# U.S. ARMY CORPS OF ENGINEERS

BORING NO. 93-365 DATE: BEGIN 8-24-93 PAGE 1 / 1
JOB NO. 146638 COMPLETE 8-24-93 Thin Walled Tube
PROJECT Core Drilling for enlargement of The retaining levee ■ 3" □ 6"
LOCATION For The Sabine Lake North Disposal Area, Port Arthur, Texas
ELEVATION OF HOLE
MANUFACTURER'S DESIGNATION OF DRILL RIG Ardco K4-4, C-1000
GROUNDWATER: DEPTH 1 ft., ELEV. ft., at end of Drilling
WEATHER Sunny & Hot
DRILLER Scott Gregurek LOGGER Iraj Mostamand

| DEPTH, FEET | SAMPLE | SAMPLE NO. | PEN./TORVANE SPT.-BLOW COUNT | COLOR | MATERIAL TYPE | CONSISTENCY | SECONDARY CONSTITUENTS | STRUCTURAL FEATURES AND COMMENTS |
|---|---|---|---|---|---|---|---|---|
| 0 | | 1 | 4.5+ | Brown | clay | Hard | Sandy | -w/sa pkts & Sa sms |
| | | 2 | 0.75 | Gray & Brown | clay | M. stiff | silty | -w/Sa sms |
| 5 | | 3 | 0.50 | Gray & Brown | clay | M. stiff | silty | -w/Fe st |
| | | 4 | 0.25 | Gray & Brown | clay | soft | silty | -w/Fe st |
| | | 5 | 0.25 | Gray & Brown. | Clay | soft | silty | -w/Fe st |
| 10 | | 6 | 0.25 | Gray & Brown | clay | soft | silty | -w/Fe st |
| | | 7 | 0.00 | Dark gray | clay | Very soft | silty | -w/shell Fragments |
| 15 | | 8 | 0.00 | Dark gray | Clay | Very soft | | |
| | | 9 | 0.25 | olive gray | Clay | soft | | -w/Fe st |
| | | 10 | 1.25 | olive gray | Clay | stiff | | -w/Fe st |
| 20 | | 11 | 1.50 | olive gray | clay | stiff | | -w/Fe st |
| | | 12 | 1.00 | Brown | clay | stiff | | -w/silt parting |
| 25 | | 13 | 0.75 | Yellowish Brown | clay | M. stiff | silty | -w/silt Seams |
| 30 | | | | | | | | |
| 35 | | | | | | | | |

GEOTEST ENGINEERING, INC.

# SUMMARY OF LABORATORY TEST RESULTS

Project: Sabine lake North Disposal Area Sabine-Neches waterway Near Port Arthur, Texas
Contract No. DACW64-92-D-0005 Delivery Order No. 0025

Boring No.93-365

| S# | Depth (ft.) | PP (tsf) | SPT Blows per foot | Visual Classification | U S C | M C (%) | Dry Unit Wt. (pcf) | Wet Unit Wt. (pcf) | LL (%) | PL (%) | Mechanical Analysis % passing #4 | #10 | #40 | #100 | #200 | Torvane Shear Strength (tsf) | qu (tsf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-2 | 4.00 | | Olive Gray,Clay,Very stiff,Sandy,w/ferrous stains | C L | 30.6 | | | | | | | | | | | |
| 2 | 2-4 | 0.50 | | Olive Gray,Clay,Medium stiff,Silty,w/silt seams and ferrous stains | C L | 35.6 | | | | | | | | | | | |
| 3 | 4-6 | 0.50 | | Gray,Clay,Medium stiff,Silty,w/sand seams and ferrous stains | C L | 31.1 | 86.4 | 113.3 | 45 | 20 | 100.0 | 100.0 | 99.5 | 97.4 | 96.0 | | 0.52 |
| 4 | 6-8 | 0.25 | | Gray and Brown,Clay,Soft,Silty,w/silt seams and grass roots | C L | 30.5 | | | | | | | | | | 0.16 | |
| 5 | 8-10 | 0.25 | | Brown,Clay,Soft,Silty,w/silt seams and grass roots | C L | 16.1 | | | | | | | | | | 0.13 | |
| 6 | 10-12 | 0.25 | | Olive Gray,Clay,Soft,Silty,w/silt seams | C L | 24.9 | 97.0 | 121.1 | 47 | 21 | | | | | | 0.13 | 0.29 |
| 7 | 12-14 | 0.00 | | Dark Olive Gray,Clay,Very soft,Silty,w/silt seams | C L | 42.3 | | | | | | | | | | 0.09 | |
| 8 | 14-16 | 0.00 | | Dark Gray,Clay,Very soft,Silty,w/silt seams and shell pockets | C L | 33.8 | 83.8 | 112.1 | 36 | 18 | | | | | | 0.10 | |
| 9 | 16-18 | 0.25 | | Olive Gray,Clay,Soft,Silty,w/silt seams and ferrous stains | C L | 32.6 | | | | | | | | | | 0.13 | |
| 10 | 18-20 | 1.75 | | Gray and Yellow,Clay,Stiff,Silty,w/silt seams and ferrous stains | C L | 24.1 | | | | | | | | | | | |
| 11 | 20-22 | 1.75 | | Gray and Yellow,Clay,Stiff,Silty,w/silt seams and ferrous stains | C L | 27.0 | 95.4 | 121.2 | 48 | 22 | | | | | | | |
| 12 | 22-24 | 1.25 | | Gray,Clay,Stiff,Silty,w/silt seams | C L | 31.7 | | | | | | | | | | | |
| 13 | 24-26 | 1.25 | | Olive Brown,Clay,Stiff,Silty,w/silt seams and ferrous stains | C L | 30.0 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |

S#: Sample Number, PP: Pocket Penetrometer Reading, USC: Unified Soil Classification, MC: Moisture Content
qu: Unconfined Compressive Strength, WOH: Weight of Hammer, WOP: Weight of Pipe

***GEOTEST ENGINEERING, INC.***

JOB NO. 14G719 DATE 10/08/93

PROJECT Sabine Lake North Disposal Area
Sabine-Neches Waterway

AREA Near Port Arthur, Texas

BORING NO. 93-365 SAMPLE NO. 3 DEPTH 4-6 ft

SPECIMEN NO. 1

CLASSIFICATION
Gray,Clay,Medium stiff,Silty,w/sand seams

| | | | |
|---|---|---|---|
| Tare No. | W-18 | Height | 5.595 in. |
| Tare plus Wet Specimen | 302.60 gm | Average Diameter | 2.830 in. |
| Tare plus Dry Specimen | 240.95 gm | Initial Area | 6.290 sq in. |
| Water Weight | 61.65 gm | Volume | 35.194 cu in. |
| Tare Weight | 42.48 gm | Volume of Solids | cu in. |
| Wet Specimen | 1046.05 gm | Void Ratio | |
| Dry Specimen | 798.13 gm | Saturation | % |
| Water Content | 31.06 % | Dry Density | 86.4 lb/cu ft |
| Specific Gravity of Solids | | | |

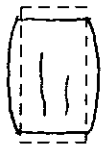
LL = 45 PL = 20 PI = 25

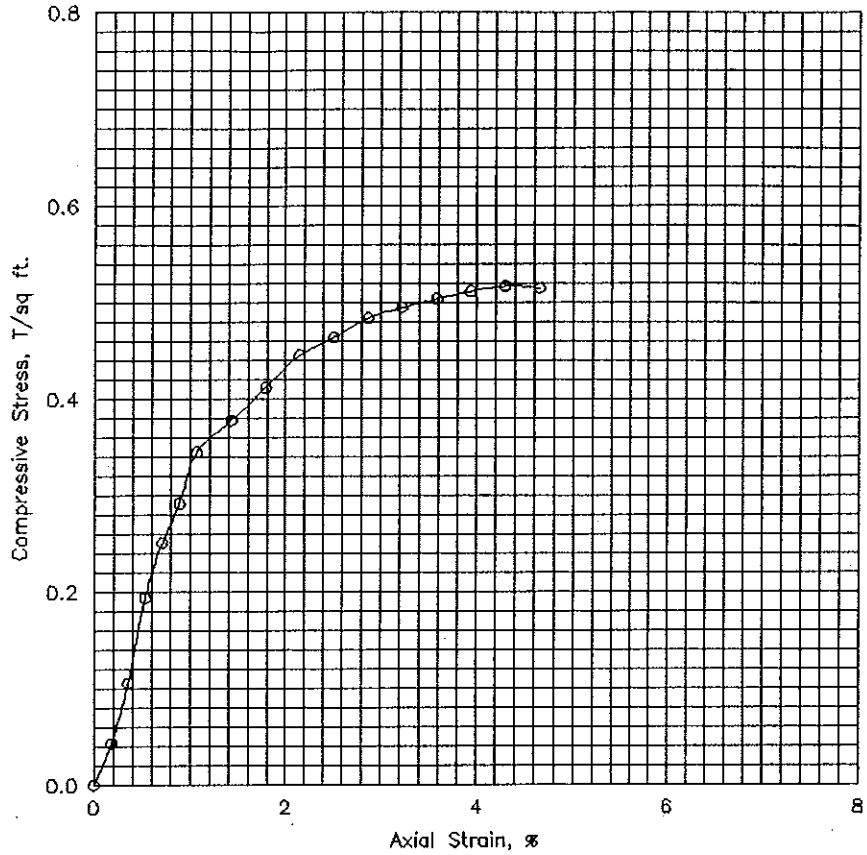
Proving Ring No. 17015
Proving Ring Constant, K = .311 lbs/div.

| 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 |
| .3 | 10. | .010 | 12.0 | 3.7 | .002 | 6.30 | .043 |
| .4 | 20. | .020 | 30.0 | 9.3 | .004 | 6.31 | .106 |
| .6 | 30. | .030 | 55.0 | 17.1 | .005 | 6.32 | .194 |
| .7 | 40. | .040 | 71.0 | 22.1 | .007 | 6.34 | .251 |
| .9 | 50. | .050 | 83.0 | 25.8 | .009 | 6.35 | .292 |
| 1.1 | 60. | .060 | 98.0 | 30.4 | .011 | 6.36 | .345 |
| 1.4 | 80. | .080 | 108.0 | 33.5 | .014 | 6.38 | .378 |
| 1.7 | 100. | .100 | 118.0 | 36.7 | .018 | 6.40 | .412 |
| 2.1 | 120. | .120 | 128.0 | 39.8 | .021 | 6.43 | .445 |
| 2.4 | 140. | .140 | 134.0 | 41.6 | .025 | 6.45 | .464 |
| 2.7 | 160. | .160 | 140.0 | 43.5 | .029 | 6.48 | .484 |
| 3.0 | 180. | .180 | 144.0 | 44.7 | .032 | 6.50 | .495 |
| 3.3 | 200. | .200 | 147.0 | 45.7 | .036 | 6.52 | .504 |
| 3.7 | 220. | .220 | 150.0 | 46.6 | .039 | 6.55 | .512 |
| 4.0 | 240. | .240 | 152.0 | 47.2 | .043 | 6.57 | .517 |
| 4.3 | 260. | .260 | 152.0 | 47.2 | .046 | 6.60 | .515 |

Job No. 14G719

Failure Sketches






☐ Controlled stress
☒ Controlled strain

| | | | | | | |
|---|---|---|---|---|---|---|
| Test No. | | | 1 | | | |
| Type of Specimen | | | Undisturbed | | | |
| Initial | Water content | $w_0$ | 31.1 % | % | % | % |
| | Void ratio | $e_0$ | | | | |
| | Saturation | $S_0$ | % | % | % | % |
| | Dry density, lb/cu ft | $\gamma_d$ | 86.4 | | | |
| Time to failure, min | | $t_f$ | 3.95 | | | |
| Unconfined compressive strength, T/sq ft | | $q_u$ | .52 | | | |
| Undrained shear strength, T/sq ft | | $S_u$ | .26 | | | |
| Sensitivity ratio | | $S_t$ | | | | |
| Initial specimen diameter, in. | | $D_0$ | 2.830 | | | |
| Initial specimen height, in. | | $H_0$ | 5.595 | | | |

Classification Gray,Clay,Medium stiff,Silty,w/sand seams

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| LL | 45 | PL | 20 | PI | 25 | $G_s$ | |

Remarks

Project Sabine Lake North Disposal Area
Sabine-Neches Waterway
Area Near Port Arthur, Texas
Boring No. 93-365 Sample No. 3
Depth El 4-6 ft Date 10/08/93

UNCONFINED COMPRESSION TEST REPORT

ENG FORM 1 JUN 65 3659

PLATE XI-2

*Geotest Engineering, Inc.*

JOB NO. 14G719 DATE 10/08/93

PROJECT Sabine Lake North Disposal Area
Sabine-Neches Waterway

AREA Near Port Arthur, Texas

BORING NO. 93-365 SAMPLE NO. 6 DEPTH 10-12 ft

SPECIMEN NO. 1

CLASSIFICATION
Olive gray,Clay,Soft,Silty,w/silt seams

| | | | |
|---|---|---|---|
| Tare No. | P-202 | Height | 5.595 in. |
| Tare plus Wet Specimen | 345.96 gm | Average Diameter | 2.830 in. |
| Tare plus Dry Specimen | 285.52 gm | Initial Area | 6.290 sq in. |
| Water Weight | 60.44 gm | Volume | 35.194 cu in. |
| Tare Weight | 42.61 gm | Volume of Solids | cu in. |
| Wet Specimen | 1118.78 gm | Void Ratio | |
| Dry Specimen | 895.87 gm | Saturation | % |
| Water Content | 24.88 % | Dry Density | 97.0 lb/cu ft |
| Specific Gravity of Solids | | | |

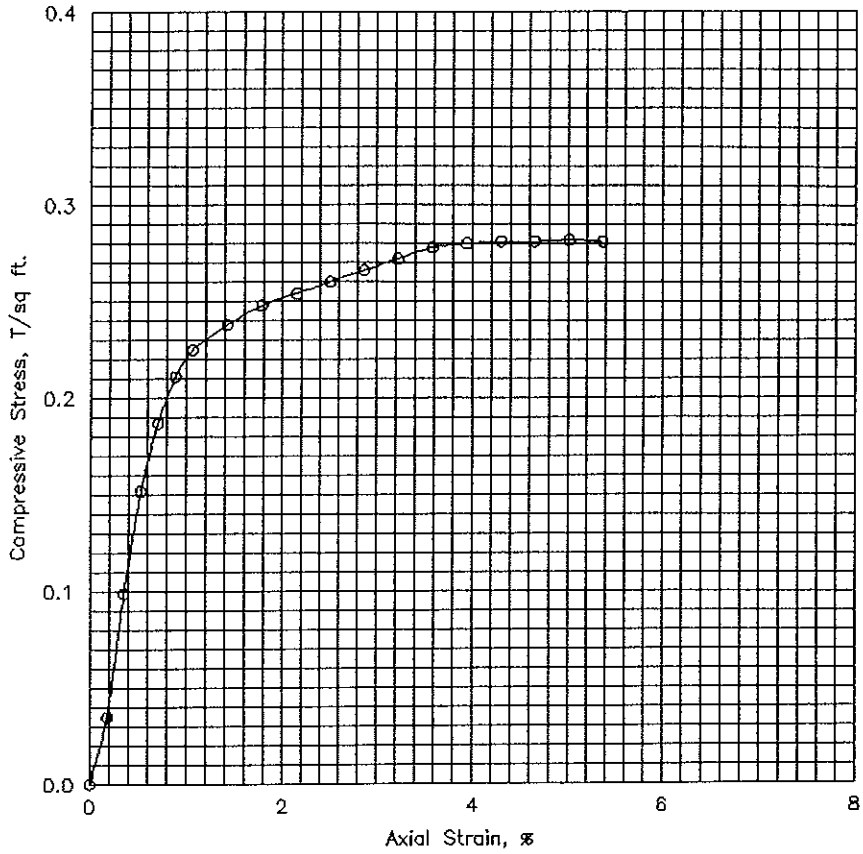
LL = 47 PL = 21 PI = 26

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 | 10.0 | 3.1 | .002 | 6.30 | .035 |
| .4 | 20. | .020 | 28.0 | 8.7 | .004 | 6.31 | .099 |
| .6 | 30. | .030 | 43.0 | 13.4 | .005 | 6.32 | .152 |
| .8 | 40. | .040 | 53.0 | 16.5 | .007 | 6.34 | .187 |
| .9 | 50. | .050 | 60.0 | 18.6 | .009 | 6.35 | .211 |
| 1.1 | 60. | .060 | 64.0 | 19.9 | .011 | 6.36 | .225 |
| 1.5 | 80. | .080 | 68.0 | 21.1 | .014 | 6.38 | .238 |
| 1.8 | 100. | .100 | 71.0 | 22.1 | .018 | 6.40 | .248 |
| 2.1 | 120. | .120 | 73.0 | 22.7 | .021 | 6.43 | .254 |
| 2.4 | 140. | .140 | 75.0 | 23.3 | .025 | 6.45 | .260 |
| 2.8 | 160. | .160 | 77.0 | 23.9 | .029 | 6.48 | .266 |
| 3.1 | 180. | .180 | 79.0 | 24.5 | .032 | 6.50 | .272 |
| 3.4 | 200. | .200 | 81.0 | 25.2 | .036 | 6.52 | .278 |
| 3.8 | 220. | .220 | 82.0 | 25.5 | .039 | 6.55 | .280 |
| 4.2 | 240. | .240 | 82.5 | 25.6 | .043 | 6.57 | .281 |
| 4.4 | 260. | .260 | 83.0 | 25.8 | .046 | 6.60 | .281 |
| 4.8 | 280. | .280 | 83.5 | 25.9 | .050 | 6.62 | .282 |
| 5.1 | 300. | .300 | 83.5 | 25.9 | .054 | 6.65 | .281 |

Job No. 14G719

Failure Sketches




☐ Controlled stress
☒ Controlled strain

| | | | | | | |
|---|---|---|---|---|---|---|
| Test No. | | | 1 | | | |
| Type of Specimen | | | Undisturbed | | | |
| Initial | Water content | $w_o$ | 24.9 % | % | % | % |
| | Void ratio | $e_o$ | | | | |
| | Saturation | $S_o$ | % | % | % | % |
| | Dry density, lb/cu ft | $\gamma_d$ | 97.0 | | | |
| Time to failure, min | | $t_f$ | 4.77 | | | |
| Unconfined compressive strength, T/sq ft | | $q_u$ | .28 | | | |
| Undrained shear strength, T/sq ft | | $S_u$ | .14 | | | |
| Sensitivity ratio | | $S_t$ | | | | |
| Initial specimen diameter, in. | | $D_o$ | 2.830 | | | |
| Initial specimen height, in. | | $H_o$ | 5.595 | | | |

Classification Olive gray,Clay,Soft,Silty,w/silt seams

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| LL | 47 | PL | 21 | PI | 26 | $G_s$ | |

Remarks

Project Sabine Lake North Disposal Area
Sabine-Neches Waterway
Area Near Port Arthur, Texas
Boring No. 93-365 Sample No. 6
Depth El 10-12 ft Date 10/08/93

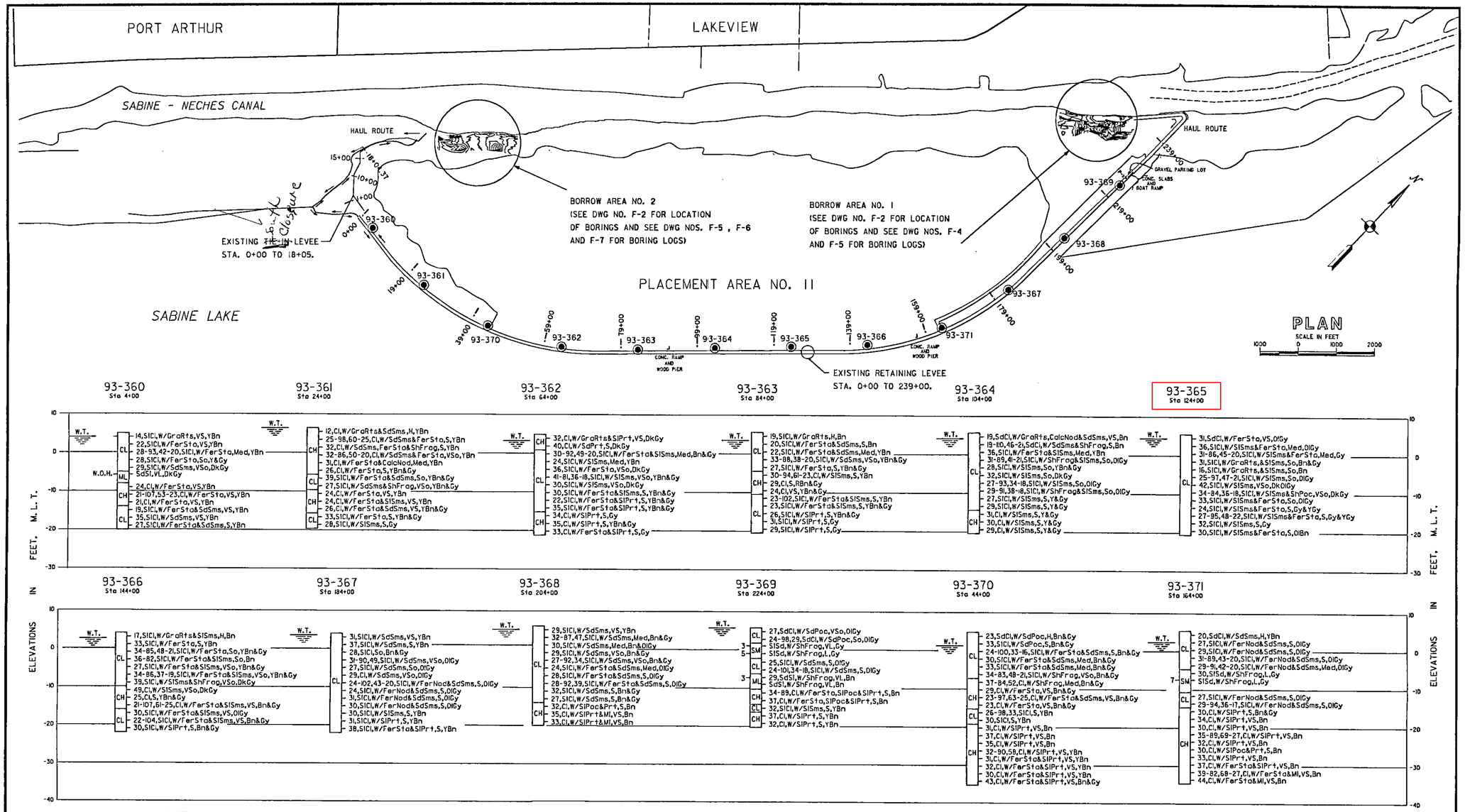
UNCONFINED COMPRESSION TEST REPORT

ENG FORM 1 JUN 65 3659

PLATE XI-2

*Geotest Engineering, Inc.*

PLATE




## NOTES;

1. SOILS HAVE BEEN CLASSIFIED IN ACCORDANCE WITH MILITARY STANDARD 619B "UNIFIED SOIL CLASSIFICATION SYSTEM FOR ROADS, AIRFIELDS, EMBANKMENTS, AND FOUNDATIONS." CONSISTENCY OF SOILS SUCH AS SOFT, MEDIUM, HARD, LOOSE, DENSE, ETC., ARE RELATIVE TERMS BASED ON ESTIMATED UNDISTURBED SHEAR STRENGTH OF THE MATERIAL AS DETERMINED BY VISUAL CLASSIFICATION POCKET PENETROMETER TESTS AND PENETRATION RESISTANCE DURING SAMPLING.
2. FIGURES TO THE RIGHT OF BORING LOGS ARE WATER CONTENTS IN PERCENT OF THE DRY WEIGHT, DRY DENSITY, LIQUID LIMIT, PLASTIC LIMIT, AND BAR LINEAR SHRINKAGE. (MC-LDW)(LL-PL)(BL.L.S.)• FIGURES TO THE LEFT OF BORING LOGS ARE BLOWS PER FOOT OF PENETRATION FROM STANDARD PENETRATION TESTING.
3. BORINGS WERE DRILLED USING WET ROTARY DRILLING TECHNIQUES AND UNDISTURBED SAMPLES WHERE RECOVERED WITH A 3-INCH DIAMETER THIN WALL SAMPLER WHERE COHESIVE MATERIALS WERE ENCOUNTERED. WHERE COHESIONLESS MATERIALS WERE ENCOUNTERED, DISTURBED SAMPLES WERE TAKEN WITH A SPLIT SPOON SAMPLER DURING PERFORMANCE OF STANDARD PENETRATION TESTING.
4. WATER TABLE LEVELS SHOWN ON BORING LOGS WERE DETERMINED AFTER DRILLING BORINGS BY MEASURING THE TOP OF FLUID LEVELS IN THE BORINGS. INASMUCH AS WET ROTARY DRILLING TECHNIQUES AND DRILLING MUD WERE USED TO DRILL THE HOLES, THE LEVEL OF DRILLING FLUIDS IN THE BORE HOLES MAY NOT HAVE STABILIZED TO THE LEVEL OF THE ACTUAL WATER TABLE. ADDITIONALLY, WATER TABLES IN THE FIELD ARE LIKELY TO FLUCTUATE DEPENDING ON WEATHER CONDITIONS. THEREFORE, SOME VARIATION SHOULD BE ANTICIPATED BETWEEN WATER TABLES INDICATED AND WATER TABLES ENCOUNTERED IN THE FIELD.

## VISUAL CLASSIFICATIONS

| | | |
|---|---|---|
| Bn Brown(ish) | Nod Nodules | Sl Silt(y) |
| Calc Calcerous | Ol Olive | Sms Seams |
| Cl Clay | Poc Pocket(s) | So Soft |
| Dk Dark | Prt Parting | Sta Stain(s) |
| Fer Ferrous | R Red | V Very |
| Frag Fragment(s) | Rts Root(s) | W/ With |
| Gra Grass | S Stiff | W.T. Water Table |
| Gy Gray(ish) | Sd Sand(y) | W.O.H. Weight Of Hammer |
| H Hard | Sh Shell(y) | Y Yellow(ish) |
| L Loose | | |
| Med Medium | | |
| Mi Mica | | |

## LABORATORY CLASSIFICATION

CH INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS.
CL INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, LEAN CLAYS.
ML INORGANIC SILTS AND VERY FINE SANDS, WITH SLIGHT PLASTICITY.
SM SILTY SANDS, SAND-SILT MIXTURES.

| REVISION | DATE | DESCRIPTION | BY |
|---|---|---|---|

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

DRAWN BY: * J.G.
DESIGNED BY: * G.M.
CHECKED BY: * G.M./L.A.A.
SUBMITTED BY: *
CHIEF, GEOTECH & SURVEYS SECTION
APPROVED: *
CHIEF, DESIGN BRANCH
APPROVED: *
CHIEF, ENGINEERING DIVISION
DATE: JULY 1995
* - AS REQUIRED BY ENGINEER CIRCULAR NO. 1110-1-1032 )
SCALE: AS SHOWN
SPEC. DATE:

SABINE - NECHES WATERWAY, TEXAS
SABINE - NECHES CANAL
REHABILITATION OF PLACEMENT AREA NO. 11

# PLAN AND BORING LOGS

Prepared under the direction of
Robert B. Gatlin, Col., C.E.,
District Engineer

DRAWING NUMBER
F-1
SHEET 23 OF 32 FILE NO. SN 103-336