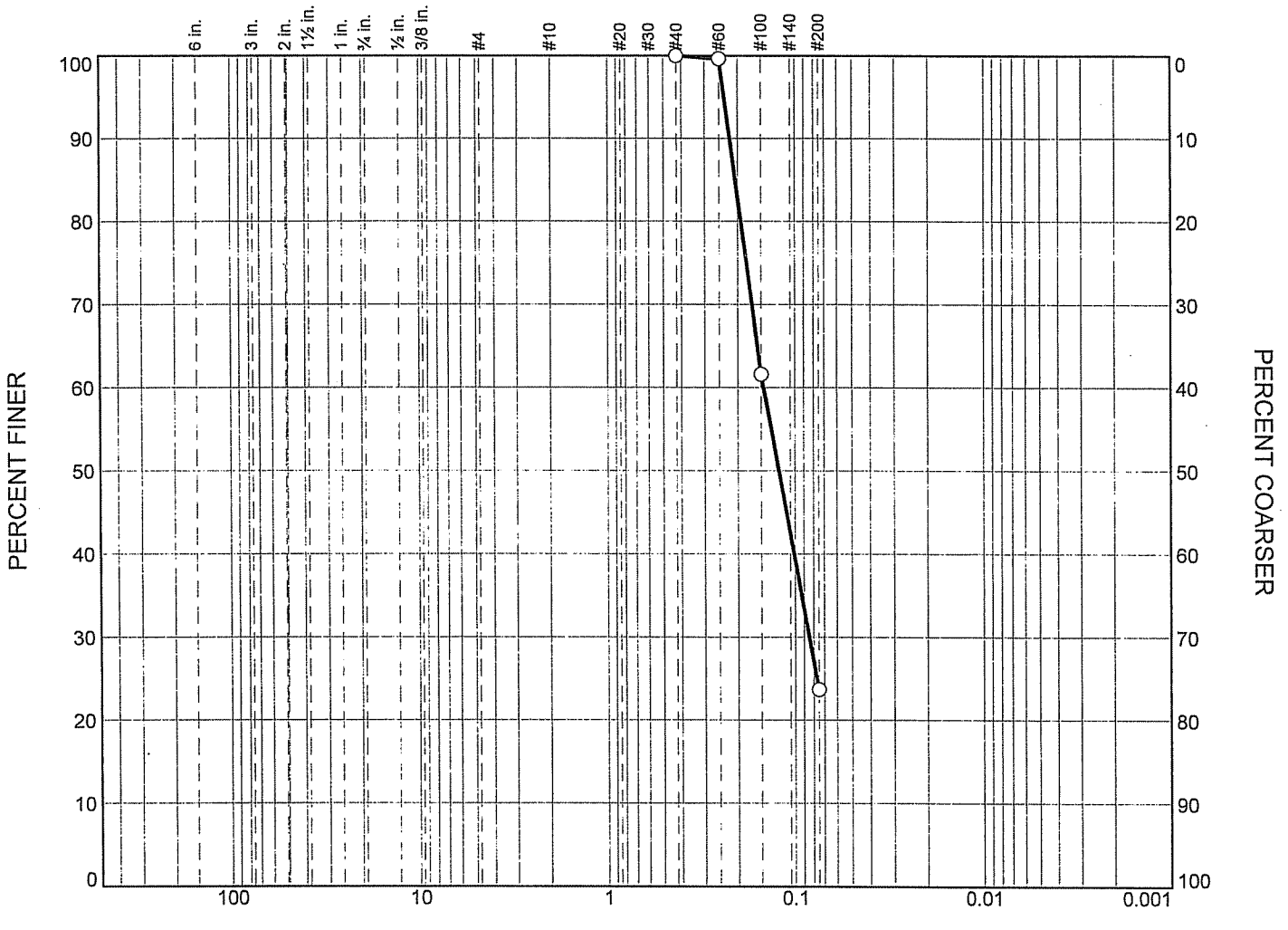
Tolunay-Wong Engineers, Inc.

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	0.0	0.0	0.0	76.3	23.7	

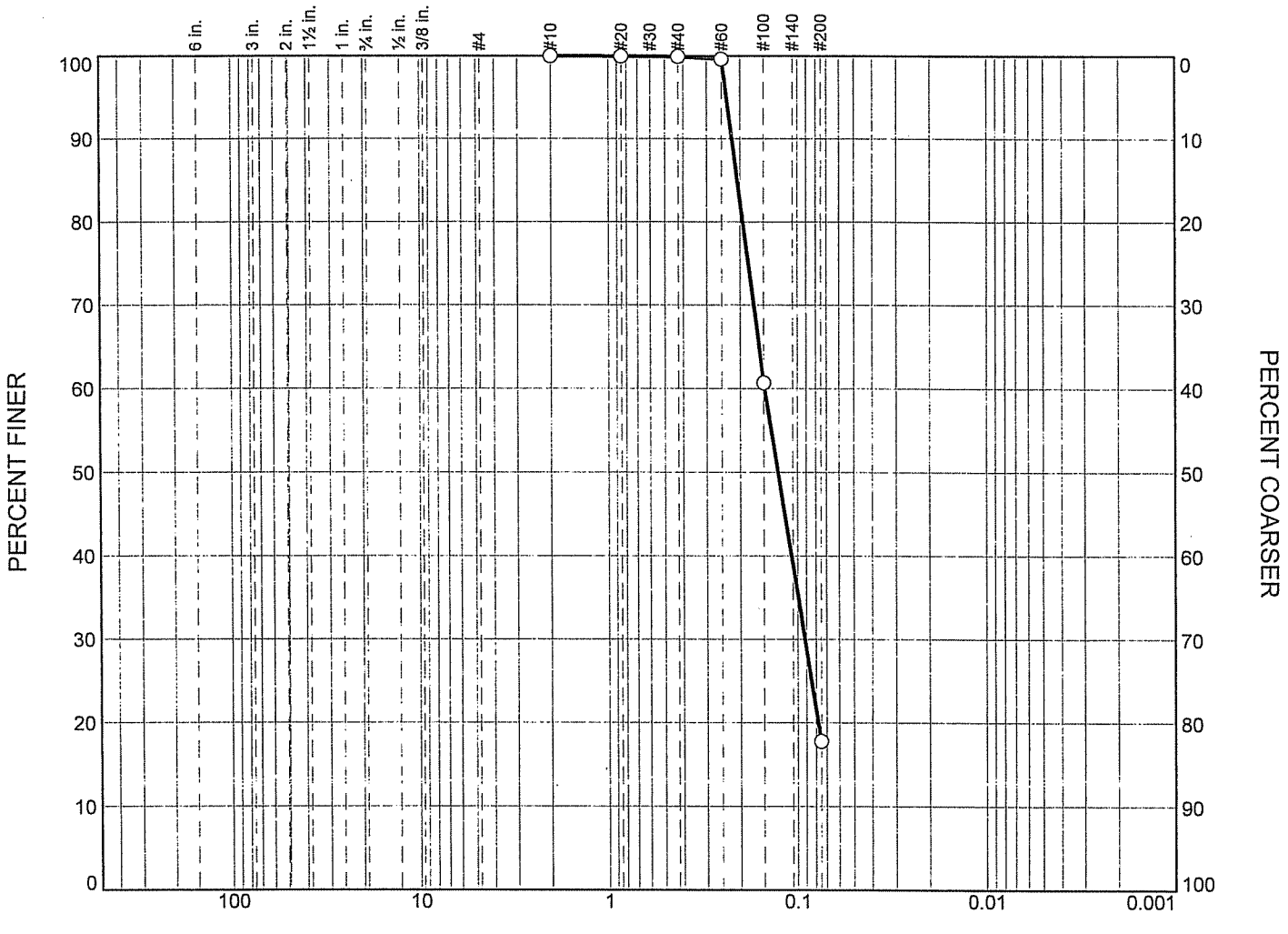
SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	08-82	5	8-10	Reddish-brown and gray SILTY SAND	SM

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

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	82.1	17.8	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	08-82	10	18-20	Reddish-brown and gray SILTY SAND	SM

Tolunay-Wong Engineers, Inc.
Houston, Texas

Client: United States Army Corps of Engineers
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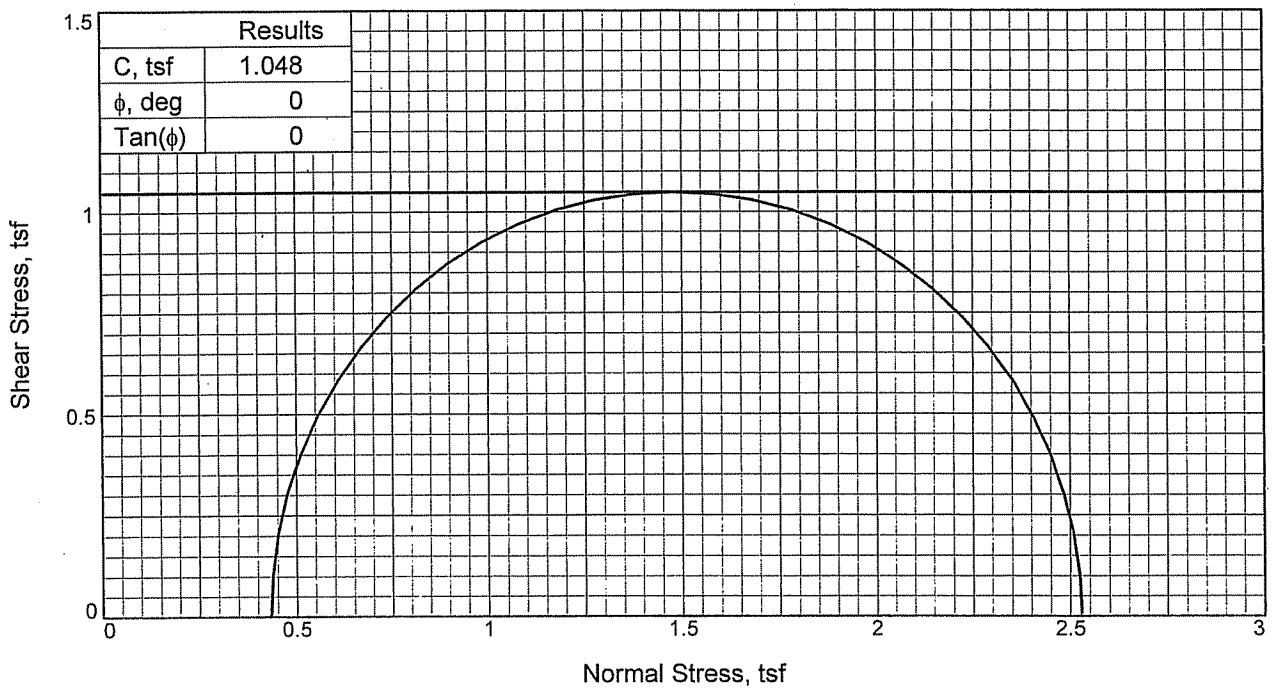
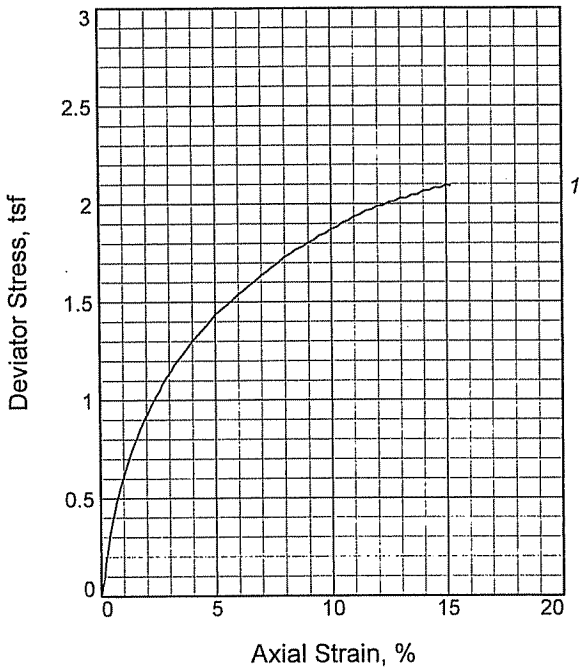




Sample No.		1
Initial	Water Content, %	16.8
	Dry Density, pcf	111.3
	Saturation, %	88.1
	Void Ratio	0.5145
	Diameter, in.	2.86
	Height, in.	6.00
At Test	Water Content, %	17.0
	Dry Density, pcf	111.3
	Saturation, %	89.5
	Void Ratio	0.5145
	Diameter, in.	2.86
	Height, in.	6.00
Strain rate, %/min.		1.00
Back Pressure, tsf		0.00
Cell Pressure, tsf		0.43
Fail. Stress, tsf		2.10
Ult. Stress, tsf		
σ_1 Failure, tsf		2.53
σ_3 Failure, tsf		0.43

Type of Test:
Unconsolidated Undrained

Sample Type: Undisturbed

Description: Tan and gray SANDY LEAN CLAY; ferrous

LL= 33 **PL=** 16 **PI=** 17

Assumed Specific Gravity= 2.70

Remarks:
Test method: ASTM D 2850
Pocket pen; tsf: 3.25
Failure type: Vertical shear

Client: United States Army Corps of Engineers

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

Source of Sample: 08-82 **Depth:** 4-6

Sample Number: 3

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
12:45 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: 08-82
Depth: 4-6 **Sample Number:** 3
Description: Tan and gray SANDY LEAN CLAY; ferrous
Remarks:
Test method: ASTM D 2850
Pocket pen; tsf: 3.25
Failure type: Vertical shear
Type of Sample: Undisturbed
Assumed Specific Gravity=2.70 **LL=**33 **PL=**16 **PI=**17
Test Method: ASTM D 2850

Parameters for Specimen No. 1

Specimen Parameter	Initial	Final
Moisture content: Moist soil+tare, gms.	153.420	121.210
Moisture content: Dry soil+tare, gms.	135.900	108.160
Moisture content: Tare, gms.	31.580	31.620
Moisture, %	16.8	17.0
Moist specimen weight, gms.	1315.2	
Diameter, in.	2.86	
Area, in.^{2}	6.42	
Height, in.	6.00	
Wet Density, pcf	130.0	
Dry density, pcf	111.3	
Void ratio	0.5145	
Saturation, %	88.1	

Test Readings for Specimen No. 1

Membrane modulus = .130 kN/cm^2
Membrane thickness = .031 cm
Cell pressure = 6.00 psi (0.432 tsf)
Back pressure = 0.00 psi (0.000 tsf)
Strain rate, %/min. = 1.00
Fail. Stress = 2.097 tsf **at reading no.** 82

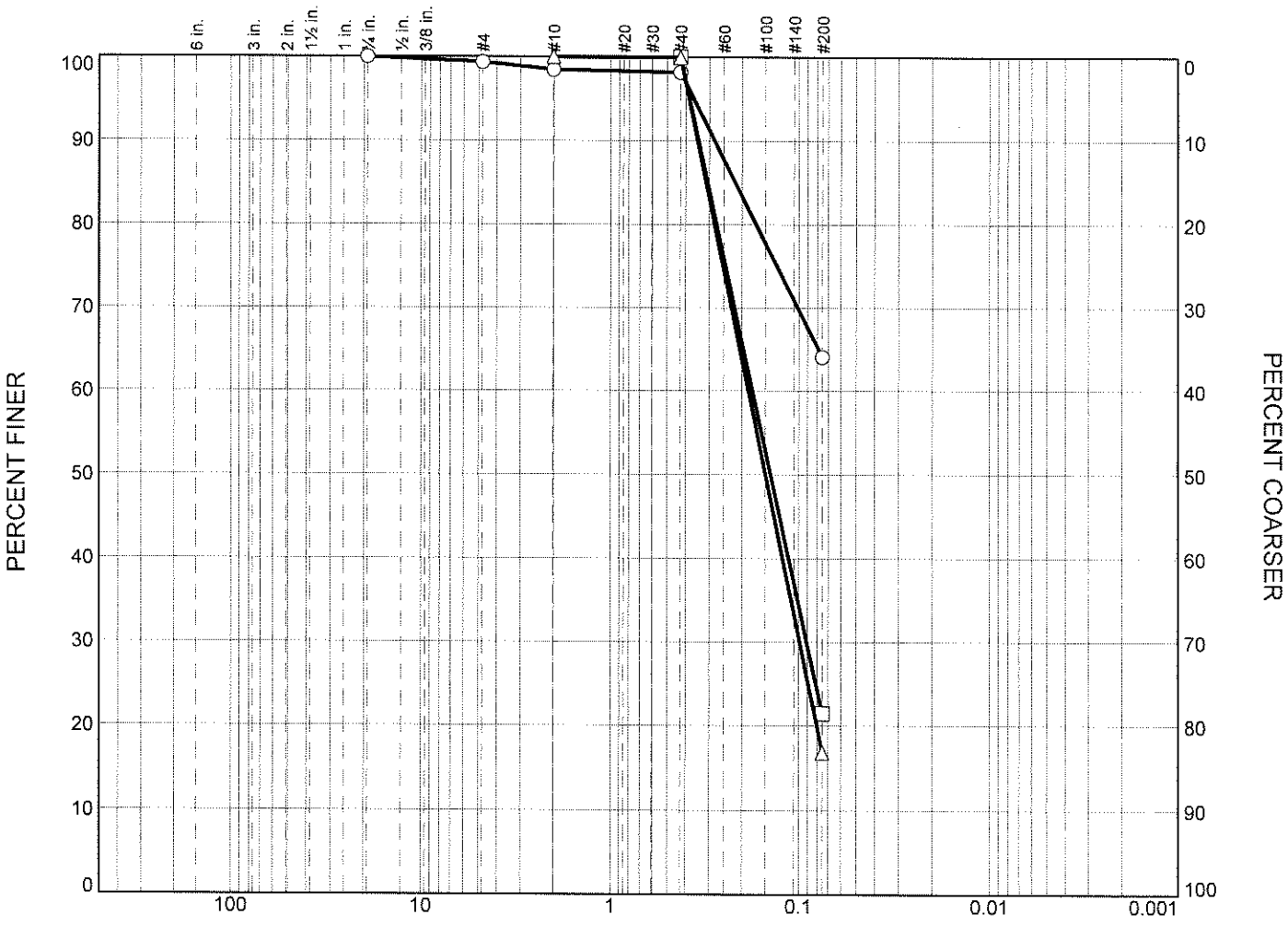
Test Readings for Specimen No. 1

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	0.0214	0.000	0.0	0.0	0.000	0.432	0.432	1.00	0.432	0.000
1	0.0309	9.190	9.2	0.2	0.103	0.432	0.535	1.24	0.483	0.051
2	0.0325	12.409	12.4	0.2	0.139	0.432	0.571	1.32	0.501	0.069
3	0.0338	14.760	14.8	0.2	0.165	0.432	0.597	1.38	0.515	0.083
4	0.0370	18.153	18.2	0.3	0.203	0.432	0.635	1.47	0.533	0.101
5	0.0402	21.880	21.9	0.3	0.244	0.432	0.676	1.57	0.554	0.122
6	0.0436	25.632	25.6	0.4	0.286	0.432	0.718	1.66	0.575	0.143
7	0.0461	28.607	28.6	0.4	0.319	0.432	0.751	1.74	0.592	0.160
8	0.0494	31.361	31.4	0.5	0.350	0.432	0.782	1.81	0.607	0.175
9	0.0527	34.393	34.4	0.5	0.383	0.432	0.815	1.89	0.624	0.192
10	0.0560	36.780	36.8	0.6	0.410	0.432	0.842	1.95	0.637	0.205
11	0.0592	39.583	39.6	0.6	0.441	0.432	0.873	2.02	0.652	0.220
12	0.0638	43.242	43.2	0.7	0.481	0.432	0.913	2.11	0.673	0.241
13	0.0683	46.131	46.1	0.8	0.513	0.432	0.945	2.19	0.688	0.256
14	0.0730	49.282	49.3	0.9	0.548	0.432	0.980	2.27	0.706	0.274
15	0.0775	52.076	52.1	0.9	0.578	0.432	1.010	2.34	0.721	0.289
16	0.0822	55.017	55.0	1.0	0.610	0.432	1.042	2.41	0.737	0.305
17	0.0868	57.617	57.6	1.1	0.639	0.432	1.071	2.48	0.751	0.319
18	0.0914	60.416	60.4	1.2	0.669	0.432	1.101	2.55	0.767	0.335
19	0.0984	64.294	64.3	1.3	0.711	0.432	1.143	2.65	0.788	0.356
20	0.1050	67.783	67.8	1.4	0.749	0.432	1.181	2.73	0.807	0.375
21	0.1107	70.446	70.4	1.5	0.778	0.432	1.210	2.80	0.821	0.389
22	0.1171	73.306	73.3	1.6	0.808	0.432	1.240	2.87	0.836	0.404
23	0.1229	76.380	76.4	1.7	0.842	0.432	1.274	2.95	0.853	0.421
24	0.1293	78.643	78.6	1.8	0.866	0.432	1.298	3.00	0.865	0.433
25	0.1351	81.238	81.2	1.9	0.893	0.432	1.325	3.07	0.879	0.447
26	0.1473	85.768	85.8	2.1	0.941	0.432	1.373	3.18	0.903	0.471
27	0.1531	88.364	88.4	2.2	0.969	0.432	1.401	3.24	0.916	0.484
28	0.1652	92.688	92.7	2.4	1.014	0.432	1.446	3.35	0.939	0.507
29	0.1776	96.329	96.3	2.6	1.052	0.432	1.484	3.43	0.958	0.526
30	0.1833	99.062	99.1	2.7	1.080	0.432	1.512	3.50	0.972	0.540
31	0.1955	102.572	102.6	2.9	1.116	0.432	1.548	3.58	0.990	0.558
32	0.2077	105.853	105.9	3.1	1.150	0.432	1.582	3.66	1.007	0.575
33	0.2141	108.534	108.5	3.2	1.177	0.432	1.609	3.73	1.021	0.589
34	0.2263	111.416	111.4	3.4	1.206	0.432	1.638	3.79	1.035	0.603
35	0.2385	114.469	114.5	3.6	1.237	0.432	1.669	3.86	1.050	0.618
36	0.2500	117.663	117.7	3.8	1.268	0.432	1.700	3.94	1.066	0.634
37	0.2623	120.917	120.9	4.0	1.301	0.432	1.733	4.01	1.082	0.650
38	0.2747	123.792	123.8	4.2	1.329	0.432	1.761	4.08	1.096	0.664
39	0.2862	126.423	126.4	4.4	1.354	0.432	1.786	4.14	1.109	0.677
40	0.2985	129.204	129.2	4.6	1.381	0.432	1.813	4.20	1.123	0.691
41	0.3107	132.205	132.2	4.8	1.410	0.432	1.842	4.26	1.137	0.705
42	0.3229	135.131	135.1	5.0	1.438	0.432	1.870	4.33	1.151	0.719
43	0.3352	137.189	137.2	5.2	1.457	0.432	1.889	4.37	1.161	0.729
44	0.3499	139.790	139.8	5.5	1.481	0.432	1.913	4.43	1.172	0.740
45	0.3653	142.668	142.7	5.7	1.507	0.432	1.939	4.49	1.186	0.754
46	0.3801	145.651	145.7	6.0	1.535	0.432	1.967	4.55	1.199	0.767

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	0.3955	148.236	148.2	6.2	1.558	0.432	1.990	4.61	1.211	0.779
48	0.4103	151.157	151.2	6.5	1.584	0.432	2.016	4.67	1.224	0.792
49	0.4257	153.685	153.7	6.7	1.606	0.432	2.038	4.72	1.235	0.803
50	0.4405	156.697	156.7	7.0	1.634	0.432	2.066	4.78	1.249	0.817
51	0.4552	159.076	159.1	7.2	1.654	0.432	2.086	4.83	1.259	0.827
52	0.4708	162.028	162.0	7.5	1.680	0.432	2.112	4.89	1.272	0.840
53	0.4856	164.427	164.4	7.7	1.700	0.432	2.132	4.94	1.282	0.850
54	0.5010	167.648	167.6	8.0	1.729	0.432	2.161	5.00	1.296	0.864
55	0.5157	169.750	169.7	8.2	1.746	0.432	2.178	5.04	1.305	0.873
56	0.5311	172.360	172.4	8.5	1.768	0.432	2.200	5.09	1.316	0.884
57	0.5459	174.194	174.2	8.7	1.782	0.432	2.214	5.12	1.323	0.891
58	0.5612	176.703	176.7	9.0	1.802	0.432	2.234	5.17	1.333	0.901
59	0.5760	178.559	178.6	9.2	1.816	0.432	2.248	5.20	1.340	0.908
60	0.5908	181.252	181.3	9.5	1.839	0.432	2.271	5.26	1.351	0.919
61	0.6063	182.708	182.7	9.7	1.848	0.432	2.280	5.28	1.356	0.924
62	0.6211	185.328	185.3	10.0	1.869	0.432	2.301	5.33	1.367	0.935
63	0.6365	187.042	187.0	10.3	1.881	0.432	2.313	5.36	1.373	0.941
64	0.6512	189.956	190.0	10.5	1.905	0.432	2.337	5.41	1.385	0.953
65	0.6661	191.333	191.3	10.7	1.914	0.432	2.346	5.43	1.389	0.957
66	0.6816	193.944	193.9	11.0	1.934	0.432	2.366	5.48	1.399	0.967
67	0.6963	195.422	195.4	11.2	1.944	0.432	2.376	5.50	1.404	0.972
68	0.7117	198.124	198.1	11.5	1.965	0.432	2.397	5.55	1.415	0.983
69	0.7264	199.294	199.3	11.8	1.971	0.432	2.403	5.56	1.418	0.986
70	0.7418	201.572	201.6	12.0	1.988	0.432	2.420	5.60	1.426	0.994
71	0.7566	202.407	202.4	12.3	1.991	0.432	2.423	5.61	1.427	0.995
72	0.7719	204.973	205.0	12.5	2.010	0.432	2.442	5.65	1.437	1.005
73	0.7867	205.744	205.7	12.8	2.012	0.432	2.444	5.66	1.438	1.006
74	0.8021	208.161	208.2	13.0	2.029	0.432	2.461	5.70	1.447	1.015
75	0.8169	208.597	208.6	13.3	2.028	0.432	2.460	5.69	1.446	1.014
76	0.8323	211.097	211.1	13.5	2.046	0.432	2.478	5.74	1.455	1.023
77	0.8471	211.685	211.7	13.8	2.046	0.432	2.478	5.74	1.455	1.023
78	0.8625	214.328	214.3	14.0	2.065	0.432	2.497	5.78	1.465	1.033
79	0.8772	215.084	215.1	14.3	2.067	0.432	2.499	5.78	1.465	1.033
80	0.8920	217.279	217.3	14.5	2.082	0.432	2.514	5.82	1.473	1.041
81	0.9075	217.893	217.9	14.8	2.081	0.432	2.513	5.82	1.473	1.041
82	0.9223	220.139	220.1	15.0	2.097	0.432	2.529	5.85	1.480	1.048
83	0.9319	219.836	219.8	15.2	2.090	0.432	2.522	5.84	1.477	1.045

Particle Size Analysis - ASTM D 422



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.6	0.9	0.3	34.1	64.1	
□	0.0	0.0	0.0	0.0	0.0	78.6	21.4	
△	0.0	0.0	0.0	0.0	0.0	83.2	16.8	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	08-82	3	4-6	Tan and gray SANDY LEAN CLAY; ferrous	CL
□	08-82	4	6-8	Reddish-brown and gray SILTY SAND	SM
△	08-82	7	12-14	Reddish-brown and gray SILTY SAND	SM

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