# 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 | 8-10 | | Gray FAT CLAY | CH | 44.0 | 76.6 | | | | | | | | |
| | 6 | 10-12 | 0.23 | Gray FAT CLAY with SAND | CH | 43.7 | 75.1 | 78 | 24 | 54 | 79.0 | | | | |
| | 7 | 12-14 | | Gray FAT CLAY | CH | 39.4 | 79.9 | | | | | | | | |
| | 8 | 14-16 | | Gray SANDY FAT CLAY | CH | 29.7 | 83.4 | 84 | 24 | 60 | 64.1 | 0.60 | 4.4 | | Slickensided |
| | 9 | 16-18 | | Gray FAT CLAY | CH | 44.2 | 71.2 | | | | | | | | |
| | 10 | 18-20 | | Gray SANDY LEAN CLAY | CL | 40.3 | 79.3 | | | | | | | | |
| | 11 | 20-22 | | Gray LEAN CLAY; organics | CL | 52.1 | 71.0 | | | | | 0.50 | 6.3 | | Vertical shear |
| | 12 | 22-24 | | Gray LEAN CLAY | CL | 30.2 | 96.9 | 43 | 21 | 22 | 93.7 | | | | |
| | 13 | 24-26 | | Gray SILTY SAND | SM | 33.7 | | | | | | | | | |
| | 14 | 26-28 | | Gray FAT CLAY | CH | 36.0 | 75.8 | | | | | | | | |
| | 15 | 28-30 | | Gray FAT CLAY | CH | 45.8 | 75.0 | | | | | | | | |
| 07-227 | | | | | | | | | | | | | | | |
| | 1 | 0-2 | | Gray FAT CLAY | CH | 48.8 | 67.3 | | | | | | | | |
| | 2 | 2-4 | | Gray FAT CLAY | CH | 55.5 | 67.2 | 88 | 24 | 64 | 92.7 | | | | |
| | 3 | 4-6 | | Gray FAT CLAY | CH | 56.2 | 67.9 | | | | | | | | |
| | 4 | 6-8 | | Gray FAT CLAY | CH | 83.5 | 49.8 | | | | | | | | |
| | 5 | 8-10 | | Gray FAT CLAY | CH | 79.8 | 51.5 | 113 | 41 | 72 | 94.0 | | | | |
| | 6 | 10-12 | | Gray FAT CLAY | CH | 46.6 | 70.3 | 64 | 22 | 42 | | 0.24 | 5.0 | | Slickensided |
| | 7 | 12-14 | 0.18 | Gray FAT CLAY | CH | 107.1 | 41.2 | 116 | 33 | 83 | 99.5 | | | | |
| | 8 | 14-15 | | Gray FAT CLAY | CH | 88.5 | 54.8 | | | | | | | | |
| | 9 | 15-16 | | Gray SILTY SAND | SM | | | | | | | | | | |
| | 10 | 16-17.5 | | Gray poorly graded SAND with SILT | SP-SM | | | | | | 5.5 | | | | |
| | 11 | 18.5-20 | | Gray and tan poorly graded SAND with SILT | SP-SM | | | | | | 7.7 | | | | |
| 07-228 | | | | | | | | | | | | | | | |
| | 1 | 0-2 | | Gray FAT CLAY | CH | 32.0 | 78.8 | | | | | | | | |
| | 2 | 2-4 | | Gray FAT CLAY | CH | 53.0 | 68.1 | 87 | 25 | 62 | 98.9 | 0.43 | 3.1 | | 60 degree |
| | 3 | 4-6 | | Gray FAT CLAY | CH | 48.2 | 71.3 | | | | | 0.48 | 3.9 | | Slickensided |
| | 4 | 6-8 | | Gray FAT CLAY | CH | 66.6 | 58.8 | | | | | | | | |
| | 5 | 8-10 | | Gray FAT CLAY | CH | 65.1 | 61.8 | 75 | 23 | 52 | 100.0 | 0.22 | 4.6 | 7.5 | Bulge |
| | 6 | 10-11.5 | | Tan and gray poorly graded SAND with SILT | SP-SM | | | | | | 7.0 | | | | |
| | 7 | 15-16.5 | | Tan and gray poorly graded SAND; shells | SP | | | | | | 4.0 | | | | |
| | 8 | 18.5-20 | | Gray poorly graded SAND with SILT; shells | SP-SM | | | | | | 6.6 | | | | |
| 07-229 | | | | | | | | | | | | | | | |
| | 1 | 0-2 | | Gray FAT CLAY | CH | 39.8 | 77.1 | | | | | | | | |
| | 2 | 2-4 | | Gray FAT CLAY | CH | 51.0 | 65.7 | | | | | | | | |
| | 3 | 4-6 | | Gray FAT CLAY | CH | 50.2 | 71.4 | 114 | 29 | 85 | 95.1 | 0.44 | 3.0 | | Slickensided |
| | 4 | 6-8 | | Gray and tan poorly graded SAND with SILT; shells | SP-SM | | | | | | 11.9 | | | | |

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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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 | 8-9.5 | | Tan and gray poorly graded SAND | SP | | | | | | 3.8 | | | | |
| | 6 | 13-14.5 | | Tan and gray poorly graded SAND | SP | | | | | | 2.7 | | | | |
| | 7 | 18-20 | | Gray FAT CLAY with SAND | CH | 54.5 | 65.7 | 61 | 21 | 40 | 72.7 | 0.31 | 10.1 | | 60 degree |
| | 8 | 20.5-22 | | Gray poorly graded SAND; shells | SP | | | | | | 4.6 | | | | |
| | 9 | 25-26.5 | | Gray and tan poorly graded SAND; shells | SP | | | | | | 4.1 | | | | |
| | 10 | 30-31.5 | | Gray poorly graded SAND with SILT; shells | SP-SM | | | | | | 6.9 | | | | |
| | 11 | 35-36.5 | | Gray poorly graded SAND | SP | | | | | | 4.5 | | | | |
| | 12 | 38.5-40 | | Gray poorly graded SAND | SP | | | | | | 4.3 | | | | |
| 07-230 | | | | | | | | | | | | | | | |
| | 1 | 0-2 | | Tan and gray FAT CLAY | CH | 16.1 | 111.7 | | | | | | | | |
| | 2 | 2-4 | | Gray FAT CLAY | CH | 22.4 | 101.1 | 55 | 20 | 35 | 91.8 | 1.02 | 5.1 | | 60 degree |
| | 3 | 4-6 | | Tan poorly graded SAND with SILT | SP-SM | | | | | | 5.3 | | | | |
| | 4 | 9-11.5 | | Tan poorly graded SAND with SILT | SP-SM | | | | | | 5.7 | | | | |
| | 5 | 14-15.5 | | Gray poorly graded SAND | SP | | | | | | 2.4 | | | | |
| | 6 | 19-20.5 | | Gray poorly graded SAND with SILT | SP-SM | | | | | | 11.7 | | | | |
| | 7 | 24-25.5 | | Gray poorly graded SAND with SILT | SP-SM | | | | | | 6.6 | | | | |
| | 8 | 28.5-30 | | Gray poorly graded SAND | SP | | | | | | 4.7 | | | | |
| 07-231 | | | | | | | | | | | | | | | |
| | 1 | 0-2 | | Gray FAT CLAY | CH | 38.5 | 77.3 | | | | | | | | |
| | 2 | 2-4 | 0.30 | Gray SANDY LEAN CLAY | CL | 37.3 | 83.6 | 35 | 18 | 17 | 58.8 | | | | |
| | 3 | 4-6 | | Gray FAT CLAY | CH | 43.9 | 74.7 | | | | | 0.65 | 2.1 | | Vertical shear |
| | 4 | 6-8 | | Gray FAT CLAY | CH | 45.1 | 71.5 | | | | | | | | |
| | 5 | 8-10 | | Gray FAT CLAY with SAND | CH | 62.8 | 62.6 | 60 | 22 | 38 | 71.7 | | | | |
| | 6 | 10-12 | | Gray FAT CLAY | CH | 47.6 | 71.4 | 64 | 22 | 42 | 92.9 | | | | |
| | 7 | 12-14 | | Gray FAT CLAY | CH | 40.0 | 78.9 | | | | | | | | |
| | 8 | 14-16 | | Gray FAT CLAY | CH | 49.2 | 68.4 | | | | | | | | |
| | 9 | 16-17.5 | | Gray and tan poorly graded SAND | SP | | | | | | 4.8 | | | | |
| | 10 | 18.5-20 | | Gray poorly graded SAND with SILT | SP-SM | | | | | | 6.0 | | | | |
| 07-232 | | | | | | | | | | | | | | | |
| | 1 | 0-2 | | Gray FAT CLAY | CH | 33.2 | 80.5 | | | | | | | | |
| | 2 | 2-4 | | Gray FAT CLAY | CH | 41.6 | 73.1 | | | | | | | | |
| | 3 | 4-6 | | Gray FAT CLAY | CH | 49.8 | 68.0 | 91 | 25 | 66 | 96.4 | 0.38 | 3.2 | | 60 degree |
| | 4 | 6-8 | | Gray FAT CLAY | CH | 55.0 | 71.5 | | | | | | | | |
| | 5 | 8-10 | | Gray SILTY SAND | SM | | | | | | 13.7 | | | | |
| | 6 | 10-11.5 | | Gray poorly graded SAND with SILT | SP-SM | | | | | | 6.3 | | | | |
| | 7 | 15-16.5 | | Gray poorly graded SAND | SP | | | | | | 3.9 | | | | |
| | 8 | 18.5-20 | | Gray poorly graded SAND with SILT | SP-SM | | | | | | 6.7 | | | | |

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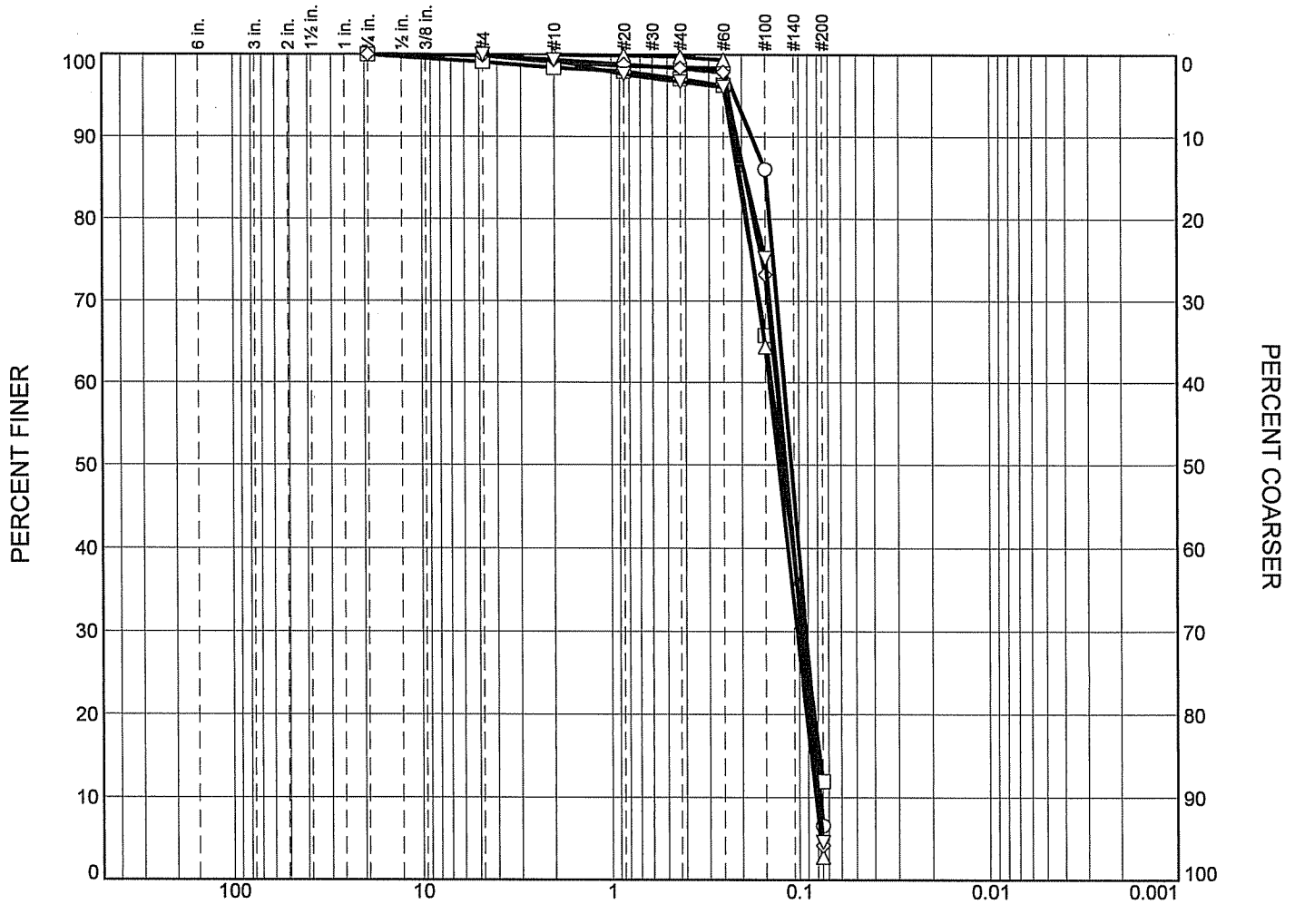
# Particle Size Analysis - ASTM D 422




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.1 | 0.8 | 0.6 | 91.9 | 6.6 | |
| □ | 0.0 | 0.0 | 0.9 | 0.7 | 1.3 | 85.2 | 11.9 | |
| △ | | | | | 0.1 | 97.1 | 2.7 | |
| ◇ | 0.0 | 0.0 | 0.1 | 0.5 | 1.0 | 94.3 | 4.1 | |
| ▽ | 0.0 | 0.0 | 0.0 | 0.6 | 2.7 | 92.2 | 4.5 | |

## SOIL DATA

| SYMBOL | SOURCE | SAMPLE NO. | DEPTH (ft.) | Material Description | USCS |
|---|---|---|---|---|---|
| ○ | 07-228 | 8 | 18.5-20 | Gray poorly graded SAND with SILT; shells | SP-SM |
| □ | 07-229 | 4 | 6-8 | Gray and tan poorly graded SAND with SILT; shells | SP-SM |
| △ | 07-229 | 6 | 13-14.5 | Tan and gray poorly graded SAND | SP |
| ◇ | 07-229 | 9 | 25-26.5 | Gray and tan poorly graded SAND; shells | SP |
| ▽ | 07-229 | 11 | 35-36.5 | Gray poorly graded SAND | SP |

**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**

Hole No. 07-229

# BORING LOG

| | |
|---|---|
| DISTRICT | |
| INSTALLATION | |
| SHEET | 1 OF 2 SHEETS |
| 1. PROJECT | Galveston Channel and San Jacinto PA |
| 2. LOCATION (Coordinates or Station) | N=13693607 E=3321181 |
| 3. DRILLING AGENCY | Dempsey (Geotest Engineering, Inc.) |
| 4. LABORATORY TESTING AGENCY | Tolunay-Wong Engineers, Inc. |
| 5. DEPTH OF WATER | ∇ TOD: ▼ 24-HR: |
| 6. DEPTH OF HOLE | 40 ft |
| 7. ELEVATION OF HOLE | |
| 8. DATUM FOR ELEVATION | |
| 9. ELEVATION OF GROUNDWATER | ∇ TOD: ▼ 24-HR: |
| 10. DRILLING DATE and TIME | STARTED: 4/21/08 COMPLETED: 4/21/08 |
| 11. CLASSIFICATION REFERENCE | |
| 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **FAT CLAY (CH)**, firm, brown -w/ roots @ 0' - 2' | | 1 | | | 1.00 | 77.1 | 39.8 | | | | |
| | | | | | 2 | | | 0.75 | 65.7 | 51.0 | | | | |
| 5 | | | -soft, brown below 4' -w/ slickensides @ 4' - 6' | | 3 | | | 0.50 | 71.4 | 50.2 | 114 | 29 | 85 | 95.1 |
| | | | **POORLY GRADED SAND WITH SILT (SP-SM)**, gray, w/ shell fragments | | 4 | | | | | | | | | 11.9 |
| | | | **POORLY GRADED SAND (SP)**, medium dense, gray | | 5 | | 29 | | | | | | | 3.8 |
| 10 | | | | | | | | | | | | | | |
| | | | | | 6 | | 24 | | | | | | | 2.7 |
| 15 | | | | | | | | | | | | | | |
| | | | **FAT CLAY WITH SAND (CH)**, very soft, gray, w/ sand seams | | 7 | | | 0.25 | 65.7 | 54.5 | 61 | 21 | 40 | 72.7 |
| 20 | | | **POORLY GRADED SAND (SP)**, dense, gray, w/ shell fragments | | 8 | | 49 | | | | | | | 4.6 |
| 25 | | | | | 9 | | 100 | | | | | | | 4.1 |
| 30 | | | **POORLY GRADED SAND WITH SILT (SP-SM)**, very dense, gray, w/ shell fragments | | 10 | | 52 | | | | | | | 6.9 |

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

ENG FORM: SWG 1836 BOR

Hole No. 07-229

| BORING LOG | DISTRICT | INSTALLATION | SHEET 2 OF 2 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT<br>Galveston Channel and San Jacinto PA | 7. ELEVATION OF HOLE |
| 2. LOCATION (Coordinates or Station)<br>N=13693607 E=3321181 | 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>40 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **POORLY GRADED SAND (SP)**, medium dense, gray, w/ shell fragments | X | 11 | | 18 | | | | | | | 4.5 |
| | | | | X | 12 | | 35 | | | | | | | 4.3 |
| 40 | | | | | | | | | | | | | | |
| 45 | | | | | | | | | | | | | | |
| 50 | | | | | | | | | | | | | | |
| 55 | | | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | | | |
| 65 | | | | | | | | | | | | | | |

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

ENG FORM: SWG 1836 BOR