TOLUNAY-WONG ENGINEERS, INC.

Boring No.	Sample No.	Sample Depth (feet)	Elevation (feet)	Pocket Pen. (tsf)	Soil Description	USCS	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Finer than No. 200 (%)	Unit Dry Weight (pcf)	Dev./Compr. Stress (tsf)	Failure Strain (%)	Confining Pressure (psi)	Failure Type
07-22	N 13843175.52, E 3153555.49		55.64													
	1	0-2	53.64	4.50	Reddish-brown and gray FAT CLAY	CH	25.9									
	2	2-4	51.64	4.50	Reddish-brown and gray FAT CLAY	CH	28.1									
	3	4-6	49.64	4.50	Gray and tan SANDY LEAN CLAY	CL	17.3									
	4	6-8	47.64	3.00	Reddish-brown and gray FAT CLAY	CH	24.6									
	5	8-10	45.64	4.00	Gray and tan FAT CLAY	CH	21.0									
	6	10-12	43.64	3.00	Gray and reddish-brown FAT CLAY	CH	23.2									
	7	12-14	41.64	4.50	Gray and tan FAT CLAY	CH	20.4									
	8	14-16	39.64	4.00	Dark gray and tan FAT CLAY	CH	24.8									
	9	16-18	37.64	2.50	Gray and tan FAT CLAY	CH	22.9	73	21	52		102.6	2.78	7.0		Bulge
	10	18-20	35.64	3.00	Gray and reddish-brown FAT CLAY	CH	24.7									
	11	20-22	33.64	4.50	Dark gray and tan FAT CLAY	CH	21.1									
	12	22-24	31.64	4.25	Dark gray and tan FAT CLAY	CH	25.3									
	13	24-25	30.64	3.50	Dark gray and tan FAT CLAY	CH	19.8									
07-23	N 13843712.30, E 3153531.10		55.54													
	1	0-2	53.54	4.50	Dark gray and tan FAT CLAY	CH	20.9									
	2	2-4	51.54	4.50	Gray and reddish-brown FAT CLAY	CH	17.8									
	3	4-6	49.54	4.50	Gray and tan FAT CLAY	CH	20.5									
	4	6-8	47.54	3.50	Gray and tan FAT CLAY	CH	24.0									
	5	8-10	45.54	3.00	Reddish-brown and gray FAT CLAY	CH	26.2									
	6	10-12	43.54	2.50	Tan and gray FAT CLAY	CH	23.2									
	7	12-14	41.54	3.00	Dark gray and tan FAT CLAY	CH	22.9									
	8	14-16	39.54	4.25	Dark gray and tan FAT CLAY; calcareous nodules	CH	20.2									
	9	16-18	37.54	3.00	Reddish-brown and gray FAT CLAY	CH	31.5									
	10	18-20	35.54	3.25	Dark gray and tan FAT CLAY	CH	24.8									
	11	20-22	33.54	4.25	Reddish-brown and gray FAT CLAY; calcareous nodules	CH	26.4									
	12	22-24	31.54	3.50	Dark gray and tan FAT CLAY; calcareous nodules	CH	23.2									
	13	24-25	30.54	3.00	Reddish-brown and gray FAT CLAY	CH	27.2									
07-24	N 13844248.75, E 3153507.26		55.87													
	1	0-2	53.87	3.25	Gray and reddish-brown FAT CLAY	CH	26.0									
	2	2-4	51.87	2.75	Reddish-brown and gray FAT CLAY	CH	26.6									
	3	4-6	49.87	3.25	Gray and reddish-brown FAT CLAY	CH	24.3									
	4	6-8	47.87	3.00	Gray and tan FAT CLAY	CH	27.3									
	5	8-10	45.87	3.25	Gray and tan FAT CLAY	CH	23.7									
	6	10-12	43.87	4.25	Gray and tan FAT CLAY	CH	24.2									
	7	12-14	41.87	3.25	Gray and tan FAT CLAY; calcareous nodules	CH	21.1									
	8	14-16	39.87	3.25	Gray and reddish-brown FAT CLAY	CH	23.6									
	9	16-18	37.87	4.00	Gray and tan FAT CLAY	CH	20.1									
	10	18-20	35.87	4.00	Reddish-brown and gray FAT CLAY	CH	23.4	85	25	60		99.6	1.97	3.4	17	Slickensided
	11	20-22	33.87	2.25	Reddish-brown and gray FAT CLAY	CH	30.1					97.6	2.09	2.0		Slickensided
	12	22-24	31.87	3.25	Gray and tan FAT CLAY	CH	23.3									
	13	24-26	29.87	2.75	Reddish-brown and gray FAT CLAY	CH	26.7									
	14	26-28	27.87	1.75	Gray and tan FAT CLAY	CH	29.6									
	15	28-30	25.87	2.50	Gray and tan FAT CLAY	CH	30.1									
	16	30-32	23.87	2.25	Tan and gray FAT CLAY	CH	32.2									
	17	32-34	21.87	2.50	Tan and gray FAT CLAY	CH	32.8									
	18	34-36	19.87	3.75	Tan and gray FAT CLAY; calcareous and ferrous	CH	29.8									
	19	36-38	17.87	3.00	Tan and gray SANDY LEAN CLAY	CL	21.0									
	20	38-40	15.87	1.75	Tan and gray SANDY SILTY CLAY	CL-ML	21.3	28	21	7		106.2	0.56	4.8		60 degree
07-25	N 13844793.06, E 3153475.64															
	1	0-2		3.50	Reddish-brown and gray FAT CLAY	CH	33.0									
	2	2-4		3.50	Reddish-brown and gray FAT CLAY	CH	32.0									
	3	4-6		3.75	Gray, tan and dark gray FAT CLAY	CH	21.5									
	4	6-8		3.50	Reddish-brown, dark gray and tan FAT CLAY	CH	29.3									
	5	8-10			Brown and gray FAT CLAY		32.0	77	23	54		87.4	1.42	1.0		Slickensided
	6	10-12		3.50	Gray, tan and dark gray FAT CLAY; tree roots and ferrous	CH	25.3									

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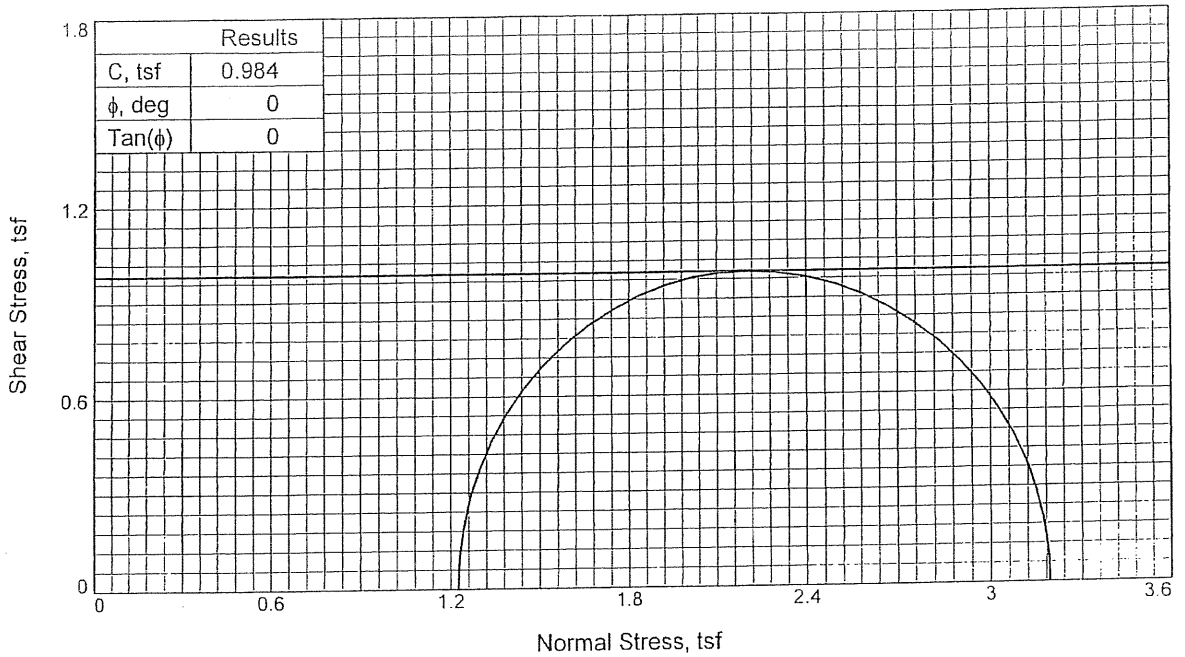
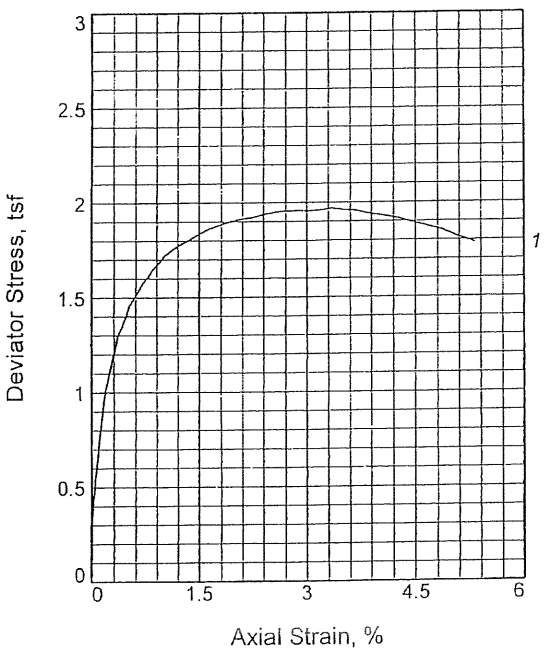




Sample No.		1
Initial	Water Content, %	23.4
	Dry Density, pcf	99.6
	Saturation, %	89.0
	Void Ratio	0.7237
	Diameter, in.	2.80
	Height, in.	6.00
At Test	Water Content, %	23.4
	Dry Density, pcf	99.6
	Saturation, %	89.0
	Void Ratio	0.7237
	Diameter, in.	2.80
	Height, in.	6.00
Strain rate, %/min.		1.00
Back Pressure, tsf		0.00
Cell Pressure, tsf		1.22
Fail. Stress, tsf		1.97
Strain, %		3.4
Ult. Stress, tsf		
Strain, %		
σ_1 Failure, tsf		3.19
σ_3 Failure, tsf		1.22

Type of Test:
Unconsolidated Undrained

Sample Type: Undisturbed

Description: Reddish-brown and gray FAT CLAY

LL= 85 PL= 25 PI= 60

Assumed Specific Gravity= 2.75

Remarks:
Test method: ASTM D 2850
Pocket pen; tsf: 4.00
Failure type: Slickensided

Client: U. S. Army Corps of Engineers

Project: House Tract Placement Area
Contract No. DACW64-03-D-0008, Task Order 0067

Source of Sample: 07-24 **Depth:** 18-20

Sample Number: 10

Proj. No.: 07.18.922 **Date Sampled:** 11/6/07

TRIAXIAL SHEAR TEST REPORT

Tolunay-Wong Engineers, Inc.

TRIAXIAL COMPRESSION TEST

Unconsolidated Undrained

11/13/2007
1:58 PM

Date:	11/6/07
Client:	U. S. Army Corps of Engineers
Project:	House Tract Placement Area
	Contract No. DACW64-03-D-0008, Task Order 0067
Project No.:	07.18.922
Location:	07-24
Depth:	18-20 **Sample Number:** 10
Description:	Reddish-brown and gray FAT CLAY
Remarks:	
	Test method: ASTM D 2850
	Pocket pen; tsf: 4.00
	Failure type: Slickensided
Type of Sample:	Undisturbed

Assumed Specific Gravity=2.75 **LL=**85 **PL=**25 **PI=**60

Test Method: ASTM D 2850

Parameters for Specimen No. 1

Specimen Parameter	Initial	Final
Moisture content: Moist soil+tare, gms.	144.630	144.630
Moisture content: Dry soil+tare, gms.	123.130	123.130
Moisture content: Tare, gms.	31.340	31.340
Moisture, %	23.4	23.4
Moist specimen weight, gms.	1192.2	
Diameter, in.	2.80	
Area, in.^{2}	6.16	
Height, in.	6.00	
Wet Density, pcf	122.9	
Dry density, pcf	99.6	
Void ratio	0.7237	
Saturation, %	89.0	

Test Readings for Specimen No. 1

Membrane modulus = .130 kN/cm^2

Membrane thickness = .031 cm

Cell pressure = 17.00 psi (1.224 tsf)

Back pressure = 0.00 psi (0.000 tsf)

Strain rate, %/min. = 1.00

Fail. Stress = 1.968 tsf at reading no. 42

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	0.8592	0.000	0.0	0.0	0.000	1.224	1.224	1.00	1.224	0.000
1	0.8593	25.468	25.5	0.0	0.298	1.224	1.522	1.24	1.373	0.149
2	0.8609	37.734	37.7	0.0	0.441	1.224	1.665	1.36	1.445	0.221
3	0.8622	46.640	46.6	0.0	0.545	1.224	1.769	1.45	1.497	0.273
4	0.8641	56.009	56.0	0.1	0.654	1.224	1.878	1.53	1.551	0.327
5	0.8654	64.515	64.5	0.1	0.754	1.224	1.978	1.62	1.601	0.377
6	0.8673	72.273	72.3	0.1	0.844	1.224	2.068	1.69	1.646	0.422
7	0.8686	79.533	79.5	0.2	0.929	1.224	2.153	1.76	1.688	0.464
8	0.8705	86.439	86.4	0.2	1.009	1.224	2.233	1.82	1.728	0.504
9	0.8718	89.837	89.8	0.2	1.048	1.224	2.272	1.86	1.748	0.524
10	0.8737	94.773	94.8	0.2	1.106	1.224	2.330	1.90	1.777	0.553
11	0.8750	98.462	98.5	0.3	1.148	1.224	2.372	1.94	1.798	0.574
12	0.8763	101.555	101.6	0.3	1.184	1.224	2.408	1.97	1.816	0.592
13	0.8783	105.715	105.7	0.3	1.232	1.224	2.456	2.01	1.840	0.616
14	0.8796	109.084	109.1	0.3	1.271	1.224	2.495	2.04	1.860	0.636
15	0.8809	111.974	112.0	0.4	1.305	1.224	2.529	2.07	1.876	0.652
16	0.8842	115.630	115.6	0.4	1.346	1.224	2.570	2.10	1.897	0.673
17	0.8855	118.020	118.0	0.4	1.374	1.224	2.598	2.12	1.911	0.687
18	0.8876	120.359	120.4	0.5	1.401	1.224	2.625	2.14	1.924	0.700
19	0.8888	123.114	123.1	0.5	1.432	1.224	2.656	2.17	1.940	0.716
20	0.8901	125.343	125.3	0.5	1.458	1.224	2.682	2.19	1.953	0.729
21	0.8947	129.550	129.5	0.6	1.506	1.224	2.730	2.23	1.977	0.753
22	0.8980	132.585	132.6	0.6	1.540	1.224	2.764	2.26	1.994	0.770
23	0.9013	135.743	135.7	0.7	1.576	1.224	2.800	2.29	2.012	0.788
24	0.9059	138.836	138.8	0.8	1.611	1.224	2.835	2.32	2.029	0.805
25	0.9085	141.560	141.6	0.8	1.642	1.224	2.866	2.34	2.045	0.821
26	0.9118	143.811	143.8	0.9	1.667	1.224	2.891	2.36	2.057	0.833
27	0.9164	146.005	146.0	1.0	1.691	1.224	2.915	2.38	2.069	0.845
28	0.9197	148.672	148.7	1.0	1.721	1.224	2.945	2.41	2.084	0.860
29	0.9268	151.808	151.8	1.1	1.755	1.224	2.979	2.43	2.102	0.878
30	0.9333	154.047	154.0	1.2	1.779	1.224	3.003	2.45	2.114	0.890
31	0.9391	155.817	155.8	1.3	1.798	1.224	3.022	2.47	2.123	0.899
32	0.9514	160.055	160.1	1.5	1.843	1.224	3.067	2.51	2.145	0.921
33	0.9572	161.838	161.8	1.6	1.861	1.224	3.085	2.52	2.155	0.931
34	0.9694	164.579	164.6	1.8	1.889	1.224	3.113	2.54	2.169	0.945
35	0.9817	166.778	166.8	2.0	1.910	1.224	3.134	2.56	2.179	0.955
36	0.9939	168.232	168.2	2.2	1.923	1.224	3.147	2.57	2.185	0.961
37	1.0055	170.050	170.1	2.4	1.940	1.224	3.164	2.58	2.194	0.970
38	1.0178	171.577	171.6	2.6	1.953	1.224	3.177	2.60	2.201	0.977
39	1.0301	172.310	172.3	2.8	1.957	1.224	3.181	2.60	2.203	0.979
40	1.0423	172.471	172.5	3.1	1.955	1.224	3.179	2.60	2.202	0.978
41	1.0546	173.459	173.5	3.3	1.962	1.224	3.186	2.60	2.205	0.981
42	1.0603	174.169	174.2	3.4	1.968	1.224	3.192	2.61	2.208	0.984
43	1.0727	173.717	173.7	3.6	1.959	1.224	3.183	2.60	2.204	0.980
44	1.0784	173.889	173.9	3.7	1.959	1.224	3.183	2.60	2.203	0.979
45	1.0908	172.778	172.8	3.9	1.942	1.224	3.166	2.59	2.195	0.971
46	1.1023	172.111	172.1	4.1	1.931	1.224	3.155	2.58	2.189	0.965

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	1.1146	171.259	171.3	4.3	1.917	1.224	3.141	2.57	2.183	0.959
48	1.1268	169.641	169.6	4.5	1.895	1.224	3.119	2.55	2.172	0.948
49	1.1390	167.986	168.0	4.7	1.873	1.224	3.097	2.53	2.160	0.936
50	1.1514	166.636	166.6	4.9	1.854	1.224	3.078	2.51	2.151	0.927
51	1.1629	164.044	164.0	5.1	1.821	1.224	3.045	2.49	2.135	0.911
52	1.1785	161.344	161.3	5.3	1.786	1.224	3.010	2.46	2.117	0.893

Hole No. 07-24

BORING LOG	DISTRICT	INSTALLATION	SHEET 1 OF 2 SHEETS

1. PROJECT House Tract Placement Area	7. ELEVATION OF HOLE 58.35 ft
2. LOCATION (Coordinates or Station) N=13839439.16 E=3154284	8. DATUM FOR ELEVATION
3. DRILLING AGENCY T.R.I.	9. ELEVATION OF GROUNDWATER ▽ TOD: ▼ 24-HR: 31.35 ft
4. LABORATORY TESTING AGENCY Tolunay-Wong Engineers, Inc.	10. DRILLING DATE and TIME STARTED: 2/20/07 COMPLETED: 2/20/07
5. DEPTH OF WATER ▽ TOD: ▼ 24-HR: 27 ft	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 40 ft	12. ENGINEER

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
			FAT CLAY"FILL", stiff, gray & reddish brown		1	54		1.50		26.0				
					2	52		2.00		26.6				
			-very stiff to hard @ 4' - 18' -w/ ferrous nodules below 4'		3	63		3.50		24.3				
5			-gray & tan below 6'		4	58		2.50		27.3				
					5	54		3.25		23.7				
10			-w/ calcareous nodules & sand pockets below 10'		6	67		4.50		24.2				
					7	75		3.50		21.1				
15					8	71		4.00		23.6				
					9	75		4.50		20.1				
					10	54		2.50	99.6	23.4	85	25	60	
20					11	79		2.25	97.6	30.1				
			-very stiff @ 22' - 24'		12	71		4.00		23.3				
25					13	75		2.25		26.7				
	30.4				14	67		2.75		29.6				
			FAT CLAY(CL), very stiff, gray & tan, w/ ferrous nodules		15	58		2.50		30.1				
30					16	79		2.75		32.2				
					17	75		3.50		32.8				
			-slickensided w/ calcareous nodules below 34'											

SWG 1836 BOR 03.14.859-057.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/4/08

ENG FORM: SWG 1836 BOR

Hole No. 07-24

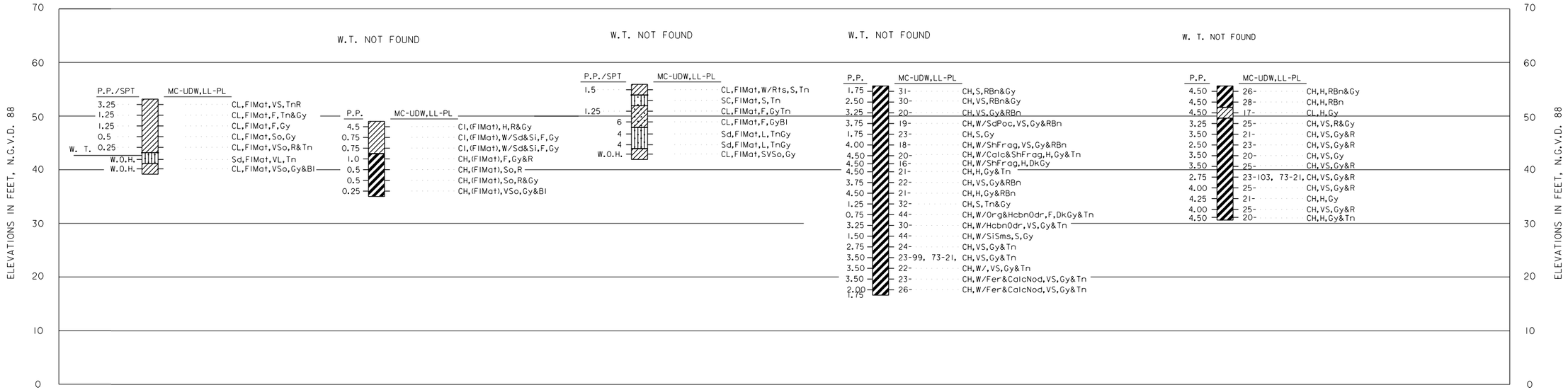
BORING LOG	DISTRICT	INSTALLATION	SHEET 2 OF 2 SHEETS

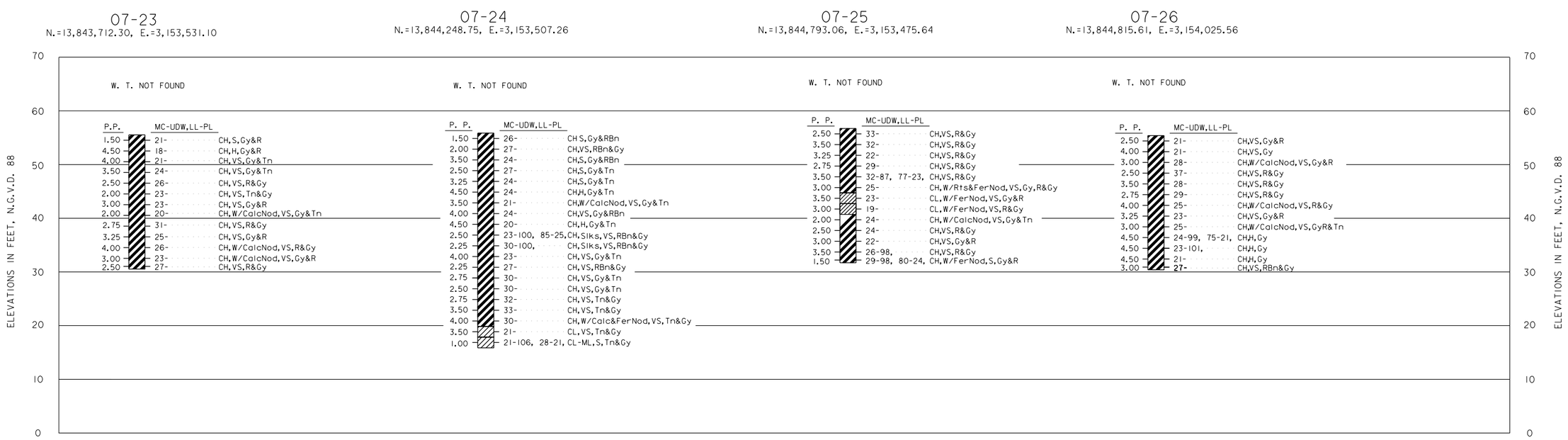
1. PROJECT House Tract Placement Area	7. ELEVATION OF HOLE 58.35 ft
2. LOCATION (Coordinates or Station) N=13839439.16 E=3154284	8. DATUM FOR ELEVATION
3. DRILLING AGENCY T.R.I.	9. ELEVATION OF GROUNDWATER ▽ TOD: ▼ 24-HR: 31.35 ft
4. LABORATORY TESTING AGENCY Tolunay-Wong Engineers, Inc.	10. DRILLING DATE and TIME STARTED: 2/20/07 COMPLETED: 2/20/07
5. DEPTH OF WATER ▽ TOD: ▼ 24-HR: 27 ft	11. CLASSIFICATION REFERENCE
6. DEPTH OF HOLE 40 ft	12. ENGINEER

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY (%)	SPT (N)	PENETROMETER (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (% <200)
	22.4				18	71		4.00		29.8				
			SANDY LEAN CLAY(CL), very stiff, tan & gray, w/ ferrous & calcareous nodules		19	58		3.50		21.0				
	20.4		**SANDY SILTY CLAY(CL-ML)**, firm, tan & gray, w/ ferrous nodules		20	67		1.00	106.2	21.3	28	21	7	
	18.4													
40			Boring terminated at 40 ft.											
45														
50														
55														
60														
65														

SWG 1836 BOR 03.14.859-057.GPJ TOLUNAY-WONG ENGINEERS.GDT 3/4/08

ENG FORM: SWG 1836 BOR





NOTE:
FOR BORING LOG NOTES AND CLASSIFICATIONS, SEE DRAWING NO. F-46.

SOLICITATION NO.
W912HY-
08-B-0016

US Army Corps of Engineers
Galveston District

Rev.	Description	Date	By

TIME:$TIME$ DATE:$DATE$ BY:$USER$

Drawn by:
Designed by: SK,SL,RB
Checked by: SL,RB
Submitted by: LORI K. THOMAS, P.E. Chief,Section 1, Structure Section
Approved by: PETE G. PEREZ, P.E. Chief, Engineering and Construction Division
Date: APRIL, 2008
Scale: AS SHOWN
Rev. --
Approval Recommended: HARRISON T. SUTCLIFFE, P.E. Chief, Engineering Branch

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
DAVID C. WESTON, COL., C.E.
DISTRICT COMMANDER

HOUSTON SHIP CHANNEL, TEXAS
HOUSE TRACT PLACEMENT AREA
INTERIOR REHABILITATION, EXTERIOR LEVEE
REHABILITATION, AND DRAINAGE DITCH REPAIR

LOGS OF BORINGS

Drawing No.:
F-44
Sheet 47 of 49

File:$FILE$

File No. HSC 401-515

4/14/2008 1:42:56 PM w:\cadd\projects\hsc\401-515 house tract\housetract plans\F44 Log of Borings 2.dgn