BKM

# U.S. ARMY CORPS OF ENGINEERS

BORING NO. 91-47 DATE: BEGIN 03-10-91 PAGE 1 / /
JOB NO. 1.46 446 COMPLETE 03-10-91 Thin Walled Tube
PROJECT CHANNEL TO VICTORIA ☑ 3" ☐ 6"
LOCATION VICTORIA CHANNEL
ELEVATION OF HOLE
MANUFACTURER'S DESIGNATION OF DRILL RIG F-36
GROUNDWATER: DEPTH 14 ft., ELEV. ____ ft., at end of Drilling
WEATHER SUNNY & CLEAR
DRILLER ROBERT TANKARD LOGGER TOMMA GENTR

| DEPTH, FEET | SAMPLE | SAMPLE NO. | PEN./TORVANE SPT.-BLOW COUNT | COLOR | MATERIAL TYPE | CONSISTENCY | SECONDARY CONSTITUENTS | STRUCTURAL FEATURES AND COMMENTS |
|---|---|---|---|---|---|---|---|---|
| 0 | | 1 | 1.75 | GRAY | CLAY | STIFF | | -w/ROOTS 0-2' |
| | | 2 | 2.0 | LIGHT GRAY* | " | VERY STIFF | | -w/SAND POCKETS 3'-6' *TAN |
| 5 | | 3 | 2.25 | " | " | " | | |
| | | 4 | 2.25 | " | " | " | | |
| | | 5 | 2.25 | " | " | " | | |
| 10 | | 6 | 0.75 | LIGHT GRAY* | CLAY | MEDIUM STIFF | SANDY | *TAN -w/SAND LAYERS & POCKET 10'- |
| | | 7 | 0.25 | " | " | SOFT | " | |
| 15 | | 8 | 0.25 | GRAY | " | MEDIUM STIFF | | -w/SHELL FRAGMENTS 14'-18' |
| | | 9 | 0.5 | " | " | " | | |
| | | 10 | 0.50 | " | " | " | | |
| 20 | | 11 | 0.25 | " | " | SOFT | | |
| | | 12 | 0.5 | " | " | MEDIUM STIFF | | -w/SHELL FRAGMENTS 22- |
| 25 | | 13 | 0.5 | " | " | " | | -w/SANDY CLAY LAYERS 24'-26' |
| | | 14 | 0.5 | " | " | " | | |
| | X | 15 | 5/5/5 | LIGHT GRAY | SAND | Medium Dense | | |
| 30 | | | | | | | | BOTTOM OF 9147 |
| 35 | | | | | | | | |

**GEOTEST ENGINEERING, INC.**

Project : Channel enlargement channel to Victoria, Victoria, Texas

**SUMMARY OF LABORATORY TEST RESULTS**

Boring No. 91-47 EL. 5.8' NGVD

Contract No. DACW64-91-D-0001 Delivery Order No.0009

| S # | Depth (ft) | P P (tsf) | SPT Blows per Foot | Visual Classification | U S C | M c (%) | Dry Unit Wt (pcf) | Wet Unit Wt (pcf) | LL (%) | P L (%) | Mechanical Analysis % Passing | | | | | Torvane Shear Strength (tsf) | q u (tsf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | #4 | #10 | #40 | #100 | #200 | | |
| 1 | 0-2 | 3.00 | | Dark gray&yellowish brown,Clay,Very stiff,Silty | CL | 24.9 | | | | | | | | | | | |
| 2 | 2-4 | 2.50 | | Yellowish brown&gray,Clay,Very stiff,Silty | CL | 20.3 | 107.1 | 128.9 | 32 | 16 | 100.0 | 99.9 | 99.9 | | 90.2 | | 1.20 |
| 3 | 4-6 | 1.50 | | Yellowish brown&gray,Clay,Stiff,Silty | CL | 20.6 | | | | | | | | | | | |
| 4 | 6-8 | 2.25 | | Gray,Clay,Stiff,Silty | CL | 24.8 | | | | | | | | | | | |
| 5 | 8-10 | 1.75 | | Gray,Clay,Stiff,Silty | CL | 30.1 | | | | | | | | | | | |
| 6 | 10-12 | 0.50 | | Gray&yellowish brown,Clay,Medium stiff,silty | CL | 31.3 | 93.4 | 122.7 | 38 | 18 | 100.0 | 100.0 | 99.8 | | 99.5 | 0.35<br>.70 | .38 |
| 7 | 12-14 | 0.50 | | Gray&yellowish brown,Clay,Medium stiffw/sand parting | CH | 27.0 | | | | | | | | | | 0.25<br>.50 | |
| 8 | 14-16 | 0.50 | | Gray,Clay,Medium stiff,w/shell fragments | CH | 36.2 | | | | | | | | | | 0.25<br>.50 | |
| 9 | 16-18 | 0.50 | | Gray,Clay,Medium stiff,w/shell fragments | CH | 30.4 | | | | | | | | | | 0.30<br>.60 | |
| 10 | 18-20 | 0.50 | | Gray,Clay,Medium stiff,w/shell fragments | CH | 47.8 | | | | | | | | | | 0.30<br>.60 | |
| 11 | 20-22 | 0.25 | | Dark gray,Clay,Soft,w/sand pockets | CH | 48.4 | 75.0 | 111.3 | 55 | 24 | 100.0 | 100.0 | 99.9 | | 99.3 | 0.30<br>.60 | .58 |
| 12 | 22-24 | 0.25 | | Gray,Clay,Soft,w/sand pockets | CH | 46.0 | | | | | | | | | | 0.30<br>.60 | |
| 13 | 24-26 | 0.00 | | Dark gray,Clay,Very soft,w/shell fragments | CH | 42.6 | 80.5 | 114.8 | 53 | 22 | 99.6 | 98.4 | 92.2* | | 64.6 | 0.10<br>.20 | .12 |
| 14 | 26-28 | 0.00 | | Olive gray,Sand,Very loose,w/clay pockets | SC | 27.9 | | | | | | | | | | 0.05<br>.10 | |
| 15 | 28.5-30 | | 10 | Gray,Sand,Medium dense,Silty | SM | | | | | | 99.8 | 99.6 | 91.0 | | 15.8 | 0.00<br>0.00 | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |

S # : Sample Number, P P : Pocket Penetrometer Reading, U S C : Unified Soil Classification, M c : Moisture Content

q u : Unconfined Compressive Strength, W O H : Weight of hammer, W O P : Weight of pipe

*Material coarser than No.40 sieve are shell fragments

JOB NO. 14G459 DATE 4/28/91

PROJECT CHANNEL ENLARGEMENT, CHANNEL TO VICTORIA, TEXAS

BORING NO. 91-47 SAMPLE NO. 2 DEPTH 2-4 ft

SPECIMEN NO. 1

CLASSIFICATION
Yellowish brown & gray,clay,very stiff, silty,

| | | | |
|---|---|---|---|
| Tare No. | P-13 | Height | 5.595 in. |
| Tare plus Wet Specimen | 728.05 gm | Average Diameter | 2.830 in. |
| Tare plus Dry Specimen | 612.28 gm | Initial Area | 6.290 sq in. |
| Water Weight | 115.77 gm | Volume | 35.194 cu in. |
| Tare Weight | 42.30 gm | Volume of Solids | cu in. |
| Wet Specimen | 1190.77 gm | Void Ratio | |
| Dry Specimen | 989.74 gm | Saturation | % |
| Water Content | 20.31 % | Dry Density | 107.1 lb/cu ft |

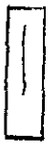
Specific Gravity of Solids
LL = 32 PL = 16 PI = 16

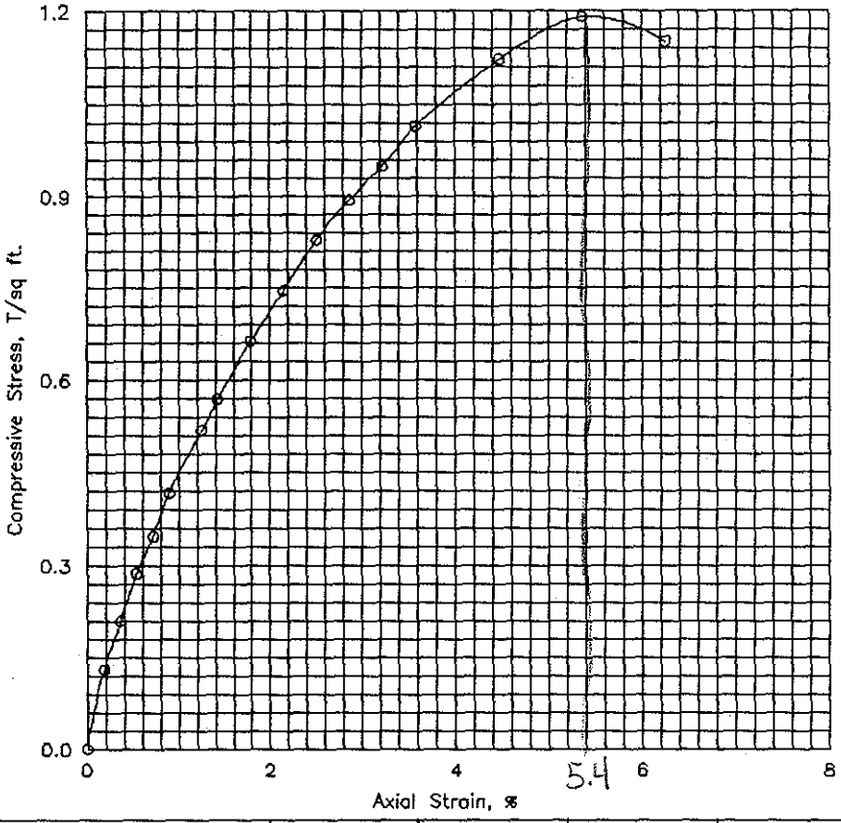
Proving Ring No. 10170
Proving Ring Constant, K = .766 lbs/div.

| 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 | 15.0 | 11.5 | .002 | 6.30 | .131 |
| .4 | 20. | .020 | 24.0 | 18.4 | .004 | 6.31 | .210 |
| .6 | 30. | .030 | 33.0 | 25.3 | .005 | 6.32 | .288 |
| .8 | 40. | .040 | 40.0 | 30.6 | .007 | 6.34 | .348 |
| .9 | 50. | .050 | 48.0 | 36.8 | .009 | 6.35 | .417 |
| 1.2 | 70. | .070 | 60.0 | 46.0 | .013 | 6.37 | .519 |
| 1.5 | 80. | .080 | 66.0 | 50.6 | .014 | 6.38 | .570 |
| 1.8 | 100. | .100 | 77.0 | 59.0 | .018 | 6.40 | .663 |
| 2.1 | 120. | .120 | 87.0 | 66.6 | .021 | 6.43 | .746 |
| 2.5 | 140. | .140 | 97.0 | 74.3 | .025 | 6.45 | .829 |
| 2.8 | 160. | .160 | 105.0 | 80.4 | .029 | 6.48 | .894 |
| 3.2 | 180. | .180 | 112.0 | 85.8 | .032 | 6.50 | .950 |
| 3.5 | 200. | .200 | 120.0 | 91.9 | .036 | 6.52 | 1.015 |
| 4.2 | 250. | .250 | 134.0 | 102.6 | .045 | 6.58 | 1.122 |
| 5.8 | 300. | .300 | 143.5 | 109.9 | .054 | 6.65 | 1.191 |
| 6.2 | 350. | .350 | 140.0 | 107.2 | .063 | 6.71 | 1.151 |

Job No. 14G459

Failure Sketches






☐ Controlled stress
☒ Controlled strain

| | | | | | | |
|---|---|---|---|---|---|---|
| Test No. | | | 1 | | | |
| Type of Specimen | | | Undisturbed | | | |
| Initial | Water content | $w_0$ | 20.3 % | % | % | % |
| | Void ratio | $e_0$ | | | | |
| | Saturation | $S_0$ | % | % | % | % |
| | Dry density, lb/cu ft | $\gamma_d$ | 107.1 | | | |
| Time to failure, min | | $t_f$ | 5.77 | | | |
| Unconfined compressive strength, T/sq ft | | $q_u$ | 1.19 | | | |
| Undrained shear strength, T/sq ft | | $S_u$ | .60 | | | |
| Sensitivity ratio | | $S_t$ | | | | |
| Initial specimen diameter, in. | | $D_0$ | 2.830 | | | |
| Initial specimen height, in. | | $H_0$ | 5.595 | | | |

Classification Yellowish brown & gray,clay,very stiff, silty,

| LL | 32 | PL | 16 | PI | 16 | $G_s$ |
|---|---|---|---|---|---|---|

Remarks

Project CHANNEL ENLARGEMENT, CHANNEL TO VICTORIA

Area Victoria, Texas

Boring No. 91-47 | Sample No. 2

Depth El 2-4 ft | Date 4/28/91

UNCONFINED COMPRESSION TEST REPORT

ENG FORM 3659
1 JUN 65

PLATE XI-2

*Geotest Engineering, Inc.*

PLATE

JOB NO. 14G459 DATE 4/30/91

PROJECT CHANNEL ENLARGEMENT, CHANNEL TO VICTORIA, TEXAS

BORING NO. 91-47 SAMPLE NO. 6 DEPTH 10-12 ft

SPECIMEN NO. 1

CLASSIFICATION
Gray & yellowish brown, Clay, Medium stiff, Silty

| | | | |
|---|---|---|---|
| Tare No. | P-21 | Height | 5.595 in. |
| Tare plus Wet Specimen | 688.26 gm | Average Diameter | 2.830 in. |
| Tare plus Dry Specimen | 534.20 gm | Initial Area | 6.290 sq in. |
| Water Weight | 154.06 gm | Volume | 35.194 cu in. |
| Tare Weight | 42.58 gm | Volume of Solids | cu in. |
| Wet Specimen | 1133.37 gm | Void Ratio | |
| Dry Specimen | 862.95 gm | Saturation | % |
| Water Content | 31.34 % | Dry Density | 93.4 lb/cu ft |

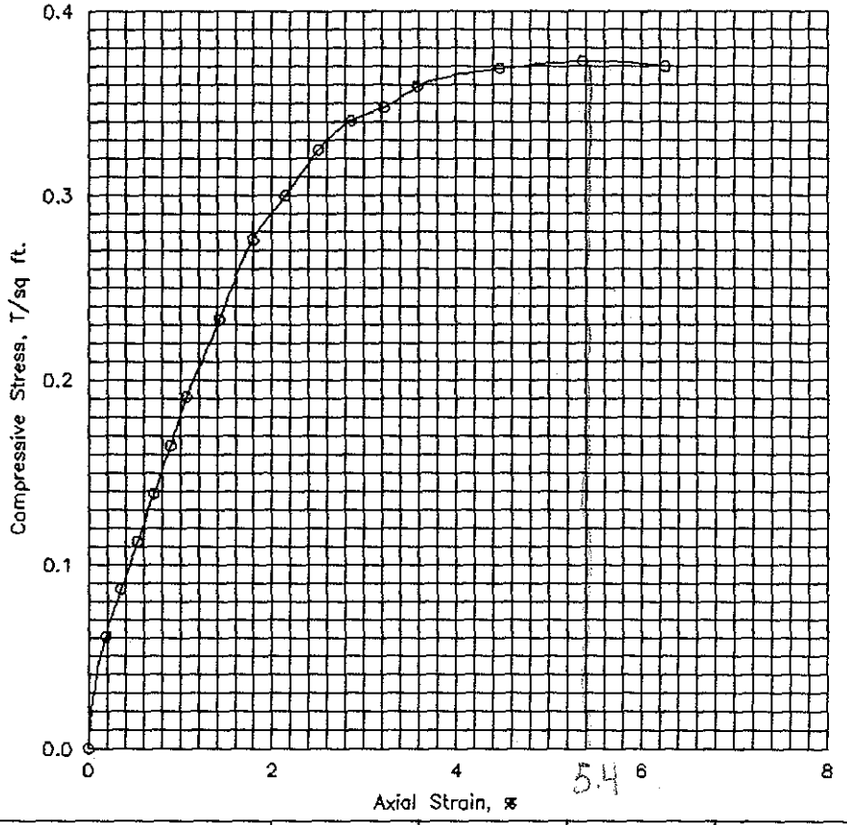
Specific Gravity of Solids
LL = 38 PL = 18 PI = 20

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

| Elapsed Time hr. | 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 | 7.0 | 5.4 | .002 | 6.30 | .061 |
| .4 | 20. | .020 | 10.0 | 7.7 | .004 | 6.31 | .087 |
| .6 | 30. | .030 | 13.0 | 10.0 | .005 | 6.32 | .113 |
| .7 | 40. | .040 | 16.0 | 12.3 | .007 | 6.34 | .139 |
| .9 | 50. | .050 | 19.0 | 14.6 | .009 | 6.35 | .165 |
| 1.1 | 60. | .060 | 22.0 | 16.9 | .011 | 6.36 | .191 |
| 1.4 | 80. | .080 | 27.0 | 20.7 | .014 | 6.38 | .233 |
| 1.7 | 100. | .100 | 32.0 | 24.5 | .018 | 6.40 | .276 |
| 2.0 | 120. | .120 | 35.0 | 26.8 | .021 | 6.43 | .300 |
| 2.4 | 140. | .140 | 38.0 | 29.1 | .025 | 6.45 | .325 |
| 2.7 | 160. | .160 | 40.0 | 30.6 | .029 | 6.48 | .341 |
| 3.0 | 180. | .180 | 41.0 | 31.4 | .032 | 6.50 | .348 |
| 3.4 | 200. | .200 | 42.5 | 32.6 | .036 | 6.52 | .359 |
| 4.1 | 250. | .250 | 44.0 | 33.7 | .045 | 6.58 | .369 |
| 4.9 | 300. | .300 | 45.0 | 34.5 | .054 | 6.65 | .373 |
| 5.8 | 350. | .350 | 45.0 | 34.5 | .063 | 6.71 | .370 |

Job No. 14G459

Failure Sketches




☐ Controlled stress
☒ Controlled strain

| | | | | | | |
|---|---|---|---|---|---|---|
| Test No. | | | 1 | | | |
| Type of Specimen | | | Undisturbed | | | |
| Initial | Water content | $w_0$ | 31.3 % | % | % | % |
| | Void ratio | $e_0$ | | | | |
| | Saturation | $S_0$ | % | % | % | % |
| | Dry density, lb/cu ft | $\gamma_d$ | 93.4 | | | |
| Time to failure, min | | $t_f$ | 4.93 | | | |
| Unconfined compressive strength, T/sq ft | | $q_u$ | .37 | | | |
| Undrained shear strength, T/sq ft | | $S_u$ | .19 | | | |
| Sensitivity ratio | | $S_t$ | | | | |
| Initial specimen diameter, in. | | $D_0$ | 2.830 | | | |
| Initial specimen height, in. | | $H_0$ | 5.595 | | | |

Classification Gray & yellowish brown, Clay, Medium stiff, Silty

| LL | PL | PI | $G_s$ |
|---|---|---|---|
| 38 | 18 | 20 | |

Remarks

Project CHANNEL ENLARGEMENT, CHANNEL TO VICTORIA

Area Victoria, Texas

Boring No. 91-47 | Sample No. 6

Depth El 10-12 ft | Date 4/30/91

UNCONFINED COMPRESSION TEST REPORT

ENG FORM 3659
1 JUN 65

PLATE XI-2

*Geotest Engineering, Inc.*

PLATE

JOB NO. 14G459 DATE 4/30/91

PROJECT CHANNEL ENLARGEMENT, CHANNEL TO VICTORIA, TEXAS

BORING NO. 91-47 SAMPLE NO. 11 DEPTH 20-22 ft

SPECIMEN NO. 1

CLASSIFICATION
Dark gray, Clay, Soft, w/sand pockets

| | | | |
|---|---|---|---|
| Tare No. | P-22 | Height | 5.595 in. |
| Tare plus Wet Specimen | 557.41 gm | Average Diameter | 2.830 in. |
| Tare plus Dry Specimen | 389.62 gm | Initial Area | 6.290 sq in. |
| Water Weight | 167.79 gm | Volume | 35.194 cu in. |
| Tare Weight | 42.73 gm | Volume of Solids | cu in. |
| Wet Specimen | 1028.22 gm | Void Ratio | |
| Dry Specimen | 693.01 gm | Saturation | % |
| Water Content | 48.37 % | Dry Density | 75.0 lb/cu ft |

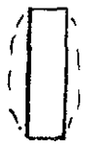
Specific Gravity of Solids
LL = 55 PL = 24 PI = 31

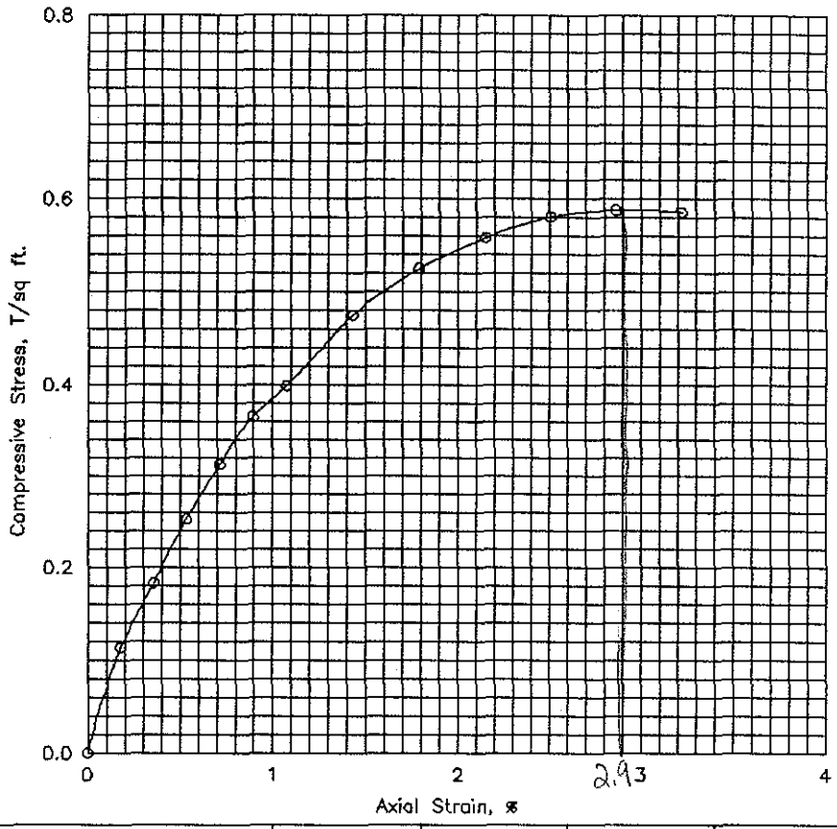
Proving Ring No. 10170
Proving Ring Constant, K = .766 lbs/div.

| 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 | 13.0 | 10.0 | .002 | 6.30 | .114 |
| .4 | 20. | .020 | 21.0 | 16.1 | .004 | 6.31 | .183 |
| .6 | 30. | .030 | 29.0 | 22.2 | .005 | 6.32 | .253 |
| .7 | 40. | .040 | 36.0 | 27.6 | .007 | 6.34 | .313 |
| .9 | 50. | .050 | 42.0 | 32.2 | .009 | 6.35 | .365 |
| 1.1 | 60. | .060 | 46.0 | 35.2 | .011 | 6.36 | .399 |
| 1.4 | 80. | .080 | 55.0 | 42.1 | .014 | 6.38 | .475 |
| 1.7 | 100. | .100 | 61.0 | 46.7 | .018 | 6.40 | .525 |
| 2.0 | 120. | .120 | 65.0 | 49.8 | .021 | 6.43 | .558 |
| 2.4 | 140. | .140 | 68.0 | 52.1 | .025 | 6.45 | .581 |
| 2.7 | 160. | .160 | 69.0 | 52.9 | .029 | 6.48 | .588 |
| 3.0 | 180. | .180 | 69.0 | 52.9 | .032 | 6.50 | .586 |

Job No. 140459

Failure Sketches






☐ Controlled stress
☒ Controlled strain

| | | | | | | |
|---|---|---|---|---|---|---|
| Test No. | | | 1 | | | |
| Type of Specimen | | | Undisturbed | | | |
| Initial | Water content | $w_0$ | 48.4 % | % | % | % |
| | Void ratio | $e_0$ | | | | |
| | Saturation | $S_0$ | % | % | % | % |
| | Dry density, lb/cu ft | $\gamma_d$ | 75.0 | | | |
| Time to failure, min | | $t_f$ | 2.68 | | | |
| Unconfined compressive strength, T/sq ft | | $q_u$ | .59 | | | |
| Undrained shear strength, T/sq ft | | $S_u$ | .29 | | | |
| Sensitivity ratio | | $S_t$ | | | | |
| Initial specimen diameter, in. | | $D_0$ | 2.830 | | | |
| Initial specimen height, in. | | $H_0$ | 5.595 | | | |

Classification Dark gray, Clay, Soft, w/sand pockets

| LL | PL | PI | $G_s$ |
|---|---|---|---|
| 55 | 24 | 31 | |

Remarks

Project CHANNEL ENLARGEMENT, CHANNEL TO VICTORIA

Area Victoria, Texas

Boring No. 91-47 | Sample No. 11

Depth El 20-22 ft | Date 4/30/91

UNCONFINED COMPRESSION TEST REPORT

ENG FORM 1 JUN 65 3659

PLATE XI-2

*Geotest Engineering, Inc.*

PLATE

JOB NO. 14G459 DATE 4/28/91

PROJECT CHANNEL ENLARGEMENT, CHANNEL TO VICTORIA, TEXAS

BORING NO. 91-47 SAMPLE NO. 13 DEPTH 24-26 ft

SPECIMEN NO. 1

CLASSIFICATION
Dark gray, Clay, Very soft, w/ shell fragments

| | | | |
|---|---|---|---|
| Tare No. | P-20 | Height | 5.595 in. |
| Tare plus Wet Specimen | 710.74 gm | Average Diameter | 2.830 in. |
| Tare plus Dry Specimen | 511.30 gm | Initial Area | 6.290 sq in. |
| Water Weight | 199.44 gm | Volume | 35.194 cu in. |
| Tare Weight | 42.67 gm | Volume of Solids | cu in. |
| Wet Specimen | 1060.68 gm | Void Ratio | |
| Dry Specimen | 744.03 gm | Saturation | % |
| Water Content | 42.56 % | Dry Density | 80.5 lb/cu ft |

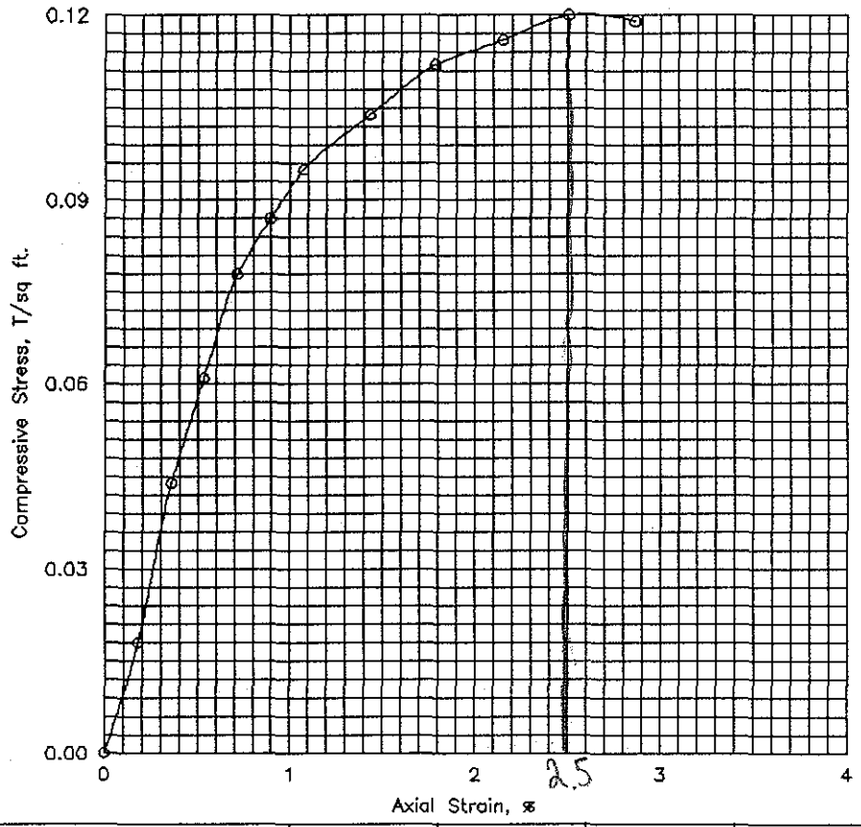
Specific Gravity of Solids
LL = 53 PL = 22 PI = 31

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 |
| .1 | 10. | .010 | 2.0 | 1.5 | .002 | 6.30 | .018 |
| .3 | 20. | .020 | 5.0 | 3.8 | .004 | 6.31 | .044 |
| .6 | 30. | .030 | 7.0 | 5.4 | .005 | 6.32 | .061 |
| .9 | 40. | .040 | 9.0 | 6.9 | .007 | 6.34 | .078 |
| 1.8 | 50. | .050 | 10.0 | 7.7 | .009 | 6.35 | .087 |
| 1.2 | 60. | .060 | 11.0 | 8.4 | .011 | 6.36 | .095 |
| 1.5 | 80. | .080 | 12.0 | 9.2 | .014 | 6.38 | .104 |
| 1.8 | 100. | .100 | 13.0 | 10.0 | .018 | 6.40 | .112 |
| 2.2 | 120. | .120 | 13.5 | 10.3 | .021 | 6.43 | .116 |
| 2.5 | 140. | .140 | 14.0 | 10.7 | .025 | 6.45 | .120 |
| 2.8 | 160. | .160 | 14.0 | 10.7 | .029 | 6.48 | .119 |

Job No. 14G459

Failure Sketches




☐ Controlled stress
☒ Controlled strain

| | | | | | | |
|---|---|---|---|---|---|---|
| Test No. | | | 1 | | | |
| Type of Specimen | | | Undisturbed | | | |
| Initial | Water content | $w_o$ | 42.6 % | % | % | % |
| | Void ratio | $e_o$ | | | | |
| | Saturation | $S_o$ | % | % | % | % |
| | Dry density, lb/cu ft | $\gamma_d$ | 80.5 | | | |
| Time to failure, min | | $t_f$ | 2.50 | | | |
| Unconfined compressive strength, T/sq ft | | $q_u$ | .12 | | | |
| Undrained shear strength, T/sq ft | | $S_u$ | .06 | | | |
| Sensitivity ratio | | $S_t$ | | | | |
| Initial specimen diameter, in. | | $D_o$ | 2.830 | | | |
| Initial specimen height, in. | | $H_o$ | 5.595 | | | |

Classification Dark gray, Clay, Very soft, w/ shell fragments

| LL | PL | PI | $G_s$ |
|---|---|---|---|
| 53 | 22 | 31 | |

Remarks

Project CHANNEL ENLARGEMENT, CHANNEL TO VICTORIA

Area Victoria, Texas

Boring No. 91-47 | Sample No. 13

Depth El 24-26 ft | Date 4/28/91

UNCONFINED COMPRESSION TEST REPORT

ENG FORM 3659
1 JUN 65

PLATE XI-2

*Geotest Engineering, Inc.*

PLATE