# SUMMARY OF LABORATORY TESTS

Project No. 08.18.920

Client: United States Army Corps of Engineers

Project: Galveston Channel and San Jacinto PA
Contract No. DACW64-03-D-0008, Task Order No. 0080

| Boring No. | Sample No. | Depth (ft) | Torvane Shear Test (tsf) | Soil Description | USCS | Water Content (%) | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plast. Index | Finer than #200 Sieve (%) | Uc/UU. Compr. (tsf) | Failure Strain (%) | Conf. Pres. (psi) | Failure Type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 6 | 13-15 | 0.23 | Gray LEAN CLAY with SAND | CL | 31.0 | 85.8 | 34 | 19 | 15 | 77.9 | | | | |
| | 7 | 15-17 | | Gray LEAN CLAY | CL | 38.1 | | | | | | | | | |
| | 8 | 17-19 | | Gray FAT CLAY | CH | 104.6 | 47.8 | | | | | | | | |
| | 9 | 19-20 | | Gray FAT CLAY | CH | 46.8 | 74.5 | | | | | | | | |
| 07-208 | | | | | | | | | | | | | | | |
| | 1 | 0-2 | | Gray and tan SANDY SILT | ML | 24.2 | | | | | 52.8 | | | | |
| | 2 | 2-4 | | Gray FAT CLAY with SAND | CH | 50.8 | 66.4 | 102 | 31 | 71 | 84.1 | 0.22 | 7.2 | | Slickensided |
| | 3 | 4-6 | | Gray FAT CLAY | CH | 46.4 | 71.0 | | | | | | | | |
| | 4 | 6-8 | | Gray and tan FAT CLAY | CH | 64.3 | 62.8 | | | | | | | | |
| | 5 | 8-9.5 | | Gray and tan SILTY SAND | SM | | | | | | 15.5 | | | | |
| | 6 | 13-14.5 | | Tan and gray SAND with SILT | SP-SM | | | | | | 5.6 | | | | |
| | 7 | 16.5-18 | | Gray SILTY SAND | SM | | | | | | 15.0 | | | | |
| | 8 | 18-20 | | Gray FAT CLAY | CH | 50.1 | 68.2 | | | | | | | | |
| 07-209 | | | | | | | | | | | | | | | |
| | 1 | 0-2 | | Gray FAT CLAY with SAND | CH | 45.6 | 70.6 | 88 | 29 | 59 | 77.2 | 0.41 | 8.1 | | Multiple shear |
| | 2 | 2-3.5 | | Tan and gray SILTY SAND | SM | 27.7 | | NV | NP | NP | 29.0 | | | | |
| | 3 | 4-6 | | Gray FAT CLAY | CH | 50.0 | 70.1 | 89 | 27 | 62 | 95.4 | 1.03 | 4.8 | | 45 degree |
| | 4 | 6-7.5 | | Gray SILTY SAND | SM | | | | | | 14.5 | | | | |
| | 5 | 11-12.5 | | Gray poorly graded SAND with SILT | SP-SM | | | | | | 11.5 | | | | |
| | 6 | 16-17.5 | | Tan and light gray SAND with SILT | SP-SM | | | | | | 7.0 | | | | |
| | 7 | 18-20 | | Gray FAT CLAY | CH | 56.3 | 71.8 | | | | | | | | |
| 07-210 | | | | | | | | | | | | | | | |
| | 1 | 0-2 | | Gray FAT CLAY with SAND | CH | 44.3 | 65.2 | 67 | 23 | 44 | 73.8 | 0.24 | 1.5 | | Vertical shear |
| | 2 | 2-4 | | Gray and tan FAT CLAY | CH | 49.5 | 66.0 | | | | | 0.51 | 4.6 | | Vertical shear |
| | 3 | 4-6 | 0.39 | Gray FAT CLAY | CH | 58.3 | 66.1 | 92 | 29 | 63 | 93.3 | | | | |
| | 4 | 6-8 | | Tan SILTY SAND | SM | | | | | | 21.2 | | | | |
| | 5 | 11-12.5 | | Gray and tan FAT CLAY | CH | 52.1 | | | | | | | | | |
| | 6 | 12.5-14 | 0.34 | Gray and tan FAT CLAY with SAND | CH | 61.5 | 63.3 | 101 | 30 | 71 | 81.4 | | | | |
| | 7 | 14-16 | | Gray FAT CLAY | CH | 48.4 | 74.1 | | | | | | | | |
| | 8 | 16-18 | | Gray FAT CLAY | CH | 39.4 | 77.7 | | | | | | | | |
| | 9 | 18-20 | | Gray and tan FAT CLAY | CH | 63.8 | 64.0 | | | | | | | | |
| 07-211 | | | | | | | | | | | | | | | |
| | 1 | 0-2 | | Tan and gray SILTY SAND | SM | | | | | | 33.4 | | | | |
| | 2 | 2-4 | | Gray FAT CLAY with SAND | CH | 28.8 | 90.2 | 54 | 19 | 35 | 70.7 | 0.44 | 7.7 | | Multiple shear |
| | 3 | 4-6 | | Gray and tan FAT CLAY | CH | 30.1 | 91.1 | | | | | 0.49 | 9.4 | 4.0 | Bulge |
| | 4 | 6-8 | | Tan SAND with SILT | SP-SM | | | | | | 6.8 | | | | |
| | 5 | 11-12.5 | | Tan and gray poorly graded SAND with SILT | SP-SM | | | | | | 8.6 | | | | |

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# SUMMARY OF LABORATORY TESTS

Project No. 08.18.920

Client: United States Army Corps of Engineers

Project: Galveston Channel and San Jacinto PA
Contract No. DACW64-03-D-0008, Task Order No. 0080

| Boring No. | Sample No. | Depth (ft) | Torvane Shear Test (tsf) | Soil Description | USCS | Water Content (%) | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plast. Index | Finer than #200 Sieve (%) | Uc/UU. Compr. (tsf) | Failure Strain (%) | Conf. Pres. (psi) | Failure Type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 6 | 16-17.5 | | Gray SILTY SAND | SM | | | | | | 26.3 | | | | |
| | 7 | 18.5-20 | | Gray SILTY SAND | SM | | | | | | 28.8 | | | | |
| 07-212 | | | | | | | | | | | | | | | |
| | 1 | 0-2 | 0.57 | Gray and tan FAT CLAY | CH | 63.8 | 67.5 | | | | | | | | |
| | 2 | 2-4 | 0.25 | Gray FAT CLAY with SAND | CH | 38.5 | 77.4 | 65 | 19 | 46 | 73.6 | 0.25 | 10.2 | | Multiple shear |
| | 3 | 4-6 | | Gray and tan SANDY LEAN CLAY; organic | CL | 27.7 | | | | | | | | | |
| | 4 | 6-8 | | Gray and tan FAT CLAY | CH | 43.8 | 74.3 | | | | | | | | |
| | 5 | 8-10 | 0.28 | Gray FAT CLAY with SAND | CH | 60.8 | 65.2 | 85 | 26 | 59 | 81.4 | | | | |
| | 6 | 10-12 | | Gray and tan FAT CLAY | CH | 29.3 | 84.0 | | | | | | | | |
| | 7 | 12-14 | 0.18 | Gray and tan FAT CLAY; shells | CH | 40.0 | 82.6 | | | | | | | | |
| | 8 | 14-16 | | Gray CLAYEY SAND; shells | SC | 24.5 | 103.6 | | | | 41.2 | | | | |
| | 9 | 16-17.5 | | Gray and tan poorly graded SAND with SILT | SP-SM | | | | | | 10.2 | | | | |
| | 10 | 18.5-20 | | Gray and tan SAND with SILT | SM | | | | | | 9.1 | | | | |
| 07-213 | | | | | | | | | | | | | | | |
| | 1 | 0-2 | | Gray FAT CLAY; organics | CH | 65.6 | 59.6 | | | | | | | | |
| | 2 | 2-4 | 0.11 | Gray FAT CLAY | CH | 95.0 | 46.9 | 119 | 34 | 85 | 96.3 | 0.04 | 14.6 | | Bulge |
| | 3 | 4-6 | | Gray FAT CLAY | CH | 62.3 | 61.8 | | | | | | | | |
| | 4 | 6-8 | | Gray FAT CLAY | CH | 41.8 | 75.3 | | | | | | | | |
| | 5 | 8-10 | 0.23 | Gray FAT CLAY | CH | 80.9 | 53.9 | 110 | 31 | 79 | 94.0 | | | | |
| | 6 | 10-12 | | Gray FAT CLAY | CH | 83.9 | 50.6 | | | | | | | | |
| | 7 | 12-14 | | Gray and tan FAT CLAY | CH | 72.0 | 58.7 | | | | | | | | |
| | 8 | 14-16 | 0.21 | Gray LEAN CLAY | CL | 52.1 | 72.7 | 49 | 20 | 29 | 93.9 | | | | |
| | 9 | 16-18 | | Gray and tan FAT CLAY | CH | 38.5 | 84.3 | | | | | | | | |
| | 10 | 18-20 | | Dark gray FAT CLAY | CH | 71.6 | 63.5 | | | | | | | | |
| 07-214 | | | | | | | | | | | | | | | |
| | 1 | 0-2 | | Gray FAT CLAY | CH | 36.1 | 73.8 | | | | | | | | |
| | 2 | 2-4 | | Gray FAT CLAY | CH | 39.6 | 75.9 | | | | | | | | |
| | 3 | 4-6 | | Gray FAT CLAY with SAND | CH | 31.4 | 87.2 | 64 | 21 | 43 | 72.7 | 1.32 | 7.4 | 4.0 | 60 degree |
| | 4 | 6-8 | | Gray FAT CLAY | CH | 30.5 | 81.3 | | | | | | | | |
| | 5 | 8-9.5 | | Tan and gray SILTY SAND; shells | SM | | | | | | 12.7 | | | | |
| | 6 | 10-12 | | Gray FAT CLAY with SAND | CH | 37.7 | 83.1 | 63 | 21 | 42 | 79.5 | 0.40 | 3.2 | | Vertical shear |
| | 7 | 12-14 | | Gray FAT CLAY | CH | 44.1 | 77.9 | | | | | | | | |
| | 8 | 14-16 | | Gray FAT CLAY with SAND; organic | CH | 46.5 | 73.5 | | | | | 0.59 | 4.9 | | Vertical shear |
| | 9 | 16-18 | | Gray FAT CLAY | CH | 46.7 | 71.6 | | | | | | | | |
| | 10 | 18-20 | | Gray FAT CLAY | CH | 60.9 | 61.2 | 110 | 32 | 78 | 97.5 | | | | |
| | 11 | 20-22 | | Gray FAT CLAY | CH | 38.3 | 79.8 | | | | | | | | |
| | 12 | 22-23.5 | | Gray SILTY SAND | SM | | | | | | 22.8 | | | | |

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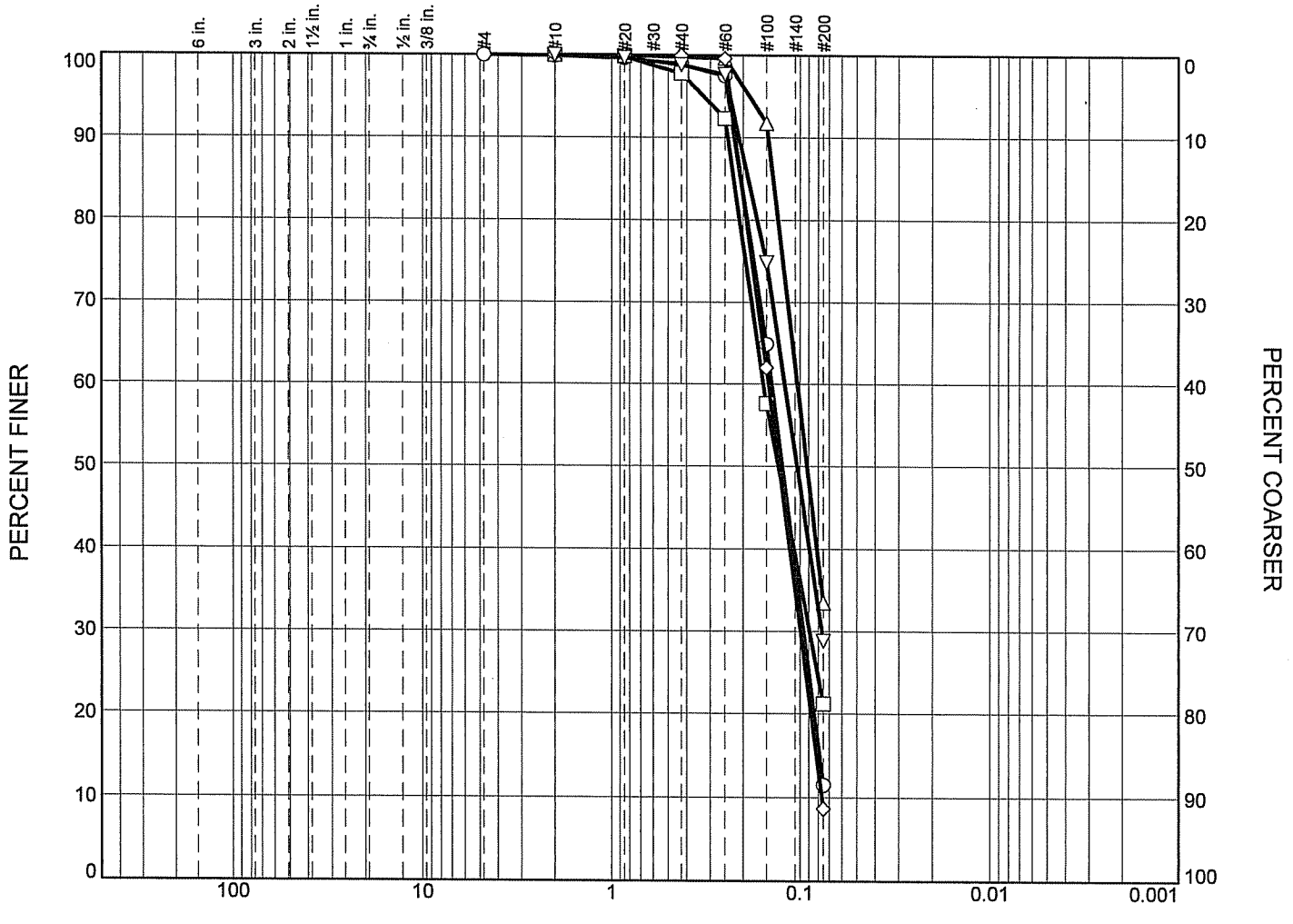
# Particle Size Analysis - ASTM D 422



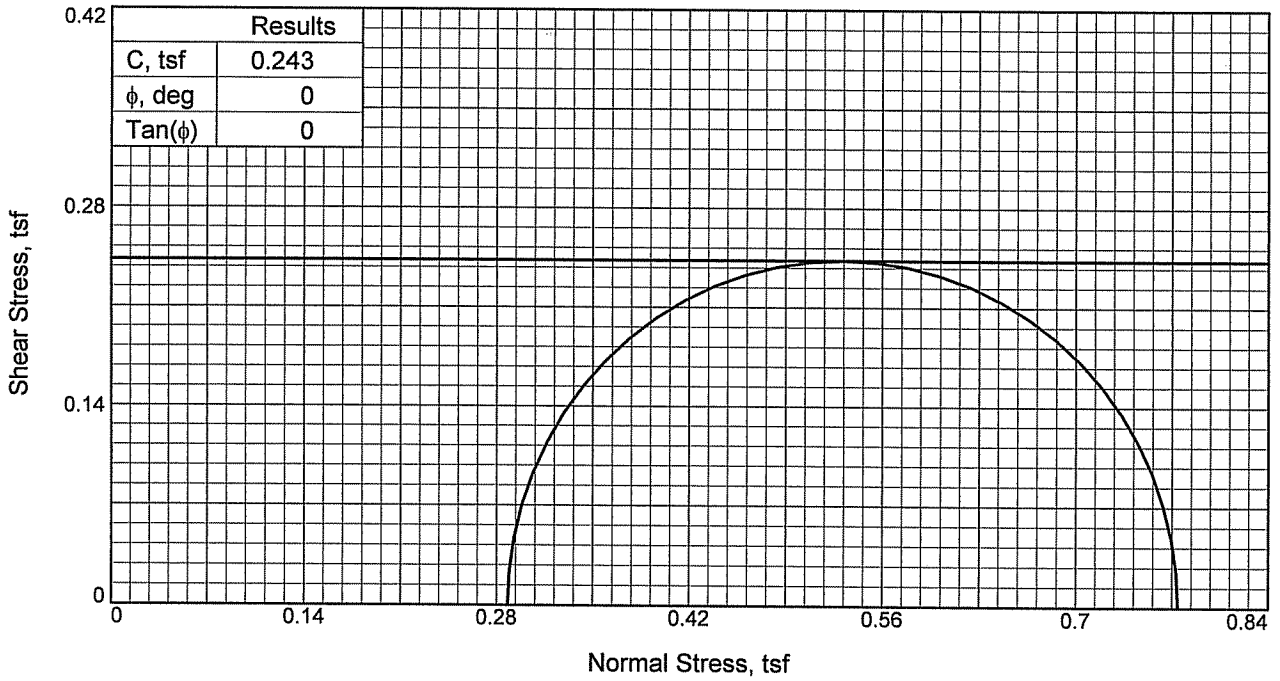

| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 0.1 | 0.9 | 87.5 | 11.5 | |
| □ | 0.0 | 0.0 | 0.0 | 0.0 | 2.2 | 76.6 | 21.2 | |
| △ | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 66.4 | 33.4 | |
| ◇ | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 91.3 | 8.6 | |
| ▽ | 0.0 | 0.0 | 0.0 | 0.0 | 1.1 | 70.1 | 28.8 | |

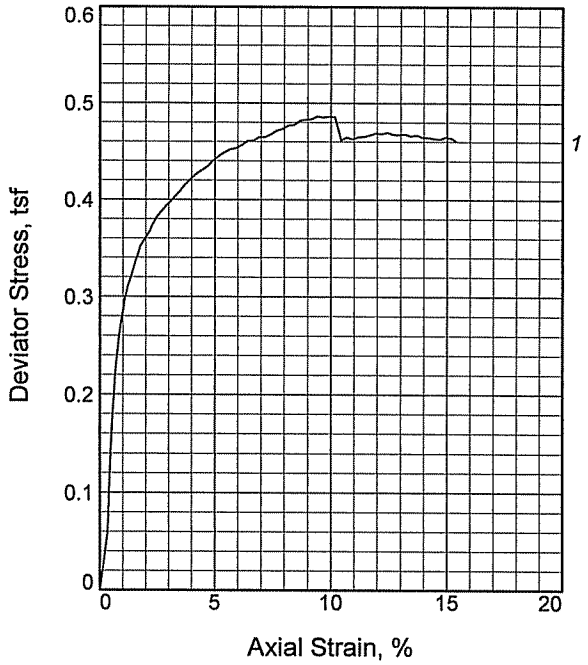
## SOIL DATA

| SYMBOL | SOURCE | SAMPLE NO. | DEPTH (ft.) | Material Description | USCS |
|---|---|---|---|---|---|
| ○ | 07-209 | 5 | 11-12.5 | Gray poorly graded SAND with SILT | SP-SM |
| □ | 07-210 | 4 | 6-8 | Tan SILTY SAND | SM |
| △ | 07-211 | 1 | 0-2 | Tan and gray SILTY SAND | SM |
| ◇ | 07-211 | 5 | 11-12.5 | Tan and gray poorly graded SAND with SILT | SP-SM |
| ▽ | 07-211 | 7 | 18.5-20 | Gray SILTY SAND | SM |

**Tolunay-Wong Engineers, Inc.**
**Houston, Texas**

**Client:** United States Army Corps of Engineers
**Project:** Galveston Channel and San Jacinto PA
Contract No. DACW64-03-D-0008, Task Order No. 0080
**Project No.:** 08.18.920 **Figure**




| | | |
|---|---|---|
| Sample No. | | 1 |
| Initial | Water Content, % | 30.1 |
| | Dry Density, pcf | 91.1 |
| | Saturation, % | 95.5 |
| | Void Ratio | 0.8499 |
| | Diameter, in. | 2.80 |
| | Height, in. | 5.60 |
| At Test | Water Content, % | 30.3 |
| | Dry Density, pcf | 91.1 |
| | Saturation, % | 96.1 |
| | Void Ratio | 0.8499 |
| | Diameter, in. | 2.80 |
| | Height, in. | 5.60 |
| Strain rate, %/min. | | 1.00 |
| Back Pressure, tsf | | 0.00 |
| Cell Pressure, tsf | | 0.29 |
| Fail. Stress, tsf | | 0.49 |
| Ult. Stress, tsf | | |
| $\sigma_1$ Failure, tsf | | 0.77 |
| $\sigma_3$ Failure, tsf | | 0.29 |

**Type of Test:**
Unconsolidated Undrained

**Sample Type:** Undisturbed

**Description:** Gray and tan FAT CLAY

**Assumed Specific Gravity=** 2.70

**Remarks:**
Test method: ASTM D 2850
Pocket pen; tsf: 0.75
Failure type: Bulge

**Client:** United States Army Corps of Engineers

**Project:** Galveston Channel and San Jacinto PA
Contract No. DACW64-03-D-0008, Task Order No. 0080

**Source of Sample:** 07-211 **Depth:** 4-6

**Sample Number:** 3

**Proj. No.:** 08.18.920 **Date Sampled:** 7/29/08

TRIAXIAL SHEAR TEST REPORT

Tolunay-Wong Engineers, Inc.

# TRIAXIAL COMPRESSION TEST

Unconsolidated Undrained

8/8/2008
11:14 AM

**Date:** 7/29/08
**Client:** United States Army Corps of Engineers
**Project:** Galveston Channel and San Jacinto PA Contract No. DACW64-03-D-0008, Task Order No. 0080
**Project No.:** 08.18.920
**Location:** 07-211
**Depth:** 4-6 **Sample Number:** 3
**Description:** Gray and tan FAT CLAY
**Remarks:**
Test method: ASTM D 2850
Pocket pen; tsf: 0.75
Failure type: Bulge
**Type of Sample:** Undisturbed
**Assumed Specific Gravity=**2.70 **LL=** **PL=** **PI=**
**Test Method:** ASTM D 2850

## Parameters for Specimen No. 1

| Specimen Parameter | Initial | Final |
|---|---|---|
| Moisture content: Moist soil+tare, gms. | 125.220 | 145.280 |
| Moisture content: Dry soil+tare, gms. | 103.370 | 118.670 |
| Moisture content: Tare, gms. | 30.680 | 30.720 |
| Moisture, % | 30.1 | 30.3 |
| Moist specimen weight, gms. | 1072.7 | |
| Diameter, in. | 2.80 | |
| Area, in.$^2$ | 6.16 | |
| Height, in. | 5.60 | |
| Wet Density, pcf | 118.5 | |
| Dry density, pcf | 91.1 | |
| Void ratio | 0.8499 | |
| Saturation, % | 95.5 | |

## Test Readings for Specimen No. 1

**Membrane modulus =** .130 kN/cm$^2$
**Membrane thickness =** .031 cm
**Cell pressure =** 4.00 psi (0.288 tsf)
**Back pressure =** 0.00 psi (0.000 tsf)
**Strain rate, %/min. =** 1.00
**Fail. Stress =** 0.486 tsf **at reading no.** 64

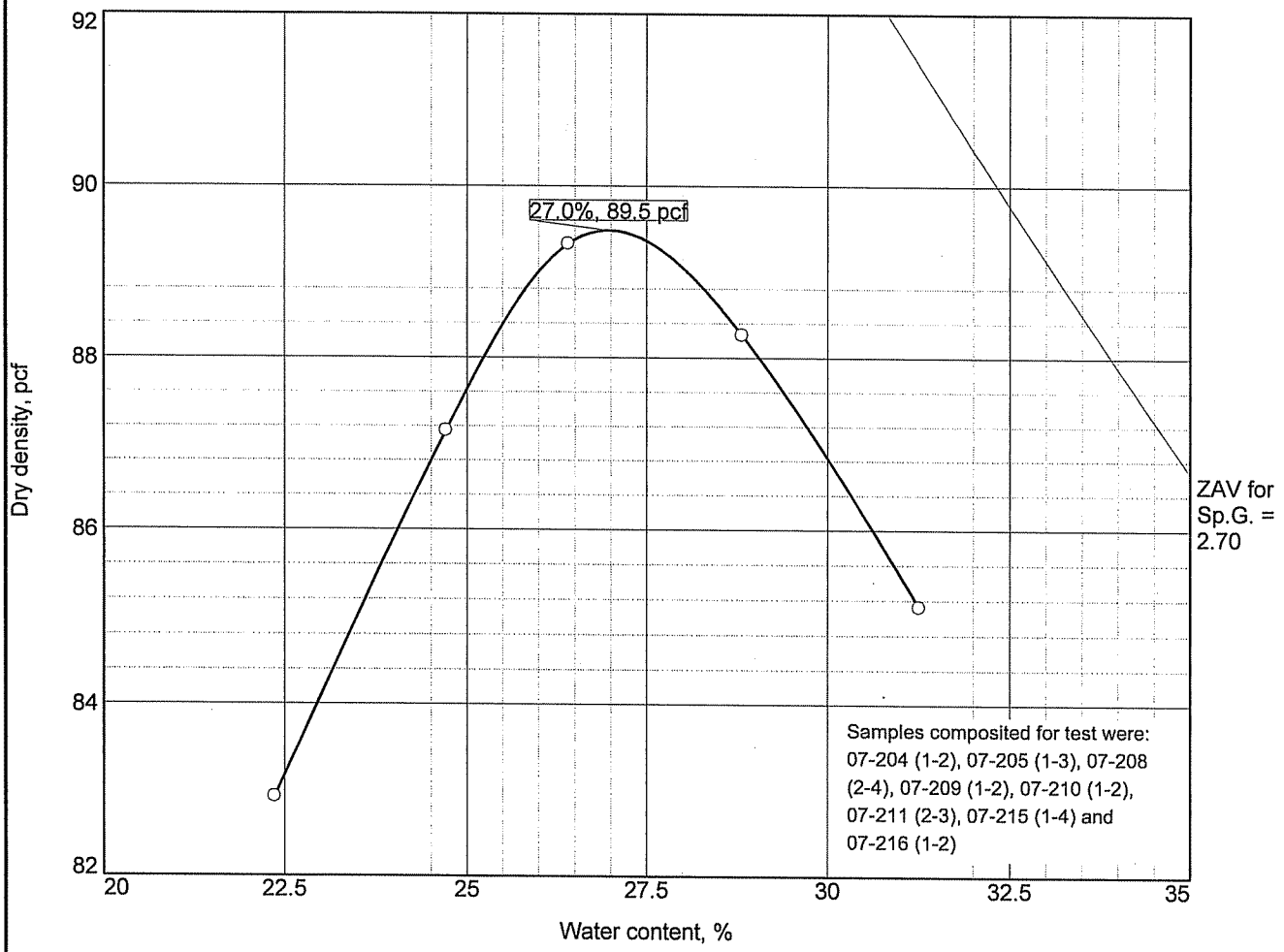
## Test Readings for Specimen No. 1

| No. | Def. Dial in. | Load Dial | Load lbs. | Strain % | Deviator Stress tsf | Minor Princ. Stress tsf | Major Princ. Stress tsf | 1:3 Ratio | P tsf | Q tsf |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.3300 | 0.000 | 0.0 | 0.0 | 0.000 | 0.288 | 0.288 | 1.00 | 0.288 | 0.000 |
| 1 | 0.3485 | 5.033 | 5.0 | 0.3 | 0.059 | 0.288 | 0.347 | 1.20 | 0.317 | 0.029 |
| 2 | 0.3503 | 6.686 | 6.7 | 0.4 | 0.078 | 0.288 | 0.366 | 1.27 | 0.327 | 0.039 |
| 3 | 0.3515 | 8.066 | 8.1 | 0.4 | 0.094 | 0.288 | 0.382 | 1.33 | 0.335 | 0.047 |
| 4 | 0.3533 | 9.513 | 9.5 | 0.4 | 0.111 | 0.288 | 0.399 | 1.38 | 0.343 | 0.055 |
| 5 | 0.3545 | 10.718 | 10.7 | 0.4 | 0.125 | 0.288 | 0.413 | 1.43 | 0.350 | 0.062 |
| 6 | 0.3563 | 12.075 | 12.1 | 0.5 | 0.141 | 0.288 | 0.429 | 1.49 | 0.358 | 0.070 |
| 7 | 0.3575 | 13.219 | 13.2 | 0.5 | 0.154 | 0.288 | 0.442 | 1.53 | 0.365 | 0.077 |
| 8 | 0.3592 | 14.352 | 14.4 | 0.5 | 0.167 | 0.288 | 0.455 | 1.58 | 0.371 | 0.083 |
| 9 | 0.3604 | 15.371 | 15.4 | 0.5 | 0.179 | 0.288 | 0.467 | 1.62 | 0.377 | 0.089 |
| 10 | 0.3622 | 16.170 | 16.2 | 0.6 | 0.188 | 0.288 | 0.476 | 1.65 | 0.382 | 0.094 |
| 11 | 0.3634 | 16.989 | 17.0 | 0.6 | 0.197 | 0.288 | 0.485 | 1.69 | 0.387 | 0.099 |
| 12 | 0.3652 | 17.643 | 17.6 | 0.6 | 0.205 | 0.288 | 0.493 | 1.71 | 0.390 | 0.102 |
| 13 | 0.3664 | 18.429 | 18.4 | 0.7 | 0.214 | 0.288 | 0.502 | 1.74 | 0.395 | 0.107 |
| 14 | 0.3676 | 19.150 | 19.2 | 0.7 | 0.222 | 0.288 | 0.510 | 1.77 | 0.399 | 0.111 |
| 15 | 0.3695 | 19.855 | 19.9 | 0.7 | 0.231 | 0.288 | 0.519 | 1.80 | 0.403 | 0.115 |
| 16 | 0.3707 | 20.370 | 20.4 | 0.7 | 0.236 | 0.288 | 0.524 | 1.82 | 0.406 | 0.118 |
| 17 | 0.3739 | 21.368 | 21.4 | 0.8 | 0.248 | 0.288 | 0.536 | 1.86 | 0.412 | 0.124 |
| 18 | 0.3762 | 22.297 | 22.3 | 0.8 | 0.259 | 0.288 | 0.547 | 1.90 | 0.417 | 0.129 |
| 19 | 0.3781 | 22.820 | 22.8 | 0.9 | 0.265 | 0.288 | 0.553 | 1.92 | 0.420 | 0.132 |
| 20 | 0.3805 | 23.519 | 23.5 | 0.9 | 0.273 | 0.288 | 0.561 | 1.95 | 0.424 | 0.136 |
| 21 | 0.3836 | 24.161 | 24.2 | 1.0 | 0.280 | 0.288 | 0.568 | 1.97 | 0.428 | 0.140 |
| 22 | 0.3867 | 24.784 | 24.8 | 1.0 | 0.287 | 0.288 | 0.575 | 2.00 | 0.431 | 0.143 |
| 23 | 0.3891 | 25.506 | 25.5 | 1.1 | 0.295 | 0.288 | 0.583 | 2.02 | 0.436 | 0.148 |
| 24 | 0.3934 | 26.098 | 26.1 | 1.1 | 0.302 | 0.288 | 0.590 | 2.05 | 0.439 | 0.151 |
| 25 | 0.3977 | 26.880 | 26.9 | 1.2 | 0.311 | 0.288 | 0.599 | 2.08 | 0.443 | 0.155 |
| 26 | 0.4039 | 27.540 | 27.5 | 1.3 | 0.318 | 0.288 | 0.606 | 2.10 | 0.447 | 0.159 |
| 27 | 0.4124 | 28.614 | 28.6 | 1.5 | 0.330 | 0.288 | 0.618 | 2.14 | 0.453 | 0.165 |
| 28 | 0.4178 | 29.365 | 29.4 | 1.6 | 0.338 | 0.288 | 0.626 | 2.17 | 0.457 | 0.169 |
| 29 | 0.4232 | 29.904 | 29.9 | 1.7 | 0.344 | 0.288 | 0.632 | 2.19 | 0.460 | 0.172 |
| 30 | 0.4293 | 30.610 | 30.6 | 1.8 | 0.352 | 0.288 | 0.640 | 2.22 | 0.464 | 0.176 |
| 31 | 0.4406 | 31.384 | 31.4 | 2.0 | 0.360 | 0.288 | 0.648 | 2.25 | 0.468 | 0.180 |
| 32 | 0.4520 | 32.142 | 32.1 | 2.2 | 0.368 | 0.288 | 0.656 | 2.28 | 0.472 | 0.184 |
| 33 | 0.4575 | 32.657 | 32.7 | 2.3 | 0.373 | 0.288 | 0.661 | 2.30 | 0.475 | 0.187 |
| 34 | 0.4688 | 33.489 | 33.5 | 2.5 | 0.382 | 0.288 | 0.670 | 2.33 | 0.479 | 0.191 |
| 35 | 0.4802 | 34.033 | 34.0 | 2.7 | 0.387 | 0.288 | 0.675 | 2.34 | 0.482 | 0.194 |
| 36 | 0.4917 | 34.644 | 34.6 | 2.9 | 0.393 | 0.288 | 0.681 | 2.37 | 0.485 | 0.197 |
| 37 | 0.5031 | 35.158 | 35.2 | 3.1 | 0.398 | 0.288 | 0.686 | 2.38 | 0.487 | 0.199 |
| 38 | 0.5144 | 35.686 | 35.7 | 3.3 | 0.404 | 0.288 | 0.692 | 2.40 | 0.490 | 0.202 |
| 39 | 0.5252 | 36.182 | 36.2 | 3.5 | 0.408 | 0.288 | 0.696 | 2.42 | 0.492 | 0.204 |
| 40 | 0.5367 | 36.837 | 36.8 | 3.7 | 0.415 | 0.288 | 0.703 | 2.44 | 0.495 | 0.207 |
| 41 | 0.5482 | 37.336 | 37.3 | 3.9 | 0.420 | 0.288 | 0.708 | 2.46 | 0.498 | 0.210 |
| 42 | 0.5596 | 37.866 | 37.9 | 4.1 | 0.425 | 0.288 | 0.713 | 2.47 | 0.500 | 0.212 |
| 43 | 0.5709 | 38.272 | 38.3 | 4.3 | 0.428 | 0.288 | 0.716 | 2.49 | 0.502 | 0.214 |
| 44 | 0.5823 | 38.597 | 38.6 | 4.5 | 0.431 | 0.288 | 0.719 | 2.50 | 0.503 | 0.215 |
| 45 | 0.5937 | 39.004 | 39.0 | 4.7 | 0.435 | 0.288 | 0.723 | 2.51 | 0.505 | 0.217 |
| 46 | 0.6044 | 39.497 | 39.5 | 4.9 | 0.439 | 0.288 | 0.727 | 2.53 | 0.508 | 0.220 |

## Test Readings for Specimen No. 1

| No. | Def. Dial in. | Load Dial | Load lbs. | Strain % | Deviator Stress tsf | Minor Princ. Stress tsf | Major Princ. Stress tsf | 1:3 Ratio | P tsf | Q tsf |
|---|---|---|---|---|---|---|---|---|---|---|
| 47 | 0.6159 | 39.976 | 40.0 | 5.1 | 0.444 | 0.288 | 0.732 | 2.54 | 0.510 | 0.222 |
| 48 | 0.6274 | 40.395 | 40.4 | 5.3 | 0.447 | 0.288 | 0.735 | 2.55 | 0.512 | 0.224 |
| 49 | 0.6466 | 40.952 | 41.0 | 5.7 | 0.452 | 0.288 | 0.740 | 2.57 | 0.514 | 0.226 |
| 50 | 0.6611 | 41.199 | 41.2 | 5.9 | 0.453 | 0.288 | 0.741 | 2.57 | 0.515 | 0.227 |
| 51 | 0.6749 | 41.564 | 41.6 | 6.2 | 0.456 | 0.288 | 0.744 | 2.58 | 0.516 | 0.228 |
| 52 | 0.6893 | 42.108 | 42.1 | 6.4 | 0.461 | 0.288 | 0.749 | 2.60 | 0.518 | 0.230 |
| 53 | 0.7031 | 42.233 | 42.2 | 6.7 | 0.461 | 0.288 | 0.749 | 2.60 | 0.518 | 0.230 |
| 54 | 0.7174 | 42.680 | 42.7 | 6.9 | 0.465 | 0.288 | 0.753 | 2.61 | 0.520 | 0.232 |
| 55 | 0.7313 | 42.792 | 42.8 | 7.2 | 0.465 | 0.288 | 0.753 | 2.61 | 0.520 | 0.232 |
| 56 | 0.7450 | 43.170 | 43.2 | 7.4 | 0.467 | 0.288 | 0.755 | 2.62 | 0.522 | 0.234 |
| 57 | 0.7595 | 43.673 | 43.7 | 7.7 | 0.472 | 0.288 | 0.760 | 2.64 | 0.524 | 0.236 |
| 58 | 0.7732 | 43.944 | 43.9 | 7.9 | 0.473 | 0.288 | 0.761 | 2.64 | 0.525 | 0.237 |
| 59 | 0.7876 | 44.391 | 44.4 | 8.2 | 0.477 | 0.288 | 0.765 | 2.66 | 0.526 | 0.238 |
| 60 | 0.8014 | 44.582 | 44.6 | 8.4 | 0.477 | 0.288 | 0.765 | 2.66 | 0.527 | 0.239 |
| 61 | 0.8158 | 45.125 | 45.1 | 8.7 | 0.482 | 0.288 | 0.770 | 2.67 | 0.529 | 0.241 |
| 62 | 0.8295 | 45.325 | 45.3 | 8.9 | 0.483 | 0.288 | 0.771 | 2.68 | 0.529 | 0.241 |
| 63 | 0.8433 | 45.490 | 45.5 | 9.2 | 0.483 | 0.288 | 0.771 | 2.68 | 0.530 | 0.242 |
| 64 | 0.8578 | 45.910 | 45.9 | 9.4 | 0.486 | 0.288 | 0.774 | 2.69 | 0.531 | 0.243 |
| 65 | 0.8716 | 45.936 | 45.9 | 9.7 | 0.485 | 0.288 | 0.773 | 2.68 | 0.531 | 0.243 |
| 66 | 0.8859 | 46.124 | 46.1 | 9.9 | 0.486 | 0.288 | 0.774 | 2.69 | 0.531 | 0.243 |
| 67 | 0.8997 | 46.239 | 46.2 | 10.2 | 0.486 | 0.288 | 0.774 | 2.69 | 0.531 | 0.243 |
| 68 | 0.9141 | 46.426 | 46.4 | 10.4 | 0.462 | 0.288 | 0.750 | 2.60 | 0.519 | 0.231 |
| 69 | 0.9279 | 46.906 | 46.9 | 10.7 | 0.465 | 0.288 | 0.753 | 2.61 | 0.520 | 0.232 |
| 70 | 0.9423 | 46.914 | 46.9 | 10.9 | 0.463 | 0.288 | 0.751 | 2.61 | 0.519 | 0.231 |
| 71 | 0.9560 | 47.299 | 47.3 | 11.2 | 0.465 | 0.288 | 0.753 | 2.61 | 0.520 | 0.232 |
| 72 | 0.9704 | 47.552 | 47.6 | 11.4 | 0.465 | 0.288 | 0.753 | 2.62 | 0.521 | 0.233 |
| 73 | 0.9842 | 47.881 | 47.9 | 11.7 | 0.467 | 0.288 | 0.755 | 2.62 | 0.521 | 0.233 |
| 74 | 0.9985 | 48.291 | 48.3 | 11.9 | 0.469 | 0.288 | 0.757 | 2.63 | 0.523 | 0.235 |
| 75 | 1.0123 | 48.409 | 48.4 | 12.2 | 0.468 | 0.288 | 0.756 | 2.63 | 0.522 | 0.234 |
| 76 | 1.0261 | 48.718 | 48.7 | 12.4 | 0.469 | 0.288 | 0.757 | 2.63 | 0.523 | 0.235 |
| 77 | 1.0405 | 48.749 | 48.7 | 12.7 | 0.468 | 0.288 | 0.756 | 2.62 | 0.522 | 0.234 |
| 78 | 1.0543 | 48.916 | 48.9 | 12.9 | 0.467 | 0.288 | 0.755 | 2.62 | 0.522 | 0.234 |
| 79 | 1.0687 | 49.162 | 49.2 | 13.2 | 0.468 | 0.288 | 0.756 | 2.62 | 0.522 | 0.234 |
| 80 | 1.0824 | 49.170 | 49.2 | 13.4 | 0.466 | 0.288 | 0.754 | 2.62 | 0.521 | 0.233 |
| 81 | 1.0968 | 49.460 | 49.5 | 13.7 | 0.467 | 0.288 | 0.755 | 2.62 | 0.521 | 0.233 |
| 82 | 1.1105 | 49.441 | 49.4 | 13.9 | 0.465 | 0.288 | 0.753 | 2.61 | 0.520 | 0.232 |
| 83 | 1.1249 | 49.614 | 49.6 | 14.2 | 0.464 | 0.288 | 0.752 | 2.61 | 0.520 | 0.232 |
| 84 | 1.1386 | 49.725 | 49.7 | 14.4 | 0.463 | 0.288 | 0.751 | 2.61 | 0.520 | 0.232 |
| 85 | 1.1530 | 49.860 | 49.9 | 14.7 | 0.463 | 0.288 | 0.751 | 2.61 | 0.519 | 0.231 |
| 86 | 1.1668 | 50.302 | 50.3 | 14.9 | 0.465 | 0.288 | 0.753 | 2.61 | 0.520 | 0.232 |
| 87 | 1.1811 | 50.367 | 50.4 | 15.2 | 0.463 | 0.288 | 0.751 | 2.61 | 0.520 | 0.232 |
| 88 | 1.1901 | 50.255 | 50.3 | 15.4 | 0.461 | 0.288 | 0.749 | 2.60 | 0.519 | 0.231 |

# COMPACTION TEST REPORT




Test specification: ASTM D 698-07 Method A Standard

| Elev/ Depth | Classification | | Nat. Moist. | Sp.G. | LL | PI | % > #4 | % < No.200 |
|---|---|---|---|---|---|---|---|---|
| | USCS | AASHTO | | | | | | |
| | CH | | | 2.70 | | | 0.0 | |

| TEST RESULTS | MATERIAL DESCRIPTION |
|---|---|
| Maximum dry density = 89.5 pcf<br>Optimum moisture = 27.0 % | Dark Gray FAT CLAY |

**Project No.** 08.18.920 **Client:** United States Army Corps of Engineers
**Project:** Galveston Channel and San Jacinto PA
Contract No. DACW64-03-D-0008, Task Order No. 0080 **Date:**
○ **Source of Sample:** Mix 01 **Sample Number:** 1

**Remarks:**
Test method: ASTM D 698
Preparation Method: Dry
Specific Gravity: Assumed

**Tolunay-Wong Engineers, Inc.**

**Houston, Texas**

**Tested By:** SA **Checked By:** JL

**Hole No. 07-211**

| BORING LOG | DISTRICT | INSTALLATION | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT<br>Galveston Channel and San Jacinto PA | 7. ELEVATION OF HOLE |
| 2. LOCATION (Coordinates or Station)<br>N=13693166 E=3318274 | 8. DATUM FOR ELEVATION |
| 3. DRILLING AGENCY<br>Dempsey (Geotest Engineering, Inc.) | 9. ELEVATION OF GROUNDWATER<br>▽ TOD: ▼ 24-HR: |
| 4. LABORATORY TESTING AGENCY<br>Tolunay-Wong Engineers, Inc. | 10. DRILLING DATE and TIME<br>STARTED: 4/21/08 COMPLETED: 4/21/08 |
| 5. DEPTH OF WATER<br>▽ TOD: ▼ 24-HR: | 11. CLASSIFICATION REFERENCE |
| 6. DEPTH OF HOLE<br>20 ft | 12. ENGINEER |

| DEPTH (ft) | ELEVATION (ft) | GRAPHIC LOG | MATERIAL DESCRIPTION | SAMPLE TYPE | NUMBER | RECOVERY (%) | SPT (N) | PENETROMETER (tsf) | DRY UNIT WT. (pcf) | MOISTURE CONTENT (%) | LIQUID LIMIT | PLASTIC LIMIT | PLASTICITY INDEX | FINES CONTENT (% <200) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **SILTY SAND (SM)**, gray & brown, w/ roots & sandy clay | | 1 | | | | | | | | | 33.4 |
| | | | **FAT CLAY(CH)**, firm, gray | | 2 | | | 1.00 | 90.2 | 28.8 | 54 | 19 | 35 | 70.7 |
| 5 | | | -gray & brown, w/ sand seams & shell fragments @ 4' - 6'<br>-w/ sand on bottom of 4' - 6' sample | | 3 | | | 0.75 | 91.1 | 30.1 | | | | |
| | | | **POORLY GRADED SAND WITH SILT (SP-SM)**, medium dense, gray & brown | | 4 | | 18 | | | | | | | 6.8 |
| 10 | | | -gray below 11' | | 5 | | 23 | | | | | | | 8.6 |
| 15 | | | **SILTY SAND (SM)**, medium dense, gray<br>-w/ shell fragments @ 16' - 19.5'<br>-w/ clay seams @ 17' | | 6 | | 11 | | | | | | | 26.3 |
| | | | -loose below 18.5'<br>-w/ clay layer @ 19.5' - 20' | | 7 | | 10 | | | | | | | 28.8 |
| 20 | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | |

SWG 1836 BOR 08.18.920.GPJ TOLUNAY-WONG ENGINEERS.GDT 11/10/08

ENG FORM: SWG 1836 BOR