Hole No. 07-197

BORING LOG	DISTRICT	INSTALLATION	SHEET 1 OF 2 SHEETS

1. PROJECT Galveston Channel and Pelican Island PA	7. ELEVATION OF HOLE
2. LOCATION (Coordinates or Station) N=13696460 E=3300628	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 40 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)
			LEAN CLAY WITH SAND(CL), very stiff, gray, w/ roots		1			3.00	89.3	27.7	79	24	55	97.4
			FAT CLAY(CH), very soft to stiff, brown & gray		2			1.75	78.0	37.9				
5			-gray & tan w/ calcareous nodules @ 4' - 6'		3			1.25	72.1	48.8				
			-reddish brown w/ shell fragments @ 6' - 12'		4			0.75	82.1	34.6	96	28	68	95.8
			-w/ calcareous nodules @ 8' - 10'		5			1.50	85.2	36.6				
10					6			2.00	84.3	37.1				
			-w/ slickensides @ 12' - 16'		7			0.25	60.1	67.8	110	28	82	99.2
			-w/ shell fragments @ 14' - 16'		8			0.50	64.6	58.0				
15			-gray w/ organics @ 16' - 18'		9			0.25	58.1	74.2				
			SANDY LEAN CLAY(CL), very soft, gray, w/ ferrous nodules		10			0.00	90.4	30.7	40	20	20	56.1
20			**SANDY SILTY CLAY(CL-ML)**, very soft, gray & tan, w/ sand seams		11			0.00	101.9	30.5				
			CLAYEY SAND(SC), very loose, gray, w/ shell fragments		12		2			28.7				
			LEAN CLAY WITH SAND(CL), very soft, gray, w/ sand seams & shell fragments		13			0.00	76.3	32.8	40	20	20	93.1
25			**SILTY SAND(SM)**, very dense, gray, w/ shell fragments		14			0.00		30.0				
					15		55							30.6
30														
			POORLY GRADED SAND WITH SILT(SP-SM), very dense, gray & tan, w/ shell fragments		16		71							6.6

SWG 1836 BOR 08.18.918.GPJ TOLUNAY-WONG ENGINEERS.GDT 10/2/08

ENG FORM: SWG 1836 BOR

Hole No. 07-197

BORING LOG	DISTRICT	INSTALLATION	SHEET 2 OF 2 SHEETS

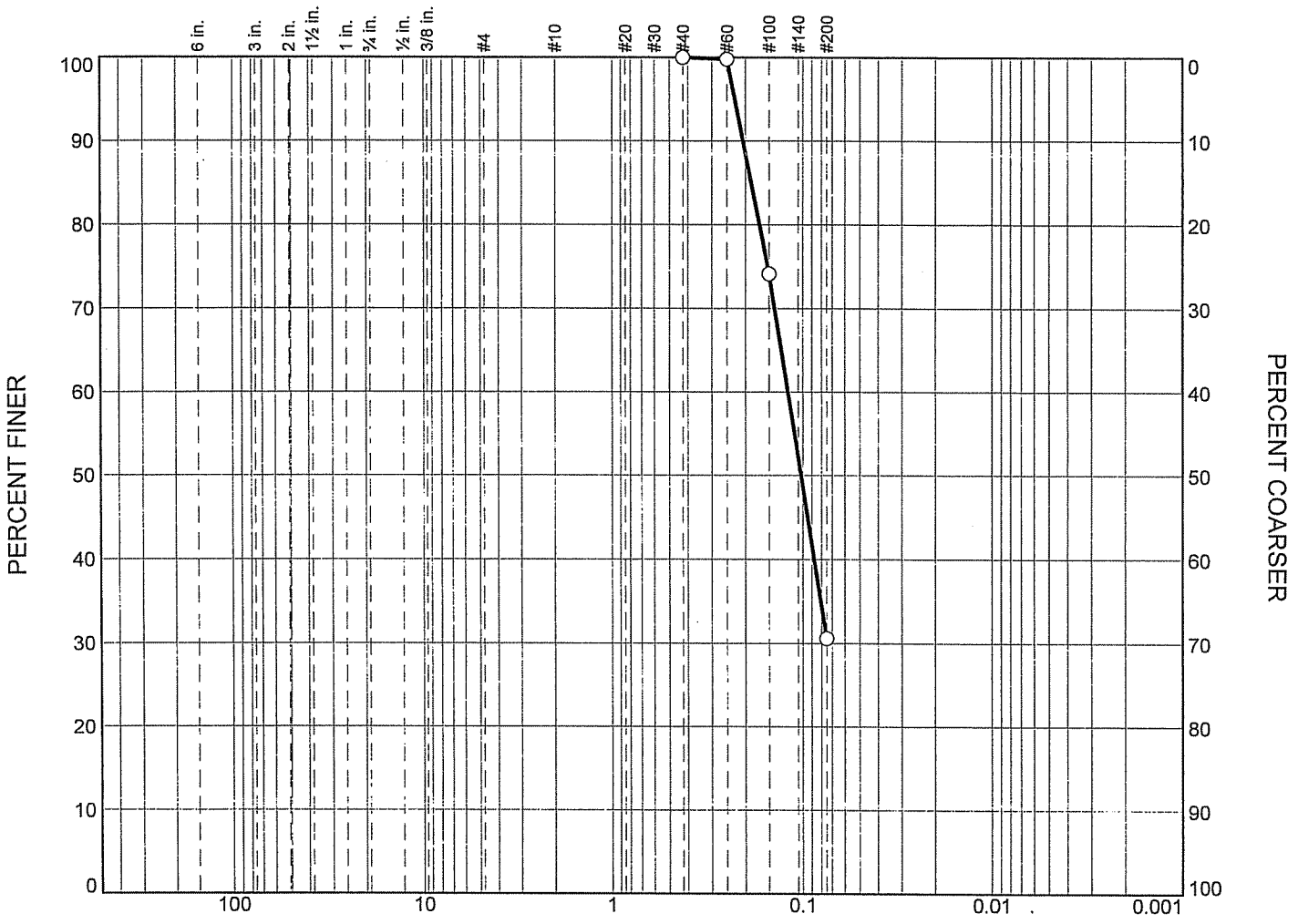
1. PROJECT Galveston Channel and Pelican Island PA	7. ELEVATION OF HOLE
2. LOCATION (Coordinates or Station) N=13696460 E=3300628	8. DATUM FOR ELEVATION
3. DRILLING AGENCY Dempsey (Geotest Engineering, Inc.)	9. ELEVATION OF GROUNDWATER ▽ TOD: ▼ 24-HR:
4. LABORATORY TESTING AGENCY Tolunay-Wong Engineers, Inc.	10. DRILLING DATE and TIME STARTED: COMPLETED:
5. DEPTH OF WATER ▽ TOD: ▼ 24-HR:	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 40 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)
			LEAN CLAY WITH SAND(CL), very soft, gray, w/ shell fragments		17			0.25	92.4	28.5	42	18	24	82.7
			SANDY SILTY CLAY(CL-ML), firm, gray, w/ sand seams & ferrous nodules		18			0.75	96.4	24.1				
40														
45														
50														
55														
60														
65														

SWG 1836 BOR 08.18.918.GPJ TOLUNAY-WONG ENGINEERS.GDT 10/2/08

ENG FORM: SWG 1836 BOR

Particle Size Analysis - ASTM D 422



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	0.0	69.4	30.6	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	07-197	15	27.5-29	Gray and tan SILTY SAND; shell fragments	SM

Tolunay-Wong Engineers, Inc.
Houston, Texas

Client: United States Army Corps of Engineers

Project: Galveston Channel and Pelican Island PA
Contract No. DACW64-03-D-0008, Task Order No. 0077

Project No.: 08.18.918

GRAIN SIZE DISTRIBUTION TEST DATA

7/22/2008

Client: United States Army Corps of Engineers
Project: Galveston Channel and Pelican Island PA
Contract No. DACW64-03-D-0008, Task Order No. 0077
Project Number: 08.18.918
Location: 07-197
Depth: 27.5-29 **Sample Number:** 15
Material Description: Gray and tan SILTY SAND; shell fragments
USCS: SM

Sieve Test Data

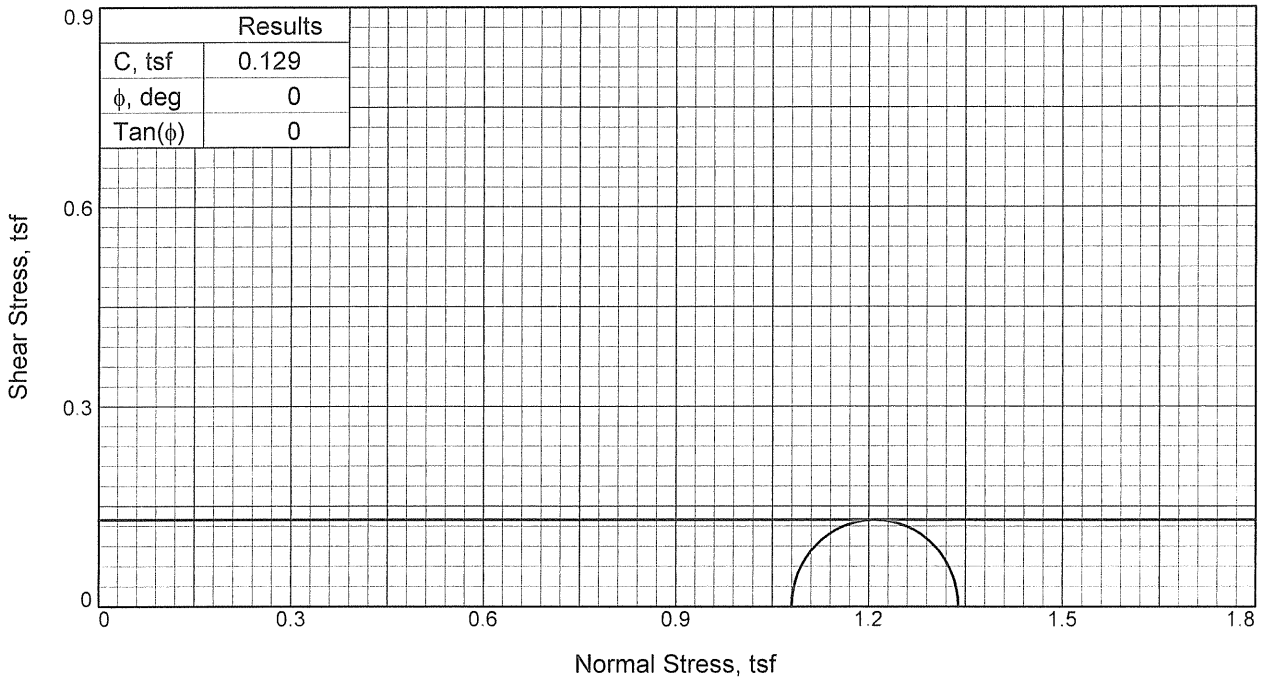
Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
301.09	217.30	217.30	3"		
			0.75"		
			#4		
			#10		
			#20		
			#40	217.30	100.0
			#60	217.47	99.8
			#100	238.97	74.1
			#200	275.48	30.6

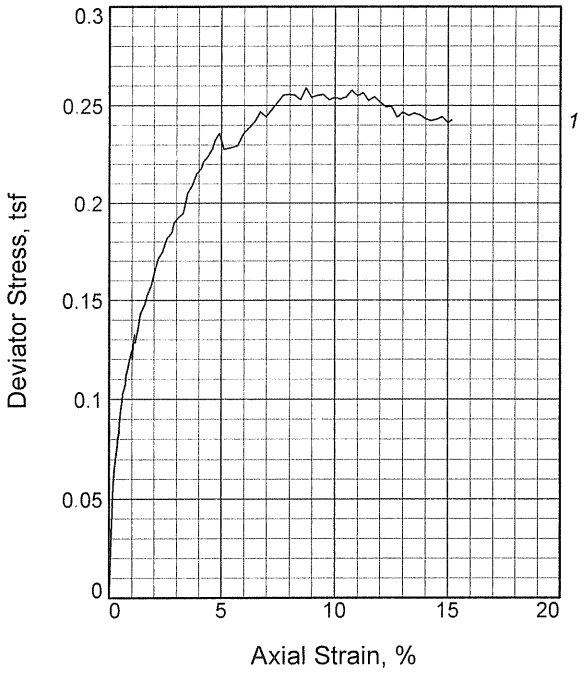
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.0	0.0	69.4	69.4			30.6

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.1022	0.1198	0.1686	0.1862	0.2057	0.2272

Fineness Modulus
0.26





Sample No.		1
Initial	Water Content, %	32.8
	Dry Density, pcf	76.3
	Saturation, %	73.3
	Void Ratio	1.2083
	Diameter, in.	2.80
	Height, in.	6.00
At Test	Water Content, %	68.3
	Dry Density, pcf	76.3
	Saturation, %	152.5
	Void Ratio	1.2083
	Diameter, in.	2.80
	Height, in.	6.00
Strain rate, %/min.		1.00
Back Pressure, tsf		0.00
Cell Pressure, tsf		1.08
Fail. Stress, tsf		0.26
Ult. Stress, tsf		
σ_1 Failure, tsf		1.34
σ_3 Failure, tsf		1.08

Type of Test:
Unconsolidated Undrained

Sample Type: Undisturbed

Description: Gray LEAN CLAY

LL= 40 **PL=** 20 **PI=** 20

Assumed Specific Gravity= 2.70

Remarks:
Test method: ASTM D 2850
Pocket pen; tsf: 0.75
Failure type: 60 degree

Client: United States Army Corps of Engineers

Project: Galveston Channel and Pelican Island PA
Contract No. DACW64-03-D-0008, Task Order No. 0077

Source of Sample: 07-197 **Depth:** 23.5-25.5

Sample Number: 13

Proj. No.: 08.18.918 **Date Sampled:** 7/19/08

TRIAXIAL SHEAR TEST REPORT

Tolunay-Wong Engineers, Inc.

TRIAXIAL COMPRESSION TEST

Unconsolidated Undrained

10/17/2008
9:52 AM

Date: 7/19/08
Client: United States Army Corps of Engineers
Project: Galveston Channel and Pelican Island PA
Contract No. DACW64-03-D-0008, Task Order No. 0077
Project No.: 08.18.918
Location: 07-197
Depth: 23.5-25.5 **Sample Number:** 13
Description: Gray LEAN CLAY
Remarks:
Test method: ASTM D 2850
Pocket pen; tsf: 0.75
Failure type: 60 degree
Type of Sample: Undisturbed
Assumed Specific Gravity=2.70 **LL=**40 **PL=**20 **PI=**20
Test Method: ASTM D 2850

Parameters for Specimen No. 1

Specimen Parameter	Initial	Final
Moisture content: Moist soil+tare, gms.	138.310	96.030
Moisture content: Dry soil+tare, gms.	112.000	69.940
Moisture content: Tare, gms.	31.750	31.720
Moisture, %	32.8	68.3
Moist specimen weight, gms.	982.1	
Diameter, in.	2.80	
Area, in.²	6.16	
Height, in.	6.00	
Wet Density, pcf	101.4	
Dry density, pcf	76.3	
Void ratio	1.2083	
Saturation, %	73.3	

Test Readings for Specimen No. 1

Membrane modulus = .130 kN/cm²
Membrane thickness = .031 cm
Cell pressure = 15.00 psi (1.080 tsf)
Back pressure = 0.00 psi (0.000 tsf)
Strain rate, %/min. = 1.00
Fail. Stress = 0.259 tsf **at reading no.** 58

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	0.0290	0.000	0.0	0.0	0.000	1.080	1.080	1.00	1.080	0.000
1	0.0378	4.457	4.5	0.1	0.052	1.080	1.132	1.05	1.106	0.026
2	0.0396	5.014	5.0	0.2	0.059	1.080	1.139	1.05	1.109	0.029
3	0.0422	5.524	5.5	0.2	0.064	1.080	1.144	1.06	1.112	0.032
4	0.0455	6.024	6.0	0.3	0.070	1.080	1.150	1.07	1.115	0.035
5	0.0500	6.550	6.6	0.4	0.076	1.080	1.156	1.07	1.118	0.038
6	0.0513	6.844	6.8	0.4	0.080	1.080	1.160	1.07	1.120	0.040
7	0.0546	7.195	7.2	0.4	0.084	1.080	1.164	1.08	1.122	0.042
8	0.0559	7.545	7.5	0.4	0.088	1.080	1.168	1.08	1.124	0.044
9	0.0592	8.085	8.1	0.5	0.094	1.080	1.174	1.09	1.127	0.047
10	0.0625	8.485	8.5	0.6	0.099	1.080	1.179	1.09	1.129	0.049
11	0.0651	8.871	8.9	0.6	0.103	1.080	1.183	1.10	1.132	0.052
12	0.0717	9.247	9.2	0.7	0.107	1.080	1.187	1.10	1.134	0.054
13	0.0730	9.590	9.6	0.7	0.111	1.080	1.191	1.10	1.136	0.056
14	0.0789	9.989	10.0	0.8	0.116	1.080	1.196	1.11	1.138	0.058
15	0.0822	10.288	10.3	0.9	0.119	1.080	1.199	1.11	1.140	0.060
16	0.0881	10.730	10.7	1.0	0.124	1.080	1.204	1.12	1.142	0.062
17	0.0901	10.379	10.4	1.0	0.120	1.080	1.200	1.11	1.140	0.060
18	0.0914	10.913	10.9	1.0	0.126	1.080	1.206	1.12	1.143	0.063
19	0.0960	11.464	11.5	1.1	0.133	1.080	1.213	1.12	1.146	0.066
20	0.0973	11.103	11.1	1.1	0.128	1.080	1.208	1.12	1.144	0.064
21	0.1051	11.739	11.7	1.3	0.136	1.080	1.216	1.13	1.148	0.068
22	0.1109	12.376	12.4	1.4	0.143	1.080	1.223	1.13	1.151	0.071
23	0.1231	12.837	12.8	1.6	0.148	1.080	1.228	1.14	1.154	0.074
24	0.1295	13.222	13.2	1.7	0.152	1.080	1.232	1.14	1.156	0.076
25	0.1411	13.719	13.7	1.9	0.157	1.080	1.237	1.15	1.159	0.079
26	0.1533	14.552	14.6	2.1	0.167	1.080	1.247	1.15	1.163	0.083
27	0.1597	14.959	15.0	2.2	0.171	1.080	1.251	1.16	1.166	0.086
28	0.1718	15.319	15.3	2.4	0.175	1.080	1.255	1.16	1.167	0.087
29	0.1840	15.956	16.0	2.6	0.182	1.080	1.262	1.17	1.171	0.091
30	0.1962	16.241	16.2	2.8	0.185	1.080	1.265	1.17	1.172	0.092
31	0.2020	16.714	16.7	2.9	0.190	1.080	1.270	1.18	1.175	0.095
32	0.2142	16.990	17.0	3.1	0.193	1.080	1.273	1.18	1.176	0.096
33	0.2263	17.200	17.2	3.3	0.194	1.080	1.274	1.18	1.177	0.097
34	0.2327	17.701	17.7	3.4	0.200	1.080	1.280	1.19	1.180	0.100
35	0.2385	18.163	18.2	3.5	0.205	1.080	1.285	1.19	1.182	0.102
36	0.2508	18.579	18.6	3.7	0.209	1.080	1.289	1.19	1.185	0.105
37	0.2630	19.153	19.2	3.9	0.215	1.080	1.295	1.20	1.188	0.108
38	0.2751	19.421	19.4	4.1	0.218	1.080	1.298	1.20	1.189	0.109
39	0.2809	19.759	19.8	4.2	0.221	1.080	1.301	1.20	1.191	0.111
40	0.2931	20.049	20.0	4.4	0.224	1.080	1.304	1.21	1.192	0.112
41	0.3053	20.460	20.5	4.6	0.228	1.080	1.308	1.21	1.194	0.114
42	0.3111	20.829	20.8	4.7	0.232	1.080	1.312	1.21	1.196	0.116
43	0.3233	21.210	21.2	4.9	0.236	1.080	1.316	1.22	1.198	0.118
44	0.3355	21.605	21.6	5.1	0.228	1.080	1.308	1.21	1.194	0.114
45	0.3566	21.852	21.9	5.5	0.229	1.080	1.309	1.21	1.194	0.114
46	0.3714	22.048	22.0	5.7	0.230	1.080	1.310	1.21	1.195	0.115

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	0.3869	22.745	22.7	6.0	0.236	1.080	1.316	1.22	1.198	0.118
48	0.4016	23.110	23.1	6.2	0.239	1.080	1.319	1.22	1.199	0.119
49	0.4170	23.515	23.5	6.5	0.242	1.080	1.322	1.22	1.201	0.121
50	0.4317	24.076	24.1	6.7	0.247	1.080	1.327	1.23	1.203	0.123
51	0.4471	23.971	24.0	7.0	0.244	1.080	1.324	1.23	1.202	0.122
52	0.4618	24.439	24.4	7.2	0.248	1.080	1.328	1.23	1.204	0.124
53	0.4772	24.905	24.9	7.5	0.252	1.080	1.332	1.23	1.206	0.126
54	0.4920	25.349	25.3	7.7	0.255	1.080	1.335	1.24	1.208	0.128
55	0.5073	25.514	25.5	8.0	0.256	1.080	1.336	1.24	1.208	0.128
56	0.5221	25.597	25.6	8.2	0.255	1.080	1.335	1.24	1.208	0.128
57	0.5369	25.519	25.5	8.5	0.253	1.080	1.333	1.23	1.207	0.127
58	0.5523	26.200	26.2	8.7	0.259	1.080	1.339	1.24	1.209	0.129
59	0.5670	25.875	25.9	9.0	0.254	1.080	1.334	1.24	1.207	0.127
60	0.5824	26.090	26.1	9.2	0.255	1.080	1.335	1.24	1.208	0.128
61	0.5972	26.264	26.3	9.5	0.256	1.080	1.336	1.24	1.208	0.128
62	0.6126	26.147	26.1	9.7	0.253	1.080	1.333	1.23	1.206	0.126
63	0.6273	26.383	26.4	10.0	0.254	1.080	1.334	1.24	1.207	0.127
64	0.6421	26.435	26.4	10.2	0.253	1.080	1.333	1.23	1.207	0.127
65	0.6576	26.665	26.7	10.5	0.254	1.080	1.334	1.24	1.207	0.127
66	0.6723	27.130	27.1	10.7	0.258	1.080	1.338	1.24	1.209	0.129
67	0.6877	26.987	27.0	11.0	0.255	1.080	1.335	1.24	1.207	0.127
68	0.7025	27.274	27.3	11.2	0.257	1.080	1.337	1.24	1.208	0.128
69	0.7172	27.038	27.0	11.5	0.253	1.080	1.333	1.23	1.206	0.126
70	0.7327	27.345	27.3	11.7	0.254	1.080	1.334	1.24	1.207	0.127
71	0.7474	27.226	27.2	12.0	0.252	1.080	1.332	1.23	1.206	0.126
72	0.7628	27.116	27.1	12.2	0.249	1.080	1.329	1.23	1.205	0.125
73	0.7775	27.274	27.3	12.5	0.250	1.080	1.330	1.23	1.205	0.125
74	0.7929	26.884	26.9	12.7	0.244	1.080	1.324	1.23	1.202	0.122
75	0.8076	27.260	27.3	13.0	0.247	1.080	1.327	1.23	1.203	0.123
76	0.8231	27.243	27.2	13.2	0.245	1.080	1.325	1.23	1.203	0.123
77	0.8378	27.485	27.5	13.5	0.246	1.080	1.326	1.23	1.203	0.123
78	0.8532	27.546	27.5	13.7	0.245	1.080	1.325	1.23	1.203	0.123
79	0.8680	27.489	27.5	14.0	0.243	1.080	1.323	1.23	1.202	0.122
80	0.8827	27.523	27.5	14.2	0.242	1.080	1.322	1.22	1.201	0.121
81	0.8982	27.756	27.8	14.5	0.243	1.080	1.323	1.23	1.202	0.122
82	0.9130	28.006	28.0	14.7	0.244	1.080	1.324	1.23	1.202	0.122
83	0.9277	27.840	27.8	15.0	0.241	1.080	1.321	1.22	1.201	0.121
84	0.9375	28.068	28.1	15.2	0.243	1.080	1.323	1.22	1.201	0.121

SUMMARY OF LABORATORY TESTS

Project No. 08.18.918

Client: United States Army Corps of Engineers

Project: Galveston Channel and Pelican Island PA
Contract No. DACW64-03-D-0008, Task Order No. 0077

Boring No.	Sample No.	Depth (ft)	Soil Description	USCS	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plast. Index	Finer than #200 Sieve (%)	Lab Vane (tsf)	Uc/UU. Compr. (tsf)	Failure Strain (%)	Conf. Pres. (psi)	Failure Type
	21	40-42	Gray LEAN CLAY; sand seams	CL	48.4	68.8									
	22	42-43.5	Gray and tan POORLY GRADED SAND with SILT; shell fragments	SP-SM						11.7					
	23	47-48.5	Gray and tan POORLY GRADED SAND with SILT; shell fragments	SP-SM						8.4					
	24	48.5-50	Gray and tan CLAYEY SAND; shell fragments	SC											
07-197															
	1	0-2	Gray LEAN CLAY with SAND; grass roots	CL	27.7	89.3									
	2	2-4	Gray and brown FAT CLAY	CH	37.9	78.0	79	24	55	97.4		1.03	3.4		Vertical shear
	3	4-6	Gray and tan FAT CLAY; calcareous nodules	CH	48.8	72.1									
	4	6-8	Reddish-brown FAT CLAY	CH	34.6	82.1	96	28	68	95.8		0.92	5.0		60 degree
	5	8-10	Reddish-brown FAT CLAY; calcareous and ferrous nodules	CH	36.6	85.2									
	6	10-12	Reddish-brown FAT CLAY; shell fragments and organics	CH	37.1	84.3									
	7	12-14	Gray and brown FAT CLAY	CH	67.8	60.1	110	28	82	99.2		0.61	1.3		Slickensided
	8	14-16	Brown and gray FAT CLAY; shell fragments	CH	58.0	64.6						0.67	4.2		Slickensided
	9	16-18	Gray FAT CLAY; organics	CH	74.2	58.1									
	10	18-20	Gray SANDY LEAN CLAY; ferrous nodules	CL	30.7	90.4	40	20	20	56.1		0.34	5.4		Bulge
	11	20-22	Tan and gray SANDY SILTY CLAY	CL-ML	30.5	101.9									
	12	22-23.5	Gray CLAYEY SAND; shell fragments	SC	28.7										
	13	23.5-25.5	Gray LEAN CLAY	CL	32.8	76.3	40	20	20	93.1		0.26	8.7	15.0	60 degree
	14	25.5-27.5	Gray SILTY SAND; shell fragments	SM	30.0										
	15	27.5-29	Gray and tan SILTY SAND; shell fragments	SM						30.6					
	16	32.5-34	Gray and tan POORLY GRADED SAND with SILT; shell fragments	SP-SM						6.6					
	17	36-38	Gray LEAN CLAY with SAND; shell fragments	CL	28.5	92.4	42	18	24	82.7		0.49	9.2		Bulge
	18	38-40	Gray SANDY SILTY CLAY	CL-ML	24.1	96.4									
07-198															
	1	0-2	Gray FAT CLAY with SAND; tree roots	CH	25.5	94.3									
	2	2-4	Gray SANDY FAT CLAY	CH	35.1		93	29	64	68.8					
	3	4-5.5	Tan and gray SILTY SAND; grass roots	SM						18.3					
	4	9-10.5	Tan and gray SILTY SAND; shell fragments	SM						30.5					
	5	14-15.5	Tan and gray SILT with SAND; shell fragments	ML						76.3					
	6	19-20.5	Tan and gray SILTY SAND; shell fragments	SM						18.1					
	7	24-25.5	Tan and gray SILTY SAND; shell fragments	SM						19.1					
	8	29-30.5	Gray CLAYEY SAND; shell fragments	SC	29.1										
	9	30.5-32	Gray CLAYEY SAND; shell fragments	SC	29.3		27	18	9	46.5					
	10	32-33.5	Gray LEAN CLAY; shell fragments	CL	29.6										
	11	33.5-35	Gray FAT CLAY; shell fragments	CH	31.8										