SUMMARY OF LABORATORY TESTS

Project No. 08.18.920

Client: United States Army Corps of Engineers

Project: Galveston Channel and San Jacinto PA
Contract No. DACW64-03-D-0008, Task Order No. 0080

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
	9	18-20		Gray and tan FAT CLAY	CH	53.7	67.1								
07-204															
	1	0-2		Gray and tan FAT CLAY	CH	57.0	62.8								
	2	2-4		Gray FAT CLAY	CH	44.8	69.4	89	26	63	91.0	0.55	4.0		Slickensided
	3	4-6		Gray and tan FAT CLAY	CH	40.1	71.7					0.93	4.4	4.0	Vertical shear
	4	6-7.5		Light gray and tan poorly graded SAND with SILT	SP-SM						8.0				
	5	10-12		Gray FAT CLAY	CH	69.1	60.0								
	6	12-14	0.14	Gray FAT CLAY	CH	77.5	60.3	69	24	45	98.5				
	7	14-16		Gray FAT CLAY	CH	44.5	72.5								
	8	16-18		Gray FAT CLAY	CH	54.8	62.3								
	9	18-20		Gray FAT CLAY	CH	40.5	77.1								
07-205															
	1	0-2		Gray and tan FAT CLAY	CH	51.8	64.7								
	2	2-4		Gray FAT CLAY	CH	43.5	72.6	114	31	83	94.9	0.57	3.4		Multiple shear
	3	4-6		Gray and tan FAT CLAY	CH	48.7	71.5								
	4	6-7.5		Gray and tan SAND with SILT	SP-SM						7.2				
	5	11-12.5		Gray and tan FAT CLAY	CH	50.8									
	6	12.5-14	0.11	Gray FAT CLAY	CH	55.1	65.4	56	19	37	96.1				
	7	14-16		Gray FAT CLAY	CH	43.9	69.3								
	8	16-18		Gray and tan FAT CLAY	CH	45.4	72.3								
	9	18-20		Gray FAT CLAY	CH	34.4	79.8								
07-206															
	1	0-2		Gray and tan FAT CLAY	CH	55.9	64.9								
	2	2-4		Gray FAT CLAY	CH	51.8	67.4	98	30	68	95.9	0.34	2.6		Multiple shear
	3	4-6		Gray and tan FAT CLAY	CH	54.0	64.4					0.76	4.1	4.0	Multiple shear
	4	6-8		Gray and tan FAT CLAY	CH	55.3	66.8								
	5	8-9.5		Tan and gray SILTY SAND	SM						15.2				
	6	13-14.5		Gray SILTY SAND	SM						24.4				
	7	15-17	0.47	Gray FAT CLAY	CH	49.0	71.2	73	23	50	98.7				
	8	17-19		Gray FAT CLAY	CL	74.6	54.9								
	9	19-20		Gray and tan FAT CLAY	CH	49.1	71.1								
07-207															
	1	0-2		Gray and tan FAT CLAY	CH	8.6	94.9								
	2	2-4		Gray FAT CLAY	CH	52.5	66.1	90	29	61	98.2	0.23	4.0		Multiple shear
	3	4-6		Gray and tan FAT CLAY	CH	66.6	60.8					0.40	3.7		45 degree
	4	6-8	0.32	Gray FAT CLAY	CH	54.4	64.8	94	29	65	92.3	0.51	4.4		45 degree
	5	8-9.5		Gray and tan SILTY SAND	SM						14.2				

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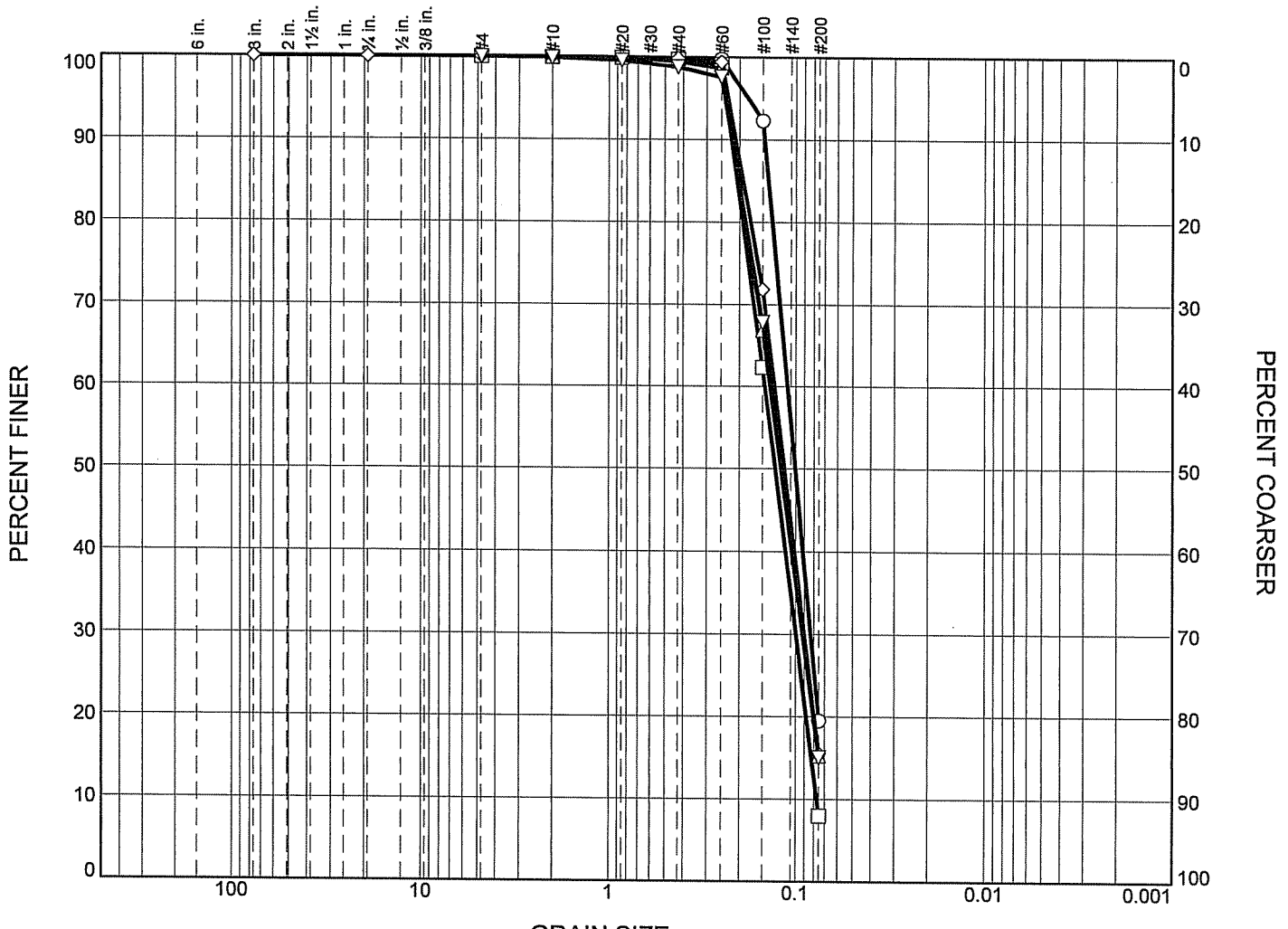
Particle Size Analysis - ASTM D 422



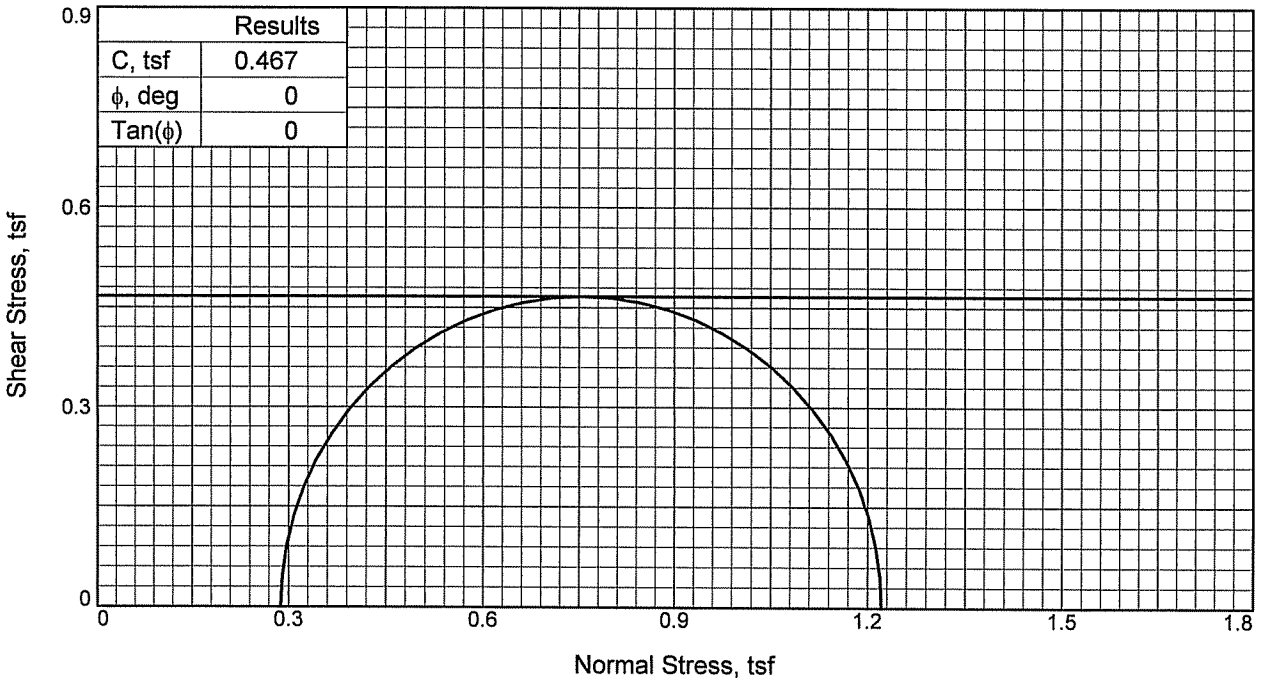
	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	0.1	80.4	19.5	
□	0.0	0.0	0.0	0.1	0.2	91.7	8.0	
△	0.0	0.0	0.0	0.0	0.5	84.3	15.2	
◇	0.0	0.0	0.0	0.0	0.2	84.3	15.5	
▽	0.0	0.0	0.0	0.1	1.1	83.8	15.0	

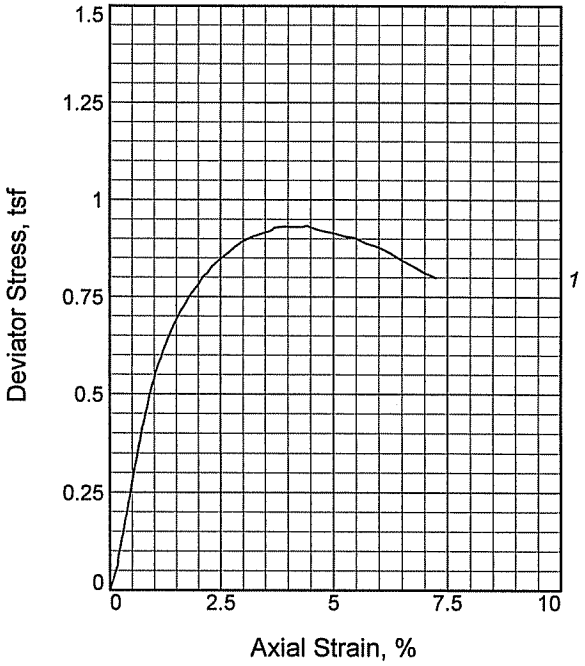
SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	07-203	6	10-11.5	Tan and gray SILTY SAND	SM
□	07-204	4	6-7.5	Light gray and tan poorly graded SAND with SILT	SP-SM
△	07-206	5	8-9.5	Tan and gray SILTY SAND	SM
◇	07-208	5	8-9.5	Gray and tan SILTY SAND	SM
▽	07-208	7	16.5-18	Gray SILTY SAND	SM

Tolunay-Wong Engineers, Inc.
Houston, Texas

Client: United States Army Corps of Engineers
Project: Galveston Channel and San Jacinto PA
Contract No. DACW64-03-D-0008, Task Order No. 0080
Project No.: 08.18.920
Figure





Sample No.		1
Initial	Water Content, %	40.1
	Dry Density, pcf	71.7
	Saturation, %	80.2
	Void Ratio	1.3508
	Diameter, in.	2.78
	Height, in.	5.64
At Test	Water Content, %	31.7
	Dry Density, pcf	71.7
	Saturation, %	63.5
	Void Ratio	1.3508
	Diameter, in.	2.78
	Height, in.	5.64
Strain rate, %/min.		1.00
Back Pressure, tsf		0.00
Cell Pressure, tsf		0.29
Fail. Stress, tsf		0.93
Ult. Stress, tsf		
σ_1 Failure, tsf		1.22
σ_3 Failure, tsf		0.29

Type of Test:
Unconsolidated Undrained

Sample Type: Undisturbed

Description: Gray and tan FAT CLAY

Assumed Specific Gravity= 2.70

Remarks:
Test method: ASTM D 2850
Pocket pen; tsf: 2.00
Failure type: Vertical shear

Client: United States Army Corps of Engineers

Project: Galveston Channel and San Jacinto PA
Contract No. DACW64-03-D-0008, Task Order No. 0080

Source of Sample: 07-204 **Depth:** 4-6

Sample Number: 3

Proj. No.: 08.18.920 **Date Sampled:** 7/29/08

TRIAXIAL SHEAR TEST REPORT

Tolunay-Wong Engineers, Inc.

TRIAXIAL COMPRESSION TEST

Unconsolidated Undrained

8/8/2008
11:06 AM

Date: 7/29/08
Client: United States Army Corps of Engineers
Project: Galveston Channel and San Jacinto PA Contract No. DACW64-03-D-0008, Task Order No. 0080
Project No.: 08.18.920
Location: 07-204
Depth: 4-6 **Sample Number:** 3
Description: Gray and tan FAT CLAY
Remarks:

Test method: ASTM D 2850
Pocket pen; tsf: 2.00
Failure type: Vertical shear

Type of Sample: Undisturbed
Assumed Specific Gravity=2.70 **LL=** **PL=** **PI=**
Test Method: ASTM D 2850

Parameters for Specimen No. 1

Specimen Parameter	Initial	Final
Moisture content: Moist soil+tare, gms.	92.530	113.640
Moisture content: Dry soil+tare, gms.	74.810	93.670
Moisture content: Tare, gms.	30.630	30.770
Moisture, %	40.1	31.7
Moist specimen weight, gms.	900.3	
Diameter, in.	2.77	
Area, in.^{2}	6.05	
Height, in.	5.64	
Wet Density, pcf	100.5	
Dry density, pcf	71.7	
Void ratio	1.3508	
Saturation, %	80.2	

Test Readings for Specimen No. 1

Membrane modulus = .130 kN/cm^2
Membrane thickness = .031 cm
Cell pressure = 4.00 psi (0.288 tsf)
Back pressure = 0.00 psi (0.000 tsf)
Strain rate, %/min. = 1.00
Fail. Stress = 0.934 tsf **at reading no.** 61

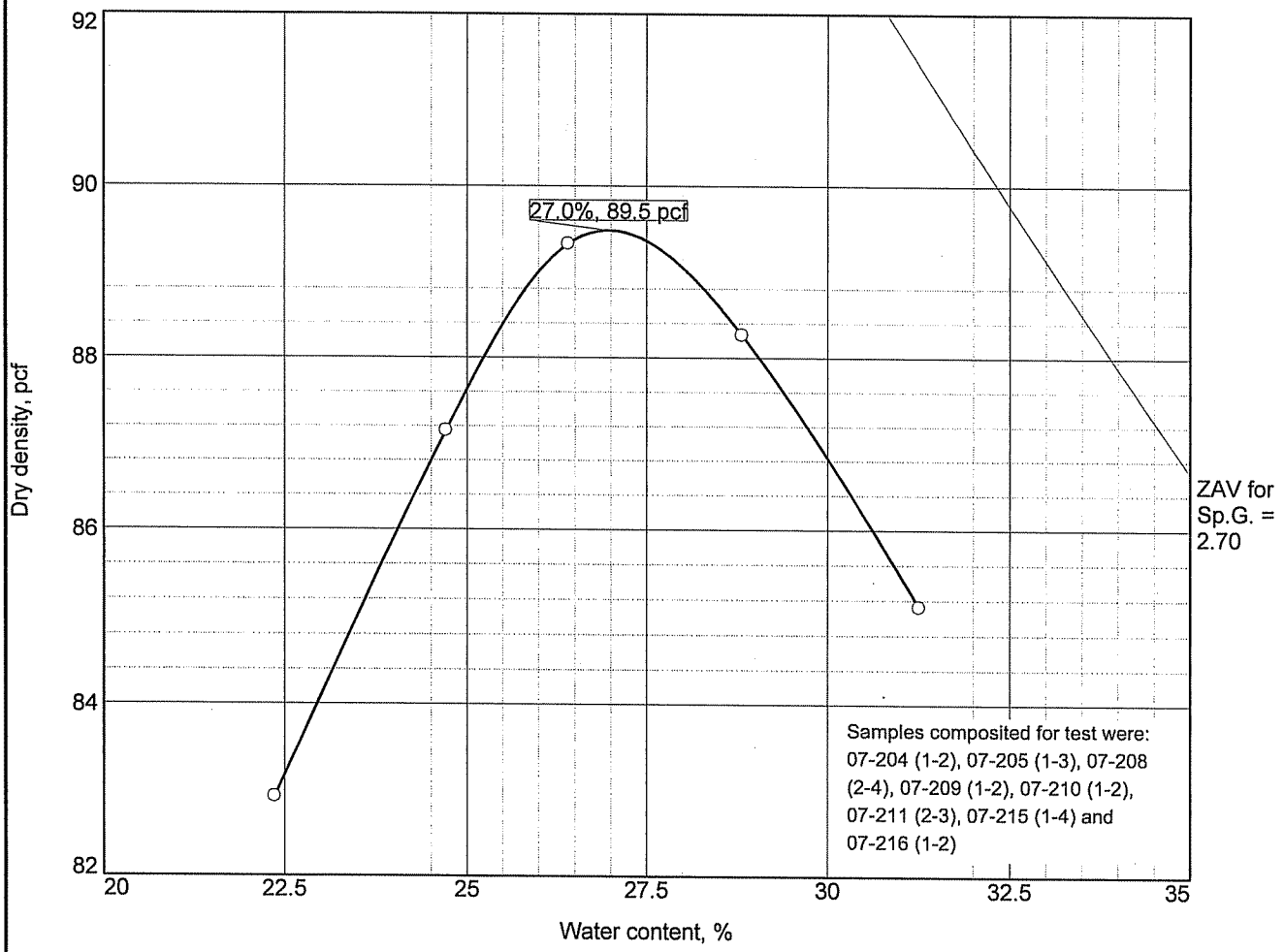
Test Readings for Specimen No. 1

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	0.0200	0.000	0.0	0.0	0.000	0.288	0.288	1.00	0.288	0.000
1	0.0294	5.329	5.3	0.2	0.063	0.288	0.351	1.22	0.320	0.032
2	0.0304	7.272	7.3	0.2	0.086	0.288	0.374	1.30	0.331	0.043
3	0.0324	8.620	8.6	0.2	0.102	0.288	0.390	1.36	0.339	0.051
4	0.0336	9.754	9.8	0.2	0.116	0.288	0.404	1.40	0.346	0.058
5	0.0348	10.961	11.0	0.3	0.130	0.288	0.418	1.45	0.353	0.065
6	0.0367	12.180	12.2	0.3	0.145	0.288	0.433	1.50	0.360	0.072
7	0.0379	13.575	13.6	0.3	0.161	0.288	0.449	1.56	0.369	0.081
8	0.0391	14.990	15.0	0.3	0.178	0.288	0.466	1.62	0.377	0.089
9	0.0410	16.345	16.3	0.4	0.194	0.288	0.482	1.67	0.385	0.097
10	0.0422	17.585	17.6	0.4	0.209	0.288	0.497	1.72	0.392	0.104
11	0.0434	18.993	19.0	0.4	0.225	0.288	0.513	1.78	0.401	0.113
12	0.0454	20.283	20.3	0.4	0.240	0.288	0.528	1.83	0.408	0.120
13	0.0466	21.717	21.7	0.5	0.257	0.288	0.545	1.89	0.417	0.129
14	0.0478	23.216	23.2	0.5	0.275	0.288	0.563	1.95	0.426	0.138
15	0.0497	24.629	24.6	0.5	0.292	0.288	0.580	2.01	0.434	0.146
16	0.0509	26.008	26.0	0.5	0.308	0.288	0.596	2.07	0.442	0.154
17	0.0521	27.186	27.2	0.6	0.322	0.288	0.610	2.12	0.449	0.161
18	0.0540	28.437	28.4	0.6	0.336	0.288	0.624	2.17	0.456	0.168
19	0.0552	29.708	29.7	0.6	0.351	0.288	0.639	2.22	0.464	0.176
20	0.0564	30.989	31.0	0.6	0.367	0.288	0.655	2.27	0.471	0.183
21	0.0583	32.354	32.4	0.7	0.383	0.288	0.671	2.33	0.479	0.191
22	0.0595	33.724	33.7	0.7	0.399	0.288	0.687	2.38	0.487	0.199
23	0.0607	34.906	34.9	0.7	0.413	0.288	0.701	2.43	0.494	0.206
24	0.0627	35.968	36.0	0.8	0.425	0.288	0.713	2.48	0.500	0.212
25	0.0639	37.085	37.1	0.8	0.438	0.288	0.726	2.52	0.507	0.219
26	0.0651	38.102	38.1	0.8	0.450	0.288	0.738	2.56	0.513	0.225
27	0.0670	39.250	39.2	0.8	0.463	0.288	0.751	2.61	0.520	0.232
28	0.0682	40.470	40.5	0.9	0.478	0.288	0.766	2.66	0.527	0.239
29	0.0694	41.606	41.6	0.9	0.491	0.288	0.779	2.70	0.533	0.245
30	0.0713	42.688	42.7	0.9	0.504	0.288	0.792	2.75	0.540	0.252
31	0.0737	44.362	44.4	1.0	0.523	0.288	0.811	2.82	0.550	0.262
32	0.0756	45.186	45.2	1.0	0.533	0.288	0.821	2.85	0.554	0.266
33	0.0768	46.136	46.1	1.0	0.544	0.288	0.832	2.89	0.560	0.272
34	0.0780	47.094	47.1	1.0	0.555	0.288	0.843	2.93	0.565	0.277
35	0.0800	48.111	48.1	1.1	0.567	0.288	0.855	2.97	0.571	0.283
36	0.0824	49.322	49.3	1.1	0.581	0.288	0.869	3.02	0.578	0.290
37	0.0855	50.607	50.6	1.2	0.595	0.288	0.883	3.07	0.586	0.298
38	0.0867	51.494	51.5	1.2	0.606	0.288	0.894	3.10	0.591	0.303
39	0.0929	54.160	54.2	1.3	0.636	0.288	0.924	3.21	0.606	0.318
40	0.0983	56.581	56.6	1.4	0.664	0.288	0.952	3.31	0.620	0.332
41	0.1038	58.540	58.5	1.5	0.687	0.288	0.975	3.38	0.631	0.343
42	0.1099	60.892	60.9	1.6	0.713	0.288	1.001	3.48	0.645	0.357
43	0.1153	62.249	62.2	1.7	0.729	0.288	1.017	3.53	0.652	0.364
44	0.1213	64.344	64.3	1.8	0.752	0.288	1.040	3.61	0.664	0.376
45	0.1268	65.658	65.7	1.9	0.767	0.288	1.055	3.66	0.671	0.383
46	0.1328	66.987	67.0	2.0	0.782	0.288	1.070	3.71	0.679	0.391

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	0.1382	68.657	68.7	2.1	0.800	0.288	1.088	3.78	0.688	0.400
48	0.1443	69.689	69.7	2.2	0.811	0.288	1.099	3.82	0.694	0.406
49	0.1497	71.145	71.1	2.3	0.827	0.288	1.115	3.87	0.702	0.414
50	0.1612	73.099	73.1	2.5	0.848	0.288	1.136	3.95	0.712	0.424
51	0.1727	74.836	74.8	2.7	0.867	0.288	1.155	4.01	0.721	0.433
52	0.1781	75.859	75.9	2.8	0.878	0.288	1.166	4.05	0.727	0.439
53	0.1896	77.399	77.4	3.0	0.894	0.288	1.182	4.10	0.735	0.447
54	0.2010	78.491	78.5	3.2	0.904	0.288	1.192	4.14	0.740	0.452
55	0.2126	79.373	79.4	3.4	0.913	0.288	1.201	4.17	0.744	0.456
56	0.2241	80.134	80.1	3.6	0.919	0.288	1.207	4.19	0.748	0.460
57	0.2295	80.956	81.0	3.7	0.928	0.288	1.216	4.22	0.752	0.464
58	0.2410	81.359	81.4	3.9	0.931	0.288	1.219	4.23	0.753	0.465
59	0.2525	81.482	81.5	4.1	0.930	0.288	1.218	4.23	0.753	0.465
60	0.2640	81.658	81.7	4.3	0.930	0.288	1.218	4.23	0.753	0.465
61	0.2694	82.052	82.1	4.4	0.934	0.288	1.222	4.24	0.755	0.467
62	0.2808	81.424	81.4	4.6	0.925	0.288	1.213	4.21	0.750	0.462
63	0.2923	80.957	81.0	4.8	0.917	0.288	1.205	4.18	0.747	0.459
64	0.3038	80.834	80.8	5.0	0.914	0.288	1.202	4.17	0.745	0.457
65	0.3153	80.320	80.3	5.2	0.906	0.288	1.194	4.15	0.741	0.453
66	0.3292	80.146	80.1	5.5	0.902	0.288	1.190	4.13	0.739	0.451
67	0.3426	79.125	79.1	5.7	0.888	0.288	1.176	4.08	0.732	0.444
68	0.3578	78.505	78.5	6.0	0.879	0.288	1.167	4.05	0.727	0.439
69	0.3722	77.338	77.3	6.2	0.863	0.288	1.151	4.00	0.720	0.432
70	0.3861	75.951	76.0	6.5	0.846	0.288	1.134	3.94	0.711	0.423
71	0.4005	74.755	74.8	6.7	0.830	0.288	1.118	3.88	0.703	0.415
72	0.4144	73.367	73.4	7.0	0.812	0.288	1.100	3.82	0.694	0.406
73	0.4289	72.403	72.4	7.2	0.800	0.288	1.088	3.78	0.688	0.400

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			0.0	

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 89.5 pcf Optimum moisture = 27.0 %	Dark Gray FAT CLAY

Project No. 08.18.920 **Client:** United States Army Corps of Engineers
Project: Galveston Channel and San Jacinto PA
Contract No. DACW64-03-D-0008, Task Order No. 0080 **Date:**
○ **Source of Sample:** Mix 01 **Sample Number:** 1

Remarks:
Test method: ASTM D 698
Preparation Method: Dry
Specific Gravity: Assumed

Tolunay-Wong Engineers, Inc.

Houston, Texas

Tested By: SA **Checked By:** JL

Hole No. 07-204

BORING LOG	DISTRICT	INSTALLATION	SHEET 1 OF 1 SHEETS

1. PROJECT Galveston Channel and San Jacinto PA	7. ELEVATION OF HOLE
2. LOCATION (Coordinates or Station) N=13692878 E=3317140	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: 4/17/08 COMPLETED: 4/17/08
5. DEPTH OF WATER TOD: 24-HR:	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 20 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), soft, gray -w/ roots @ 0' - 2'		1			0.50	62.8	57.0				
					2			0.50	69.4	44.8	89	26	63	91
5			-gray below 4' -w/ sand on bottom of 4' - 6' sample		3			0.25	71.7	40.1				
			POORLY GRADED SAND WITH SILT (SP-SM), loose, gray		4		4							8
10			**FAT CLAY(CH)**, soft, gray		5			0.50	60.0	69.1				
			-very soft @ 12' - 18'		6			0.0	60.3	77.5	69	24	45	98.5
15			-w/ sand seams @ 14' - 18'		7			0.0	72.5	44.5				
					8			0.0	62.3	54.8				
			-firm below 18'		9			0.75	77.1	40.5				
20														
25														
30														

SWG 1836 BOR 08.18.920.GPJ TOLUNAY-WONG ENGINEERS.GDT 11/10/08

ENG FORM: SWG 1836 BOR