

ALEXANDER ISLAND BORING SUMMARY SHEET

| | |
|--------------------------|------------------------|
| BORING ID: | <u>13-P01</u> |
| BORING TYPE: | <u>Perimeter Levee</u> |
| DEPTH: | <u>60'</u> |
| ELEVATION: | <u>25.73'</u> |
| X (US SURVEY FT): | <u>3228153.92</u> |
| Y (US SURVEY FT): | <u>13827285.05</u> |
| DEPTH TO WATER: | <u>13.25'</u> |

Client: USACE-Galveston District Boring: 13-P01
 Date/Time Drilling Begun: 11.21.2013 1547 Date/Time Drilling Ended: 11.24.2013 @ 1540
 Driller: Jason New Logger: Eddie Ficker Designated X (Easting): Lat = 29.7105747 Long = -95.0309906
 Drill Rig: Mobil B57 on Gemco Articulated Platform Designated Y (Northing): Lat 29.7105747 Z (Elevation): on top of existing levee
 Total depth: 60.0 Ft. Initial Water Encounter (Depth, date/time): 14.10' 11.22.13 @ 0855 Water Depth (15 min.): 13.25' @ 0910

| Feet (Ft) | USCS Log | Sample Interval (ft) | Amount Material Obtained (in) | Sample Type Blow Counts | Number of Tubes | Pocket Pene. (tsf) | Shear Strength (tsf) | Description (SOIL TYPE, color, moisture, plasticity, consistency, density, inclusions, etc.) |
|-----------|----------|----------------------|-------------------------------|-------------------------|-----------------|--------------------|----------------------|--|
| 0 | | 0-2 | 6 | ST | 1 | 1.10 | — | Silty SAND, Yellowish Orange, Moist, Loose, SA is FC with occasional shell frags |
| | SM | 2-4 | 8 | ST | 1 | Loose | — | S.A.A.; Light Gray + Yellowish orange |
| | 4'8" | 4-6 | 14 | SS 3-6-6 | 1 | None 1.0 | — | S.A.A. CLAY, Light Gray + Yellowish Brown, Moist, High Plasticity, Med. |
| 5 | ↑ | 6-8 | 14 | ST | 1 | 2.0 | — | S.A.A.; STIFF |
| | CH | 8-10 | 7 | ST | 1 | 1.25 | — | S.A.A.; occasional shell frags. |
| 10 | ↓ | 10-12 | 7 | ST | 1 | 1.25 | — | S.A.A.; Turning Light Gray + Reddish Brown |
| | | 12-14 | 9 | ST | 1 | 1.75 | — | S.A.A. |
| 15 | | 14-16 | 12 | ST | 1 | 1.0 | — | S.A.A.; Trace of caliche nodules |
| | 17'8" | 16-18 | 19 | ST | 1 | 1.5 | — | S.A.A. |
| | SM | 18-20 | 13 | SS 5-6-6 | 1 | — | — | Silty SAND; Light Gray, Wet, Loose, SA is F-C, slightly clayey; occasional shell frags. |
| 20 | | | | | | | | S.A.A. |

11.21.13 @ 1655
 16' START 11.22.13 @ 840 END @ 940
 18' START 11.23.13 @ 1250

4'8"
 STIFF to STIFF

17'8"

Weather: Overcast, breezy, ~72°F (11.21.13); Overcast, Windy ~50° Began to Rain (Shutdown 11.22.13 @ 940); Overcast, Breezy - 45°F (11.23.13)

Comments: SA = SAND; FC = fine to coarse grained; Med. = medium; frags = fragments; S.A.A = Same as above

USCS Log Legend:

| | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

US Army Corps of Engineers, Southwestern Division
 Galveston District
 2000 Fort Point Road/P.O. Box 1229
 Galveston, TX 77553-1229

Alexander Island
 Houston Ship Channel
 Baytown, TX

Quaternary Resource Investigations, L.L.C.
 Government & Industry in Harmony with the Environment
 13588 Florida Boulevard, Baton Rouge, Louisiana 70819

Client: USACE-Galveston District Boring: 13-101

Page 2 of 3

26' END 11.23.13 15:25
START 11.24.13 08:35

| Feet (ft) | USCS Log | Sample Interval (ft) | Amount Material Obtained (in) | Sample Type Blow Counts | Number of Tubes | Pocket Pene. (tsf) | Shear Strength (tsf) | Description (SOIL TYPE, color, moisture, plasticity, consistency, density, inclusions, etc.) |
|-----------|----------|----------------------|-------------------------------|-------------------------|-----------------|--------------------|----------------------|--|
| 20 | CH/OH | 20-22 | 16 | ST | 1 | 0.5 | | Organic CLAY, Dark Gray, Moist, High Plasticity, Soft/Med. Stiff |
| | | 22-24 | 9 | ST | 1 | 0.25 | | S.A.A.; Soft |
| | 24'5" | | | | | | | S.A.A.; Very Soft |
| 25 | SM | 24-26 | 16 | ST | 2 | ∅ | - | Silty SAND, Light Gray, Wet, Loose, Shell frags at contact with above |
| | | 26-28 | 15 | SS 5-4-6 | 1 | ∅ | | S.A.A., Light Grayish Brown, Occasional Shell frags. SA is F-C Med. Dense |
| | 29'7" | | | | | | | S.A.A., Turning Light Gray, Increasing silt & clay @ base, SA is F-M. |
| 30 | OH/CH | 30-32 | 17 | ST | 1 | 0.5 | | Organic CLAY, Black, Moist, High plasticity, Soft to Med. Stiff. |
| | | 32-34 | 14 | ST | 1 | 0.5 | | Organic CLAY with SAND; Dark Gray to Black, Moist, High plasticity, SA is fine grained. |
| 35 | SC/OH | 34-36 | 12 | ST | 1 | ∅ | 0.25 | S.A.A., Abundant Carbonaceous SA lams, Silty |
| | | 36-38 | 16 | ST | 1 | 0.5 | | S.A.A. |
| 40 | SM | 38-40 | 13 | ST | 1 | ∅ | | Clayey, Silty SAND, Gray, Wet, Loose, SA is F-C, occasional shell frags. |

20'
20'5"
24'5"
29'5"
30'
38'

Weather: Overcast, Breezy, ~48°F (11.23.13); Overcast Breezy, ~48°F (11.24.13)

Comments: S.A.A. = Same as above; SA = SAND; F-M = fine to medium grained; Lams = laminations; F-C = fine to coarse grained; Med = medium

USCS Log Legend:

| | | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| GW | GP | GM | GC | SW | SP | SM | SC | ML | CL | CL | MH | CH | OH | PT |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|

US Army Corps of Engineers, Southwestern Division
Galveston District
2000 Fort Point Road/P.O. Box 1229
Galveston, TX 77553-1229

Alexander Island
Houston Ship Channel
Baytown, TX

ORI Quaternary Resource Investigations, L.L.C.
Government & Industry in Harmony with the Environment
13588 Florida Boulevard, Baton Rouge, Louisiana 70819

Client: USACE-Galveston District Boring: 13-P01 Page 3 of 3

Total depth: 60.0 Date/Time Drilling Ended: 11.24.13 @ 1540

| Feet (ft) | USCS Log | Sample Interval (ft) | Amount Material Obtained (in) | Sample Type Blow Counts | Number of Tubes | Pocket Pene. (tsf) | Shear Strength (tsf) | Description (SOIL TYPE, color, moisture, plasticity, consistency, density, inclusions, etc.) |
|-----------|--------------|----------------------|-------------------------------|-------------------------|-----------------|--------------------|----------------------|--|
| 40 | SM ↑ ↓ | 40-42 | 18 | SS 3-3-2 | 1 | / | - | S.A.A., Very Loose |
| | | 42-44 | 18 | SS 3-2-1 | 1 | / | - | S.A.A., Very Loose |
| 45 | | 44-46 | 18 | SS WOR-3-3 | 1 | / | - | S.A.A., Loose |
| | | 46-48 | 13 | SS WOR-4-3 | 1 | / | - | S.A.A., common carbonaceous frags., Loose |
| | | 48-50 | 18 | SS WOR-3-2 | 1 | / | - | S.A.A., Loose |
| 50 | | 50-52 | 18 | SS WOR-3-2 | 1 | / | - | S.A.A., occasional shell frags., Loose |
| | | 52-54 | 18 | SS 1-2-3 | 1 | / | - | S.A.A., common silty clay (CL) Lams., V. Loose |
| 55 | SC ↓ | 54-56 | 18 | SS 3-3-4 | 1 | / | - | S.A.A., Loose Clayey SAND with silt, Gray, Moist, SA is FC, Common |
| | | 56-58 | 15 | SS 2-3-4 | 1 | / | - | SA.A., Very Silty, Loose |
| 60 | | 58-60 | 17 | SS 3-3-3 | 1 | / | - | S.A.A. Abundant silty clay lams, Common Carbonaceous frags., Loose |

55'
silty clay
Lams.

Loose

TD
END

11.24.13
@ 1540

Weather: Overcast, Breezy, ~48°F (11.24.13)

Comments: Backfilled boring with cuttings to surface; S.A.A = Same as above; frags = fragments; Lams = laminations WOR = Weight of Rods

USCS Log Legend: GW GP GM GC SW SP SM SC ML CL OL MH CH OH PT

| | | |
|---|--|---|
| <p>US Army Corps of Engineers, Southwestern Division Galveston District 2000 Fort Point Road/P.O. Box 1229 Galveston, TX 77553-1229</p> | <p>Alexander Island Houston Ship Channel Baytown, TX</p> | <p>Quaternary Resource Investigations, L.L.C. Government & Industry in Harmony with the Environment 13588 Florida Boulevard, Baton Rouge, Louisiana 70819</p> |
|---|--|---|

COPY OF PEGGY LAKE GEOTECH BH - PEGGY LAKE TEMPLATE GDT - 4/4/14 15:03 - F:\QRI DATA\TECHNICAL\JOBS (CURRENT)\AGE - GALVESTON\2012-12-20 GEOTECHNICAL\CONTRACT\TASK ORDER DY06 2013-09-10 ALEXANDER ISLAND\DELIVERABLES\ALEX



Quaternary Resource Investigations, LLC
 13588 Florida Boulevard
 Baton Rouge, LA 70820
 Telephone: 225-292-1400
 Fax: 225-292-1404

BORING NUMBER 13-P01

PAGE 1 OF 2

CLIENT USACE-Galveston District **PROJECT NAME** Alexander Island
PROJECT NUMBER W912HY-13-D-0001-DY06 **PROJECT LOCATION** Alexander Island, Baytown, TX
DATE STARTED 11/21/2013 3:47:00 PM **COMPLETED** 11/24/2013 3:40:00 PM **GROUND ELEVATION** 25.7269 ft **HOLE SIZE** 8.25 inches
DRILLING CONTRACTOR QRI **NORTHING** 13827285 ft **EASTING** 3228154 ft
DRILLING METHOD Hollow Stem Auger **DRILLING RIG MAKE/MODEL** Mobile B57 on Gemco Articulated Platform
LOGGED BY Eddie Ficker **TOTAL DEPTH** 60 ft **GROUND WATER LEVEL** ▽ **AT TIME OF DRILLING** 14.10 ft / Elev 11.63 ft
WEATHER cloudy, 70s to 40s, breezy to windy, some rain **24 HOURS AFTER DRILLING** ▽ 13.25 ft / Elev 12.48 ft

| GRAPHIC LOG | USCS SYMBOL | MATERIAL DESCRIPTION | DEPTH (ft) | SAMPLE TYPE | RECOVERY (in) | SPT BLOW COUNTS (N VALUE) | POCKET PEN. (tsf) | FIELD TORVANE (tsf) | DRY UNIT WT. (pcf) | MOISTURE CONTENT (%) | ATTERBERG LIMITS | | | MINUS #200 SIEVE CONTENT (%) | COMPRESSIVE STRENGTH (tsf) | FAILURE STRAIN (%) | CONFINING PRESSURE (psi) | | |
|-------------|-------------|--|------------|-------------|---------------|---------------------------|-------------------|---------------------|--------------------|----------------------|------------------|---------------|------------------|------------------------------|----------------------------|--------------------|--------------------------|----|--|
| | | | | | | | | | | | LIQUID LIMIT | PLASTIC LIMIT | PLASTICITY INDEX | | | | | | |
| | SM | Silty SAND; fine to coarse grained, yellowish orange, moist, loose, with occasional shell fragments light gray and yellowish orange | 0 | ST | 6 | | 1.10 | | | 10 | | | | | | | | | |
| | | | | ST | 8 | | | | | | 12 | | | | 21 | | | | |
| | CL | CLAY; light gray and yellowish brown, moist, high plasticity, medium stiff to stiff with occasional shell fragments light gray and reddish brown | 5 | SS | 14 | 3-6-6 (12) | -1.0 | | | 20 | | | | | | | | | |
| | | | | ST | 14 | | | 2.0 | | 107 | 22 | 45 | 16 | 29 | | | | | |
| | | | | ST | 7 | | | 1.25 | | 107 | 22 | | | | | 1.11 | 11 | 0 | |
| | | | | ST | 7 | | | 1.25 | | | 20 | 42 | 14 | 28 | | | | | |
| | CH | CLAY; light gray and yellowish brown, moist, high plasticity, medium stiff to stiff, with a trace of caliche nodules | 10 | ST | 9 | | 1.75 | | 99 | 26 | | | | 0.68 | 5 | 0 | | | |
| | | | 15 | ST | 12 | | 1.0 | | 105 | 22 | 53 | 16 | 37 | | 0.77 | 6 | 11 | | |
| | SM | Silty SAND; fine to coarse grained, light gray, wet, loose, slightly clayey, with occasional shell fragments | 20 | SS | 13 | 5-6-6 (12) | | | | 16 | | | | | | | | | |
| | | | | ST | 19 | | 1.5 | | | | 21 | | | | | | | | |
| | CH | CLAY; dark gray, moist, high plasticity, medium stiff soft very soft with fine to medium grained sand, light gray, wet, loose, shell fragments layer at 24.5' with fine to coarse grained sand, light grayish brown, occasional shell fragments, medium dense with fine to medium grained sand, light gray, silt and clay increasing with depth black, moist, high plasticity, soft to medium stiff, no sand dark gray to black, moist, high plasticity and medium stiff, with fine grained sand | 20 | ST | 16 | | 0.5 | | 71 | 51 | 120 | 24 | 96 | | 0.81 | 2 | 13 | | |
| | | | | ST | 9 | | 0.25 | 0.2 | 66 | 59 | | | | | | 0.53 | 2 | 0 | |
| | | | 25 | ST | 16 | | 0 | | | | 44 | | | | | 92 | | | |
| | | | | SS | 15 | 5-4-6 (10) | 0 | 0.15 | | | | | | | | | | | |
| | | | | SS | 17 | 2-2-2 (4) | 0 | 0.1 | | | | 27 | | | | | | | |
| | | | 30 | ST | 17 | | 0.5 | | 59 | 68 | 120 | 34 | 86 | | | 1.00 | 2 | 17 | |
| | CL | | | ST | 14 | | 0.5 | | 67 | 61 | | | | | | | | | |
| | | | 35 | | | | | | | | | | | | | | | | |

(Continued Next Page)

COPY OF PEGGY LAKE GEOTECH BH - PEGGY LAKE TEMPLATE.GDT - 4/4/14 15:03 - F:\QRI DATA\TECHNICAL JOBS (CURRENT)\AGE - GALVESTON\2012-12-20 GEOTECHNICAL CONTRACT\TASK ORDER.DY06 2013-09-10 ALEXANDER ISLAND\DELIVERABLES\ALEX



Quaternary Resource Investigations, LLC
 13588 Florida Boulevard
 Baton Rouge, LA 70820
 Telephone: 225-292-1400
 Fax: 225-292-1404

BORING NUMBER 13-P01

CLIENT USACE-Galveston District PROJECT NAME Alexander Island
 PROJECT NUMBER W912HY-13-D-0001-DY06 PROJECT LOCATION Alexander Island, Baytown, TX

| GRAPHIC LOG | USCS SYMBOL | MATERIAL DESCRIPTION | DEPTH (ft) | SAMPLE TYPE | RECOVERY (in) | SPT BLOW COUNTS (N VALUE) | POCKET PEN. (tsf) | FIELD TORVANE (tsf) | DRY UNIT WT. (pcf) | MOISTURE CONTENT (%) | ATTERBERG LIMITS | | | MINUS #200 SIEVE CONTENT (%) | COMPRESSIVE STRENGTH (tsf) | FAILURE STRAIN (%) | CONFINING PRESSURE (psi) | | |
|-------------|-------------|--|------------|-------------|---------------|---------------------------|-------------------|---------------------|--------------------|----------------------|------------------|---------------|------------------|------------------------------|----------------------------|--------------------|--------------------------|--|--|
| | | | | | | | | | | | LIQUID LIMIT | PLASTIC LIMIT | PLASTICITY INDEX | | | | | | |
| | CL | Silty CLAY, dark gray to black, moist, high plasticity, medium stiff, with abundant carbonaceous sand laminations (continued) | 35 | ST | 12 | | 0 | 0.25 | 83 | 33 | 39 | 15 | 24 | 89 | | | | | |
| | | | | ST | 16 | | 0.5 | | 84 | 35 | | | | | 0.93 | 5 | 0 | | |
| | SM | Silty SAND; fine to coarse grained, gray, wet, loose, with occasional shell fragments very loose loose carbonaceous fragments common occasional shell fragments very loose, silty clay laminations common | 40 | ST | 13 | | 0 | 0.1 | | 20 | | | | | | | | | |
| | | | | SS | 18 | 3-3-2 (5) | | | | 22 | | | | | | | | | |
| | | | | SS | 18 | 3-2-1 (3) | | | | | 22 | | | 20 | | | | | |
| | | | 45 | SS | 18 | 0-3-3 (6) | | | | | 22 | | | | | | | | |
| | | | | SS | 13 | 0-4-3 (7) | | | | | 19 | | | 15 | | | | | |
| | | | 50 | SS | 18 | 0-3-2 (5) | | | | | 21 | | | | | | | | |
| | | | | SS | 18 | 0-3-2 (5) | | | | | 21 | | | | | | | | |
| | | | | SS | 18 | 1-2-3 (5) | | | | | 27 | | | | | | | | |
| | CH | CLAY; gray, moist, loose, with common silty clay laminations and some fine to coarse grained sand very silty abundant silty clay laminations, carbonaceous fragments common | 55 | SS | 18 | 3-3-4 (7) | | | | 32 | | | 64 | | | | | | |
| | | | | SS | 15 | 2-3-4 (7) | | | | 31 | | | | | | | | | |
| | | | 60 | SS | 17 | 3-3-3 (6) | | | | 30 | | | | | | | | | |

Bottom of borehole at 60.0 feet.

