BUFFALO BAYOU

SUMMARY OF CONSOLIDATED-DRAINED(S) DIRECT SHEAR TEST DATA

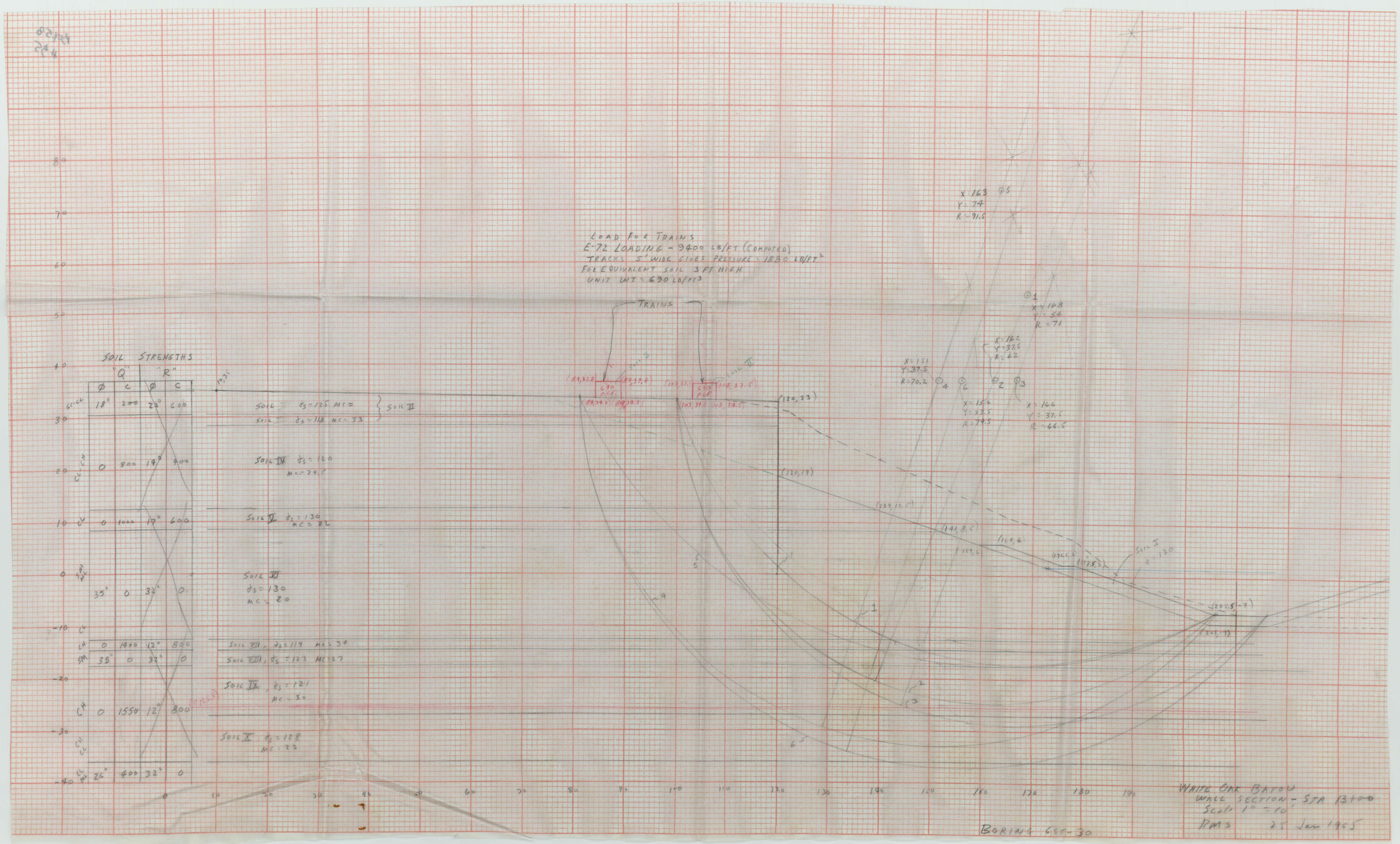
Boring No.	Depth Ft	Density Data MC %	UDW p.c.f.	Shear Data Actual Φ	Actual c, psf	Revised (1) Φ	Revised c, psf	Atterberg Limits L.L.	P.L.	Gradation Gr	Sa	Fines	Classification
					Clay (CH)								
6ST-4A	32-34	32	91	14	.40	20	0	69	19	0	1	99	Brown Clay (CH)
6ST-30	26-28	19	107	25.5	.46	31	0	50	18	0	0	100	Red Clay (CH)
6ST-42	26-28	24	102	26	.3	30	0	54	21	0	3	97	Gray Clay (CH)
6ST-68	42.5-45	33	86	11.5	.6	23	0	65	24	0	0	100	Red Clay (CH)
6ST-114	62-64	32	89	13	.2	21.5	0	77	20	0	1	99	Red Clay (CH)
6ST-118	65-67	31	89	16.6	.3	26	0	70	24	0	0	100	Red Clay (CH)
6ST-122	42-44	20	108	18.5	.34	26.5	0	57	20	—	—	—	Red Clay (CH)
6ST-123	48-50	15	110	18.3	.3	27	0	67	22	—	—	—	Red Clay (CH)
6ST-133	78-80	37	82	14	.5	21.5	0	81	23	—	—	—	Gray Clay (CH)
6ST-140	40-42	27	98	18.5	.3	27.5	0	74	23	—	—	—	Red Clay (CH)
					CL								
6ST-8A	12-14	18	113	34.2	.1	35.5	0	22	14	0	40	60	Brown Sandy Clay (CL)
6ST-13	22-24	22	105	33.9	0	33.9	0	25	15	0	24	76	Tan Sandy Clay (CL)
6ST-15A	10-12	17	104	30	0	30	0	39	11	0	35	65	Brown Sandy Clay (CL)
6ST-62	13-15	23	98	22.4	.3	26.5	0	36	13	0	20	80	Tan Sandy Clay (CL)
6ST-72	14-16	22	105	23.8	.45	29.5	0	45	15	0	4	96	Gray Clay (CL)
6ST-114	30-32	23	99	28.9	.3	32.2	0	30	13	0	9	91	Red Clay (CL)
6ST-116	14-16	21	107	33.7	.2	36.2	0	29	19	0	6	94	Gray Clay (CL)
6ST-116	36-38	25	99	27.2	.1	29.7	0	31	20	8	6	86	Red Clay (CL)
6ST-126	30-32	20	107	28.1	.2	33	0	38	13	—	—	—	Gray Clay (CL)
					CL-ML								
6ST-5A	35-37	21	105	35.8	.2	37.5	0	21	17	0	2	98	Red Silty Clay (CL-ML)
6ST-15A	30-32	17	110	30.5	0	30.5	0	23	16	0	20	80	Red Silty Clay (CL-ML)

cont'd on next sheet

(1) Based on EM 1110-2-1805, with 3 tons/sq.ft. normal stress

SUBJECT
COMPUTATION
COMPUTED BY
DATE
CHECKED BY
DATE
FILE NO.
PAGE OF

SWD FORM 521-J
8 Jan 65



LOAD FOR TRAINS
E-72 LOADING - 9400 LB/FT (COMPUTED)
TRACKS 5' WIDE GIVES PRESSURE = 1880 LB/FT²
FOR EQUIVALENT SOIL 3 FT HIGH
UNIT WT = 690 LB/FT³
TRAINS
SOIL STRENGTHS
"Q" "R"
Ø C Ø C
18° 200 22° 600
0 800 14° 400
0 1000 17° 600
35° 0 32° 0
0 1400 12° 800
35° 0 32° 0
0 1550 12° 800
26° 400 32° 0
SOIL γs = 125 MC =
SOIL γs = 118 MC = 33
SOIL III
SOIL IV γs = 120 MC = 29.5
SOIL V γs = 130 MC = 22
SOIL VI γs = 130 MC = 20
SOIL VII, γs = 119 MC = 34
SOIL VIII, γs = 123 MC = 27
SOIL IX, γs = 121 MC = 30
SOIL X γs = 128 MC = 23
690 P.C.F.
(89,37.8)
(89,39.8)
(103,37.5)
(103,39.5)
(108,37.5)
(120,33)
(120,19)
(139,12.5)
(141,8.5)
(159,6)
(164,6)
(175.5,2)
(178.5,2)
(205.5,-7)
(205,-9)
SOIL I γ = 130
X = 163 Y = 74 R = 91.5
X = 168 Y = 54 R = 71
X = 162 Y = 37.5 R = 62
X = 151 Y = 37.5 R = 70.2
X = 156 Y = 37.5 R = 74.5
X = 166 Y = 37.5 R = 66.5
WHITE OAK BAYOU
WALL SECTION - STA 13+00
Scale 1" = 10'
RMS 25 Jan 1965
BORING 6ST-30

STA.	Y	X	ELEV.	DESCRIPTION
B-1	721,311.87	3,155,008.92	35.730	R.R. SPIKE
B-2	721,228.31	3,154,923.28	34.720	R.R. SPIKE
B-3	721,763.62	3,154,378.93	32.976	R.R. SPIKE
B-175	721,772.07	3,153,709.31	26.387	
B-176	721,418.27	3,153,680.90	40.329	R.R. SPIKE
B-177	721,325.12	3,154,102.72	35.397	
B-178	721,185.90	3,154,411.23	34.105	IRON PIN
B-179	721,164.46	3,154,591.31	33.359	
B-180	720,978.39	3,154,749.06		R.R. SPIKE
B-181	720,952.73	3,154,889.72	33.346	
B-182	721,049.47	3,155,027.90	33.749	IRON PIN
B-183	720,554.89	3,155,302.19	37.317	"X" ON CONC. BLK.
B-184	720,369.26	3,155,479.57	39.171	
B-185	720,874.21	3,155,497.56		
B-186	720,981.41	3,155,478.96		
B-187	721,034.10	3,155,285.11		R.R. SPIKE
B-188	721,169.13	3,155,248.43		R.R. SPIKE
STA-131	720,361.75	3,155,357.84		

Galveston Dist. Lab. Report No. 1013

BUFFALO BAYOU, TEXAS

WHITE OAK BAYOU PROPOSED ALIGNMENT

SCALE 100' 0' 100'

U.S. ARMY ENGINEER DISTRICT, GALVESTON, TEXAS APRIL 1963

TO ACCOMPANY GENERAL DESIGN MEMORANDUM NO. 1 BUFFALO AND WHITE OAK BAYOUS AND WHITE OAK BAYOU FEATURE DESIGN MEMORANDUM NO. 2, MILE 1.07 TO YALE STREET. DATED: APRIL 1963

FILE: HSC 402-133

Sheet 6 of 7

PLATE 45

CORE BORINGS
WHITE OAK BAYOU, HOUSTON

Core Hole No.	Coordinates X	Coordinates Y	M.S.L. Elev.
6 St 26	3,155,165	720,440	37.60
27	3,155,450	720,370	39.3
28	3,155,275	720,465 ?	36.2
29	3,155,325	720,950	28.2
30	3,155,000	720,930	33.8
31	3,154,495	721,145	33.4
* 32	3,153,575	722,170	21.0
* 33	3,153,240	722,540	22.0
** 34	Never	drilled	
* 35	3,152,640	723,275	21.5
* 36	3,152,510	723,625	13.0
37	3,151,210	724,895	14.1
** 38			
39	3,150,300	725,020	31.6
** 40			
41	3,149,115	725,590	21.3
** 42			
** 43			
44	3,147,545	725,075	35.2
45	3,147,700	724,925	37.9
** 46	3,147,280	724,730	12.0
47	3,146,780	724,755	31.4
48	3,146,405	724,485	22.1
49	3,145,305	724,905	24.3
** 50	3,144,990	724,180	24.5
** 51	3,144,870	723,910	17.0
** 52			
** 53			
54	3,143,480	723,365	32.1
55	3,142,790	723,450	44.0
56	3,142,755	723,735	43.8
57	3,142,515	723,515	47.0
58	3,142,420	723,840	37.5
59	3,142,325	723,500	48.8
* 60			
61	3,141,890	724,290	43.8
62	3,141,750	724,970	47.9
63	3,140,570	725,070	51.0
64	3,140,200	725,465	50.5
65	3,138,940	725,205	49.0
66	3,137,960	726,015	50.5
67	3,137,385	726,500	46.2
68	3,130,375	734,185	61.5
69	3,126,995	738,435	69.9

* Core Holes covered up by fill material
** Core Holes not drilled

HOLE NO. 6ST-30

DEPARTMENT OF THE ARMY DIVISION Southwestern INSTALLATION Galv Dist, Eng Div	1. PROJECT White Oak Bayou	SHEET OF	
DRILLING LOG	2. LOCATION (Coordinates or Station) Pasadena, Texas (3,155,000 - 720,930)		
	3. DRILLING AGENCY U. S. Army Corps of Engineers 55'R		
4. HOLE NO. (As shown on drawing title and file No.) 6ST-30	5. NAME OF DRILLER K. D. West		
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED DEGREES WITH VERTICAL	7. THICKNESS OF OVER-BURDEN	8. DEPTH DRILLED INTO ROCK	9. TOTAL DEPTH OF HOLE 75.0
10. SIZE AND TYPE OF BIT Shelby Tube-6"	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) M.S.L.	12. MANUFACTURER'S DESIGNATION OF DRILL	
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN DISTURBED UNDISTURBED	14. TOTAL NO. CORE BOXES	15. ELEV. GROUND WATER	16. DATE HOLE STARTED 6/1/60 COMPLETED 6/3/60
17. ELEV. TOP OF HOLE 33.8	18. TOTAL CORE RECOVERY FOR BORING (%)	19. SIGNATURE OF INSPECTOR Bott Elev. -41.2	

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	
0.0	2.0	CH	Black-gray sandy clay, fill hard	Lab SM	w=12	Fines=48 Cont. 1 31.8	4.50
2.0	4.0		Black-tan sandy clay, fill w/rock	CL	w=21	Sandy Gravelly LL=46 Jar 1 29.8	
4.0	6.0		Tan-gray sandy clay, plastic stiff, fill	CH	w=33 γ=88	LL=60 Cont. 2 27.8	0.75
6.0	8.0		Gray-red sandy clay, fill, plastic, stiff	CL	w=30 γ=91	LL=43 Cont. 3	1.00
8.0	10.0		Red-tan sandy clay, soft			Cont. 4 23.8	0.50
10.0	12.0		Gray-tan sandy clay, fill plastic stiff			Cont. 5	0.75
12.0	14.0	CL	Dark gray sandy clay, plastic stiff, fill		w=29	Cont. 6	0.75
14.0	16.0		Tan-gray sandy clay, fill, plastic, stiff	CH	γ=91	LL=54 Cont. 7	1.00
16.0	18.0		Red-dark gray sandy clay, fill plastic, stiff			Cont. 8	1.00
18.0	20.0		Red-dark gray sandy clay, stiff			Cont. 9	1.25
20.0	22.0		Gray-red sandy clay, plastic, stiff			Cont. 10 11.8	1.00
22.0	24.0		Gray-tan sandy clay, fill	CL	w=23 γ=100	Jar 2 Sandy LL=26	
24.0	26.0		Gray silty clay, sand, stiff			Cont. 11 7.8	1.50
26.0	28.0		Brown-red silty sand, coarse plastic, stiff	SM	w=18 γ=112	Cont. 12 Fines=40	1.00
28.0	30.0	SM	Tan-coarse sand, plastic, stiff			Cont. 13	0.75
30.0	37.5		Brown-red med. coarse, water sand, soft			Jar 3 -3.7	
37.5	40.0	SC	Blue silty clayey sand, soft	ML	w=31 γ=109	Jar 4 Fines=85	
40.0	42.0	CL	Red-blue sandy clay, v/stiff			Cont. 14	3.00
42.0	43.0		Red sandy clay, plastic, stiff			Cont. 15 Fines=22 -9.2	1.00
43.0	44.5	SM	Red, coarse sand, soft	SM	w=18 γ=110	Cont. 16 -10.7	0.25
44.5	45.5		Red sandy clay, hard	CL	w=20 γ=108	Cont. 17 LL=26	4.50+
45.5	47.0	CL	Red silty clay, v/stiff			Cont. 18 -13.2	3.00
47.0	49.0		Red silty clay, v/stiff	CH	w=34 γ=92	Cont. 19 LL=71 -15.2	3.00
49.0	52.0	SM	Red fine water sand, soft	SM	w=27	Jar 5 Fines=22 -18.2	

HOLE NO. 6ST-30 (cont'd)

DEPARTMENT OF THE ARMY DIVISION _____ INSTALLATION _____ **DRILLING LOG**	1. PROJECT White Oak Bayou	SHEET OF
	2. LOCATION (Coordinates or Station)	
	3. DRILLING AGENCY	
4. HOLE NO. (As shown on drawing title and file No.)	5. NAME OF DRILLER K. D. West	

6. DIRECTION OF HOLE			7. THICKNESS OF OVER-BURDEN	8. DEPTH DRILLED INTO ROCK	9. TOTAL DEPTH OF HOLE 75.0
☐ VERTICAL	☐ INCLINED	DEGREES WITH VERTICAL			

10. SIZE AND TYPE OF BIT	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	12. MANUFACTURER'S DESIGNATION OF DRILL

13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		14. TOTAL NO. CORE BOXES	15. ELEV. GROUND WATER	16. DATE HOLE	
DISTURBED	UNDISTURBED			STARTED 6/1/60	COMPLETED 6/3/60

17. ELEV. TOP OF HOLE	18. TOTAL CORE RECOVERY FOR BORING (%)	19. SIGNATURE OF INSPECTOR

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	
52.0	54.0	ML	Red, silty clay, stiff	CL	w=28 γ=98	LL=49 Cont. 20 -20.2	1.50
54.0	56.0	CL	Red-blue silty clay, stiff		w=38	Cont. 21	1.50
56.0	58.0		Blue-red silty clay, stiff		γ=83	LL=63 Cont. 22	1.25
58.0	60.0	CH	Red beaumont clay, v/stiff	CH		Cont. 23	2.25
60.0	62.0	ML	Blue, silty clay, w/calcareous nodules stiff		w=20	Cont. 24	2.75
62.0	63.0	CL	Gray-tan silty clay, w/nodules stiff		γ=107	LL=51 Cont. 25 -29.2	2.50
63.0	64.5		Tan-gray sandy clay, v/stiff	CL	w=22 γ=105	LL=39 Cont. 26 -30.7	3.25
64.5	66.0		Gray-red beaumont clay, hard		w=23	Cont. 27	4.50
66.0	67.5		Gray-red beaumont clay, v/stiff	CH		Cont. 28	3.50
67.5	69.0		Gray-red beaumont clay, v/stiff		γ=105	LL=57 Cont. 29	3.75
69.0	70.5	CH	Gray-red beaumont clay, hard			Cont. 30 -36.7	4.50+
70.5	72.0		Gray-red Beaumont clay, stiff	CL	w=19 γ=110	LL=34 Cont. 31 -38.2	2.00
72.0	73.5		Gray-red sandy clay, stiff		w=20	Cont. 32	1.50
73.5	75.0		Red sandy clay, plastic, stiff	ML	γ=108	Fines=95 Cont. 33 -41.2	1.00
			Bottomed at 75.0 in above Water seepage 17.0				

White Oak Bayou
Channel Rectification
Houston, Texas

TEST DATA SUMMARY

FEATURE Log of Soil Borings

BORING NO.	SAMPLE NO.	DEPTH OR ELEV. OF SAMPLE	MECHANICAL ANALYSIS GRAVEL %	SAND %	FINES %	D/10	ATTERBERG LIMITS LL	PL	BAR L.S. %	NATURAL WATER CONTENT %	NATURAL DRY DENSITY LBS./CU.FT.	LABORATORY CLASSIFICATION
65T-30	-60-	0.0	4-10-37									
	2537		1	51	48	4.5+			4.0	12.3	Crumb.	B, Cl Sa (SC), Topsoil
		2.0										
	2538		20-8-28	17	55	—	46.1		17.0	21.3	—	D-Ru, Sa Gr Cl (CL)
		4.0										
	2539		0	7	93	0.75	60.1		21.0	33.1	87.6	T, Cl (CH), Med. (Fill)
		6.0										
	2540		Same as 60-2541			1.0				31.5	90.0	G-T-R, Cl (CL), Med (Fill)
		8.0								(30)		
	2541		0	14	86	1.0	43.3		17.0	29.0	91.9	G-T-R, Cl (CL), Med. (Fill)
		10.0										
	2542		Same as 60-2543			1.0				30.7	86.2	T-G, Cl (CH), Med. (Fill)
		12.0										
	2543		2	10	88	1.25	57.1		20.0	29.5	91.6	T-G, Cl (CH), St (Fill)
		14.0										
	2544		Same as 60-2543			0.75				27.2	97.2	T-G, Cl (CH), Med. (Fill)
		16.0								(29)		
	2545		Same as 60-2546			1.0				31.6	84.7	T-G-R, Cl (CH), Med.
		18.0										
	2546		0	7	93	1.25	50.7		19.0	25.8	93.8	T-G-R, Cl (CH), St.
		20.0										
	2547		1	5	94	1.0	55.1		20.0	30.0	92.0	R, Cl (CH), Med
		22.0										
	2548		3	37	60	—	26.3		6.0	25.4	—	G, Sa Cl (CL).
		24.0								(22)		
	2549		Same as 60-2548			1.0				20.3	100.2	G, Sa Cl (CL)
		26.0										
	2550		0-0-56	56	44	1.50			2.0	15.9	113.9	R, Si Sa (SM)
		28.0										
	2551		Same as 60-2550			1.50				17.2	110.6	R, Si Sa (SM)
		30.0								(18)		
	2552		0-0-64	64	36	—			0.0	22.3	—	Ru, Si Sa (SM)
		37.5										
	2553		0	17	83	—			2.0	22.2	—	G, Si (ML)
		40.0								(21)		
	2554		Same as 60-2553			1.25				20.6	108.5	G, Si (ML)
		42.0										
	2555		1	11	88	4.5			1.0	19.6	109.8	R, Si (ML)
		43.0										
	2556		0-0-78	78	22	1.75			0.0	17.7	109.9	Ru, Si Sa (SM)
		44.5										
	2557		2	14	84	4.5	25.7		5.0	17.2	112.3	R, Cl (CL), Hd.
		45.5								(20)		
	2558		Same as 60-2557			3.0				23.2	103.1	R, Cl (CL), Hd.
		47.0										

* Laboratory Penetrometer Reading

DLR-853

White Oak Bayou
Channel Rectification
Houston, Texas

TEST DATA SUMMARY

FEATURE Log of Soil Borings

BORING NO.	SAMPLE NO.	DEPTH OR ELEV. OF SAMPLE	MECHANICAL ANALYSIS GRAVEL %	SAND %	FINES %	D/6	ATTERBERG LIMITS LL	PL	BAR L.S. %	NATURAL WATER CONTENT %	NATURAL DRY DENSITY LBS./CU.FT.	LABORATORY CLASSIFICATION
GST-30	-60-	47.0										
Cont.	2559		0	0	100	1.85	70.5		20.0	34.3	91.9	R, Cl(CH), St. w/Si partings
		49.0		0-0-78								
	2560		0	78	22	—			0.0	26.9	—	Ru, SiSa (SM)
		52.0										
	2561		0	0	100	4.0	49.4		17.0	27.9	98.0	R, Cl(CL), Hd, w/Si partings
		54.0										
	2562		Same as 60-2563			1.75				37.1	83.4	MoH R-G, Cl(CH), St. w/Si partings
		56.0								(30)		
	2563		0	1	99	2.0	62.8		18.5	39.1	82.1	MoH R-G, Cl(CH), St. w/Si partings
		58.0										
	2564		0	3	97	1.0	62.6		18.0	37.6	82.8	R, Cl(CH), Med.; w/Si partings
		60.0										
	2565		0	8	92	3.5	50.1		17.0	21.7	105.9	G, Cl(CH), v/st. w/Si partings.
		62.0										
	2566		4-14-18	12	70	3.75	52.7		17.0	18.3	109.6	G, SaGr Cl(CH), v/st. w/calc. nods.
		63.0										
	2567		6	16	78	2.75	39.2		11.0	21.8	105.4	Br. G, SaCl(CL), v/st w/calc. nods
		64.5										
	2568		2	3	95	3.85	52.4		17.0	21.6	106.0	R-G, Cl(CH), v/st. w/ Calc. nods.
		66.0										
	2569		Same as 60-2570			3.75				23.8	100.6	R-G, Cl(CH), v/st. w/calc. nods nods
		67.5								(23)		
	2570		1	3	96	4.5	62.1		17.0	27.5	99.2	R-G, Cl(CH), Hd. w/calc. nods.
		69.0										
	2571		Same as 60-2570			3.85				18.2	111.5	R-G, Cl(CH), v/st. w/calc. nods.
		70.5										
	2572		2	5	93	4.5+	33.7		6.0	18.6	110.3	R, Cl(CL), Hd.
		72.0										
	2573		Same as 60-2574			3.25				20.8	107.9	R-G, Si (ML)
		73.5								(20)		
	2574		1	4	95	3.25			3.0	19.3	108.1	R-G, Si (ML)
		75.0										

Bottomed @ 75.0' in R-G, Si (ML)
Water seepage @ 17.0'

* Laboratory Penetrometer Reading

DLR-853

BUFFALO BAYOU, TEXAS
WHITE OAK BAYOU CHANNEL RECTIFICATION
SUMMARY OF UNCONFINED COMPRESSION TEST DATA
MOUTH TO 56+50

TABLE 3

Boring Number	Depth, feet	Density Data MC %	Density Data UDW Lb/cu ft	LL	PL	Bar L.S.	Gradation Gr	Gradation Sa	Gradation Fines	% Strain @ Max stress	Max strain Lbs/sq ft	Classification
6ST-28	32.0-34.0	22	103	49	-	18	0	22	78	3.5	4239	Red sandy clay,v/stiff (CL)
6ST-30	28.0-30.0	22	105	53	-	19	0	0	100	4.9	5606	Red clay, hard (CH)
6ST-169	12.0-14.0	27	97	57	-18	+8	0	1	99	8.0	1360	Red clay, med. (CH)
6ST-169	14.0-16.0	22	103	42	-13	+3	1	12	88	11.7	1200	Red clay, med. (CL)
6ST-170	20.0-22.0	21	104	52	-15	+5	22	14	64	2.0	800	Red clay, gravelly (CH)
6ST-170	22.0-24.0	22	102	47	-14	-	20	21	59	9.3	1200	Red clay, gravelly (CL)