Hole No. 08-75

BORING LOG	DISTRICT	INSTALLATION	SHEET 1 OF 1 SHEETS

1. PROJECT Galveston Channel Extension - New Pelican Island PA	7. ELEVATION OF HOLE
2. LOCATION (Coordinates or Station) N=13687180 E=3310181	8. DATUM FOR ELEVATION
3. DRILLING AGENCY Dempsey (Geotest Engineering, Inc.)	9. ELEVATION OF GROUNDWATER ▽ TOD: ▼ 24-HR:
4. LABORATORY TESTING AGENCY Tolunay-Wong Engineers, Inc.	10. DRILLING DATE and TIME STARTED: COMPLETED:
5. DEPTH OF WATER ▽ TOD: ▼ 24-HR:	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 25 ft	12. ENGINEER

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY (CH), stiff, brown & gray, w/ roots & sand seams		1			2.50	94.8	21.4				
			LEAN CLAY (CL), soft, brown & gray, w/ roots, sand pockets & seams		2			0.50	88.1	30.2				
5			**SANDY FAT CLAY (CH)**, firm, brown & gray, w/ roots & sand seams		3			0.50	87.8	32.5	58	21	37	57.7
			LEAN CLAY (CL), soft, gray, w/ shell fragments, sand pockets & seams		4			0.50	69.3	50.6				
			SILTY SAND (SM), medium dense, gray, w/ shell fragments	X	5		17							12.3
10			-w/ clay seams @ 13' - 14.5'	X	6		23							
15			-dense @ 18' - 22.5'	X	7		39							13.1
20			-w/ clay seams below 21'	X	8		49							
				X	9		14							
25														
30														

SWG 1836 BOR 08.18.919.GPJ TOLUNAY-WONG ENGINEERS.GDT 12/5/08

ENG FORM: SWG 1836 BOR

SUMMARY OF LABORATORY TESTS

Project No. 08.18.919

Client: United States Army Corps of Engineers

Project: Galveston Channel Extension - New Pelican Island PA
Contract No. DACW64-03-D-0008, Task Order No. 0078

Boring No.	Sample No.	Depth (ft)	Torvane Shear Test (tsf)	Soil Description	USCS	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plast. Index	Finer than #200 Sieve (%)	Uc/UU. Compr. (tsf)	Failure Strain (%)	Conf. Pres. (psi)	Failure Type
08-74															
	1	0-2		Tan and gray FAT CLAY; grass roots and shell fragments	CH	23.7	95.8								
	2	2-4		Tan and gray SANDY LEAN CLAY; shell fragments	CL	16.3	105.0	48	19	29	61.9	2.44	3.4		Vertical shear
	3	4-6		Gray poorly graded GRAVEL	GP	3.8									
	4	6-8		Gray FAT CLAY	CH	34.4									
	5	8-10	0.15	Dark gray FAT CLAY; sand seams	CH	83.2	52.3	90	31	59	94.9	0.20	3.8		45 degree
	6	10-12		Gray and tan SILTY SAND; shell fragments and clay seams	SM						20.1				
	7	15-16.5		Gray SILTY SAND; clay seams	SM										
	8	20-21.5		Gray and tan SILTY SAND; shell fragments and clay seams	SM						18.0				
	9	23.5-25		Gray SILTY SANDY; clay seams	SM										
08-75															
	1	0-2		Gray and tan FAT CLAY	CH	21.4	94.8								
	2	2-4		Tan and gray LEAN CLAY; sand pockets	CL	30.2	88.1								
	3	4-6		Gray and tan SANDY FAT CLAY; sand seams	CH	32.5	87.8	58	21	37	57.7	0.71	7.5	3.5	Vertical shear
	4	6-8		Gray and tan LEAN CLAY; sand pockets	CL	50.6	69.3								
	5	8-9.5		Gray SILTY SAND; shell fragments	SM						12.3				
	6	13-14.5		Gray SILTY SAND; shells and clay seams	SM										
	7	18-19.5		Gray SILTY SAND; shell fragments	SM						13.1				
	8	21-23.5		Gray SILTY SAND; shells and clay seams	SM										
	9	23.5-25		Gray SILTY SAND; shells	SM										
08-76															
	1	0-2		Tan SILTY SAND; clay seams and shell fragments	SM						12.7				
	2	2-4		Tan SILTY SAND	SM	11.9									
	3	4-6		Gray SANDY FAT CLAY	CH	29.4	90.7	50	19	31	64.7				
	4	6-8		Gray and tan POORLY GRADED SAND with SILT; clay seams	SP-SM						10.7				
	5	11-12.5		Gray FAT CLAY; sand and shell fragments	CH										
	6	16-17.5		Gray and tan SILTY SAND; clay seams and shell fragments	SM						22.8				
	7	21-22.5		Gray and tan SILTY SAND; clay seams and shell fragments	SM										
	8	23.5-25		Gray SILTY SAND; clay seams and shell fragments	SM										
08-77															
	1	0-2		Gray LEAN CLAY with SAND; shell fragments and grass roots	CL	13.0	104.0								
	2	2-4		Tan and gray SILTY SAND; clay balls	SM						31.3				
	3	4-6		Gray and tan SILTY SAND; tree roots							19.7				
	4	6-8	0.13	Tan and gray FAT CLAY; sand seams	CH	46.1	76.3					0.22	3.2		Vertical shear
	5	8-9.5		Gray SILTY SAND	SM										
	6	13-14.5		Gray POORLY GRADED SAND with SILT; shell fragments	SP-SM						7.0				

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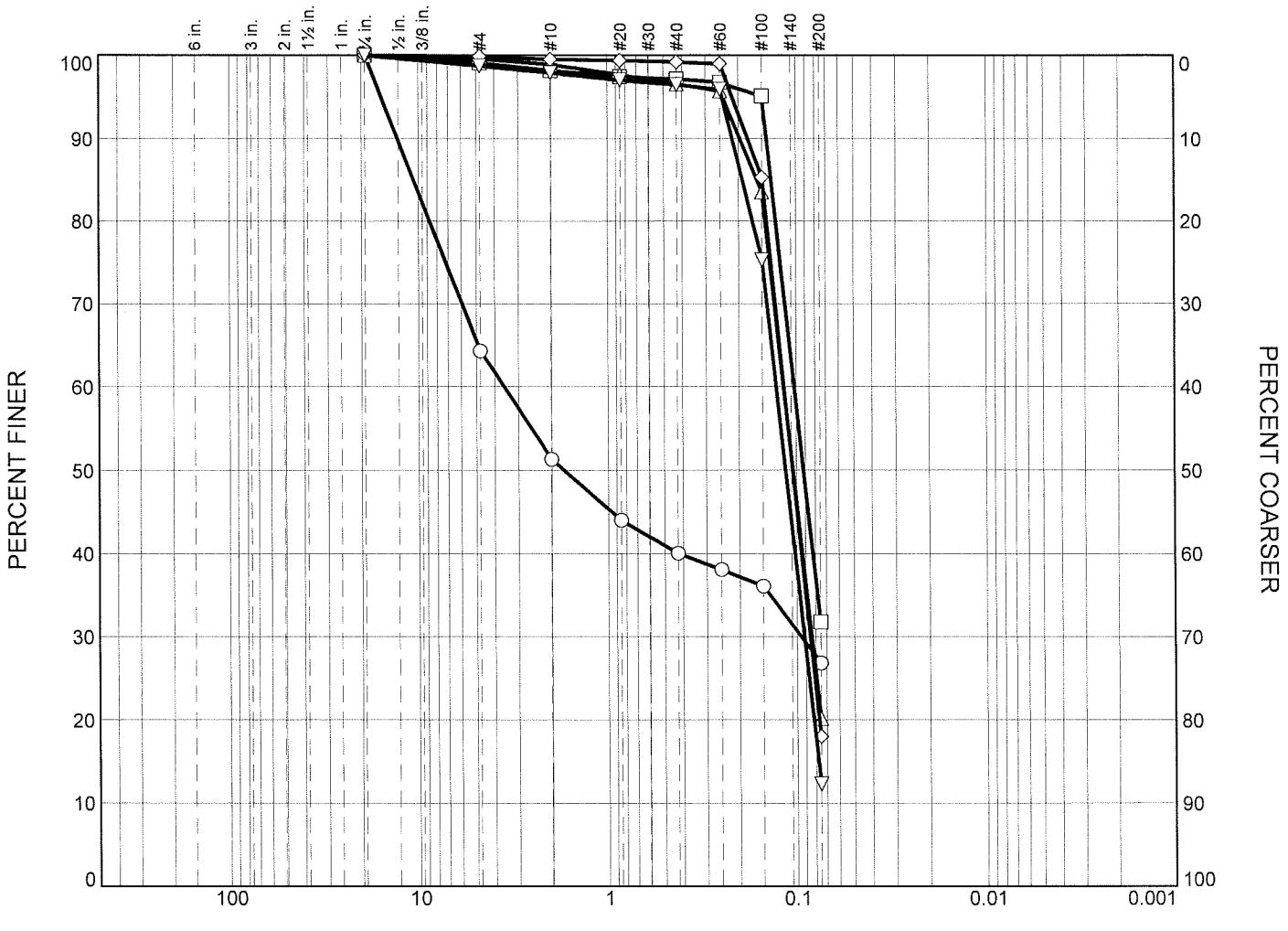
Particle Size Analysis - ASTM D 422



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	35.7	13.0	11.3	13.2	26.8	
□	0.0	0.0	0.9	0.9	1.0	65.5	31.7	
△	0.0	0.0	0.4	0.7	2.3	76.5	20.1	
◇	0.0	0.0	0.1	0.4	0.3	81.2	18.0	
▽	0.0	0.0	1.3	0.8	1.4	84.2	12.3	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	08-73	2	2-4	Gray and tan SILTY SAND; shells and clay seams	SM
□	08-73	8	17-18.5	Gray SILTY SAND; shells	SM
△	08-74	6	10-12	Gray and tan SILTY SAND; shell fragments and clay seams	SM
◇	08-74	8	20-21.5	Gray and tan SILTY SAND; shell fragments and clay seams	SM
▽	08-75	5	8-9.5	Gray SILTY SAND; shell fragments	SM

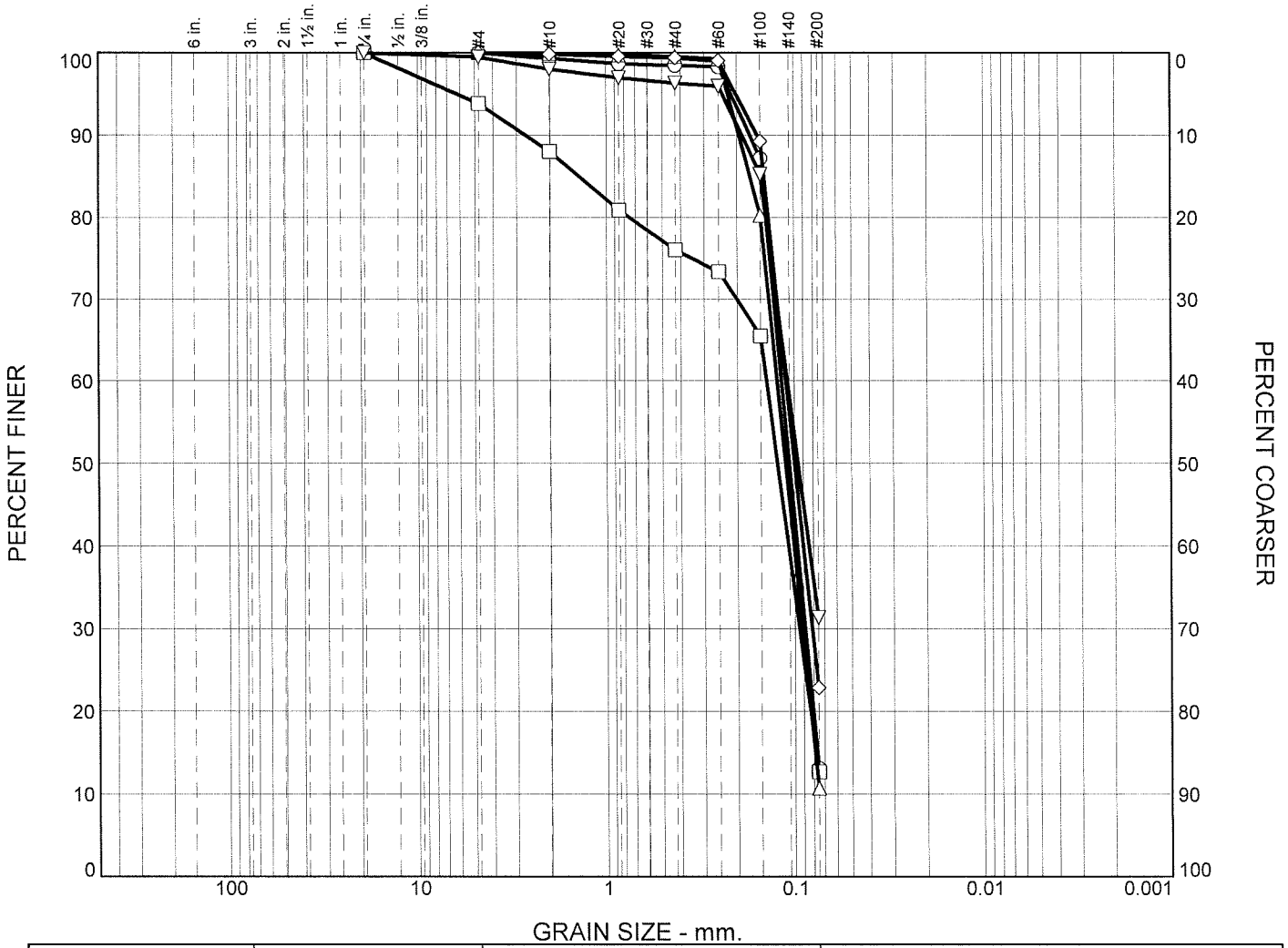
Tolunay-Wong Engineers, Inc.
Houston, Texas

Client: United States Army Corps of Engineers

Project: Galveston Channel Extension - New Pelican Island PA
Contract No. DACW64-03-D-0008, Task Order No. 0078

Project No.: 08.18.919

Particle Size Analysis - ASTM D 422



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.7	0.8	85.4	13.1	
□	0.0	0.0	6.2	5.8	12.0	63.3	12.7	
△	0.0	0.0	0.0	0.1	0.4	88.8	10.7	
◇	0.0	0.0	0.0	0.2	0.4	76.6	22.8	
▽	0.0	0.0	0.5	1.5	1.7	65.0	31.3	

SOIL DATA

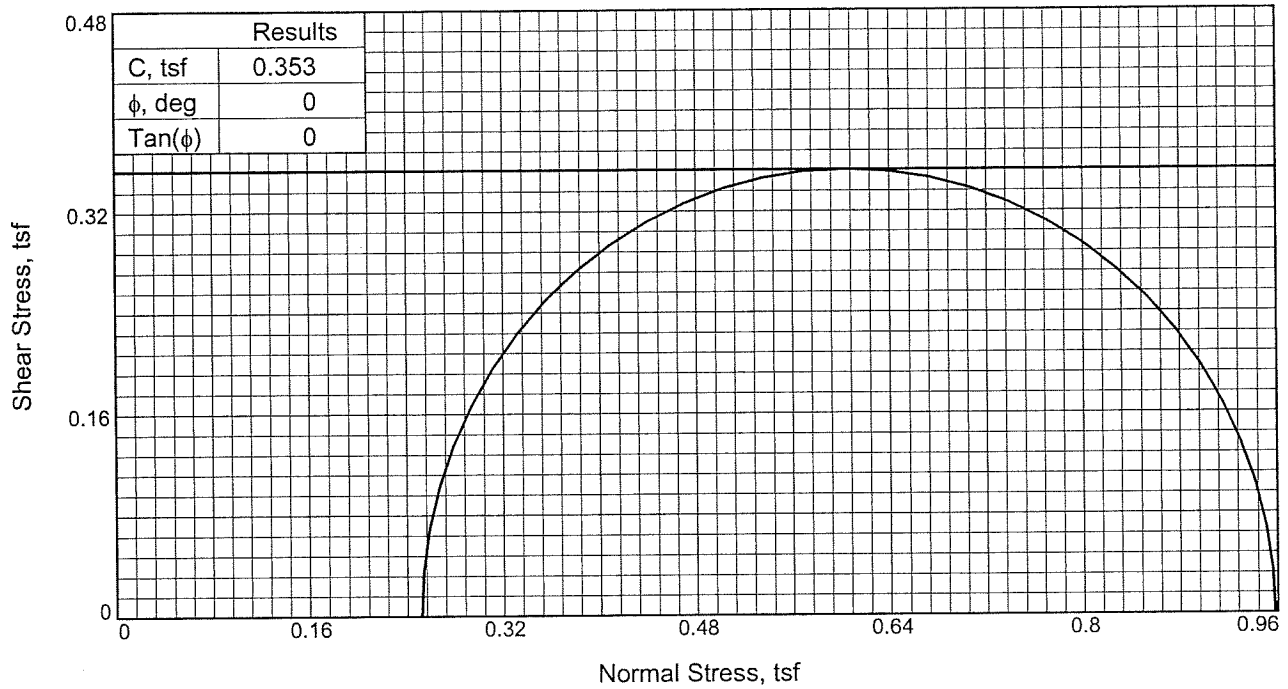
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	08-75	7	18-19.5	Gray SILTY SAND; shell fragments	SM
□	08-76	1	0-2	Tan SILTY SAND; clay seams and shell fragments	SM
△	08-76	4	6-8	Gray and tan POORLY GRADED SAND with SILT; clay seams	SP-SM
◇	08-76	6	16-17.5	Gray and tan SILTY SAND; clay seams and shell fragments	SM
▽	08-77	2	2-4	Tan and gray SILTY SAND; clay balls	SM

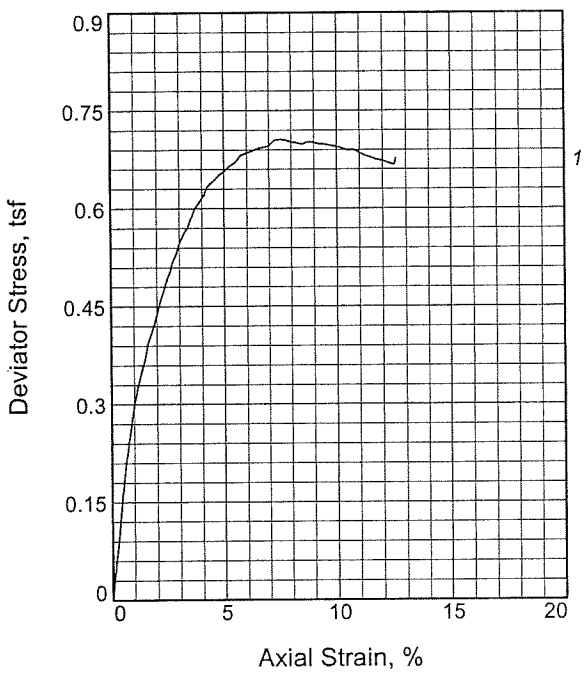
Tolunay-Wong Engineers, Inc.
Houston, Texas

Client: United States Army Corps of Engineers

Project: Galveston Channel Extension - New Pelican Island PA
Contract No. DACW64-03-D-0008, Task Order No. 0078

Project No.: 08.18.919





Sample No.		1
Initial	Water Content, %	32.5
	Dry Density, pcf	87.9
	Saturation, %	95.5
	Void Ratio	0.9181
	Diameter, in.	2.80
	Height, in.	5.98
At Test	Water Content, %	29.4
	Dry Density, pcf	87.9
	Saturation, %	86.3
	Void Ratio	0.9181
	Diameter, in.	2.80
	Height, in.	5.98
Strain rate, %/min.		1.00
Back Pressure, tsf		0.00
Cell Pressure, tsf		0.25
Fail. Stress, tsf		0.71
Ult. Stress, tsf		
σ_1 Failure, tsf		0.96
σ_3 Failure, tsf		0.25

Type of Test:
Unconsolidated Undrained

Sample Type: Undisturbed

Description: Gray and tan SANDY FAT CLAY; sand seams

LL= 58 **PL=** 21 **PI=** 37

Assumed Specific Gravity= 2.70

Remarks:
Test method: ASTM D 2166
Torvane; tsf: 0.55
Failure type: Vertical shear

Figure _____

Client: United States Army Corps of Engineers

Project: Galveston Channel Extension - New Pelican Island PA
Contract No. DACW64-03-D-0008, Task Order No. 0078

Source of Sample: 08-75 **Depth:** 4-6

Sample Number: 3

Proj. No.: 08.18.919 **Date Sampled:** 10/29/08

TRIAXIAL SHEAR TEST REPORT

Tolunay-Wong Engineers, Inc.

TRIAXIAL COMPRESSION TEST

Unconsolidated Undrained

10/30/2008
4:47 PM

Date: 10/29/08
Client: United States Army Corps of Engineers
Project: Galveston Channel Extension - New Pelican Island PA
Contract No. DACW64-03-D-0008, Task Order No. 0078
Project No.: 08.18.919
Location: 08-75
Depth: 4-6 **Sample Number:** 3
Description: Gray and tan SANDY FAT CLAY; sand seams
Remarks:
Test method: ASTM D 2166
Torvane; tsf: 0.55
Failure type: Vertical shear
Type of Sample: Undisturbed
Assumed Specific Gravity=2.70 **LL=**58 **PL=**21 **PI=**37
Test Method: ASTM D 2850

Parameters for Specimen No. 1

Specimen Parameter	Initial	Final
Moisture content: Moist soil+tare, gms.	154.820	124.460
Moisture content: Dry soil+tare, gms.	124.640	103.110
Moisture content: Tare, gms.	31.660	30.380
Moisture, %	32.5	29.4
Moist specimen weight, gms.	1125.6	
Diameter, in.	2.80	
Area, in.^{2}	6.16	
Height, in.	5.98	
Wet Density, pcf	116.4	
Dry density, pcf	87.9	
Void ratio	0.9181	
Saturation, %	95.5	

Test Readings for Specimen No. 1

Membrane modulus = .130 kN/cm^2
Membrane thickness = .031 cm
Cell pressure = 3.50 psi (0.252 tsf)
Back pressure = 0.00 psi (0.000 tsf)
Strain rate, %/min. = 1.00
Fail. Stress = 0.706 tsf **at reading no.** 62

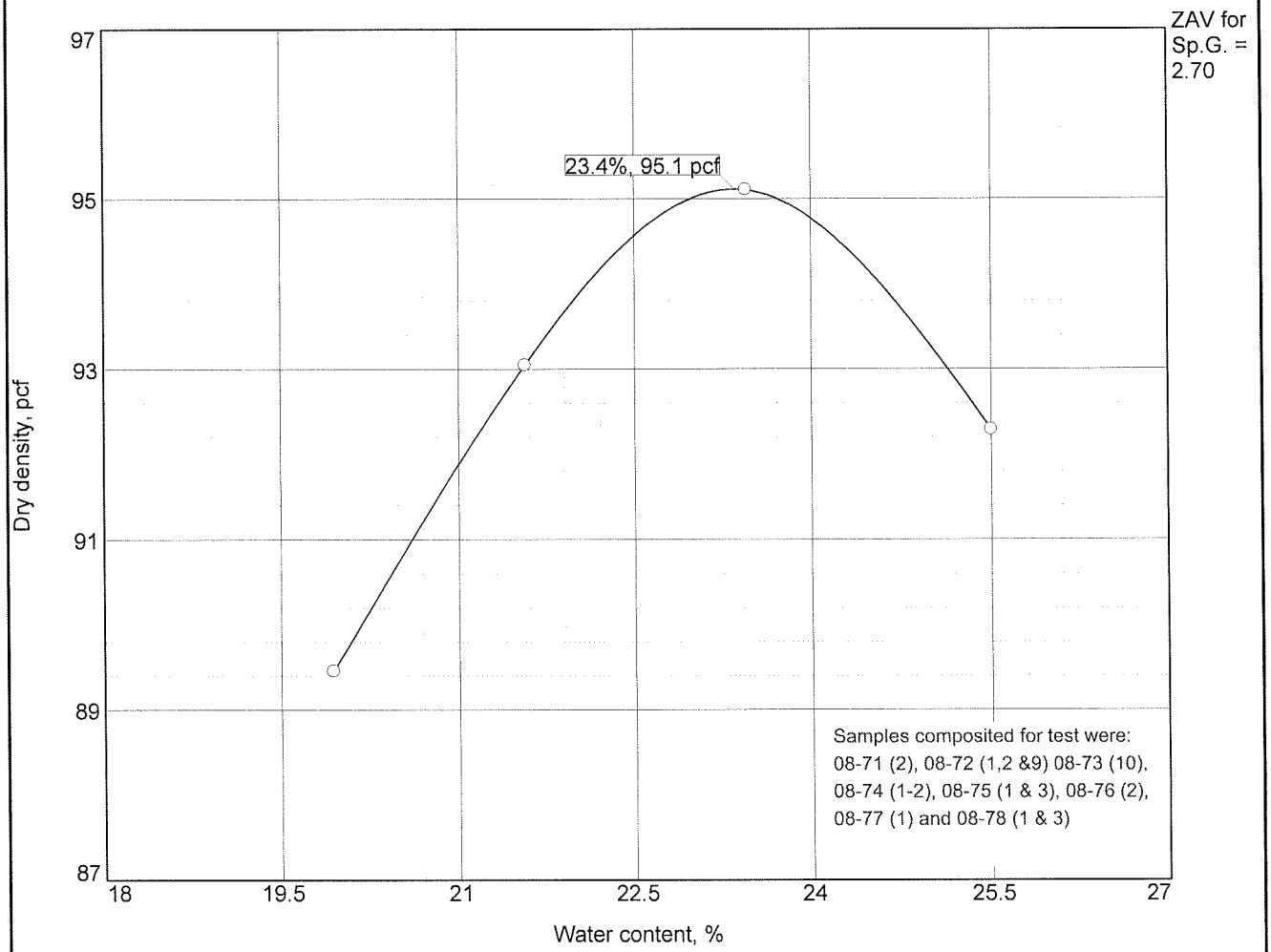
Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Princ. Stress tsf	Major Princ. Stress tsf	1:3 Ratio	P tsf	Q tsf
0	0.0709	0.000	0.0	0.0	0.000	0.252	0.252	1.00	0.252	0.000
1	0.0809	5.071	5.1	0.2	0.059	0.252	0.311	1.23	0.282	0.030
2	0.0838	6.150	6.2	0.2	0.072	0.252	0.324	1.28	0.288	0.036
3	0.0872	7.330	7.3	0.3	0.085	0.252	0.337	1.34	0.295	0.043
4	0.0884	8.113	8.1	0.3	0.095	0.252	0.347	1.38	0.299	0.047
5	0.0897	8.887	8.9	0.3	0.104	0.252	0.356	1.41	0.304	0.052
6	0.0917	10.055	10.1	0.3	0.117	0.252	0.369	1.46	0.311	0.059
7	0.0930	10.980	11.0	0.4	0.128	0.252	0.380	1.51	0.316	0.064
8	0.0962	12.603	12.6	0.4	0.147	0.252	0.399	1.58	0.325	0.073
9	0.0975	13.634	13.6	0.4	0.159	0.252	0.411	1.63	0.331	0.079
10	0.1008	14.559	14.6	0.5	0.169	0.252	0.421	1.67	0.337	0.085
11	0.1021	15.692	15.7	0.5	0.183	0.252	0.435	1.72	0.343	0.091
12	0.1054	16.919	16.9	0.6	0.197	0.252	0.449	1.78	0.350	0.098
13	0.1087	18.376	18.4	0.6	0.214	0.252	0.466	1.85	0.359	0.107
14	0.1112	19.092	19.1	0.7	0.222	0.252	0.474	1.88	0.363	0.111
15	0.1133	19.886	19.9	0.7	0.231	0.252	0.483	1.92	0.367	0.115
16	0.1145	20.617	20.6	0.7	0.239	0.252	0.491	1.95	0.372	0.120
17	0.1179	21.504	21.5	0.8	0.249	0.252	0.501	1.99	0.377	0.125
18	0.1204	22.422	22.4	0.8	0.260	0.252	0.512	2.03	0.382	0.130
19	0.1237	23.530	23.5	0.9	0.273	0.252	0.525	2.08	0.388	0.136
20	0.1270	24.545	24.5	0.9	0.284	0.252	0.536	2.13	0.394	0.142
21	0.1296	25.320	25.3	1.0	0.293	0.252	0.545	2.16	0.399	0.147
22	0.1316	26.001	26.0	1.0	0.301	0.252	0.553	2.19	0.402	0.150
23	0.1362	26.975	27.0	1.1	0.312	0.252	0.564	2.24	0.408	0.156
24	0.1388	27.765	27.8	1.1	0.321	0.252	0.573	2.27	0.412	0.160
25	0.1479	29.743	29.7	1.3	0.343	0.252	0.595	2.36	0.424	0.172
26	0.1543	30.901	30.9	1.4	0.356	0.252	0.608	2.41	0.430	0.178
27	0.1601	32.073	32.1	1.5	0.369	0.252	0.621	2.47	0.437	0.185
28	0.1665	34.060	34.1	1.6	0.392	0.252	0.644	2.56	0.448	0.196
29	0.1780	35.814	35.8	1.8	0.411	0.252	0.663	2.63	0.458	0.206
30	0.1846	36.972	37.0	1.9	0.424	0.252	0.676	2.68	0.464	0.212
31	0.1903	38.025	38.0	2.0	0.436	0.252	0.688	2.73	0.470	0.218
32	0.1961	39.175	39.2	2.1	0.448	0.252	0.700	2.78	0.476	0.224
33	0.2026	40.372	40.4	2.2	0.462	0.252	0.714	2.83	0.483	0.231
34	0.2083	41.157	41.2	2.3	0.470	0.252	0.722	2.87	0.487	0.235
35	0.2147	42.329	42.3	2.4	0.483	0.252	0.735	2.92	0.494	0.242
36	0.2205	43.368	43.4	2.5	0.494	0.252	0.746	2.96	0.499	0.247
37	0.2269	44.114	44.1	2.6	0.502	0.252	0.754	2.99	0.503	0.251
38	0.2326	45.427	45.4	2.7	0.517	0.252	0.769	3.05	0.510	0.258
39	0.2449	46.982	47.0	2.9	0.533	0.252	0.785	3.12	0.519	0.267
40	0.2507	48.121	48.1	3.0	0.546	0.252	0.798	3.17	0.525	0.273
41	0.2629	49.638	49.6	3.2	0.562	0.252	0.814	3.23	0.533	0.281
42	0.2751	50.651	50.7	3.4	0.572	0.252	0.824	3.27	0.538	0.286
43	0.2808	51.692	51.7	3.5	0.583	0.252	0.835	3.31	0.544	0.292
44	0.2872	52.384	52.4	3.6	0.590	0.252	0.842	3.34	0.547	0.295
45	0.2930	53.236	53.2	3.7	0.599	0.252	0.851	3.38	0.552	0.300
46	0.3052	54.381	54.4	3.9	0.611	0.252	0.863	3.42	0.557	0.305

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Princ. Stress tsf	Major Princ. Stress tsf	1:3 Ratio	P tsf	Q tsf
47	0.3173	55.362	55.4	4.1	0.621	0.252	0.873	3.46	0.562	0.310
48	0.3237	56.456	56.5	4.2	0.632	0.252	0.884	3.51	0.568	0.316
49	0.3359	57.165	57.2	4.4	0.639	0.252	0.891	3.54	0.571	0.319
50	0.3475	57.806	57.8	4.6	0.645	0.252	0.897	3.56	0.574	0.322
51	0.3598	58.619	58.6	4.8	0.652	0.252	0.904	3.59	0.578	0.326
52	0.3720	59.166	59.2	5.0	0.657	0.252	0.909	3.61	0.581	0.329
53	0.3836	59.944	59.9	5.2	0.664	0.252	0.916	3.64	0.584	0.332
54	0.3991	60.649	60.6	5.5	0.670	0.252	0.922	3.66	0.587	0.335
55	0.4138	61.764	61.8	5.7	0.681	0.252	0.933	3.70	0.592	0.340
56	0.4292	62.251	62.3	6.0	0.684	0.252	0.936	3.72	0.594	0.342
57	0.4439	62.681	62.7	6.2	0.687	0.252	0.939	3.73	0.596	0.344
58	0.4587	63.207	63.2	6.5	0.691	0.252	0.943	3.74	0.598	0.346
59	0.4741	63.558	63.6	6.7	0.693	0.252	0.945	3.75	0.599	0.347
60	0.4889	63.909	63.9	7.0	0.695	0.252	0.947	3.76	0.600	0.348
61	0.5042	64.853	64.9	7.2	0.703	0.252	0.955	3.79	0.604	0.352
62	0.5189	65.238	65.2	7.5	0.706	0.252	0.958	3.80	0.605	0.353
63	0.5343	65.382	65.4	7.7	0.705	0.252	0.957	3.80	0.605	0.353
64	0.5490	65.224	65.2	8.0	0.702	0.252	0.954	3.78	0.603	0.351
65	0.5638	65.278	65.3	8.2	0.700	0.252	0.952	3.78	0.602	0.350
66	0.5792	65.246	65.2	8.5	0.698	0.252	0.950	3.77	0.601	0.349
67	0.5940	65.761	65.8	8.7	0.702	0.252	0.954	3.78	0.603	0.351
68	0.6093	65.869	65.9	9.0	0.701	0.252	0.953	3.78	0.602	0.350
69	0.6240	65.857	65.9	9.2	0.699	0.252	0.951	3.77	0.601	0.349
70	0.6393	65.983	66.0	9.5	0.698	0.252	0.950	3.77	0.601	0.349
71	0.6540	65.947	65.9	9.7	0.696	0.252	0.948	3.76	0.600	0.348
72	0.6694	66.024	66.0	10.0	0.695	0.252	0.947	3.76	0.599	0.347
73	0.6841	65.979	66.0	10.2	0.692	0.252	0.944	3.75	0.598	0.346
74	0.6995	65.822	65.8	10.5	0.689	0.252	0.941	3.73	0.596	0.344
75	0.7143	66.146	66.1	10.8	0.690	0.252	0.942	3.74	0.597	0.345
76	0.7290	65.914	65.9	11.0	0.686	0.252	0.938	3.72	0.595	0.343
77	0.7445	65.603	65.6	11.3	0.681	0.252	0.933	3.70	0.592	0.340
78	0.7580	65.527	65.5	11.5	0.678	0.252	0.930	3.69	0.591	0.339
79	0.7741	65.369	65.4	11.8	0.675	0.252	0.927	3.68	0.589	0.337
80	0.7895	65.401	65.4	12.0	0.673	0.252	0.925	3.67	0.588	0.336
81	0.8042	65.281	65.3	12.3	0.670	0.252	0.922	3.66	0.587	0.335
82	0.8196	65.160	65.2	12.5	0.667	0.252	0.919	3.65	0.585	0.333
83	0.8228	66.119	66.1	12.6	0.676	0.252	0.928	3.68	0.590	0.338

COMPACTION TEST REPORT



Test specification: ASTM D 698-07 Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	CH			2.70				

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 95.1 pcf Optimum moisture = 23.4 %	Dark Brown FAT CLAY

Project No. 08.18.919 **Client:** United States Army Corps of Engineers
Project: Galveston Channel Extension - New Pelican Island PA
Contract No. DACW64-03-D-0008, Task Order No. 0078 **Date:** 11/20/08
Source of Sample: Mix-1

Remarks:
Preparation Method: Dry
Specific Gravity: Assumed

Tolunay-Wong Engineers, Inc.

Houston, Texas

Tested By: SV **Checked By:** JL