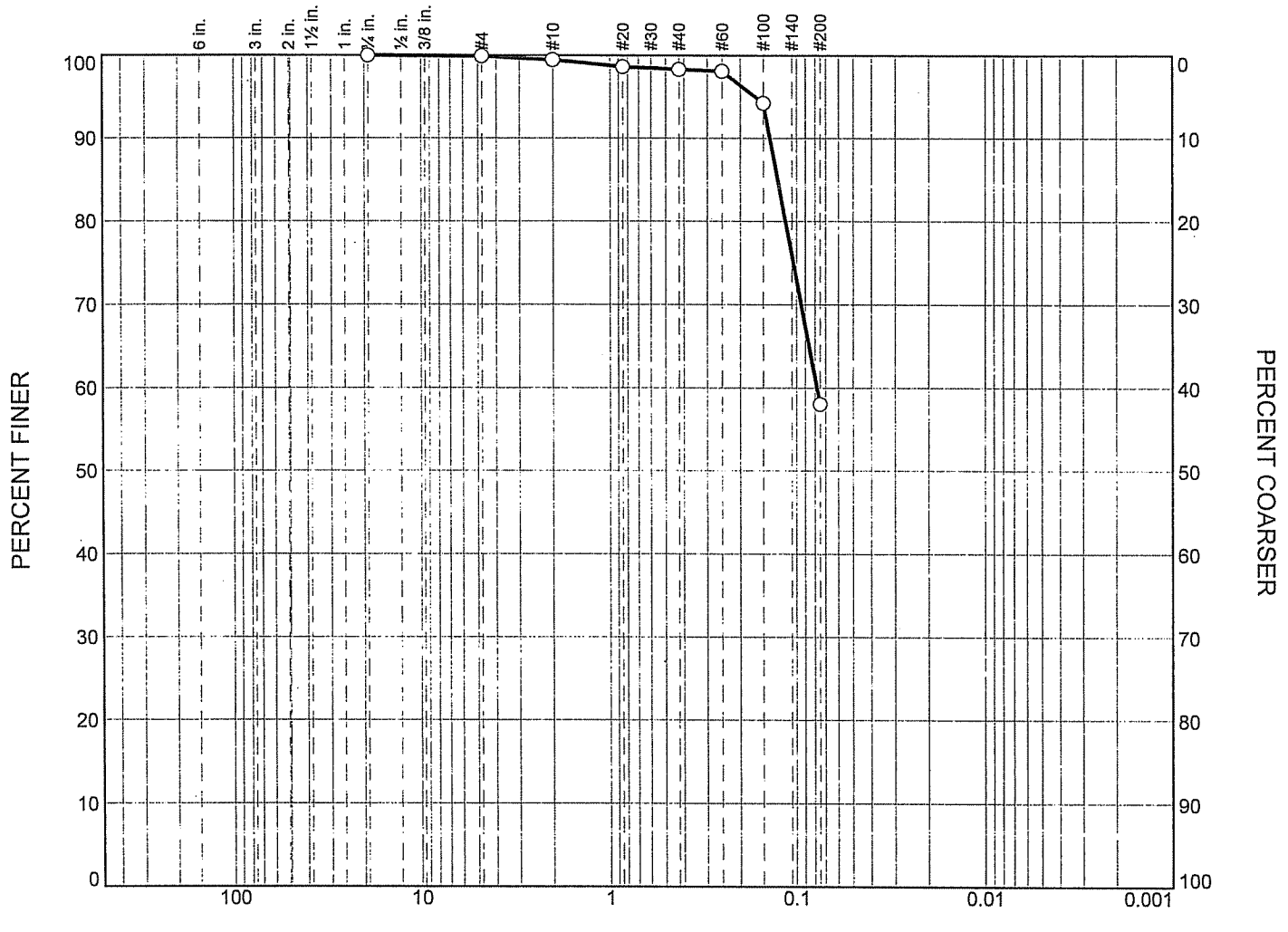
Tolunay-Wong Engineers, Inc.

Project Number:	08.18.921	Client:	United Army Corps of Engineers	Date:	9/18/08
Project Name:	Chocolate Bayou Placement Area DACW64-03-D-0008; Task Order 0079				

Boring No.	Sample No.	Sample Depth (ft)	Soil Description	USCS	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Finer than #200 sieve (%)	Uc/UU Compr. Strength (tsf)	Failure Strain (%)	Confining Pressure (psi)	Failure Type
08-79			**El. 8.75, E=3186743 N=13647040**											
	2	2-4	Gray FAT CLAY; calcareous nodules	CH	20.9	103.9								
	3	4-6	Tan and gray FAT CLAY; calcareous nodules	CH	21.0	105.8								
	4	6-8	Reddish-brown and gray SANDY LEAN CLAY	CL	22.7									
	5	8-10	Reddish-brown and tan LEAN CLAY; calcareous nodules	CL	22.6	101.5	25	15	10	86.1	2.44	11.7	9	Bulge
	6	10-12	Reddish-brown SANDY LEAN CLAY	CL	24.3									
	7	12-14	Reddish-brown SANDY LEAN CLAY	CL	26.5					56.7				
	8	14-16	Reddish-brown SANDY SILT	ML	26.6					58.0				
	9	16-18	Reddish-brown SILTY SAND	SM	29.3									
	10	18-20	Reddish-brown SILTY SAND	SM	30.4					48.6				
08-80			**El. 11.50, E=3185851 N=13647657**											
	2	2-4	Tan and gray SANDY LEAN CLAY	CL	11.5	105.4								
	3	4-6	Tan and gray SANDY LEAN CLAY	CL	16.9	109.6								
	4	6-8	Reddish-brown and gray FAT CLAY	CH	33.3	87.9								
	5	8-10	Reddish-brown SANDY LEAN CLAY	CL	23.6					59.4				
	6	10-12	Reddish-brown and gray LEAN CLAY	CL	24.6					92.9				
	7	12-14	Reddish-brown and gray FAT CLAY	CH	23.5	100.5	55	20	35	98.9	2.50	14.6		60 degree
	8	14-16	Reddish-brown and gray FAT CLAY	CH	23.1	103.2								
	9	16-18	Reddish-brown and gray FAT CLAY	CH	24.3	101.5								
	10	18-20	Reddish-brown and gray FAT CLAY; calcareous nodules	CH	25.3	101.5								
08-81			**El. 9.00, E=3185030 N=13648226**											
	2	2-4	Gray and tan SANDY LEAN CLAY	CL	9.9	113.5								
	3	4-6	Tan and gray SANDY LEAN CLAY	CL	19.0	106.5								
	4	6-8	Tan and gray SANDY LEAN CLAY	CL	18.3	107.3								
	5	8-10	Reddish-brown and gray SILTY SAND	SM	25.2	101.9								
	6	10-12	Tan and gray SILT	ML	25.9					95.8				
	7	12-14	Reddish-brown and gray FAT CLAY with SAND	CH	32.9	90.5	57	20	37	80.0	1.30	7.5	12	45 degree
	8	14-16	Tan and gray SILTY SAND	SM	24.4									
	9	16-18	Reddish-brown and gray FAT CLAY	CH	35.0					97.5				
	10	18-20	Reddish-brown and gray SANDY LEAN CLAY	CL	22.3									
08-82			**El. 12.00, E=3184209 N=13648793**											
	2	2-4	Tan and gray SANDY LEAN CLAY	CL	19.8	106.7								
	3	4-6	Tan and gray SANDY LEAN CLAY; ferrous nodules	CL	16.8	111.3	33	16	17	64.1	2.10	15	6	Vertical shear
	4	6-8	Reddish-brown and gray SILTY SAND	SM	24.9					21.4				
	5	8-10	Reddish-brown and gray SILTY SAND	SM	25.3					23.7				
	7	12-14	Reddish-brown and gray SILTY SAND	SM	26.4					16.8				
	10	18-20	Reddish-brown and gray SILTY SAND	SM	24.0					17.8				
08-83			**El. 11.75, E=3183367 N=13648831**											
	2	2-4	Gray and tan SANDY LEAN CLAY	CL	15.2	109.0								
	3	4-6	Tan and gray SANDY LEAN CLAY	CL	19.6	109.0								
	4	6-8	Tan and reddish-brown SANDY SILTY CLAY	CL-ML	19.7	106.9	22	15	7	69.6	1.90	11	8	Bulge
	5	8-10	Tan and gray SILTY SAND	SM	27.2					25.3				
	7	12-14	Tan and gray SILTY SAND	SM	30.3					24.1				
	10	18-20	Tan and gray SILTY SAND	SM	30.3		NV	NP	NP	19.5				
08-84			**El. 9.75, E=3182831 N=13648199**											
	2	2-4	Tan and gray SANDY LEAN CLAY	CL	20.9	102.3								
	3	4-6	Reddish-brown and gray FAT CLAY	CH	27.3	96.0								
	4	6-8	Reddish-brown and gray FAT CLAY	CH	24.9	100.7								
	5	8-10	Reddish-brown and gray FAT CLAY	CH	25.5	98.8	75	23	52	99.1	1.41	11.5	9	60 degree
	6	10-12	Reddish-brown and gray FAT CLAY	CH	27.4	97.4								
	7	12-14	Reddish-brown and gray FAT CLAY; calcareous nodules	CH	27.1	95.9								

Particle Size Analysis - ASTM D 422



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.1	0.4	1.2	40.3	58.0	

SOIL DATA

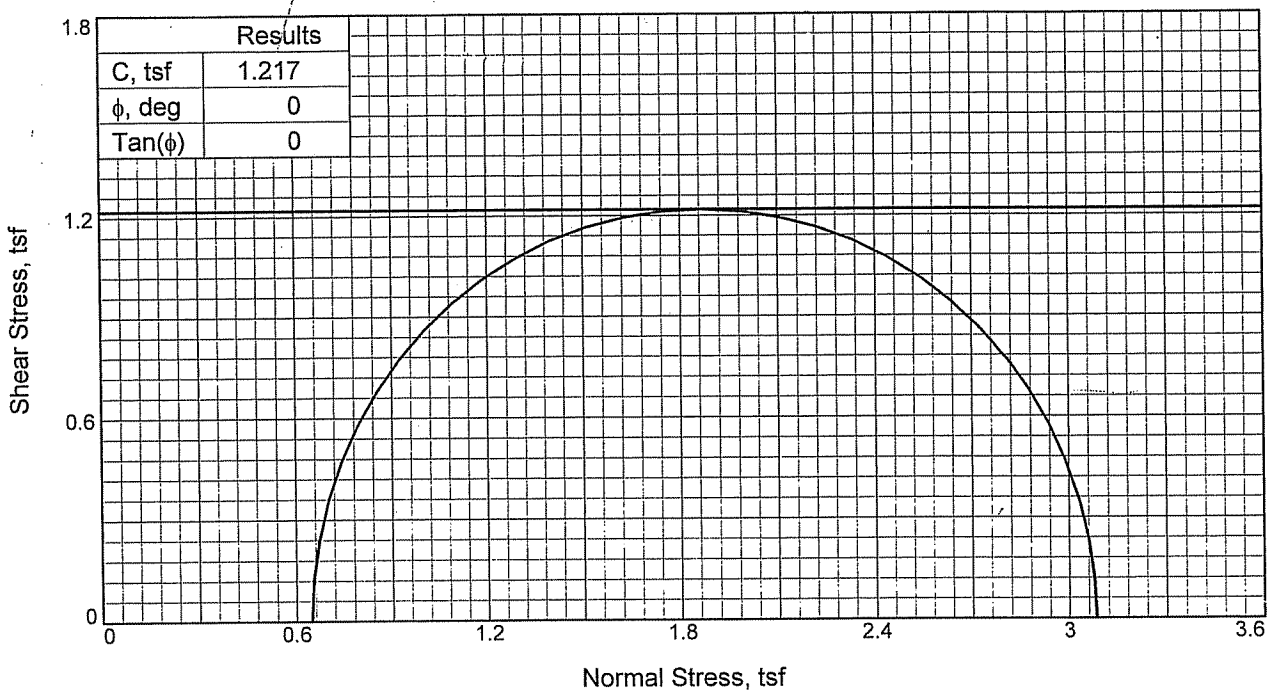
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	08-79	8	14-16	Reddish-brown SANDY SILT	ML

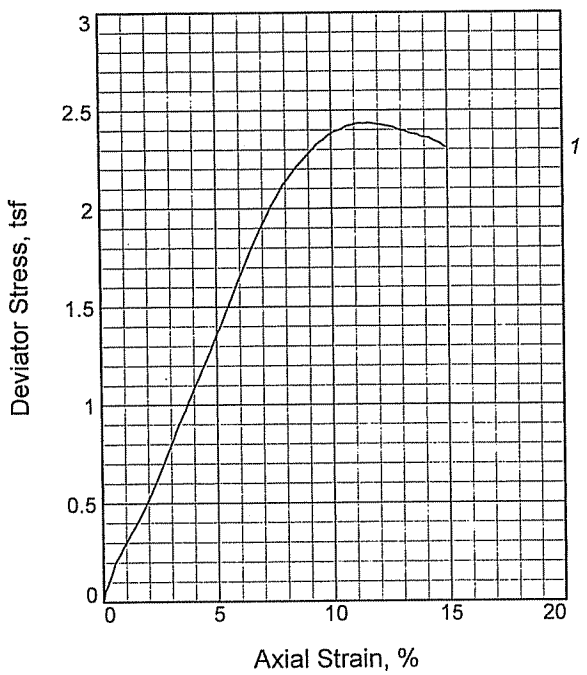
Tolunay-Wong Engineers, Inc.
Houston, Texas

Client: United States Army Corps of Engineers

Project: Chocolate Bayou Placement Area
Contract DACW64-03-D-0008; Task Order 0079

Project No.: 08.18.921





Sample No.		1
Initial	Water Content, %	22.6
	Dry Density, pcf	101.5
	Saturation, %	92.3
	Void Ratio	0.6604
	Diameter, in.	2.90
	Height, in.	5.97
At Test	Water Content, %	22.9
	Dry Density, pcf	101.5
	Saturation, %	93.5
	Void Ratio	0.6604
	Diameter, in.	2.90
	Height, in.	5.97
Strain rate, %/min.		1.00
Back Pressure, tsf		0.00
Cell Pressure, tsf		0.65
Fail. Stress, tsf		2.43
Ult. Stress, tsf		
σ_1 Failure, tsf		3.08
σ_3 Failure, tsf		0.65

Type of Test:
Unconsolidated Undrained

Sample Type: Undisturbed

Description: Reddish-brown and tan LEAN CLAY; calcareous

LL= 25 **PL=** 15 **PI=** 10

Assumed Specific Gravity= 2.70

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

Client: United States Army Corps of Engineers

Project: Chocolate Bayou Placement Area
Contract DACW64-03-D-0008; Task Order 0079

Source of Sample: 08-79 **Depth:** 8-10

Sample Number: 5

Proj. No.: 08.18.921 **Date Sampled:** 8/14/08

TRIAXIAL SHEAR TEST REPORT

Tolunay-Wong Engineers, Inc.

TRIAXIAL COMPRESSION TEST

Unconsolidated Undrained

8/19/2008
12:42 PM

Date: 8/14/08
Client: United States Army Corps of Engineers
Project: Chocolate Bayou Placement Area
Contract DACW64-03-D-0008; Task Order 0079
Project No.: 08.18.921
Location: 08-79
Depth: 8-10 **Sample Number:** 5
Description: Reddish-brown and tan LEAN CLAY; calcareous
Remarks:
Test method: ASTM D 2850
Pocket pen; tsf: 0.75
Failure type: Bulge
Type of Sample: Undisturbed
Assumed Specific Gravity=2.70 **LL=**25 **PL=**15 **PI=**10
Test Method: ASTM D 2850

Parameters for Specimen No. 1

Specimen Parameter	Initial	Final
Moisture content: Moist soil+tare, gms.	155.030	134.310
Moisture content: Dry soil+tare, gms.	132.150	115.210
Moisture content: Tare, gms.	30.810	31.730
Moisture, %	22.6	22.9
Moist specimen weight, gms.	1288.9	
Diameter, in.	2.90	
Area, in.^{2}	6.61	
Height, in.	5.97	
Wet Density, pcf	124.4	
Dry density, pcf	101.5	
Void ratio	0.6604	
Saturation, %	92.3	

Test Readings for Specimen No. 1

Membrane modulus = .130 kN/cm^2
Membrane thickness = .031 cm
Cell pressure = 9.00 psi (0.648 tsf)
Back pressure = 0.00 psi (0.000 tsf)
Strain rate, %/min. = 1.00
Fail. Stress = 2.435 tsf **at reading no.** 61

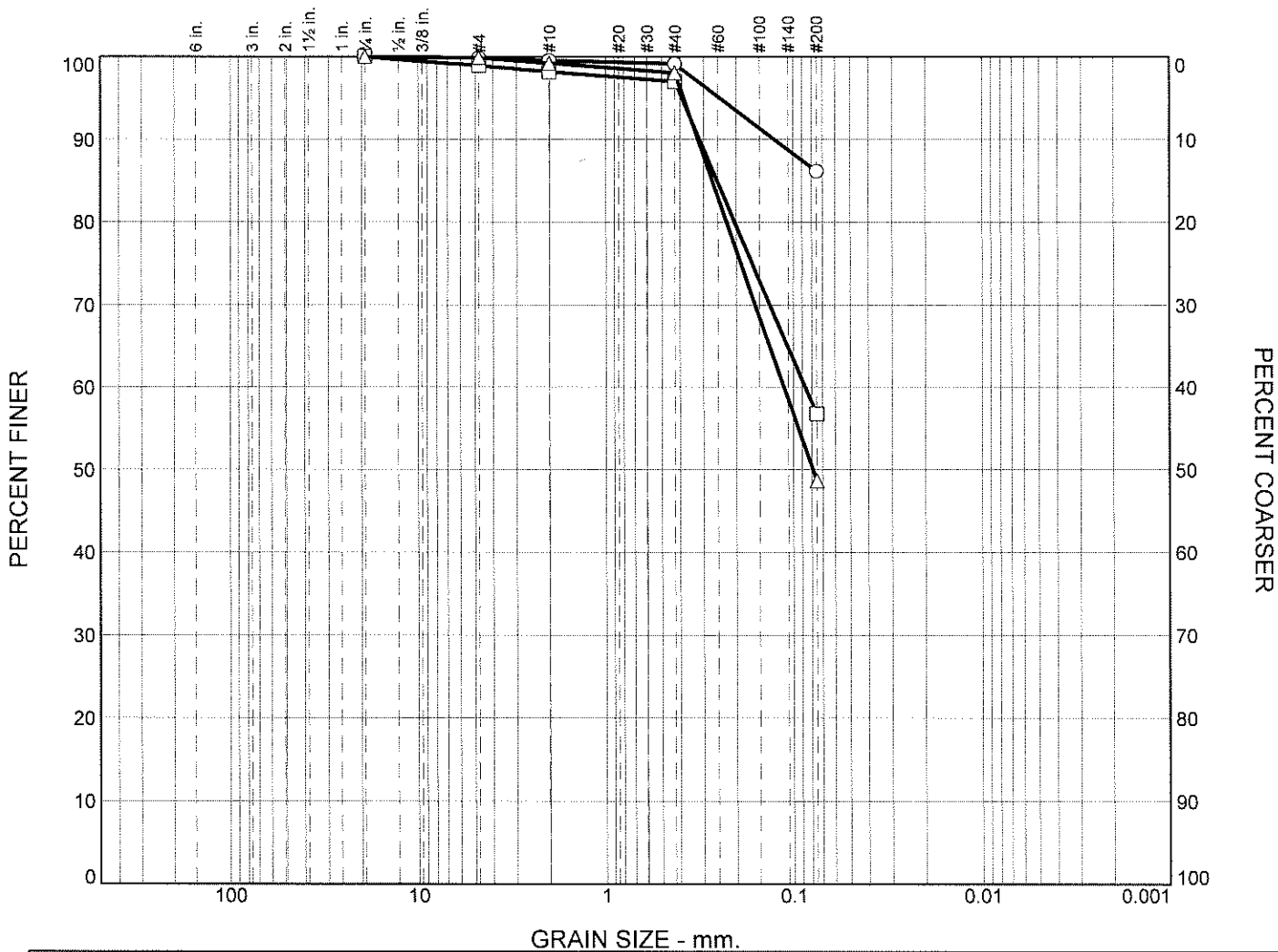
Test Readings for Specimen No. 1

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	0.0500	0.000	0.0	0.0	0.000	0.648	0.648	1.00	0.648	0.000
1	0.0542	4.583	4.6	0.1	0.050	0.648	0.698	1.08	0.673	0.025
2	0.0615	7.695	7.7	0.2	0.084	0.648	0.732	1.13	0.690	0.042
3	0.0695	11.638	11.6	0.3	0.126	0.648	0.774	1.20	0.711	0.063
4	0.0753	14.661	14.7	0.4	0.159	0.648	0.807	1.25	0.728	0.080
5	0.0799	17.512	17.5	0.5	0.190	0.648	0.838	1.29	0.743	0.095
6	0.0878	20.183	20.2	0.6	0.219	0.648	0.867	1.34	0.757	0.109
7	0.0957	22.834	22.8	0.8	0.247	0.648	0.895	1.38	0.772	0.124
8	0.1028	25.418	25.4	0.9	0.275	0.648	0.923	1.42	0.785	0.137
9	0.1107	28.068	28.1	1.0	0.303	0.648	0.951	1.47	0.799	0.151
10	0.1210	31.218	31.2	1.2	0.336	0.648	0.984	1.52	0.816	0.168
11	0.1332	35.166	35.2	1.4	0.378	0.648	1.026	1.58	0.837	0.189
12	0.1454	39.093	39.1	1.6	0.419	0.648	1.067	1.65	0.858	0.210
13	0.1575	43.705	43.7	1.8	0.468	0.648	1.116	1.72	0.882	0.234
14	0.1697	48.246	48.2	2.0	0.515	0.648	1.163	1.80	0.906	0.258
15	0.1818	53.394	53.4	2.2	0.569	0.648	1.217	1.88	0.933	0.285
16	0.1940	58.503	58.5	2.4	0.622	0.648	1.270	1.96	0.959	0.311
17	0.1998	61.297	61.3	2.5	0.651	0.648	1.299	2.01	0.974	0.326
18	0.2119	66.906	66.9	2.7	0.710	0.648	1.358	2.09	1.003	0.355
19	0.2183	69.745	69.7	2.8	0.739	0.648	1.387	2.14	1.017	0.369
20	0.2305	75.531	75.5	3.0	0.798	0.648	1.446	2.23	1.047	0.399
21	0.2362	78.124	78.1	3.1	0.825	0.648	1.473	2.27	1.061	0.413
22	0.2420	81.537	81.5	3.2	0.860	0.648	1.508	2.33	1.078	0.430
23	0.2485	84.595	84.6	3.3	0.891	0.648	1.539	2.38	1.094	0.446
24	0.2600	89.883	89.9	3.5	0.945	0.648	1.593	2.46	1.121	0.473
25	0.2665	92.487	92.5	3.6	0.972	0.648	1.620	2.50	1.134	0.486
26	0.2722	95.666	95.7	3.7	1.004	0.648	1.652	2.55	1.150	0.502
27	0.2844	100.853	100.9	3.9	1.056	0.648	1.704	2.63	1.176	0.528
28	0.2907	104.146	104.1	4.0	1.090	0.648	1.738	2.68	1.193	0.545
29	0.3029	109.210	109.2	4.2	1.140	0.648	1.788	2.76	1.218	0.570
30	0.3086	112.144	112.1	4.3	1.170	0.648	1.818	2.80	1.233	0.585
31	0.3209	117.673	117.7	4.5	1.225	0.648	1.873	2.89	1.260	0.612
32	0.3330	122.941	122.9	4.7	1.277	0.648	1.925	2.97	1.286	0.638
33	0.3388	126.124	126.1	4.8	1.308	0.648	1.956	3.02	1.302	0.654
34	0.3509	132.201	132.2	5.0	1.368	0.648	2.016	3.11	1.332	0.684
35	0.3573	134.790	134.8	5.1	1.394	0.648	2.042	3.15	1.345	0.697
36	0.3719	142.674	142.7	5.4	1.471	0.648	2.119	3.27	1.384	0.736
37	0.3873	150.246	150.2	5.6	1.545	0.648	2.193	3.38	1.421	0.773
38	0.4020	158.252	158.3	5.9	1.623	0.648	2.271	3.51	1.460	0.812
39	0.4173	165.507	165.5	6.1	1.693	0.648	2.341	3.61	1.495	0.847
40	0.4320	173.194	173.2	6.4	1.767	0.648	2.415	3.73	1.532	0.884
41	0.4468	179.863	179.9	6.6	1.830	0.648	2.478	3.82	1.563	0.915
42	0.4622	186.802	186.8	6.9	1.896	0.648	2.544	3.93	1.596	0.948
43	0.4769	193.084	193.1	7.1	1.954	0.648	2.602	4.02	1.625	0.977
44	0.4917	199.669	199.7	7.4	2.016	0.648	2.664	4.11	1.656	1.008
45	0.5071	205.218	205.2	7.7	2.066	0.648	2.714	4.19	1.681	1.033
46	0.5218	210.974	211.0	7.9	2.118	0.648	2.766	4.27	1.707	1.059

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	0.5372	215.611	215.6	8.2	2.159	0.648	2.807	4.33	1.727	1.079
48	0.5519	220.301	220.3	8.4	2.200	0.648	2.848	4.39	1.748	1.100
49	0.5666	224.192	224.2	8.6	2.232	0.648	2.880	4.45	1.764	1.116
50	0.5821	228.466	228.5	8.9	2.269	0.648	2.917	4.50	1.782	1.134
51	0.5968	231.989	232.0	9.2	2.297	0.648	2.945	4.55	1.797	1.149
52	0.6115	235.739	235.7	9.4	2.328	0.648	2.976	4.59	1.812	1.164
53	0.6270	238.600	238.6	9.7	2.350	0.648	2.998	4.63	1.823	1.175
54	0.6417	241.748	241.7	9.9	2.374	0.648	3.022	4.66	1.835	1.187
55	0.6570	244.127	244.1	10.2	2.391	0.648	3.039	4.69	1.843	1.195
56	0.6717	245.943	245.9	10.4	2.402	0.648	3.050	4.71	1.849	1.201
57	0.6871	248.347	248.3	10.7	2.418	0.648	3.066	4.73	1.857	1.209
58	0.7018	249.641	249.6	10.9	2.424	0.648	3.072	4.74	1.860	1.212
59	0.7171	251.336	251.3	11.2	2.434	0.648	3.082	4.76	1.865	1.217
60	0.7318	251.827	251.8	11.4	2.432	0.648	3.080	4.75	1.864	1.216
61	0.7471	252.880	252.9	11.7	2.435	0.648	3.083	4.76	1.865	1.217
62	0.7618	252.981	253.0	11.9	2.429	0.648	3.077	4.75	1.863	1.215
63	0.7771	253.450	253.5	12.2	2.426	0.648	3.074	4.74	1.861	1.213
64	0.7918	253.380	253.4	12.4	2.419	0.648	3.067	4.73	1.858	1.210
65	0.8072	253.436	253.4	12.7	2.412	0.648	3.060	4.72	1.854	1.206
66	0.8219	252.866	252.9	12.9	2.400	0.648	3.048	4.70	1.848	1.200
67	0.8372	252.919	252.9	13.2	2.394	0.648	3.042	4.69	1.845	1.197
68	0.8519	252.137	252.1	13.4	2.380	0.648	3.028	4.67	1.838	1.190
69	0.8672	252.563	252.6	13.7	2.376	0.648	3.024	4.67	1.836	1.188
70	0.8818	251.634	251.6	13.9	2.361	0.648	3.009	4.64	1.829	1.181
71	0.8972	252.366	252.4	14.2	2.361	0.648	3.009	4.64	1.828	1.180
72	0.9119	251.217	251.2	14.4	2.343	0.648	2.991	4.62	1.820	1.172
73	0.9266	250.720	250.7	14.7	2.332	0.648	2.980	4.60	1.814	1.166
74	0.9420	249.098	249.1	14.9	2.310	0.648	2.958	4.56	1.803	1.155

Particle Size Analysis - ASTM D 422



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.1	0.3	0.4	13.1	86.1	
□	0.0	0.0	1.0	0.8	1.2	40.3	56.7	
△	0.0	0.0	0.1	0.6	1.2	49.5	48.6	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	08-79	5	8-10	Reddish-brown and tan LEAN CLAY; calcareous	CL
□	08-79	7	12-14	Reddish-brown SANDY LEAN CLAY	CL
△	08-79	10	18-20	Reddish-brown SILTY SAND	SM

Tolunay-Wong Engineers, Inc.
Houston, Texas

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