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
	5	8-10		Gray FAT CLAY	CH	44.0	76.6								
	6	10-12	0.23	Gray FAT CLAY with SAND	CH	43.7	75.1	78	24	54	79.0				
	7	12-14		Gray FAT CLAY	CH	39.4	79.9								
	8	14-16		Gray SANDY FAT CLAY	CH	29.7	83.4	84	24	60	64.1	0.60	4.4		Slickensided
	9	16-18		Gray FAT CLAY	CH	44.2	71.2								
	10	18-20		Gray SANDY LEAN CLAY	CL	40.3	79.3								
	11	20-22		Gray LEAN CLAY; organics	CL	52.1	71.0					0.50	6.3		Vertical shear
	12	22-24		Gray LEAN CLAY	CL	30.2	96.9	43	21	22	93.7				
	13	24-26		Gray SILTY SAND	SM	33.7									
	14	26-28		Gray FAT CLAY	CH	36.0	75.8								
	15	28-30		Gray FAT CLAY	CH	45.8	75.0								
07-227															
	1	0-2		Gray FAT CLAY	CH	48.8	67.3								
	2	2-4		Gray FAT CLAY	CH	55.5	67.2	88	24	64	92.7				
	3	4-6		Gray FAT CLAY	CH	56.2	67.9								
	4	6-8		Gray FAT CLAY	CH	83.5	49.8								
	5	8-10		Gray FAT CLAY	CH	79.8	51.5	113	41	72	94.0				
	6	10-12		Gray FAT CLAY	CH	46.6	70.3	64	22	42		0.24	5.0		Slickensided
	7	12-14	0.18	Gray FAT CLAY	CH	107.1	41.2	116	33	83	99.5				
	8	14-15		Gray FAT CLAY	CH	88.5	54.8								
	9	15-16		Gray SILTY SAND	SM										
	10	16-17.5		Gray poorly graded SAND with SILT	SP-SM						5.5				
	11	18.5-20		Gray and tan poorly graded SAND with SILT	SP-SM						7.7				
07-228															
	1	0-2		Gray FAT CLAY	CH	32.0	78.8								
	2	2-4		Gray FAT CLAY	CH	53.0	68.1	87	25	62	98.9	0.43	3.1		60 degree
	3	4-6		Gray FAT CLAY	CH	48.2	71.3					0.48	3.9		Slickensided
	4	6-8		Gray FAT CLAY	CH	66.6	58.8								
	5	8-10		Gray FAT CLAY	CH	65.1	61.8	75	23	52	100.0	0.22	4.6	7.5	Bulge
	6	10-11.5		Tan and gray poorly graded SAND with SILT	SP-SM						7.0				
	7	15-16.5		Tan and gray poorly graded SAND; shells	SP						4.0				
	8	18.5-20		Gray poorly graded SAND with SILT; shells	SP-SM						6.6				
07-229															
	1	0-2		Gray FAT CLAY	CH	39.8	77.1								
	2	2-4		Gray FAT CLAY	CH	51.0	65.7								
	3	4-6		Gray FAT CLAY	CH	50.2	71.4	114	29	85	95.1	0.44	3.0		Slickensided
	4	6-8		Gray and tan poorly graded SAND with SILT; shells	SP-SM						11.9				

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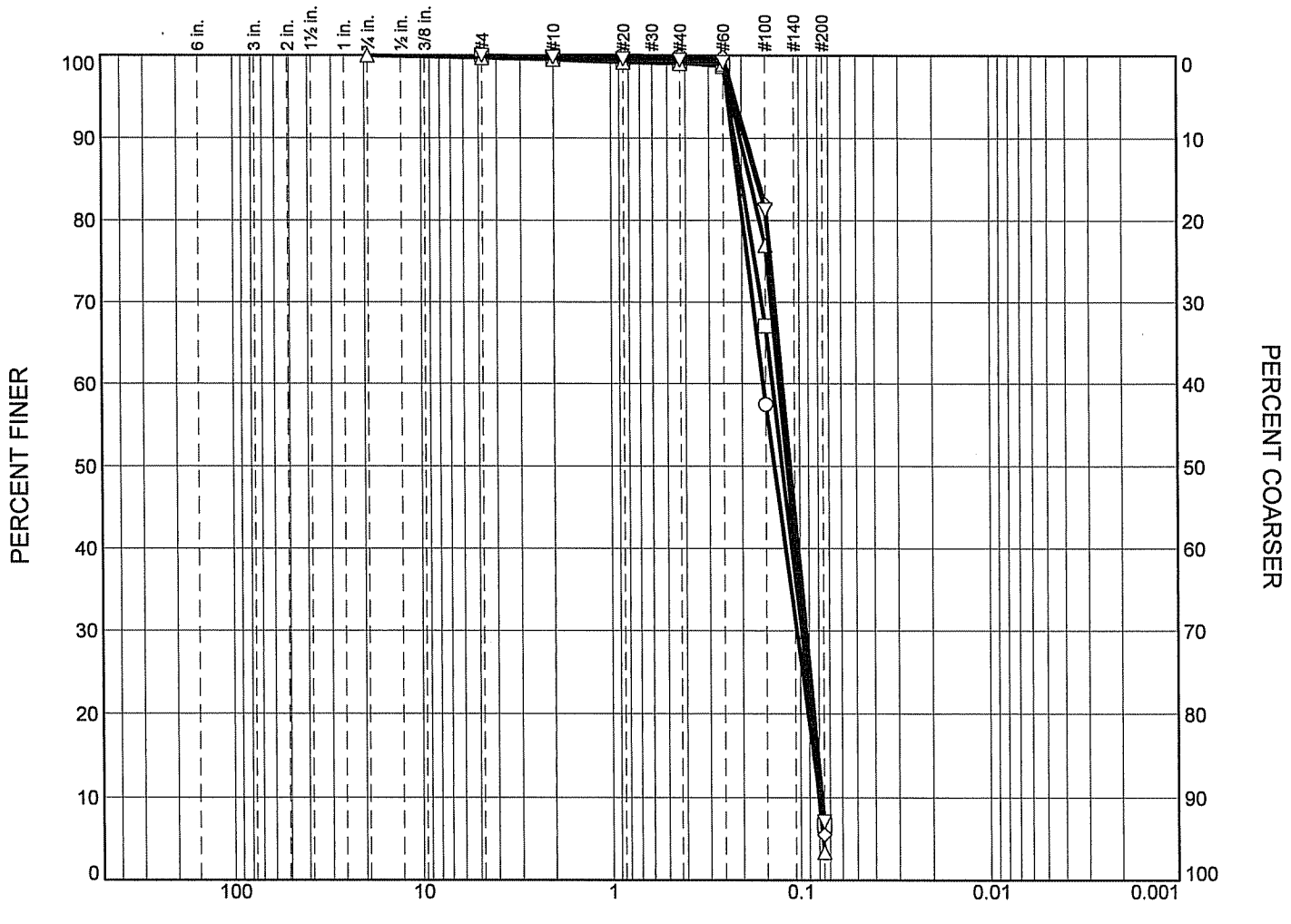
Particle Size Analysis - ASTM D 422



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	0.1	93.9	6.0	
□	0.0	0.0	0.0	0.2	0.6	92.5	6.7	
△	0.0	0.0	0.3	0.2	0.5	95.6	3.4	
◇	0.0	0.0	0.0	0.0	0.1	94.4	5.5	
▽	0.0	0.0	0.0	0.2	0.4	92.4	7.0	

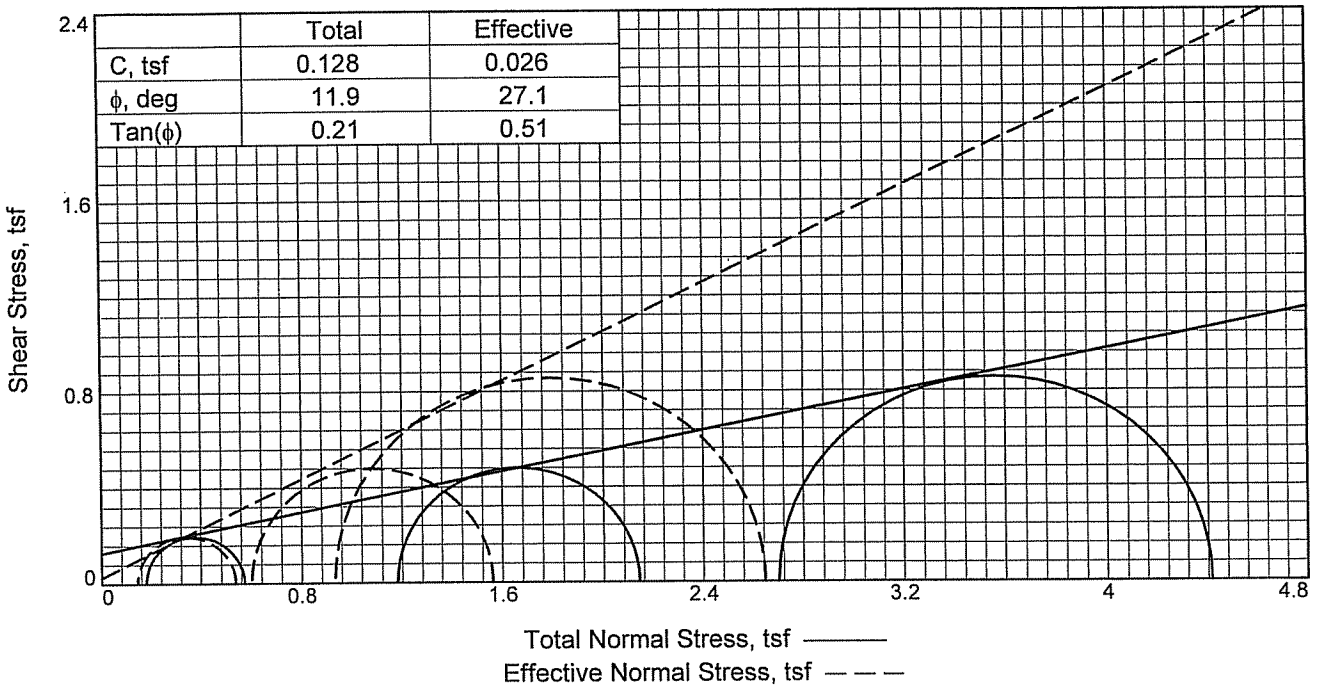
SOIL DATA

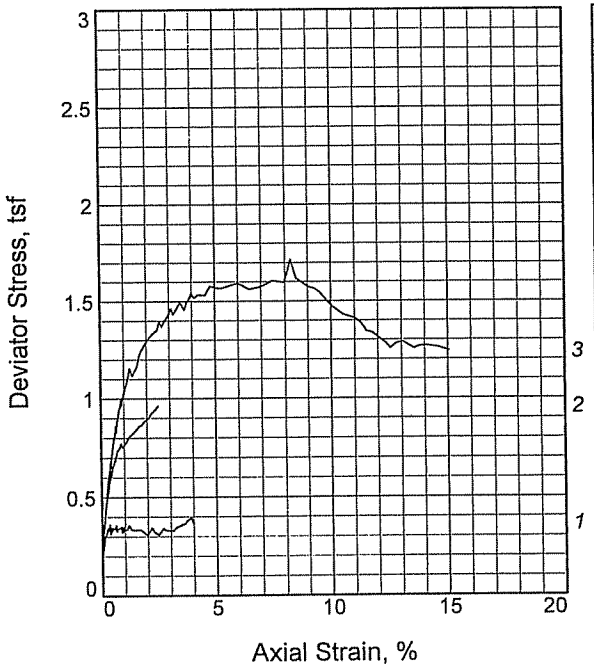
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	07-223	3	7-8.5	Gray poorly graded SAND with SILT	SP-SM
□	07-223	5	17-18.5	Gray and tan poorly graded SAND with SILT	SP-SM
△	07-225	11	20-21.5	Gray poorly graded SAND; shells	SP
◇	07-227	10	16-17.5	Gray and tan poorly graded SAND with SILT	SP-SM
▽	07-228	6	10-11.5	Tan and gray poorly graded SAND with SILT	SP-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**

	Total	Effective
C, tsf	0.128	0.026
ϕ, deg	11.9	27.1
Tan(ϕ)	0.21	0.51





Sample No.		1	2	3
Initial	Water Content, %	55.5	55.5	55.5
	Dry Density, pcf	67.2	67.2	67.2
	Saturation, %	98.1	98.1	98.1
	Void Ratio	1.5564	1.5564	1.5564
	Diameter, in.	2.02	2.02	2.02
	Height, in.	4.11	4.11	4.11
At Test	Water Content, %	42.8	42.8	42.8
	Dry Density, pcf	78.9	78.9	78.9
	Saturation, %	100.0	100.0	100.0
	Void Ratio	1.1758	1.1758	1.1758
	Diameter, in.	1.84	1.89	1.92
	Height, in.	4.19	4.01	3.86
Strain rate, %/min.		0.02	0.01	0.0060
Back Pressure, tsf		2.17	2.17	2.17
Cell Pressure, tsf		2.35	3.36	4.87
Fail. Stress, tsf		0.39	0.96	1.71
Excess Pore Pr., tsf		0.03	0.58	1.77
Ult. Stress, tsf		0.37	0.96	1.24
Excess Pore Pr., tsf		0.04	0.58	1.74
$\bar{\sigma}_1$ Failure, tsf		0.54	1.56	2.65
$\bar{\sigma}_3$ Failure, tsf		0.15	0.60	0.93

Type of Test:
CU with Pore Pressures
Sample Type: Undisturbed
Description: Gray FAT CLAY

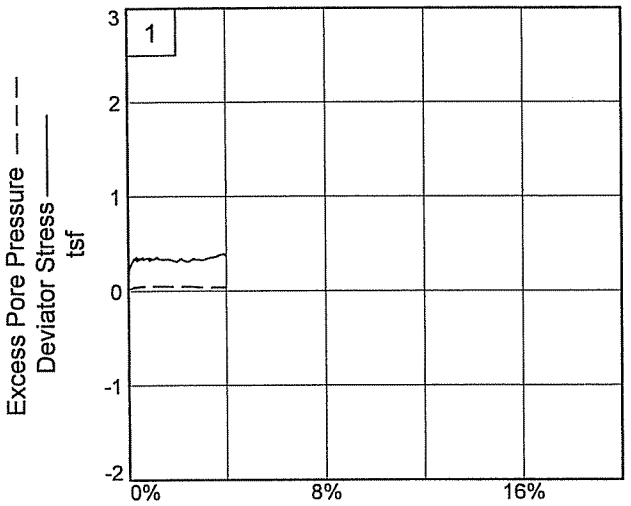
LL= 88 **PL=** 24 **PI=** 64
Assumed Specific Gravity= 2.75
Remarks: Test method: ASTM D 4767
Pocket pen; tsf: 0.31
Failure type: Slickensided

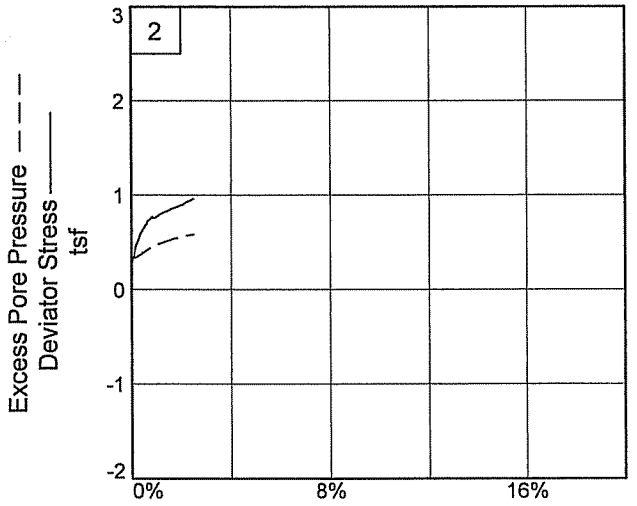
Client: United States Army Corps of Engineers

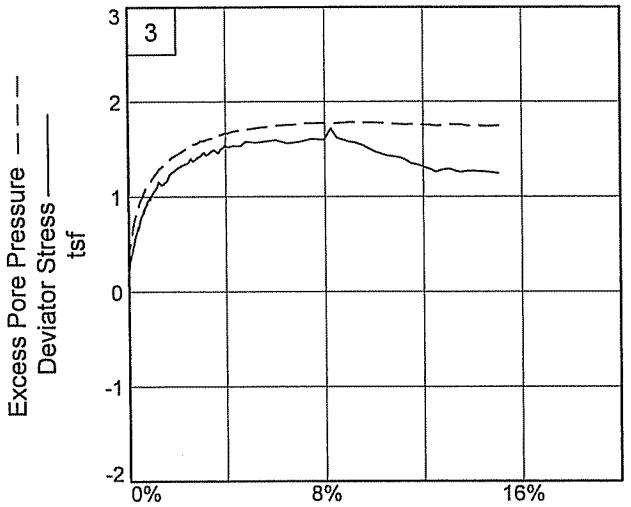
Project: Galveston Channel and San Jacinto PA
Contract No. DACW64-03-D-0008, Task Order No. 0080
Source of Sample: 07-227 **Depth:** 2-4
Sample Number: 2
Proj. No.: 08.18.920 **Date Sampled:** 8/23/08

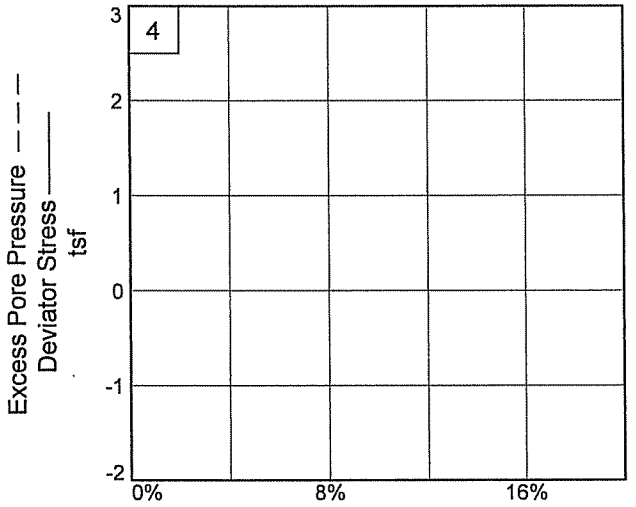
TRIAXIAL SHEAR TEST REPORT

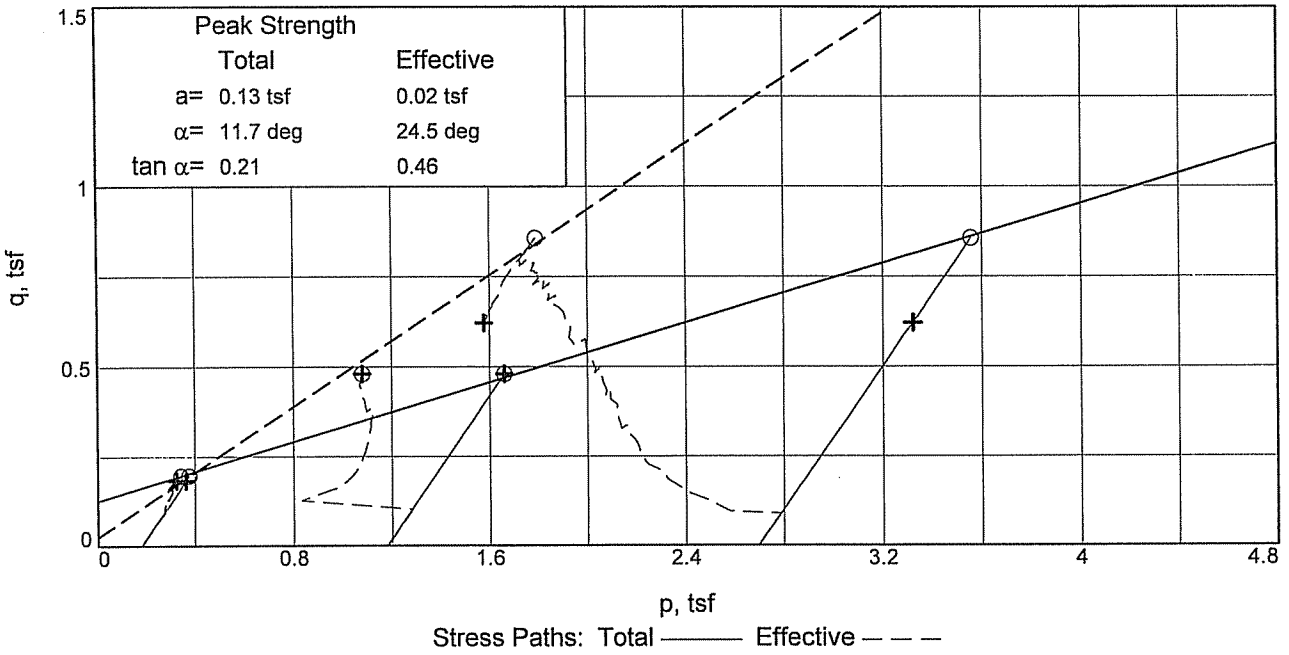
Tolunay-Wong Engineers, Inc.











Client: United States Army Corps of Engineers

Project: Galveston Channel and San Jacinto PA

Source of Sample: 07-227 **Depth:** 2-4 **Sample Number:** 2

Project No.: 08.18.920

TOLUNAY-WONG ENGINEERS, INC.

TRIAXIAL COMPRESSION TEST

CU with Pore Pressures

9/2/2008
2:59 PM

Date: 8/23/08
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: 07-227
Depth: 2-4 **Sample Number:** 2
Description: Gray FAT CLAY
Remarks: Test method: ASTM D 4767
Pocket pen; tsf: 0.31
Failure type: Slickensided
Type of Sample: Undisturbed
Assumed Specific Gravity=2.75 **LL=**88 **PL=**24 **PI=**64
Test Method: ASTM D 4767 Method B

Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	82.300			116.980
Moisture content: Dry soil+tare, gms.	63.710			91.130
Moisture content: Tare, gms.	30.230			30.670
Moisture, %	55.5	43.1	42.8	42.8
Moist specimen weight, gms.	360.1			
Diameter, in.	2.02	1.84	1.84	
Area, in.^{2}	3.20	2.66	2.67	
Height, in.	4.11	4.23	4.19	
Net decrease in height, in.		-0.12	0.03	
Net decrease in water volume, cc.			0.80	
Wet Density, pcf	104.4	112.4	112.6	
Dry density, pcf	67.2	78.6	78.9	
Void ratio	1.5564	1.1853	1.1758	
Saturation, %	98.1	100.0	100.0	

Test Readings for Specimen No. 1

Membrane modulus = .130 kN/cm^2
Membrane thickness = .031 cm
Filter paper coefficient = 0.0019 kN/cm
Filter paper coverage = 50%
Consolidation cell pressure = 32.60 psi (2.347 tsf)
Consolidation back pressure = 30.10 psi (2.167 tsf)
Consolidation effective confining stress = 0.180 tsf
Strain rate, %/min. = 0.02
Fail. Stress = 0.393 tsf **at reading no.** 54
Ult. Stress = 0.367 tsf **at reading no.** 55

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Eff. Stress tsf	Major Eff. Stress tsf	1:3 Ratio	Pore Press. psi	P tsf	Q tsf
0	0.0011	0.000	0.0	0.0	0.000	0.181	0.181	1.00	30.08	0.181	0.000
1	0.0012	7.030	7.0	0.0	0.190	0.181	0.371	2.05	30.08	0.276	0.095
2	0.0013	7.643	7.6	0.0	0.206	0.172	0.378	2.20	30.22	0.275	0.103
3	0.0022	8.185	8.2	0.0	0.221	0.166	0.387	2.33	30.29	0.277	0.110
4	0.0034	8.894	8.9	0.1	0.240	0.163	0.403	2.47	30.34	0.283	0.120
5	0.0042	9.962	10.0	0.1	0.269	0.162	0.431	2.65	30.34	0.297	0.134
6	0.0049	9.540	9.5	0.1	0.257	0.160	0.417	2.61	30.38	0.288	0.129
7	0.0060	10.811	10.8	0.1	0.292	0.159	0.450	2.84	30.40	0.304	0.146
8	0.0087	11.528	11.5	0.2	0.311	0.152	0.462	3.05	30.49	0.307	0.155
9	0.0101	11.895	11.9	0.2	0.321	0.144	0.465	3.22	30.60	0.305	0.160
10	0.0111	12.572	12.6	0.2	0.339	0.146	0.485	3.31	30.57	0.316	0.169
11	0.0125	12.143	12.1	0.3	0.327	0.141	0.468	3.32	30.65	0.304	0.164
12	0.0134	12.769	12.8	0.3	0.344	0.141	0.485	3.43	30.64	0.313	0.172
13	0.0145	12.525	12.5	0.3	0.337	0.139	0.476	3.42	30.66	0.308	0.169
14	0.0148	13.319	13.3	0.3	0.358	0.145	0.504	3.47	30.58	0.324	0.179
15	0.0161	12.315	12.3	0.4	0.315	0.141	0.456	3.24	30.65	0.298	0.157
16	0.0180	13.530	13.5	0.4	0.345	0.139	0.484	3.48	30.67	0.312	0.173
17	0.0186	12.728	12.7	0.4	0.323	0.139	0.462	3.33	30.67	0.300	0.161
18	0.0198	13.570	13.6	0.4	0.344	0.139	0.483	3.48	30.67	0.311	0.172
19	0.0203	13.005	13.0	0.5	0.328	0.137	0.465	3.40	30.70	0.301	0.164
20	0.0213	13.460	13.5	0.5	0.339	0.134	0.474	3.53	30.73	0.304	0.170
21	0.0246	13.772	13.8	0.6	0.344	0.133	0.477	3.58	30.75	0.305	0.172
22	0.0260	13.440	13.4	0.6	0.333	0.130	0.464	3.55	30.79	0.297	0.167
23	0.0266	14.304	14.3	0.6	0.356	0.134	0.490	3.65	30.73	0.312	0.178
24	0.0278	13.315	13.3	0.6	0.328	0.134	0.461	3.45	30.74	0.298	0.164
25	0.0290	13.688	13.7	0.7	0.336	0.135	0.471	3.49	30.73	0.303	0.168
26	0.0320	13.956	14.0	0.7	0.340	0.135	0.474	3.53	30.73	0.304	0.170
27	0.0349	14.238	14.2	0.8	0.344	0.134	0.478	3.56	30.74	0.306	0.172
28	0.0364	14.495	14.5	0.8	0.349	0.135	0.484	3.59	30.73	0.309	0.175
29	0.0371	13.511	13.5	0.9	0.322	0.130	0.452	3.48	30.79	0.291	0.161
30	0.0389	14.498	14.5	0.9	0.346	0.137	0.483	3.53	30.70	0.310	0.173
31	0.0398	13.660	13.7	0.9	0.323	0.133	0.456	3.42	30.75	0.295	0.161
32	0.0405	14.567	14.6	0.9	0.346	0.135	0.481	3.56	30.72	0.308	0.173
33	0.0416	14.181	14.2	1.0	0.334	0.133	0.468	3.51	30.75	0.300	0.167
34	0.0461	14.386	14.4	1.1	0.334	0.130	0.465	3.56	30.79	0.298	0.167
35	0.0503	15.346	15.3	1.2	0.355	0.132	0.487	3.69	30.77	0.310	0.178
36	0.0549	14.724	14.7	1.3	0.333	0.132	0.464	3.53	30.77	0.298	0.166
37	0.0626	15.023	15.0	1.5	0.332	0.131	0.462	3.54	30.78	0.297	0.166
38	0.0672	15.318	15.3	1.6	0.334	0.133	0.467	3.51	30.76	0.300	0.167
39	0.0716	15.509	15.5	1.7	0.334	0.134	0.467	3.49	30.74	0.301	0.167
40	0.0840	15.082	15.1	2.0	0.307	0.134	0.441	3.30	30.74	0.287	0.154
41	0.0927	16.483	16.5	2.2	0.342	0.136	0.479	3.51	30.71	0.307	0.171
42	0.0969	15.730	15.7	2.3	0.322	0.135	0.457	3.39	30.72	0.296	0.161
43	0.1045	15.190	15.2	2.5	0.307	0.134	0.442	3.29	30.73	0.288	0.154
44	0.1095	15.919	15.9	2.6	0.326	0.133	0.459	3.45	30.75	0.296	0.163
45	0.1133	16.484	16.5	2.7	0.340	0.134	0.474	3.54	30.74	0.304	0.170
46	0.1181	16.105	16.1	2.8	0.330	0.137	0.467	3.41	30.70	0.302	0.165

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Eff. Stress tsf	Major Eff. Stress tsf	1:3 Ratio	Pore Press. psi	P tsf	Q tsf
47	0.1313	16.078	16.1	3.1	0.328	0.143	0.471	3.29	30.61	0.307	0.164
48	0.1355	16.641	16.6	3.2	0.342	0.147	0.489	3.33	30.56	0.318	0.171
49	0.1440	17.140	17.1	3.4	0.354	0.146	0.500	3.42	30.57	0.323	0.177
50	0.1483	17.361	17.4	3.5	0.359	0.138	0.497	3.61	30.69	0.317	0.180
51	0.1529	17.557	17.6	3.6	0.364	0.143	0.508	3.54	30.61	0.325	0.182
52	0.1568	18.125	18.1	3.7	0.378	0.142	0.520	3.67	30.63	0.331	0.189
53	0.1613	18.447	18.4	3.8	0.386	0.140	0.526	3.76	30.66	0.333	0.193
54	0.1646	18.722	18.7	3.9	0.393	0.145	0.538	3.70	30.58	0.342	0.196
55	0.1687	17.722	17.7	4.0	0.367	0.140	0.507	3.61	30.65	0.324	0.183

Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	82.300			116.980
Moisture content: Dry soil+tare, gms.	63.710			91.130
Moisture content: Tare, gms.	30.230			30.670
Moisture, %	55.5	48.6	42.8	42.8
Moist specimen weight, gms.	360.1			
Diameter, in.	2.02	1.90	1.89	
Area, in.²	3.20	2.84	2.79	
Height, in.	4.11	4.23	4.01	
Net decrease in height, in.		-0.12	0.22	
Net decrease in water volume, cc.			13.60	
Wet Density, pcf	104.4	109.2	112.6	
Dry density, pcf	67.2	73.5	78.9	
Void ratio	1.5564	1.3373	1.1758	
Saturation, %	98.1	100.0	100.0	

Test Readings for Specimen No. 2

Membrane modulus = .130 kN/cm²

Membrane thickness = .031 cm

Filter paper coefficient = 0.0019 kN/cm

Filter paper coverage = 50%

Consolidation cell pressure = 46.60 psi (3.355 tsf)

Consolidation back pressure = 30.20 psi (2.174 tsf)

Consolidation effective confining stress = 1.181 tsf

Strain rate, %/min. = 0.01

Fail. Stress = 0.960 tsf **at reading no.** 41

Ult. Stress = 0.960 tsf **at reading no.** 41

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Eff. Stress tsf	Major Eff. Stress tsf	1:3 Ratio	Pore Press. psi	P tsf	Q tsf
0	0.0004	0.000	0.0	0.0	0.000	1.184	1.184	1.00	30.16	1.184	0.000
1	0.0005	7.913	7.9	0.0	0.204	1.184	1.388	1.17	30.16	1.286	0.102
2	0.0006	9.797	9.8	0.0	0.253	0.707	0.960	1.36	36.78	0.833	0.126
3	0.0018	11.371	11.4	0.0	0.293	0.765	1.058	1.38	35.98	0.911	0.147
4	0.0031	12.525	12.5	0.1	0.323	0.813	1.135	1.40	35.31	0.974	0.161
5	0.0047	13.916	13.9	0.1	0.359	0.835	1.194	1.43	35.00	1.014	0.179
6	0.0056	14.996	15.0	0.1	0.386	0.844	1.230	1.46	34.88	1.037	0.193
7	0.0059	16.176	16.2	0.1	0.417	0.847	1.264	1.49	34.83	1.055	0.208

Test Readings for Specimen No. 2

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Eff. Stress tsf	Major Eff. Stress tsf	1:3 Ratio	Pore Press. psi	P tsf	Q tsf
8	0.0069	17.394	17.4	0.2	0.448	0.845	1.293	1.53	34.86	1.069	0.224
9	0.0091	18.812	18.8	0.2	0.484	0.838	1.322	1.58	34.96	1.080	0.242
10	0.0098	19.403	19.4	0.2	0.499	0.834	1.333	1.60	35.02	1.083	0.250
11	0.0118	20.328	20.3	0.3	0.523	0.830	1.353	1.63	35.08	1.091	0.261
12	0.0125	21.102	21.1	0.3	0.543	0.824	1.367	1.66	35.16	1.095	0.271
13	0.0132	21.869	21.9	0.3	0.562	0.819	1.381	1.69	35.23	1.100	0.281
14	0.0153	23.072	23.1	0.4	0.593	0.811	1.404	1.73	35.33	1.108	0.297
15	0.0173	23.813	23.8	0.4	0.612	0.801	1.413	1.76	35.47	1.107	0.306
16	0.0178	24.265	24.3	0.4	0.623	0.797	1.420	1.78	35.53	1.108	0.312
17	0.0188	24.811	24.8	0.5	0.637	0.793	1.430	1.80	35.59	1.111	0.319
18	0.0214	25.784	25.8	0.5	0.662	0.784	1.446	1.84	35.70	1.115	0.331
19	0.0231	26.615	26.6	0.6	0.683	0.775	1.458	1.88	35.83	1.117	0.341
20	0.0240	26.549	26.5	0.6	0.681	0.772	1.453	1.88	35.88	1.112	0.340
21	0.0250	27.129	27.1	0.6	0.696	0.769	1.465	1.90	35.92	1.117	0.348
22	0.0268	28.161	28.2	0.7	0.722	0.761	1.482	1.95	36.03	1.122	0.361
23	0.0289	28.705	28.7	0.7	0.735	0.754	1.489	1.98	36.13	1.122	0.368
24	0.0318	29.141	29.1	0.8	0.746	0.742	1.487	2.01	36.30	1.115	0.373
25	0.0331	29.614	29.6	0.8	0.758	0.739	1.496	2.03	36.34	1.117	0.379
26	0.0349	30.114	30.1	0.9	0.770	0.732	1.503	2.05	36.43	1.118	0.385
27	0.0372	30.965	31.0	0.9	0.751	0.723	1.474	2.04	36.55	1.099	0.375
28	0.0405	31.649	31.6	1.0	0.764	0.716	1.480	2.07	36.65	1.098	0.382
29	0.0433	32.240	32.2	1.1	0.775	0.705	1.480	2.10	36.81	1.093	0.388
30	0.0476	33.269	33.3	1.2	0.796	0.695	1.491	2.15	36.95	1.093	0.398
31	0.0521	34.119	34.1	1.3	0.812	0.684	1.496	2.19	37.10	1.090	0.406
32	0.0557	34.687	34.7	1.4	0.821	0.674	1.496	2.22	37.23	1.085	0.411
33	0.0602	35.505	35.5	1.5	0.836	0.664	1.500	2.26	37.37	1.082	0.418
34	0.0640	36.131	36.1	1.6	0.847	0.658	1.505	2.29	37.46	1.081	0.423
35	0.0673	36.748	36.7	1.7	0.858	0.649	1.507	2.32	37.59	1.078	0.429
36	0.0716	37.261	37.3	1.8	0.865	0.641	1.507	2.35	37.69	1.074	0.433
37	0.0755	38.041	38.0	1.9	0.880	0.635	1.515	2.38	37.78	1.075	0.440
38	0.0838	39.050	39.0	2.1	0.898	0.620	1.518	2.45	37.99	1.069	0.449
39	0.0878	39.962	40.0	2.2	0.920	0.614	1.534	2.50	38.07	1.074	0.460
40	0.0962	41.015	41.0	2.4	0.944	0.603	1.547	2.57	38.22	1.075	0.472
41	0.1004	41.710	41.7	2.5	0.960	0.601	1.561	2.60	38.26	1.081	0.480

Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	82.300			116.980
Moisture content: Dry soil+tare, gms.	63.710			91.130
Moisture content: Tare, gms.	30.230			30.670
Moisture, %	55.5	52.9	42.8	42.8
Moist specimen weight, gms.	360.1			
Diameter, in.	2.02	1.95	1.92	
Area, in.^{2}	3.20	2.99	2.89	
Height, in.	4.11	4.23	3.86	
Net decrease in height, in.		-0.12	0.36	
Net decrease in water volume, cc.			23.60	
Wet Density, pcf	104.4	106.9	112.6	
Dry density, pcf	67.2	69.9	78.9	
Void ratio	1.5564	1.4561	1.1758	
Saturation, %	98.1	100.0	100.0	

Test Readings for Specimen No. 3

Membrane modulus = .130 kN/cm^2

Membrane thickness = .031 cm

Filter paper coefficient = 0.0019 kN/cm

Filter paper coverage = 50%

Consolidation cell pressure = 67.70 psi (4.874 tsf)

Consolidation back pressure = 30.20 psi (2.174 tsf)

Consolidation effective confining stress = 2.700 tsf

Strain rate, %/min. = 0.0060

Fail. Stress = 1.714 tsf **at reading no.** 64

Ult. Stress = 1.243 tsf **at reading no.** 83

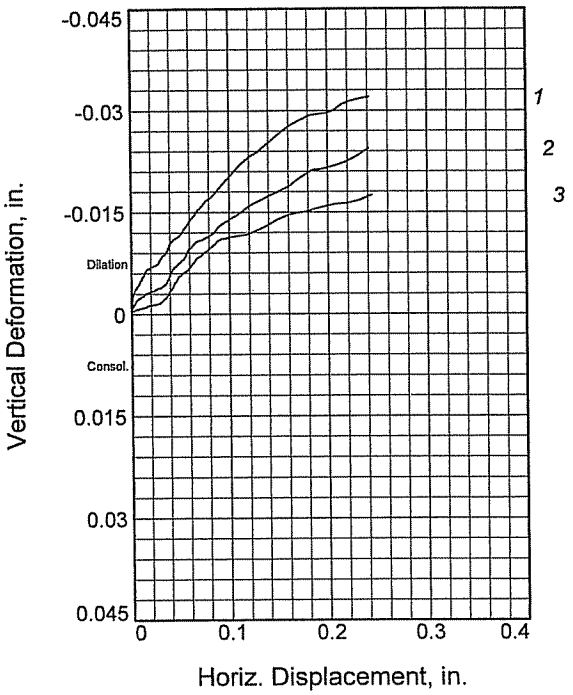
No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Eff. Stress tsf	Major Eff. Stress tsf	1:3 Ratio	Pore Press. psi	P tsf	Q tsf
0	0.0002	0.000	0.0	0.0	0.000	2.698	2.698	1.00	30.23	2.698	0.000
1	0.0003	7.255	7.3	0.0	0.181	2.698	2.879	1.07	30.23	2.788	0.090
2	0.0004	7.653	7.7	0.0	0.190	2.486	2.677	1.08	33.17	2.581	0.095
3	0.0013	10.410	10.4	0.0	0.259	2.354	2.613	1.11	35.01	2.483	0.129
4	0.0020	11.909	11.9	0.0	0.296	2.262	2.558	1.13	36.28	2.410	0.148
5	0.0034	13.531	13.5	0.1	0.336	2.199	2.536	1.15	37.15	2.368	0.168
6	0.0046	14.969	15.0	0.1	0.372	2.142	2.514	1.17	37.96	2.328	0.186
7	0.0059	16.741	16.7	0.1	0.416	2.101	2.517	1.20	38.53	2.309	0.208
8	0.0070	18.286	18.3	0.2	0.454	2.022	2.477	1.22	39.61	2.250	0.227
9	0.0082	19.083	19.1	0.2	0.474	1.998	2.472	1.24	39.95	2.235	0.237
10	0.0091	20.335	20.3	0.2	0.505	1.968	2.473	1.26	40.37	2.220	0.252
11	0.0108	23.203	23.2	0.3	0.576	1.915	2.491	1.30	41.10	2.203	0.288
12	0.0127	24.121	24.1	0.3	0.598	1.893	2.491	1.32	41.41	2.192	0.299
13	0.0140	25.506	25.5	0.4	0.632	1.850	2.482	1.34	42.01	2.166	0.316
14	0.0151	27.210	27.2	0.4	0.674	1.822	2.496	1.37	42.40	2.159	0.337
15	0.0160	26.364	26.4	0.4	0.653	1.812	2.465	1.36	42.53	2.139	0.327
16	0.0169	27.715	27.7	0.4	0.687	1.788	2.475	1.38	42.86	2.131	0.343
17	0.0179	28.857	28.9	0.5	0.715	1.768	2.482	1.40	43.15	2.125	0.357
18	0.0194	30.523	30.5	0.5	0.756	1.739	2.495	1.43	43.55	2.117	0.378
19	0.0211	31.824	31.8	0.5	0.788	1.728	2.516	1.46	43.70	2.122	0.394
20	0.0235	33.108	33.1	0.6	0.819	1.684	2.503	1.49	44.31	2.093	0.409

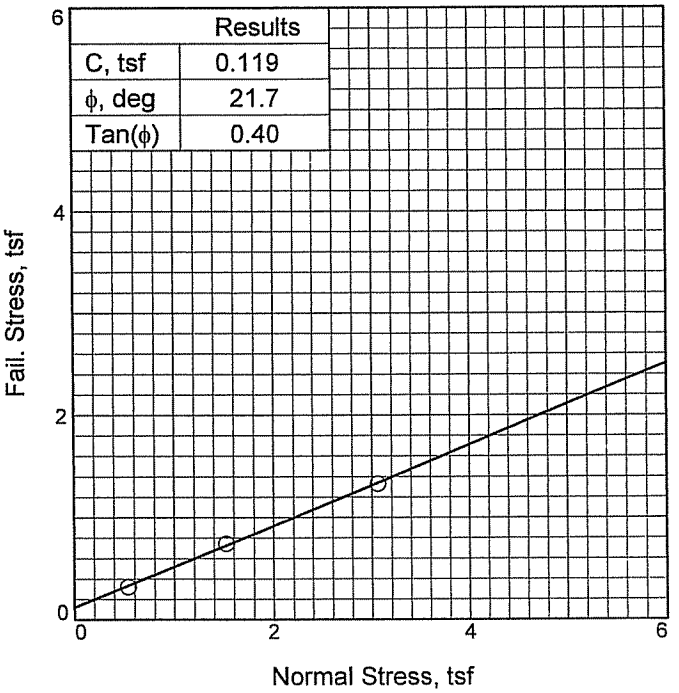
Test Readings for Specimen No. 3

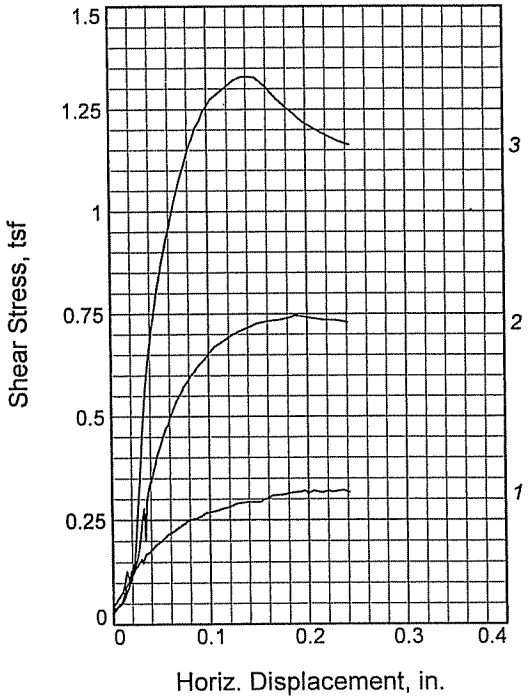
No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Eff. Stress tsf	Major Eff. Stress tsf	1:3 Ratio	Pore Press. psi	P tsf	Q tsf
21	0.0246	34.728	34.7	0.6	0.859	1.664	2.522	1.52	44.59	2.093	0.429
22	0.0252	33.486	33.5	0.6	0.828	1.659	2.487	1.50	44.66	2.073	0.414
23	0.0263	35.130	35.1	0.7	0.868	1.644	2.512	1.53	44.87	2.078	0.434
24	0.0273	35.974	36.0	0.7	0.889	1.627	2.516	1.55	45.10	2.071	0.444
25	0.0291	36.964	37.0	0.7	0.913	1.607	2.520	1.57	45.38	2.064	0.456
26	0.0299	38.016	38.0	0.8	0.939	1.591	2.530	1.59	45.60	2.060	0.469
27	0.0330	38.935	38.9	0.8	0.961	1.567	2.527	1.61	45.94	2.047	0.480
28	0.0340	40.188	40.2	0.9	0.991	1.553	2.544	1.64	46.13	2.048	0.496
29	0.0348	39.100	39.1	0.9	0.964	1.547	2.512	1.62	46.21	2.030	0.482
30	0.0357	40.204	40.2	0.9	0.991	1.540	2.531	1.64	46.32	2.035	0.496
31	0.0418	43.142	43.1	1.1	1.062	1.479	2.541	1.72	47.16	2.010	0.531
32	0.0452	44.345	44.3	1.2	1.091	1.453	2.543	1.75	47.53	1.998	0.545
33	0.0488	46.982	47.0	1.3	1.154	1.414	2.569	1.82	48.05	1.992	0.577
34	0.0533	47.899	47.9	1.4	1.117	1.391	2.508	1.80	48.38	1.949	0.558
35	0.0611	50.188	50.2	1.6	1.162	1.344	2.506	1.86	49.03	1.925	0.581
36	0.0652	52.716	52.7	1.7	1.218	1.322	2.540	1.92	49.34	1.931	0.609
37	0.0687	53.951	54.0	1.8	1.243	1.294	2.536	1.96	49.73	1.915	0.621
38	0.0809	57.108	57.1	2.1	1.306	1.249	2.555	2.05	50.35	1.902	0.653
39	0.0883	58.272	58.3	2.3	1.331	1.218	2.549	2.09	50.79	1.883	0.666
40	0.0961	59.290	59.3	2.5	1.353	1.178	2.531	2.15	51.35	1.854	0.677
41	0.0999	61.187	61.2	2.6	1.398	1.174	2.571	2.19	51.40	1.872	0.699
42	0.1035	60.053	60.1	2.7	1.369	1.153	2.522	2.19	51.69	1.837	0.684
43	0.1083	61.163	61.2	2.8	1.394	1.149	2.543	2.21	51.74	1.846	0.697
44	0.1154	62.713	62.7	3.0	1.428	1.117	2.545	2.28	52.19	1.831	0.714
45	0.1200	64.230	64.2	3.1	1.463	1.115	2.578	2.31	52.21	1.847	0.732
46	0.1236	63.049	63.0	3.2	1.433	1.103	2.536	2.30	52.38	1.819	0.717
47	0.1352	65.766	65.8	3.5	1.494	1.080	2.574	2.38	52.70	1.827	0.747
48	0.1430	64.333	64.3	3.7	1.456	1.051	2.507	2.39	53.10	1.779	0.728
49	0.1467	65.969	66.0	3.8	1.494	1.055	2.549	2.42	53.04	1.802	0.747
50	0.1509	66.795	66.8	3.9	1.512	1.041	2.553	2.45	53.24	1.797	0.756
51	0.1544	68.063	68.1	4.0	1.540	1.032	2.573	2.49	53.36	1.803	0.770
52	0.1586	67.157	67.2	4.1	1.517	1.035	2.552	2.47	53.32	1.794	0.759
53	0.1657	67.949	67.9	4.3	1.533	1.014	2.547	2.51	53.61	1.781	0.766
54	0.1777	68.096	68.1	4.6	1.531	1.006	2.537	2.52	53.73	1.771	0.766
55	0.1861	70.231	70.2	4.8	1.578	0.996	2.574	2.58	53.87	1.785	0.789
56	0.2034	70.099	70.1	5.3	1.567	0.980	2.547	2.60	54.10	1.763	0.783
57	0.2224	71.184	71.2	5.8	1.584	0.965	2.549	2.64	54.30	1.757	0.792
58	0.2326	71.800	71.8	6.0	1.594	0.957	2.550	2.67	54.41	1.754	0.797
59	0.2518	70.767	70.8	6.5	1.561	0.945	2.505	2.65	54.58	1.725	0.780
60	0.2705	71.726	71.7	7.0	1.574	0.941	2.515	2.67	54.64	1.728	0.787
61	0.2801	72.556	72.6	7.2	1.589	0.927	2.517	2.71	54.82	1.722	0.795
62	0.2897	73.464	73.5	7.5	1.605	0.927	2.532	2.73	54.83	1.730	0.803
63	0.3082	73.503	73.5	8.0	1.598	0.924	2.522	2.73	54.87	1.723	0.799
64	0.3192	75.066	75.1	8.3	1.714	0.932	2.646	2.84	54.75	1.789	0.857
65	0.3289	74.866	74.9	8.5	1.619	0.928	2.547	2.74	54.81	1.738	0.809
66	0.3483	73.378	73.4	9.0	1.576	0.920	2.495	2.71	54.93	1.708	0.788
67	0.3588	73.158	73.2	9.3	1.566	0.917	2.483	2.71	54.96	1.700	0.783

Test Readings for Specimen No. 3

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Eff. Stress tsf	Major Eff. Stress tsf	1:3 Ratio	Pore Press. psi	P tsf	Q tsf
68	0.3680	72.381	72.4	9.5	1.544	0.921	2.465	2.68	54.91	1.693	0.772
69	0.3883	69.613	69.6	10.0	1.473	0.921	2.394	2.60	54.91	1.657	0.736
70	0.4065	68.140	68.1	10.5	1.432	0.929	2.360	2.54	54.80	1.645	0.716
71	0.4264	67.628	67.6	11.0	1.412	0.937	2.349	2.51	54.68	1.643	0.706
72	0.4361	66.797	66.8	11.3	1.389	0.940	2.329	2.48	54.64	1.635	0.695
73	0.4449	65.059	65.1	11.5	1.347	0.937	2.284	2.44	54.69	1.610	0.673
74	0.4556	64.772	64.8	11.8	1.336	0.944	2.281	2.41	54.58	1.612	0.668
75	0.4747	62.873	62.9	12.3	1.287	0.944	2.231	2.36	54.58	1.588	0.643
76	0.4842	61.642	61.6	12.5	1.256	0.955	2.211	2.31	54.43	1.583	0.628
77	0.4942	62.950	63.0	12.8	1.281	0.952	2.233	2.34	54.48	1.592	0.640
78	0.5046	63.598	63.6	13.1	1.290	0.943	2.233	2.37	54.61	1.588	0.645
79	0.5237	62.317	62.3	13.6	1.255	0.943	2.198	2.33	54.60	1.570	0.627
80	0.5337	63.055	63.1	13.8	1.267	0.954	2.221	2.33	54.45	1.587	0.633
81	0.5437	63.337	63.3	14.1	1.269	0.955	2.224	2.33	54.43	1.590	0.634
82	0.5626	63.381	63.4	14.6	1.262	0.957	2.219	2.32	54.41	1.588	0.631
83	0.5821	62.876	62.9	15.1	1.243	0.956	2.200	2.30	54.42	1.578	0.622







Sample No.		1	2	3
Initial	Water Content, %	79.8	102.3	109.0
	Dry Density, pcf	51.5	44.4	42.7
	Saturation, %	94.7	98.8	99.9
	Void Ratio	2.2758	2.7952	2.9445
	Diameter, in.	2.50	2.50	2.50
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	55.0	56.1	49.0
	Dry Density, pcf	64.0	63.0	67.5
	Saturation, %	90.8	90.3	88.2
	Void Ratio	1.6354	1.6767	1.4983
	Diameter, in.	2.50	2.50	2.50
	Height, in.	0.81	0.71	0.63
Normal Stress, tsf		0.540	1.523	3.060
Fail. Stress, tsf		0.322	0.746	1.329
Displacement, in.		0.24	0.19	0.14
Ult. Stress, tsf				
Displacement, in.				
Strain rate, %/min.		0.01	0.02	0.01

Sample Type: Undisturbed
Description: Gray FAT CLAY

LL= 113 **PL=** 41 **PI=** 72
Assumed Specific Gravity= 2.70
Remarks: Test method: ASTM D 3080

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: 07-227 **Depth:** 8-10
Sample Number: 5
Proj. No.: 08.18.920 **Date Sampled:** 8/21/08

DIRECT SHEAR TEST REPORT

Tolunay-Wong Engineers, Inc.

DIRECT SHEAR TEST

9/2/2008

Date: 8/21/08
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: 07-227
Depth: 8-10 **Sample Number:** 5
Description: Gray FAT CLAY
Remarks: Test method: ASTM D 3080
Type of Sample: Undisturbed
Assumed Specific Gravity=2.70 **LL=**113 **PL=**41 **PI=**72

Parameters for Specimen No. 1

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	331.210		314.690
Moisture content: Dry soil+tare, gms.	278.180		278.180
Moisture content: Tare, gms.	211.760		211.760
Moisture, %	79.8	55.0	55.0
Moist specimen weight, gms.	119.5		
Diameter, in.	2.50	2.50	
Area, in.^{2}	4.91	4.91	
Height, in.	1.00	0.81	
Net decrease in height, in.		0.20	
Wet Density, pcf	92.5	99.1	
Dry density, pcf	51.5	64.0	
Void ratio	2.2758	1.6354	
Saturation, %	94.7	90.8	

Test Readings for Specimen No. 1

Normal stress = 0.54 tsf
Strain rate, %/min. = 0.01
Fail. Stress = 0.322 tsf **at reading no.** 70

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Shear Stress tsf	Vertical Def. Dial in.
0	0.0732	0.000	0.0	0.000	0.8411
1	0.0733	0.000	0.0	0.000	0.8411
2	0.0734	2.008	2.0	0.029	0.8411
3	0.0744	1.923	1.9	0.028	0.8435
4	0.0754	2.282	2.3	0.033	0.8441
5	0.0764	2.517	2.5	0.037	0.8444
6	0.0774	2.761	2.8	0.040	0.8447
7	0.0814	3.285	3.3	0.048	0.8455
8	0.0824	3.802	3.8	0.056	0.8459
9	0.0834	4.088	4.1	0.060	0.8461
10	0.0839	4.380	4.4	0.064	0.8462
11	0.0844	4.785	4.8	0.070	0.8463
12	0.0854	5.196	5.2	0.076	0.8466
13	0.0859	5.601	5.6	0.082	0.8467

Test Readings for Specimen No. 1

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Shear Stress tsf	Vertical Def. Dial in.
14	0.0864	5.993	6.0	0.088	0.8468
15	0.0874	6.345	6.3	0.093	0.8472
16	0.0894	6.806	6.8	0.100	0.8476
17	0.0904	7.030	7.0	0.103	0.8477
18	0.0909	6.699	6.7	0.098	0.8477
19	0.0914	6.984	7.0	0.102	0.8478
20	0.0919	7.363	7.4	0.108	0.8478
21	0.0924	7.631	7.6	0.112	0.8479
22	0.0939	8.227	8.2	0.121	0.8480
23	0.0949	8.491	8.5	0.124	0.8481
24	0.0969	9.216	9.2	0.135	0.8482
25	0.0984	9.444	9.4	0.138	0.8483
26	0.1004	10.003	10.0	0.147	0.8485
27	0.1019	10.333	10.3	0.151	0.8488
28	0.1034	10.712	10.7	0.157	0.8492
29	0.1049	10.067	10.1	0.148	0.8495
30	0.1064	10.881	10.9	0.159	0.8497
31	0.1079	11.497	11.5	0.169	0.8499
32	0.1109	11.732	11.7	0.172	0.8506
33	0.1139	12.224	12.2	0.179	0.8516
34	0.1169	12.709	12.7	0.186	0.8520
35	0.1184	13.011	13.0	0.191	0.8522
36	0.1214	13.364	13.4	0.196	0.8525
37	0.1244	13.605	13.6	0.199	0.8528
38	0.1259	13.929	13.9	0.204	0.8531
39	0.1274	14.194	14.2	0.208	0.8536
40	0.1304	14.694	14.7	0.215	0.8541
41	0.1349	15.041	15.0	0.220	0.8551
42	0.1379	15.305	15.3	0.224	0.8556
43	0.1409	15.671	15.7	0.230	0.8563
44	0.1439	15.936	15.9	0.234	0.8567
45	0.1454	16.206	16.2	0.238	0.8570
46	0.1484	16.458	16.5	0.241	0.8574
47	0.1499	16.751	16.8	0.246	0.8577
48	0.1544	17.101	17.1	0.251	0.8582
49	0.1604	17.356	17.4	0.254	0.8591
50	0.1649	17.628	17.6	0.258	0.8599
51	0.1694	18.191	18.2	0.267	0.8606
52	0.1799	18.484	18.5	0.271	0.8624
53	0.1859	18.886	18.9	0.277	0.8632
54	0.1949	19.255	19.3	0.282	0.8644
55	0.2009	19.710	19.7	0.289	0.8648
56	0.2129	19.996	20.0	0.293	0.8663
57	0.2249	19.968	20.0	0.293	0.8678
58	0.2279	20.341	20.3	0.298	0.8681
59	0.2339	20.652	20.7	0.303	0.8688
60	0.2369	21.048	21.0	0.308	0.8690

Test Readings for Specimen No. 1

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Shear Stress tsf	Vertical Def. Dial in.
61	0.2489	21.205	21.2	0.311	0.8699
62	0.2549	21.478	21.5	0.315	0.8704
63	0.2669	21.690	21.7	0.318	0.8706
64	0.2699	21.913	21.9	0.321	0.8707
65	0.2729	21.361	21.4	0.313	0.8708
66	0.2789	21.826	21.8	0.320	0.8711
67	0.2879	21.518	21.5	0.315	0.8720
68	0.2939	21.908	21.9	0.321	0.8724
69	0.2969	21.649	21.6	0.317	0.8725
70	0.3089	21.973	22.0	0.322	0.8729
71	0.3149	21.596	21.6	0.317	0.8731

Parameters for Specimen No. 2

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	333.760		307.300
Moisture content: Dry soil+tare, gms.	275.140		275.140
Moisture content: Tare, gms.	217.810		217.810
Moisture, %	102.3	56.1	56.1
Moist specimen weight, gms.	116.0		
Diameter, in.	2.50	2.50	
Area, in.^{2}	4.91	4.91	
Height, in.	1.00	0.71	
Net decrease in height, in.		0.30	
Wet Density, pcf	89.8	98.3	
Dry density, pcf	44.4	63.0	
Void ratio	2.7952	1.6767	
Saturation, %	98.8	90.3	

Test Readings for Specimen No. 2

Normal stress = 1.523 tsf

Strain rate, %/min. = 0.02

Fail. Stress = 0.746 tsf **at reading no.** 62

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Shear Stress tsf	Vertical Def. Dial in.
0	0.0000	0.000	0.0	0.000	0.9591
1	0.0003	1.911	1.9	0.028	0.9591
2	0.0004	2.526	2.5	0.037	0.9591
3	0.0005	2.406	2.4	0.035	0.9599
4	0.0060	3.025	3.0	0.044	0.9611
5	0.0105	3.762	3.8	0.055	0.9616
6	0.0120	4.316	4.3	0.063	0.9617
7	0.0135	5.006	5.0	0.073	0.9619
8	0.0155	5.764	5.8	0.084	0.9621
9	0.0175	6.530	6.5	0.096	0.9622
10	0.0185	7.143	7.1	0.105	0.9623
11	0.0195	7.759	7.8	0.114	0.9623
12	0.0200	8.544	8.5	0.125	0.9623
13	0.0245	10.079	10.1	0.148	0.9626

Test Readings for Specimen No. 2

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Shear Stress tsf	Vertical Def. Dial in.
14	0.0255	10.808	10.8	0.158	0.9627
15	0.0270	11.851	11.9	0.174	0.9628
16	0.0285	13.446	13.4	0.197	0.9629
17	0.0300	15.490	15.5	0.227	0.9629
18	0.0315	17.421	17.4	0.255	0.9631
19	0.0330	18.866	18.9	0.277	0.9633
20	0.0345	13.736	13.7	0.201	0.9634
21	0.0360	19.865	19.9	0.291	0.9636
22	0.0375	21.458	21.5	0.314	0.9639
23	0.0390	22.734	22.7	0.333	0.9644
24	0.0405	23.361	23.4	0.342	0.9650
25	0.0420	24.056	24.1	0.353	0.9655
26	0.0435	25.331	25.3	0.371	0.9658
27	0.0450	25.958	26.0	0.380	0.9659
28	0.0465	27.294	27.3	0.400	0.9662
29	0.0480	28.118	28.1	0.412	0.9664
30	0.0495	28.707	28.7	0.421	0.9666
31	0.0510	29.565	29.6	0.433	0.9668
32	0.0525	30.294	30.3	0.444	0.9670
33	0.0540	31.066	31.1	0.455	0.9671
34	0.0555	32.054	32.1	0.470	0.9675
35	0.0585	32.750	32.8	0.480	0.9684
36	0.0600	33.833	33.8	0.496	0.9687
37	0.0615	34.430	34.4	0.505	0.9688
38	0.0645	35.439	35.4	0.519	0.9694
39	0.0660	36.242	36.2	0.531	0.9697
40	0.0690	37.190	37.2	0.545	0.9699
41	0.0720	37.952	38.0	0.556	0.9700
42	0.0735	38.564	38.6	0.565	0.9700
43	0.0750	39.117	39.1	0.573	0.9702
44	0.0795	40.085	40.1	0.587	0.9705
45	0.0825	40.956	41.0	0.600	0.9708
46	0.0855	41.469	41.5	0.608	0.9711
47	0.0885	42.295	42.3	0.620	0.9717
48	0.0915	42.870	42.9	0.628	0.9722
49	0.0960	43.579	43.6	0.639	0.9726
50	0.0990	44.278	44.3	0.649	0.9729
51	0.1035	45.141	45.1	0.662	0.9733
52	0.1065	45.674	45.7	0.669	0.9735
53	0.1125	46.361	46.4	0.679	0.9741
54	0.1185	47.041	47.0	0.689	0.9748
55	0.1245	47.662	47.7	0.699	0.9754
56	0.1335	48.411	48.4	0.710	0.9760
57	0.1425	48.992	49.0	0.718	0.9766
58	0.1485	49.524	49.5	0.726	0.9770
59	0.1605	49.964	50.0	0.732	0.9779
60	0.1725	50.181	50.2	0.735	0.9792

Test Readings for Specimen No. 2

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Shear Stress tsf	Vertical Def. Dial in.
61	0.1845	50.645	50.6	0.742	0.9803
62	0.1875	50.884	50.9	0.746	0.9804
63	0.1935	50.774	50.8	0.744	0.9804
64	0.2055	50.419	50.4	0.739	0.9809
65	0.2175	50.150	50.1	0.735	0.9815
66	0.2295	50.121	50.1	0.735	0.9824
67	0.2415	49.767	49.8	0.729	0.9835

Parameters for Specimen No. 3

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	327.000		293.900
Moisture content: Dry soil+tare, gms.	266.890		266.890
Moisture content: Tare, gms.	211.730		211.730
Moisture, %	109.0	49.0	49.0
Moist specimen weight, gms.	115.3		
Diameter, in.	2.50	2.50	
Area, in.^{2}	4.91	4.91	
Height, in.	1.00	0.63	
Net decrease in height, in.		0.37	
Wet Density, pcf	89.3	100.5	
Dry density, pcf	42.7	67.5	
Void ratio	2.9445	1.4983	
Saturation, %	99.9	88.2	

Test Readings for Specimen No. 3

Normal stress = 3.06 tsf

Strain rate, %/min. = 0.01

Fail. Stress = 1.329 tsf **at reading no.** 59

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Shear Stress tsf	Vertical Def. Dial in.
0	0.0000	0.000	0.0	0.000	1.0465
1	0.0003	2.919	2.9	0.043	1.0465
2	0.0004	2.946	2.9	0.043	1.0466
3	0.0005	2.965	3.0	0.043	1.0468
4	0.0050	4.091	4.1	0.060	1.0472
5	0.0100	5.249	5.2	0.077	1.0473
6	0.0120	6.634	6.6	0.097	1.0474
7	0.0130	7.563	7.6	0.111	1.0474
8	0.0145	8.686	8.7	0.127	1.0475
9	0.0175	7.036	7.0	0.103	1.0477
10	0.0185	8.367	8.4	0.123	1.0478
11	0.0215	9.388	9.4	0.138	1.0479
12	0.0230	10.715	10.7	0.157	1.0479
13	0.0240	12.494	12.5	0.183	1.0479
14	0.0245	13.709	13.7	0.201	1.0479
15	0.0250	14.776	14.8	0.217	1.0479
16	0.0255	16.399	16.4	0.240	1.0479
17	0.0285	22.797	22.8	0.334	1.0481

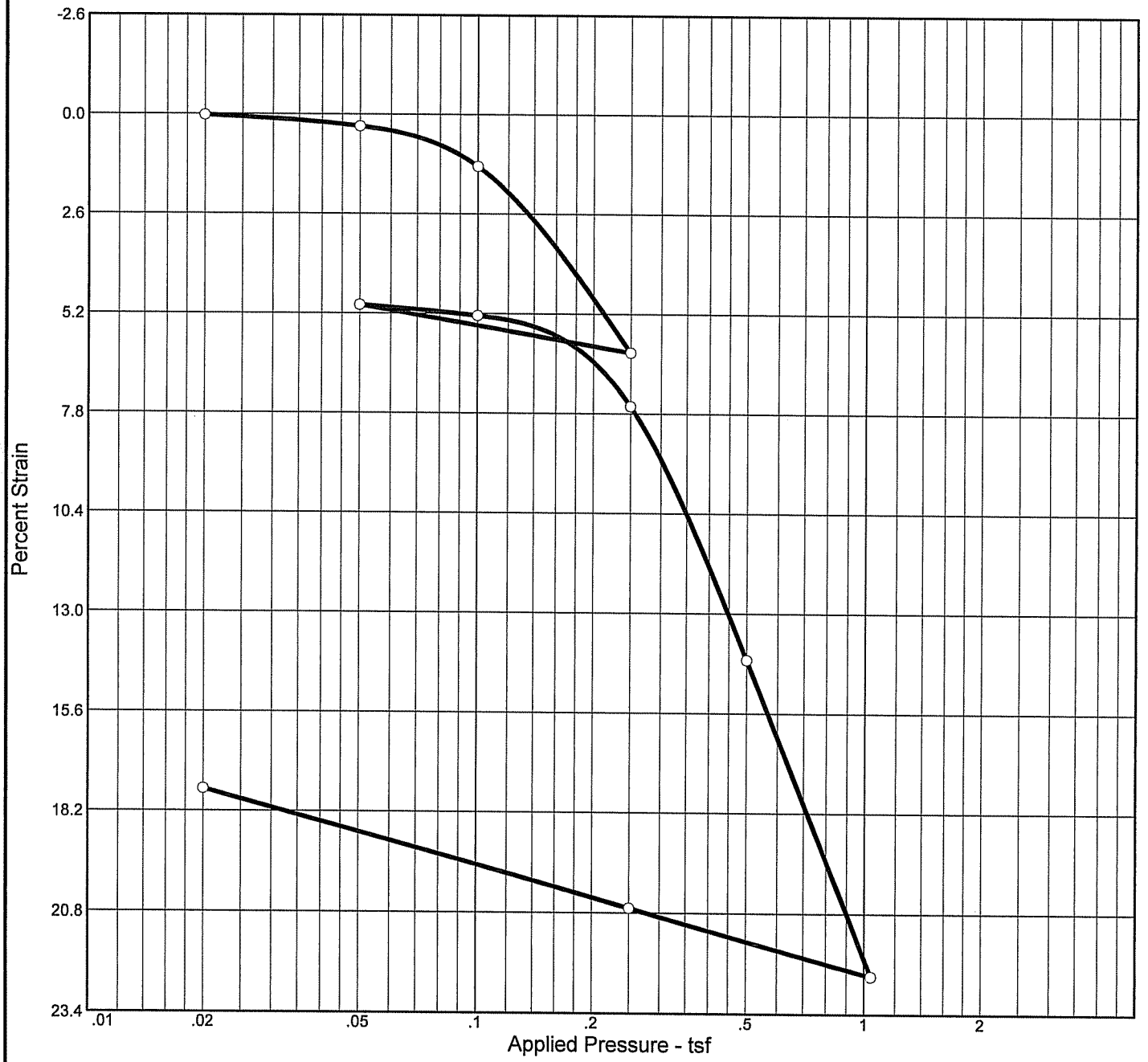
Test Readings for Specimen No. 3

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Shear Stress tsf	Vertical Def. Dial in.
18	0.0300	26.928	26.9	0.395	1.0482
19	0.0315	30.819	30.8	0.452	1.0483
20	0.0330	34.560	34.6	0.507	1.0486
21	0.0345	37.552	37.6	0.550	1.0487
22	0.0360	40.449	40.4	0.593	1.0489
23	0.0375	43.020	43.0	0.630	1.0493
24	0.0390	44.864	44.9	0.658	1.0496
25	0.0405	46.753	46.8	0.685	1.0499
26	0.0420	48.829	48.8	0.716	1.0502
27	0.0435	50.315	50.3	0.737	1.0505
28	0.0450	51.917	51.9	0.761	1.0511
29	0.0465	53.725	53.7	0.787	1.0512
30	0.0480	55.459	55.5	0.813	1.0518
31	0.0495	56.465	56.5	0.828	1.0520
32	0.0510	57.915	57.9	0.849	1.0522
33	0.0525	59.353	59.4	0.870	1.0524
34	0.0540	60.688	60.7	0.889	1.0525
35	0.0555	61.889	61.9	0.907	1.0527
36	0.0570	63.165	63.2	0.926	1.0528
37	0.0585	64.331	64.3	0.943	1.0530
38	0.0600	65.259	65.3	0.956	1.0532
39	0.0615	66.481	66.5	0.974	1.0536
40	0.0630	67.427	67.4	0.988	1.0539
41	0.0645	68.640	68.6	1.006	1.0541
42	0.0660	69.733	69.7	1.022	1.0545
43	0.0675	70.665	70.7	1.036	1.0547
44	0.0690	71.597	71.6	1.049	1.0549
45	0.0720	73.553	73.6	1.078	1.0551
46	0.0750	75.134	75.1	1.101	1.0555
47	0.0765	76.108	76.1	1.115	1.0557
48	0.0795	77.863	77.9	1.141	1.0560
49	0.0825	79.401	79.4	1.164	1.0564
50	0.0855	80.543	80.5	1.180	1.0567
51	0.0885	82.133	82.1	1.204	1.0572
52	0.0930	83.468	83.5	1.223	1.0576
53	0.0960	84.815	84.8	1.243	1.0576
54	0.1005	85.804	85.8	1.258	1.0578
55	0.1035	86.739	86.7	1.271	1.0579
56	0.1095	87.672	87.7	1.285	1.0580
57	0.1185	88.897	88.9	1.303	1.0582
58	0.1275	90.110	90.1	1.321	1.0588
59	0.1365	90.713	90.7	1.329	1.0593
60	0.1485	90.614	90.6	1.328	1.0603
61	0.1605	89.001	89.0	1.304	1.0611
62	0.1695	87.206	87.2	1.278	1.0614
63	0.1785	85.843	85.8	1.258	1.0616
64	0.1875	84.616	84.6	1.240	1.0620

Test Readings for Specimen No. 3

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Shear Stress tsf	Vertical Def. Dial in.
65	0.1965	83.240	83.2	1.220	1.0623
66	0.2085	82.099	82.1	1.203	1.0627
67	0.2205	80.987	81.0	1.187	1.0628
68	0.2325	80.014	80.0	1.173	1.0633
69	0.2445	79.305	79.3	1.162	1.0640

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	USCS	AASHTO	Initial Void Ratio
Saturation	Moisture							
93.5 %	107.1 %	41.2	116	83	2.70	CH		3.093

MATERIAL DESCRIPTION

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

Source: 07-227 **Sample No.:** 7 **Elev./Depth:** 12-14

Tolunay-Wong Engineers, Inc.

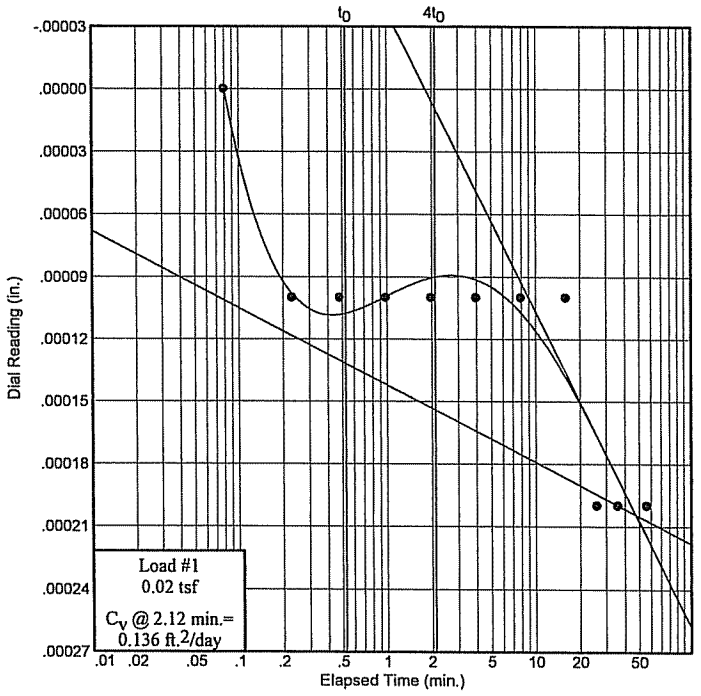
Houston, Texas

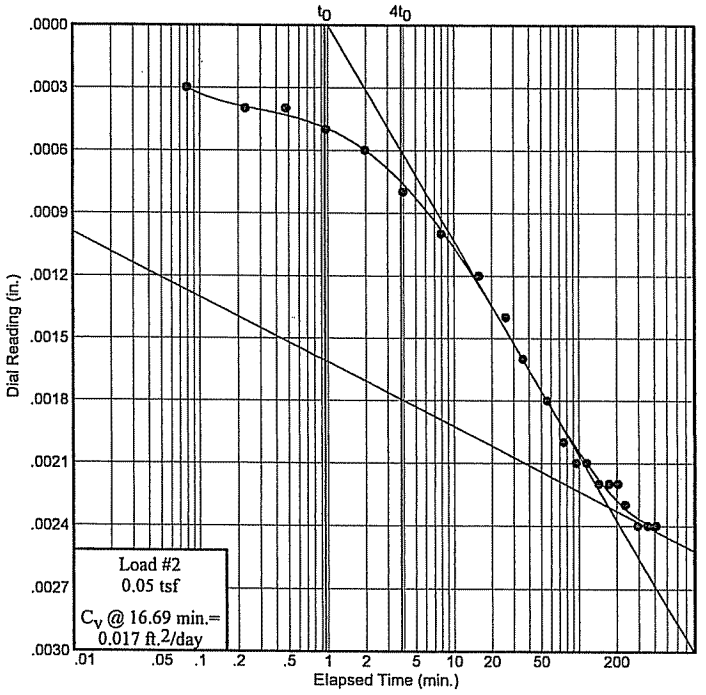
Remarks:

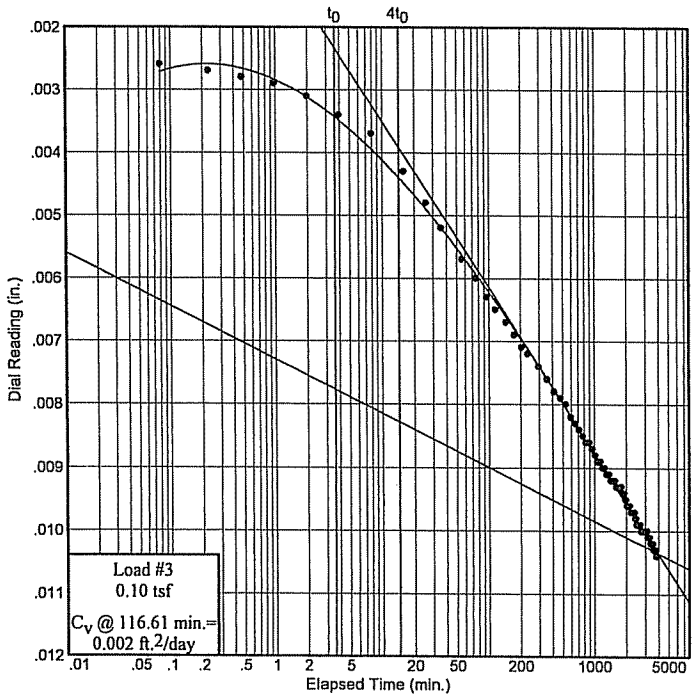
Test method: ASTM D 2435

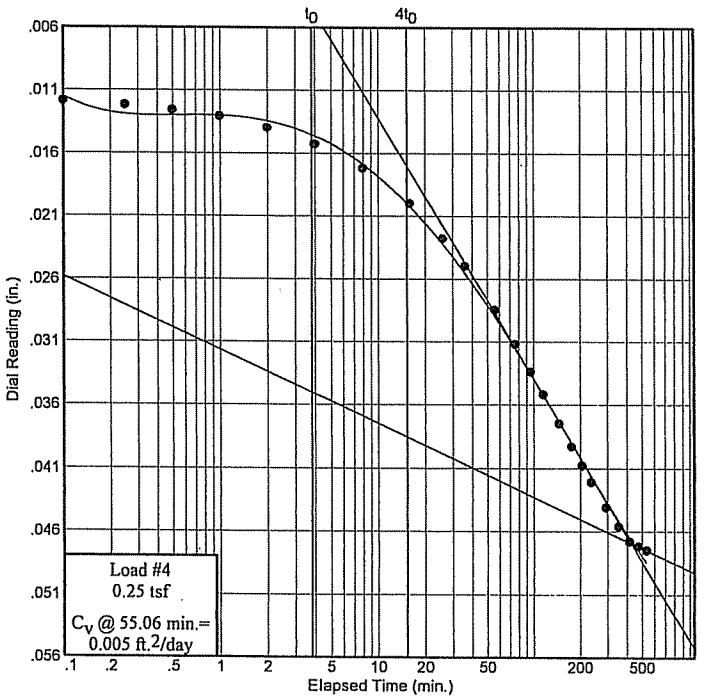
Dial Reading vs. Time

Project No.: 08.18.920
Project: Galveston Channel and San Jacinto PA
Contract No. DACW64-03-D-0008, Task Order No. 0080
Source: 07-227 Sample No.: 7 Elev./Depth: 12-14









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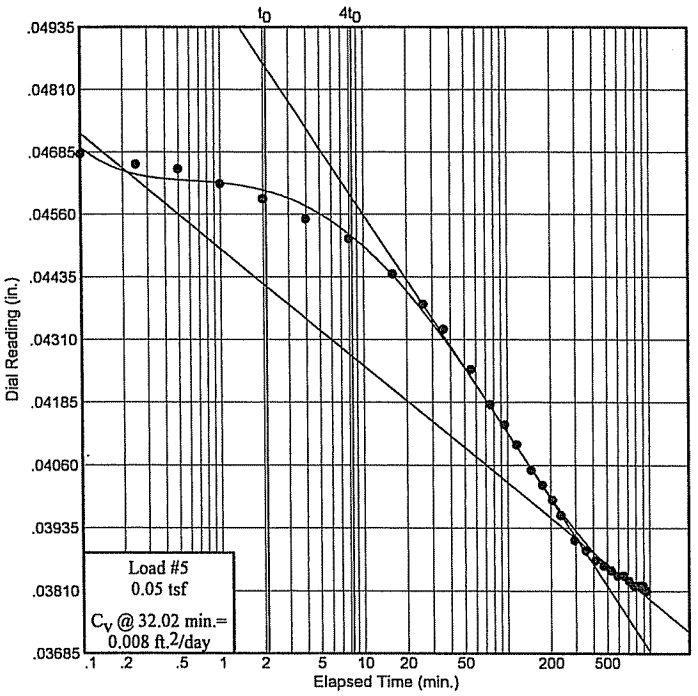
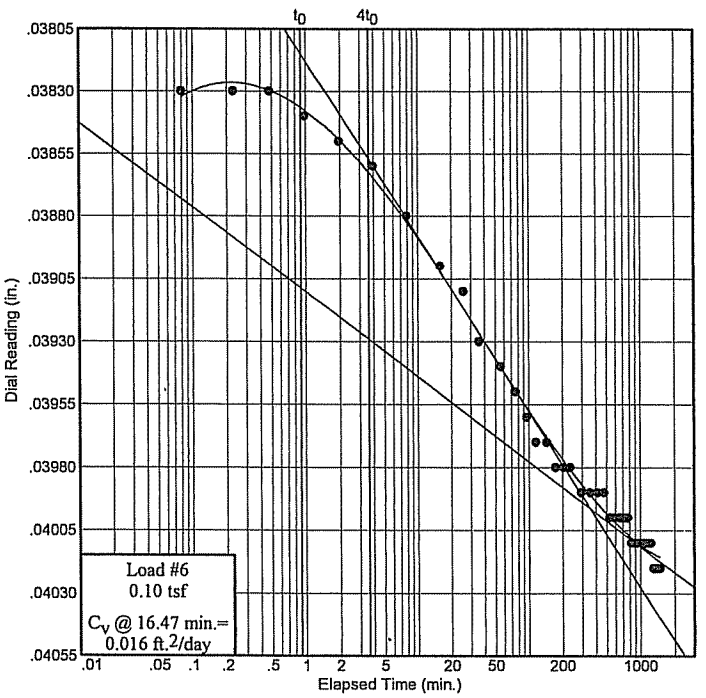
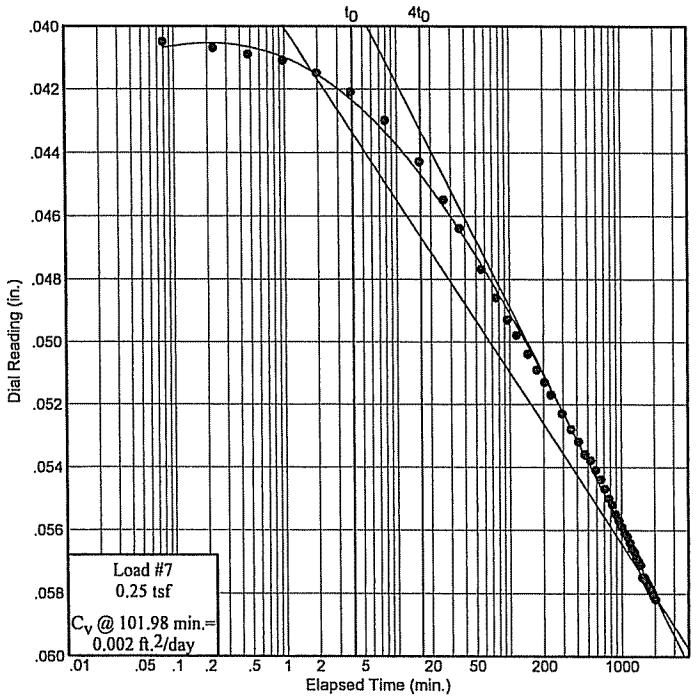
Houston, Texas

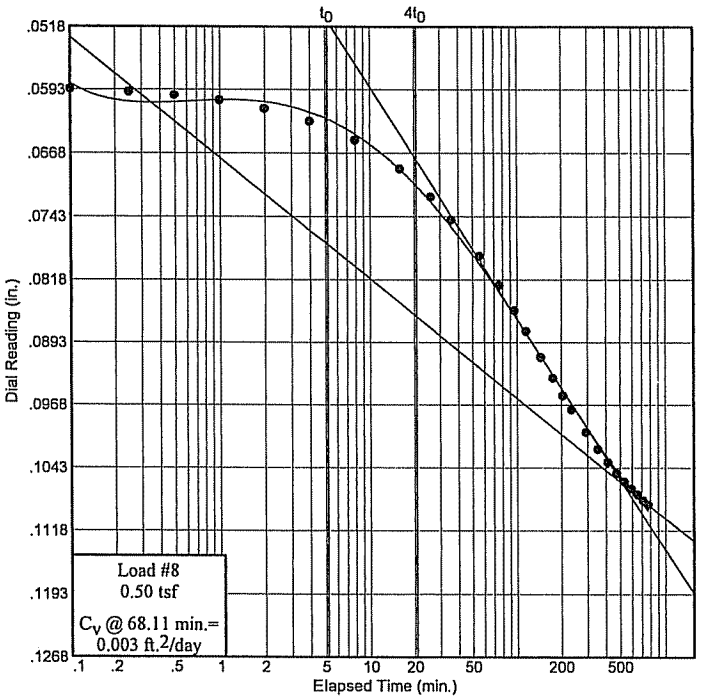
Dial Reading vs. Time

Project No.: 08.18.920
Project: Galveston Channel and San Jacinto PA
Contract No. DACW64-03-D-0008, Task Order No. 0080
Source: 07-227 Sample No.: 7 Elev./Depth: 12-14









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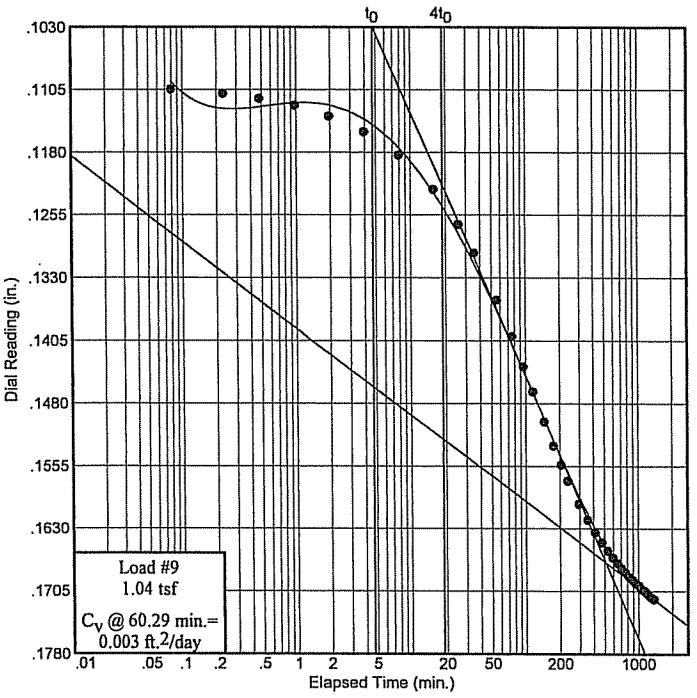
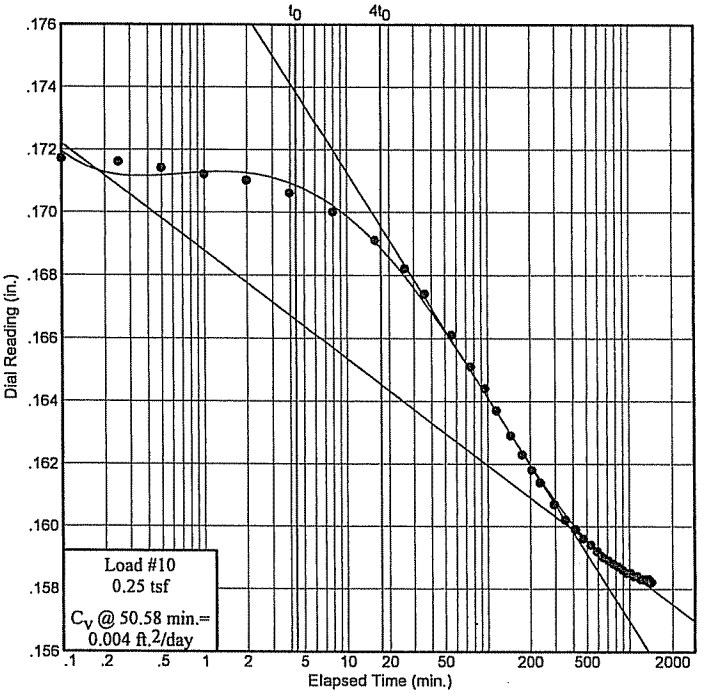
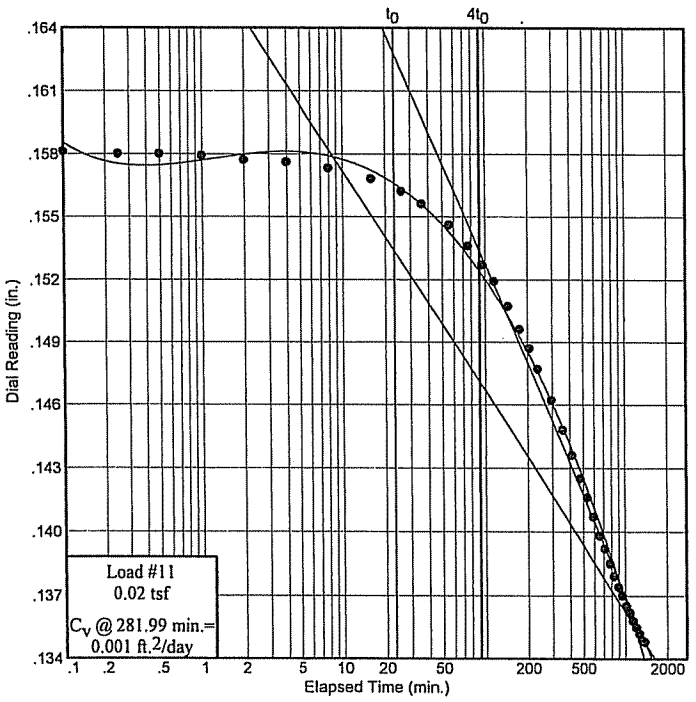
Houston, Texas

Dial Reading vs. Time

Project No.: 08.18.920
Project: Galveston Channel and San Jacinto PA
Contract No. DACW64-03-D-0008, Task Order No. 0080
Source: 07-227 Sample No.: 7 Elev./Depth: 12-14







Tolunay-Wong Engineers, Inc.

Houston, Texas

CONSOLIDATION TEST DATA

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 Number: 08.18.920

Sample Data

Source: 07-227
Sample No.: 7
Elev. or Depth: 12-14 **Sample Length(in./cm.):** 24
Location:
Description: Gray FAT CLAY
Liquid Limit: 116 **Plasticity Index:** 83
USCS: CH **AASHTO:** **Figure No.:**
Testing Remarks: Test method: ASTM D 2435

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST	AFTER TEST
Wet w+t	= 121.92 g.	Consolidometer # = 1	Wet w+t = 113.13 g.
Dry w+t	= 94.85 g.		Dry w+t = 94.85 g.
Tare Wt.	= 69.57 g.	Spec. Gravity = 2.70	Tare Wt. = 69.57 g.
Height	= .76 in.	Height = .76 in.	
Diameter	= 1.97 in.	Diameter = 1.96 in.	
Weight	= 52.35 g.	Defl. Table = 08.18.920.07-227.S.7.12-14.8.27.08	
Moisture	= 107.1 %	Ht. Solids = 0.1869 in.	Moisture = 72.3 %
Wet Den.	= 85.3 pcf	Dry Wt. = 24.92 g.*	Dry Wt. = 25.28 g.
Dry Den.	= 41.2 pcf	Void Ratio = 3.093	Void Ratio = 2.372
Ovrbrdn.	= n/a tsf	Saturation = 93.5 %	

*** Initial dry weight used in calculations**

End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.00000				3.093	
0.02	0.00020	0.00000	0.136	0.000	3.092	0.0 Comprs.
0.05	0.00240	0.00000	0.017	0.000	3.081	0.3 Comprs.
0.10	0.01050	0.00010	0.002	0.001	3.038	1.4 Comprs.
0.25	0.04790	0.00040	0.005	0.008	2.839	6.2 Comprs.
0.05	0.03820	0.00010	0.008		2.890	5.0 Comprs.
0.10	0.04040	0.00020	0.016	0.000	2.878	5.3 Comprs.
0.25	0.05870	0.00050	0.002	0.008	2.782	7.6 Comprs.
0.50	0.10950	0.00080	0.003	0.020	2.512	14.2 Comprs.
1.04	0.17270	0.00120	0.003	0.016	2.176	22.4 Comprs.
0.25	0.15870	0.00050	0.004		2.247	20.7 Comprs.
0.02	0.13500	0.00020	0.001		2.372	17.6 Comprs.

C_c = 1.06 P_c = 0.20 tsf C_r = 0.12

Pressure: 0.02 tsf **TEST READINGS** **Load No. 1**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.00000	11	35.98	0.00020
2	0.08	0.00000	12	55.98	0.00020
3	0.23	0.00010			
4	0.48	0.00010			
5	0.98	0.00010			
6	1.98	0.00010			
7	3.98	0.00010			
8	7.98	0.00010			
9	15.98	0.00010			
10	25.98	0.00020			

Void Ratio = 3.092 **Compression** = 0.0 %
D_0 = 0.00013 D_{50} = 0.00016 D_{100} = 0.00020
C_v **at 2.1 min.** = 0.136 ft.^{2}/day C_α = 0.000

Pressure: 0.05 tsf **TEST READINGS** **Load No. 2**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.00020	9	15.98	0.00120	17	175.98	0.00220
2	0.08	0.00030	10	25.98	0.00140	18	205.98	0.00220
3	0.23	0.00040	11	35.98	0.00160	19	235.98	0.00230
4	0.48	0.00040	12	55.98	0.00180	20	295.98	0.00240
5	0.98	0.00050	13	75.98	0.00200	21	355.98	0.00240
6	1.98	0.00060	14	95.98	0.00210	22	415.98	0.00240
7	3.98	0.00080	15	115.98	0.00210			
8	7.98	0.00100	16	145.98	0.00220			

Void Ratio = 3.081 **Compression** = 0.3 %
D_0 = 0.00023 D_{50} = 0.00127 D_{100} = 0.00231
C_v **at 16.7 min.** = 0.017 ft.^{2}/day C_α = 0.000

Pressure: 0.10 tsf **TEST READINGS** **Load No. 3**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.00240	28	775.98	0.00860	55	2395.98	0.00980
2	0.08	0.00270	29	835.98	0.00870	56	2455.98	0.00990
3	0.23	0.00280	30	895.98	0.00870	57	2515.98	0.01000
4	0.48	0.00290	31	955.98	0.00880	58	2575.98	0.01000
5	0.98	0.00300	32	1015.98	0.00890	59	2635.98	0.01000
6	1.98	0.00320	33	1075.98	0.00900	60	2695.98	0.01000
7	3.98	0.00350	34	1135.98	0.00900	61	2755.98	0.01010
8	7.98	0.00380	35	1195.98	0.00910	62	2815.98	0.01010
9	15.98	0.00440	36	1255.98	0.00910	63	2875.98	0.01010
10	25.98	0.00490	37	1315.98	0.00920	64	2935.98	0.01010
11	35.98	0.00530	38	1375.98	0.00920	65	2995.98	0.01010
12	55.98	0.00580	39	1435.98	0.00930	66	3055.98	0.01010
13	75.98	0.00610	40	1495.98	0.00930	67	3115.98	0.01010
14	95.98	0.00640	41	1555.98	0.00930	68	3175.98	0.01020
15	115.98	0.00660	42	1615.98	0.00940	69	3235.98	0.01020
16	145.98	0.00680	43	1675.98	0.00940	70	3295.98	0.01020
17	175.98	0.00700	44	1735.98	0.00940	71	3355.98	0.01030
18	205.98	0.00720	45	1795.98	0.00940	72	3415.98	0.01030
19	235.98	0.00730	46	1855.98	0.00950	73	3475.98	0.01030
20	295.98	0.00750	47	1915.98	0.00950	74	3535.98	0.01030
21	355.98	0.00770	48	1975.98	0.00960	75	3595.98	0.01040
22	415.98	0.00790	49	2035.98	0.00970	76	3655.98	0.01040
23	475.98	0.00800	50	2095.98	0.00970	77	3715.98	0.01040
24	535.98	0.00810	51	2155.98	0.00970	78	3775.98	0.01040
25	595.98	0.00830	52	2215.98	0.00980	79	3835.98	0.01050
26	655.98	0.00840	53	2275.98	0.00980	80	3895.98	0.01050
27	715.98	0.00850	54	2335.98	0.00980			

Void Ratio = 3.038 **Compression** = 1.4 %
D_0 = 0.00240 D_{50} = 0.00637 D_{100} = 0.01035
C_v **at 116.6 min.** = 0.002 ft.^{2}/day C_α = 0.001

Pressure: 0.25 tsf **TEST READINGS** **Load No. 4**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.01120	9	16.00	0.02040	17	176.00	0.03970
2	0.10	0.01230	10	26.00	0.02320	18	206.00	0.04120
3	0.25	0.01260	11	36.00	0.02540	19	236.00	0.04250
4	0.50	0.01300	12	56.00	0.02890	20	296.00	0.04450
5	1.00	0.01350	13	76.00	0.03160	21	356.00	0.04600
6	2.00	0.01440	14	96.00	0.03380	22	416.00	0.04720
7	4.00	0.01570	15	116.00	0.03560	23	476.00	0.04760
8	8.00	0.01760	16	146.00	0.03790	24	536.00	0.04790

Void Ratio = 2.839 **Compression** = 6.2 %
D_0 = 0.01080 D_{50} = 0.02886 D_{100} = 0.04691
C_v **at 55.1 min.** = 0.005 ft.^{2}/day C_α = 0.008

Pressure: 0.05 tsf **TEST READINGS** **Load No. 5**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.04760	12	56.00	0.04260	23	476.00	0.03870
2	0.10	0.04690	13	76.00	0.04190	24	536.00	0.03860
3	0.25	0.04670	14	96.00	0.04150	25	596.00	0.03850
4	0.50	0.04660	15	116.00	0.04110	26	656.00	0.03850
5	1.00	0.04630	16	146.00	0.04060	27	716.00	0.03840
6	2.00	0.04600	17	176.00	0.04030	28	776.00	0.03830
7	4.00	0.04560	18	206.00	0.04000	29	836.00	0.03830
8	8.00	0.04520	19	236.00	0.03970	30	896.00	0.03830
9	16.00	0.04450	20	296.00	0.03920	31	956.00	0.03820
10	26.00	0.04390	21	356.00	0.03900			
11	36.00	0.04340	22	416.00	0.03880			

Void Ratio = 2.890 **Compression** = 5.0 %
D_0 = 0.04750 D_{50} = 0.04332 D_{100} = 0.03913
C_v **at 32.0 min.** = 0.008 ft.^{2}/day

Pressure: 0.10 tsf **TEST READINGS** **Load No. 6**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.03820	15	115.98	0.03990	29	835.98	0.04030
2	0.08	0.03850	16	145.98	0.03990	30	895.98	0.04030
3	0.23	0.03850	17	175.98	0.04000	31	955.98	0.04030
4	0.48	0.03850	18	205.98	0.04000	32	1015.98	0.04030
5	0.98	0.03860	19	235.98	0.04000	33	1075.98	0.04030
6	1.98	0.03870	20	295.98	0.04010	34	1135.98	0.04030
7	3.98	0.03880	21	355.98	0.04010	35	1195.98	0.04030
8	7.98	0.03900	22	415.98	0.04010	36	1255.98	0.04030
9	15.98	0.03920	23	475.98	0.04010	37	1315.98	0.04040
10	25.98	0.03930	24	535.98	0.04020	38	1375.98	0.04040
11	35.98	0.03950	25	595.98	0.04020	39	1435.98	0.04040
12	55.98	0.03960	26	655.98	0.04020	40	1495.98	0.04040
13	75.98	0.03970	27	715.98	0.04020			
14	95.98	0.03980	28	775.98	0.04020			

Void Ratio = 2.878 **Compression** = 5.3 %
D_0 = 0.03810 D_{50} = 0.03903 D_{100} = 0.03996
C_v **at 16.5 min.** = 0.016 ft.^{2}/day C_α = 0.000

Pressure: 0.25 tsf **TEST READINGS** **Load No. 7**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.04040	18	205.98	0.05180	35	1195.98	0.05690
2	0.08	0.04100	19	235.98	0.05220	36	1255.98	0.05710
3	0.23	0.04120	20	295.98	0.05280	37	1315.98	0.05720
4	0.48	0.04140	21	355.98	0.05330	38	1375.98	0.05740
5	0.98	0.04160	22	415.98	0.05370	39	1435.98	0.05750
6	1.98	0.04200	23	475.98	0.05410	40	1495.98	0.05760
7	3.98	0.04260	24	535.98	0.05430	41	1555.98	0.05800
8	7.98	0.04350	25	595.98	0.05460	42	1615.98	0.05800
9	15.98	0.04480	26	655.98	0.05490	43	1675.98	0.05810
10	25.98	0.04600	27	715.98	0.05520	44	1735.98	0.05820
11	35.98	0.04690	28	775.98	0.05550	45	1795.98	0.05830
12	55.98	0.04820	29	835.98	0.05570	46	1855.98	0.05840
13	75.98	0.04910	30	895.98	0.05600	47	1915.98	0.05850
14	95.98	0.04980	31	955.98	0.05620	48	1975.98	0.05860
15	115.98	0.05030	32	1015.98	0.05640	49	2035.98	0.05870
16	145.98	0.05090	33	1075.98	0.05660			
17	175.98	0.05140	34	1135.98	0.05670			

Void Ratio = 2.782 **Compression** = 7.6 %
D_0 = 0.04020 D_{50} = 0.04913 D_{100} = 0.05806
C_v **at 102.0 min.** = 0.002 ft.^{2}/day C_α = 0.008

Pressure: 0.50 tsf **TEST READINGS** **Load No. 8**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.05880	11	36.00	0.07550	21	356.00	0.10290
2	0.10	0.06010	12	56.00	0.07980	22	416.00	0.10450
3	0.25	0.06040	13	76.00	0.08330	23	476.00	0.10580
4	0.50	0.06080	14	96.00	0.08630	24	536.00	0.10680
5	1.00	0.06140	15	116.00	0.08880	25	596.00	0.10760
6	2.00	0.06240	16	146.00	0.09190	26	656.00	0.10830
7	4.00	0.06390	17	176.00	0.09440	27	716.00	0.10900
8	8.00	0.06610	18	206.00	0.09650	28	776.00	0.10950
9	16.00	0.06950	19	236.00	0.09820			
10	26.00	0.07280	20	296.00	0.10090			

Void Ratio = 2.512 **Compression** = 14.2 %
D_0 = 0.05800 D_{50} = 0.08214 D_{100} = 0.10628
C_v **at 68.1 min.** = 0.003 ft.^{2}/day C_α = 0.020

Pressure: 1.04 tsf **TEST READINGS** **Load No. 9**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.11000	14	95.98	0.14480	27	715.98	0.16900
2	0.08	0.11170	15	115.98	0.14780	28	775.98	0.16950
3	0.23	0.11220	16	145.98	0.15140	29	835.98	0.17000
4	0.48	0.11280	17	175.98	0.15430	30	895.98	0.17040
5	0.98	0.11360	18	205.98	0.15660	31	955.98	0.17080
6	1.98	0.11490	19	235.98	0.15850	32	1015.98	0.17110
7	3.98	0.11680	20	295.98	0.16130	33	1075.98	0.17150
8	7.98	0.11960	21	355.98	0.16320	34	1135.98	0.17170
9	15.98	0.12370	22	415.98	0.16470	35	1195.98	0.17200
10	25.98	0.12790	23	475.98	0.16590	36	1255.98	0.17230
11	35.98	0.13130	24	535.98	0.16690	37	1315.98	0.17250
12	55.98	0.13690	25	595.98	0.16770	38	1375.98	0.17270
13	75.98	0.14120	26	655.98	0.16840			

Void Ratio = 2.176 **Compression** = 22.4 %
D_0 = 0.10880 D_{50} = 0.13793 D_{100} = 0.16707
C_v **at 60.3 min.** = 0.003 ft.^{2}/day C_α = 0.016

Pressure: 0.25 tsf **TEST READINGS** **Load No. 10**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.17290	14	96.00	0.16490	27	716.00	0.15940
2	0.10	0.17220	15	116.00	0.16420	28	776.00	0.15930
3	0.25	0.17210	16	146.00	0.16340	29	836.00	0.15920
4	0.50	0.17190	17	176.00	0.16280	30	896.00	0.15910
5	1.00	0.17170	18	206.00	0.16230	31	956.00	0.15900
6	2.00	0.17150	19	236.00	0.16190	32	1016.00	0.15900
7	4.00	0.17110	20	296.00	0.16120	33	1076.00	0.15890
8	8.00	0.17050	21	356.00	0.16070	34	1136.00	0.15890
9	16.00	0.16960	22	416.00	0.16040	35	1196.00	0.15880
10	26.00	0.16870	23	476.00	0.16010	36	1256.00	0.15880
11	36.00	0.16790	24	536.00	0.15990	37	1316.00	0.15880
12	56.00	0.16660	25	596.00	0.15970	38	1376.00	0.15880
13	76.00	0.16560	26	656.00	0.15950	39	1436.00	0.15870

Void Ratio = 2.247 **Compression** = 20.7 %
D_0 = 0.17240 D_{50} = 0.16618 D_{100} = 0.15997
C_v **at 50.6 min.** = 0.004 ft.^{2}/day

Pressure: 0.02 tsf | TEST READINGS | Load No. 11

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.15870	14	96.00	0.15290	27	716.00	0.13940
2	0.10	0.15830	15	116.00	0.15210	28	776.00	0.13870
3	0.25	0.15820	16	146.00	0.15090	29	836.00	0.13810
4	0.50	0.15820	17	176.00	0.14980	30	896.00	0.13760
5	1.00	0.15810	18	206.00	0.14890	31	956.00	0.13720
6	2.00	0.15790	19	236.00	0.14790	32	1016.00	0.13670
7	4.00	0.15780	20	296.00	0.14640	33	1076.00	0.13640
8	8.00	0.15750	21	356.00	0.14500	34	1136.00	0.13600
9	16.00	0.15700	22	416.00	0.14380	35	1196.00	0.13570
10	26.00	0.15640	23	476.00	0.14270	36	1256.00	0.13540
11	36.00	0.15580	24	536.00	0.14180	37	1316.00	0.13510
12	56.00	0.15480	25	596.00	0.14090	38	1376.00	0.13500
13	76.00	0.15380	26	656.00	0.14000			

Void Ratio = 2.372 **Compression** = 17.6 %

D_0 = 0.15820 D_{50} = 0.14646 D_{100} = 0.13472

C_v **at 282.0 min.** = 0.001 ft.^{2}/day

Hole No. 07-227

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=13688475 E=3318642	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: 4/22/08 COMPLETED: 4/22/08
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, brown & gray -w/ roots @ 0' - 4'		1			0.50	67.3	48.8				
			-very soft @ 2' - 5'		2			0.25	67.2	55.5	88	24	64	92.7
5			-gray below 4'		3			0.0	67.9	56.2				
					4			0.0	49.8	83.5				
					5			0.0	51.5	79.8	113	41	72	94
10			-w/ slickensides @ 10' - 12'		6			0.0	70.3	46.6	64	22	42	
			-w/ sand seams on bottom of 12' - 14' sample		7			0.0	41.2	107.1	116	33	83	99.5
			-w/ sand seams on bottom of 14' - 15' sample		8			0.0	54.8	88.5				
15			**SILTY SAND (SM)**, gray		9									
			POORLY GRADED SAND WITH SILT (SP-SM), dense, gray		10		43							5.5
			-very dense below 18.5'		11		63							7.7
20														
25														
30														

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

ENG FORM: SWG 1836 BOR