



- Geotechnical Engineering
- Construction Materials Testing

**PROJECT NAME:** Anchorage Basin Sand Source Investigation

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-14

**DESCRIPTION:** Anchorage Basin Borrow Source Area

| PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE) |                   |                   |
|----------------------------------------------|-------------------|-------------------|
| -30' to -31' NAVD                            | -31' to -32' NAVD | -33' to -34' NAVD |
| 2.78                                         | 0.19              | 16.48             |

| ASTM<br>MESH                 | % FINER BY WEIGHT AFTER REMOVING SHELL |                   |                   |
|------------------------------|----------------------------------------|-------------------|-------------------|
|                              | -30' to -31' NAVD                      | -31' to -32' NAVD | -33' to -34' NAVD |
| #10                          | 100.00                                 | 100.00            | 100.00            |
| #18                          | 95.72                                  | 99.57             | 82.31             |
| #35                          | 93.64                                  | 99.52             | 72.22             |
| #60                          | 86.66                                  | 99.11             | 60.18             |
| #70                          | 79.27                                  | 98.12             | 57.34             |
| #100                         | 50.83                                  | 38.32             | 41.55             |
| #120                         | 43.68                                  | 18.75             | 32.21             |
| #170                         | 39.73                                  | 9.92              | 26.96             |
| #200                         | 38.69                                  | 8.34              | 25.55             |
| STATISTICS (EXCLUDING SHELL) |                                        |                   |                   |
| MEDIAN GRAIN<br>SIZE (mm)    | 0.15                                   | 0.17              | 0.18              |
| MEAN GRAIN SIZE<br>(mm)      | N/A                                    | 0.16              | N/A               |
| SORTING ( $\sigma$ )         | N/A                                    | N/A               | N/A               |

\*The -#10 material was utilized as the total sample for Grain Size Distribution Curve calculations.



- Geotechnical Engineering
- Construction Materials Testing

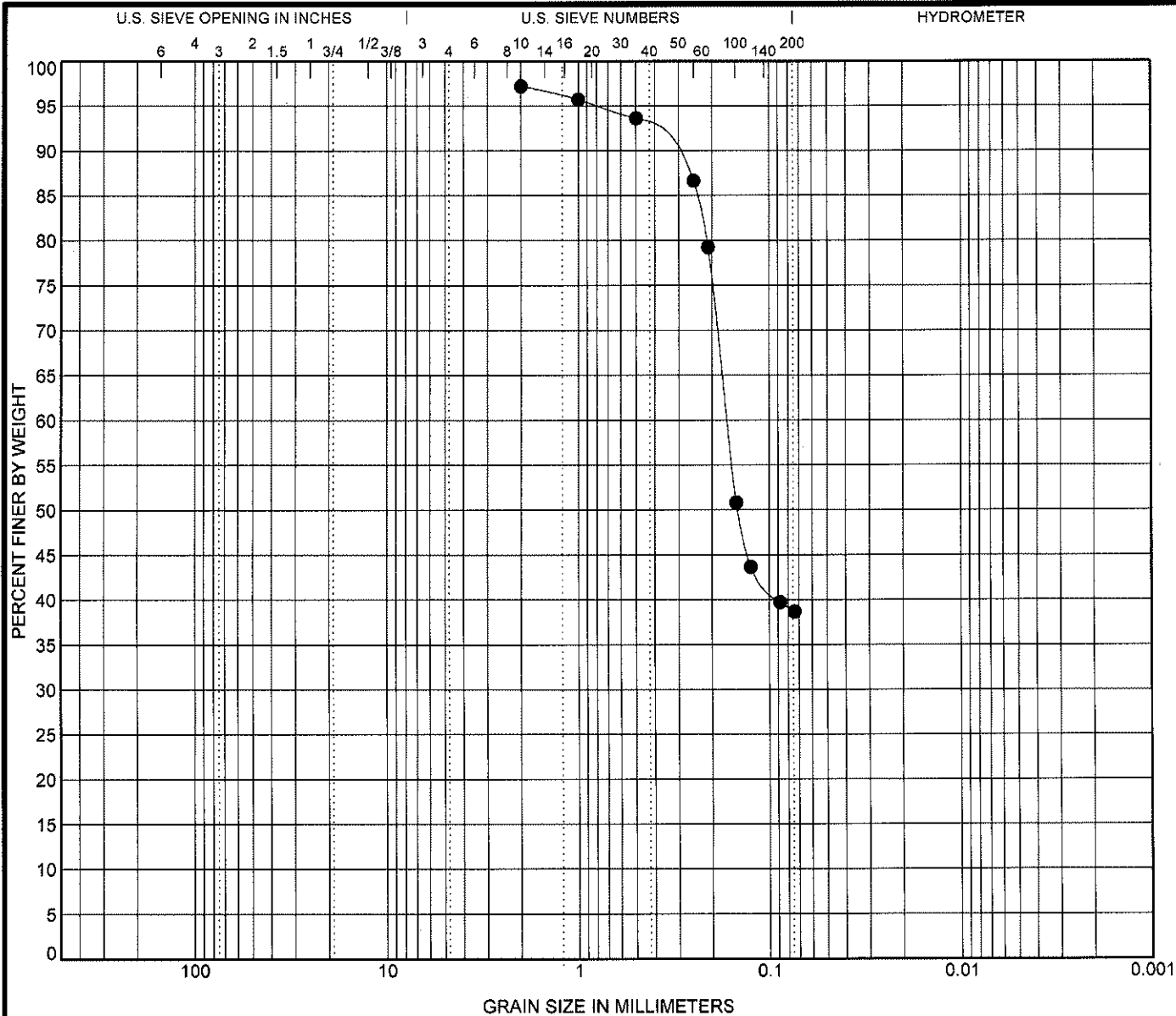
**PROJECT NAME:** Anchorage Basin Sand Source Investigation  
**CLIENT:** HDR Engineering, Inc.  
**BORING ID.:** AA-14  
**DESCRIPTION:** Anchorage Basin Borrow Source Area

| PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE) |                   |                   |
|----------------------------------------------|-------------------|-------------------|
| -35' to -36' NAVD                            | -38' to -39' NAVD | -41' to -42' NAVD |
| 0.74                                         | 0.27              | 0.87              |

| ASTM<br>MESH                 | % FINER BY WEIGHT AFTER REMOVING SHELL |                   |                   |
|------------------------------|----------------------------------------|-------------------|-------------------|
|                              | -35' to -36' NAVD                      | -38' to -39' NAVD | -41' to -42' NAVD |
| #10                          | 100.00                                 | 100.00            | 100.00            |
| #18                          | 98.68                                  | 99.43             | 98.55             |
| #35                          | 98.23                                  | 99.14             | 98.19             |
| #60                          | 97.30                                  | 98.56             | 97.51             |
| #70                          | 95.49                                  | 97.21             | 96.26             |
| #100                         | 26.94                                  | 41.99             | 53.84             |
| #120                         | 12.64                                  | 23.22             | 31.36             |
| #170                         | 6.15                                   | 15.89             | 18.69             |
| #200                         | 5.53                                   | 14.83             | 16.26             |
| STATISTICS (EXCLUDING SHELL) |                                        |                   |                   |
| MEDIAN GRAIN<br>SIZE (mm)    | 0.17                                   | 0.17              | 0.15              |
| MEAN GRAIN SIZE<br>(mm)      | 0.17                                   | 0.15              | N/A               |
| SORTING ( $\sigma$ )         | N/A                                    | N/A               | N/A               |

\*The -#10 material was utilized as the total sample for Grain Size Distribution Curve calculations.

U.S. GRAIN SIZE G109112 PROP. ANCHORAGE BASIN SAND SOURCE GPJ US LAB GDT 4/9/09



| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | coarse | fine | coarse | medium | fine |              |

| Specimen ID | Depth               | Classification                  |       |     |     |         | LL    | PL    | PI    | Cc | Cu |
|-------------|---------------------|---------------------------------|-------|-----|-----|---------|-------|-------|-------|----|----|
| ● AA-14     | (-30' to -31' NAVD) | Borrow Area (-30' to -31' NAVD) |       |     |     |         |       |       |       |    |    |
|             |                     |                                 |       |     |     |         |       |       |       |    |    |
|             |                     |                                 |       |     |     |         |       |       |       |    |    |
|             |                     |                                 |       |     |     |         |       |       |       |    |    |
|             |                     |                                 |       |     |     |         |       |       |       |    |    |
| Specimen ID | Depth               | D100                            | D60   | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |    |    |
| ● AA-14     | (-30' to -31' NAVD) | 2                               | 0.166 |     |     | 0.0     |       |       |       |    |    |
|             |                     |                                 |       |     |     |         |       |       |       |    |    |
|             |                     |                                 |       |     |     |         |       |       |       |    |    |
|             |                     |                                 |       |     |     |         |       |       |       |    |    |
|             |                     |                                 |       |     |     |         |       |       |       |    |    |



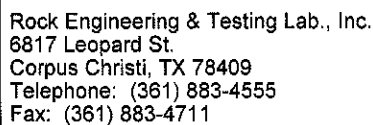
Rock Engineering & Testing Lab., Inc.  
6817 Leopard St.  
Corpus Christi, TX 78409  
Telephone: (361) 883-4555  
Fax: (361) 883-4711

## GRAIN SIZE DISTRIBUTION

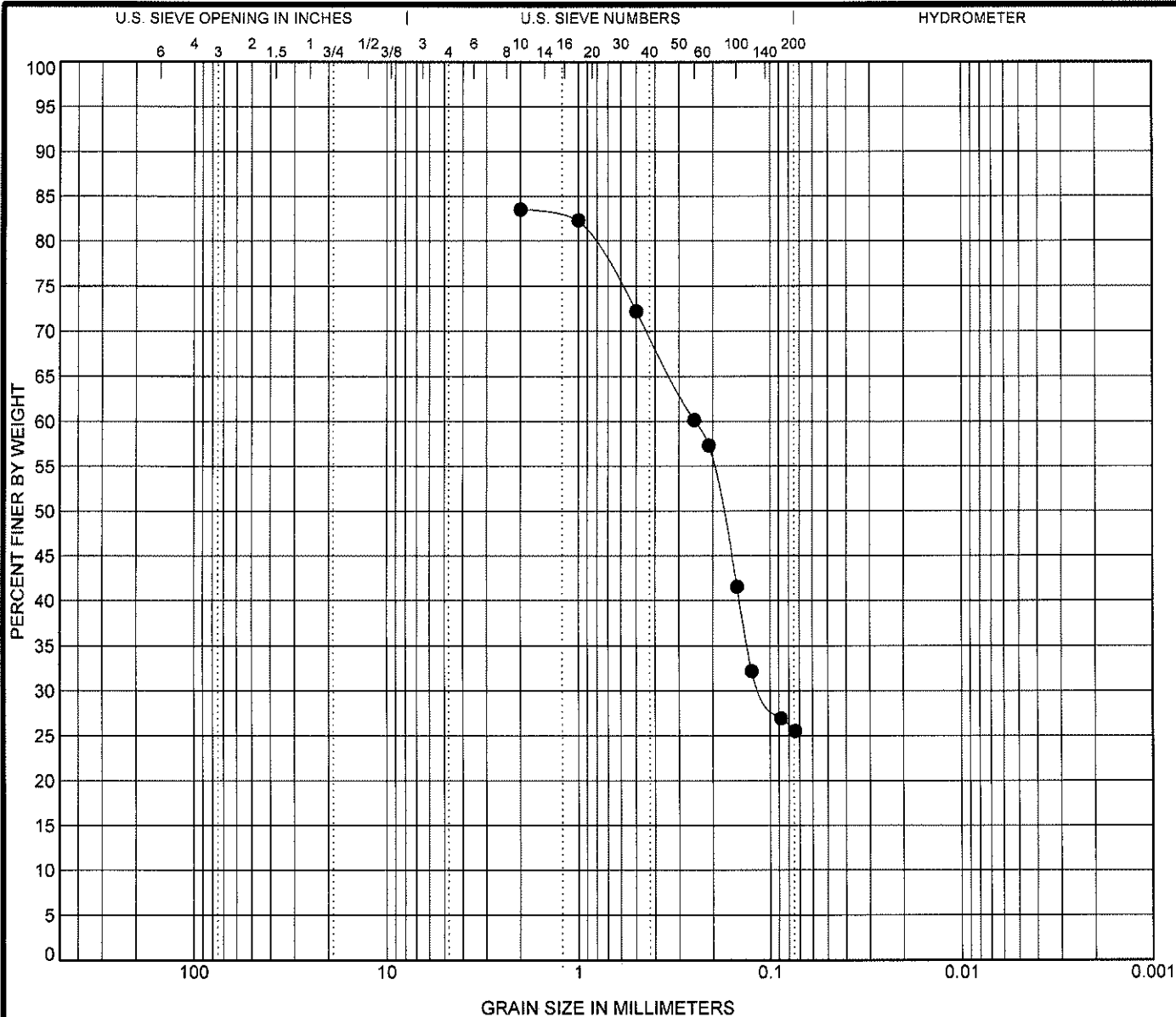
Project: Anchorage Basin Sand Source Investigation  
Location: Anchorage Basin; Galveston, Texas  
Number: G109112



| Specimen ID  | Depth                      | Classification                         | LL | PL | PI | Cc          | Cu          |
|--------------|----------------------------|----------------------------------------|----|----|----|-------------|-------------|
| <b>IA-14</b> | <b>(-31' to -32' NAVD)</b> | <b>Borrow Area (-31' to -32' NAVD)</b> |    |    |    | <b>1.28</b> | <b>1.91</b> |

[illegible]

Project: Anchorage Basin Sand Source Investigation  
Location: Anchorage Basin; Galveston, Texas  
Number: G109112



| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | coarse | fine | coarse | medium | fine |              |

| Specimen ID |                           | Depth | Classification                  |       |       |     |         | LL    | PL    | PI    | Cc | Cu |
|-------------|---------------------------|-------|---------------------------------|-------|-------|-----|---------|-------|-------|-------|----|----|
| ●           | AA-14 (-33' to -34' NAVD) |       | Borrow Area (-33' to -34' NAVD) |       |       |     |         |       |       |       |    |    |
|             |                           |       |                                 |       |       |     |         |       |       |       |    |    |
|             |                           |       |                                 |       |       |     |         |       |       |       |    |    |
|             |                           |       |                                 |       |       |     |         |       |       |       |    |    |
|             |                           |       |                                 |       |       |     |         |       |       |       |    |    |
| Specimen ID |                           | Depth | D100                            | D60   | D30   | D10 | %Gravel | %Sand | %Silt | %Clay |    |    |
| ●           | AA-14 (-33' to -34' NAVD) |       | 2                               | 0.247 | 0.108 |     | 0.0     |       |       |       |    |    |
|             |                           |       |                                 |       |       |     |         |       |       |       |    |    |
|             |                           |       |                                 |       |       |     |         |       |       |       |    |    |
|             |                           |       |                                 |       |       |     |         |       |       |       |    |    |
|             |                           |       |                                 |       |       |     |         |       |       |       |    |    |

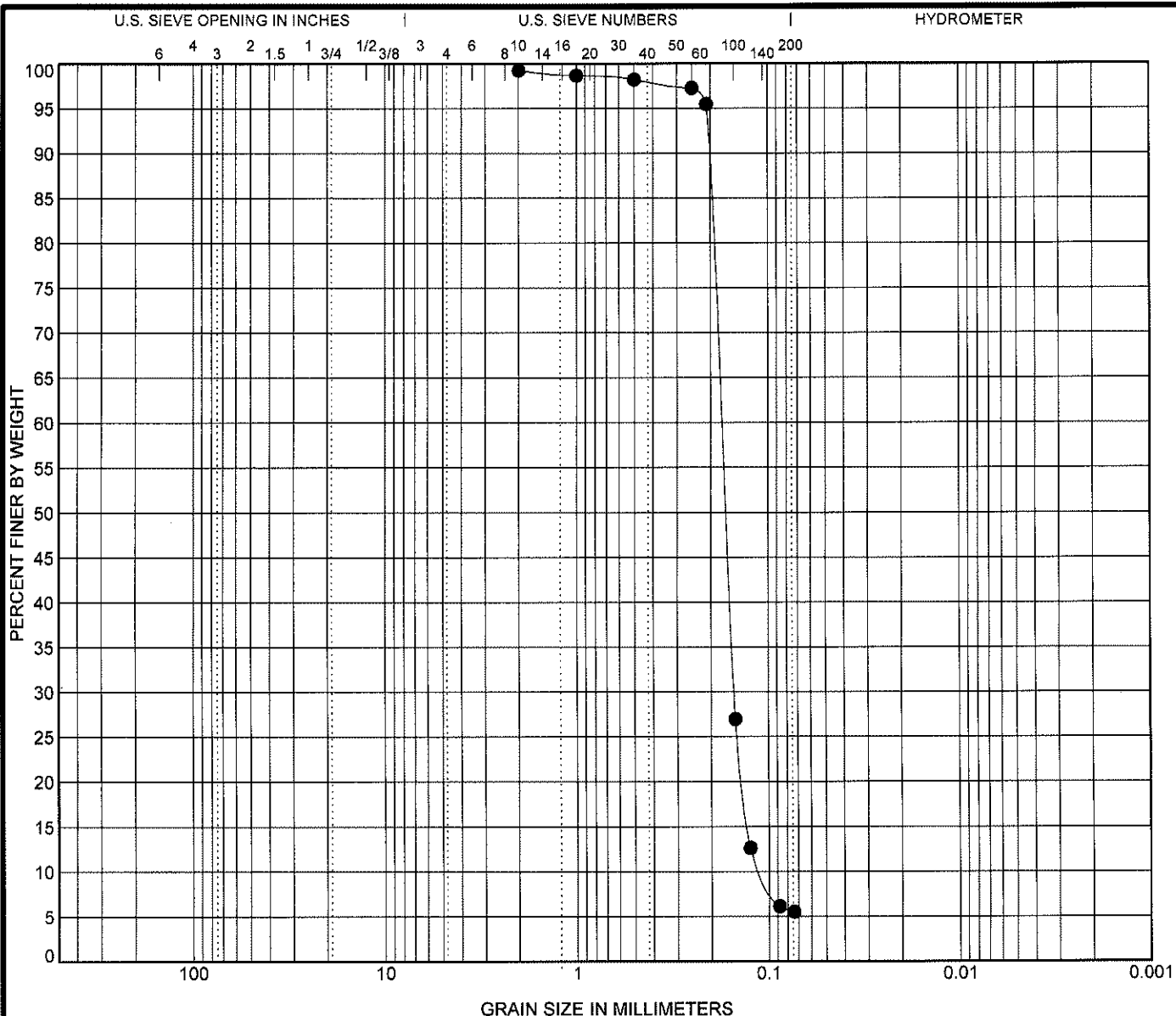


Rock Engineering & Testing Lab., Inc.  
6817 Leopard St.  
Corpus Christi, TX 78409  
Telephone: (361) 883-4555  
Fax: (361) 883-4711

## GRAIN SIZE DISTRIBUTION

Project: Anchorage Basin Sand Source Investigation  
Location: Anchorage Basin; Galveston, Texas  
Number: G109112

U.S. GRAIN SIZE G109112 PROP. ANCHORAGE BASIN SAND SOURCE GPJ US LAB GDT 4/9/09



| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | coarse | fine | coarse | medium | fine |              |

| Specimen ID                 | Depth | Classification                  | LL | PL | PI | Cc   | Cu   |
|-----------------------------|-------|---------------------------------|----|----|----|------|------|
| ● AA-14 (-35' to -36' NAVD) |       | Borrow Area (-35' to -36' NAVD) |    |    |    | 1.20 | 1.62 |
|                             |       |                                 |    |    |    |      |      |
|                             |       |                                 |    |    |    |      |      |
|                             |       |                                 |    |    |    |      |      |

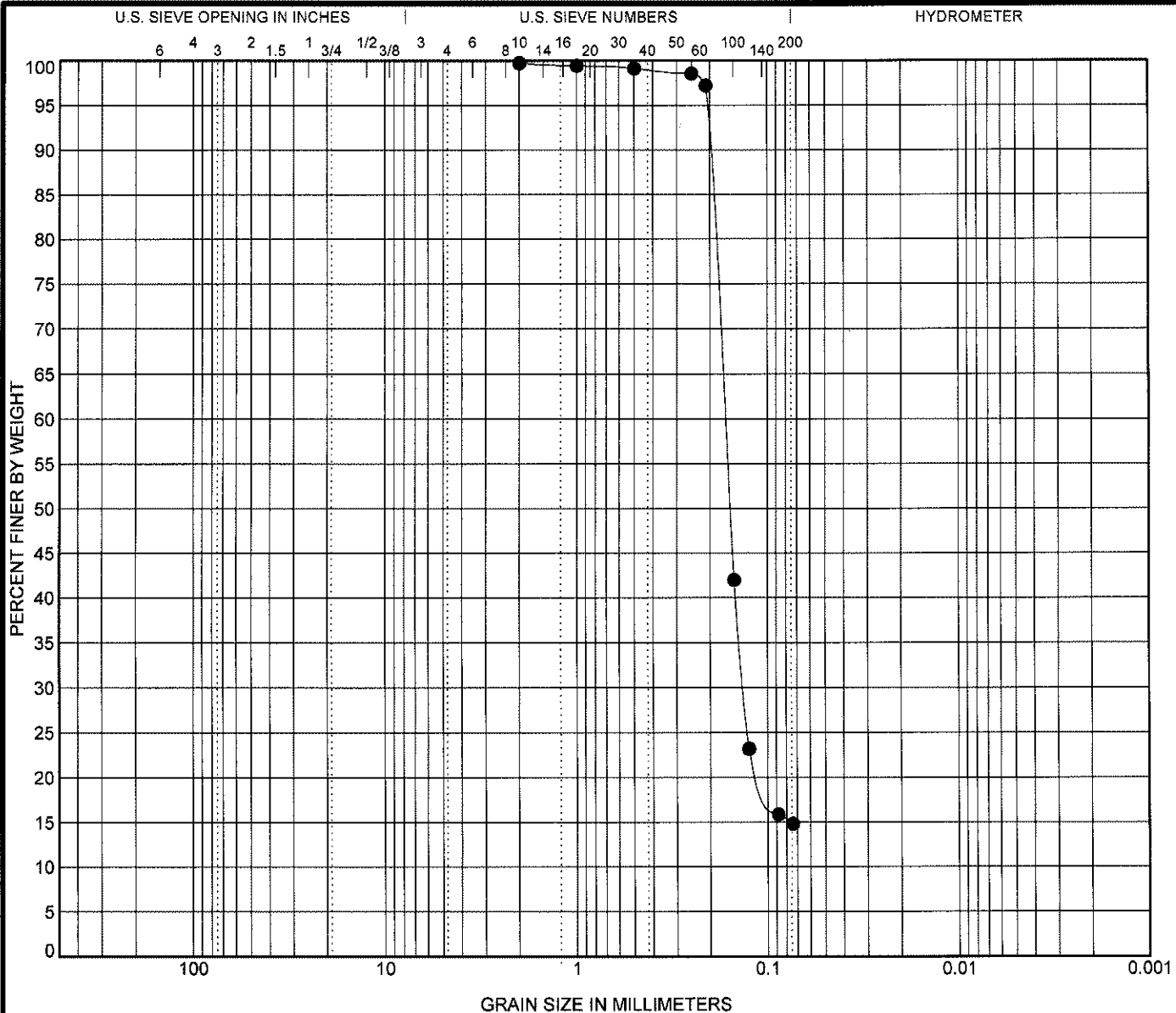
| Specimen ID                 | Depth | D100 | D60   | D30   | D10   | %Gravel | %Sand | %Silt | %Clay |
|-----------------------------|-------|------|-------|-------|-------|---------|-------|-------|-------|
| ● AA-14 (-35' to -36' NAVD) |       | 2    | 0.176 | 0.151 | 0.108 | 0.0     |       |       |       |
|                             |       |      |       |       |       |         |       |       |       |
|                             |       |      |       |       |       |         |       |       |       |
|                             |       |      |       |       |       |         |       |       |       |



Rock Engineering & Testing Lab., Inc.  
6817 Leopard St.  
Corpus Christi, TX 78409  
Telephone: (361) 883-4555  
Fax: (361) 883-4711

## GRAIN SIZE DISTRIBUTION

Project: Anchorage Basin Sand Source Investigation  
Location: Anchorage Basin; Galveston, Texas  
Number: G109112



| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | coarse | fine | coarse | medium | fine |              |

[illegible]

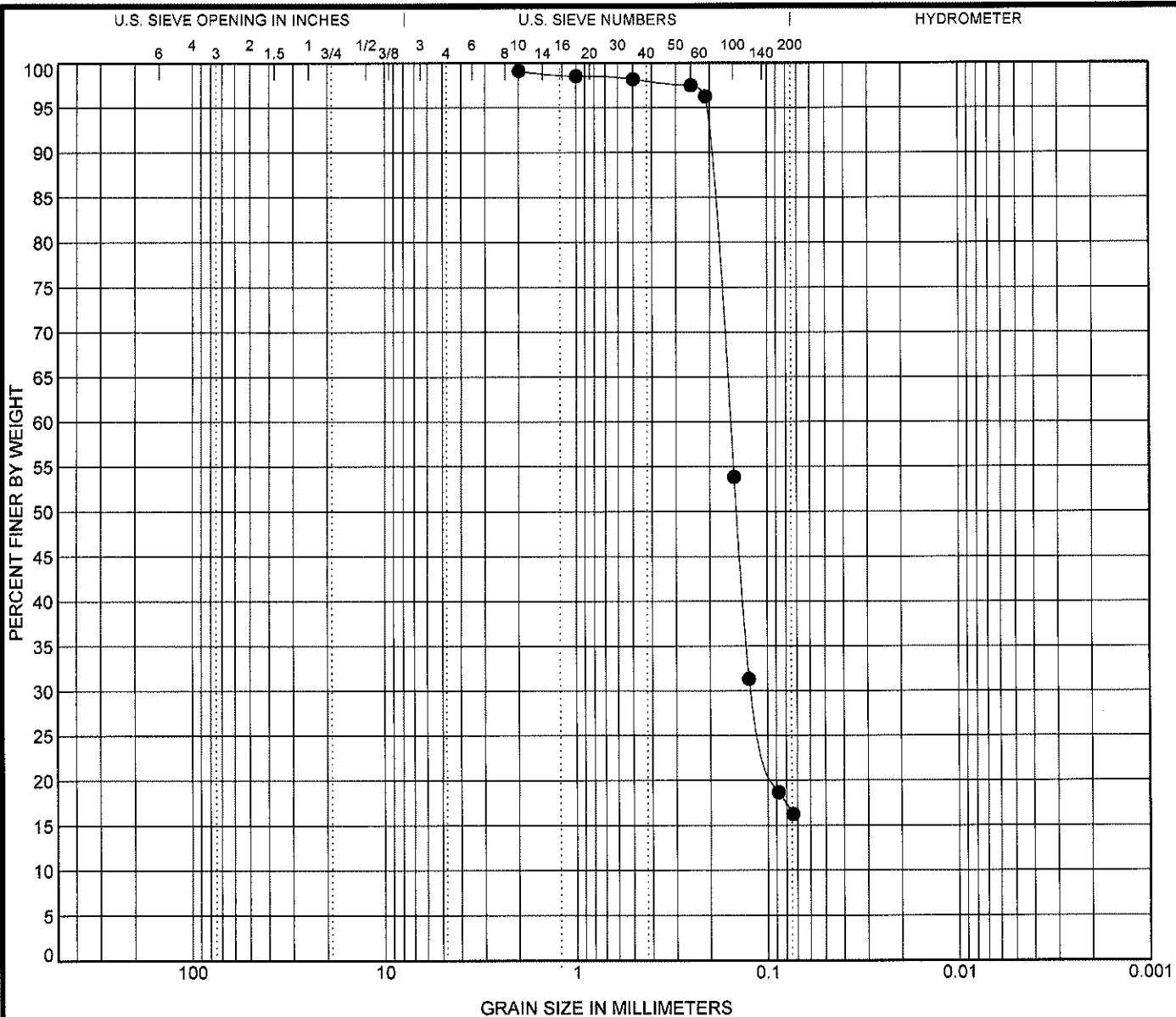
**Rock Engineering & Testing Lab., Inc.**  
6817 Leopard St.  
Corpus Christi, TX 78409  
Telephone: (361) 883-4555  
Fax: (361) 883-4711

## GRAIN SIZE DISTRIBUTION

Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas

Number: G109112



| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | coarse | fine | coarse | medium | fine |              |

| Specimen ID                 | Depth | Classification                  | LL | PL | PI | Cc | Cu |
|-----------------------------|-------|---------------------------------|----|----|----|----|----|
| ● AA-14 (-41' to -42' NAVD) |       | Borrow Area (-41' to -42' NAVD) |    |    |    |    |    |
|                             |       |                                 |    |    |    |    |    |
|                             |       |                                 |    |    |    |    |    |
|                             |       |                                 |    |    |    |    |    |

| Specimen ID                 | Depth | D100 | D60   | D30  | D10 | %Gravel | %Sand | %Silt | %Clay |
|-----------------------------|-------|------|-------|------|-----|---------|-------|-------|-------|
| ● AA-14 (-41' to -42' NAVD) |       | 2    | 0.157 | 0.12 |     | 0.0     |       |       |       |
|                             |       |      |       |      |     |         |       |       |       |
|                             |       |      |       |      |     |         |       |       |       |
|                             |       |      |       |      |     |         |       |       |       |



Rock Engineering & Testing Lab., Inc.  
6817 Leopard St.  
Corpus Christi, TX 78409  
Telephone: (361) 883-4555  
Fax: (361) 883-4711

## GRAIN SIZE DISTRIBUTION

Project: Anchorage Basin Sand Source Investigation  
Location: Anchorage Basin; Galveston, Texas  
Number: G109112

## LOG OF BORING AA-14

SHEET 1 OF 2



Rock Engineering & Testing Lab., Inc.  
 6817 Leopard St.  
 Corpus Christi, TX 78409  
 Telephone: (361) 883-4555  
 Fax: (361) 883-4711

CLIENT: HDR Engineering, Inc.  
 PROJECT: Anchorage Basin Sand Source Investigation  
 LOCATION: Anchorage Basin; Galveston, Texas  
 NUMBER: G109112

DATE(S) DRILLED: 03/12/09 - 03/12/09

DRILLING METHOD(S):

Vibracore

GROUNDWATER INFORMATION:

SURFACE ELEVATION: -30' NAVD

DESCRIPTION OF STRATUM

|                                                                                    | FIELD DATA            |               |         |                                                                                                | LABORATORY DATA      |                  |    |    |                             |                                         |                         |
|------------------------------------------------------------------------------------|-----------------------|---------------|---------|------------------------------------------------------------------------------------------------|----------------------|------------------|----|----|-----------------------------|-----------------------------------------|-------------------------|
| SOIL SYMBOL                                                                        | Elevation, Ft. [NAVD] | SAMPLE NUMBER | SAMPLES | N: BLOWS/FT<br>P: TONS/SQ FT<br>T: TONS/SQ FT<br>PERCENT RECOVERY/<br>ROCK QUALITY DESIGNATION | MOISTURE CONTENT (%) | ATTERBERG LIMITS |    |    | DRY DENSITY<br>POUNDS/CU.FT | COMPRESSIVE<br>STRENGTH<br>(TONS/SQ.FT) | MINUS NO. 200 SIEVE (%) |
|                                                                                    |                       |               |         |                                                                                                |                      | LL               | PL | PI |                             |                                         |                         |
|  | 21                    |               |         |                                                                                                |                      |                  |    |    |                             |                                         |                         |
|                                                                                    | 22                    |               |         |                                                                                                |                      |                  |    |    |                             |                                         |                         |
|                                                                                    | 23                    |               |         |                                                                                                |                      |                  |    |    |                             |                                         |                         |
|                                                                                    | 24                    |               |         |                                                                                                |                      |                  |    |    |                             |                                         |                         |
|                                                                                    | 25                    |               |         |                                                                                                |                      |                  |    |    |                             |                                         |                         |
|                                                                                    | 26                    |               |         |                                                                                                |                      |                  |    |    |                             |                                         |                         |
|                                                                                    | 27                    |               |         |                                                                                                |                      |                  |    |    |                             |                                         |                         |
|                                                                                    | 28                    |               |         |                                                                                                |                      |                  |    |    |                             |                                         |                         |
|                                                                                    | 29                    |               |         |                                                                                                |                      |                  |    |    |                             |                                         |                         |
|                                                                                    | 30                    |               |         |                                                                                                |                      |                  |    |    |                             |                                         |                         |
|  | 31                    | S-1           |         |                                                                                                |                      |                  |    |    |                             |                                         | 39                      |
|                                                                                    | 32                    | S-2           |         |                                                                                                |                      |                  |    |    |                             |                                         | 8                       |
|                                                                                    | 33                    | S-3           |         |                                                                                                |                      |                  |    |    |                             |                                         |                         |
|                                                                                    | 34                    | S-4           |         |                                                                                                |                      |                  |    |    |                             |                                         | 26                      |
|                                                                                    | 35                    | S-5           |         |                                                                                                |                      |                  |    |    |                             |                                         |                         |
|                                                                                    | 36                    | S-6           |         |                                                                                                |                      |                  |    |    |                             |                                         | 6                       |
|                                                                                    | 37                    | S-7           |         |                                                                                                |                      |                  |    |    |                             |                                         |                         |
|                                                                                    | 38                    | S-8           |         |                                                                                                |                      |                  |    |    |                             |                                         |                         |
|                                                                                    | 39                    | S-9           |         |                                                                                                |                      |                  |    |    |                             |                                         | 15                      |
|                                                                                    | 40                    | S-10          |         |                                                                                                |                      |                  |    |    |                             |                                         |                         |

CLAYEY SAND, gray.

POORLY GRADED SAND, with clay and shell fragments, gray.  
 Same as above.

SILTY CLAYEY SAND, with shell fragments, gray.  
 Same as above.

POORLY GRADED SAND, with clay, gray.  
 Same as above.

SILTY CLAYEY SAND, gray.  
 Same as above.  
 Same as above.

N - STANDARD PENETRATION TEST RESISTANCE  
 P - POCKET PENETROMETER RESISTANCE  
 T - POCKET TORVANE SHEAR STRENGTH

#### REMARKS:

Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc.  
 GPS Coord. N. 13,698,747' E. 3,318,773'

LOG OF BORING G109112 PROP. ANCHORAGE BASIN SAND SOURCE GPI ROCK ETL GDT 4/28/09

## LOG OF BORING AA-14

SHEET 2 OF 2



Rock Engineering & Testing Lab., Inc.  
 6817 Leopard St.  
 Corpus Christi, TX 78409  
 Telephone: (361) 883-4555  
 Fax: (361) 883-4711

CLIENT: HDR Engineering, Inc.  
 PROJECT: Anchorage Basin Sand Source Investigation  
 LOCATION: Anchorage Basin; Galveston, Texas  
 NUMBER: G109112

DATE(S) DRILLED: 03/12/09 - 03/12/09

DRILLING METHOD(S):

Vibracore

GROUNDWATER INFORMATION:

SURFACE ELEVATION: -30' NAVD

DESCRIPTION OF STRATUM

**SILTY CLAYEY SAND** gray.

Same as above.

Same as above.

**SILTY CLAYEY SAND** gray.

Boring was extended to an elevation of -44-feet NAVD during the drilling operations.

#### REMARKS:

Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc.  
 GPS Coord. N. 13,698,747' E. 3,318,773'

N - STANDARD PENETRATION TEST RESISTANCE  
 P - POCKET PENETROMETER RESISTANCE  
 T - POCKET TORVANE SHEAR STRENGTH

LOG OF BORING G109112 PROP. ANCHORAGE BASIN SAND SOURCE GPJ ROCK ETL GDT 4/28/09