15+00

Hole No. 6ST-171

DRILLING LOG	DIVISION Southwestern	INSTALLATION Galv Dist, Eng Div	SHEET OF SHEETS

1. PROJECT White Oak Bayou	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY Dept of the Army, GD, Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 6ST-171	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN — DISTURBED: 11 Jar; UNDISTURBED: 17 Cont
5. NAME OF DRILLER Eck	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED: 12 Oct; COMPLETED: 13 Oct 1966
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 55.0	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
0.0	2.0		Fill			Jar 1
2.0	4.0		Fill	Same as 5-170?		Jar 2
4.0	6.0		Fill, gravel			Jar 3
6.0	8.0		Fill, gravel			Jar 4
8.0	10.0		Gray fine sand, layer of stone, ~~v/soft~~			Jar 5 ~~0.0~~
10.0	12.0		Gray fine sand w/clay part ~~v/soft~~			Jar 6 ~~0.0~~
12.0	14.0		Same as above, ~~v/soft~~			Jar 7 ~~0.0~~
14.0	16.0		Gray clayey fine sandy silt ~~v/soft~~			Jar 8 ~~0.0~~
16.0	18.0		Gray and brown clayey silt (could not pick up in 6" tube) medium 3" tube	?		Cont. 1 0.75
18.0	20.0		Light gray clay w/pockets sand and silt, stiff			Cont. 2 1.25
20.0	22.0		Gray and brown sandy clay v/stiff			Cont. 3 2.25
22.0	24.0		Tan and gray clay, hard			Cont. 4 4.50+
24.0	26.0		Tan and gray clay w/nod, hard			Cont. 5 4.50+
26.0	28.0		Same as above, hard	"S"		Cont. 6 4.50+
28.0	30.0		Tan clay and cal nod w/layer clayey silt v/stiff to hard			Cont. 7 2.50-4.50+
30.0	32.0		Tan silt and tan clay layered, v/soft to hard			Cont. 8 0.0-4.50+
32.0	34.0		Tan clay w/cal nod, hard			Cont. 9 4.50+
34.0	36.0		Tan and gray silty clay v/stiff			Cont. 10 2.25
36.0	38.0		Same as above, v/stiff			Cont. 11 3.25
38.0	38.5		Silt stone, hard			Cont. 12 4.50+
38.5	40.0		Tan clayey silt, med			Jar 9 0.75
40.0	42.0		Tan and gray clay w/nod hard			Cont. 13 4.50+
42.0	44.0		Tan clay w/nod, hard			Cont. 14 4.50+
44.0	46.0		Brown clay, silt			Jar 10

continued

DRILLING LOG

DIVISION	
INSTALLATION	
SHEET	OF SHEETS
1. PROJECT	White Oak Bayou
2. LOCATION *(Coordinates or Station)*	
3. DRILLING AGENCY	
4. HOLE NO. *(As shown on drawing title and file number)*	
5. NAME OF DRILLER	
6. DIRECTION OF HOLE	☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	
8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE	
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	DISTURBED / UNDISTURBED
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUND WATER	
16. DATE HOLE	STARTED / COMPLETED
17. ELEVATION TOP OF HOLE	
18. TOTAL CORE RECOVERY FOR BORING	%
19. SIGNATURE OF INSPECTOR	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS *(Description)* d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS *(Drilling time, water loss, depth of weathering, etc., if significant)* g
46.0	48.0		Stone, layers of silt and sand, no recovery			
48.0	50.0		Brown fine sand, stiff			Cont. 15 1.75
50.0	52.0		Brown fine sand 50.0-50.5 56 blows 50.5-50.8 50 blows refusal } v/Dense			Jar 11
52.0	54.0		Brown sand w/layer sandstone med to hard			Cont. 16 0.75-4.50
54.0	55.0		Tan clay, v/stiff BOTTOMED WT. @			Cont. 17 2.25

1 December 1966

WHITE OAK BAYOU

TEST REQUEST CE-28-67

A. Samples submitted

Borings 6ST-169 thru 6ST-171, 50 containers and 31 jars.

B. Identification tests requested

S-1	Processing and preparation	50 @ $8	$400
		31 @ $1	31
S-2	Moisture content	81 @ $1	81
S-4	Mechanical analysis, sieves only	40 @ $7	280
S-9	Liquid limit	20 @ $8	160
S-10	Plastic limit	20 @ $8	160
S-15	Unit weight	50 @ $7	350
S-20	Visual classification	81 @ $2	162

C. Special tests requested

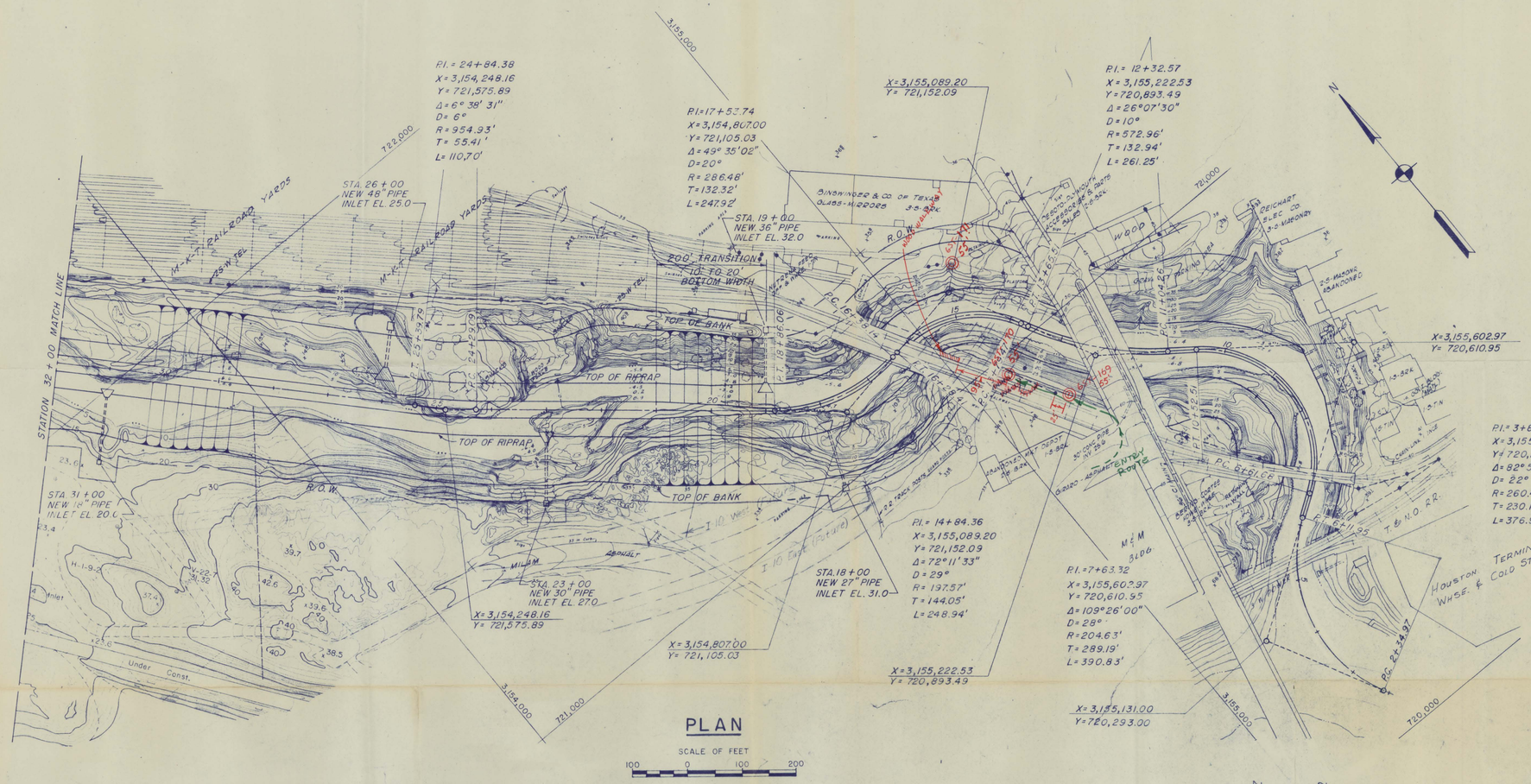
1. S-42 Direct shear (maximum lateral stress 3tons/sq ft) 3 @ $100 $300

Boring No.	Cont. No.
6ST-169	2
6ST-169	17
6ST-171	6

2. Unconfined compression 4 @ $27 $108

Boring No.	Cont. No.
6ST-169	3
6ST-169	4
6ST-170	1
6ST-170	2

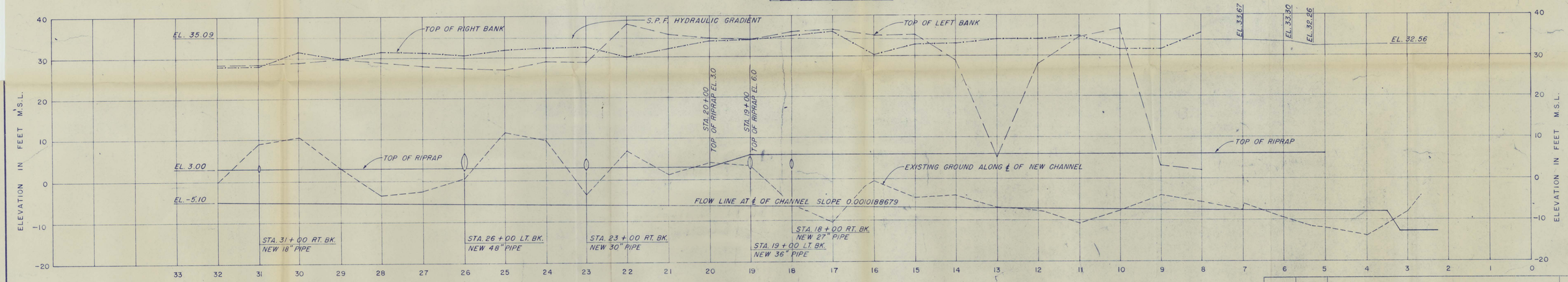
$2,032



PLAN

SCALE OF FEET

100 0 100 200



PROFILE

REVISION	DATE	BY

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

DRAWN BY:
TRACED BY:
CHECKED BY:
SUBMITTED BY:
CHIEF
APPROVED:
CHIEF DESIGN BRANCH

BORING LAYOUT
BUFFALO BAYOU, TEXAS
WHITE OAK BAYOU

GALVESTON DISTRICT LABORATORY REPORT NO. 1155
SHEET 1 OF 1

APPROVED: DATE
CHIEF ENGINEERING DIVISION

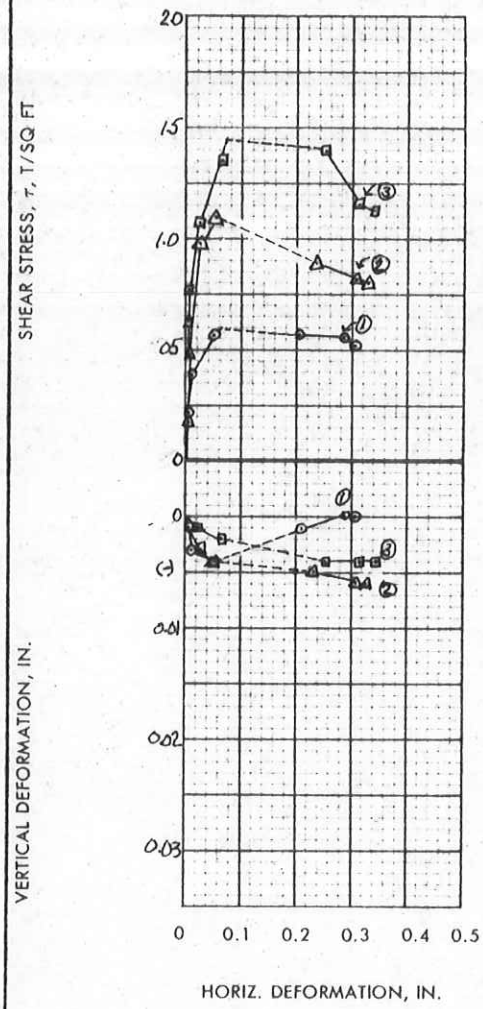
SCALE: AS SHOWN
SPEC. DATE
DRAWING NUMBER
SHEET
FILE NO.

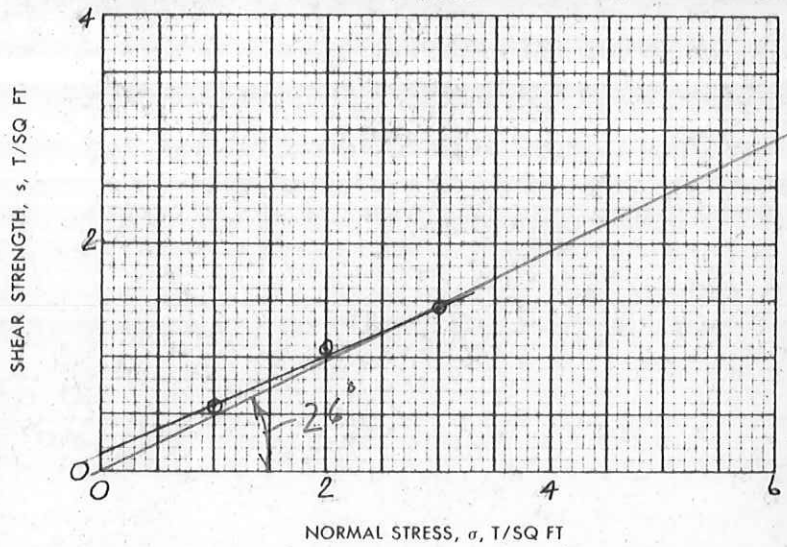
Results of Tests of Foundation Materials

Hole No.	SWD Sample No.	Depth, feet	Type of Sample	Mechanical Analysis, % Passing 1"	3/4"	1/2"	3/8"	No. 4	No. 10	No. 20	No. 40	No. 100	No. 200	Limits LL	PL	LS	Natural Conditions Water Content %	Dry Density lbs/cu.ft.	Classification
6ST-170 (Cont'd)	X-3369	28.0 - 30.0	Ctn														18.2	109	CL CLAY, sandy, dark gray and grayish brown, stiff; seams and pockets of sandy silt; organic material in lower 0.4'.
	3370	30.0 - 32.0	"								100	93	69	26	17		17.3	113	CL CLAY, sandy, light gray, very stiff.
	3371	32.0 - 34.0	"								100	77	44				17.0	112	SC SAND, clayey, light reddish-brown.
	3372	34.0 - 36.0	"														17.3	113	SC SAND, clayey, light reddish-brown and gray.
	3373	36.0 - 37.0	"								100	85	53				20.9	104	CL CLAY, sandy, grayish-brown.
	3373A	37.0 - 38.0	"											31	15		23.3	111	CL CLAY, sandy, light brownish-gray, stiff.
	3374	38.0 - 40.0	"														19.1	107	SM SAND, silty, light brownish-gray; 1/4" to 1/2" seams of dark gray sandy clay in lower 0.4'.
	3375	40.0 - 42.0	"		100	96	88	82	78	75	74	64	56				16.9	111	CL CLAY, sandy, light red, stiff.
	3376	42.0 - 44.0	"														15.9	109	CL CLAY, sandy, light red, hard; few hard flat sandstone particles.
	3377	44.0 - 46.0	"					100	99	99	99	96	46				18.7	111	SM SAND, silty, light reddish-brown.
	3378	46.0 - 48.0	Jar							100	99	95	48				24.4		SC SAND, clayey, light reddish-brown and dark gray.
	3379	48.0 - 50.0	Ctn											69	22		33.6	89	CH CLAY, red, stiff; 1/8" to 1/2" diagonal silty sand seam.
	3380	50.0 - 52.0	"								100	53	20				17.5	102	SM SAND, silty, light brown.
	3381	52.0 - 53.5	Jar														30.0		CH CLAY, red.
	3382	54.0 - 56.0	Ctn														39.6	81	CH CLAY, red, stiff.
6ST-171	X-3383	0.0 - 2.0	Jar														8.3		GC GRAVEL, clayey, sandy, brown; 100% finer than 1-1/2" screen.
	3384	2.0 - 4.0	"	89	79	75	71	64	57	51	46	37	27				6.4		SC SAND, clayey gravelly, reddish-brown; 100% finer than 1-1/2" screen.
	3385	4.0 - 6.0	"														4.6		SC SAND, clayey gravelly, reddish-brown; 100% finer than 1-1/2" screen.
	3386	6.0 - 8.0	"	90	86	81	74	57	43	34	25	16	13				4.7		SC SAND, clayey gravelly, reddish-brown; 100% finer than 1-1/2" screen.

Results of Tests of Foundation Materials

Hole No.	SWD Sample No.	Depth, feet	Type of Sample	Mechanical Analysis, % Passing 1"	3/4"	1/2"	3/8"	No. 4	No. 10	No. 20	No. 40	No. 100	No. 200	Limits LL	PL	LS	Natural Conditions Water Content %	Dry Density lbs/cu.ft.	Classification
6ST-171 (Cont'd)	X-3387	8.0 - 10.0	Jar														6.2		SM SAND, silty, yellow
	3388	10.0 - 12.0	"				100	99	98	97	96	73	38				9.6		SC SAND, clayey, light yellow
	3389	12.0 - 14.0	"														14.3		SC SAND, clayey, light yellow
	3390	14.0 - 16.0	"						100	99	99	81	51	19	15		15.1		ML-CL SILT, light brown
	3391	16.0 - 18.0	Ctn														20.6	113	CL CLAY, sandy, gray; stiff
	3392	18.0 - 20.0	"								100	96	80	72	24		19.8	108	CH CLAY, light gray, stiff
	3393	20.0 - 22.0	"														23.1	101	CL CLAY, sandy, stiff
	3394	22.0 - 24.0	"				100	99	99	98	98	98	95				23.3	104	CH CLAY, red, very stiff
	3395	24.0 - 26.0	"														20.0	110	CH CLAY, red, hard
	3396	26.0 - 28.0	"									100	99	53	18		22.0	115	CH CLAY, red, hard, very stiff
																			DIRECT SHEAR TEST: PLATE 7
	3397	28.0 - 30.0	"														23.3	103	CL CLAY, red, stiff.
	3398	30.0 - 30.8	"									100	86				21.9	102	CL CLAY, red
	3398A	30.8 - 32.0	"														31.5	92	CH CLAY, red, stiff.
	3399	32.0 - 34.0	"														21.9	102	CH CLAY, red, very stiff.
	3400	34.0 - 36.0	"		100	93	89	88	87	87	87	87	87	36	17		19.4	110	CL CLAY, red, very stiff; pockets of hard calcareous material.
	3401	36.0 - 38.0	"														22.7	104	CH CLAY, red, very stiff.
	3402	38.0 - 38.5	"														7.5	106	- SANDSTONE, red, hard.
	3403	38.5 - 40.0	Jar					100	99	99	99	99	99				28.8		CL CLAY, red, Free water.
	3404	40.0 - 42.0	Ctn			100	99	98	97	96	96	96	96	47	19		24.0	103	CL CLAY, red, very stiff.
	3405	42.0 - 44.0	"														24.2	102	CL CLAY, red, hard.
	3406	44.0 - 46.0	Jar						100	99	99	99	88				24.3		CL CLAY, red.
	3407	48.0 - 50.0	Ctn														19.5	108	SM SAND, silty, light red
	3408	50.0 - 52.0	Jar									100	28				17.6		SM SAND, silty, light red
	3409	52.0 - 54.0	Ctn														20.1	110	SM SAND, silty, yellowish-brow upper 0.4' weakly cemented.
	3410	54.0 - 55.0	"									100	99	65	22		39.3	82	CH CLAY, red, stiff; 0.2' layer of silty sand at top.





TEST NO.			①	②	③	
INITIAL	WATER CONTENT	w_o	23.5 %	20.1 %	22.1 %	%
	VOID RATIO	e_o				
	SATURATION	S_o	%	%	%	%
	DRY DENSITY, LB/CU FT	γ_d	103	107	105	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}				
FINAL	WATER CONTENT	w_f	30.0 %	27.2 %	28.5 %	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.59	1.09	1.44	
ACTUAL TIME TO FAILURE, MIN		t_f	195	210	265	
RATE OF STRAIN, IN./MIN			0.0002	0.0002	0.0002	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS

ϕ' = 23.0°

TAN ϕ' = .425

c' = 0.2 T/SQ FT

☐ CONTROLLED STRESS

☑ CONTROLLED STRAIN

TYPE OF SPECIMEN Undisturbed 3.0 IN. SQUARE 0.5 IN. THICK

CLASSIFICATION CLAY (CH)

LL 53 PL 18 PI 35 G_s

REMARKS

PROJECT WHITE OAK BAYOU

AREA

BORING NO. 6ST-171 SAMPLE NO. X-3396

DEPTH ~~FT~~ 26.0-28.0 DATE JAN 63

DIRECT SHEAR TEST REPORT

ENG FORM 1 JUN 65 **2092** (EM 1110-2-1906) PREVIOUS EDITIONS ARE OBSOLETE (TRANSLUCENT) GPO : 1966 OF—214-945

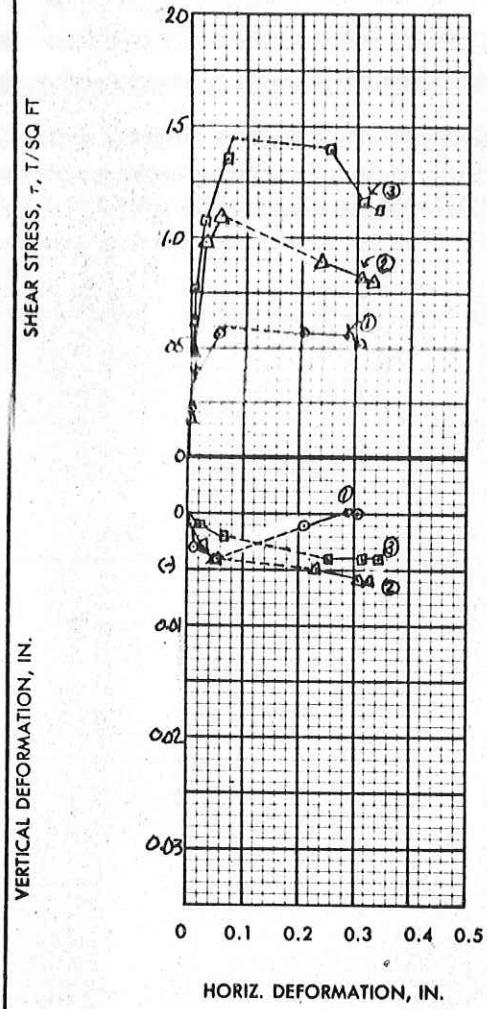
PLATE IX-3

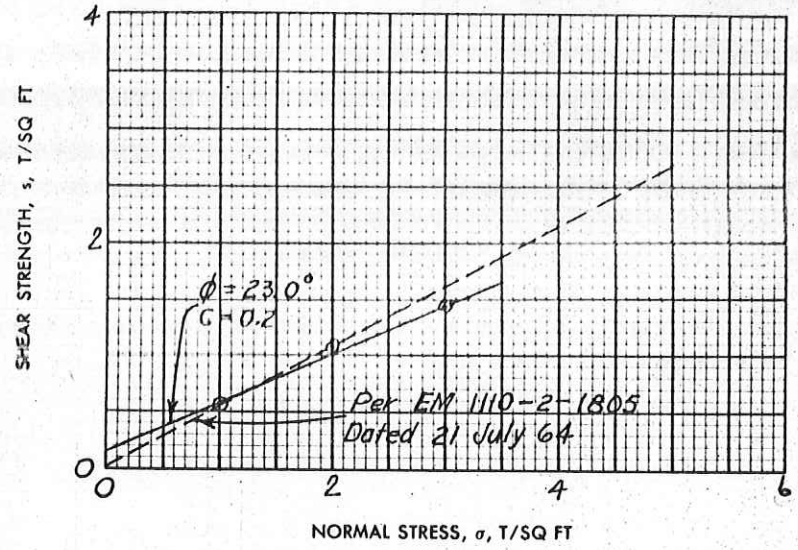
BUFFALO BAYOU, TEXAS
WHITE OAK BAYOU CHANNEL RECTIFICATION
SUMMARY OF DIRECT SHEAR TEST DATA

TABLE 2

Boring Number	Depth, feet	Type of test	Density Data MC %	Density Data UDW Lbs/cu ft	Shear Data maximum Ø	Shear Data maximum C	Atterberg Limits LL	Atterberg Limits PL	Bar L.S.	Gradation Gr	Gradation Sa	Gradation Fines	Classification
6ST-27	22.0-24.0	S	16	110	31.5	0.0	32	15	7	0	25	75	Rust-tan clay (CL),v/stiff
6ST-28	10.0-12.0	S	21	103	24.5	0.0	34	13	11	0	20	80	Rust-red clay (CL), soft
6ST-29	32.0-33.0	S	23	101	26.0	0.0	62	22	20	0	0	100	Red clay (CH), v/stiff
6ST-31	14.0-16.0	S	3	109	34.2	0.0	NP	NP	2	0	60	40	Gray silty sand (SM)
6ST-31	37.5-39.0	S	25	100	35.7	0.0	35	15	-	0	5	95	Rust clay (CL),stiff
6ST-113	29.0-30.5	S	-	101	35.0	0.0	-	-	-	0	90	10	Tan silty sand (SM-SP)
	32.0-34.0												
6ST-117	6.0-8.0	S	21	106	26.0	0.0	48	19	-	2	16	82	Tan sandy clay (CL),v/stiff
6ST-117	14.0-16.0	S	19	108	35.0	0.0	39	13	-	0	21	79	Red sandy clay (CL), hard
6ST-117	24.0-26.0	S	21	104	32.6	0.0	-	-	3.0	0	11	89	Red clayey silt (CL-ML), hard
6ST-123	0.0-2.0	S	15	109	28.5	0.0	45	18	-	0	21	79	Gray sandy clay (CL), hard
6ST-123	42.0-43.5	S	24	100	27.5	0.0	57	23	-	0	0	100	Red clay (CH), very stiff
6ST-154	20.0-22.0	S	23	100	34.6	0.0	-	-	0.0	8	19	73	Red sandy silt (ML)
6ST-156	30.0-32.0	S	17	106	30.0	0.0	33	19	-	0	0	100	Red clay (CL), very stiff
6ST-157	39.0-40.0	S	32	89	25.2	0.0	68	27	-	0	0	100	Brown clay (CH), hard
6ST-159	10.0-12.0	S	12	113	28.0	0.0	27	13	-	0	30	70	Tan sandy clay (CL), hard
6ST-169	10.0-12.0	S	29	95	19.8	0.0	62	18	-	0	1	99	Brown clay (CH), stiff
6ST-169	50.0-52.0	S	25	102	25.0	0.0	57	20	-	0	2	98	Red clay (CH), hard
6ST-171	26.0-28.0	S	22	105	28.1	0.0	53	18	-	0	1	99	Red clay (CH), very stiff

SWDED-GL Report 10062





TEST NO.			①	②	③	
INITIAL	WATER CONTENT	w_o	23.5 %	20.7 %	22.1 %	%
	VOID RATIO	e_o				
	SATURATION	S_o	%	%	%	%
	DRY DENSITY, LB/CU FT	γ_d	103	107	105	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}				
FINAL	WATER CONTENT	w_f	30.0 %	27.2 %	28.5 %	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.59	1.09	1.44	
ACTUAL TIME TO FAILURE, MIN		t_f	195	210	265	
RATE OF STRAIN, IN./MIN			0.0002	0.0002	0.0002	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS

ϕ' = 28.1°

TAN ϕ' = .534

c' = 0.0 T/SQ FT

☐ CONTROLLED STRESS

☑ CONTROLLED STRAIN

TYPE OF SPECIMEN Undisturbed 3.0 IN. SQUARE 0.5 IN. THICK

CLASSIFICATION CLAY (CH) V/Stiff

LL 53 PL 18 PI 35 G_s

REMARKS

PROJECT WHITE OAK BAYOU

AREA

BORING NO. GST-171 SAMPLE NO. X-3396

DEPTH ~~EL~~ 26.0-28.0 DATE JAN 67

DIRECT SHEAR TEST REPORT

ENG FORM 1 JUN 65 **2092** (EM 1110-2-1906) PREVIOUS EDITIONS ARE OBSOLETE (TRANSLUCENT) GPO : 1966 OF—214-945

PLATE 34