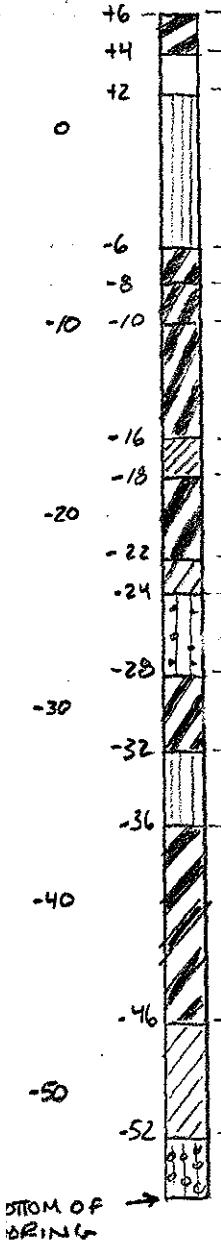
BORING 96-63

ELEVATION OF BORING = 6.1 FT MLT.

ELEV. FT. MLT



	γ_{SAT} PCF	SOIL SHEAR STRENGTH: UNDRAINED/SHORT TERM ϕ, DEG	UNDRAINED/SHORT TERM C, COHESION PSF	DRAINED/LONG TERM ϕ, DEG	DRAINED/LONG TERM C, COHESION PSF
VERY STIFF (CH)	120	0	600	18	0
VERY LOOSE SHELL (CH)	100	27	0	27	0
VERY LOOSE SAND SILT (ML)	100	27	0	27	0
MEDIUM (CH)	119	0	600	13	240
STIFF (CH)	123	0	600	13	240
VERY STIFF (CH)	125	0	1000	13	240
VERY STIFF (CL)	127	0	1000	14	240
VERY STIFF (CH)	125	0	1000	13	240
STIFF (CL)	126	0	600	14	240
MEDIUM (SM)	115	30	0	30	0
VERY STIFF (CH)	122	0	1000	13	240
MEDIUM DENSE (ML)	115	28	0	28	0
STIFF (CH)	120	0	700	15.5	320
V. STIFF (CL)	132	0	1000	14	240
MED DENSE (SM)	115	30	0	30	0

- γ_{SAT} = SOIL SATURATED UNIT WEIGHT
- SEE LAB LOGS FOR MORE DETAILED SOIL DESCRIPTION.
- WATER TABLE AT APPROX WATER SURFACE ELEV.

F: HARRISON/8/13/96

BY L. BROTMAN DATE 8/13/96 SUBJECT COLORADO RIVER LOCKS BOAT BASIN, TX SHEET NO. 1 OF 1

CHKD. BY ..... DATE ..... JOB NO. .....

Harrison/Dave, 13 August 1996

Enclosed are the soil shear strengths to be used for the Colorado River Boat Basin, TX.

I ran CWALSHT (based on an imput file I copied from Dave's computer) using the new long term strengths. I came up with a wall bottom elevation of -26.5 (32.5 foot wall). My input and output files are on the disk (CO-RES.IN) for you to use/review if you want.

Let me know if you come up with a similar design. I didn't check the wall with short term strengths, this should still be done.

Also curious about the recommended construction sequence when the wall will be replaced.

Has someone worked up a plan sheet yet? If so I have coordinates of the boring to add.

Thanks

Ira

N= 321,298.88
E=2,971,746.342
ELEV = 6.1 FT MLT.

Project: Colorado River Locks, Boat Basin, Tx

SUMMARY OF LABORATORY TEST RESULTS

Contract No. DACW64-95-D-0007 Delivery Order No. 0013

Boring No. 96-63

S #	Depth (ft)	P P (tsf)	SPT Blows per Foot	Visual Classification	U S C	Mc (%)	Dry Unit Wt (pcf)	Wet Unit Wt (pcf)	L L (%)	PL (%)	Mechanical Analysis % Passing #4	#10	#40	#100	#200	Torvane Shear Strength (tsf)	q u (tsf)
1	0 - 2	2.75		Clay,w/shell & shell fragments,Very stiff, Brown	C H	18.7											
2	2 - 4			Shell & shell fragments,w/sand,Very loose, Gray	G M												
3	4-5.5		3	Shell & shell fragments,w/sand & clay seams, Very loose,Gray	M L												
4	7-9			Sandy Silt,w/clay seams & shell fragments, Very loose,Gray	M L												
5	9-10.5 -12		3	Sandy Silt,w/clay seams & shell fragments, Very loose,Gray	M L												
6	12-14	0.75		Clay,w/shell fragmens&sand seams,Medium ~~stiff~~,Brown	C H	33.1	89.4	119.0	74.0	28.0	100.0	100.0	99.2	97.1	96.4		0.62
7	14-16	1.75		Clay,w/calc nod & fer stains,slickensided,Stiff, Reddish brown	C H	27.6											
8	16-18	2.75		Clay,w/calc nod & fer stains,slickensided,Very stiff,Reddish brown SWD	C H	26.1	99		63	19					98		
9	18-20	2.50		Clay,w/ferrous stains&sand seams,slickensided, Very stiff,Brown SWD	C H												
10	20-22	2.75		Clay,w/ferrous stains&sand seams,slickensided, Very stiff,Brown	C H	27.1											
11	22-24	3.25		Clay,w/calc nod ferrous stains&silt pockets, slickensided,Very stiff,Reddish brown SWD	~~CH~~ CL	22.9	103		49	15					91		
12	24-26	3.50		Clay,w/ferrous stains & sand seams,Very stiff, Reddish brown SWD	C H												
13	26-28	3.75		Clay,w/ferrous stains silt parting & sand seams, Very stiff,Reddish brown & Yellowish gray	C H	29.5											
14	28-30	1.25		Silty Clay,w/ferrous stains & sand seams, Stiff,Yellowish brown & Yellowish gray	C L	21.1	103.6	125.5	36.0	18.0	100.0	100.0	100.0	97.5	84.3		1.01
15	30-32			Silty Sand,Medium dense,Reddish brown	S M												
16	32-33.5		14	Silty Sand,Medium dense,Reddish brown	S M												
17	34-36	3.50		Clay,w/ferrous stains & silt seams,Very stiff, Reddish brown	C H	29.8	93.7	121.7	69.0	27.0							
18	36-38	3.75		Clay,w/ferrous stains silt seams & silt pockets, Very stiff,Reddish brown	C H	21.6											
19	38-39.5		18	Sandy Silt,Medium dense,Reddish brown	M L												
20	42-44	1.50		Clay,w/ferrous stains silt seams&shell fragments, Stiff,Reddish brown	C H	29.0											

S # : Sample Number, P P : Pocket Penetrometer Reading, U S C : Unified Soil Classifcation, M c : Moisture Content
q u : Uncogined Compressive Strength, W O H : Weight of hammer, W O P : Weight of Pipe

Project: Colorado River Locks, Boat Basin, Tx

SUMMARY OF LABORATORY TEST RESULTS

Contract No. DACW64-95-D-0007 Delivery Order No. 0013

Boring No. 96-63

S #	Depth (ft)	P P (tsf)	SPT Blows per Foot	Visual Classification	U S C	Mc (%)	Dry Unit Wt (pcf)	Wet Unit Wt (pcf)	L L (%)	PL (%)	Mechanical Analysis % Passing #4	#10	#40	#100	#200	Torvane Shear Strength (tsf)	q u (tsf)
21	44-46	1.50		Clay,w/ferrous stains & shell fragments,Stiff, Dark brown	C H	32.1	89.8	118.7	61.0	25.0	100.0	100.0	100.0	98.0	93.8		1.15
22	46-48	1.00		Clay,w/ferrous stains & organic material,Stiff, Dark Brown & Gray SWD	C H	27.8	96		50	16					98		
23	48-50	1.00		Clay,w/ferrous stains & organic material,Stiff, Dark Brown & Gray SWD	C H												
24	50-52	1.00		Clay,w/organic material,Stiff,Dark gray	C H	33.4											
25	52-54	2.50		Silty Clay,w/silt seams silt pockets & organic material,Very stiff,Gray	C L	18.7											
26	54-56	3.50		Silty Clay,w/ferrous stains sand seams&sand pockets,Very stiff,Gray	C L	18.8	110.9	131.8	41.0	20.0							
27	56-58	4.25		Silty Clay,w/ferrous stains sand seams&sand pockets,Hard,Gray & Yellowish gray	C L	17.6											
28	58-59.5		21	Silty Sand,Medium dense,Yellowish gray	S M												
29	59.5-61		28	Silty Sand,Medium dense,Yellowish gray	S M												

S # : Sample Number, P P : Pocket Penetrometer Reading, U S C : Unified Soil Classifcation, M c : Moisture Content
q u : Uncogined Compressive Strength, W O H : Weight of hammer, W O P : Weight of Pipe

JOB NO. 114008611 DATE 7/5/96

PROJECT Colorado River Locks,
Boat Basin

AREA Matagorda, Texas

BORING NO. 96-63 SAMPLE NO. 6 DEPTH 12-14 ft

SPECIMEN NO. 1

CLASSIFICATION
Clay,w/shell fragments&sand seams,Medium stiff,Brown

Tare No.	HP-17	Height	5.595 in.
Tare plus Wet Specimen	372.94 gm	Average Diameter	2.830 in.
Tare plus Dry Specimen	290.83 gm	Initial Area	6.290 sq in.
Water Weight	82.11 gm	Volume	35.194 cu in.
Tare Weight	42.73 gm	Volume of Solids	cu in.
Wet Specimen	1099.85 gm	Void Ratio	
Dry Specimen	826.36 gm	Saturation	%
Water Content	33.10 %	Dry Density	89.4 lb/cu ft

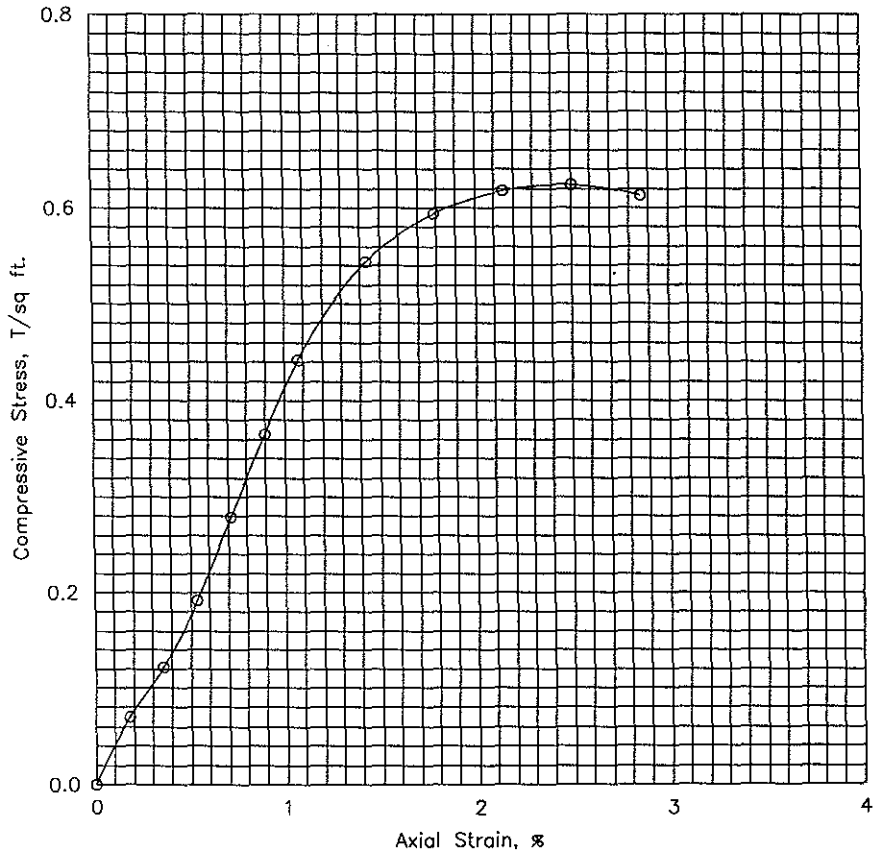
Specific Gravity of Solids
LL = 74 PL = 28 PI = 46

Proving Ring No. 10170
Proving Ring Constant, K = .766 lbs/div.

Elapsed Time min.	Dial Reading 0.001"	Cumulative Change in.	Proving Ring Dial Reading	Axial Load lb	Axial Strain	Area Corr. sq in.	Compr. Stress tsf
.0	0.	.000	.0	.0	.000	6.29	.000
.2	10.	.010	8.0	6.1	.002	6.30	.070
.4	20.	.020	14.0	10.7	.004	6.31	.122
.6	30.	.030	22.0	16.9	.005	6.32	.192
.8	40.	.040	32.0	24.5	.007	6.34	.279
.9	50.	.050	42.0	32.2	.009	6.35	.365
1.1	60.	.060	51.0	39.1	.011	6.36	.442
1.4	80.	.080	63.0	48.3	.014	6.38	.544
1.7	100.	.100	69.0	52.9	.018	6.40	.594
2.0	120.	.120	72.0	55.2	.021	6.43	.618
2.4	140.	.140	73.0	55.9	.025	6.45	.624
2.7	160.	.160	72.0	55.2	.029	6.48	.613

Job No. 114008611

Failure Sketches



☐ Controlled stress
☒ Controlled strain

Test No.			1			
Type of Specimen			Undisturbed			
Initial	Water content	w_0	33.1 %	%	%	%
	Void ratio	e_0				
	Saturation	S_0	%	%	%	%
	Dry density, lb/cu ft	γ_d	89.4			
Time to failure, min		t_f	2.37			
Unconfined compressive strength, T/sq ft		q_u	.62			
Undrained shear strength, T/sq ft		S_u	.31			
Sensitivity ratio		S_t				
Initial specimen diameter, in.		D_0	2.830			
Initial specimen height, in.		H_0	5.595			

Classification Clay,w/shell fragments&sand seams,Medium stiff,Brown

LL	74	PL	28	PI	46	G_s

Remarks

Project Colorado River Locks,
Boat Basin
Area Matagorda, Texas
Boring No. 96-63 | Sample No. 6
Depth El 12-14 ft | Date 7/5/96

UNCONFINED COMPRESSION TEST REPORT

ENG FORM 1 JUN 65 3659

PLATE XI-2

Geotest Engineering, Inc.

PLATE

JOB NO. 114008611 DATE 7/5/96

PROJECT Colorado River Locks,
Boat Basin

AREA Matagorda, Texas

BORING NO. 96-63 SAMPLE NO. 14 DEPTH 28-30 ft

SPECIMEN NO. 1

CLASSIFICATION
Silty Clay,w/fer stains&sand seams,Stiff,yellowish brown&yellowish gray

Tare No.	IB-12	Height	5.595 in.
Tare plus Wet Specimen	357.73 gm	Average Diameter	2.830 in.
Tare plus Dry Specimen	302.88 gm	Initial Area	6.290 sq in.
Water Weight	54.85 gm	Volume	35.194 cu in.
Tare Weight	43.35 gm	Volume of Solids	cu in.
Wet Specimen	1159.82 gm	Void Ratio	
Dry Specimen	957.47 gm	Saturation	%
Water Content	21.13 %	Dry Density	103.6 lb/cu ft
Specific Gravity of Solids			

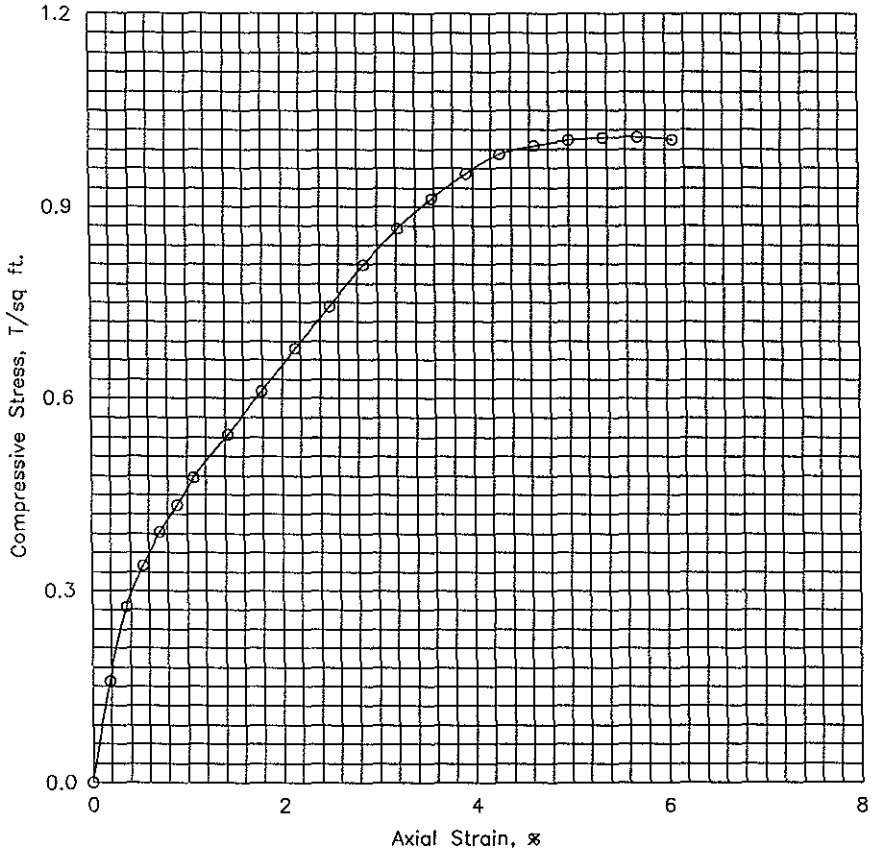
LL = 36 PL = 18 PI = 18

Proving Ring No. 10170
Proving Ring Constant, K = .766 lbs/div.

Elapsed Time min.	Dial Reading 0.001"	Cumulative Change in.	Proving Ring Dial Reading	Axial Load lb	Axial Strain	Area Corr. sq in.	Compr. Stress tsf
.0	0.	.000	.0	.0	.000	6.29	.000
.2	10.	.010	18.0	13.8	.002	6.30	.158
.4	20.	.020	31.5	24.1	.004	6.31	.275
.6	30.	.030	39.0	29.9	.005	6.32	.340
.7	40.	.040	45.0	34.5	.007	6.34	.392
.9	50.	.050	50.0	38.3	.009	6.35	.434
1.1	60.	.060	55.0	42.1	.011	6.36	.477
1.4	80.	.080	63.0	48.3	.014	6.38	.544
1.7	100.	.100	71.0	54.4	.018	6.40	.611
2.0	120.	.120	79.0	60.5	.021	6.43	.678
2.3	140.	.140	87.0	66.6	.025	6.45	.744
2.6	160.	.160	95.0	72.8	.029	6.48	.809
3.0	180.	.180	102.0	78.1	.032	6.50	.866
3.3	200.	.200	108.0	82.7	.036	6.52	.913
3.6	220.	.220	113.0	86.6	.039	6.55	.952
4.0	240.	.240	117.0	89.6	.043	6.57	.982
4.3	260.	.260	119.0	91.2	.046	6.60	.995
4.6	280.	.280	120.5	92.3	.050	6.62	1.004
4.9	300.	.300	121.5	93.1	.054	6.65	1.008
5.3	320.	.320	122.0	93.5	.057	6.67	1.009
5.6	340.	.340	122.0	93.5	.061	6.70	1.005

Job No. 114008611

Failure Sketches



☐ Controlled stress
☒ Controlled strain

Test No.			1			
Type of Specimen			Undisturbed			
Initial	Water content	w_0	21.1 %	%	%	%
	Void ratio	e_0				
	Saturation	S_0	%	%	%	%
	Dry density, lb/cu ft	γ_d	103.6			
Time to failure, min		t_f	5.28			
Unconfined compressive strength, T/sq ft		q_u	1.01			
Undrained shear strength, T/sq ft		S_u	.50			
Sensitivity ratio		S_t				
Initial specimen diameter, in.		D_0	2.830			
Initial specimen height, in.		H_0	5.595			

Classification Silty Clay,w/fer stains&sand seams,Stiff,yellowish brown&yellowish gray

LL	36	PL	18	PI	18	G_s	

Remarks

Project Colorado River Locks, Boat Basin

Area Matagorda, Texas

Boring No. 96-63 | Sample No. 14

Depth El 28-30 ft | Date 7/5/96

UNCONFINED COMPRESSION TEST REPORT

ENG FORM 1 JUN 65 3659

PLATE XI-2

Geotest Engineering, Inc.

PLATE

JOB NO. 114008611 DATE 7/5/96

PROJECT Colorado River Locks,
Boat Basin

AREA Matagorda, Texas

BORING NO. 96-63 SAMPLE NO. 21 DEPTH 44-46 ft

SPECIMEN NO. 1

CLASSIFICATION
Clay,w/ferrous stains&shell fragments,Stiff,Dark brown

Tare No.	M-10	Height	5.595 in.
Tare plus Wet Specimen	429.00 gm	Average Diameter	2.830 in.
Tare plus Dry Specimen	335.04 gm	Initial Area	6.290 sq in.
Water Weight	93.96 gm	Volume	35.194 cu in.
Tare Weight	42.73 gm	Volume of Solids	cu in.
Wet Specimen	1096.79 gm	Void Ratio	
Dry Specimen	830.00 gm	Saturation	%
Water Content	32.14 %	Dry Density	89.8 lb/cu ft

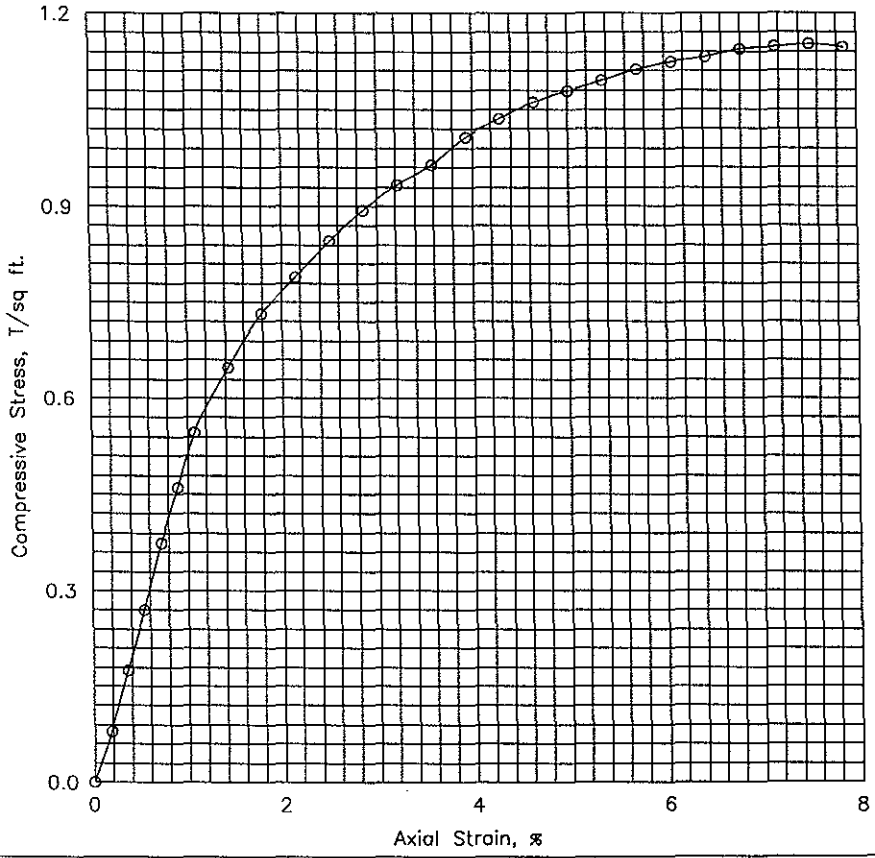
Specific Gravity of Solids
LL = 61 PL = 25 PI = 36

Proving Ring No. 10170
Proving Ring Constant, K = .766 lbs/div.

Elapsed Time min.	Dial Reading 0.001"	Cumulative Change in.	Proving Ring Dial Reading	Axial Load lb	Axial Strain	Area Corr. sq in.	Compr. Stress tsf
.0	0.	.000	.0	.0	.000	6.29	.000
.2	10.	.010	9.0	6.9	.002	6.30	.079
.4	20.	.020	20.0	15.3	.004	6.31	.175
.6	30.	.030	31.0	23.7	.005	6.32	.270
.7	40.	.040	43.0	32.9	.007	6.34	.374
.9	50.	.050	53.0	40.6	.009	6.35	.461
1.1	60.	.060	63.0	48.3	.011	6.36	.546
1.4	80.	.080	75.0	57.4	.014	6.38	.648
1.7	100.	.100	85.0	65.1	.018	6.40	.732
2.0	120.	.120	92.0	70.5	.021	6.43	.789
2.3	140.	.140	99.0	75.8	.025	6.45	.846
2.6	160.	.160	105.0	80.4	.029	6.48	.894
3.0	180.	.180	110.0	84.3	.032	6.50	.933
3.3	200.	.200	114.0	87.3	.036	6.52	.964
3.6	220.	.220	119.5	91.5	.039	6.55	1.007
4.0	240.	.240	123.5	94.6	.043	6.57	1.036
4.3	260.	.260	127.0	97.3	.046	6.60	1.062
4.6	280.	.280	129.5	99.2	.050	6.62	1.079
4.9	300.	.300	132.0	101.1	.054	6.65	1.095
5.3	320.	.320	134.5	103.0	.057	6.67	1.112
5.6	340.	.340	136.5	104.6	.061	6.70	1.124
5.9	360.	.360	138.0	105.7	.064	6.72	1.132
6.3	380.	.380	140.0	107.2	.068	6.75	1.144
6.6	400.	.400	141.0	108.0	.071	6.77	1.148
6.9	420.	.420	142.0	108.8	.075	6.80	1.152
7.3	440.	.440	142.0	108.8	.079	6.83	1.147

Job No. 114008611

Failure Sketches



☐ Controlled stress
☒ Controlled strain

Test No.			1			
Type of Specimen			Undisturbed			
Initial	Water content	w_0	32.1 %	%	%	%
	Void ratio	e_0				
	Saturation	S_0	%	%	%	%
	Dry density, lb/cu ft	γ_d	89.8			
Time to failure, min		t_f	6.92			
Unconfined compressive strength, T/sq ft		q_u	1.15			
Undrained shear strength, T/sq ft		S_u	.58			
Sensitivity ratio		S_t				
Initial specimen diameter, in.		D_0	2.830			
Initial specimen height, in.		H_0	5.595			

Classification Clay,w/ferrous stains&shell fragments,Stiff,Dark brown

LL	61	PL	25	PI	36	G_s

Remarks

Project Colorado River Locks, Boat Basin

Area Matagorda, Texas

Boring No. 96-63 | Sample No. 21

Depth El 44-46 ft | Date 7/5/96

UNCONFINED COMPRESSION TEST REPORT

ENG FORM 1 JUN 65 3659

PLATE XI-2

Geotest Engineering, Inc.

PLATE

		Mc	γ_{SAT}	Undrained ϕ	Undrained C, PSF	DRAINED "PEAK" ϕ	DRAINED "PEAK" C, PSF	DRAINED RESIDUAL ϕ	DRAINED RESIDUAL C, PSF	ADJ ϕ to 27 PSF
	① V. ST (CH)	18.7	(120)	0	600	18	0	18	0	18°
	② V. LOOSE SHELL		100	27	0	27	0	27	0	27°
	③ V. LOOSE SANDY SILT (ML)		100	27	0	27	0	27	0	27°
	MED (CH)	33.1	119	0	600	19.3	500	13	240	UC (SU = 620 PSF)
	ST (CH)	27.6	(123)	0	600	19.3	500	13	240	19°
	V. ST (CH)	26.1	125			19.3	500	13	240	19°
		27.1		0	1000					
	V. ST	22.9	126.6	0	1000	27	500	14	240	32°
	⑧	29.5	125	0	1000	19.3	500	13	240	19°
	ST (CL)	21.1	125.5	0	600	27	500	14	240	UC (SU = 1010 PSF)
	MED (SM)		115	30	0	30	0	30	0	30°
	V. ST (CH)	29.8 21.6	121.7	0	1000	19.3	500	13	240	19°
	MED (ML)		115	28	0	28	0	28	0	28°
	STIFF (CH)	29.0 32.1 27.8 33.4	118.6 122.7	120 0	700	14.6	660	15.5	320	23°
	V. STIFF (CL)	18.7 18.8 17.6	131.8	0	1000	27	500	14	240	32°
	MED (SM)		115	30	0	30	0	30	0	30°

GROUND SURFACE

19° δ = 12.6

32° δ = 21.3

δ = 8.7

δ = 15.3

( ) - FROM RELATIONSHIPS w/ G_s = 2.68

$\frac{S_u}{P} = \frac{620}{950} = .65$

$\frac{S_u}{P} = \frac{1010}{1950} = .52$

BY ..... DATE ..... SUBJECT ..... SHEET NO. ..... OF .....

CHKD. BY ..... DATE ..... BORING 96-63 JOB NO. .....

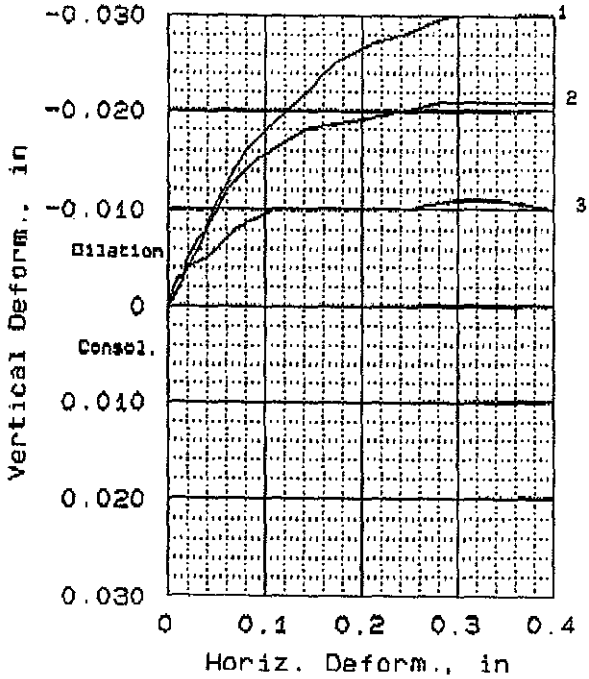
TABLE 1

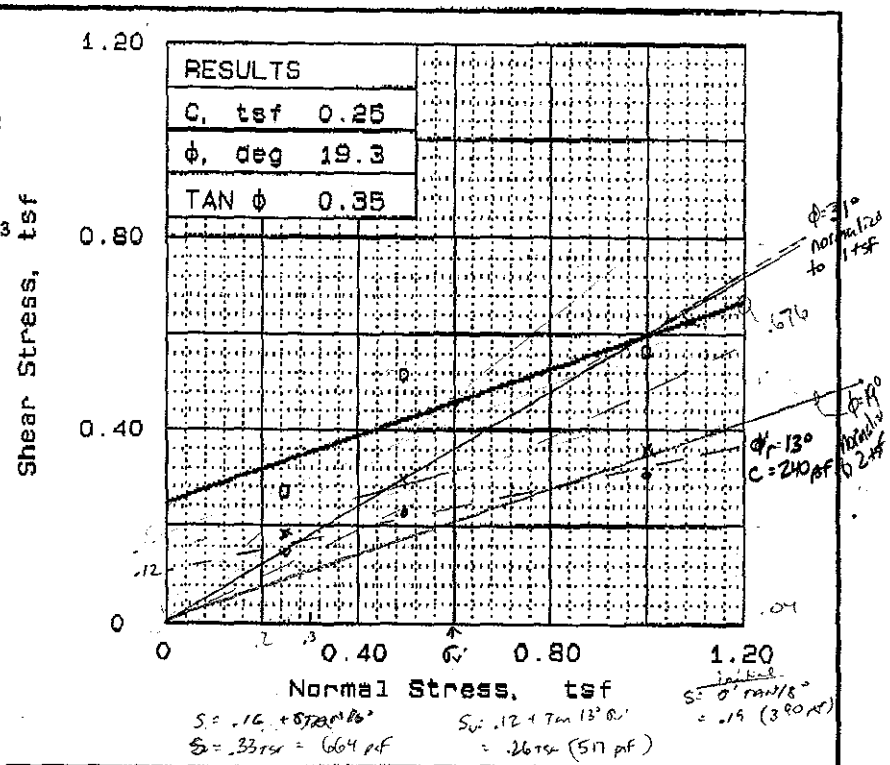
RESULTS OF TESTS OF DISTURBED AND UNDISTURBED SOIL SAMPLES

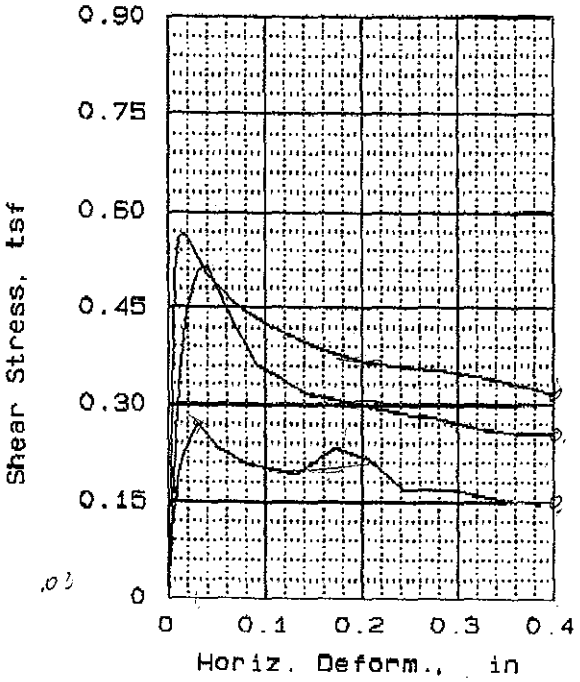
NOTE: * ALL SOIL SAMPLES THAT DO NOT HAVE COMPLETE LABORATORY TEST DATA WERE VISUALLY CLASSIFIED ONLY.

CESWD-ETE-GL REPORT No. 16608 Colorado River Locks - Boat Basin

BORING NO.	SWD NO.	FLD NO.	DEPTH, FT	GR	SA	FI	LL	PL	PI	LS	WC, %	PCF	MAJOR TESTS	DESCRIPTION OF MATERIAL
96 63	96\1888	CORE-8	16.0 - 18.0	1	1	98	63	19	44		26.1	99	DS	CH - FAT CLAY, YELLOWISH RED WITH LIGHT GRAY, MOIST, VERY STIFF (PENE.= 2.75-3.5 TSF), CALCAREOUS WITH CALCAREOUS NODULES, PIECES OF SEA-SHELLS, SCATTERED BLACK STAINING.
96 63	96\1889	CORE-9	18.0 - 20.0											CH - FAT CLAY, REDDISH BROWN, MOIST, VERY STIFF (PENE.= 3.5 TSF), CALCAREOUS, PIECES OF SEA-SHELLS, POCKETES AND SEAMS OF FINE SAND, SCATTERED BLACK STAINING.
96 63	96\1890	CORE-11	22.0 - 24.0	0	9	91	49	15	34		22.9	103	DS	CL - LEAN CLAY, YELLOWISH RED WITH LIGHT GRAY, MOIST, VERY STIFF (PENE.= 3.5 TSF), CALCAREOUS WITH CALCAREOUS NODULES, POCKETS OF FINE SAND, SCATTERED BLACK STAINING.
96 63	96\1891	CORE-12	24.0 - 26.0											CH - FAT CLAY, REDDISH BROWN WITH YELLOW, MOIST, STIFF (PENE.= 3.25 TSF), CALCAREOUS WITH CALCAREOUS NODULES, PIECES OF SHALE, FEW POCKETS OF SAND, SCATTERED BLACK STAINING.
96 63	96\1892	CORE-22	46.0 - 48.0	0	2	98	50	16	34		27.8	96	DS	CH - FAT CLAY, LIGHT GRAY WITH YELLOWISH BROWN, MOIST, STIFF (PENE.= 1.25 TSF), CALCAREOUS WITH CALCAREOUS NODULES, SOME FINE SAND, SCATTERED BLACK STAINING.
96 63	96\1893	CORE-23	48.0 - 50.0											CH - FAT CLAY, DARK GRAYISH BROWN, MOIST, STIFF (PENE.=1.5 TSF), CALCAREOUS WITH CALCAREOUS NODULES, FEW POCKETS OF SAND, SCATTERED BLACK STAINING.







SAMPLE NO.		1	2	3
INITIAL	WATER CONTENT, %	26.3	24.8	25.7
	DRY DENSITY, pcf	97.6	101.2	100.1
	SATURATION, %	97.5	100.6	101.5
	VOID RATIO	0.727	0.666	0.684
	DIAMETER, in.	2.51	2.51	2.51
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	26.5	24.9	23.7
	DRY DENSITY, pcf	97.2	101.7	102.2
	SATURATION, %	97.5	102.3	98.5
	VOID RATIO	0.734	0.657	0.649
	DIAMETER, in	2.51	2.51	2.51
	HEIGHT, in	1.00	1.00	0.98
NORMAL STRESS, tsf		0.25	0.50	1.00
MAX. SHEAR, tsf		0.27	0.52	0.56
RESIDUAL		.195	.50	.36
RESIDUAL @ 0.4"		.15	.255	.315
STRAIN RATE, %/min.		0.003	0.003	0.003
ULT. SHEAR, tsf		0.15	0.25	0.32

SAMPLE DATA

SAMPLE TYPE: UNDISTURBED

DESCRIPTION: FAT CLAY (CH)

LL= 63 PL= 19 PI= 44.0

SPECIFIC GRAVITY= 2.70

REMARKS: SPECIFIC GRAVITY EST.

CLIENT: US ARMY CORPS OF ENGINEERS
GALVESTON DISTRICT

PROJECT: COLORADO RIVER
BOAT BASIN

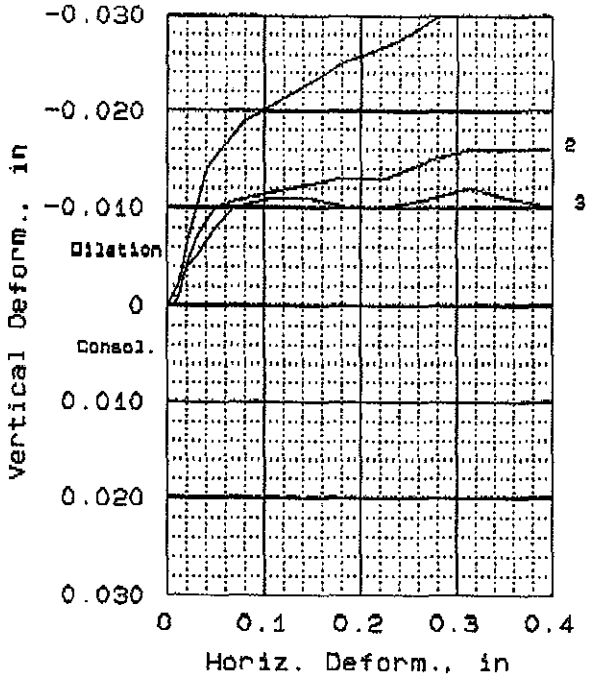
SAMPLE LOCATION: BORING: 96-63, CORE-8,
15.0'-18.0', SWD LAB No. 96/1888

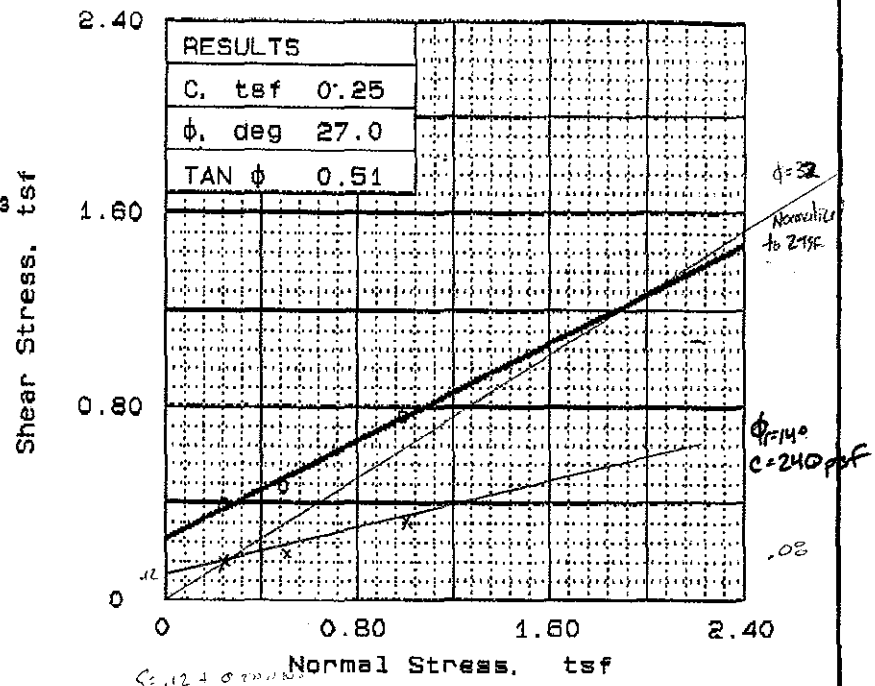
PROJ. NO.: 16608 DATE: AUG 1996

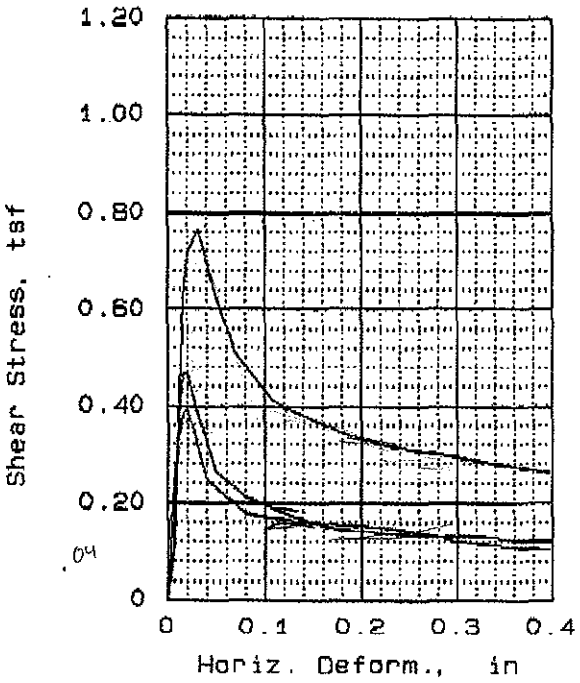
DIRECT SHEAR TEST

FIG. NO.

CORPS OF ENGINEERS - SOUTHWESTERN







SAMPLE NO.		1	2	3
INITIAL	WATER CONTENT, %	24.3	22.4	23.8
	DRY DENSITY, pcf	100.8	104.3	102.2
	SATURATION, %	98.7	99.4	100.0
	VOID RATIO	0.660	0.604	0.638
	DIAMETER, in	2.51	2.51	2.51
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	25.7	23.3	23.9
	DRY DENSITY, pcf	101.3	105.1	103.4
	SATURATION, %	105.9	105.6	103.8
	VOID RATIO	0.651	0.592	0.618
	DIAMETER, in	2.51	2.51	2.51
	HEIGHT, in	1.00	0.99	0.99
NORMAL STRESS, tsf		0.25	0.50	1.00
MAX. SHEAR, tsf		0.39	0.47	0.76
RESIDUAL		.16	.184	.32
STRAIN RATE, %/min.		0.003	0.003	0.003
ULT. SHEAR, tsf		0.12	0.10	0.26

SAMPLE DATA

SAMPLE TYPE: UNDISTURBED

DESCRIPTION: LEAN CLAY (CL)

LL= 49 PL= 15 PI= 34.0

SPECIFIC GRAVITY= 2.68

REMARKS: SPECIFIC GRAVITY EST.

CLIENT: US ARMY CORPS OF ENGINEERS
GALVESTON DISTRICT

PROJECT: COLORADO RIVER
BOAT BASIN

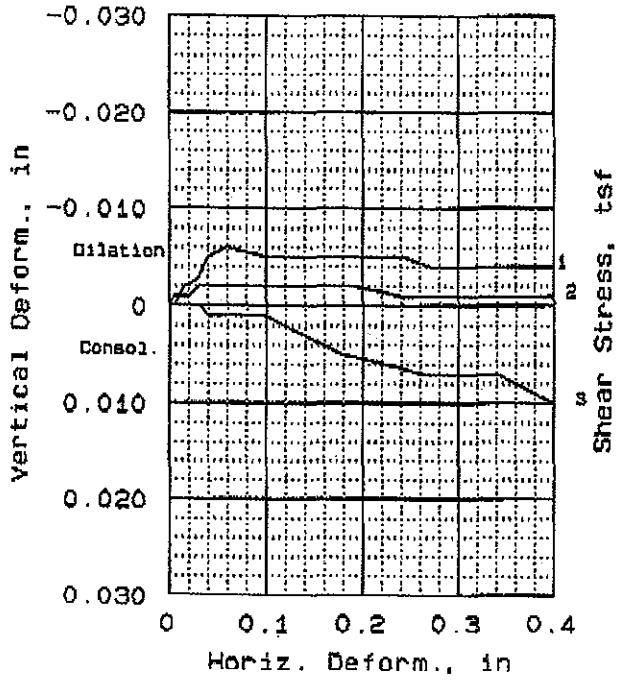
SAMPLE LOCATION: BORING: 95-63, CORE-11,
23.0'-23.8', SWD LAB No. 96/1890 $\sigma_v \approx .78$ tsf

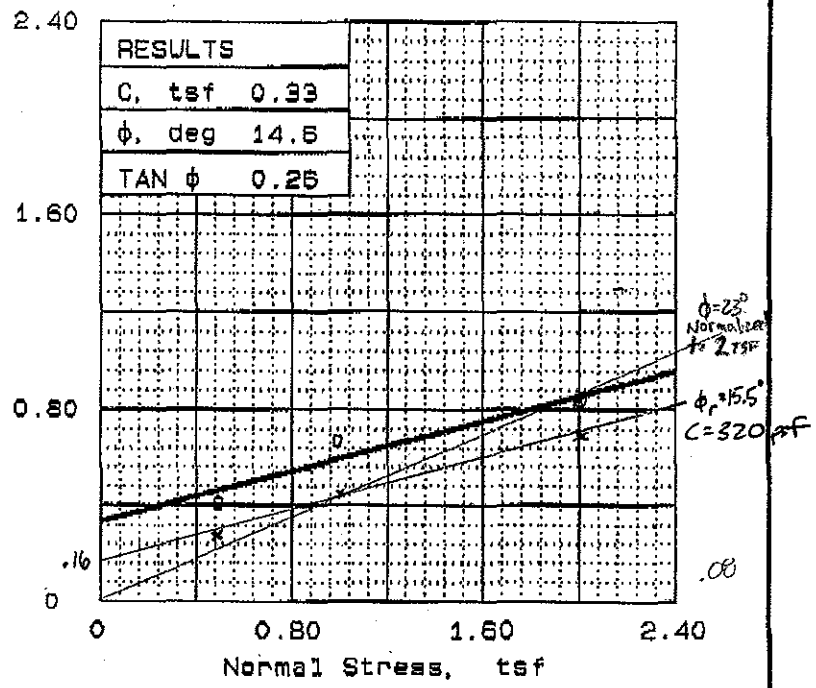
PROJ. NO.: 16608 DATE: AUG 1996

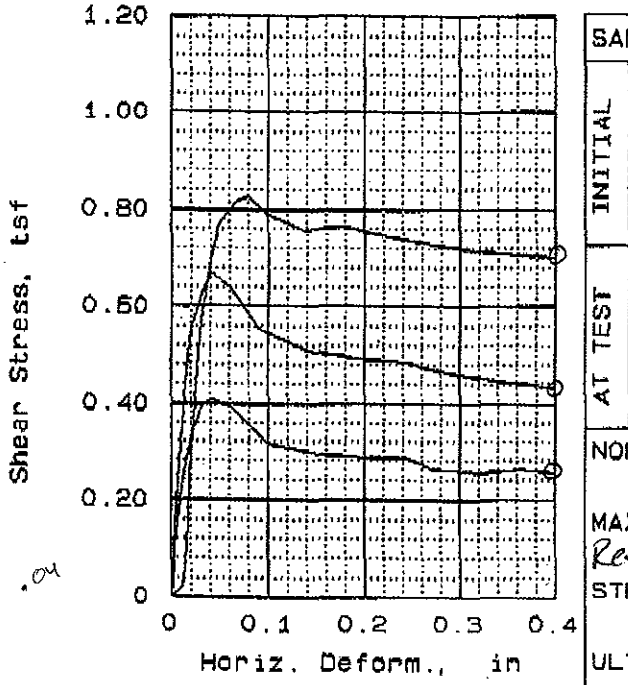
DIRECT SHEAR TEST

FIG. NO.

CORPS OF ENGINEERS – SOUTHWESTERN







	SAMPLE NO.	1	2	3
INITIAL	WATER CONTENT, %	27.2	26.1	28.1
	DRY DENSITY, pcf	96.3	96.6	95.7
	SATURATION, %	97.9	94.5	99.9
	VOID RATIO	0.749	0.744	0.761
	DIAMETER, in	2.51	2.51	2.51
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	28.3	27.4	26.1
	DRY DENSITY, pcf	97.3	98.1	100.1
	SATURATION, %	104.5	103.1	103.0
	VOID RATIO	0.732	0.718	0.683
	DIAMETER, in	2.51	2.51	2.51
	HEIGHT, in	0.99	0.99	0.96
NORMAL STRESS, tsf		0.50	1.00	2.00
MAX. SHEAR, tsf		0.41	0.67	0.83
Residual		.252	.436	.7
STRAIN RATE, %/min.		0.003	0.003	0.003
ULT. SHEAR, tsf		0.25	0.43	0.70

SAMPLE DATA

SAMPLE TYPE: UNDISTURBED

DESCRIPTION: FAT CLAY (CH)

LL= 50 PL= 16 PI= 34.0

SPECIFIC GRAVITY= 2.70

REMARKS: SPECIFIC GRAVITY EST.

CLIENT: US ARMY CORPS OF ENGINEERS
GALVESTTON DISTRICT

PROJECT: COLORADO RIVER
BOAT BASIN

SAMPLE LOCATION: BORING: 96-63, CORE-22,
47.1'-48.0', SWD LAB No. 96/1892 σ_v'= 1.47 TSF

PROJ. NO.: 16608 DATE: AUG 1996

DIRECT SHEAR TEST

FIG. NO.

CORPS OF ENGINEERS - SOUTHWESTERN