JOB NO. 14G783-4 DATE 8/23/94

PROJECT Houston-Galvaston Navigation Channel

AREA Houston, Texas

BORING NO. 93-91 SAMPLE NO. 6 DEPTH 10-12 ft

SPECIMEN NO. 1

CLASSIFICATION
Gray,Clay,Very soft,Sandy

Tare No.	K1-17	Height	5.595 in.
Tare plus Wet Specimen	254.01 gm	Average Diameter	2.830 in.
Tare plus Dry Specimen	184.12 gm	Initial Area	6.290 sq in.
Water Weight	69.89 gm	Volume	35.194 cu in.
Tare Weight	42.36 gm	Volume of Solids	cu in.
Wet Specimen	989.78 gm	Void Ratio	
Dry Specimen	662.94 gm	Saturation	%
Water Content	49.30 %	Dry Density	71.8 lb/cu ft

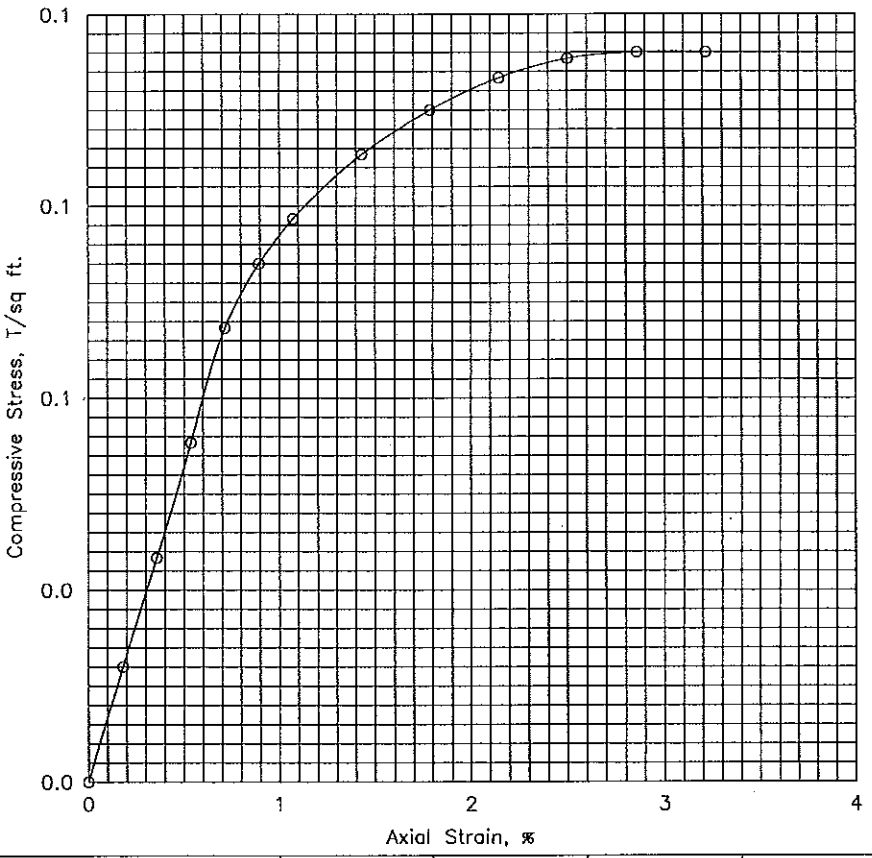
Specific Gravity of Solids
LL = 25 PL = 17 PI = 8

Proving Ring No. 17015
Proving Ring Constant, K = .311 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	5.0	1.6	.002	6.30	.018
.4	20.	.020	10.0	3.1	.004	6.31	.035
.6	30.	.030	15.0	4.7	.005	6.32	.053
.8	40.	.040	20.0	6.2	.007	6.34	.071
.9	50.	.050	23.0	7.1	.009	6.35	.081
1.1	60.	.060	25.0	7.8	.011	6.36	.088
1.4	80.	.080	28.0	8.7	.014	6.38	.098
1.8	100.	.100	30.0	9.3	.018	6.40	.105
2.1	120.	.120	31.5	9.8	.021	6.43	.110
2.4	140.	.140	32.5	10.1	.025	6.45	.113
2.5	160.	.160	33.0	10.2	.029	6.48	.114
3.1	180.	.180	33.0	10.2	.032	6.50	.114

Job No. 14G783-4

Failure Sketches



☐ Controlled stress
☒ Controlled strain

Test No.			1			
Type of Specimen			Undisturbed			
Initial	Water content	w_0	49.3 %	%	%	%
	Void ratio	e_0				
	Saturation	S_0	%	%	%	%
	Dry density, lb/cu ft	γ_d	71.8			
Time to failure, min		t_f	2.50			
Unconfined compressive strength, T/sq ft		q_u	.11			
Undrained shear strength, T/sq ft		S_u	.06			
Sensitivity ratio		S_t				
Initial specimen diameter, in.		D_0	2.830			
Initial specimen height, in.		H_0	5.595			

Classification Gray,Clay,Very soft,Sandy

LL	25	PL	17	PI	8	G_s	

Remarks

Project Houston-Galvaston Navigation Channel

Area Houston, Texas

Boring No. 93-91 | Sample No. 6

Depth El 10-12 ft | Date 8/23/94

UNCONFINED COMPRESSION TEST REPORT

ENG FORM 3659
1 JUN 65

PLATE XI-2

Geotest Engineering, Inc.

PLATE

JOB NO. 14G783-4 DATE 8/24/94

PROJECT Houston-Galvaston Navigation Channel

AREA Houston, Texas

BORING NO. 93-91 SAMPLE NO. 12 DEPTH 22-24 ft

SPECIMEN NO. 1

CLASSIFICATION
Gray,Clay,Very soft,Sandy,w/ shell fragments

Tare No.	K1-29	Height	5.595 in.
Tare plus Wet Specimen	388.73 gm	Average Diameter	2.830 in.
Tare plus Dry Specimen	309.75 gm	Initial Area	6.290 sq in.
Water Weight	78.98 gm	Volume	35.194 cu in.
Tare Weight	42.47 gm	Volume of Solids	cu in.
Wet Specimen	1151.70 gm	Void Ratio	
Dry Specimen	889.00 gm	Saturation	%
Water Content	29.55 %	Dry Density	96.2 lb/cu ft

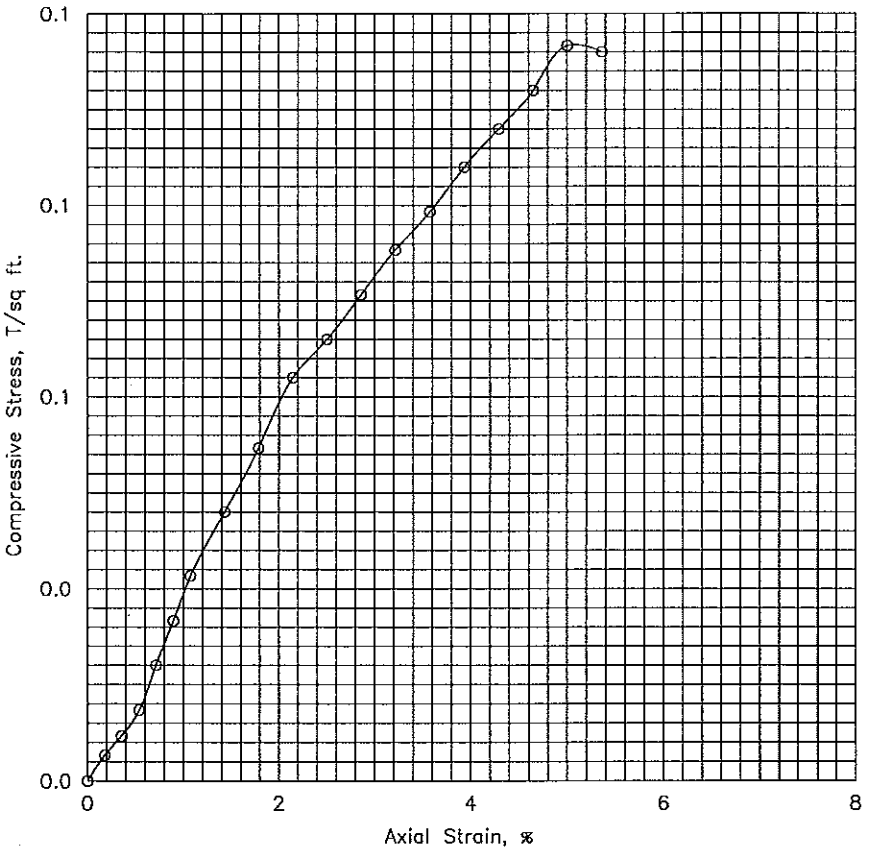
Specific Gravity of Solids
LL = 28 PL = 14 PI = 14

Proving Ring No. 17015
Proving Ring Constant, K = .311 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	1.0	.3	.002	6.30	.004
.4	20.	.020	2.0	.6	.004	6.31	.007
.6	30.	.030	3.0	.9	.005	6.32	.011
.8	40.	.040	5.0	1.6	.007	6.34	.018
1.0	50.	.050	7.0	2.2	.009	6.35	.025
1.1	60.	.060	9.0	2.8	.011	6.36	.032
1.5	80.	.080	12.0	3.7	.014	6.38	.042
1.8	100.	.100	15.0	4.7	.018	6.40	.052
2.1	120.	.120	18.0	5.6	.021	6.43	.063
2.4	140.	.140	20.0	6.2	.025	6.45	.069
2.8	160.	.160	22.0	6.8	.029	6.48	.076
3.0	180.	.180	24.0	7.5	.032	6.50	.083
3.4	200.	.200	26.0	8.1	.036	6.52	.089
3.8	220.	.220	28.0	8.7	.039	6.55	.096
4.1	240.	.240	30.0	9.3	.043	6.57	.102
4.4	260.	.260	32.0	9.9	.046	6.60	.108
4.7	280.	.280	34.0	10.6	.050	6.62	.115
4.9	300.	.300	34.0	10.6	.054	6.65	.114

Job No. 14G783-4

Failure Sketches



☐ Controlled stress
☒ Controlled strain

Test No.			1			
Type of Specimen			Undisturbed			
Initial	Water content	w_0	29.5 %	%	%	%
	Void ratio	e_0				
	Saturation	S_0	%	%	%	%
	Dry density, lb/cu ft	γ_d	96.2			
Time to failure, min		t_f	4.65			
Unconfined compressive strength, T/sq ft		q_u	.11			
Undrained shear strength, T/sq ft		S_u	.06			
Sensitivity ratio		S_t				
Initial specimen diameter, in.		D_0	2.830			
Initial specimen height, in.		H_0	5.595			

Classification Gray,Clay,Very soft,Sandy,w/ shell fragments

LL	28	PL	14	PI	14	G_s	

Remarks

Project Houston-Galvaston Navigation Channel

Area Houston, Texas

Boring No. 93-91 | Sample No. 12

Depth 22-24 ft | Date 8/24/94
El

UNCONFINED COMPRESSION TEST REPORT

ENG FORM 3659
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PLATE XI-2

JOB NO. 14G783-4 DATE 8/24/94

PROJECT Houston-Galvaston Navigation Channel

AREA Houston, Texas

BORING NO. 93-91 SAMPLE NO. 16 DEPTH 32-34 ft

SPECIMEN NO. 1

CLASSIFICATION
Gray,Clay,soft,w/ shell fragments

Tare No.	Ka-9	Height	5.595 in.
Tare plus Wet Specimen	376.79 gm	Average Diameter	2.830 in.
Tare plus Dry Specimen	289.10 gm	Initial Area	6.290 sq in.
Water Weight	87.69 gm	Volume	35.194 cu in.
Tare Weight	42.50 gm	Volume of Solids	cu in.
Wet Specimen	1068.31 gm	Void Ratio	
Dry Specimen	788.07 gm	Saturation	%
Water Content	35.56 %	Dry Density	85.3 lb/cu ft

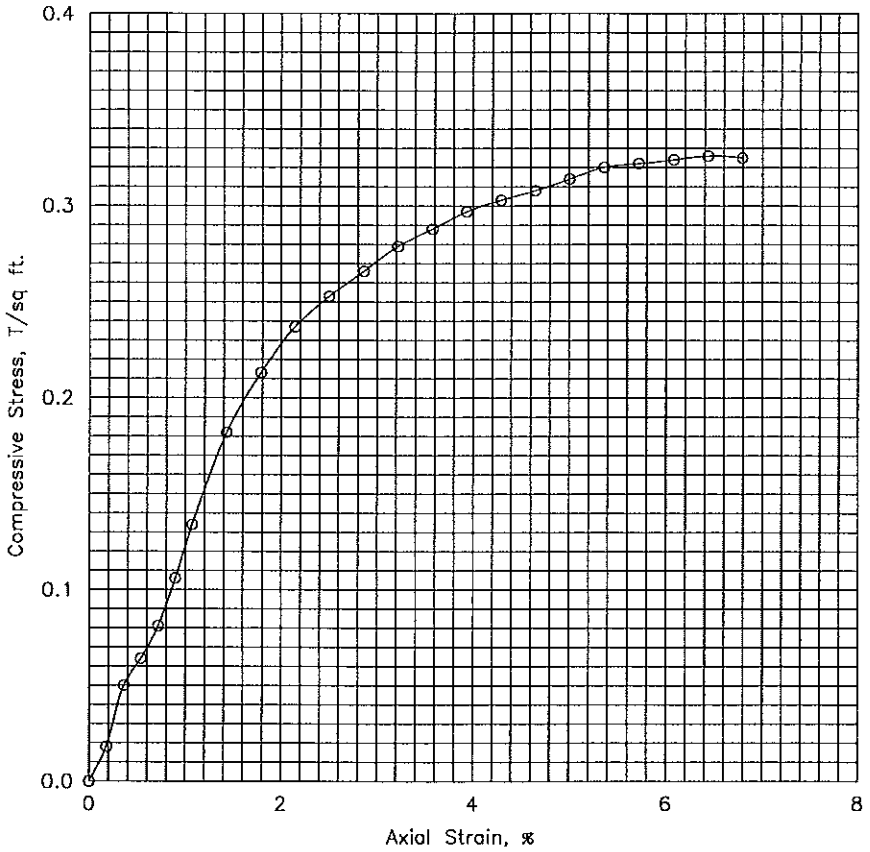
Specific Gravity of Solids
LL = 50 PL = 18 PI = 32

Proving Ring No. 17015
Proving Ring Constant, K = .311 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	5.0	1.6	.002	6.30	.018
.4	20.	.020	14.0	4.3	.004	6.31	.050
.6	30.	.030	18.0	5.6	.005	6.32	.064
.7	40.	.040	23.0	7.1	.007	6.34	.081
.9	50.	.050	30.0	9.3	.009	6.35	.106
1.1	60.	.060	38.0	11.8	.011	6.36	.134
1.4	80.	.080	52.0	16.2	.014	6.38	.182
1.7	100.	.100	61.0	18.9	.018	6.40	.213
2.1	120.	.120	68.0	21.1	.021	6.43	.237
2.4	140.	.140	73.0	22.7	.025	6.45	.253
2.8	160.	.160	77.0	23.9	.029	6.48	.266
3.1	180.	.180	81.0	25.2	.032	6.50	.279
3.4	200.	.200	84.0	26.1	.036	6.52	.288
3.8	220.	.220	87.0	27.0	.039	6.55	.297
4.0	240.	.240	89.0	27.6	.043	6.57	.303
4.4	260.	.260	91.0	28.3	.046	6.60	.308
4.7	280.	.280	93.0	28.9	.050	6.62	.314
5.0	300.	.300	95.0	29.5	.054	6.65	.320
5.4	320.	.320	96.0	29.8	.057	6.67	.322
5.7	340.	.340	97.0	30.1	.061	6.70	.324
6.0	360.	.360	98.0	30.4	.064	6.72	.326
6.3	380.	.380	98.0	30.4	.068	6.75	.325

Job No. 14G783-4

Failure Sketches



☐ Controlled stress
☒ Controlled strain

Test No.			1			
Type of Specimen			Undisturbed			
Initial	Water content	w_0	35.6 %	%	%	%
	Void ratio	e_0				
	Saturation	S_0	%	%	%	%
	Dry density, lb/cu ft	γ_d	85.3			
Time to failure, min		t_f	6.00			
Unconfined compressive strength, T/sq ft		q_u	.33			
Undrained shear strength, T/sq ft		S_u	.16			
Sensitivity ratio		S_t				
Initial specimen diameter, in.		D_0	2.830			
Initial specimen height, in.		H_0	5.595			

Classification Gray,Clay,soft,w/ shell fragments

LL	50	PL	18	PI	32	G_s	

Remarks

Project Houston-Galvaston Navigation Channel

Area Houston, Texas

Boring No. 93-91 | Sample No. 16

Depth El 32-34 ft | Date 8/24/94

UNCONFINED COMPRESSION TEST REPORT

ENG FORM 3659
1 JUN 65

PLATE XI-2

JOB NO. 14G783-4 DATE 8/24/94

PROJECT Houston-Galvaston Navigation Channel

AREA Houston, Texas

BORING NO. 93-91 SAMPLE NO. 19 DEPTH 38-40 ft

SPECIMEN NO. 1

CLASSIFICATION
Gray,Clay,soft,w/ shell fragments

Tare No.	IB-7	Height	5.595 in.
Tare plus Wet Specimen	383.77 gm	Average Diameter	2.830 in.
Tare plus Dry Specimen	295.88 gm	Initial Area	6.290 sq in.
Water Weight	87.89 gm	Volume	35.194 cu in.
Tare Weight	42.59 gm	Volume of Solids	cu in.
Wet Specimen	1068.31 gm	Void Ratio	
Dry Specimen	793.11 gm	Saturation	%
Water Content	34.70 %	Dry Density	85.8 lb/cu ft

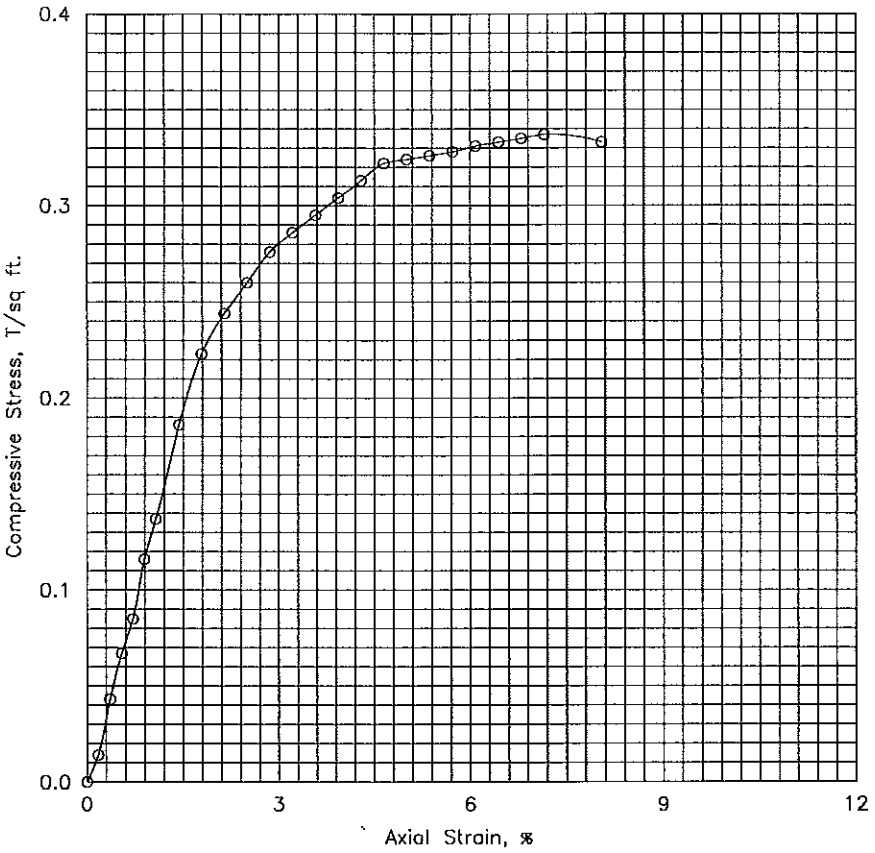
Specific Gravity of Solids
LL = 52 PL = 19 PI = 33

Proving Ring No. 17015
Proving Ring Constant, K = .311 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	4.0	1.2	.002	6.30	.014
.4	20.	.020	12.0	3.7	.004	6.31	.043
.6	30.	.030	19.0	5.9	.005	6.32	.067
.7	40.	.040	24.0	7.5	.007	6.34	.085
.9	50.	.050	33.0	10.2	.009	6.35	.116
1.1	60.	.060	39.0	12.1	.011	6.36	.137
1.4	80.	.080	53.0	16.5	.014	6.38	.186
1.8	100.	.100	64.0	19.9	.018	6.40	.223
2.1	120.	.120	70.0	21.7	.021	6.43	.244
2.4	140.	.140	75.0	23.3	.025	6.45	.260
2.8	160.	.160	80.0	24.8	.029	6.48	.276
3.1	180.	.180	83.0	25.8	.032	6.50	.286
3.4	200.	.200	86.0	26.7	.036	6.52	.295
3.8	220.	.220	89.0	27.6	.039	6.55	.304
4.0	240.	.240	92.0	28.6	.043	6.57	.313
4.4	260.	.260	95.0	29.5	.046	6.60	.322
4.8	280.	.280	96.0	29.8	.050	6.62	.324
5.1	300.	.300	97.0	30.1	.054	6.65	.326
5.3	320.	.320	98.0	30.4	.057	6.67	.328
5.7	340.	.340	99.0	30.7	.061	6.70	.331
6.0	360.	.360	100.0	31.1	.064	6.72	.333
6.4	380.	.380	101.0	31.4	.068	6.75	.335
6.7	400.	.400	102.0	31.7	.071	6.77	.337
7.5	450.	.450	102.0	31.7	.080	6.84	.333

Job No. 14G783-4

Failure Sketches



☐ Controlled stress
☒ Controlled strain

Test No.			1			
Type of Specimen			Undisturbed			
Initial	Water content	w_0	34.7 %	%	%	%
	Void ratio	e_0				
	Saturation	S_0	%	%	%	%
	Dry density, lb/cu ft	γ_d	85.8			
Time to failure, min		t_f	6.67			
Unconfined compressive strength, T/sq ft		q_u	.34			
Undrained shear strength, T/sq ft		S_u	.17			
Sensitivity ratio		S_t				
Initial specimen diameter, in.		D_0	2.830			
Initial specimen height, in.		H_0	5.595			

Classification Gray,Clay,soft,w/ shell fragments

LL	52	PL	19	PI	33	G_s	

Remarks

Project Houston-Galvaston Navigation Channel

Area Houston, Texas

Boring No. 93-91 | Sample No. 19

Depth El 38-40 ft | Date 8/24/94

UNCONFINED COMPRESSION TEST REPORT

ENG FORM 3659
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PLATE XI-2

U.S. ARMY CORPS OF ENGINEERS

BORING NO. 93-91 DATE: BEGIN 7-20-94 PAGE 1 / 2
JOB NO. 946783.1 COMPLETE 7-20-94 Thin Walled Tube
PROJECT HOUSTON-GALVESTON Navigation Channel ■ 3" □ 6"
LOCATION Dispos AL Area # 1's
ELEVATION OF HOLE
MANUFACTURER'S DESIGNATION OF DRILL RIG Acko K4X4, C-1000 Marsh Buggy
GROUNDWATER: DEPTH 0 ft., ELEV. ft., at end of Drilling
WEATHER Sunny and Hot 98°
DRILLER Scott Gregnek LOGGER Willis Barnes

Torvane Reading	DEPTH, FEET	SAMPLE	SAMPLE NO.	PEN./TORVANE SPT.-BLOW COUNT	COLOR	MATERIAL TYPE	CONSISTENCY	SECONDARY CONSTITUENTS	STRUCTURAL FEATURES AND COMMENTS
	0		1	.75	Brown	Clay	Medium Stiff		W/Shell fragments
			2	.75	Brown	Clay	Medium Stiff		
	5		3	3/6/8	Gray	Sand	Medium Dense	Silty	
0.05			4	0.0/0.01	Gray	Clay	Very soft	SANDY	
0.10			5	0.0/0.01	Gray	clay	Very Soft	SANDY	
	10								
0.2			6	0.0/0.04	Gray	clay	Very soft	SANDY	
			7	4/8/10	Gray	Sand	Medium Dense	Silty	
0.10	15		8	0.00/0.01	Gray	Clay	Very soft	silty	
0.15			9	0.0/0.03	Gray	Clay	Very Soft	Sandy	
			10	Wash	Gray	Sand	Very loose	SILT	
	20								
0.10			11	0.0/0.02	Gray	Clay	Very Soft	Sandy	
0.05	25		12	0.00/0.01	Gray	clay	V. soft	Sandy	
0.15			13	0.00/0.03	Gray	clay	V. Soft	Sandy	
0.10			14	0.00/0.02	Gray	clay	V. Soft	Sandy	
	30								
0.20			15	0.00/0.04	Gray	clay	V. Soft	Sandy	
0.20			16	0.00/0.02	Gray	Clay	V. Soft	Sandy	
0.10	35		17	0.00/0.02	Gray	clay	Soft	Sandy	

U.S. ARMY CORPS OF ENGINEERS

BORING NO. 93-91 DATE: BEGIN 7-20-94 PAGE 2 / 2
JOB NO. 946783.1 COMPLETE 7-20-94 Thin Walled Tube
PROJECT Houston-Galveston Navigation channel ■ 3" □ 6"
LOCATION Disposal Area # 15
ELEVATION OF HOLE
MANUFACTURER'S DESIGNATION OF DRILL RIG Ardco K4X4, C-1000 Marsh Buggy
GROUNDWATER: DEPTH 0 ft., ELEV. ft., at end of Drilling
WEATHER Sunny and Hot 98°
DRILLER Scott Gregurek LOGGER Willie Barnes

Torvane Reading	DEPTH, FEET	SAMPLE	SAMPLE NO.	PEN./TORVANE SPT.-BLOW COUNT	COLOR	MATERIAL TYPE	CONSISTENCY	SECONDARY CONSTITUENTS	STRUCTURAL FEATURES AND COMMENTS
	35								
0.10			18	0.0 / 0.02	Gray	Clay	Very Soft	Sandy	W/ Shell Fragment
0.2	40		19	0.0 / 0.04	Gray	clay	Very Soft	Sandy	
									Torvane Multiplier 0.2
	45								
	50								
	55								
	60								
	65								
	70								

GEOTEST ENGINEERING, INC.

Project: ...on-Galveston Navigation Channel

SUM... OF LABORATORY TEST RESULTS

Contract No. DACW64-94-C-0040

Boring No. 93-91

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					Torvane Shear Strength (tsf)	q u (tsf)
											#4	#10	#40	#100	#200		
1	0 - 2	0.75		Brown,Clay,Medium stiff,w/shell fragments	C H	22.2											
2	2 - 4	0.75		Brown,Clay,Medium stiff	C H	21.7											
3	4-5.5		14	Gray,Sand,Medium dense,Silty	S M						100.0	100.0	99.8	81.1	26.9		
4	6-8	0.00		Gray,Clay,Very soft,Sandy	C L	56.4											
5	8 - 10	0.00		Gray,Clay,Very soft,Sandy Q-Test See SWD report 16162	C L	39.9	79		46	15							Q-330
6	10 - 12	0.00		Gray,Clay,Very soft,Sandy	C L	49.7	72.0	107.2	25	17	99.8	99.7	99.4	88.3	61.9		0.11
7	12-13.5		18	Gray,Sand,Medium dense,Silty	S M												
8	14 - 16	0.00		Gray,Clay,Very soft,w/sand seams	CH	59.4	66.3	105.6	75	30	100.0	99.8	97.9	94.3	89.2		
9	16 - 18	0.00		Gray,Clay,Very soft,w/sand seams	CH	25.5											
10	18-19.5		W.O.H	Gray,Sand,Very loose,Silty	S M												
11	22 - 24	0.00		Gray,Clay,Very soft,Sandy,w/shell fragments	C L	25.4											
12	24 - 26	0.00		Gray,Clay,Very soft,Sandy,w/shell fragments	C L	29.6	96.2	124.7	28	14	92.9*	92.3*	91.5*	86.1	54.8		0.11
13	26 - 28	0.00		Gray,Clay,Very soft,Sandy,w/shell fragments	C L	32.0											
14	28 - 30	0.00		Gray,Clay,Very soft,Sandy,w/shell fragments	C L	35.3											
15	30 - 32	0.00		Gray,Clay,Very soft,Sandy,w/shell fragments	C L	32.1											
16	32 - 34	0.25		Gray,Clay,Soft,w/shell fragments	CH	35.6	85.3	115.6	50	18	99.5*	98.8*	96.7*	93.3	92.8		0.33
17	34 - 36	0.25		Gray,Clay,Soft,w/shell fragments	CH	35.2											
18	36 - 38	0.25		Gray,Clay,Soft,w/shell fragments	CH	31.3											
19	38 - 40	0.25		Gray,Clay,Soft,w/shell fragments	CH	34.7	85.9	115.6	52	19	100.0	100.0	100.0	99.1	97.4		0.34

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

*: Material retained are shell fragments