	0.35
0.20	32.49	0.01	0.21	0.37
0.23	33.53	0.01	0.23	0.39
0.25	35.45	0.01	0.25	0.41
0.28	37.34	0.01	0.28	0.43
0.30	39.38	0.02	0.31	0.45
0.33	41.34	0.02	0.34	0.47
0.37	43.24	0.02	0.36	0.50
0.38	44.88	0.02	0.39	0.51
0.42	46.78	0.02	0.41	0.54
0.43	48.24	0.02	0.44	0.55
0.47	49.92	0.02	0.46	0.57
0.50	51.68	0.03	0.50	0.59
0.52	53.51	0.03	0.52	0.61
0.55	55.54	0.03	0.55	0.64
0.57	57.21	0.03	0.57	0.65
0.60	58.55	0.03	0.60	0.67
0.62	60.16	0.03	0.62	0.69
0.65	61.35	0.03	0.65	0.70
0.68	62.89	0.03	0.68	0.72
0.70	64.42	0.04	0.70	0.74
0.73	66.44	0.04	0.73	0.76
0.75	68.17	0.04	0.75	0.78
0.78	69.86	0.04	0.78	0.80
0.80	71.03	0.04	0.81	0.81
0.83	72.19	0.04	0.83	0.82
0.85	73.63	0.04	0.86	0.84
0.88	75.56	0.05	0.88	0.86
0.92	77.09	0.05	0.91	0.88



ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.93	78.80	0.05	0.93	0.90
0.97	80.66	0.05	0.97	0.92
0.98	81.78	0.05	0.99	0.93
1.02	83.23	0.05	1.01	0.95
1.03	84.67	0.05	1.04	0.96
1.13	90.42	0.06	1.14	1.03
1.23	96.29	0.06	1.24	1.09
1.33	102.58	0.07	1.34	1.16
1.43	108.15	0.07	1.44	1.22
1.53	114.15	0.08	1.54	1.29
1.65	120.18	0.08	1.65	1.36
1.75	125.95	0.09	1.74	1.42
1.85	131.45	0.09	1.85	1.48
1.95	137.32	0.10	1.94	1.55
2.05	142.88	0.11	2.05	1.61
2.15	148.40	0.11	2.14	1.67
2.25	154.01	0.12	2.25	1.73
2.35	159.66	0.12	2.34	1.79
2.38	160.64	0.12	2.39	1.80
2.45	100.85	0.12	2.34	1.13
2.55	49.20	0.12	2.24	0.55
2.63	29.09	0.11	2.16	0.33
2.65	33.26	0.11	2.15	0.38
2.75	86.33	0.12	2.25	0.97
2.85	135.53	0.12	2.35	1.52
2.95	159.71	0.13	2.46	1.79
3.05	168.59	0.13	2.55	1.89
3.15	174.58	0.14	2.66	1.95
3.25	179.69	0.14	2.75	2.01
3.35	184.75	0.15	2.86	2.06
3.45	190.56	0.15	2.95	2.12
3.55	194.65	0.16	3.06	2.17
3.65	199.87	0.16	3.16	2.22
3.75	204.25	0.17	3.26	2.27
3.87	209.09	0.17	3.36	2.32
3.97	213.45	0.18	3.46	2.36
4.07	217.83	0.18	3.56	2.41
4.17	222.22	0.19	3.67	2.46
4.27	226.73	0.19	3.76	2.50
4.37	231.38	0.20	3.87	2.55
4.47	235.29	0.20	3.96	2.59
4.57	239.39	0.21	4.07	2.63
4.67	243.51	0.21	4.17	2.68
4.77	246.91	0.22	4.27	2.71
4.87	250.82	0.22	4.37	2.75
4.97	254.44	0.23	4.47	2.79
5.07	257.81	0.23	4.57	2.82
5.32	265.45	0.25	4.82	2.90
5.57	273.06	0.26	5.07	2.97
5.82	280.44	0.27	5.32	3.05
6.07	286.28	0.29	5.57	3.10
6.32	291.78	0.30	5.82	3.15
6.57	296.59	0.31	6.07	3.20
6.82	301.07	0.33	6.32	3.23
7.07	303.19	0.34	6.58	3.25
7.32	304.30	0.35	6.82	3.25
7.57	305.53	0.36	7.08	3.26

MUESER RUTLEDGE CONSULTING ENGINEERS

File	10587
Boring No.	M.P. B-1
Sample No.	10.0-10.6

UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION

Perf by:	ZY	Date:	09-07-07
Calc by:	MM	Date:	09-20-07
Ch'kd by:	YO	Date:	09-21-07

TEST SUMMARY

Compressive Strength =	2.60 tsf	36.1 psi	
Strain at Failure =	8.4 %		
Cell Pressure =	6.99 psi	0.50 tsf	48 kPa
Dry Density =	104.27 pcf		

USC Group Symbol =

In Situ Density = 129.12 pcf

SAMPLE DATA

Initial Height = 5.67 in

Initial Diameter = 2.81 in

Initial Area = 6.19 sq in

STRENGTH CORRECTIONS

Thickness of membrane =	0.012 in
Weight of piston+gage+clamp =	354.10 gm
Weight of end cap+porous stone =	576.70 gm
Correction for membrane =	-0.013 tsf
Correction for end cap+assembly =	0.015 tsf

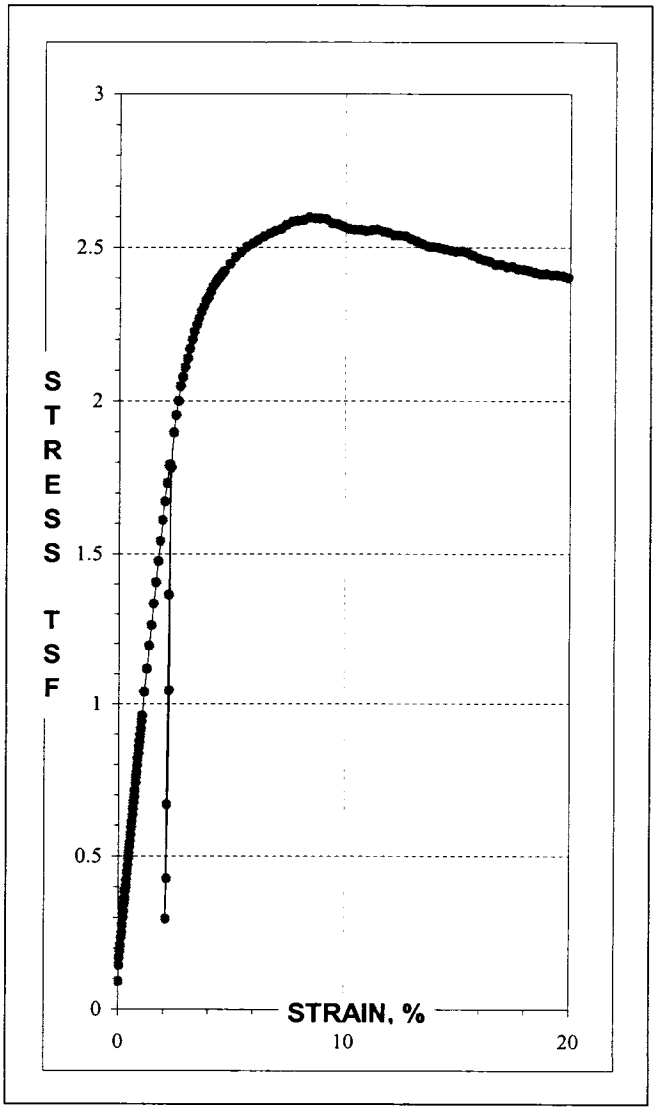
TEST CONSTANTS

Strain Rate = 1.00 %/min

WATER CONTENT

	START	END
Tare No.		ZX
Wet + Tare	1189.20	1284.10
Dry + Tare		1059.00
Water	228.80	225.10
Tare		98.60
Sample Dry	960.40	960.40
Water Content	23.8%	23.4%

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.00	11.42	0.00	0.00	0.09
0.03	15.89	0.00	0.03	0.14
0.05	17.88	0.00	0.05	0.17
0.08	19.77	0.00	0.07	0.19
0.10	21.51	0.01	0.10	0.21
0.13	23.58	0.01	0.12	0.23
0.17	25.23	0.01	0.15	0.25
0.18	27.17	0.01	0.18	0.27
0.22	29.34	0.01	0.21	0.30
0.23	31.20	0.01	0.23	0.32
0.27	33.24	0.01	0.26	0.34
0.28	34.77	0.02	0.28	0.36
0.32	36.78	0.02	0.30	0.39
0.35	37.96	0.02	0.34	0.40
0.37	40.01	0.02	0.36	0.42
0.40	42.11	0.02	0.39	0.45
0.42	44.06	0.02	0.41	0.47
0.45	45.85	0.03	0.44	0.49
0.47	47.49	0.03	0.46	0.51
0.50	49.23	0.03	0.49	0.53
0.52	50.84	0.03	0.52	0.55
0.55	52.68	0.03	0.54	0.57
0.58	54.82	0.03	0.57	0.59
0.60	56.42	0.03	0.59	0.61
0.63	58.27	0.04	0.62	0.63
0.65	60.11	0.04	0.65	0.65
0.68	61.93	0.04	0.68	0.67
0.70	63.62	0.04	0.70	0.69
0.73	65.40	0.04	0.72	0.71
0.77	67.49	0.04	0.75	0.74
0.78	69.24	0.04	0.77	0.76
0.82	70.75	0.05	0.81	0.78
0.83	72.51	0.05	0.83	0.80
0.87	74.53	0.05	0.85	0.82
0.88	75.95	0.05	0.88	0.83
0.92	77.92	0.05	0.90	0.86



ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.93	79.59	0.05	0.93	0.88
0.97	81.42	0.05	0.96	0.90
1.00	83.25	0.06	0.99	0.92
1.02	85.27	0.06	1.01	0.94
1.05	86.96	0.06	1.04	0.96
1.15	94.01	0.06	1.14	1.04
1.25	100.71	0.07	1.24	1.12
1.35	107.52	0.08	1.34	1.19
1.45	113.56	0.08	1.44	1.26
1.55	120.03	0.09	1.54	1.33
1.65	126.43	0.09	1.65	1.41
1.75	132.63	0.10	1.74	1.48
1.85	138.57	0.10	1.85	1.54
1.95	144.70	0.11	1.94	1.61
2.05	150.22	0.12	2.05	1.67
2.15	155.75	0.12	2.14	1.73
2.25	160.84	0.13	2.25	1.79
2.30	161.27	0.13	2.29	1.79
2.35	95.34	0.13	2.25	1.04
2.45	41.00	0.12	2.15	0.43
2.50	29.54	0.12	2.11	0.30
2.55	62.28	0.12	2.14	0.67
2.67	123.59	0.13	2.25	1.36
2.77	160.41	0.13	2.34	1.78
2.87	170.68	0.14	2.45	1.90
2.97	175.84	0.14	2.54	1.95
3.07	180.11	0.15	2.65	2.00
3.17	184.46	0.16	2.75	2.05
3.27	187.37	0.16	2.85	2.08
3.37	190.38	0.17	2.95	2.11
3.47	193.05	0.17	3.05	2.14
3.57	196.08	0.18	3.15	2.17
3.67	198.89	0.18	3.25	2.20
3.77	201.35	0.19	3.35	2.22
3.87	203.74	0.20	3.46	2.25
3.97	205.64	0.20	3.55	2.27
4.07	208.01	0.21	3.66	2.29
4.17	209.39	0.21	3.75	2.30
4.27	211.40	0.22	3.86	2.32
4.37	212.67	0.22	3.96	2.34
4.47	214.36	0.23	4.06	2.35
4.57	216.06	0.24	4.16	2.37
4.68	217.19	0.24	4.26	2.38
4.78	218.76	0.25	4.36	2.39
4.88	219.47	0.25	4.47	2.40
4.98	220.77	0.26	4.56	2.41
5.08	221.85	0.26	4.67	2.42
5.33	224.62	0.28	4.91	2.45
5.58	227.30	0.29	5.17	2.47
5.83	229.28	0.31	5.41	2.48
6.08	231.52	0.32	5.67	2.50
6.33	233.04	0.34	5.91	2.51
6.58	234.73	0.35	6.17	2.52
6.83	236.36	0.36	6.41	2.53
7.08	237.87	0.38	6.67	2.54
7.33	239.31	0.39	6.91	2.55
7.58	240.54	0.41	7.17	2.56

MUESER RUTLEDGE CONSULTING ENGINEERS

UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION

File: 10587
Boring No.: M.P. B-2
Sample No.: 7.3-8.1

Perf by: ZY Date: 09-10-07
Calc by: MM Date: 09-20-07
Ch'kd by: YO Date: 09-21-07

TEST SUMMARY

Compressive Strength =	6.60 tsf	91.6 psi	
Strain at Failure =	3.7 %		
Cell Pressure =	5.33 psi	0.38 tsf	37 kPa
Dry Density =	93.67 pcf		

USC Group Symbol =
In Situ Density = 122.43 pcf

SAMPLE DATA

Initial Height = 5.73 in
Initial Diameter = 2.80 in
Initial Area = 6.16 sq in

STRENGTH CORRECTIONS

Thickness of membrane = 0.012 in
Weight of piston+gage+clamp = 354.10 gm
Weight of end cap+porous stone = 558.20 gm
Correction for membrane = -0.006 tsf
Correction for end cap+assembly = 0.014 tsf

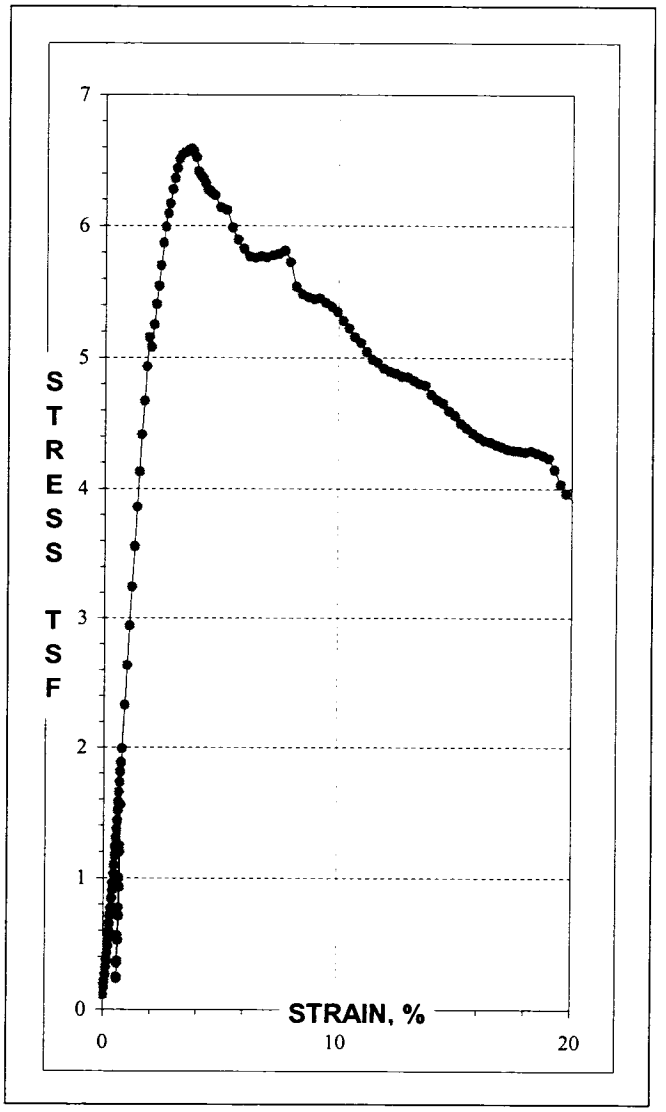
TEST CONSTANTS

Strain Rate = 1.00 %/min

WATER CONTENT

	START	END
Tare No.		V
Wet + Tare	1134.10	1225.30
Dry + Tare		965.20
Water	266.40	260.10
Tare		97.50
Sample Dry	867.70	867.70
Water Content	30.7%	30.0%

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.00	11.64	0.00	0.00	0.11
0.03	16.62	0.00	0.03	0.17
0.05	20.53	0.00	0.05	0.21
0.08	24.99	0.00	0.09	0.27
0.10	29.40	0.01	0.11	0.32
0.13	34.25	0.01	0.14	0.37
0.15	38.69	0.01	0.16	0.43
0.18	43.44	0.01	0.19	0.48
0.22	48.28	0.01	0.21	0.54
0.23	53.20	0.01	0.24	0.59
0.27	58.26	0.02	0.26	0.65
0.28	63.29	0.02	0.29	0.71
0.32	68.53	0.02	0.32	0.77
0.33	74.37	0.02	0.34	0.84
0.37	79.95	0.02	0.37	0.91
0.38	84.72	0.02	0.39	0.96
0.42	90.75	0.02	0.42	1.03
0.45	96.50	0.03	0.44	1.10
0.47	102.67	0.03	0.48	1.17
0.50	108.54	0.03	0.50	1.24
0.52	114.45	0.03	0.52	1.30
0.55	120.21	0.03	0.55	1.37
0.57	125.90	0.03	0.57	1.44
0.60	132.47	0.03	0.60	1.51
0.62	138.54	0.04	0.63	1.58
0.65	144.80	0.04	0.65	1.66
0.67	151.45	0.04	0.68	1.73
0.70	158.26	0.04	0.70	1.81
0.73	164.81	0.04	0.73	1.89
0.73	164.15	0.04	0.73	1.88
0.75	136.50	0.04	0.73	1.56
0.78	105.37	0.04	0.70	1.20
0.80	82.33	0.04	0.68	0.93
0.83	63.39	0.04	0.65	0.71
0.85	47.60	0.04	0.62	0.53
0.88	34.04	0.03	0.60	0.37



ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.90	23.35	0.03	0.57	0.25
0.92	22.41	0.03	0.57	0.23
0.93	32.33	0.03	0.57	0.35
0.97	50.65	0.03	0.59	0.56
0.98	68.76	0.04	0.63	0.77
1.02	88.58	0.04	0.65	1.00
1.03	109.55	0.04	0.68	1.25
1.13	174.00	0.04	0.78	1.99
1.23	203.17	0.05	0.88	2.33
1.33	229.86	0.06	0.98	2.63
1.43	256.63	0.06	1.08	2.94
1.53	283.20	0.07	1.18	3.24
1.63	310.50	0.07	1.28	3.56
1.73	336.89	0.08	1.38	3.86
1.83	360.90	0.08	1.48	4.13
1.93	385.91	0.09	1.58	4.41
2.03	408.81	0.10	1.68	4.67
2.13	431.81	0.10	1.78	4.93
2.23	451.57	0.11	1.88	5.15
2.33	445.73	0.11	1.98	5.08
2.43	461.15	0.12	2.08	5.25
2.53	475.05	0.12	2.18	5.40
2.63	487.78	0.13	2.28	5.54
2.73	501.96	0.14	2.38	5.70
2.83	517.36	0.14	2.48	5.87
2.93	528.49	0.15	2.58	5.99
3.03	537.96	0.15	2.68	6.09
3.13	545.14	0.16	2.78	6.17
3.23	555.33	0.17	2.88	6.28
3.33	563.46	0.17	2.98	6.36
3.43	570.65	0.18	3.08	6.44
3.53	577.58	0.18	3.18	6.51
3.63	580.82	0.19	3.28	6.54
3.73	582.74	0.19	3.38	6.55
3.83	584.05	0.20	3.48	6.56
3.93	585.70	0.20	3.58	6.57
4.03	587.57	0.21	3.68	6.59
4.13	586.25	0.22	3.78	6.57
4.23	582.80	0.22	3.88	6.52
4.35	573.91	0.23	3.98	6.41
4.45	571.61	0.23	4.09	6.38
4.55	570.54	0.24	4.18	6.36
4.65	567.33	0.25	4.29	6.32
4.75	563.50	0.25	4.38	6.27
4.82	563.93	0.26	4.47	6.27
4.85	563.51	0.26	4.49	6.26
4.95	562.34	0.26	4.58	6.25
5.05	561.81	0.27	4.69	6.23
5.30	555.02	0.28	4.94	6.14
5.55	554.81	0.30	5.19	6.12
5.80	543.92	0.31	5.45	5.99
6.05	537.17	0.33	5.69	5.90
6.30	532.50	0.34	5.94	5.83
6.55	528.42	0.35	6.20	5.77
6.80	529.11	0.37	6.45	5.76
7.05	531.48	0.38	6.69	5.77
7.30	532.02	0.40	6.95	5.76