

GEOTECHNICAL ENGINEERING

• Construction Materials Engineering & Testing

• Soils • Asphalt • Concrete

April 20, 2009

HDR Engineering, Inc. 555 North Carancahua Street, Suite 1650 Corpus Christi, Texas 78478

Attention: Mr. Daniel Heilman, P.E.

SUBJECT: Letter Report

SUBSURFACE INVESTIGATION AND LABORATORY TESTING PROGRAM

FOR THE ANCHORAGE BASIN SAND SOURCE INVESTIGATION

**Anchorage Basin Borrow Area** 

Galveston Island, Texas

**RETL Job Number: G109112** 

Dear Mr. Heilman,

This report presents the results of a subsurface investigation and laboratory testing program for the Anchorage Basin Sand Source Investigation. This study was conducted for HDR Engineering, Inc. in support of the West Galveston Island End of Seawall Beach Nourishment Project. The results of this laboratory testing program are to be found in the accompanying report, three copies which are being transmitted herewith.

#### **Authorization**

The scope of work for this project was performed in accordance with RETL Proposal Number P121108A dated January 26, 2009. The proposal was approved and incorporated into an HDR Engineering, Inc. Geotech Subconsultant Agreement and was executed on February 26, 2009.

## Purpose and Scope

The purpose of this exploration was to evaluate the soil conditions at the project location, perform laboratory testing, as directed by representatives of HDR Engineering, Inc., and to generate grain size distribution curves. The soil information will be applied by HDR Engineering, Inc. to determine the viability of the Anchorage Basin as an alternative or supplemental borrow area to the South Jetty Borrow Source.

The scope of the exploration and analysis included the subsurface exploration, field and laboratory testing and preparation of this report.

## ROCK ENGINEERING & TESTING LABORATORY. INC.

18847 REDLAND ROAD #202 . SAN ANTONIO, TEXAS, 78259

OFFICE: (210) 495-8000 • FAX: (210) 495-8015

April 20, 2009 Attn.: Mr. Daniel H

Attn.: Mr. Daniel Heilman, P.E. RETL Job No.: G109112

Anchorage Basin Galveston Island, Texas

The scope of services did not include an environmental assessment. Any statements in this report regarding odors, colors, unusual or suspicious items or conditions are strictly for the information of the client.

### General

The exploration of the subsurface conditions reported herein are considered sufficient in detail and scope to form a reasonable basis for the evaluation of the soil conditions within the Anchorage Basin as an alternative or supplemental borrow area to the South Jetty Borrow Source.

The Geotechnical Engineer states that the findings, recommendations, specifications or professional advice contained herein have been presented after being prepared in a manner consistent with that level of care and skill ordinarily exercised by reputable members of the Geotechnical Engineer's profession practicing contemporaneously under similar conditions in the locality of the project. RETL operates in general accordance with "Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction, (ASTM D 3740)." No other representations are expressed or implied, and no warranty or guarantee is included or intended.

This report has been prepared for the exclusive use of HDR Engineering, Inc. for the specific purpose of the Anchorage Basin Sand Source Investigation.

#### **Scope of Field Exploration**

The field exploration included reconnaissance of the project site and obtaining vibracore soil samples. During the sample recovery operations, the soils encountered were classified and recorded on boring logs in accordance with "Standard Guide for Field Logging of Subsurface Exploration of Soil and Rock, (ASTM D 5434)."

A vessel equipped with a platform configured with a 3-point mooring system and a mechanized A-frame for handling the vibratory corer was utilized to access the boring locations. The borings were performed using a Model 1500 vibratory corer (VC) equipped with a 20-foot long core barrel and was equipped with a Lexan core liner in which the sediment sample was recovered.

Thirty borings were performed for the purpose of determining the geotechnical properties of the subsurface soils at the site. All work for this project was performed at elevations ranging from -22-feet to -36-feet NAVD. HDR Engineering, Inc. determined the number, depth and location of the borings. Ocean Surveys, Inc., a subcontractor to RETL, performed the boring operations. The sample locations were recorded using State Plane NAD 83, Texas South Central Zone map datum. The sample identification and GPS Coordinates at the sample locations are provided in the table below:



April 20, 2009

Attn.: Mr. Daniel Heilman, P.E.

RETL Job No.: G109112

Anchorage Basin Galveston Island, Texas

BORING NO.	GPS COOF	RDINATES
boking no.	Northing (Ft.)	Easting (Ft.)
AA-01	13,697,653	3,316,595
AA-02	13,698,267	3,316,725
AA-03	13,698,824	3,316,993
AA-04	13,699,436	3,317,401
AA-05	13,700,293	3,317,717
AA-06	13,697,692	3,317,372
AA-07	13,697,972	3,317,029
AA-08	13,698,396	3,317,267
AA-09	13,698,183	3,317,733
AA-10	13,698,835	3,317,844
AA-11	13,699,483	3,318,163
AA-12	13,700,304	3,318,392
AA-13	13,698,028	3,318,672
AA-14	13,698,747	3,318,773
AA-15	13,699,240	3,318,962
AA-16	13,699,918	3,319,141
AA-17	13,698,322	3,319,855
AA-18	13,699,496	3,319,957
AA-19	13,700,406	3,320,164
AA-20	13,698,014	3,320,905
AA-21	13,698,958	3,321,049
AA-22	13,700,020	3,321,179
AA-23	13,698,522	3,321,488
AA-24	13,698,450	3,322,163
AA-25	13,699,095	3,322,545
AA-26	13,699,510	3,322,110
AA-27	13,699,532	3,323,082
AA-28	13,700,599	3,324,100
AA-29	13,700,790	3,322,827
AA-30	13,700,597	3,325,148

# **LABORATORY TESTING PROGRAM**

In addition to the field investigation, a laboratory testing program was conducted to determine additional pertinent engineering characteristics of the subsurface materials necessary in analyzing the behavior of the subsurface soils for the proposed project.

Attn.: Mr. Daniel Heilman, P.E.

RETL Job No.: G109112

Anchorage Basin Galveston Island, Texas

Selected samples were subjected to percent material finer than the #200 sieve and sieve analysis of fine and course aggregates (ASTM C 136).

All phases of the laboratory testing program were conducted in general accordance with the applicable ASTM Specification. The results of this test are to be found on the test reports provided as attachments to this report.

The grain size distribution curves were created using the data obtained from the sieve analysis of fine and course aggregates (ASTM C 136). The phi values were obtained from the grain size distribution curves and utilized to determine the following statistical values:

Median = 
$$\frac{\phi_{50}}{2}$$

Mean =  $\frac{(\phi_{84} + \phi_{50} + \phi_{16})}{3}$ 

Sorting  $\sigma = \frac{\phi_{84} - \phi_{16}}{4} + \frac{\phi_{95} - \phi_5}{6.6}$ 

## **GENERAL COMMENTS**

# **General Comments**

The Geotechnical Engineer states that the findings or professional advice contained herein, have been presented after being prepared in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics and engineering geology. No warranties are implied or expressed.

Pursuant to instructions, no further testing or analysis have been performed. Unless notified, the soil samples will be disposed of 3-months after issuance of this report. We appreciate the opportunity to provide our services to you on this project. If you have any questions or comments, please contact us at (361) 883-4555.

Sincerely,

Christopher A. Rock, P.E.

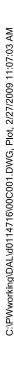
Branch Manager

Attachments: Boring Location Plan

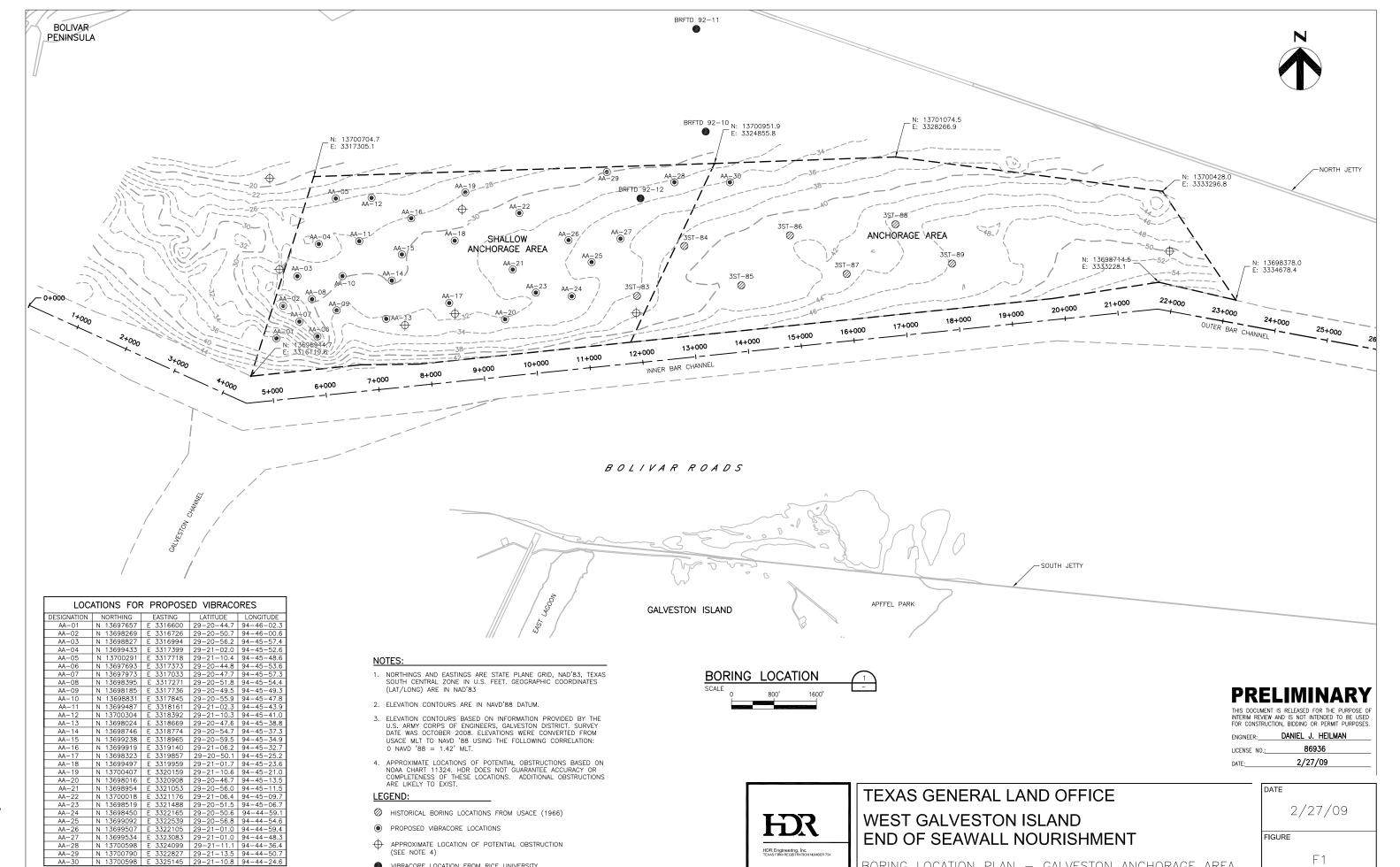
Sieve Analysis of Fine and Course Aggregates, (ASTM C 136) Summary Sheets

Grain Size Distribution Curves





AA-28



HDR Engineering, Inc. TEXAS FIRM REGISTRATION NUMBER 75

BORING LOCATION PLAN — GALVESTON ANCHORAGE AREA

F1

APPROXIMATE LOCATION OF POTENTIAL OBSTRUCTION

● VIBRACORE LOCATION FROM RICE UNIVERSITY

(SEE NOTE 4)



- · Geotechnical Engineering
- · Construction Materials Testing

CLIENT: HDR Engineering, Inc.

**SAMPLE ID.:** AA-01

	PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)			
	-38' to -39' NAVD			
l	29.60			

ASTM	% FINER BY WEIGHT AFTER REMOVING SHELL
MESH	-38' to -39' NAVD
#10	100.00
#18	37.43
#35	17.06
#60	10.97
#70	9.17
#100	4.76
#120	2.71
#170	0.95
#200	0.69
	STATISTICS (EXCLUDING SHELL)
MEDIAN GRAIN SIZE (mm)	1.30
MEAN GRAIN SIZE (mm)	0.84
SORTING (σ)	0.68

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



· Construction Materials Testing

PROJECT NAME: Anchorage Basin Sand Source Investigation

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-02

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)				
-22' to -23' NAVD   -24' to -25' NAVD   -27' to -28' NAVD   -29' to -30' NAVD				
62.20	46.80	20.56	22.95	

ASTM	% F	INER BY WEIGHT A	FTER REMOVING SH	IELL
MESH	-22' to -23' NAVD	-24' to -25' NAVD	-27' to -28' NAVD	-29' to -30' NAVD
#10	100.00	100.00	100.00	100.00
#18	N/A	27.49	68.63	66.09
#35	N/A	11.94	60.99	59.34
#60	N/A	6.67	58.05	55.30
#70	N/A	5.24	56.43	52.93
#100	N/A	3.27	46.89	33.36
#120	N/A	2.51	41.88	. 19.33
#170	N/A	2.02	38.33	10.51
#200	N/A	1.88	37.55	8.86
	STATIS	STICS (EXCLUDING	SHELL)	
MEDIAN GRAIN SIZE (mm)	N/A	1.80	0.18	0.19
MEAN GRAIN SIZE (mm)	N/A	1.05	N/A	0.28
SORTING (σ)	N/A	0.50	N/A	N/A

<sup>\*</sup>AA-02; -22' to -23' NAVD was only passed through the #10 sieve.

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



· Construction Materials Testing

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

CLIENT: HDR Engineering, Inc.

**BORING ID.:** AA-03

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)			
-30' to -31' NAVD	-33' to -34' NAVD	-36' to -37' NAVD	
0.52	0.14	0.55	

ASTM	% FINER BY	WEIGHT AFTER REMOV	VING SHELL
MESH	-30' to -31' NAVD	-33' to -34' NAVD	-36' to -37' NAVD
#10	100.00	100.00	100.00
#18	98.86	99.53	99.00
#35	98.13	99.25	98.56
#60	97.41	98.88	97.78
#70	96.85	98.39	96.67
#100	92.82	90.85	67.32
#120	81.78	72.05	43.12
#170	61.66	48.20	18.91
#200	55.17	43.91	14.09
	STATISTICS (EX	KCLUDING SHELL)	
MEDIAN GRAIN SIZE (mm)	N/A	0.09	0.14
MEAN GRAIN SIZE (mm)	N/A	N/A	0.13
SORTING (σ)	N/A	N/A	N/A

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



· Construction Materials Testing

**PROJECT NAME:** 

Anchorage Basin Sand Source Investigation

**CLIENT:** 

HDR Engineering, Inc.

**BORING ID.:** 

AA-03

**DESCRIPTION:** 

Anchorage Basin Borrow Source Area

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)				
-39' to -40' NAVD	-42' to -43' NAVD -45' to -46' NAV			
5.29	0.07	0.16		

ASTM	% FINER BY	WEIGHT AFTER REMOV	VING SHELL
MESH	-39' to -40' NAVD	-42' to -43' NAVD	-45' to -46' NAVD
#10	100.00	100.00	100.00
#18	91.52	99.78	99.59
#35	89.74	99.64	99.24
#60	88.36	99.25	98.46
#70	86.96	98.61	96.84
#100	73.12	89.69	29.99
#120	61.46	73.00	13.49
#170	50.59	54.20	4.43
#200	48.04	50.03	2.98
	STATISTICS (EX	XCLUDING SHELL)	
MEDIAN GRAIN SIZE (mm)	0.08	0.07	0.17
MEAN GRAIN SIZE (mm)	N/A	N/A	0.17
SORTING (σ)	N/A	N/A	0.30

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



- · Geotechnical Engineering
- · Construction Materials Testing

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-04

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)					
-26' to -27'   -32' to -33'   -35' to -36'   -38' to -39'   -40' to -41'					
NAVD	NAVD	NAVD	NAVD	NAVD	
N/A	0.01	0.11	0.00	0.02	

	%	FINER BY WE	GHT AFTER R	EMOVING SHE	LL
ASTM MESH	-26' to -27' NAVD	-32' to -33' NAVD	-35' to -36' NAVD	-38' to -39' NAVD	-40' to -41' NAVD
#10	N/A	100.00	100.00	100.00	100.00
#18	N/A	99.96	99.64	99.97	99.95
#35	N/A	99.92	99.05	99.89	99.88
#60	N/A	99.68	95.48	98.71	99.75
#70	N/A	97.85	80.15	93.92	99.62
#100	N/A	27.90	17.11	28.51	96.19
#120	N/A	11.35	7.96	8.98	87.46
#170	N/A	3.08	4.70	1.99	79.73
#200	82.10	1.80	4.02	1.25	77.00
	STAT	ISTICS (EXCLU	DING SHELL)		
MEDIAN GRAIN SIZE (mm)	N/A	0.17	0.18	0.18	N/A
MEAN GRAIN SIZE (mm)	N/A	0.17	0.18	0.17	N/A
SORTING (σ)	N/A	0.24	0.30	0.19	N/A

<sup>\*</sup>AA-04; -26' to -27' NAVD was only passed through the -#200 sieve.

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



- · Geotechnical Engineering
- · Construction Materials Testing

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-05

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)				
-26' to -27' NAVD   -29' to -30' NAVD   -31' to -32' NAVD   -33' to -34' NAVD				
0.55	0.08	21.02	1.80	

ASTM	ASTM % FINER BY WEIGHT AFTER REMOVING SHELL				
MESH	-26' to -27' NAVD	-29' to -30' NAVD	-31' to -32' NAVD	-33' to -34' NAVD	
#10	100.00	100.00	100.00	100.00	
#18	99.20	99.08	72.95	97.61	
#35	98.78	98.90	68.22	97.17	
#60	97.73	98.25	59.44	95.81	
#70	97.22	96.82	50.66	91.97	
#100	95.31	88.63	35.28	58.85	
#120	90.80	82.13	30.27	43.31	
#170	80.06	72.82	24.22	35.42	
#200	78.39	68.80	21.15	33.98	
	STATIS	TICS (EXCLUDING	SHELL)		
MEDIAN GRAIN SIZE (mm)	N/A	N/A	0.21	0.15	
MEAN GRAIN SIZE (mm)	N/A	N/A	N/A	N/A	
SORTING (σ)	N/A	N/A	N/A	N/A	

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



- · Geotechnical Engineering
- · Construction Materials Testing

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-05

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)				
-36' to -37' NAVD	-39' to -40' NAVD	-42' to -46' NAVD		
0.18	0.02	0.00		

ASTM	% FINER BY WEIGHT AFTER REMOVING SHELL			
MESH	-36' to -37' NAVD	-39' to -40' NAVD	-42' to -46' NAVD	
#10	100.00	100.00	100.00	
#18	99.53	99.86	99.93	
#35	99.32	99.78	99.81	
#60	98.96	99.52	99.40	
#70	98.08	99.11	99.01	
#100	70.84	49.48	63.99	
#120	55.44	28.71	38.64	
#170	47.06	15.69	22.51	
#200	45.45	14.24	19.41	
	STATISTICS (EX	XCLUDING SHELL)		
MEDIAN GRAIN SIZE (mm)	0.11	0.16	0.15	
MEAN GRAIN SIZE (mm)	N/A	0.14	N/A	
SORTING (σ)	N/A	N/A	N/A	

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



- · Geotechnical Engineering
- · Construction Materials Testing

CLIENT: HDR Engineering, Inc.

**BORING ID.:** AA-06

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)					
-26' to -27' NAVD   -29' to -30' NAVD   -31' to -32' NAVD   -33' to -34' NAVD					
58.88 16.77 0.00 0.29					

ASTM	% FINER BY WEIGHT AFTER REMOVING SHELL				
MESH	-26' to -27' NAVD	-29' to -30' NAVD	-31' to -32' NAVD	-33' to -34' NAVD	
#10	100.00	100.00	100.00	100.00	
#18	N/A	73.31	99.80	99.47	
#35	N/A	63.48	99.51	99.22	
#60	N/A	50.66	99.02	98.45	
#70	N/A	40.98	98.61	96.89	
#100	N/A	16.82	52.40	40.75	
#120	N/A	8.98	35.23	22.84	
#170	N/A	4.85	27.12	13.80	
#200	N/A	4.30	25.94	12.26	
	STATIS	STICS (EXCLUDING	SHELL)		
MEDIAN GRAIN SIZE (mm)	N/A	0.26	0.15	0.17	
MEAN GRAIN SIZE (mm)	N/A	0.35	N/A	0.15	
SORTING (σ)	N/A	1.19	N/A	N/A	

<sup>\*</sup>AA-06; -26' to -27' NAVD was only passed through the #10 sieve.

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



- · Geotechnical Engineering
- · Construction Materials Testing

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-07

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)				
-26' to -27'	-29' to -30'	-32' to -33'	-34' to -35'	-35' to -36'
NAVD	NAVD	NAVD	NAVD	NAVD
72.72	4.46	3.89	20.73	0.00

	%	FINER BY WEI	GHT AFTER RI	EMOVING SHE	LL
ASTM MESH	-26' to -27' NAVD	-29' to -30' NAVD	-32' to -33' NAVD	-34' to -35' NAVD	-35' to -36' NAVD
#10	100.00	100.00	100.00	100.00	100.00
#18	N/A	88.72	90.74	67.05	99.98
#35	N/A	75.21	79.74	57.27	99.91
#60	N/A	53.27	57.46	44.68	99.69
#70	N/A	44.34	43.65	38.68	99.26
#100	N/A	29.94	19.20	23.96	60.02
#120	N/A	14.00	8.57	15.77	30.01
#170	N/A	7.22	3.29	10.00	14.00
#200	N/A	6.25	3.11	9.35	11.38
	STAT	STICS (EXCLU	DING SHELL)		
MEDIAN GRAIN SIZE (mm)	N/A	0.25	0.25	0.30	0.16
MEAN GRAIN SIZE (mm)	N/A	0.30	0.30	0.34	0.15
SORTING (σ)	N/A	N/A	1,12	N/A	N/A

<sup>\*</sup>AA-07; -26' to -27' NAVD was only passed through the #10 sieve.

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



- · Geotechnical Engineering
- · Construction Materials Testing

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-08

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)				
-30' to -31' NAVD	-33' to -34' NAVD	-36' to -37' NAVD		
25.33	0.46	2.16		

ASTM	% FINER BY	WEIGHT AFTER REMOV	VING SHELL
MESH	-30' to -31' NAVD	-33' to -34' NAVD	-36' to -37' NAVD
#10	100.00	100.00	100.00
#18	N/A	99.26	96.09
#35	N/A	99.06	94.42
#60	N/A	98.57	91.61
#70	N/A	97.45	82.85
#100	N/A	29.49	46.51
#120	N/A	3.93	33.71
#170	N/A	3.24	24.71
#200	N/A	3.04	22.35
	STATISTICS (EX	(CLUDING SHELL)	
MEDIAN GRAIN SIZE (mm)	N/A	0.17	0.17
MEAN GRAIN SIZE (mm)	N/A	0.17	N/A
SORTING (σ)	N/A	0.21	N/A

<sup>\*</sup>AA-08; -30' to -31' NAVD was only passed through the #10 sieve.

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



· Construction Materials Testing

PROJECT NAME: Anchorage Basin Sand Source Investigation

**CLIENT:** 

HDR Engineering, Inc.

**BORING ID.:** 

AA-08

**DESCRIPTION:** 

Anchorage Basin Borrow Source Area

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)					
-39' to -40' NAVD	-41' to -42' NAVD	-42' to -43' NAVD			
0.26	9.39	N/A			

ASTM	% FINER BY	WEIGHT AFTER REMOV	VING SHELL
MESH	-39' to -40' NAVD	-41' to -42' NAVD	-42' to -43' NAVD
#10	100.00	100.00	N/A
#18	99.48	84.38	N/A
#35	99.26	77.77	N/A
#60	98.58	71.31	N/A
#70	96.95	68.49	N/A
#100	63.89	57.52	N/A
#120	41.45	50.99	N/A
#170	23.82	40.44	N/A
#200	18.72	40.20	75.80
	STATISTICS (EX	XCLUDING SHELL)	
MEDIAN GRAIN SIZE (mm)	0.15	0.13	N/A
MEAN GRAIN SIZE (mm)	N/A	N/A	N/A
SORTING (σ)	N/A	N/A	N/A

<sup>\*</sup>AA-08; -42' to -43' NAVD was only passed through the -#200 sieve.

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



· Construction Materials Testing

PROJECT NAME: Anchorage Basin Sand Source Investigation

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-09

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)					
-32' to -33'					
NAVD	NAVD	NAVD	NAVD	NAVD	
25.83	10.03	0.22	0.15	1.19	

	%	% FINER BY WEIGHT AFTER REMOVING SHELL					
ASTM MESH	-32' to -33' NAVD	-33' to -34' NAVD	-34' to -35' NAVD	-36' to -37' NAVD	-38' to -39' NAVD		
#10	100.00	100.00	100.00	100.00	100.00		
#18	N/A	85.17	99.66	99.72	97.89		
#35	N/A	79.80	99.49	99.50	97.18		
#60	N/A	74.59	98.94	98.98	95.94		
#70	N/A	72.05	98.08	98.16	92.76		
#100	N/A	55.81	58.32	44.00	20.49		
#120	N/A	48.04	39.44	28.66	9.27		
#170	N/A	42.38	29.63	19.90	4.25		
#200	N/A	36.50	27.65	17.70	3.70		
	STAT	ISTICS (EXCLU	JDING SHELL)				
MEDIAN GRAIN SIZE (mm)	N/A	0.13	0.15	0.17	0.18		
MEAN GRAIN SIZE (mm)	N/A	N/A	N/A	N/A	0.18		
SORTING (σ)	N/A	N/A	N/A	N/A	0.30		

<sup>\*</sup>AA-09; -32' to -33' NAVD was only passed through the #10 sieve.

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



- · Geotechnical Engineering
- · Construction Materials Testing

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-10

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)				
-30' to -31' NAVD	-31' to -32' NAVD	-32' to -33' NAVD		
4.57	3.02	0.74		

ASTM	% FINER BY	WEIGHT AFTER REMOV	VING SHELL
MESH	-30' to -31' NAVD	-31' to -32' NAVD	-32' to -33' NAVD
#10	100.00	100.00	100.00
#18	89.98	94.89	98.87
#35	80.49	91.89	98.50
#60	60.45	78.96	98.02
#70	49.21	64.95	97.48
#100	40.92	24.44	86.43
#120	39.07	14.50	56.19
#170	37.96	11.10	39.17
#200	37.79	10.81	35.96
	STATISTICS (EX	(CLUDING SHELL)	
MEDIAN GRAIN SIZE (mm)	0.16	0.18	0.12
MEAN GRAIN SIZE (mm)	N/A	0.19	N/A
SORTING (σ)	N/A	N/A	N/A

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



· Construction Materials Testing

**PROJECT NAME:** 

Anchorage Basin Sand Source Investigation

**CLIENT:** 

HDR Engineering, Inc.

**BORING ID.:** 

AA-10

**DESCRIPTION:** 

Anchorage Basin Borrow Source Area

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)					
-34' to -35' NAVD	-35' to -36' NAVD	-38' to -39' NAVD			
0.25	3.71	0.43			

ASTM	% FINER BY	WEIGHT AFTER REMOV	VING SHELL
MESH	-34' to -35' NAVD	-35' to -36' NAVD	-38' to -39' NAVD
#10	100.00	100.00	100.00
#18	99.56	93.91	99.40
#35	99.40	92.34	99.36
#60	98.96	90.75	99.21
#70	97.96	88.52	98.76
#100	63.78	37.68	85.96
#120	47.05	14.96	74.57
#170	37.91	2.47	67.53
#200	36.11	0.40	66.81
	STATISTICS (EX	KCLUDING SHELL)	
MEDIAN GRAIN SIZE (mm)	0.14	0.18	N/A
MEAN GRAIN SIZE (mm)	N/A	0.17	N/A
SORTING (σ)	N/A	0.81	N/A

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



- · Geotechnical Engineering
- · Construction Materials Testing

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-11

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)				
-28' to -29' NAVD	-30' to -31' NAVD	-31' to -32' NAVD	-33' to -34' NAVD	-36' to -37' NAVD
0.19	0.12	0.08	0.00	0.00

	%	FINER BY WEI	GHT AFTER R	EMOVING SHE	LL
ASTM MESH	-28' to -29' NAVD	-30' to -31' NAVD	-31' to -32' NAVD	-33' to -34' NAVD	-36' to -37' NAVD
#10	100.00	100.00	100.00	100.00	100.00
#18	99.45	99.82	99.82	99.97	100.00
#35	98.62	99.78	99.60	99.86	99.90
#60	94.72	99.43	98.89	99.43	98.82
#70	89.78	98.87	97.33	96.58	94.13
#100	78.43	86.52	47.34	34.35	23.06
#120	73.60	68.61	29.50	21.36	8.74
#170	67.75	52.79	22.09	16.41	2.34
#200	61.64	47.19	20.49	14.77	1.65
	STAT	ISTICS (EXCLU	DING SHELL)		
MEDIAN GRAIN SIZE (mm)	N/A	0.08	0.17	0.17	0.18
MEAN GRAIN SIZE (mm)	N/A	N/A	N/A	0.14	0.18
SORTING (σ)	N/A	N/A	N/A	N/A	0.25

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



· Construction Materials Testing

PROJECT NAME: Anchorage Basin Sand Source Investigation

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-12

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)				
-26' to -27' NAVD	-27' to -28' NAVD	-29' to -30' NAVD	-32' to -33' NAVD	
2.93	0.33	0.98	1.09	

ASTM	% FINER BY WEIGHT AFTER REMOVING SHELL				
MESH	-26' to -27' NAVD	-27' to -28' NAVD	-29' to -30' NAVD	-32' to -33' NAVD	
#10	100.00	100.00	100.00	100.00	
#18	95.36	99.20	98.37	98.70	
#35	89.97	98.97	97.74	98.55	
#60	60.37	98.33	96.96	98.07	
#70	32.48	97.32	96.22	97.06	
#100	11.33	87.59	93.23	41.58	
#120	4.76	80.24	90.43	22.62	
#170	1.93	75.08	85.86	10.17	
#200	1.53	73.04	82.50	7.91	
	STATIS	STICS (EXCLUDING	SHELL)		
MEDIAN GRAIN SIZE (mm)	0.22	N/A	N/A	0.17	
MEAN GRAIN SIZE (mm)	0.24	N/A	N/A	0.15	
SORTING (σ)	0.67	N/A	N/A	N/A	

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



- · Geotechnical Engineering
- · Construction Materials Testing

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-13

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)				
-32' to -33'	-34' to -35'	-35' to -36'	-37' to -38'	-40' to -41'
NAVD	NAVD	NAVD	NAVD	NAVD
12.15	4.65	0.01	0.38	0.15

	%	FINER BY WEI	GHT AFTER R	EMOVING SHE	LL
ASTM	-32' to -33'	-34' to -35'	-35' to -36'	-37' to -38'	-40' to -41'
MESH	NAVD	NAVD	NAVD	NAVD	NAVD
#10	100.00	100.00	100.00	100.00	100.00
#18	79.37	90.31	99.92	99.42	99.59
#35	67.10	83.72	99.79	99.29	99.38
#60	43.35	67.44	99.34	98.90	98.78
#70	28.25	50.65	98.49	98.03	97.23
#100	10.10	23.45	55.94	42.46	39.74
#120	5.66	15.35	31.73	21.53	19.20
#170	2.42	11.45	22.01	10.85	8.00
#200	1.92	10.70	18.83	8.53	5.21
	STAT	ISTICS (EXCLU	DING SHELL)		
MEDIAN GRAIN SIZE (mm)	0.28	0.21	0.16	0.17	0.17
MEAN GRAIN SIZE (mm)	0.44	0.25	N/A	0.16	0.16
SORTING (σ)	1.24	N/A	N/A	N/A	0.38

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



- · Geotechnical Engineering
- · Construction Materials Testing

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-14

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	% FINER BY WEIGHT AFTER REMOVING SHELL			
MESH	-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 (EX	(CLUDING SHELL)		
MEDIAN GRAIN SIZE (mm)	0.15	0.17	0.18	
MEAN GRAIN SIZE (mm)	N/A	0.16	N/A	
SORTING (σ)	N/A	N/A	N/A	

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



· Construction Materials Testing

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

CLIENT: HDR Engineering, Inc.

**BORING ID.:** AA-14

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

ASTM	% FINER BY	WEIGHT AFTER REMOV	VING SHELL
MESH	-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 (EX	XCLUDING SHELL)	
MEDIAN GRAIN SIZE (mm)	0.17	0.17	0.15
MEAN GRAIN SIZE (mm)	0.17	0.15	N/A
SORTING (σ)	N/A	N/A	N/A

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



- · Geotechnical Engineering
- · Construction Materials Testing

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-15

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)				
-30' to -31' NAVD -31' to -32' NAVD -33' to -34' NAVD				
0.18	0.46	1.69		

ASTM	% FINER BY	WEIGHT AFTER REMOV	VING SHELL
MESH	-30' to -31' NAVD	-31' to -32' NAVD	-33' to -34' NAVD
#10	100.00	100.00	100.00
#18	99.49	99.23	97.51
#35	98.87	98.92	96.82
#60	96.01	97.80	95.74
#70	84.61	94.27	92.94
#100	26.70	57.36	47.80
#120	13.73	48.74	28.02
#170	7.68	43.13	22.36
#200	6.42	40.84	21.54
	STATISTICS (EX	CLUDING SHELL)	
MEDIAN GRAIN SIZE (mm)	0.17	0.14	0.17
MEAN GRAIN SIZE (mm)	0.17	N/A	N/A
SORTING (σ)	N/A	N/A	N/A

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



· Construction Materials Testing

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

CLIENT: HDR Engineering, Inc.

**BORING ID.:** AA-15

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)				
-36' to -37' NAVD -39' to -40' NAVD -42' to -43' NAVD				
1.05	3.61	0.04		

ASTM	% FINER BY	WEIGHT AFTER REMOV	VING SHELL
MESH	-36' to -37' NAVD	-39' to -40' NAVD	-42' to -43' NAVD
#10	100.00	100.00	100.00
#18	98.31	94.93	99.91
#35	97.94	93.07	99.84
#60	97.09	84.55	99.43
#70	93.51	66.40	87.13
#100	54.94	21.70	21.03
#120	42,23	11.08	10.49
#170	35.17	7.28	6.41
#200	33.32	6.80	5.74
	STATISTICS (EX	KCLUDING SHELL)	
MEDIAN GRAIN SIZE (mm)	0.15	0.19	0.18
MEAN GRAIN SIZE (mm)	N/A	0.19	0.18
SORTING (σ)	N/A	N/A	N/A

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



- · Geotechnical Engineering
- · Construction Materials Testing

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-16

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)				
-28' to -29' NAVD -30' to -31' NAVD -32' to -33' NAVD				
0.00	0.17	0.49		

ASTM	% FINER BY	WEIGHT AFTER REMOV	VING SHELL
MESH	-28' to -29' NAVD	-30' to -31' NAVD	-32' to -33' NAVD
#10	100.00	100.00	100.00
#18	100.00	99.75	99.12
#35	99.97	99.66	98.82
#60	99.85	99.31	98.43
#70	99.68	98.65	97.75
#100	88.14	54.01	89.16
#120	48.85	34.65	80.28
#170	25.65	23.40	73.34
#200	18.71	20.79	72.13
	STATISTICS (EX	(CLUDING SHELL)	
MEDIAN GRAIN SIZE (mm)	0.13	0.15	N/A
MEAN GRAIN SIZE (mm)	N/A	N/A	N/A
SORTING (σ)	N/A	N/A	N/A

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



· Construction Materials Testing

PROJECT NAME: Anchorage Basin Sand Source Investigation

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-16

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)				
-34' to -35' NAVD				
0.00	0.07	6.50		

ASTM	% FINER BY	WEIGHT AFTER REMOV	VING SHELL
MESH	-34' to -35' NAVD	-36' to -37' NAVD	-39' to -40' NAVD
#10	100.00	100.00	100.00
#18	100.00	99.85	90.86
#35	99.98	99.70	88.34
#60	99.80	99.44	80.20
#70	99.44	99.15	63.78
#100	74.51	78.63	20.33
#120	54.25	54.92	8.85
#170	38.84	39.20	2.99
#200	34.63	35.56	1.95
	STATISTICS (EX	KCLUDING SHELL)	
MEDIAN GRAIN SIZE (mm)	0.13	0.12	0.19
MEAN GRAIN SIZE (mm)	N/A	N/A	0.20
SORTING (σ)	N/A	N/A	0.71

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



- · Geotechnical Engineering
- · Construction Materials Testing

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-17

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)					
-31' to -32'					
NAVD	NAVD	NAVD	NAVD	NAVD	
0.07 3.57 0.18 0.18 0.00					

	%	FINER BY WEI	GHT AFTER RI	EMOVING SHE	LL
ASTM MESH	-31' to -32' NAVD	-33' to -34' NAVD	-34' to -35' NAVD	-37' to -38' NAVD	-40' to -41' NAVD
#10	100.00	100.00	100.00	100.00	100.00
#18	99.72	94.00	99.53	99.64	99.98
#35	99.02	91.47	99.26	99.44	99.89
#60	93.58	86.25	98.73	98.89	99.66
#70	73.49	74.26	97.94	97.86	99.34
#100	22.95	34.04	65.38	39.93	65.35
#120	11.42	24.41	40.99	20.93	40.24
#170	4.21	19.37	23.22	11.69	22.62
#200	3.13	18.26	18.46	10.03	18.96
	STAT	ISTICS (EXCLU	DING SHELL)		
MEDIAN GRAIN SIZE (mm)	0.19	0.18	0.14	0.16	0.14
MEAN GRAIN SIZE (mm)	0.18	N/A	N/A	0.15	N/A
SORTING (σ)	0.37	N/A	N/A	N/A	N/A

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



- · Geotechnical Engineering
- · Construction Materials Testing

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-18

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)					
-30' to -31'	-33' to -34'	-35' to -36'	-37' to -38'	-39' to -40'	
NAVD	NAVD	NAVD	NAVD	NAVD	
0.33	0.13	0.92	0.04	0.03	

	%	FINER BY WEI	GHT AFTER RI	EMOVING SHE	LL
ASTM MESH	-30' to -31' NAVD	-33' to -34' NAVD	-35' to -36' NAVD	-37' to -38' NAVD	-39' to -40' NAVD
#10	100.00	100.00	100.00	100.00	100.00
#18	99.47	99.72	98.20	99.88	99.92
#35	99.23	99.39	96.64	99.61	99.87
#60	98.62	97.91	92.16	99.22	99.69
#70	97.22	94.66	88.18	98.30	99.22
#100	29.15	28.94	59.31	64.78	41.17
#120	11.76	10.88	42.55	48.43	18.25
#170	3.80	1.70	32.13	37.17	5.28
#200	2.65	1.05	30.51	34.93	3.28
	STAT	ISTICS (EXCLU	JDING SHELL)		
MEDIAN GRAIN SIZE (mm)	0.17	0.17	0.14	0.14	0.17
MEAN GRAIN SIZE (mm)	0.17	0.17	N/A	N/A	0.16
SORTING (σ)	0.25	0.24	N/A	N/A	0.33

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



- · Geotechnical Engineering
- · Construction Materials Testing

CLIENT: HDR Engineering, Inc.

**BORING ID.:** AA-19

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)				
-28' to -29' NAVD	-30' to -31' NAVD	-33' to -34' NAVD		
0.12	0.42	0.25		

ASTM	% FINER BY	WEIGHT AFTER REMOVIN	NG SHELL
MESH	-28' to -29' NAVD	-30' to -31' NAVD	-33' to -34' NAVD
#10	100.00	100.00	100.00
#18	99.77	99.20	99.43
#35	99.59	98.93	99.08
#60	99.19	98.55	98.19
#70	98.58	98.00	95.53
#100	87.41	90.89	37.89
#120	76.89	84.88	18.92
#170	59.27	78.48	10.03
#200	41.80	74.81	8.68
	STATISTICS (E	XCLUDING SHELL)	
MEDIAN GRAIN SIZE (mm)	0.08	N/A	0.16
MEAN GRAIN SIZE (mm)	N/A	N/A	0.15
SORTING (σ)	N/A	N/A	N/A

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



- · Geotechnical Engineering
- · Construction Materials Testing

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-19

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)				
-34' to -35' NAVD   -37' to -38' NAVD   -39' to -40' NAVD   -41' to -42' NAVD				
N/A	0.12	0.27	2.56	

ASTM	% F	INER BY WEIGHT A	FTER REMOVING SI	HELL
MESH	-34' to -35' NAVD	-37' to -38' NAVD	-39' to -40' NAVD	-41' to -42' NAVD
#10	N/A	100.00	100.00	100.00
#18	N/A	99.76	99.65	96.54
#35	N/A	99.67	99.61	96.00
#60	N/A	99.44	99.40	95.23
#70	N/A	99.09	98.18	92.73
#100	N/A	84.58	24.88	52.87
#120	N/A	65.99	10.90	35.86
#170	N/A	55.13	5.90	25.91
#200	92.90	52.44	5.23	24.52
	STATIS	STICS (EXCLUDING	SHELL)	
MEDIAN GRAIN SIZE (mm)	N/A	N/A	0.17	0.15
MEAN GRAIN SIZE (mm)	N/A	N/A	0.17	N/A
SORTING (σ)	N/A	N/A	N/A	N/A

<sup>\*</sup>AA-19; -34' to -35' NAVD was only passed through the -#200 sieve.

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



- · Geotechnical Engineering
- · Construction Materials Testing

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-20

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)				
-32' to -33' NAVD	-35' to -36' NAVD	-38' to -39' NAVD	-40' to -41' NAVD	
16.46	0.03	0.00	0.05	

ASTM	% F	INER BY WEIGHT A	FTER REMOVING SH	IELL
MESH	-32' to -33' NAVD	-35' to -36' NAVD	-38' to -39' NAVD	-40' to -41' NAVD
#10	100.00	100.00	100.00	100.00
#18	78.06	99.89	100.00	99.87
#35	73.88	99.80	99.95	99.70
#60	65.43	99.64	99.81	98.65
#70	52.81	99.45	99.57	87.62
#100	19.82	73.90	78.02	23.79
#120	11.92	51.90	56.54	11.94
#170	7.53	34.69	42.16	4.11
#200	7.07	30.57	37.79	3.22
	STATIS	STICS (EXCLUDING	SHELL)	
MEDIAN GRAIN SIZE (mm)	0.20	0.13	0.12	0.18
MEAN GRAIN SIZE (mm)	0.32	N/A	N/A	0.18
SORTING (σ)	N/A	N/A	N/A	0.30

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



- · Geotechnical Engineering
- · Construction Materials Testing

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-21

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)				
-33' to -34' NAVD   -35' to -36' NAVD   -37' to -38' NAVD   -40' to -41' NAVD				
0.68	0.12	0.15	0.01	

ASTM	% FINER BY WEIGHT AFTER REMOVING SHELL					
MESH	-33' to -34' NAVD	-35' to -36' NAVD	-37' to -38' NAVD	-40' to -41' NAVD		
#10	100.00	100.00	100.00	100.00		
#18	98.97	99.76	99.72	99.93		
#35	98.48	99.70	99.64	99.88		
#60	96.90	99.62	99.50	99.69		
#70	93.79	99.50	99.32	99.43		
#100	36.83	94.71	89.70	72.55		
#120	15.94	85.45	64.04	43.10		
#170	5.49	76.93	48.35	27.11		
#200	3.50	73.73	44.78	22.77		
	STATIS	STICS (EXCLUDING	SHELL)			
MEDIAN GRAIN SIZE (mm)	0.17	N/A	0.10	0.14		
MEAN GRAIN SIZE (mm)	0.16	N/A	N/A	N/A		
SORTING (σ)	0.33	N/A	N/A	N/A		

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



- · Geotechnical Engineering
- · Construction Materials Testing

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-22

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)				
-31' to -32'   -32' to -33'   -33' to -34'   -35' to -36'   -38' to -39'   NAVD   NAVD   NAVD   NAVD				
0.02	N/A	0.26	0.00	0.84

ASTM MESH	% FINER BY WEIGHT AFTER REMOVING SHELL					
	-31' to -32' NAVD	-32' to -33' NAVD	-33' to -34' NAVD	-35' to -36' NAVD	-38' to -39' NAVD	
#10	100.00	N/A	100.00	100.00	100.00	
#18	99.98	N/A	99.58	99.99	99.02	
#35	99.94	N/A	99.38	99.98	98.88	
#60	99.72	N/A	98.32	99.92	98.46	
#70	99.12	N/A	97.30	99.80	97.79	
#100	93.74	N/A	57.08	91.79	62.05	
#120	86.98	N/A	37.65	82.10	46.44	
#170	65.38	N/A	28.51	74.11	39.74	
#200	46.05	93.30	26.39	72.22	38.56	
STATISTICS (EXCLUDING SHELL)						
MEDIAN GRAIN SIZE (mm)	0.08	N/A	0.15	N/A	0.14	
MEAN GRAIN SIZE (mm)	N/A	N/A	N/A	N/A	N/A	
SORTING (σ)	N/A	N/A	N/A	N/A	N/A	

<sup>\*</sup>AA-22; -32' to -33' NAVD was only passed through the #10 sieve.

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



- · Geotechnical Engineering
- · Construction Materials Testing

**CLIENT:** HDR Engineering, Inc.

**BORING ID.:** AA-23

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)							
-32' to -33'	-34' to -35'	-36' to -37'	-39' to -40'	-41' to -42'			
NAVD	NAVD	NAVD	NAVD	NAVD			
0.00	0.02	0.00	0.00	0.00			

ASTM MESH	% FINER BY WEIGHT AFTER REMOVING SHELL						
	-32' to -33'	-34' to -35'	-36' to -37'	-39' to -40'	-41' to -42'		
	NAVD	NAVD	NAVD	NAVD	NAVD		
#10	100.00	100.00	100.00	100.00	100.00		
#18	99.85	99.91	99.98	100.00	99.98		
#35	99.70	99.67	99.96	99.95	99.93		
#60	99.28	99.26	99.85	99.76	99.76		
#70	98.38	98.97	99.71	99.31	99.49		
#100	61.43	66.78	54.84	77.39	58.16		
#120	32.20	49.00	33.34	56.65	29.41		
#170	27.42	35.28	28.54	42.74	12.37		
#200	23.36	31.58	20.20	39.19	8.85		
STATISTICS (EXCLUDING SHELL)							
MEDIAN GRAIN SIZE (mm)	0.15	0.13	0.15	0.12	0.15		
MEAN GRAIN SIZE (mm)	N/A	N/A	N/A	N/A	0.14		
SORTING (σ)	N/A	N/A	N/A	N/A	N/A		

<sup>\*</sup>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-24

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)			
-33' to -34' NAVD	-35' to -36' NAVD	-38' to -39' NAVD	-40' to -41' NAVD
0.21	0.77	0.00	0.02

ASTM	% FINER BY WEIGHT AFTER REMOVING SHELL			IELL
MESH	-33' to -34' NAVD	-35' to -36' NAVD	-38' to -39' NAVD	-40' to -41' NAVD
#10	100.00	100.00	100.00	100.00
#18	99.58	98.90	99.94	99.89
#35	99.34	98.78	99.89	99.84
#60	98.64	98.62	99.84	99.76
#70	97.30	98.41	99.81	99.67
#100	37.45	82.59	99.38	98.14
#120	14.23	63.36	96.94	89.18
#170	3.96	50.99	92.71	78.51
#200	0.93	49.00	91.47	76.45
	STATIS	STICS (EXCLUDING	SHELL)	
MEDIAN GRAIN SIZE (mm)	0.17	0.08	N/A	N/A
MEAN GRAIN SIZE (mm)	0.16	N/A	N/A	N/A
SORTING (σ)	0.31	N/A	N/A	N/A

<sup>\*</sup>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-25

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)			
-34' to -35' NAVD	-35' to -36' NAVD	-37' to -38' NAVD	-39' to -40' NAVD
0.11	0.83	0.00	0.00

ASTM	% F	% FINER BY WEIGHT AFTER REMOVING SHELL		
MESH	-34' to -35' NAVD	-35' to -36' NAVD	-37' to -38' NAVD	-39' to -40' NAVD
#10	100.00	100.00	100.00	100.00
#18	99.83	98.90	99.95	99.95
#35	99.72	98.65	99.89	99.93
#60	99.42	97.78	99.62	99.89
#70	98.80	95.46	99.08	99.84
#100	84.36	38.54	55.26	98.89
#120	73.02	18.09	24.42	88.83
#170	63.75	8.17	13.41	73.41
#200	57.36	6.29	10.78	68.05
The second secon	STATIS	STICS (EXCLUDING	SHELL)	
MEDIAN GRAIN SIZE (mm)	N/A	0.17	0.14	N/A
MEAN GRAIN SIZE (mm)	N/A	0.16	0.14	N/A
SORTING (σ)	N/A	N/A	N/A	N/A

<sup>\*</sup>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-26

PERCENT SHE	PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)			
-33' to -34' NAVD	-35' to -36' NAVD	-38' to -39' NAVD		
0.03	1.01	0.05		

ASTM	% FINER BY	WEIGHT AFTER REMOV	VING SHELL
MESH	-33' to -34' NAVD	-35' to -36' NAVD	-38' to -39' NAVD
#10	100.00	100.00	100.00
#18	99.88	98.49	99.91
#35	99.48	97.85	99.88
#60	98.73	96.43	99.80
#70	98.28	94.84	99.71
#100	72.78	65.93	96.76
#120	46.57	42.85	86.76
#170	26.45	26.96	72.78
#200	22.52	17.84	68.11
	STATISTICS (EX	(CLUDING SHELL)	
MEDIAN GRAIN SIZE (mm)	0.14	0.14	N/A
MEAN GRAIN SIZE (mm)	. N/A	N/A	N/A
SORTING (σ)	N/A	N/A	N/A

<sup>\*</sup>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-27

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)			
-35' to -36' NAVD	-36' to -37' NAVD	-38' to -39' NAVD	-40' to -41' NAVD
0.10	8.43	0.05	0.00

ASTM	% FINER BY WEIGHT AFTER REMOVING SHELL			IELL
MESH	-35' to -36' NAVD	-36' to -37' NAVD	-38' to -39' NAVD	-40' to -41' NAVD
#10	100.00	100.00	100.00	100.00
#18	99.68	90.44	99.89	99.99
#35	99.43	89.66	99.82	99.93
#60	98.84	88.12	99.66	99.71
#70	97.91	86.70	99.44	99.42
#100	81.69	73.83	86.03	81.02
#120	63.94	49.50	47.41	45.13
#170	53.04	31.32	29.17	24.48
#200	36.47	28.03	24.76	20.12
	STATIS	STICS (EXCLUDING	SHELL)	
MEDIAN GRAIN SIZE (mm)	0.08	0.13	0.13	0.13
MEAN GRAIN SIZE (mm)	N/A	N/A	N/A	N/A
SORTING (σ)	N/A	N/A	N/A	N/A

<sup>\*</sup>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-29

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)				
-30' to -31' NAVD   -31' to -32' NAVD   -34' to -35' NAVD   -37' to -38' NAVD				
N/A 0.01 0.01 N/A				

ASTM	% FINER BY WEIGHT AFTER REMOVING SHELL			IELL
MESH	-30' to -31' NAVD	-31' to -32' NAVD	-34' to -35' NAVD	-37' to -38' NAVD
#10	N/A	100.00	100.00	N/A
#18	N/A	99.94	99.96	N/A
#35	N/A	99.91	99.95	N/A
#60	N/A	99.70	99.84	N/A
#70	N/A	99.36	99.73	N/A
#100	N/A	89.64	94.08	N/A
#120	N/A	55.52	70.38	N/A
#170	N/A	31.73	49.10	N/A
#200	47.10	26.14	43.43	23.90
	STATIS	STICS (EXCLUDING	SHELL)	
MEDIAN GRAIN SIZE (mm)	N/A	0.13	0.09	N/A
MEAN GRAIN SIZE (mm)	N/A	N/A	N/A	N/A
SORTING (σ)	N/A	· N/A	N/A	N/A

<sup>\*</sup>AA-29; -30' to -31' NAVD and -37' to -38' NAVD were only passed through the -#200 sieve.

<sup>\*</sup>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.

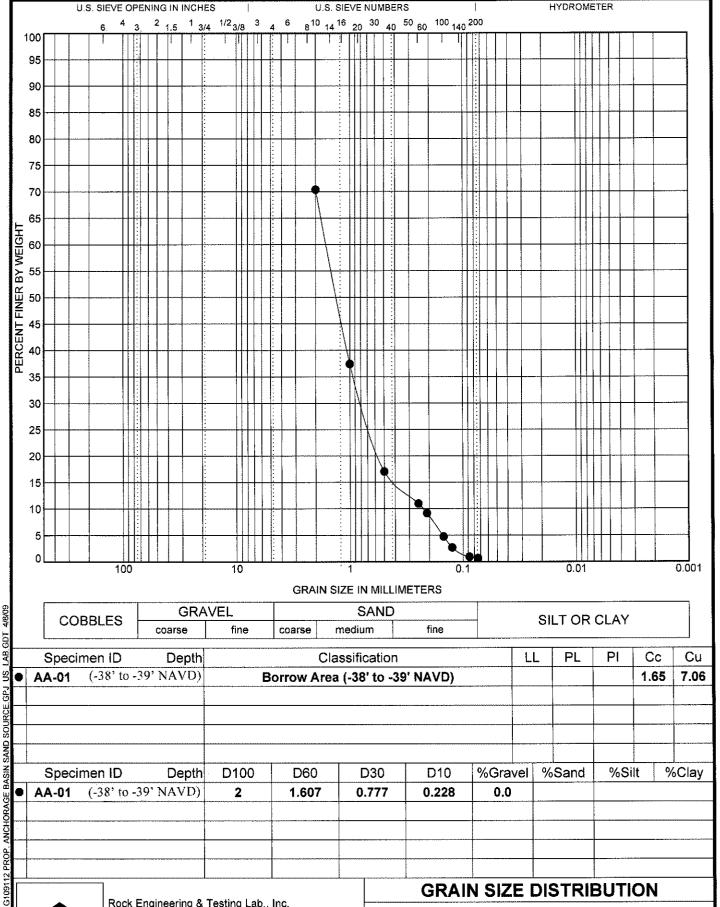
**SAMPLE ID.:** AA-30

PERCENT SHELL BY WEIGHT (BASED ON #10 SIEVE)			
-34' to -35' NAVD	-35' to -36' NAVD		
0.01 N/A			

ASTM	% FINER BY WEIGHT A	FTER REMOVING SHELL
MESH	-34' to -35' NAVD	-35' to -36' NAVD
#10	100.00	N/A
#18	99.98	N/A
#35	99.95	N/A
#60	99.89	N/A
#70	99.76	N/A
#100	96.42	N/A
#120	86.39	N/A
#170	75.18	N/A
#200	64.26	84.00
	STATISTICS (EXCLUDING S	SHELL)
MEDIAN GRAIN SIZE (mm)	N/A	N/A
MEAN GRAIN SIZE (mm)	N/A	N/A
SORTING (σ)	N/A	N/A

<sup>\*</sup>AA-30; -34' to -35' NAVD was only passed through the -#200 sieve.

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

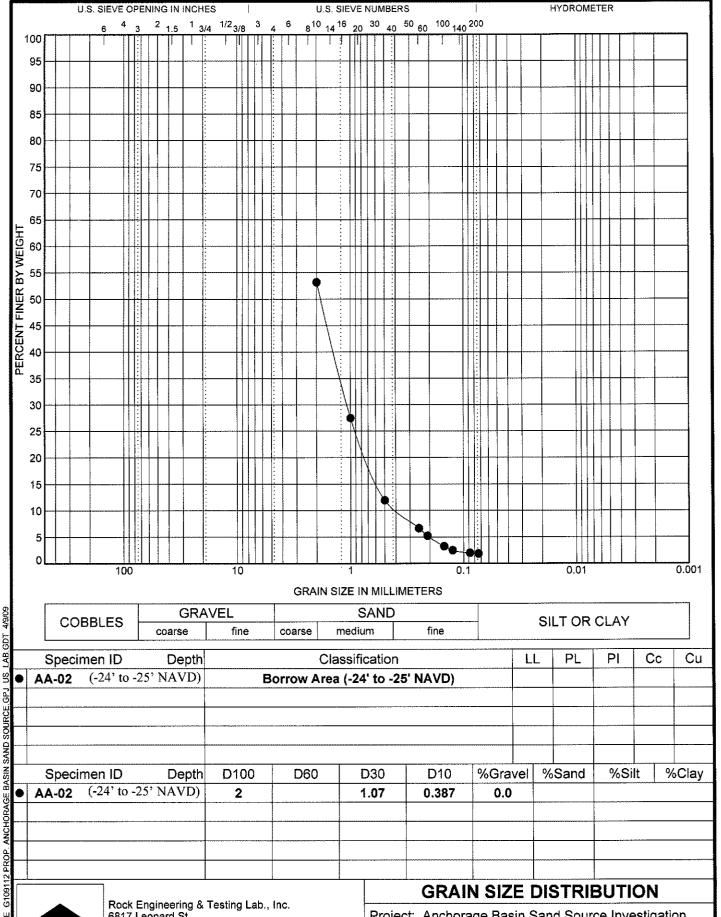




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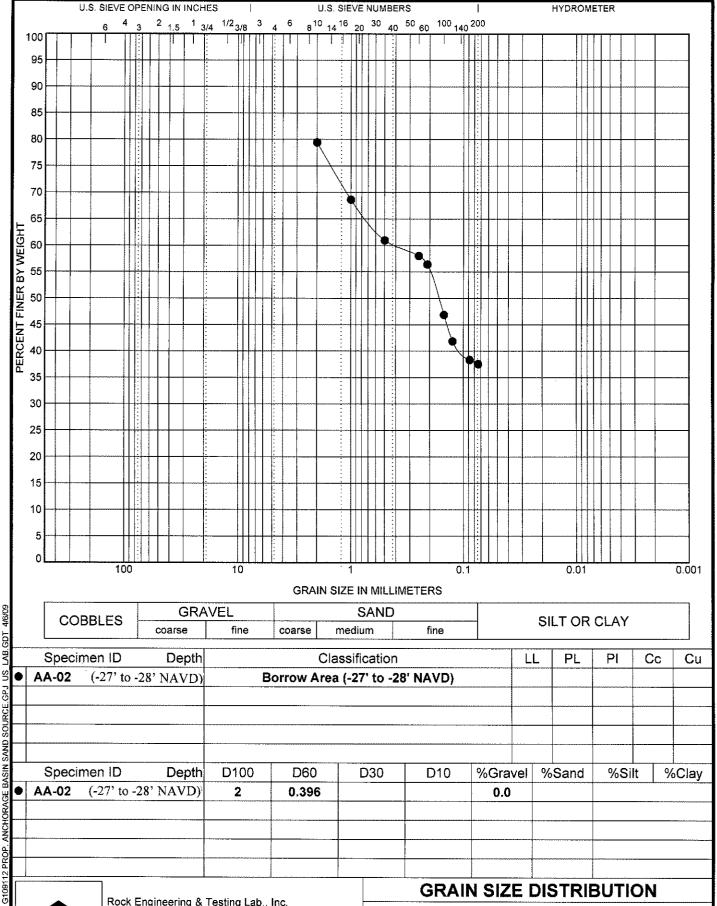
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Location: Anchorage Basin; Galveston, Texas

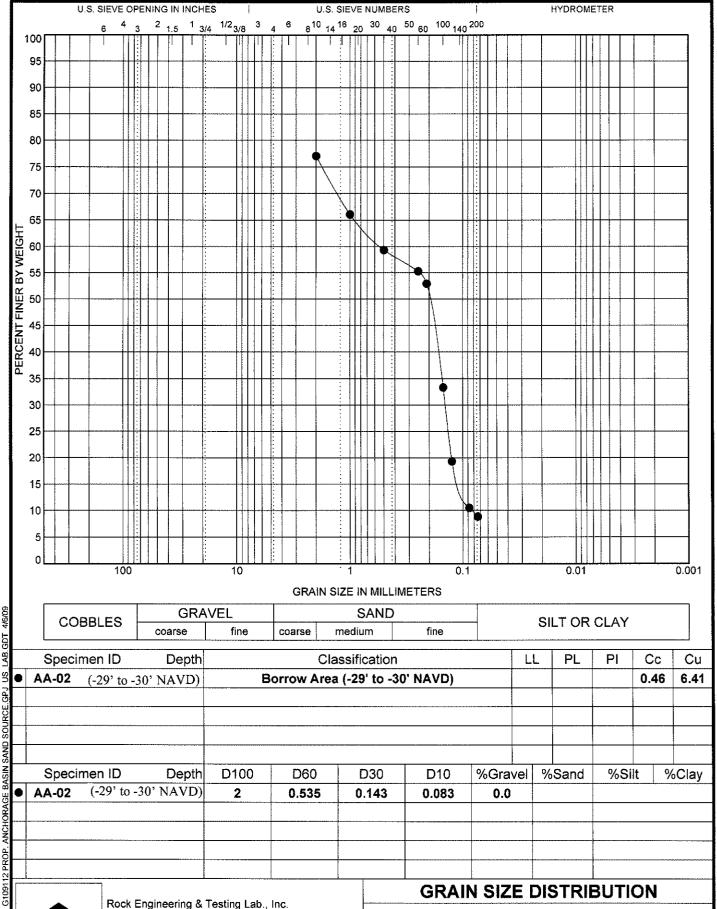




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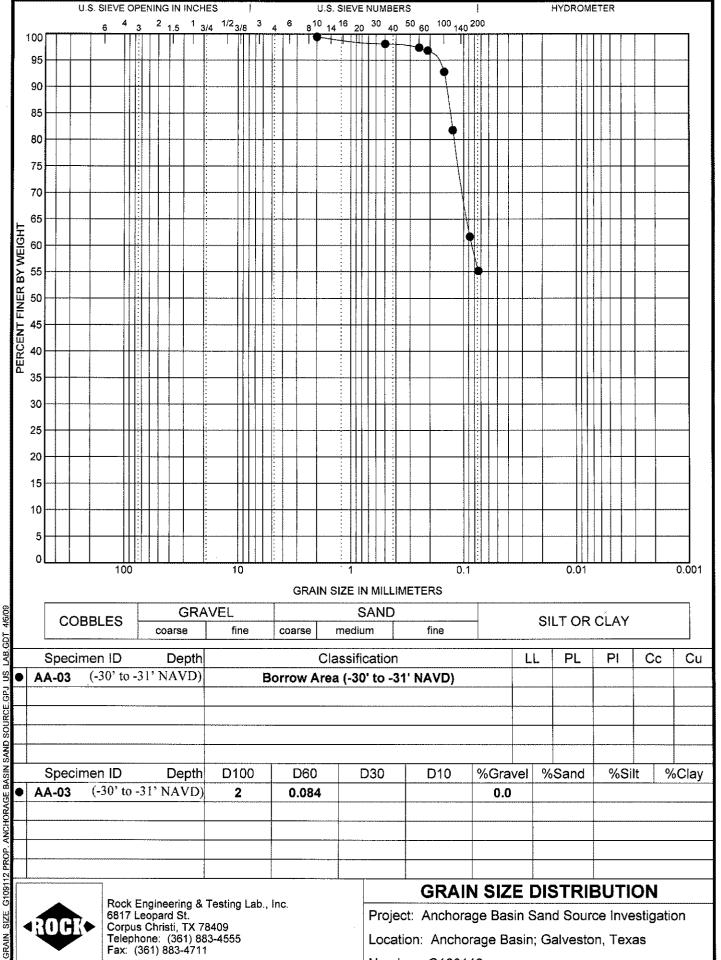


GRAIN SIZE

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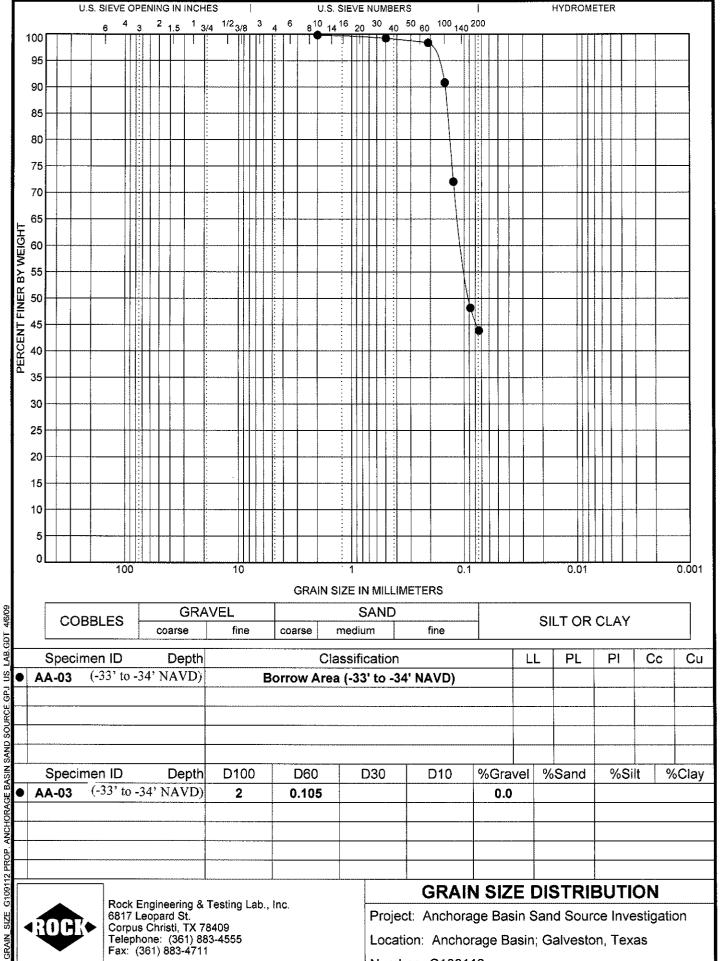
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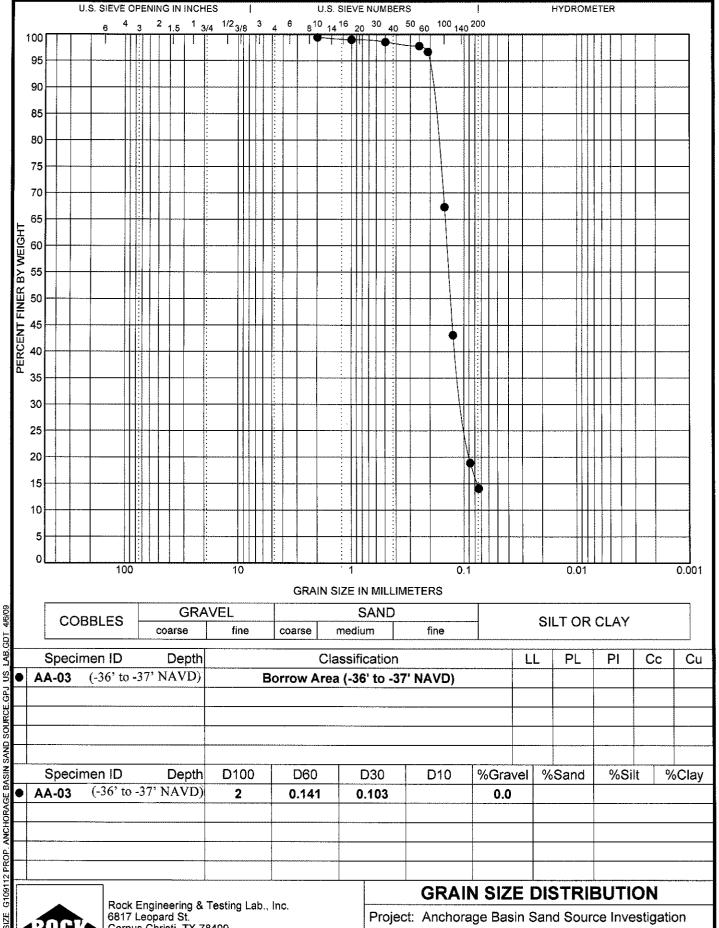
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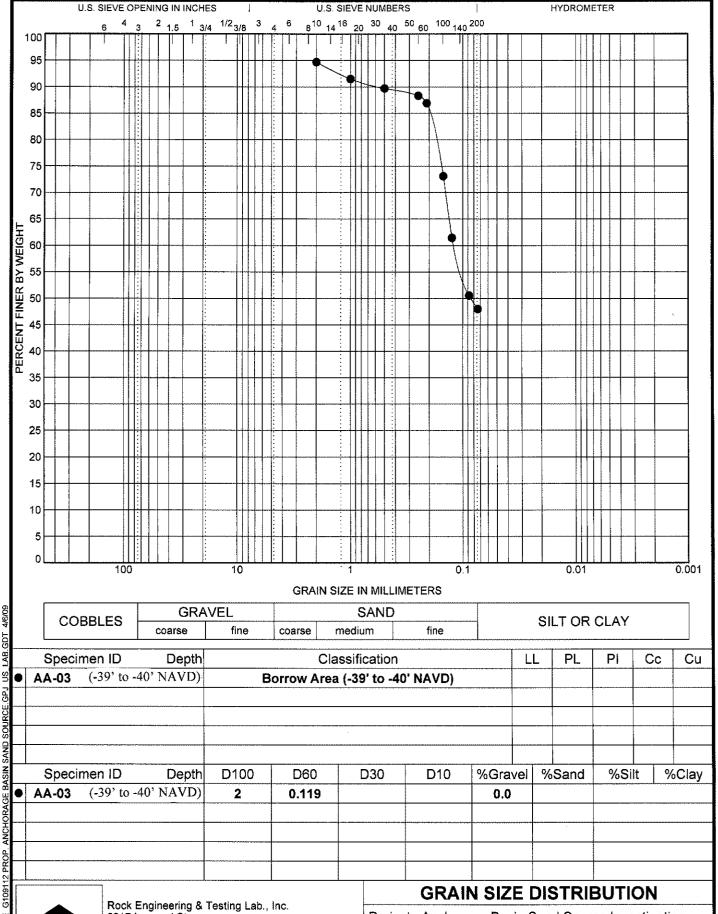
Location: Anchorage Basin; Galveston, Texas



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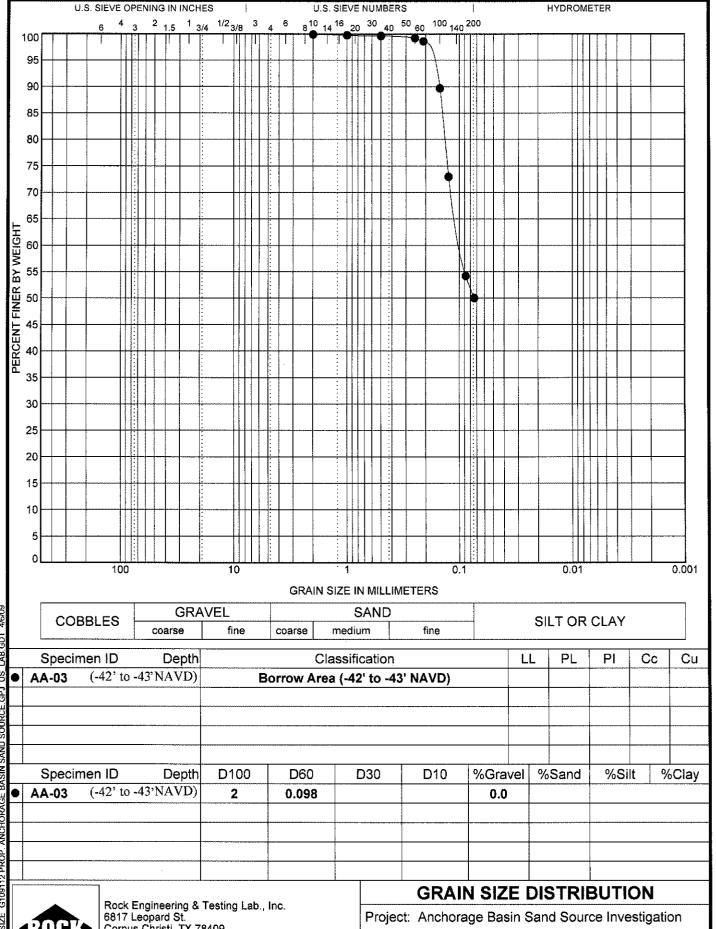


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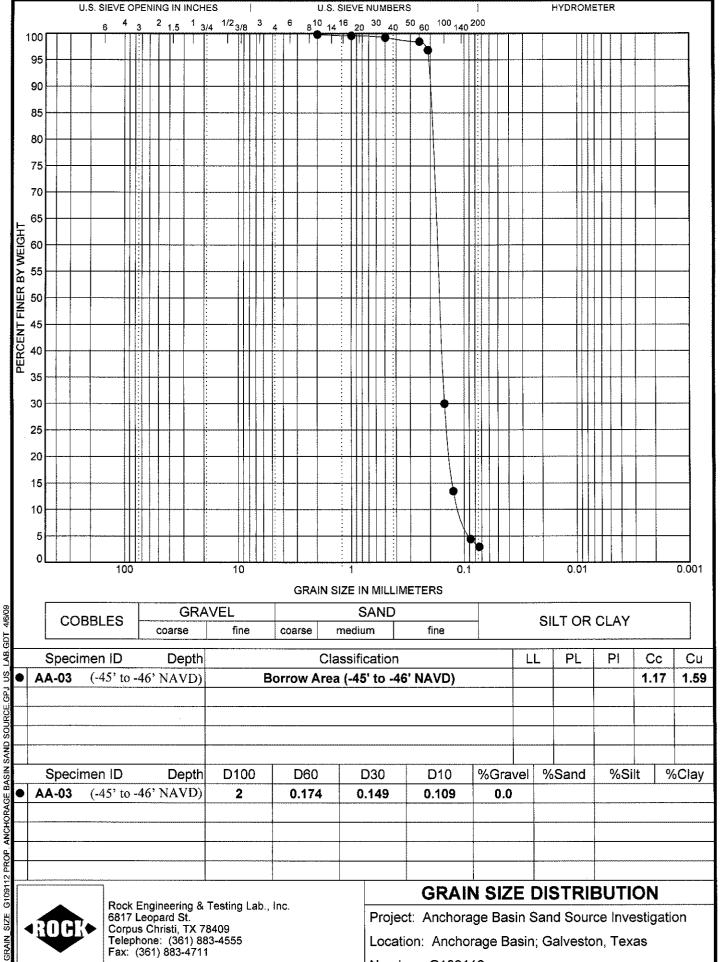
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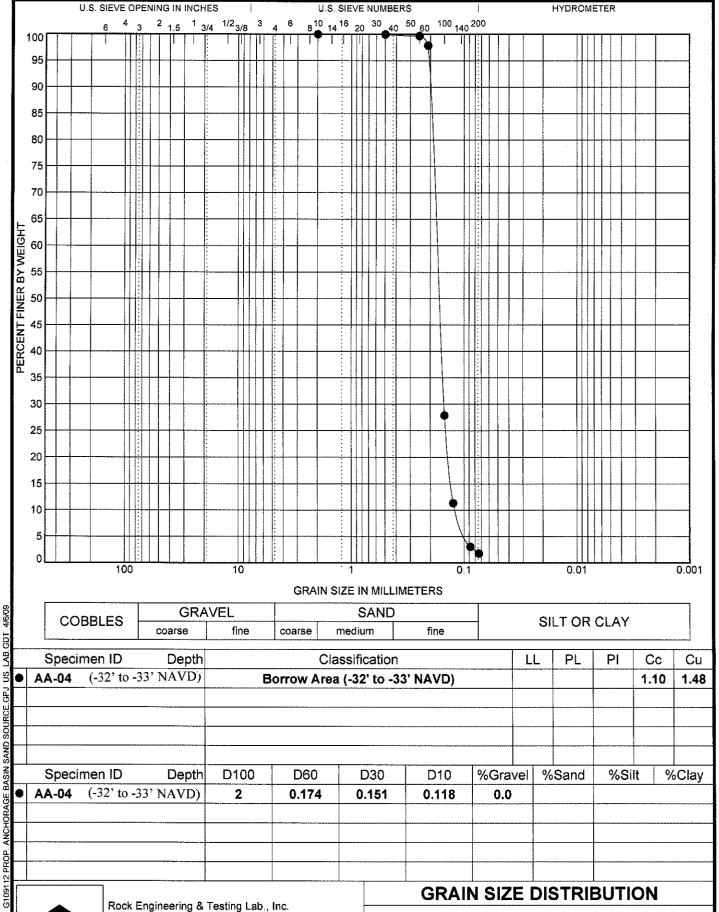




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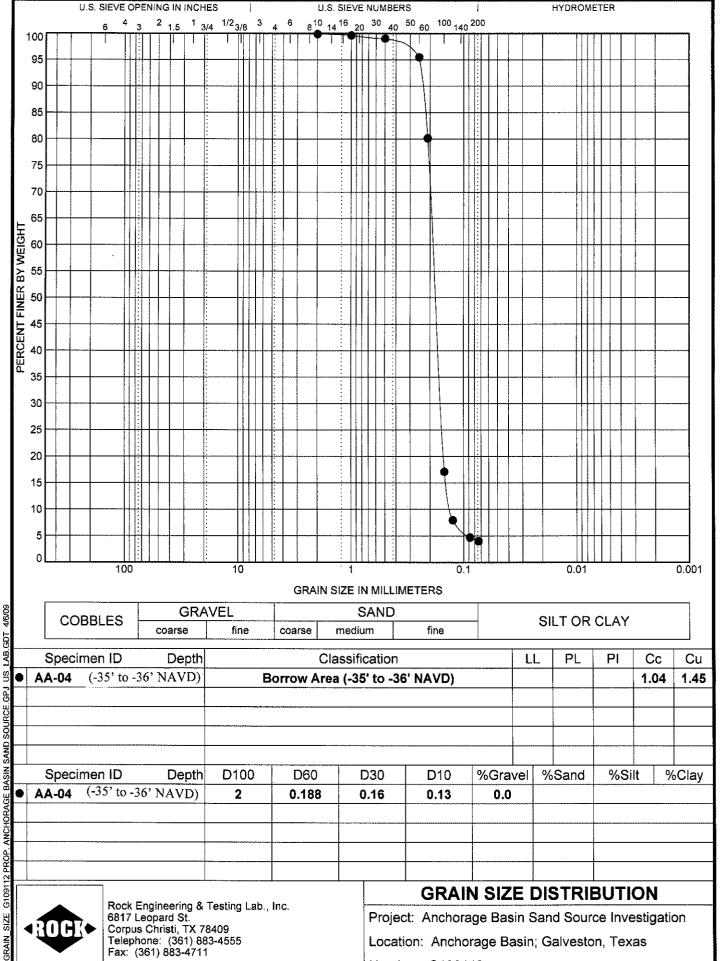




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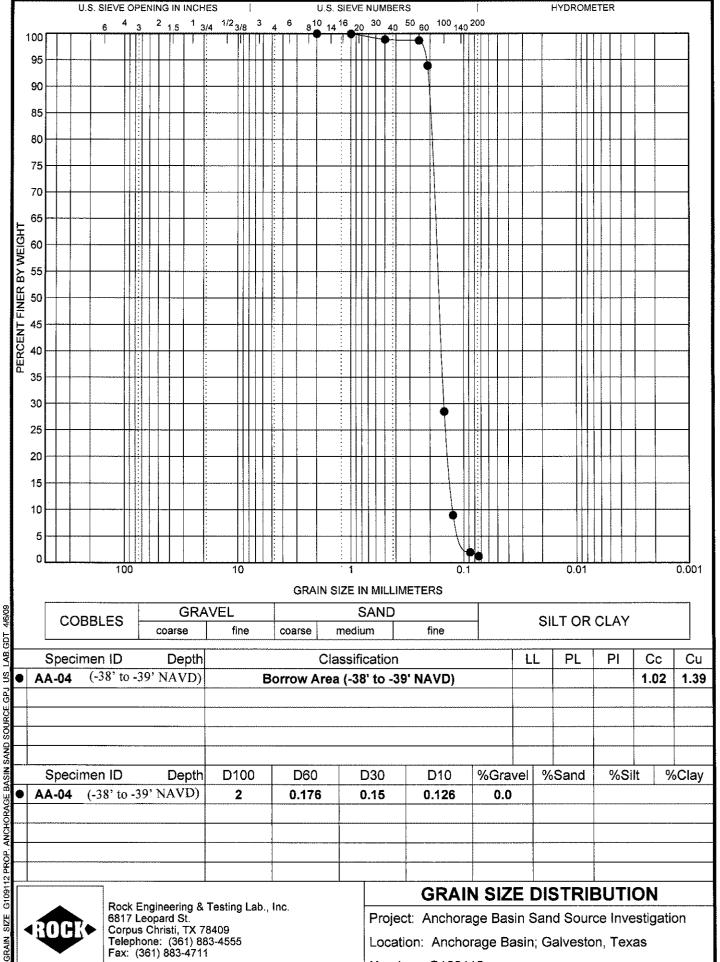
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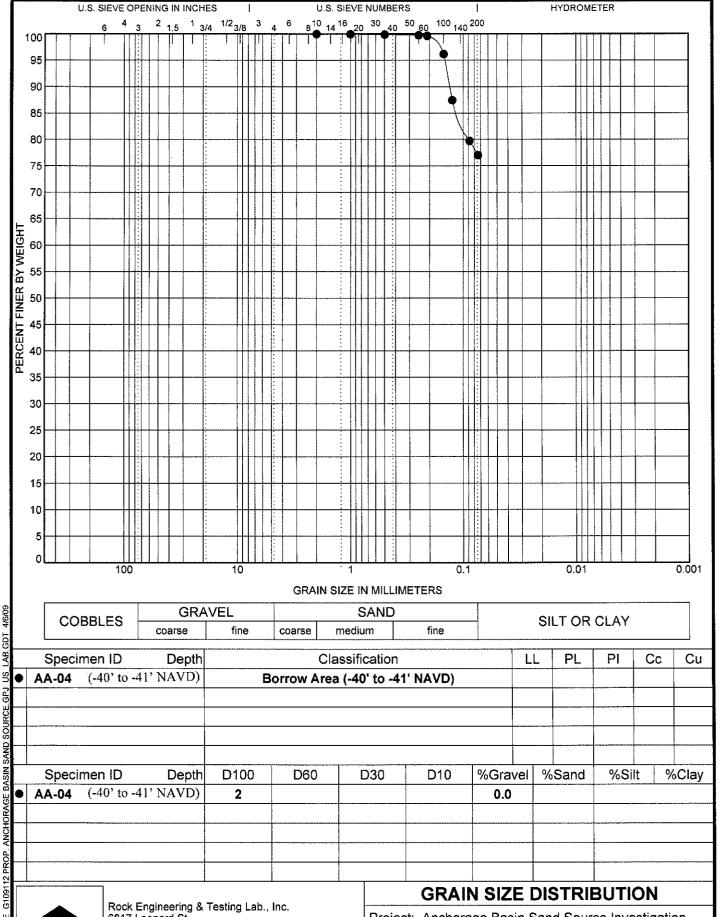
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Location: Anchorage Basin; Galveston, Texas

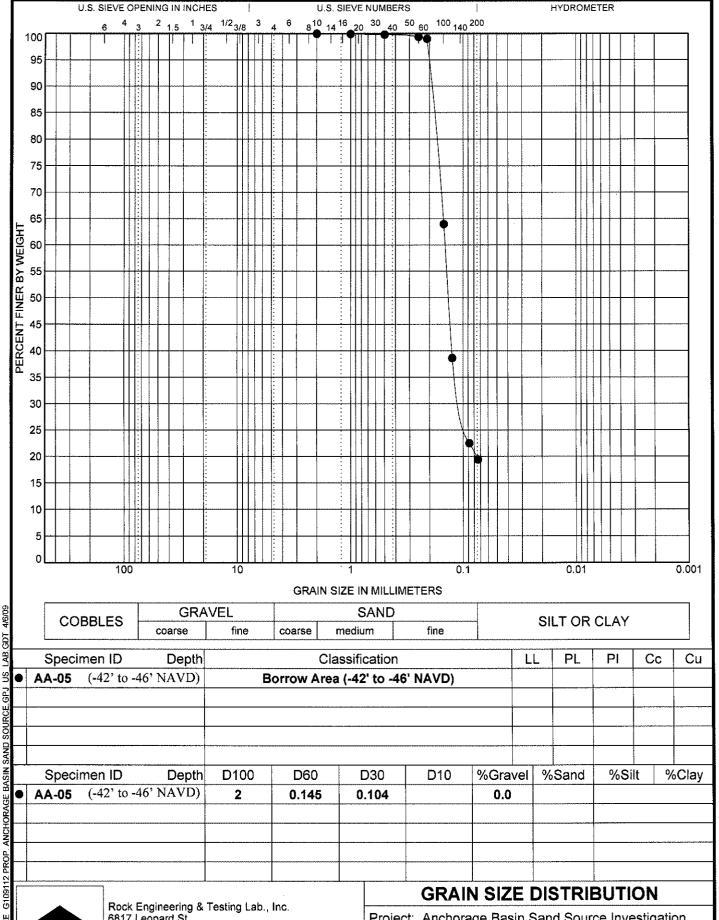




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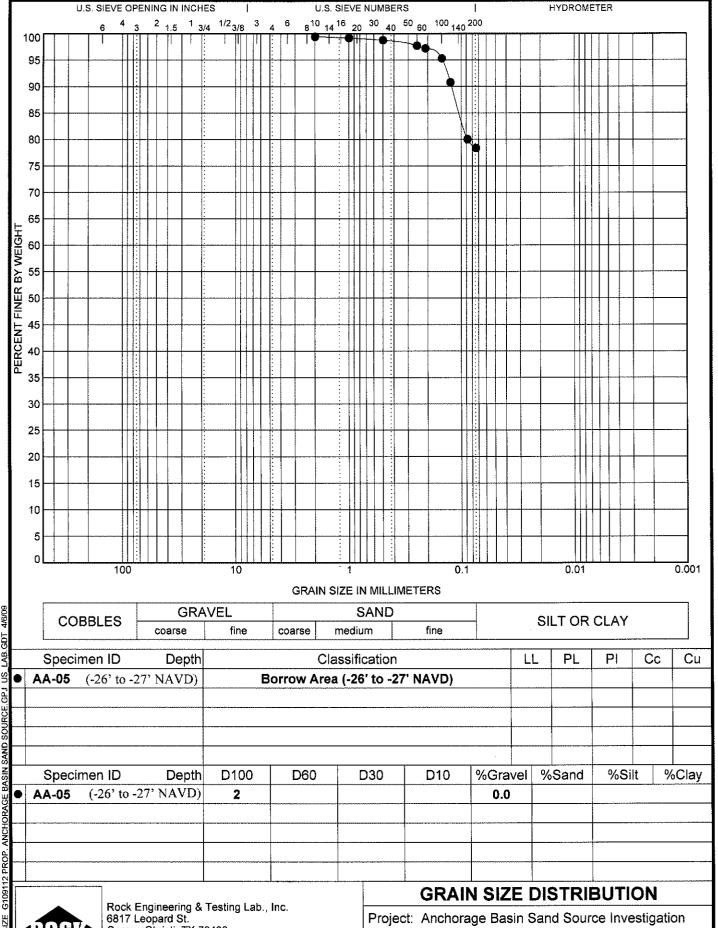
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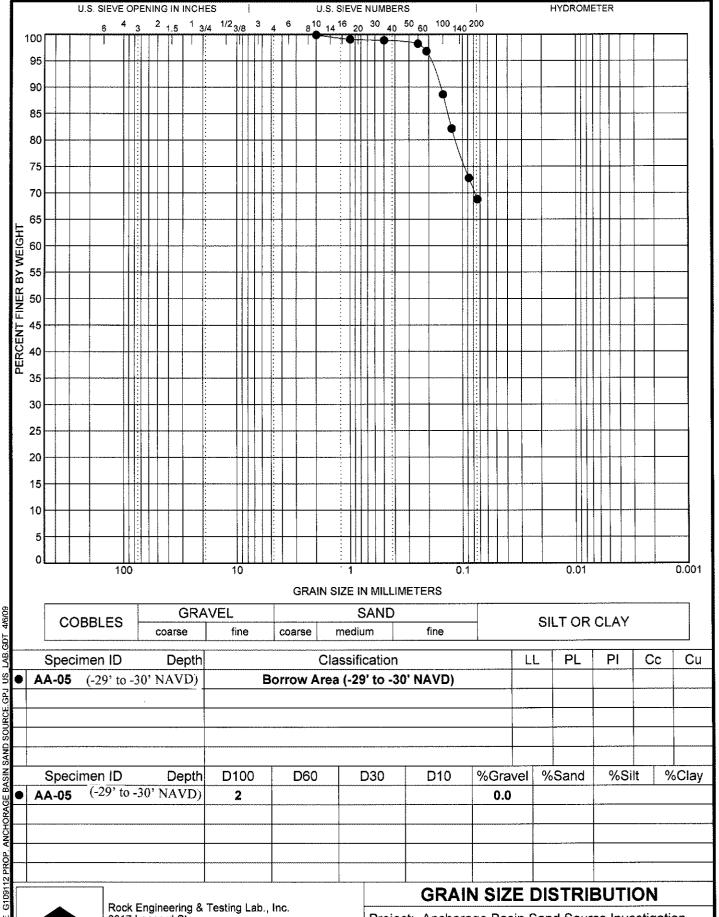
Location: Anchorage Basin; Galveston, Texas



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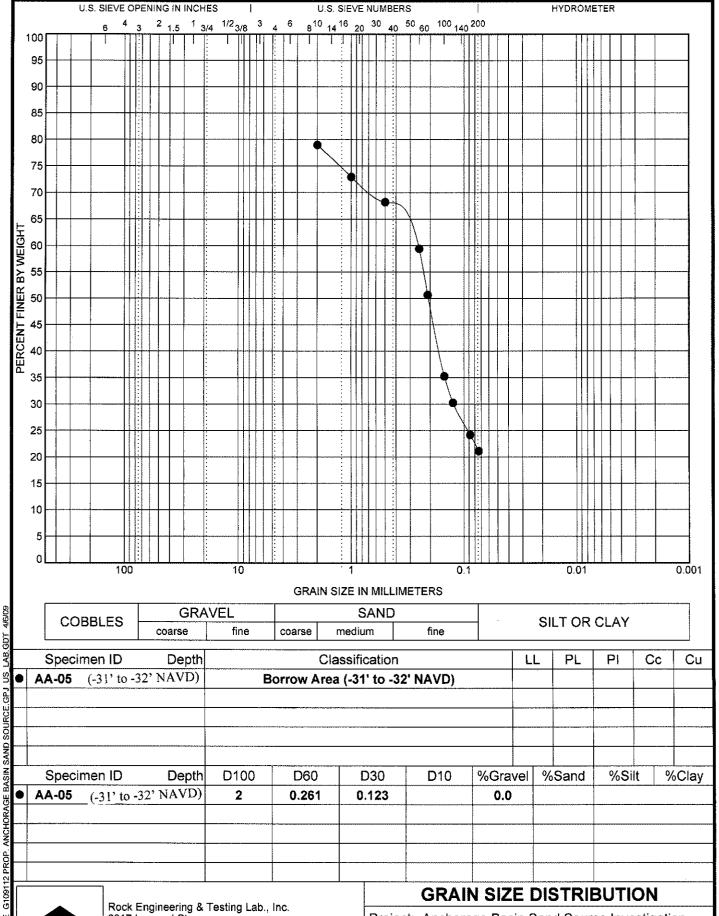




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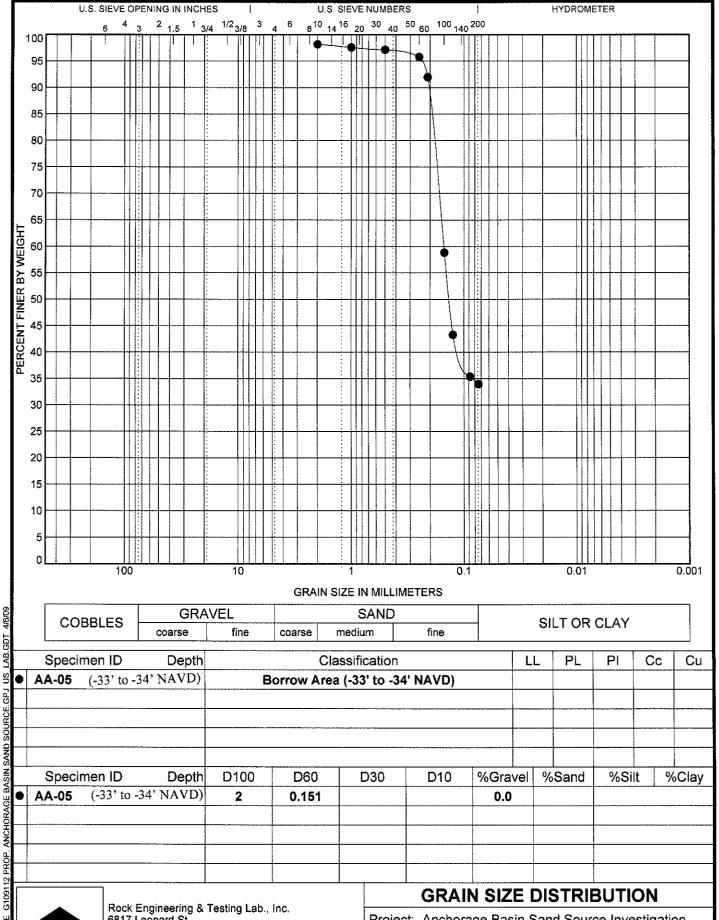




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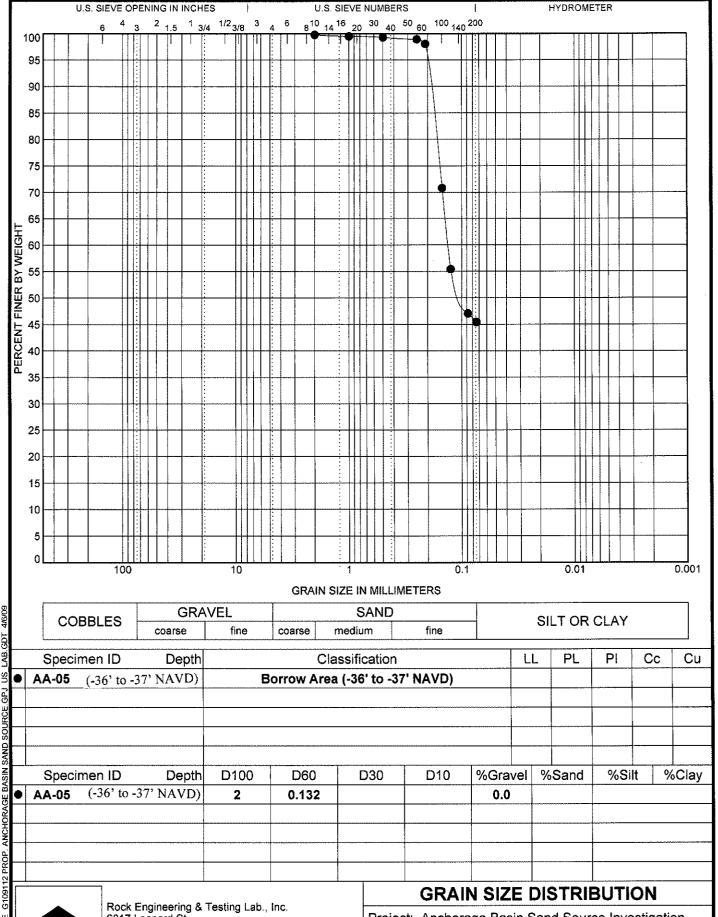




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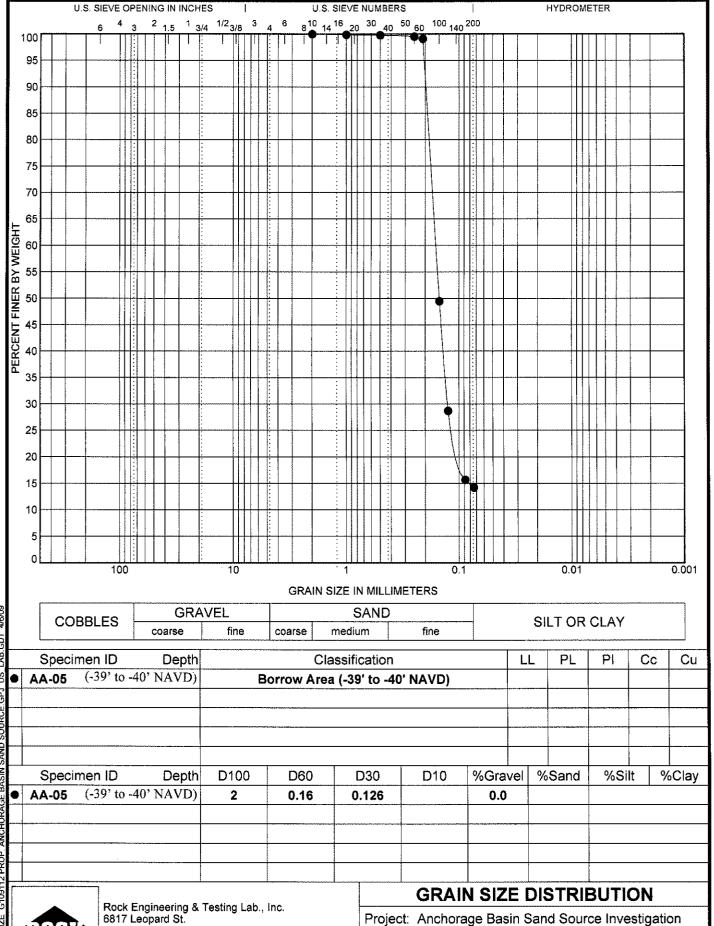




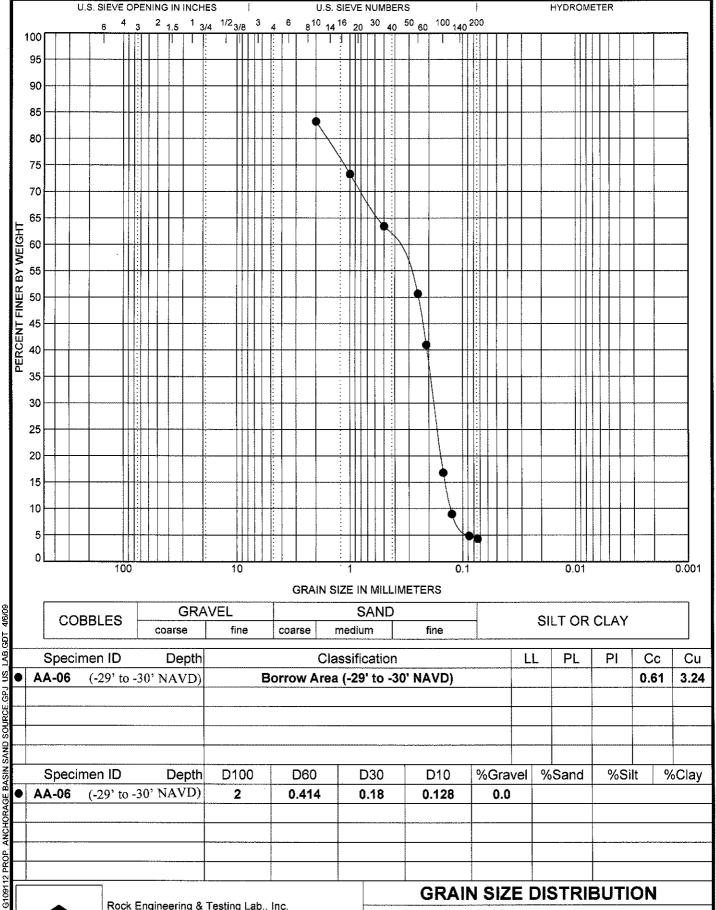
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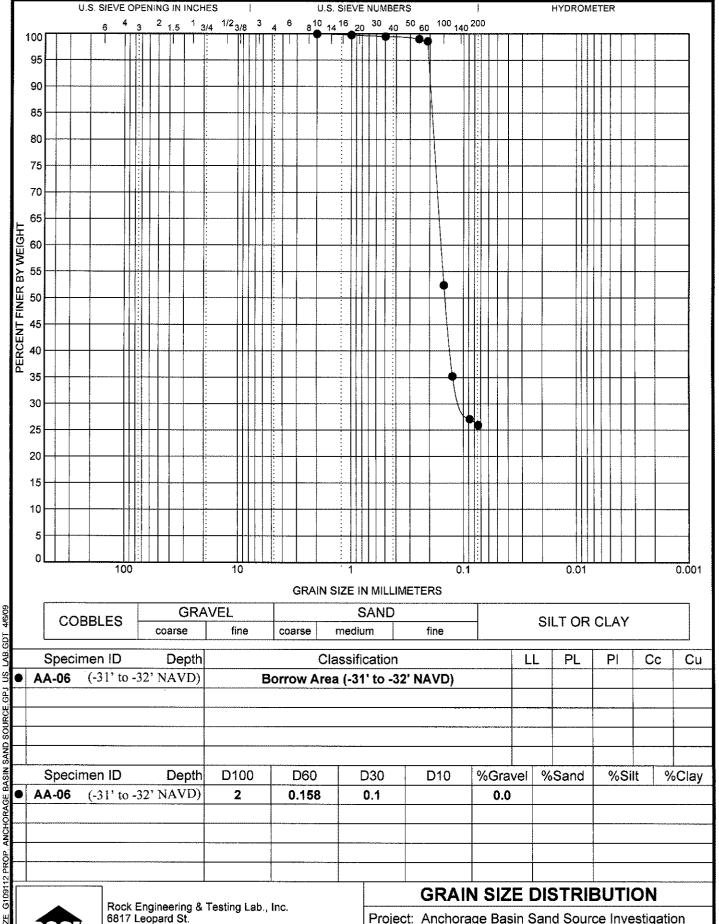


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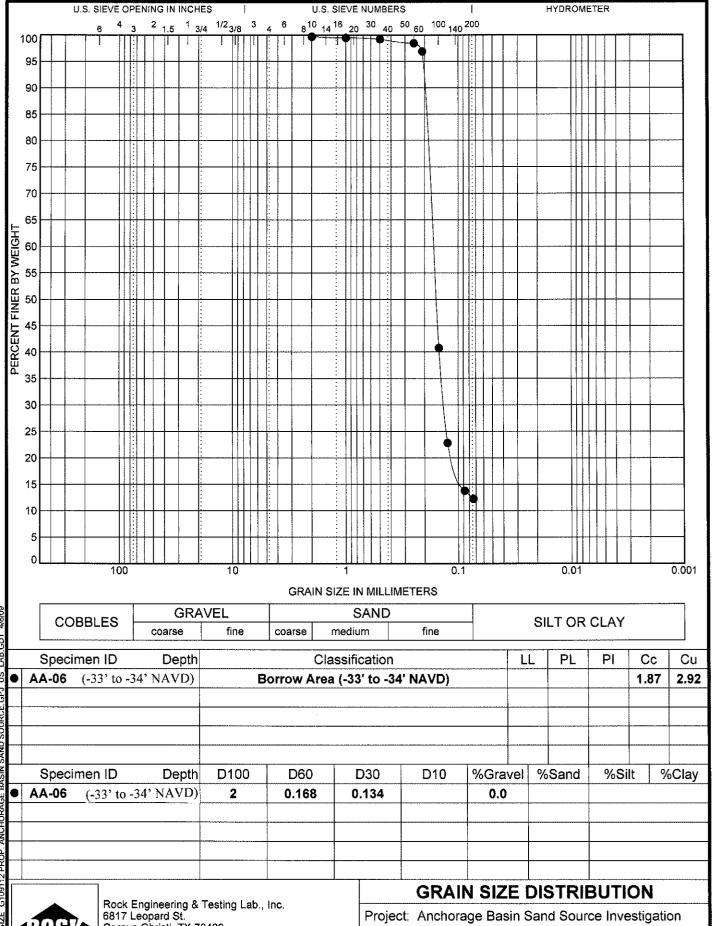
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Location: Anchorage Basin; Galveston, Texas

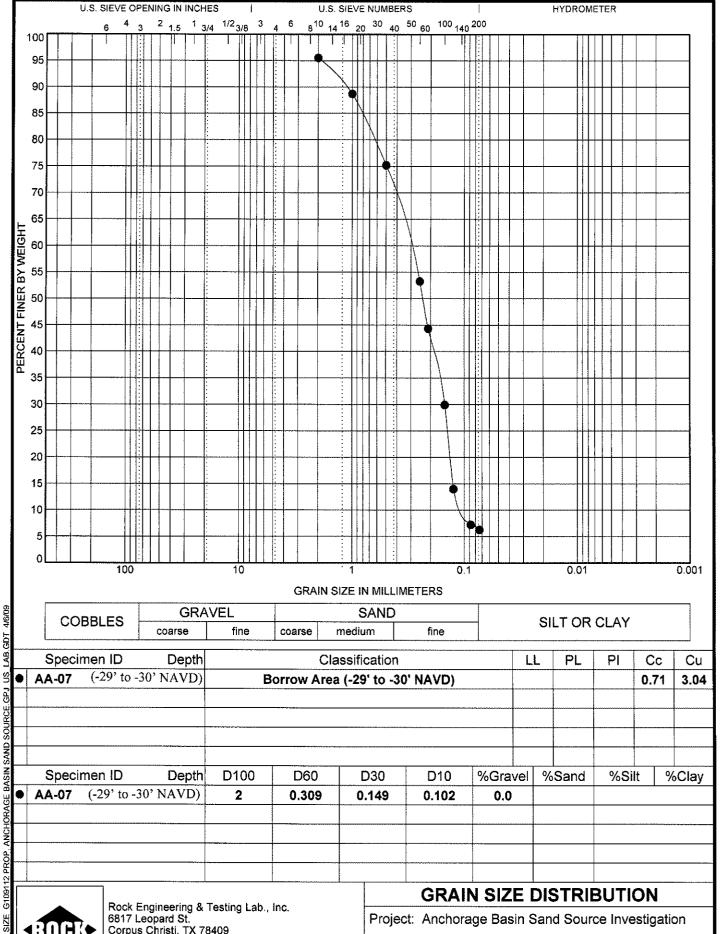


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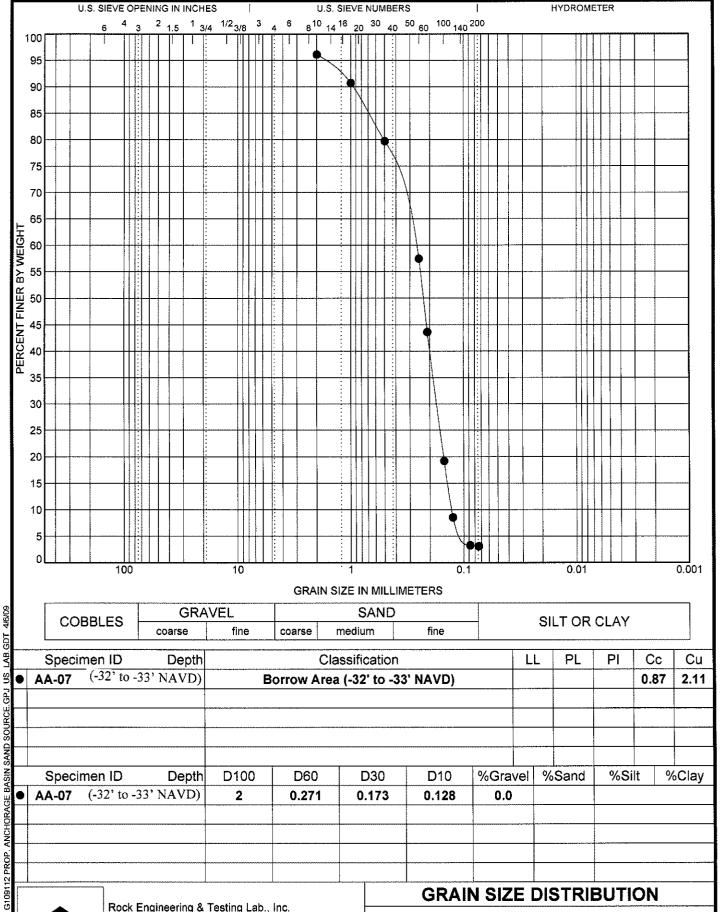
Location: Anchorage Basin; Galveston, Texas





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Location: Anchorage Basin; Galveston, Texas

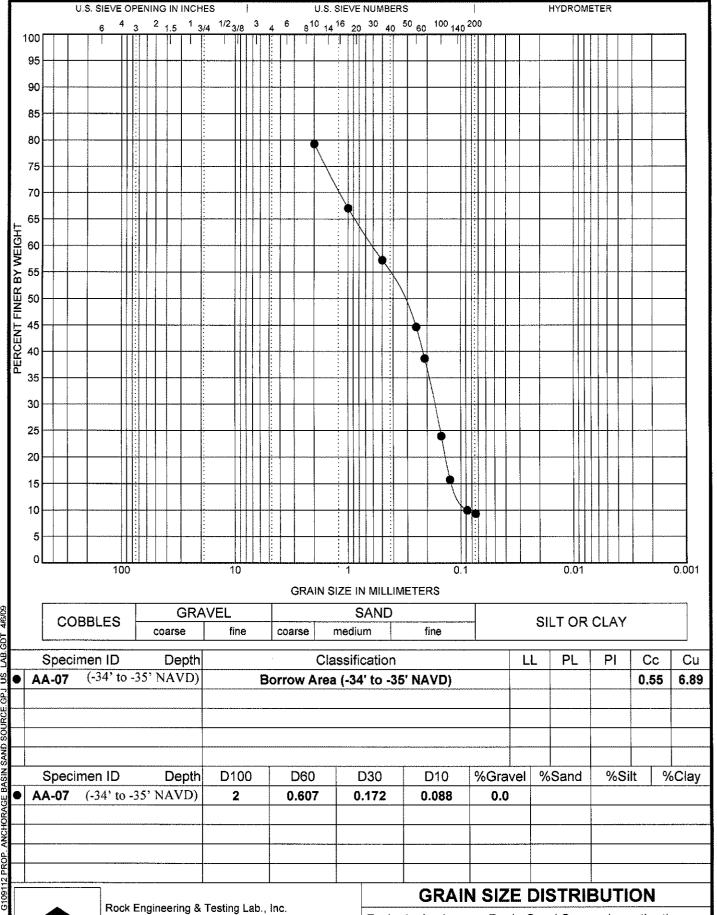




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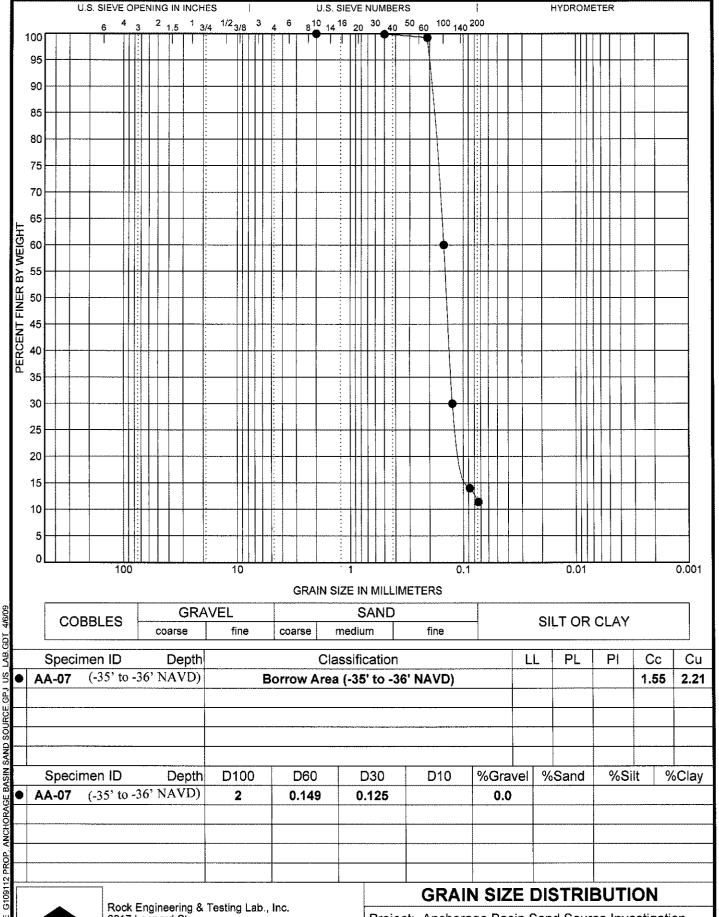




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Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas

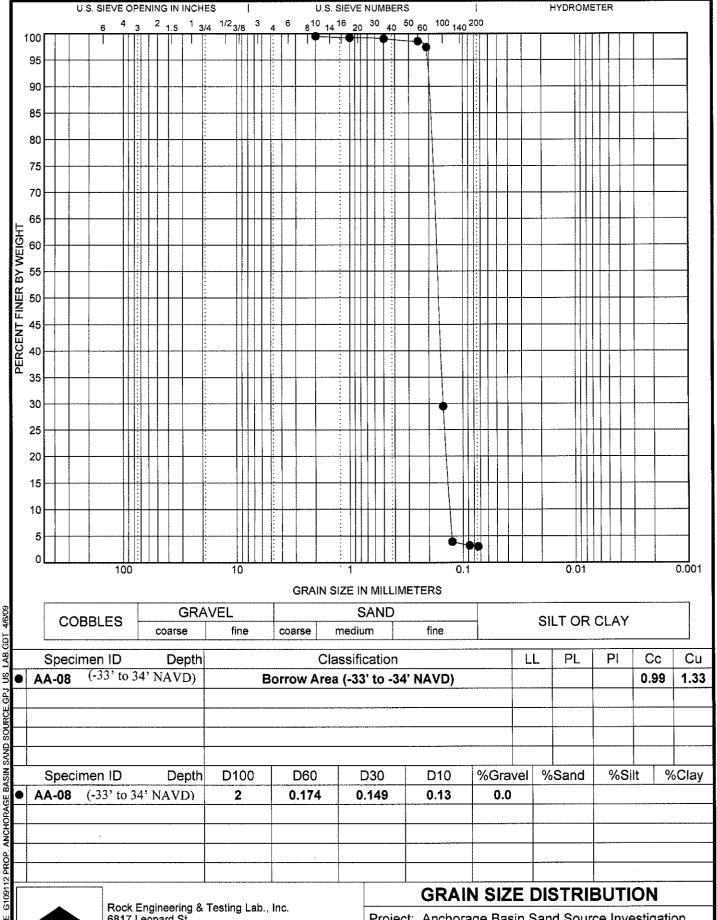




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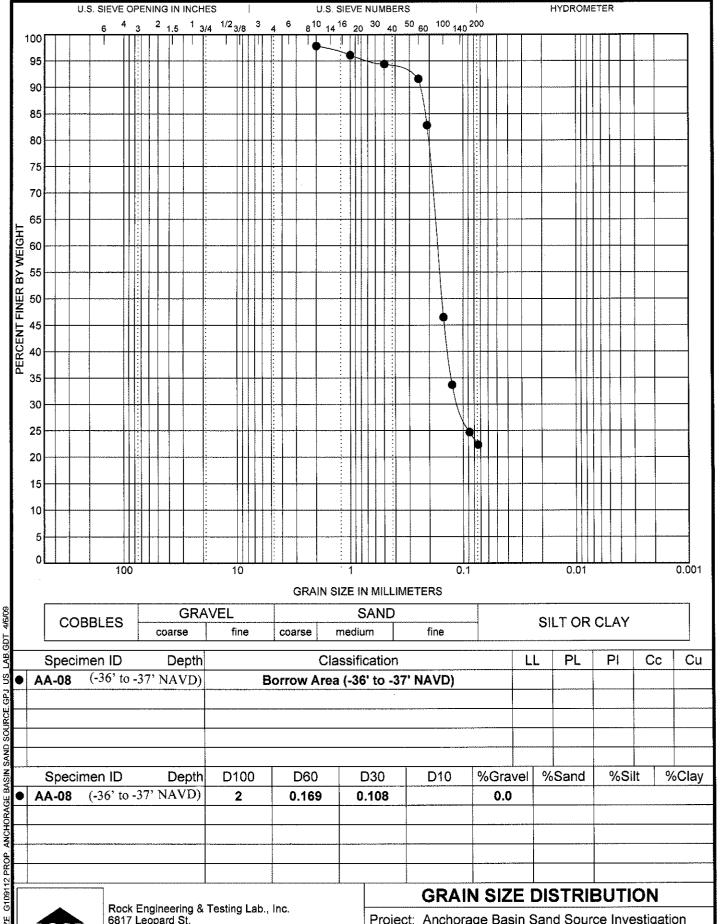
Location: Anchorage Basin; Galveston, Texas





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Location: Anchorage Basin; Galveston, Texas



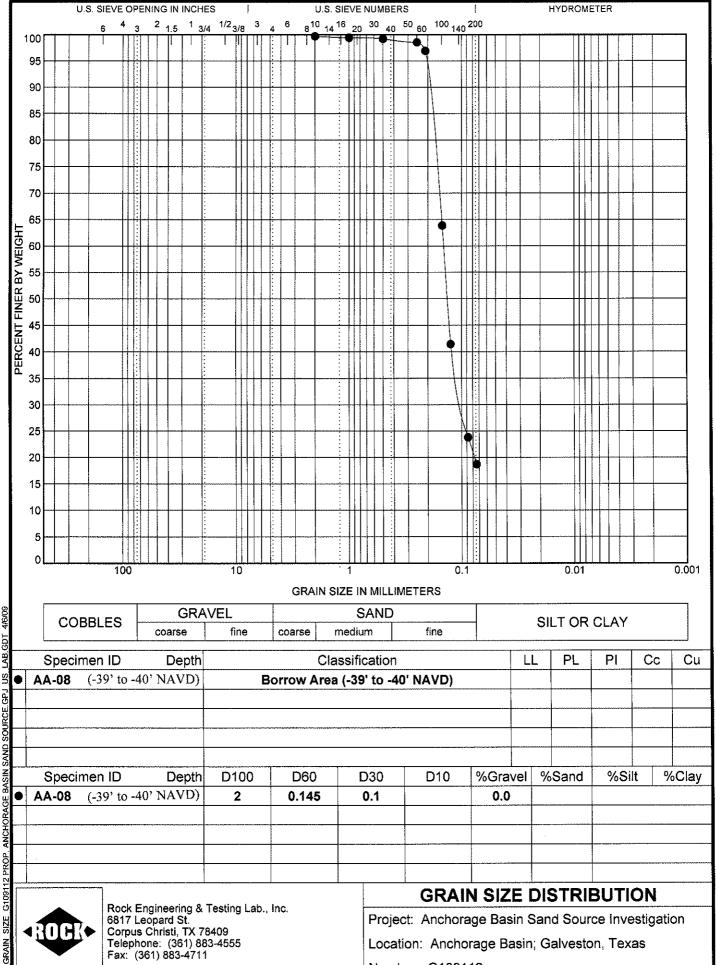


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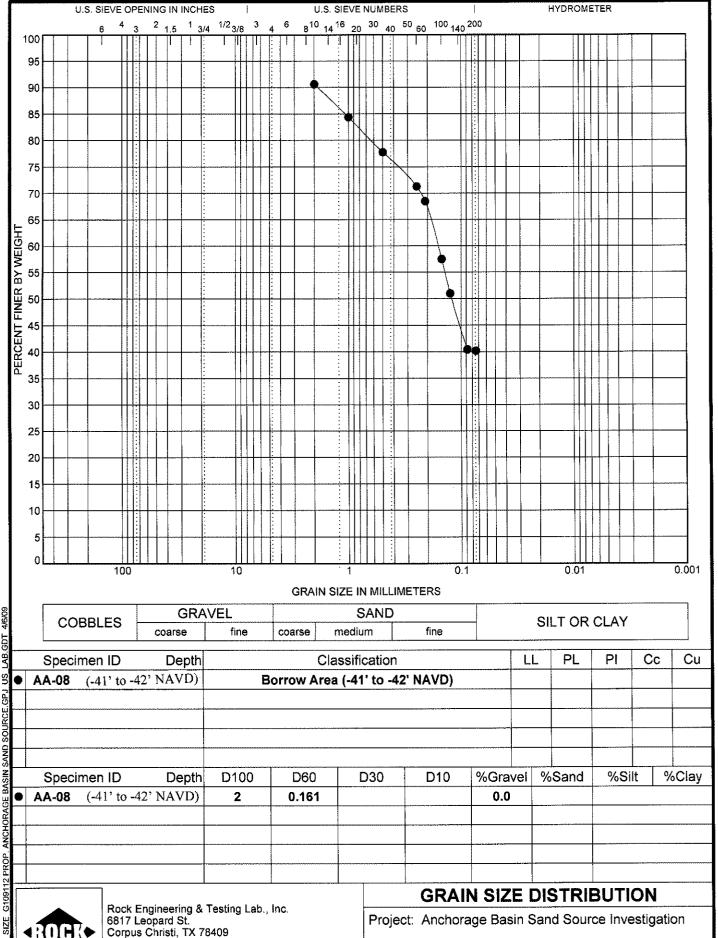
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Location: Anchorage Basin; Galveston, Texas



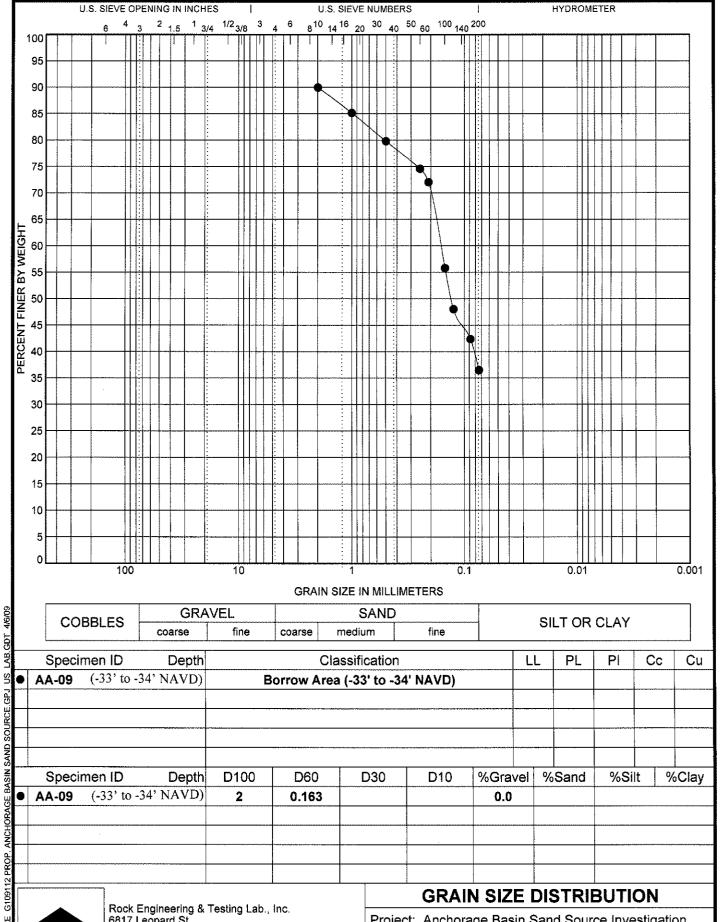
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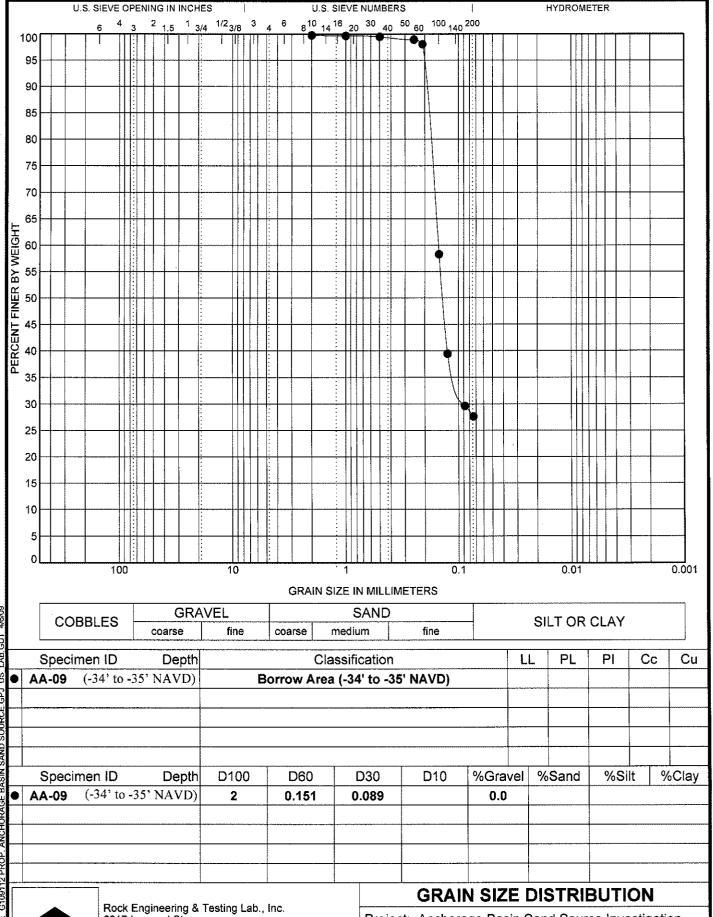


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Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas

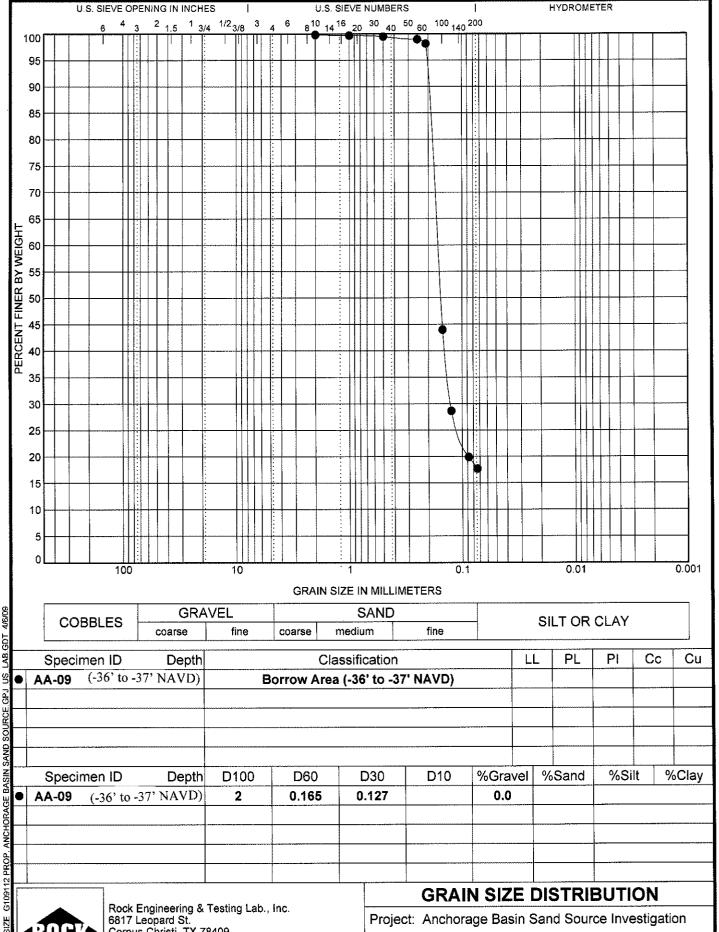




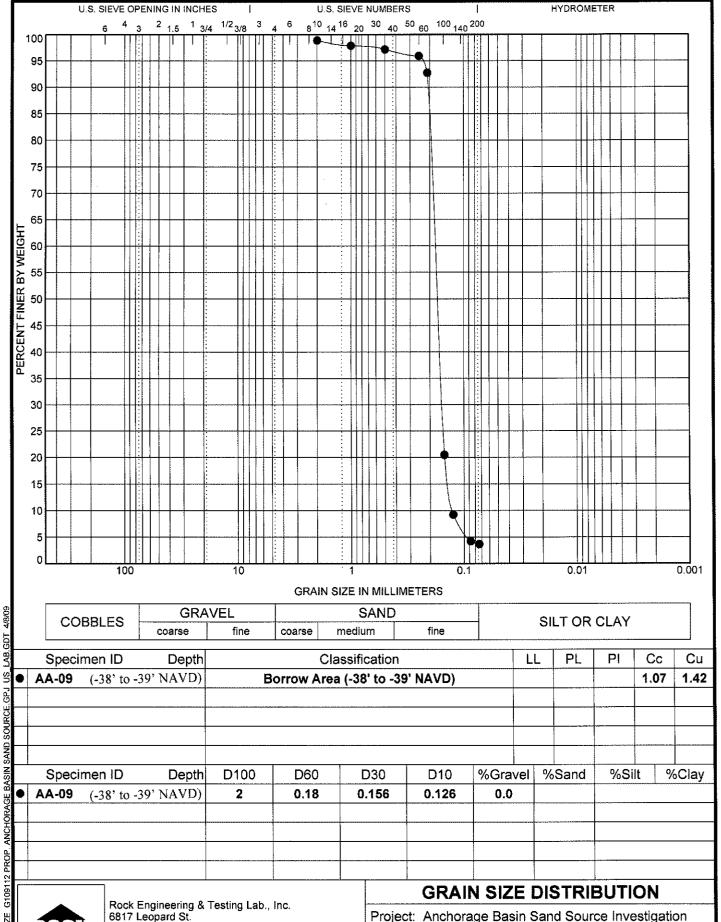
Rock Engineering & Testing Lab., Inc. 6817 Leopard St. Corpus Christi, TX 78409 Telephone: (361) 883-4555 Fax: (361) 883-4711

Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas



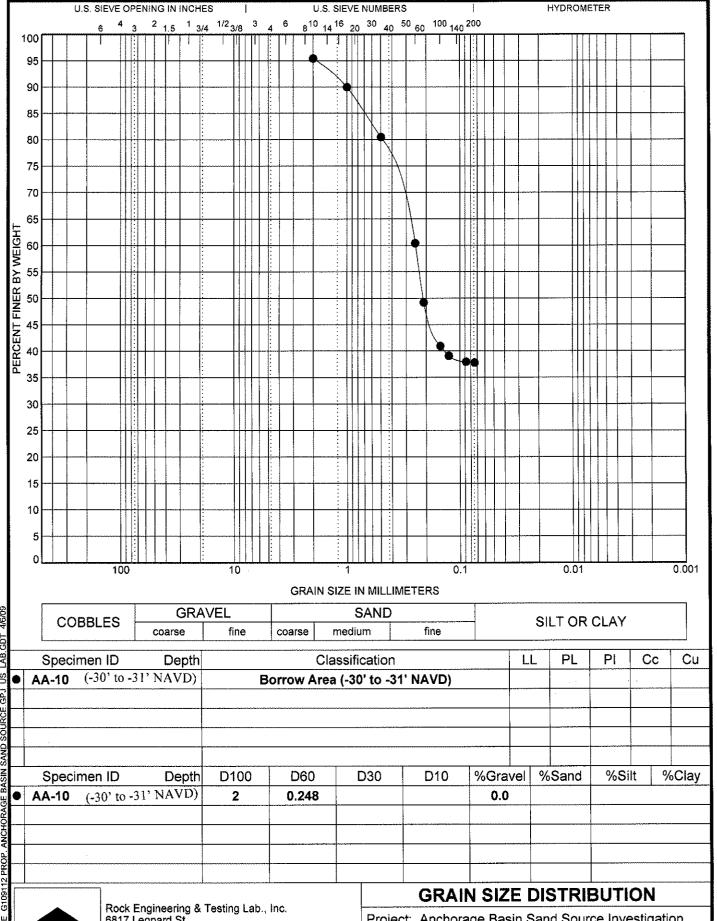
Location: Anchorage Basin; Galveston, Texas





Project: Anchorage Basin Sand Source Investigation

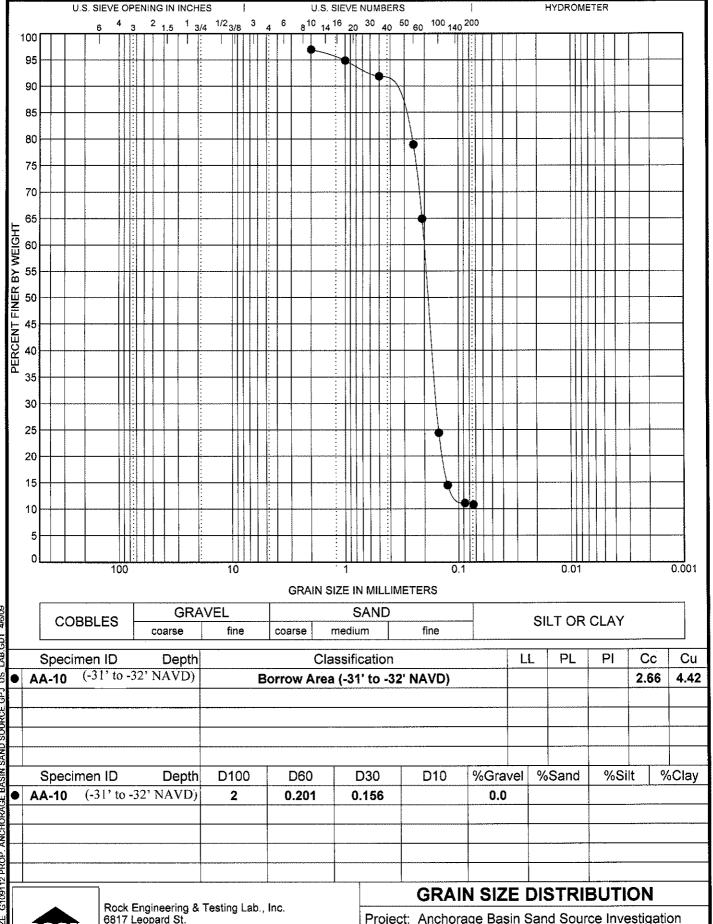
Location: Anchorage Basin; Galveston, Texas





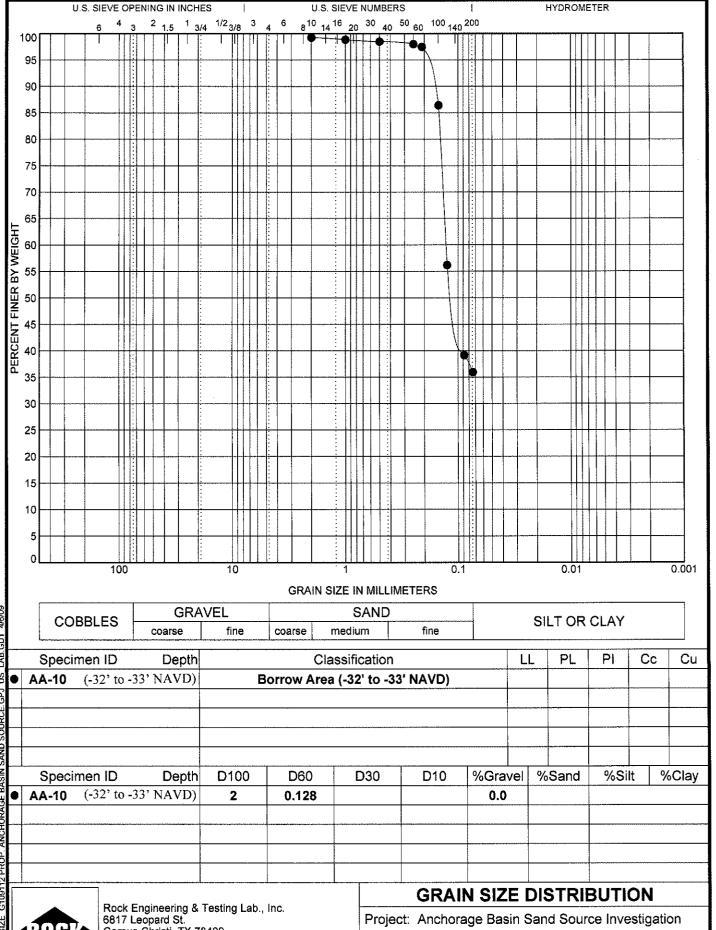
Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas



Project: Anchorage Basin Sand Source Investigation

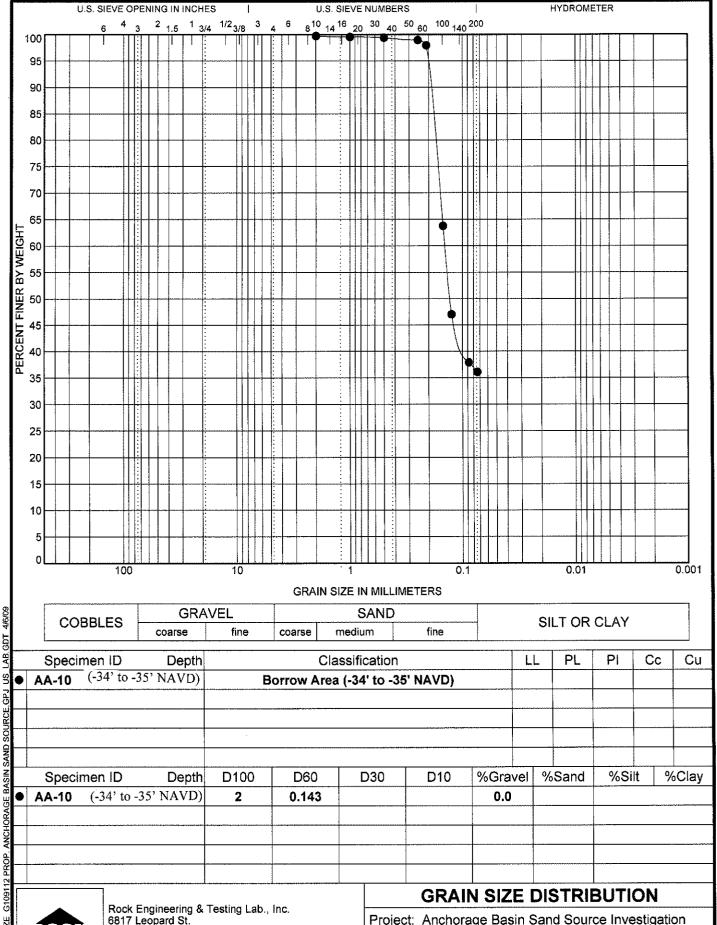
Location: Anchorage Basin; Galveston, Texas



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Location: Anchorage Basin; Galveston, Texas

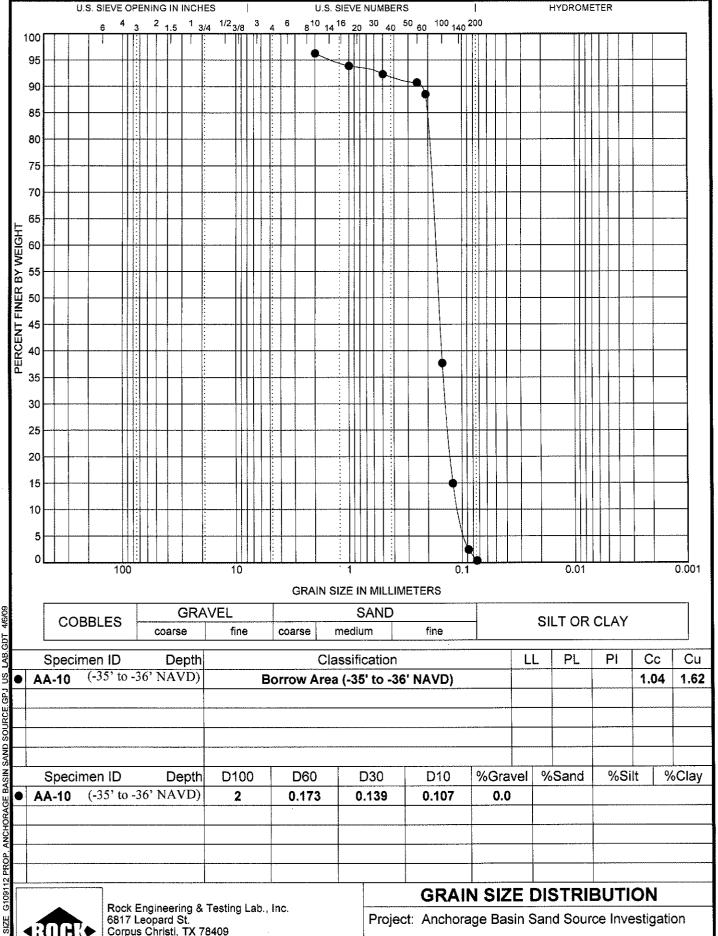


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Fax: (361) 883-4711

Project: Anchorage Basin Sand Source Investigation

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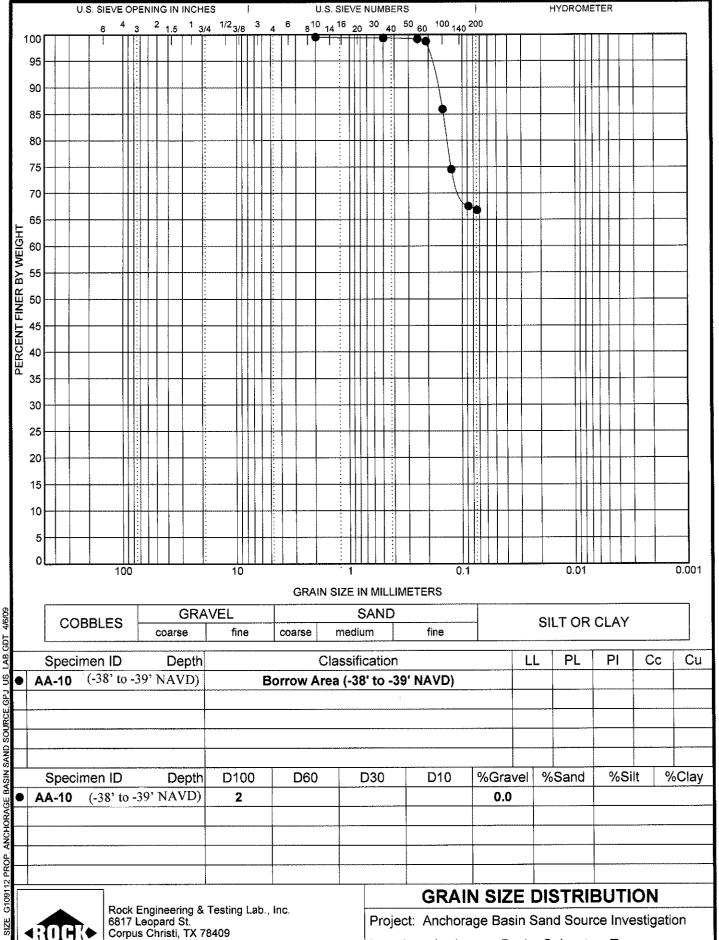




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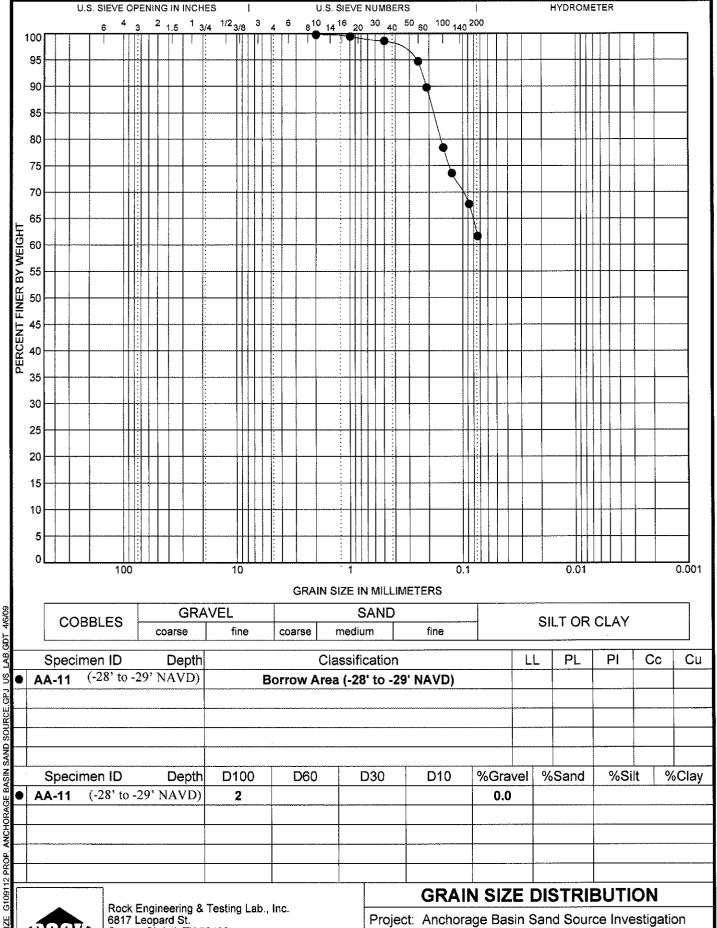
Fax: (361) 883-4711

Location: Anchorage Basin; Galveston, Texas



Telephone: (361) 883-4555 Fax: (361) 883-4711

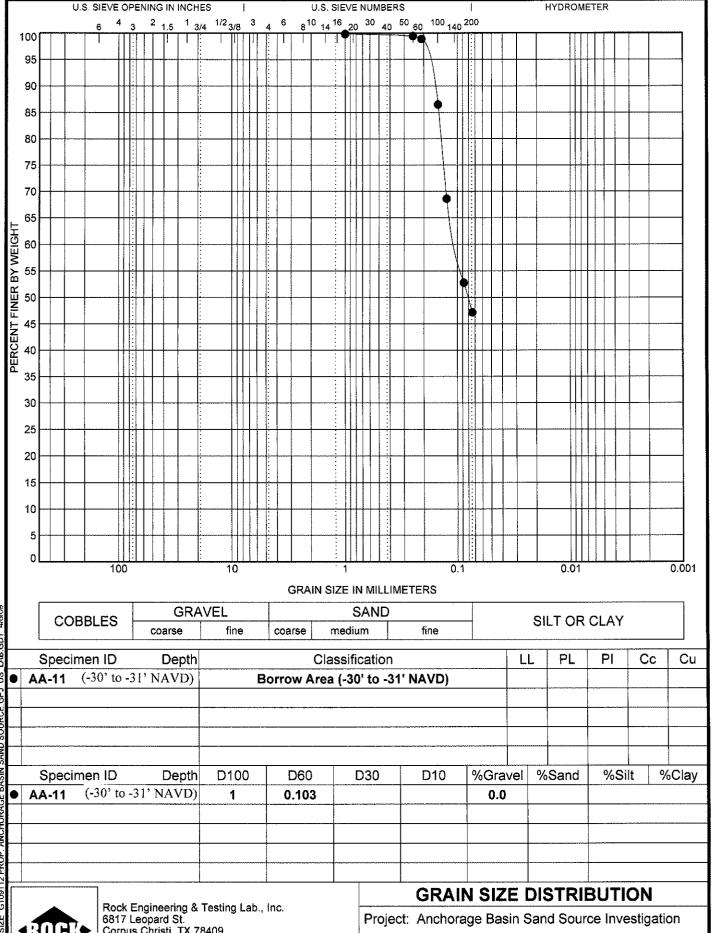
Location: Anchorage Basin; Galveston, Texas



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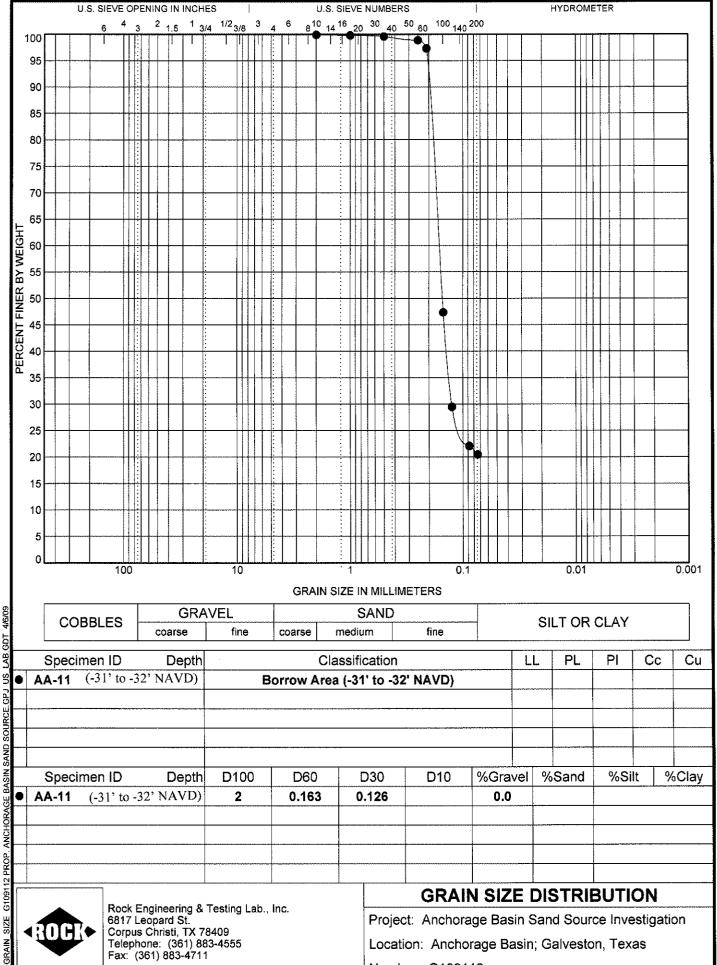
Location: Anchorage Basin; Galveston, Texas



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Location: Anchorage Basin; Galveston, Texas



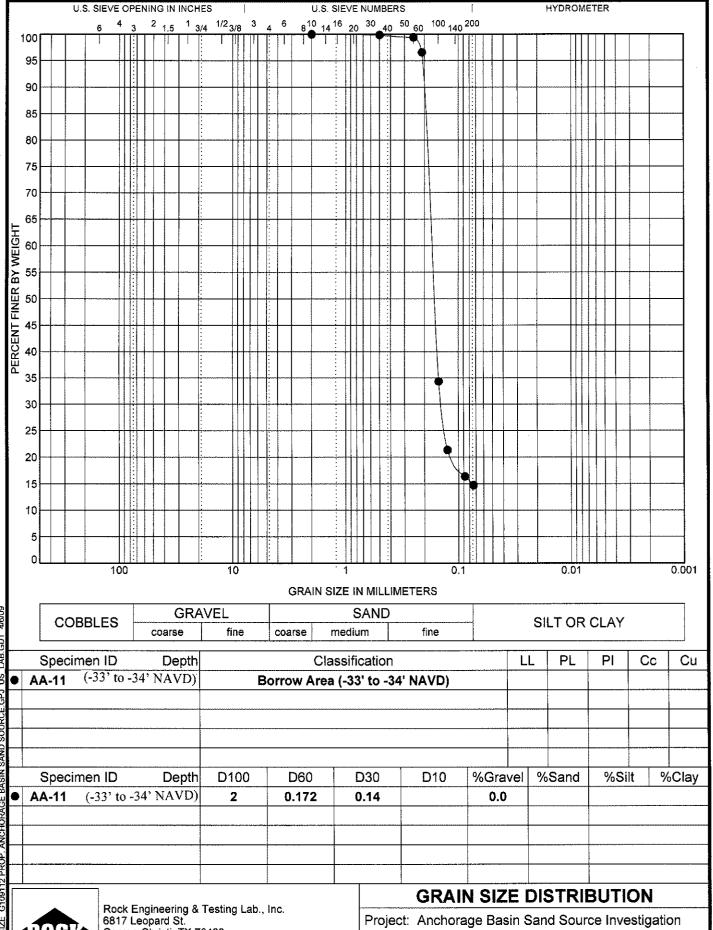


6817 Leopard St. Corpus Christi, TX 78409 Telephone: (361) 883-4555

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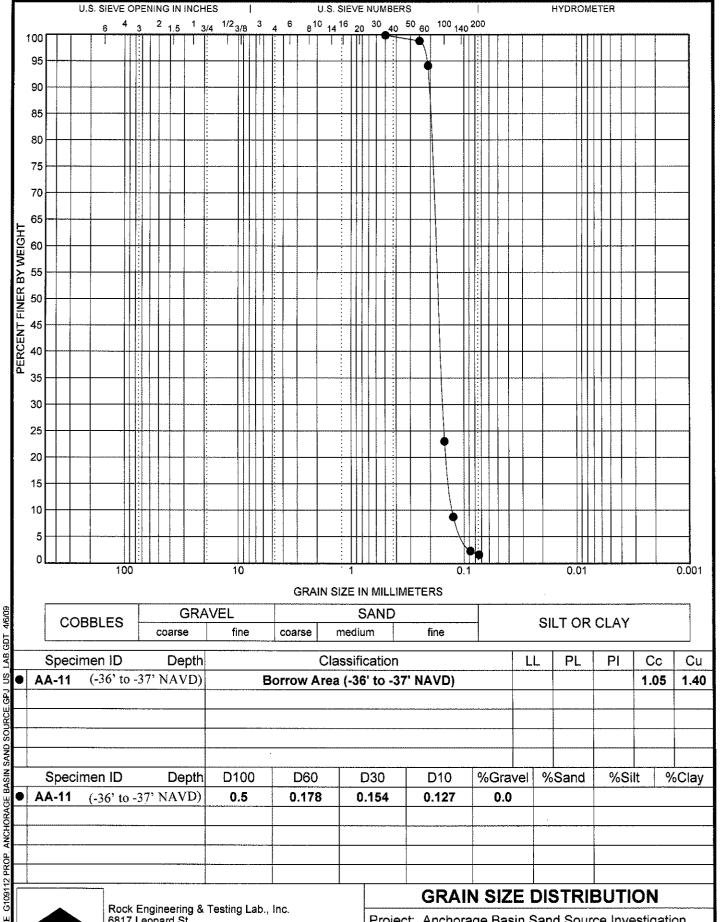
Location: Anchorage Basin; Galveston, Texas



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Location: Anchorage Basin; Galveston, Texas

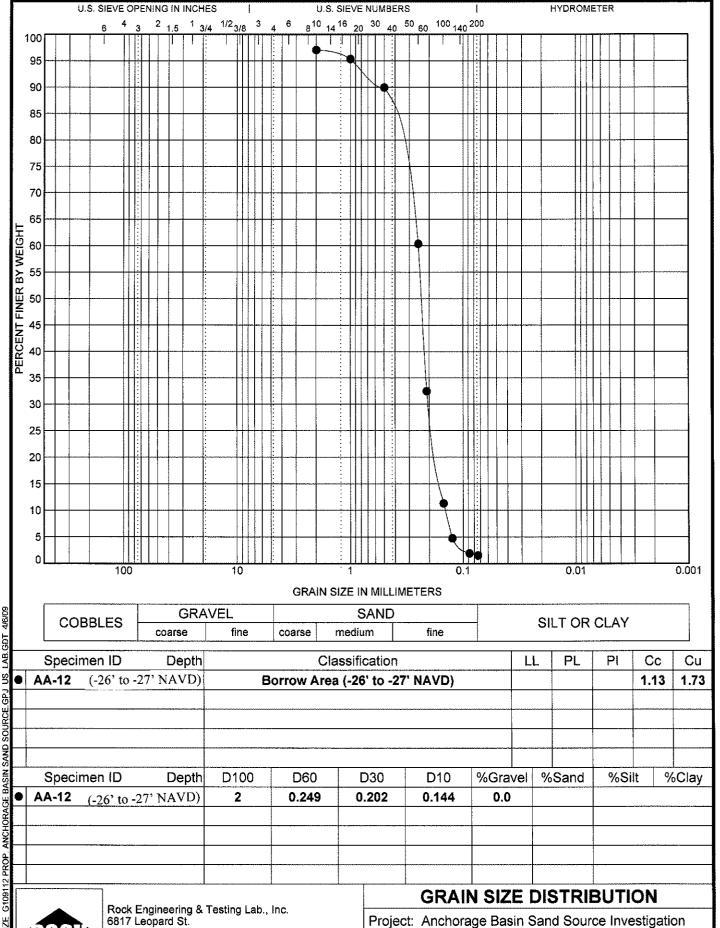


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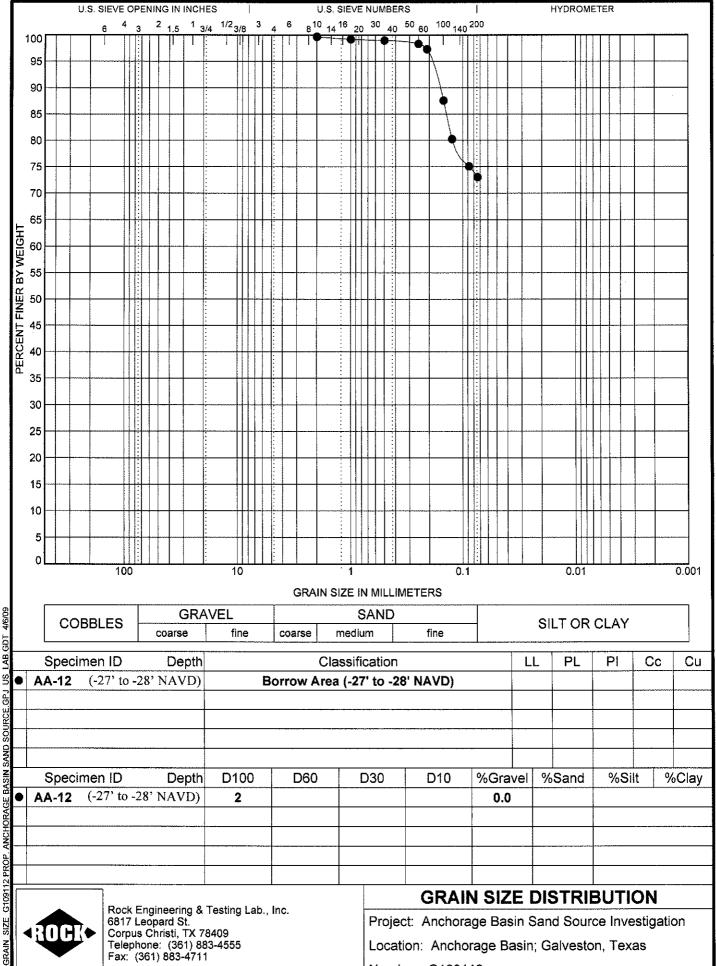




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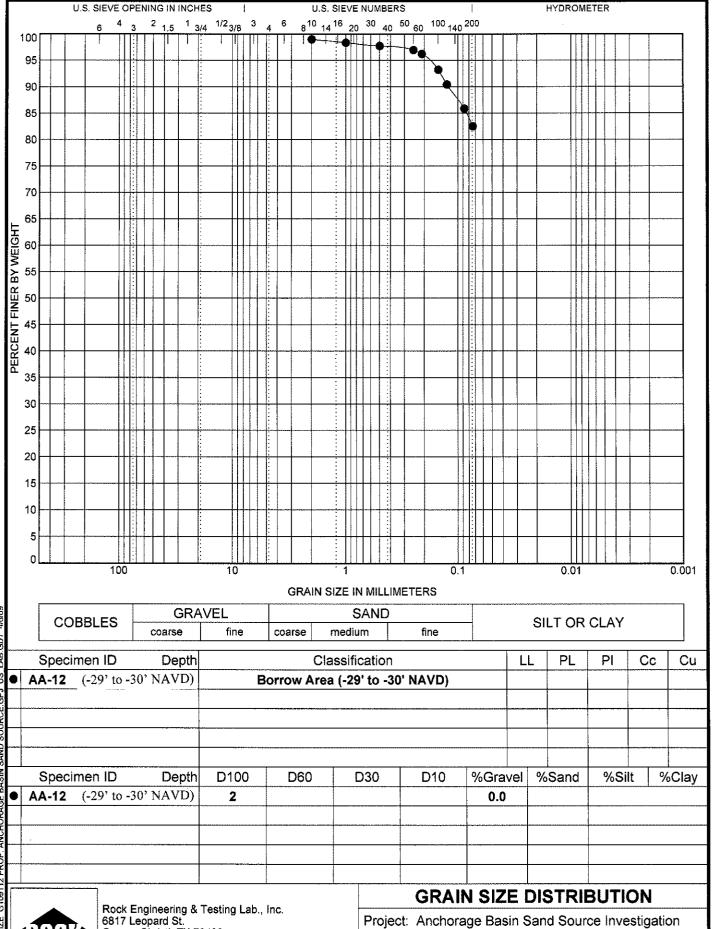
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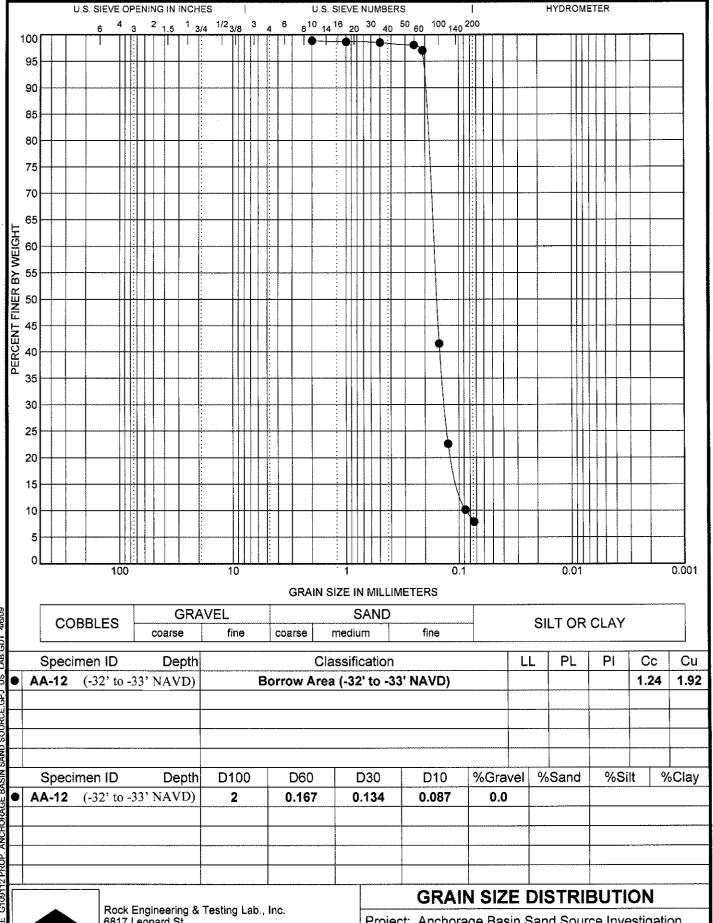
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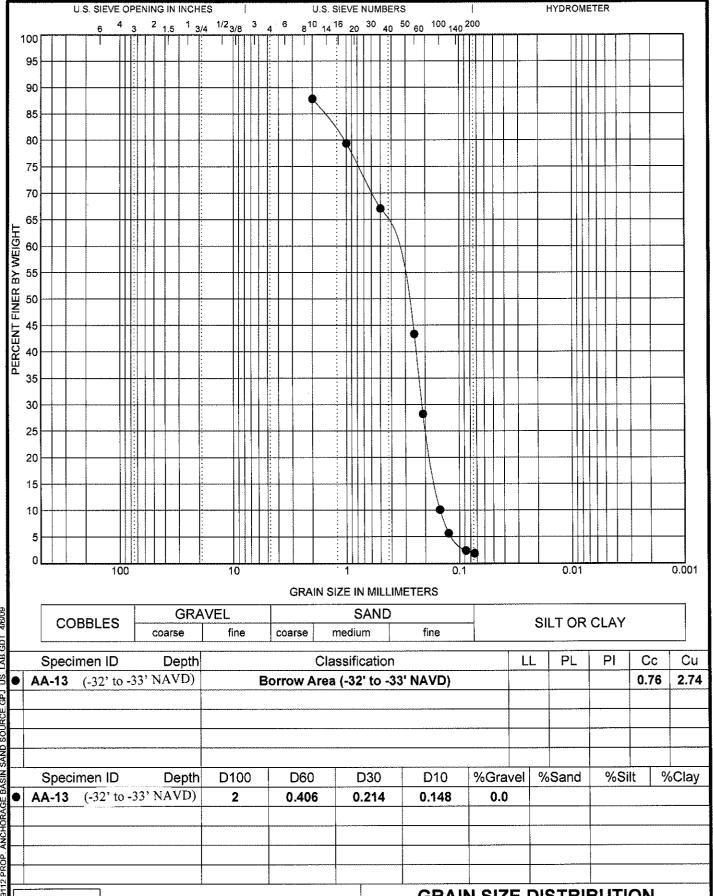


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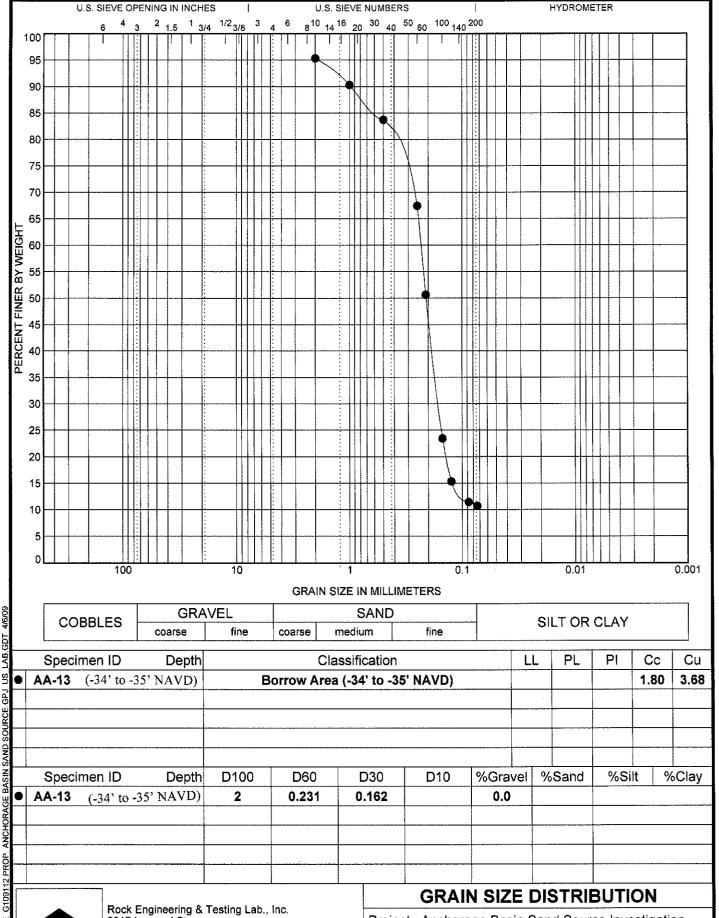


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## **GRAIN SIZE DISTRIBUTION**

Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas



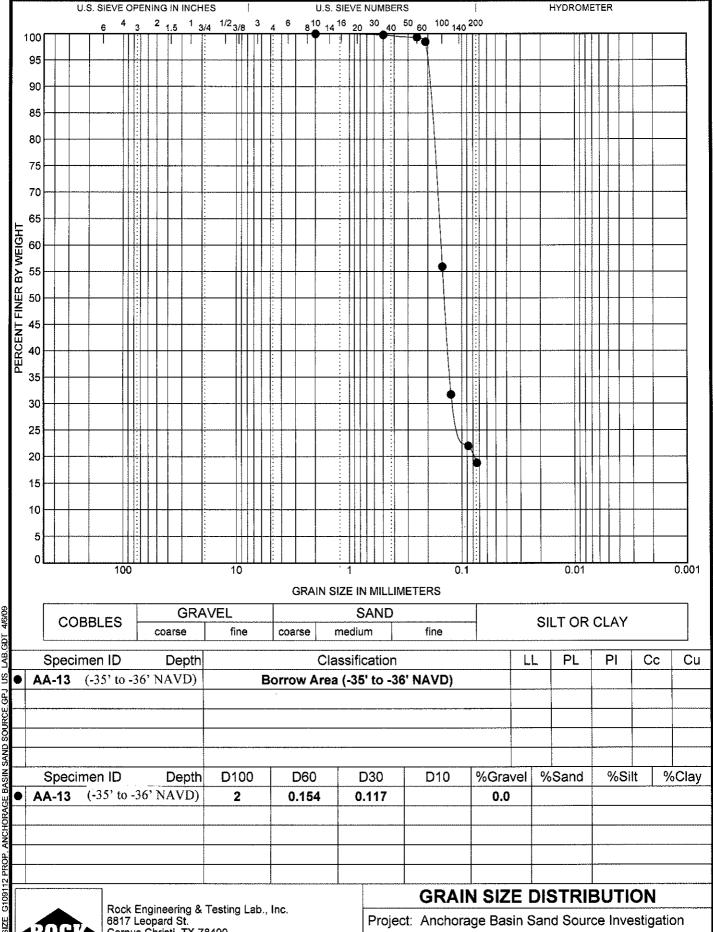


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Project: Anchorage Basin Sand Source Investigation

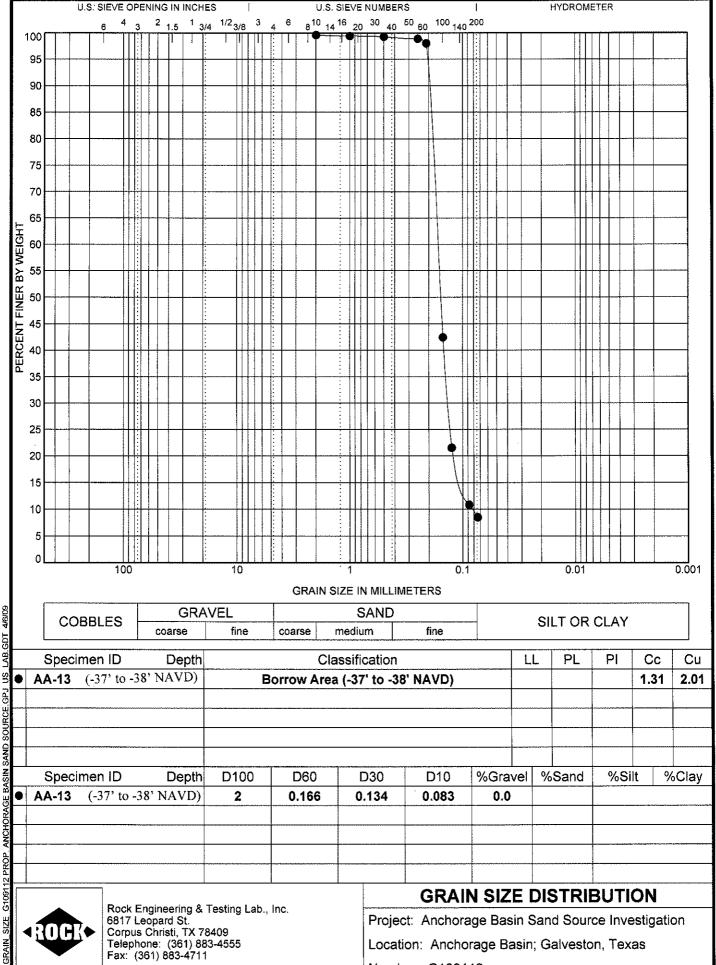
Location: Anchorage Basin; Galveston, Texas





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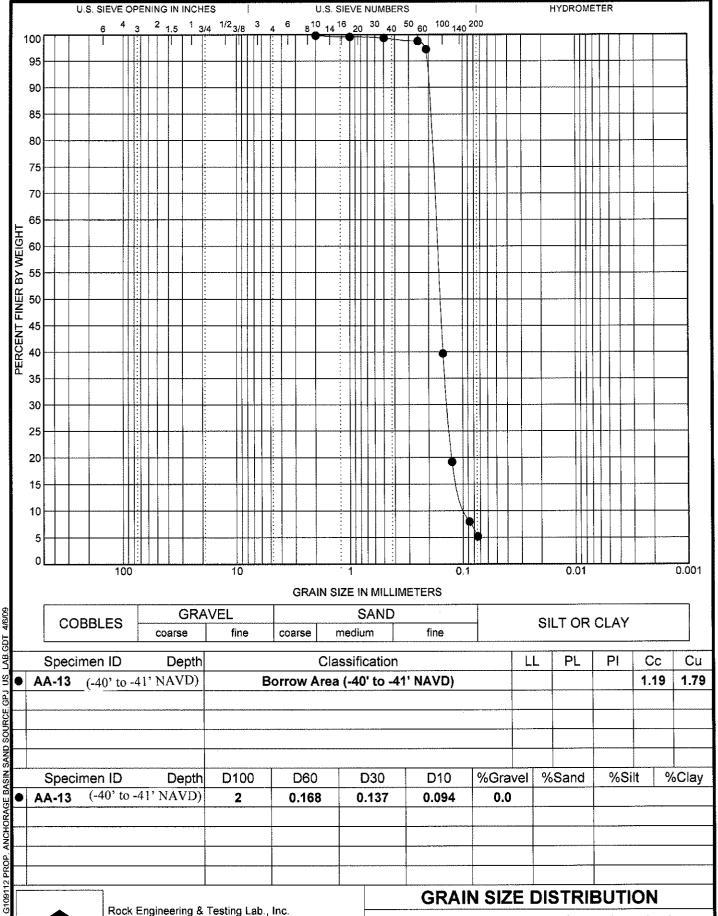
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Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas

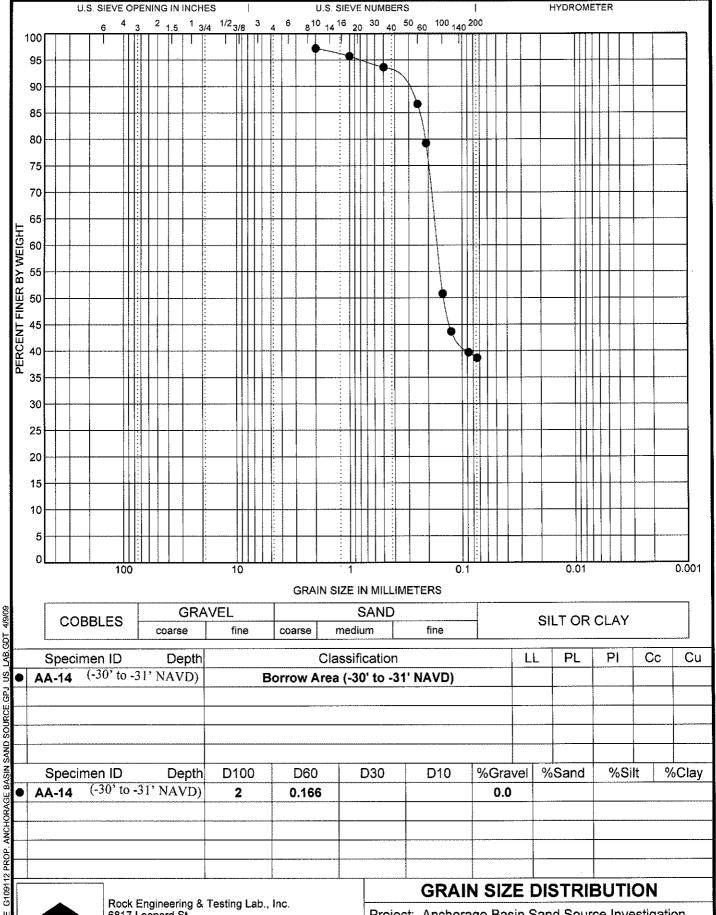




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Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas



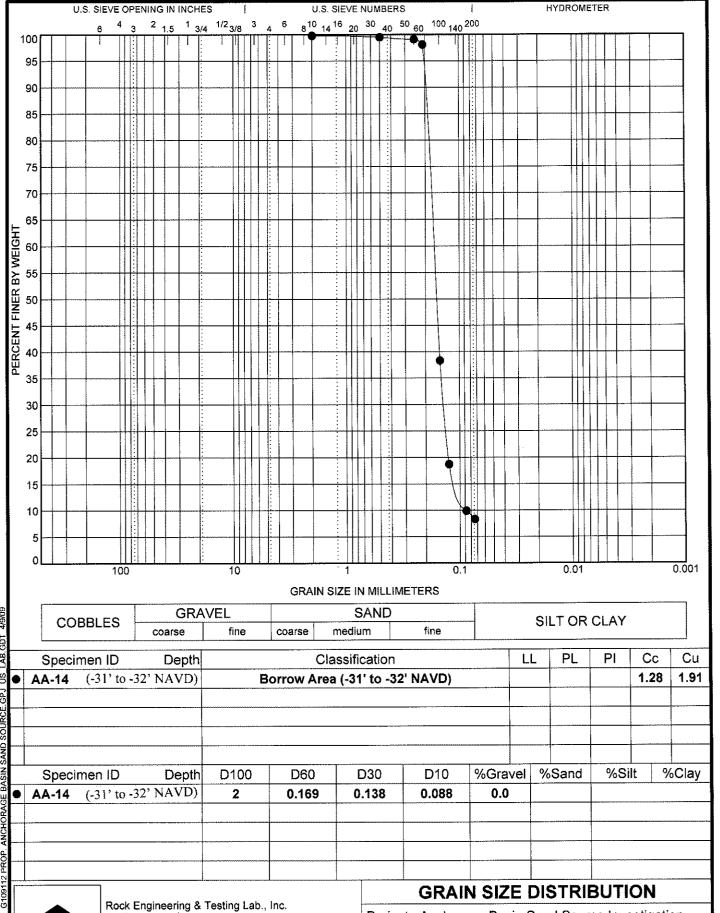


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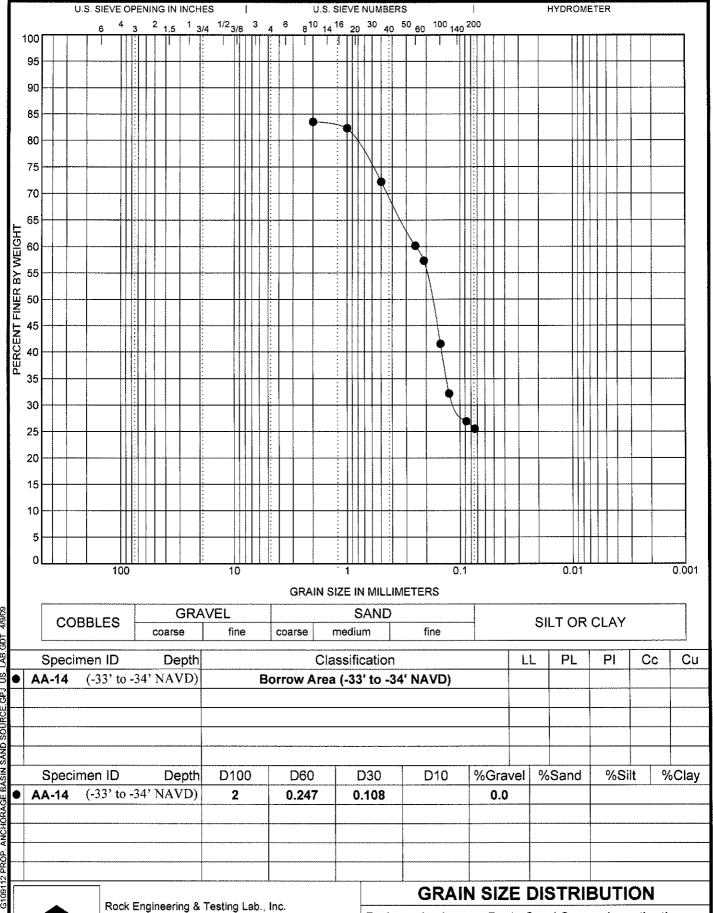




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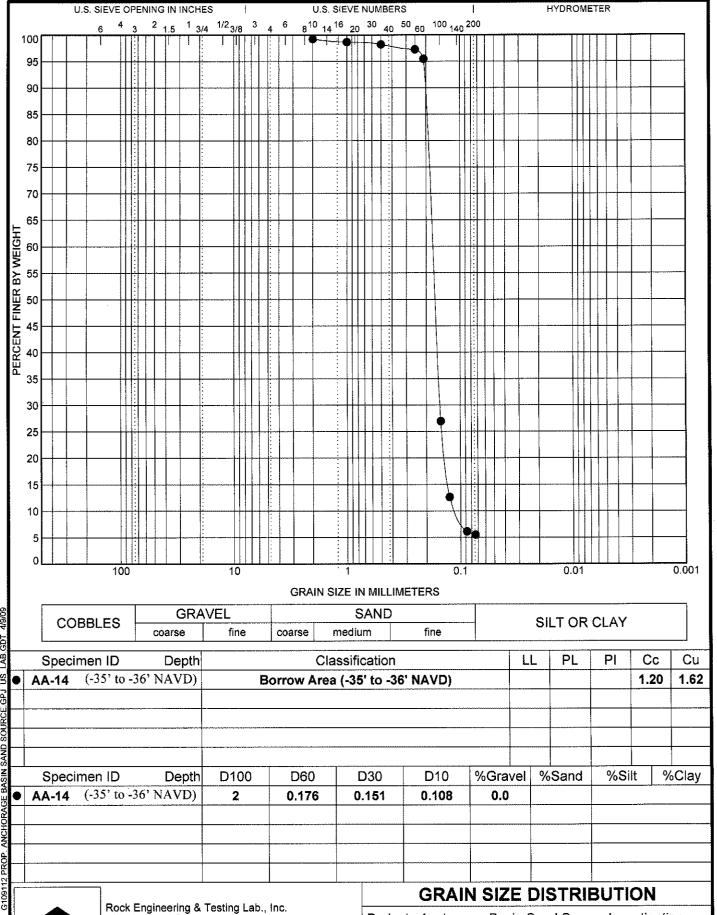




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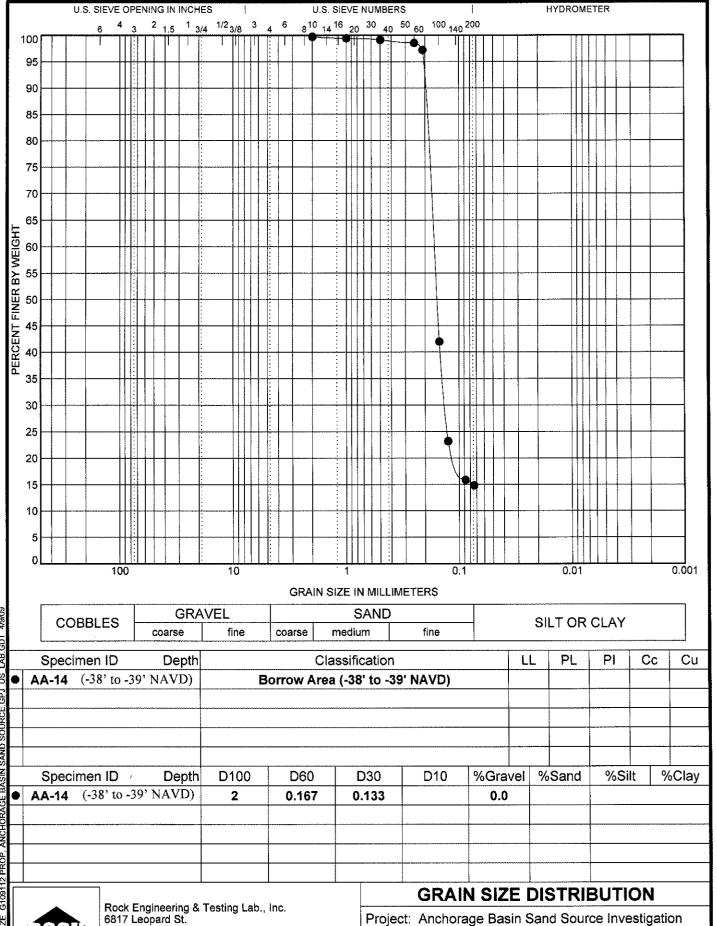




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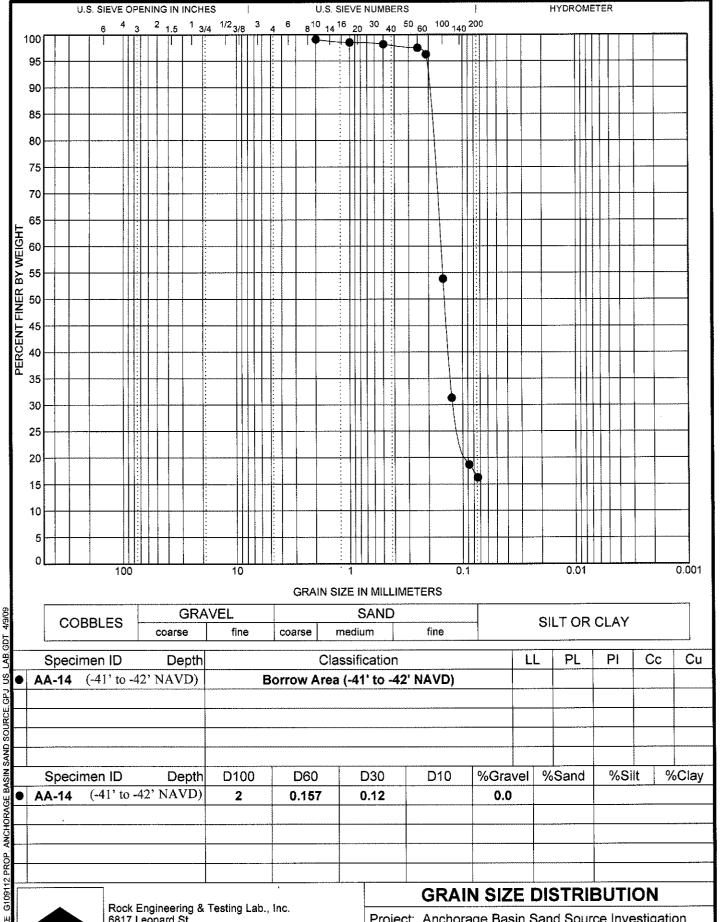
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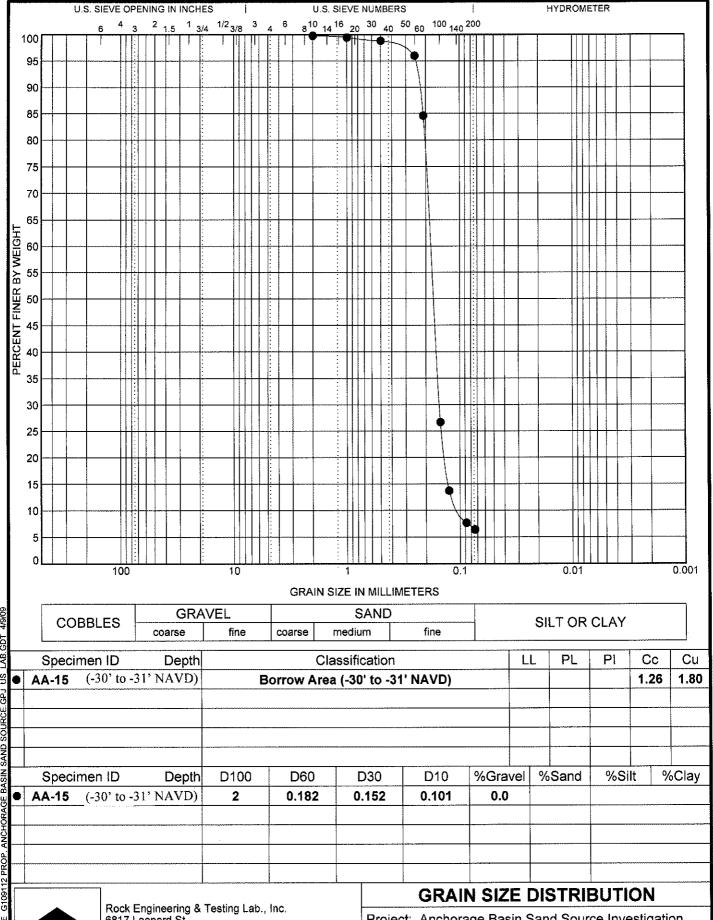


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Project: Anchorage Basin Sand Source Investigation

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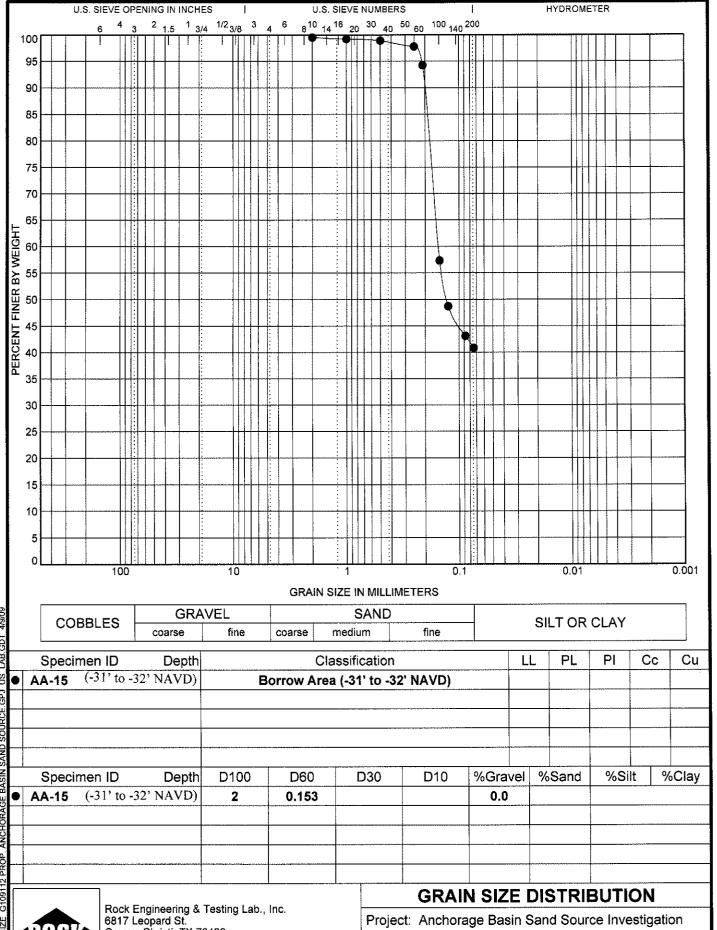




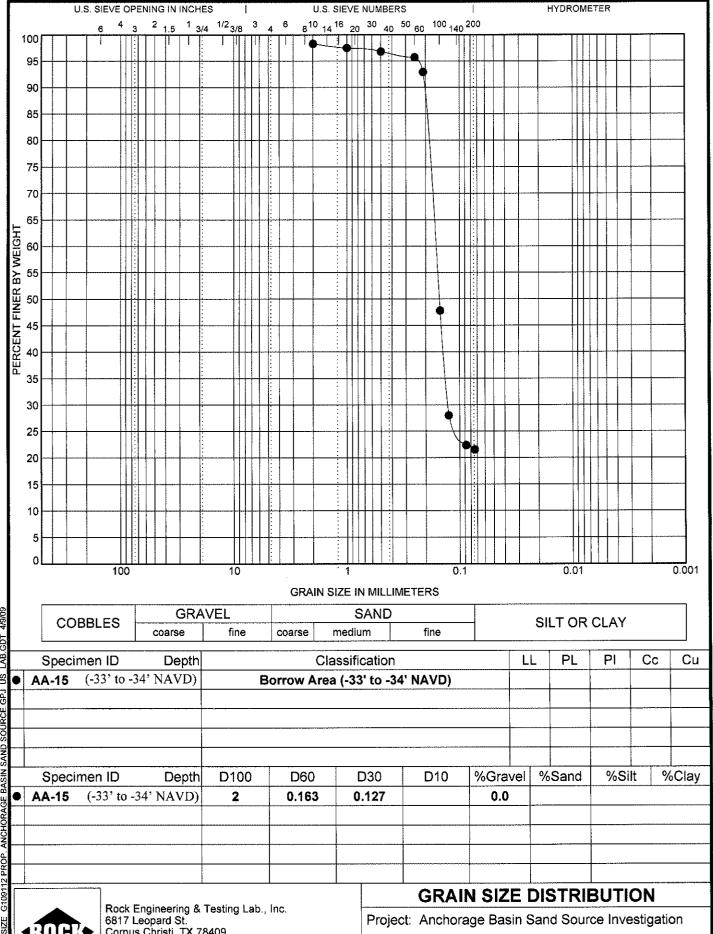
Rock Engineering & Testing Lab., Inc. 6817 Leopard St. Corpus Christi, TX 78409 Telephone: (361) 883-4555 Fax: (361) 883-4711

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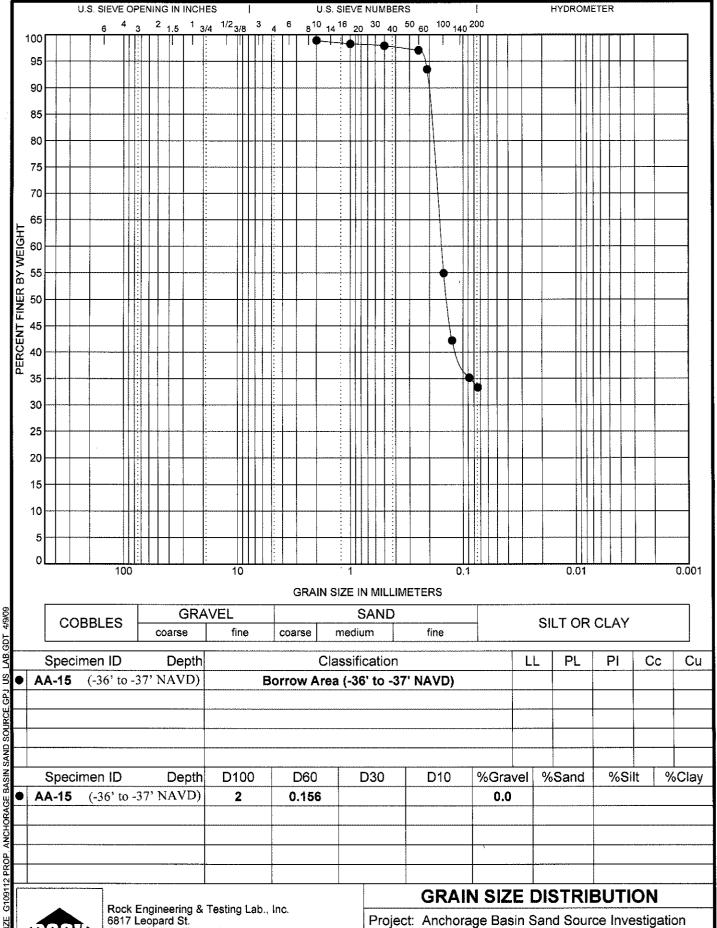
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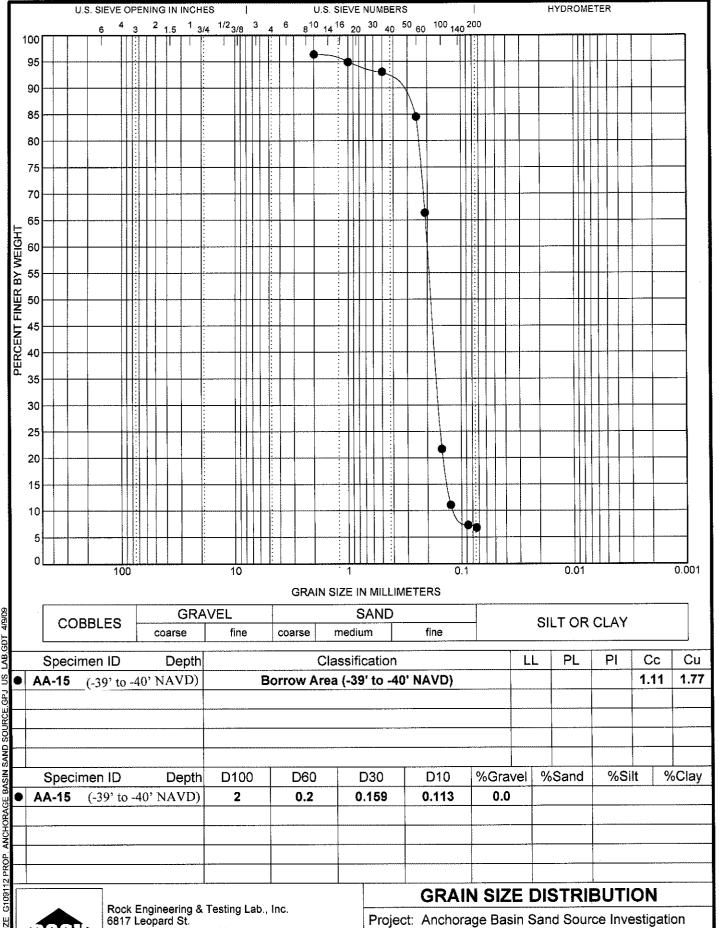
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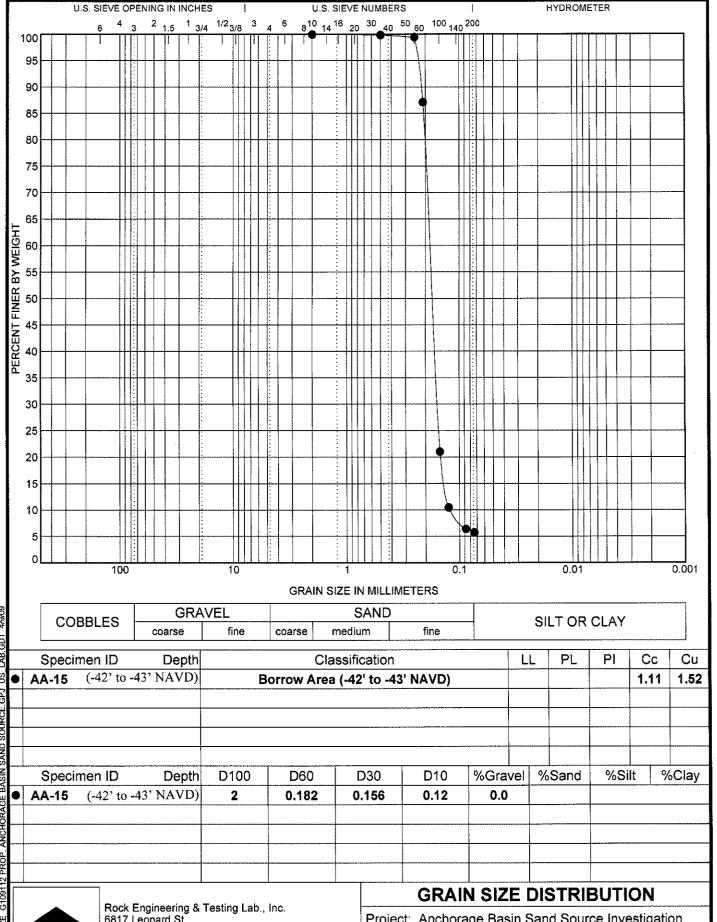
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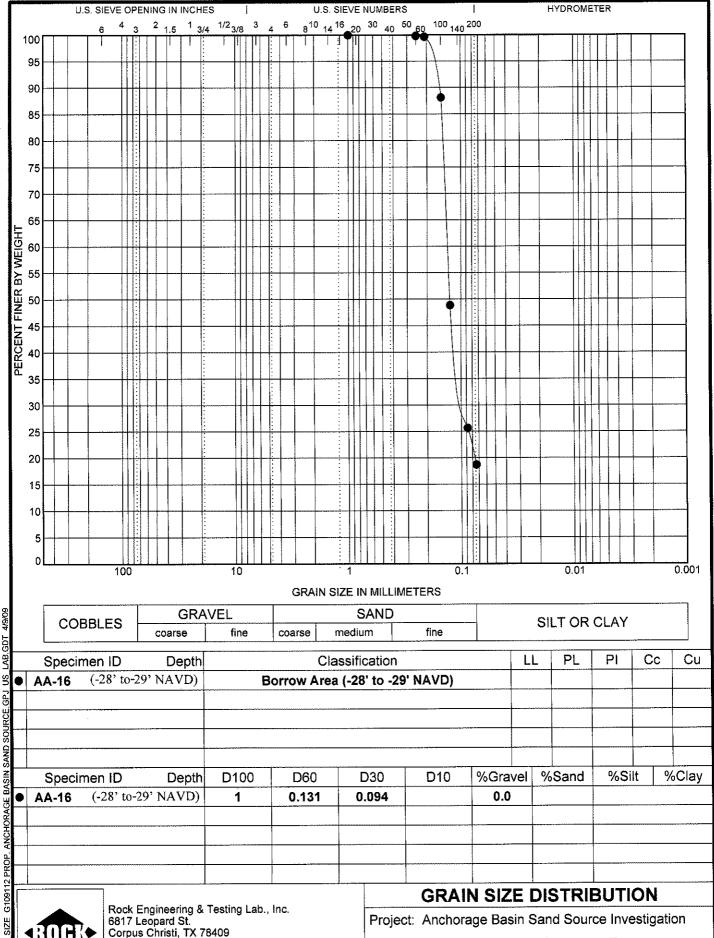
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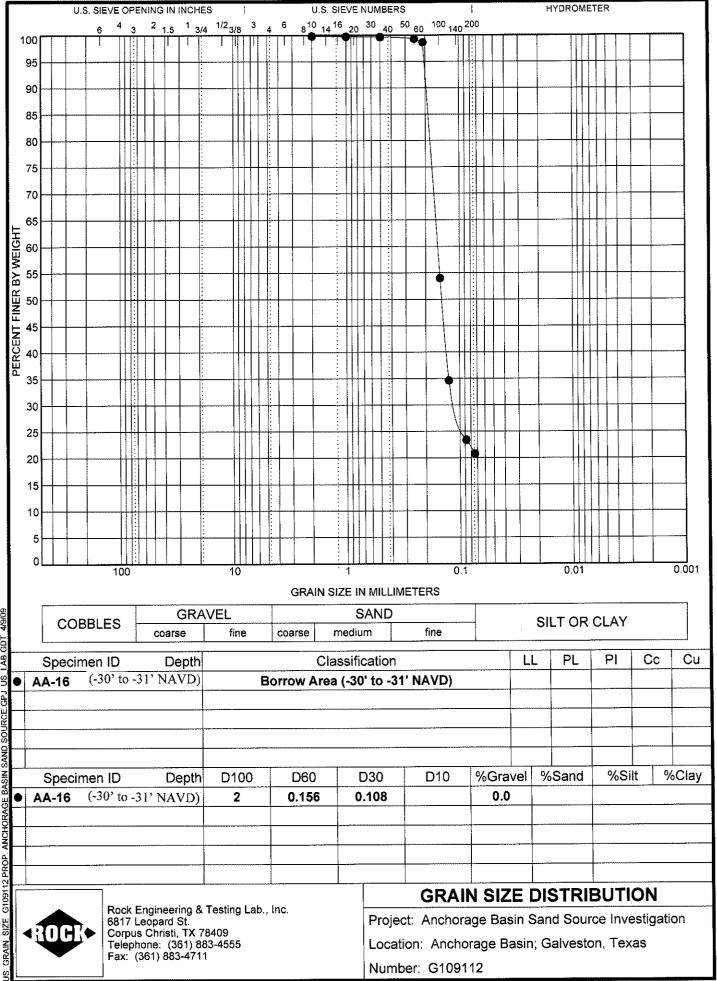
Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas

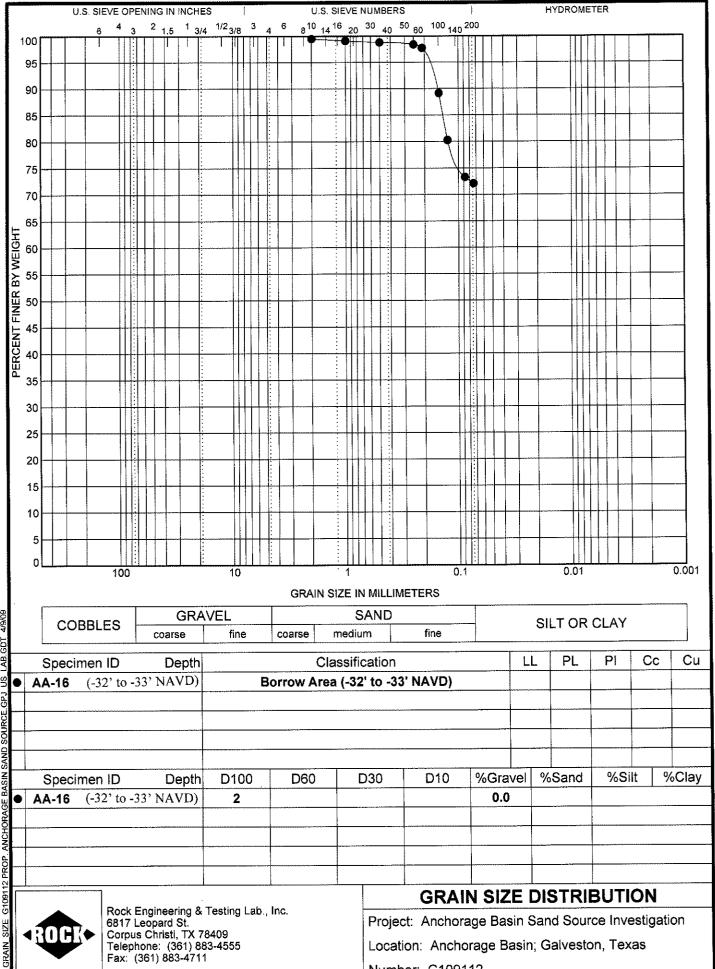


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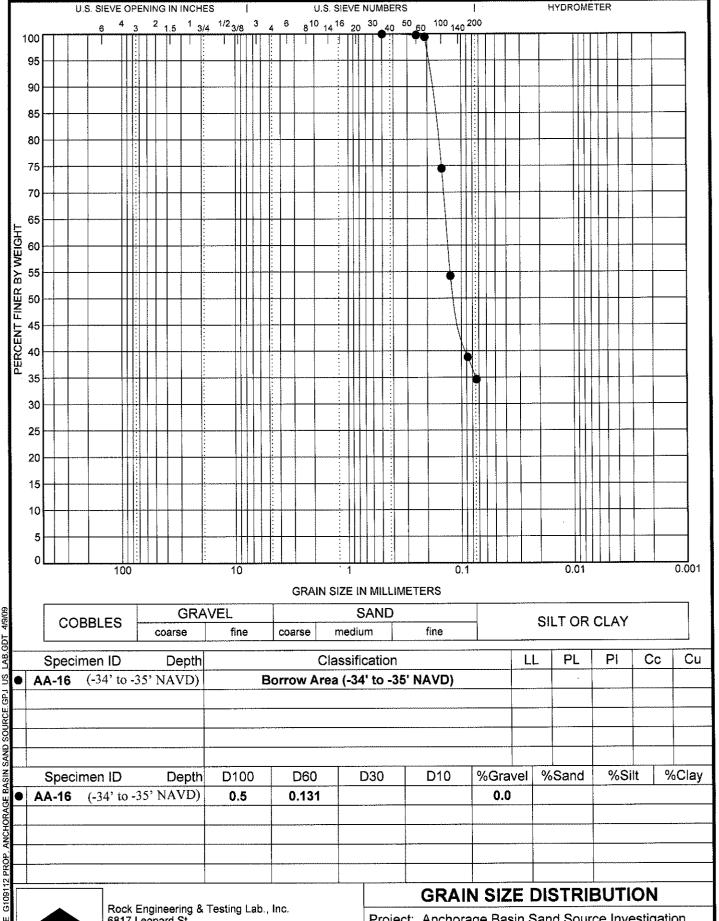
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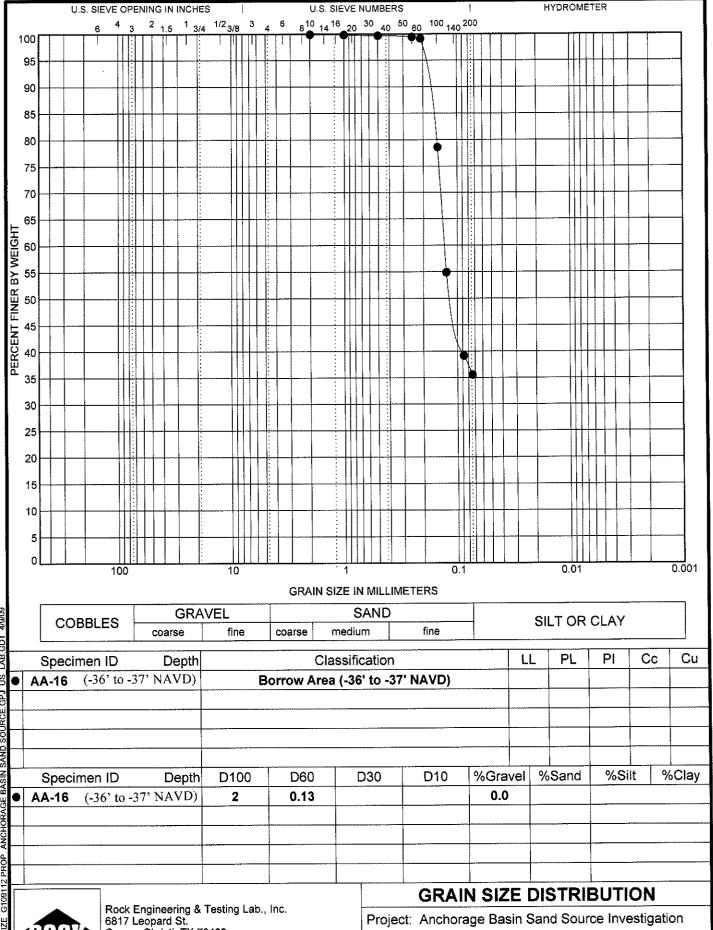


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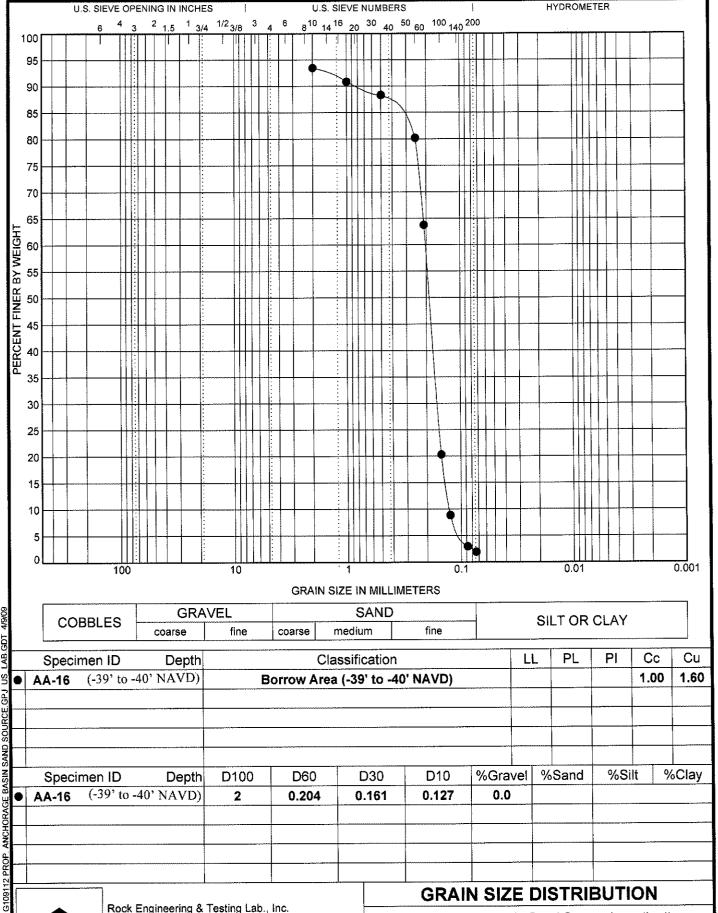
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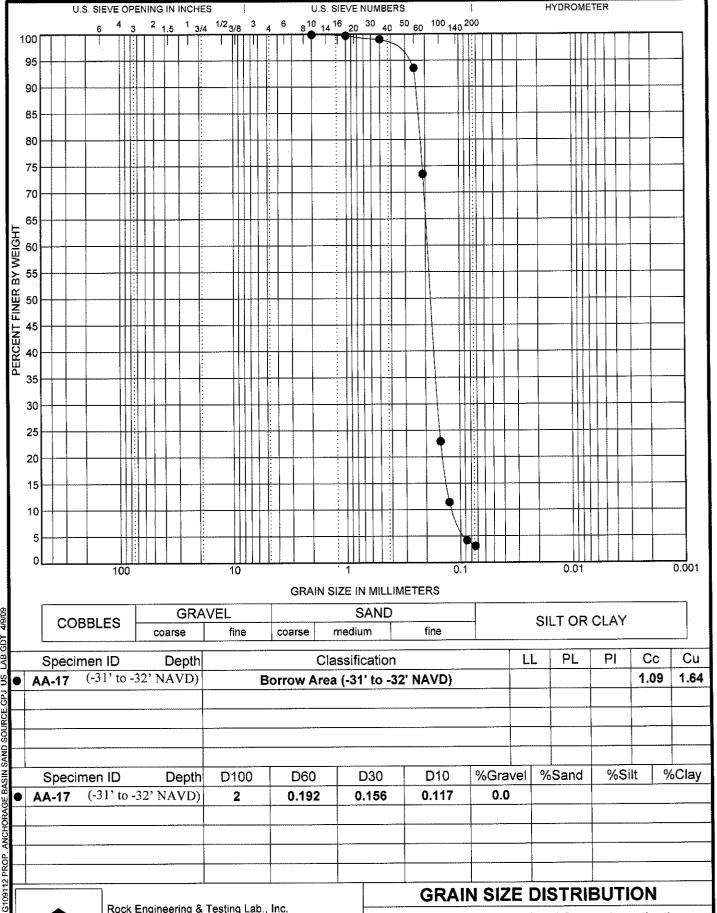


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Corpus Christi, TX 78409 Telephone: (361) 883-4555 Fax: (361) 883-4711

Project: Anchorage Basin Sand Source Investigation

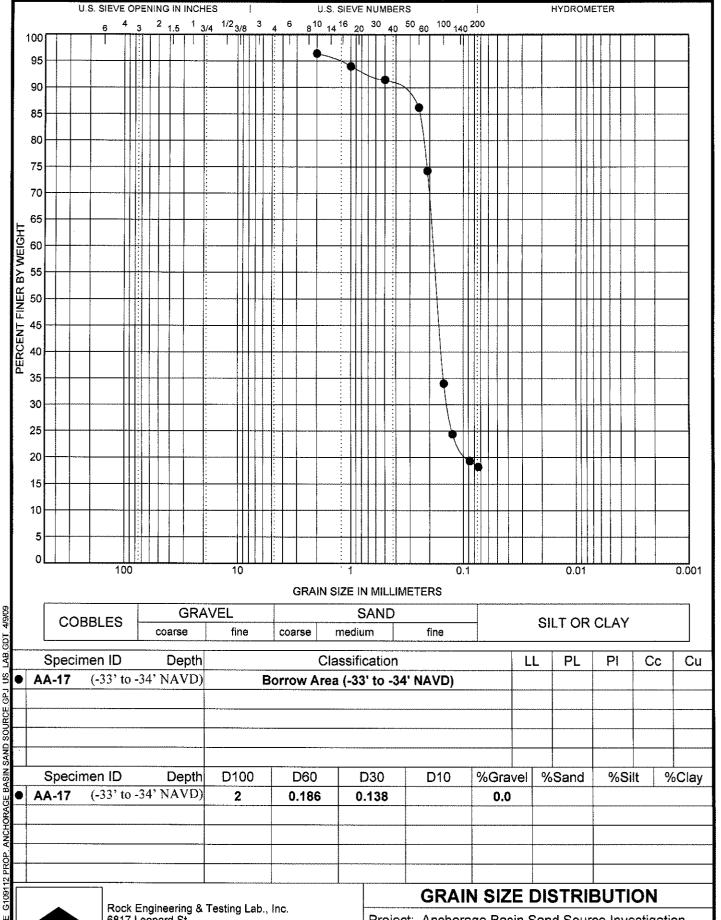
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Project: Anchorage Basin Sand Source Investigation

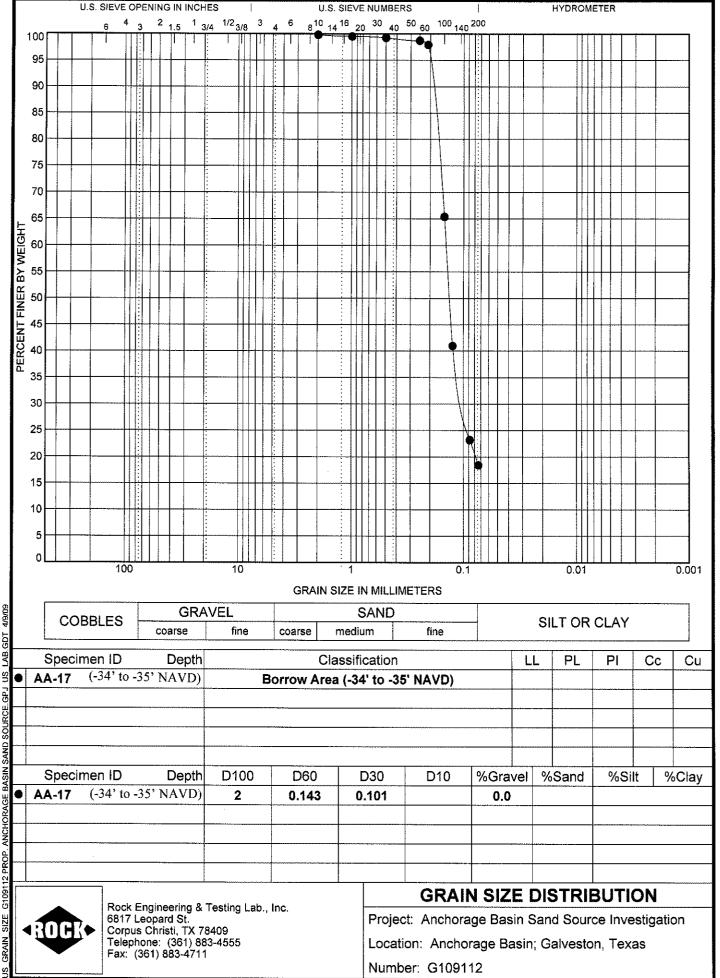
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Project: Anchorage Basin Sand Source Investigation

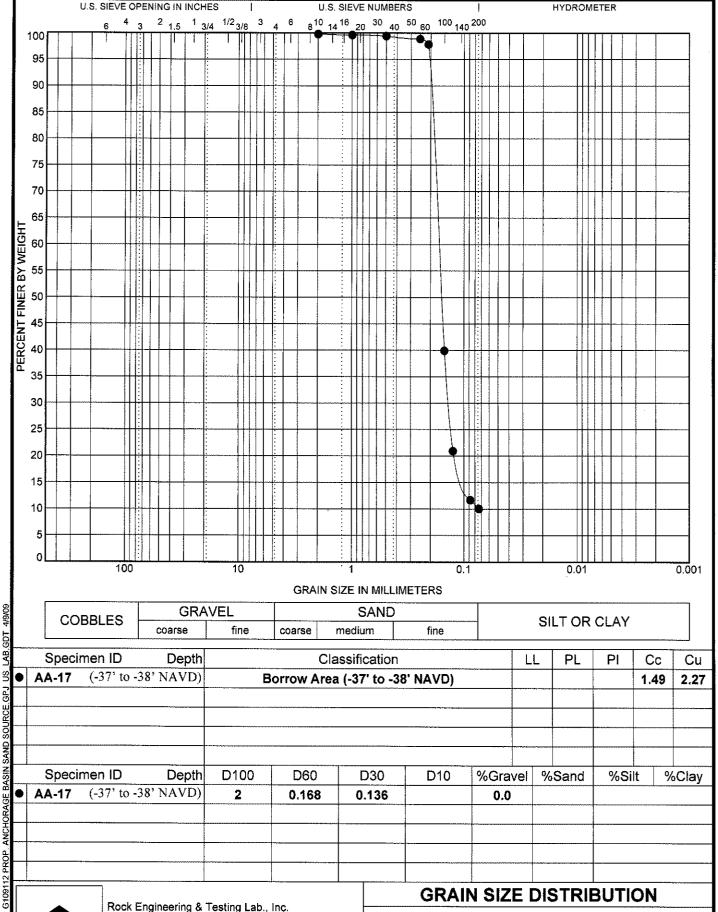
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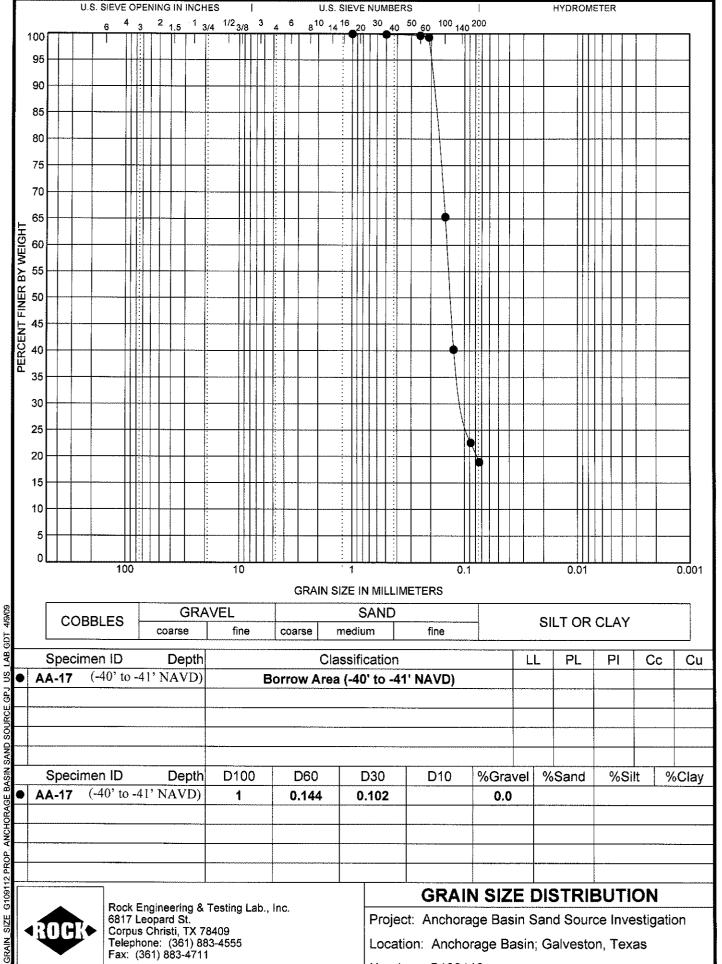
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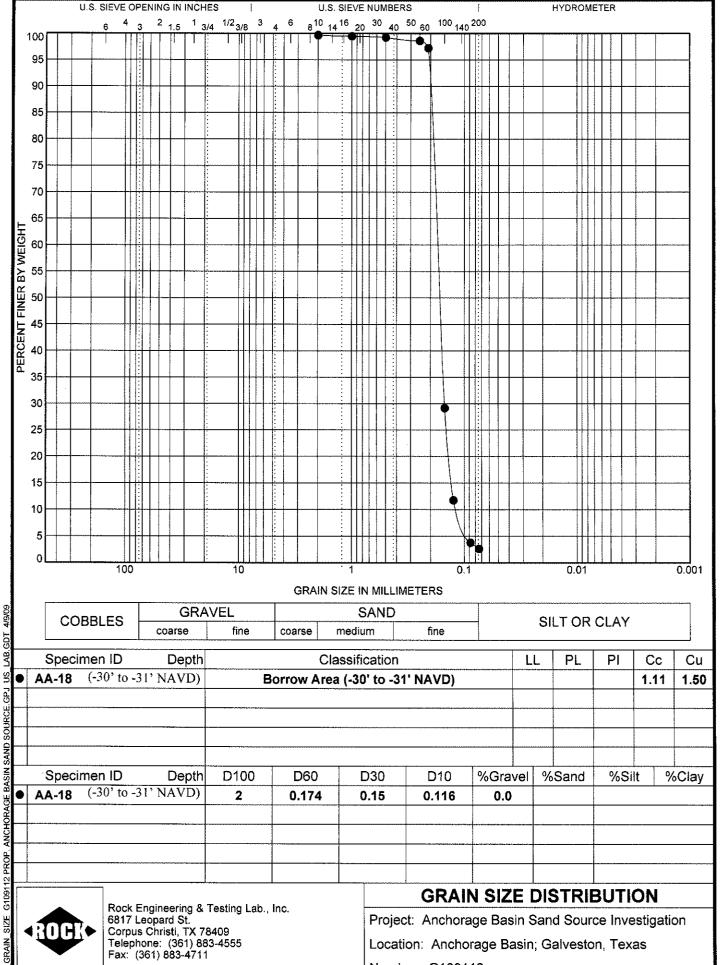
Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas





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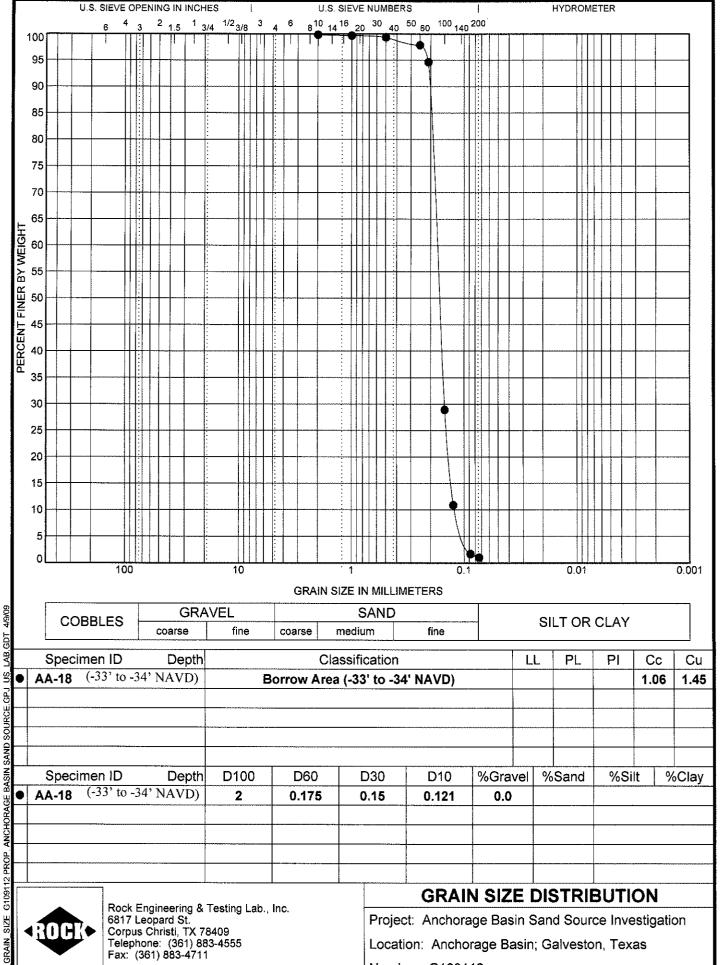


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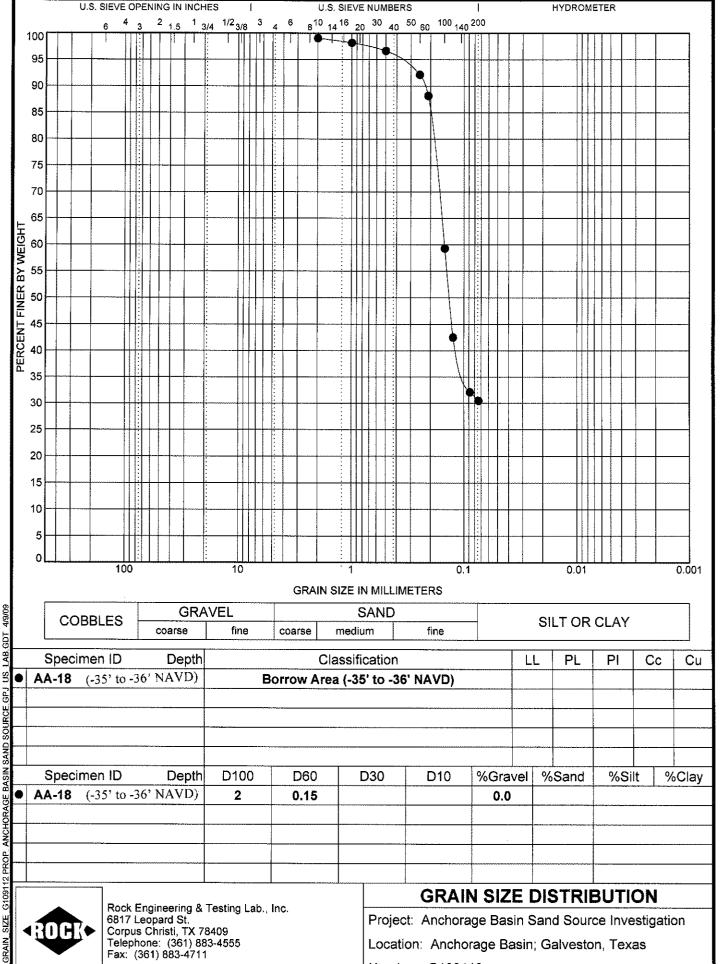
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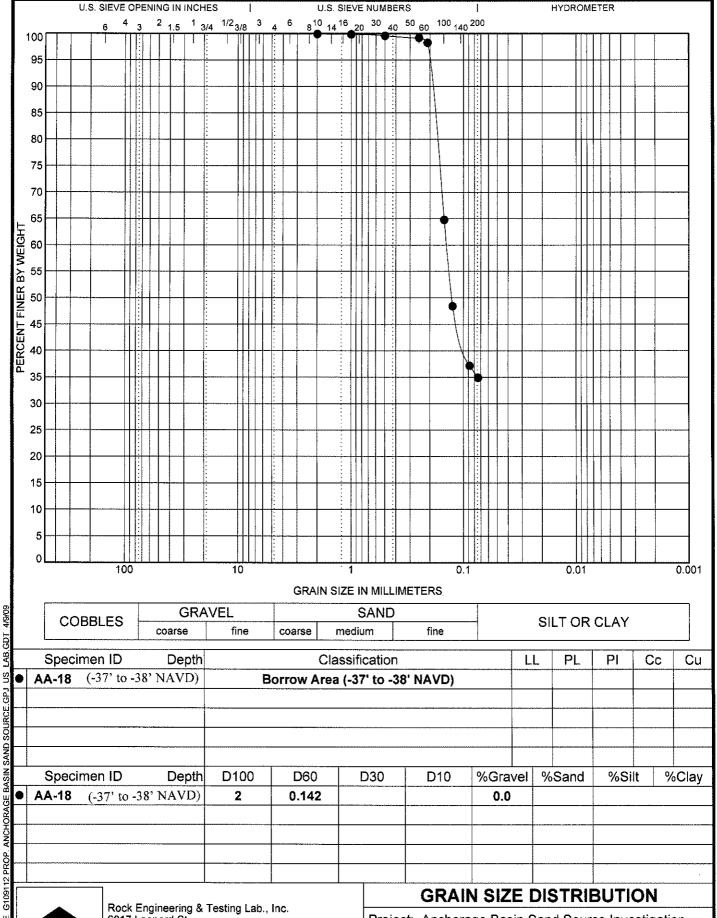
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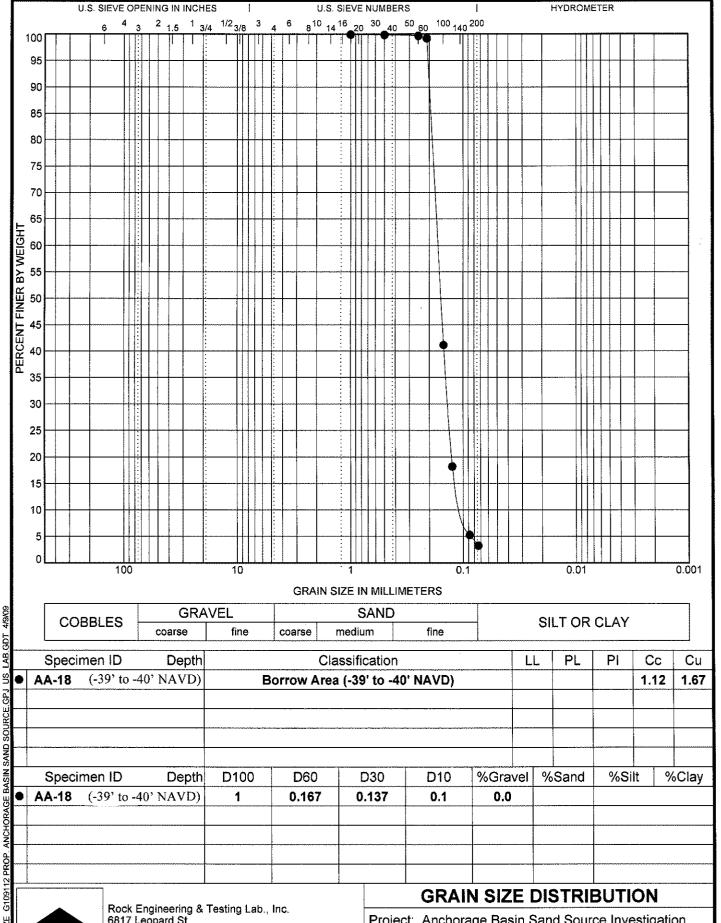
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Project: Anchorage Basin Sand Source Investigation

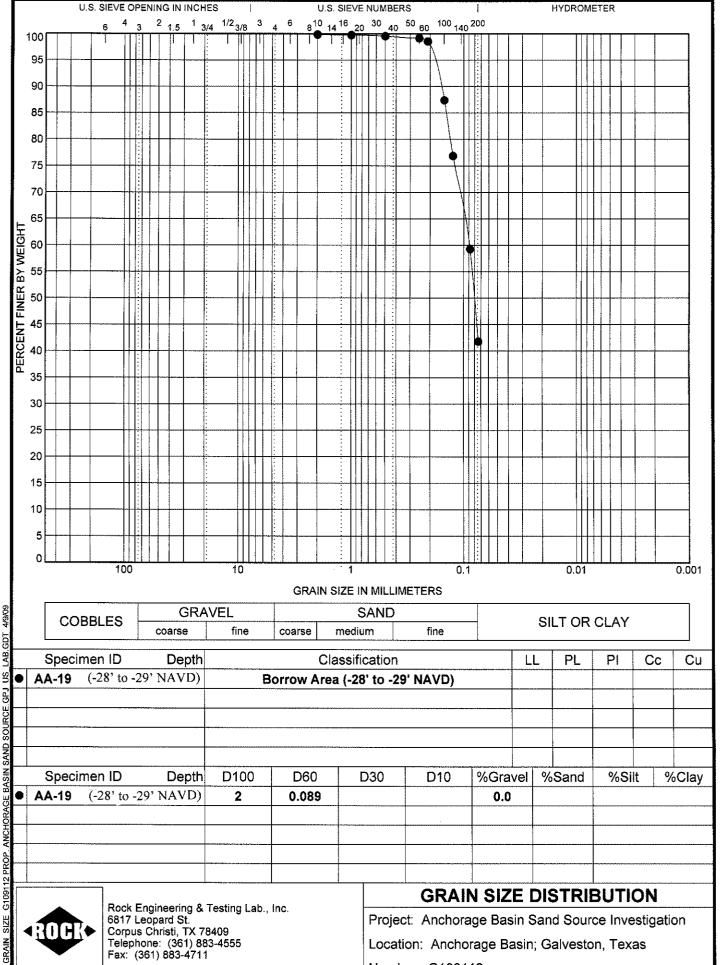
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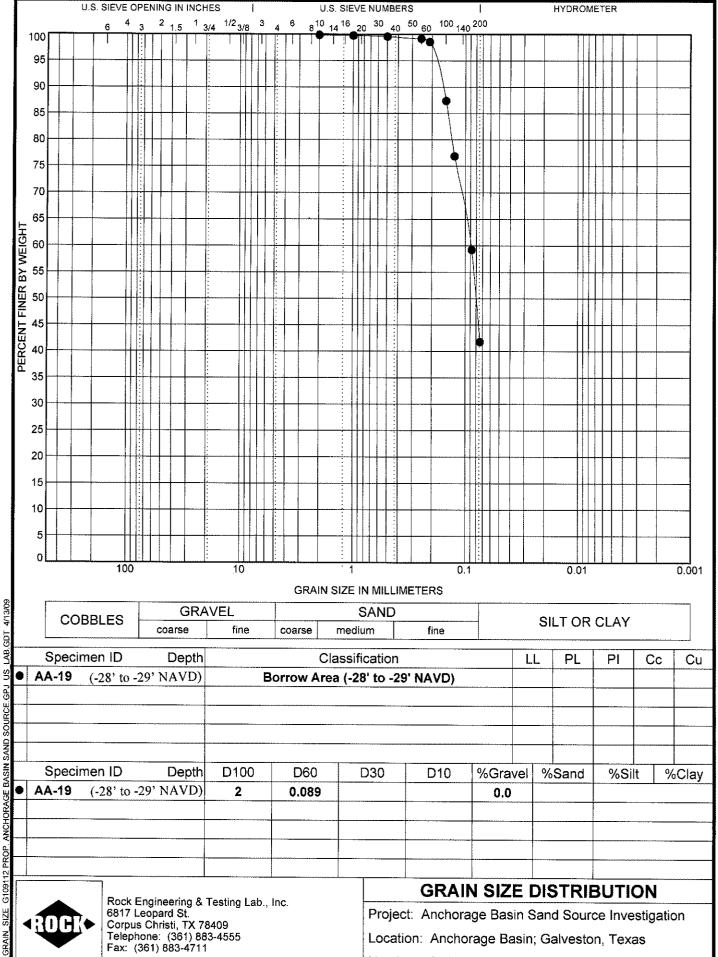
Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas

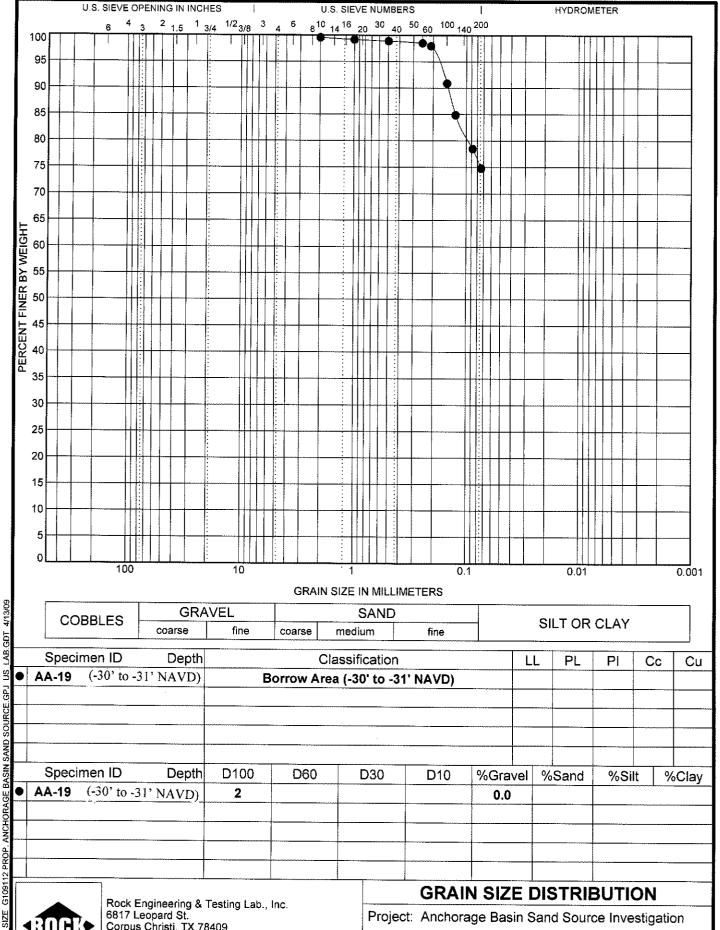




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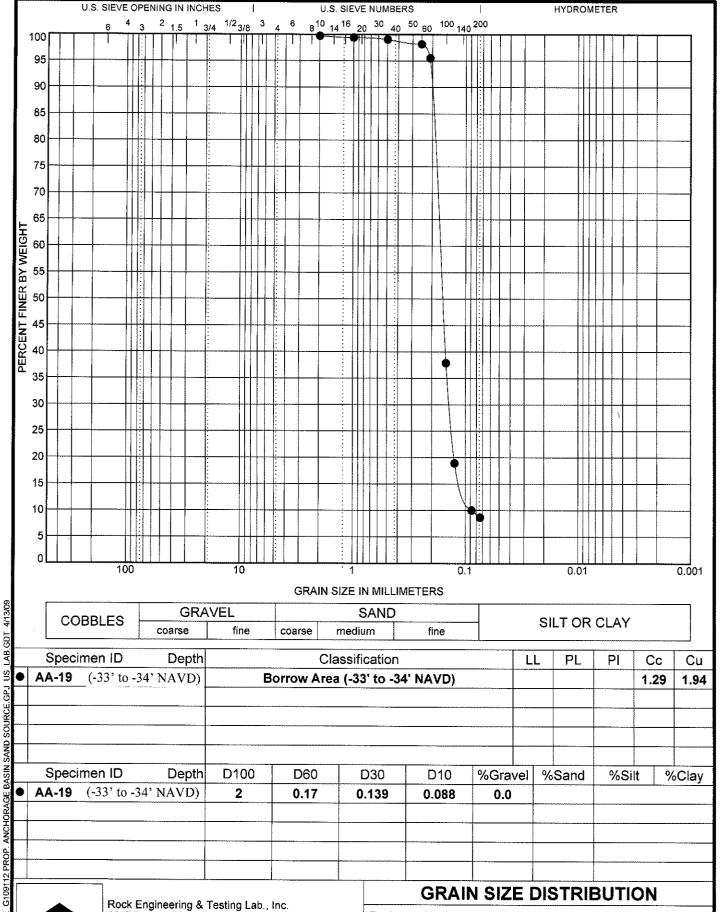
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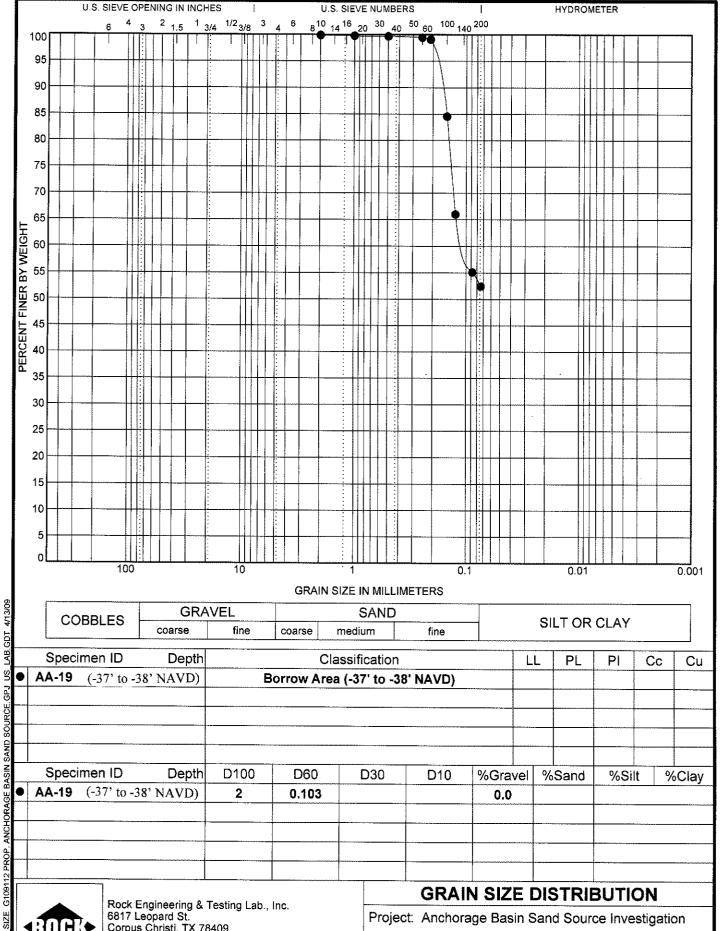
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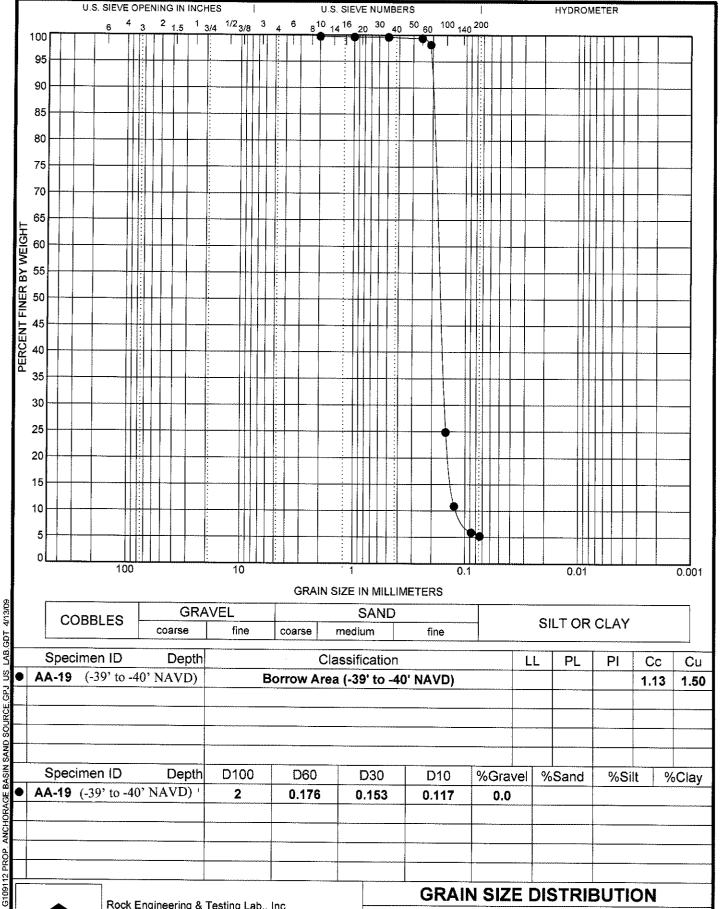
Project: Anchorage Basin Sand Source Investigation

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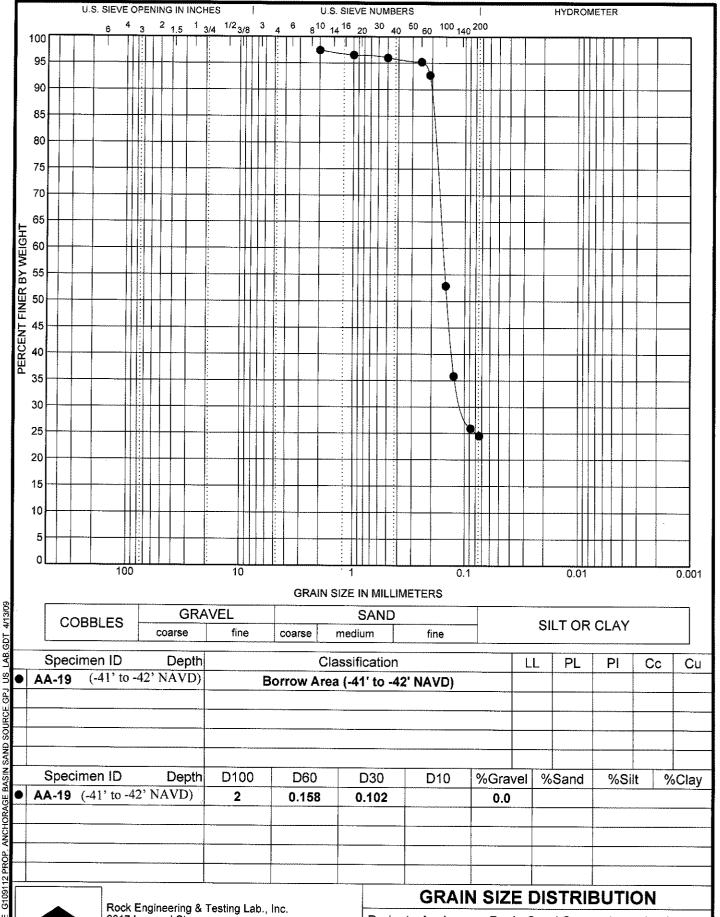
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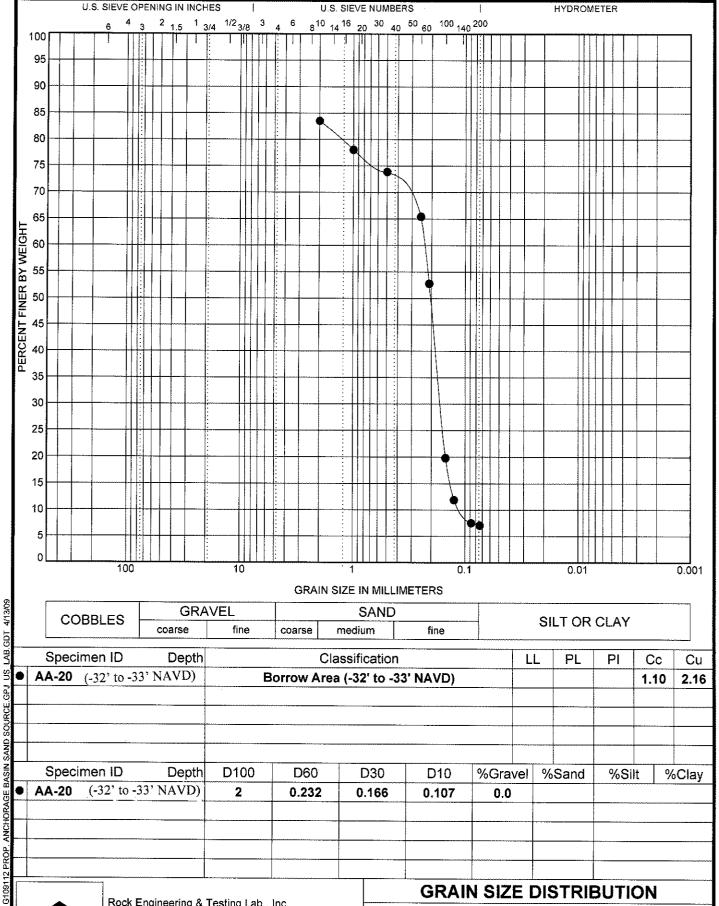
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Location: Anchorage Basin; Galveston, Texas

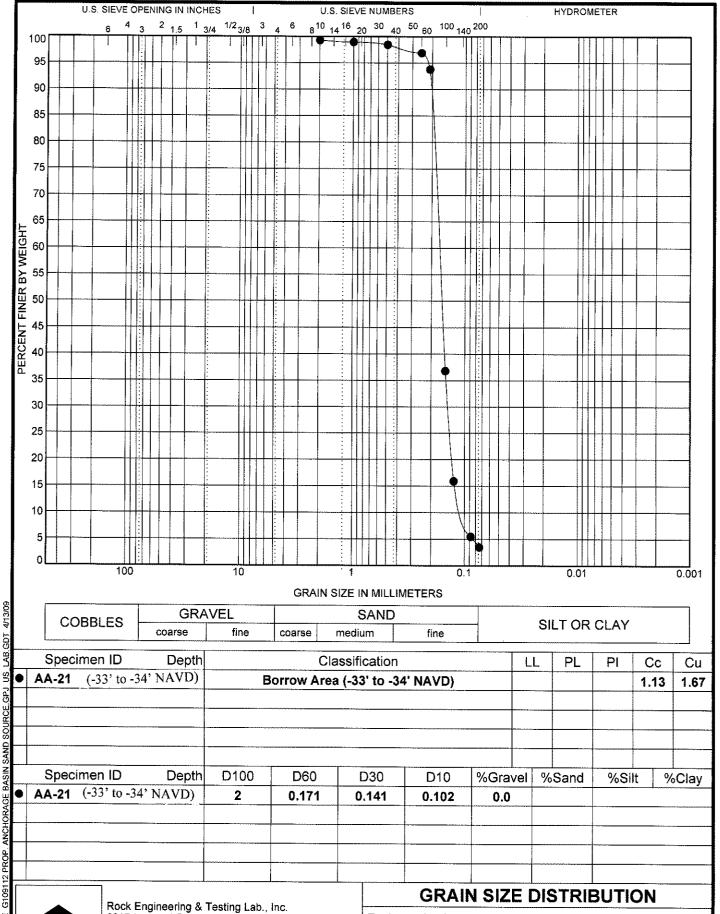




## **GRAIN SIZE DISTRIBUTION**

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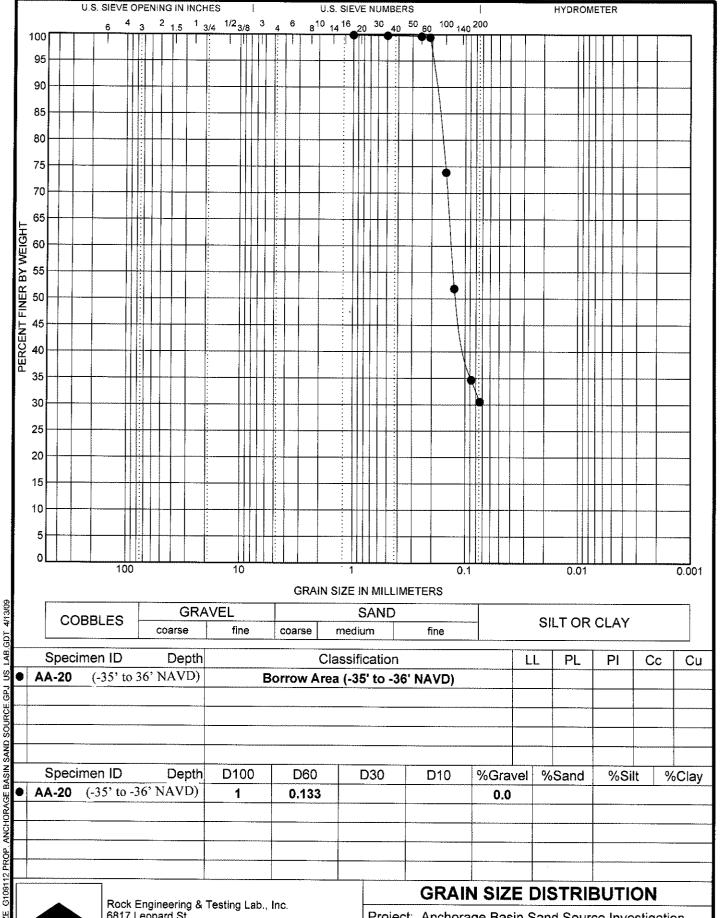
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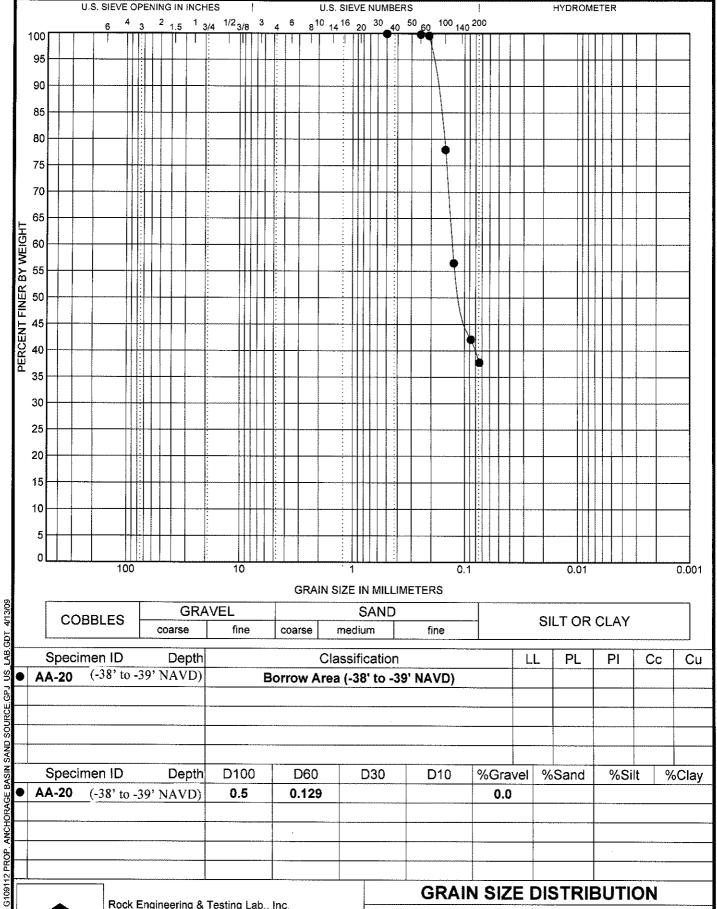
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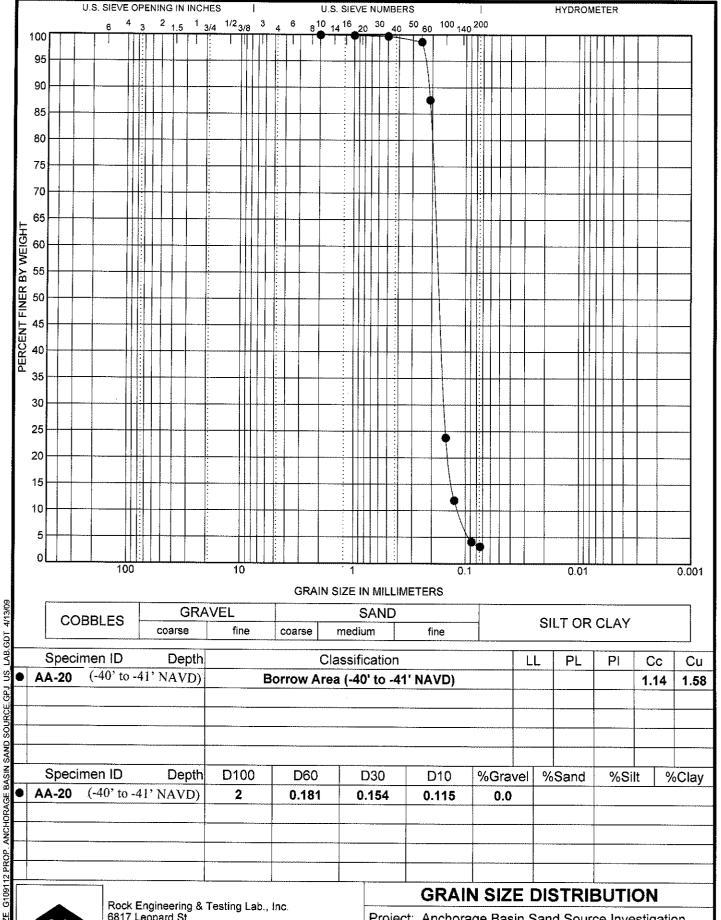
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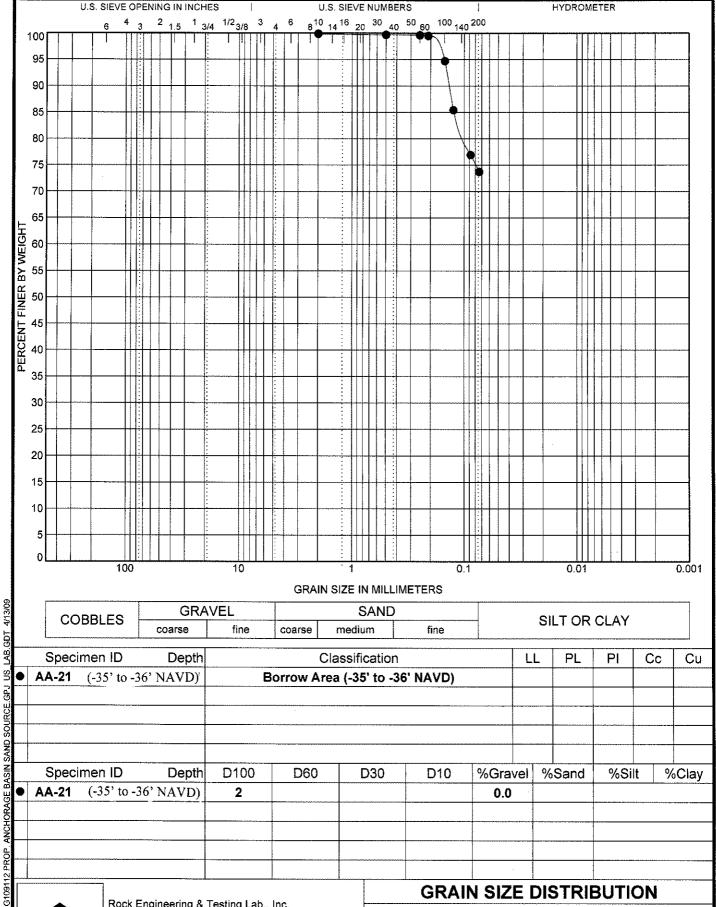
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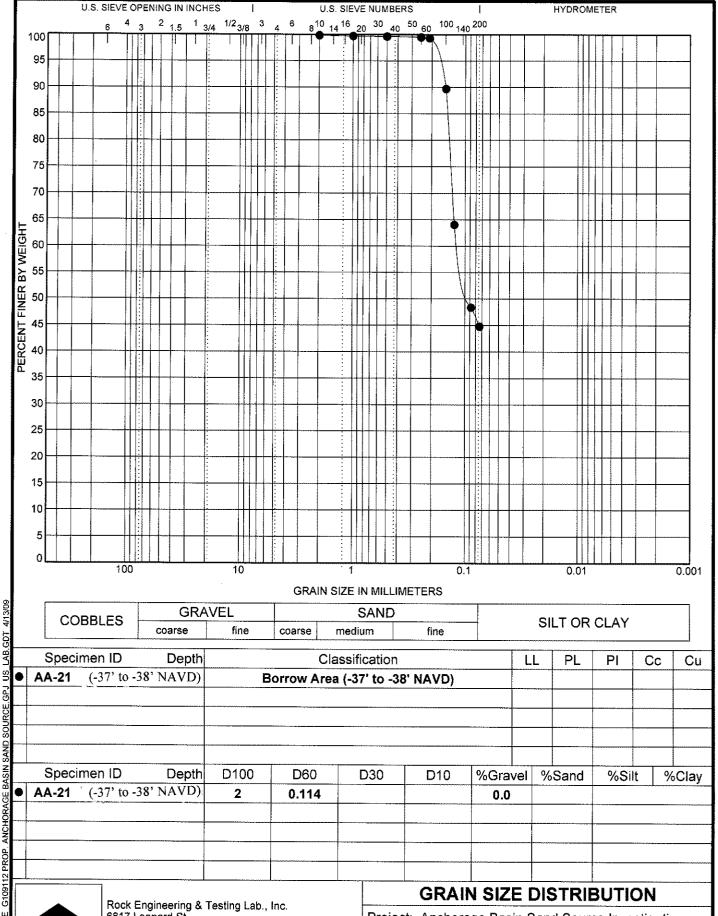
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Project: Anchorage Basin Sand Source Investigation

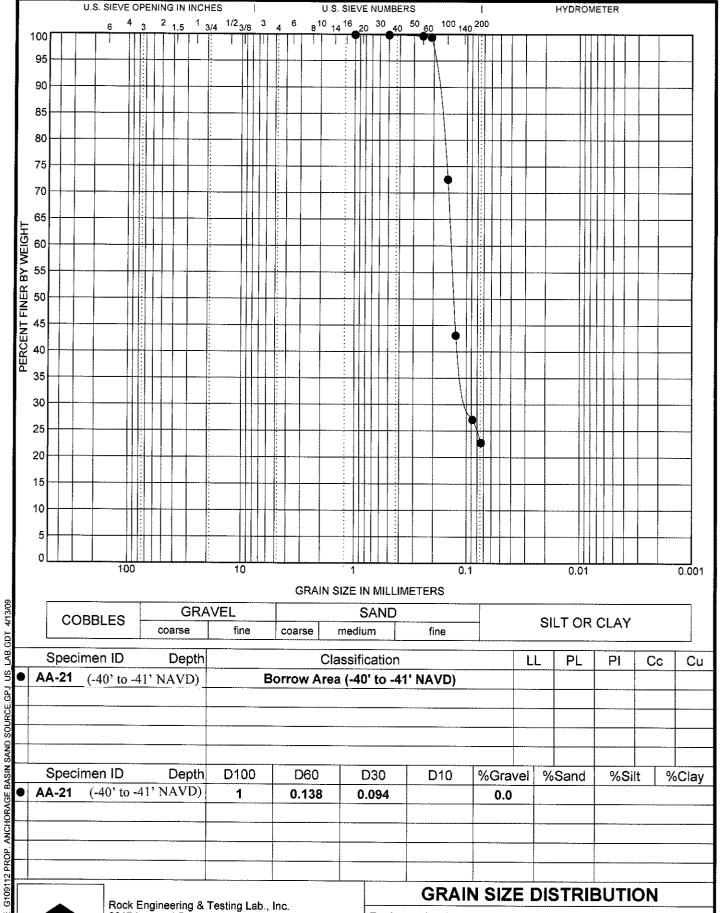
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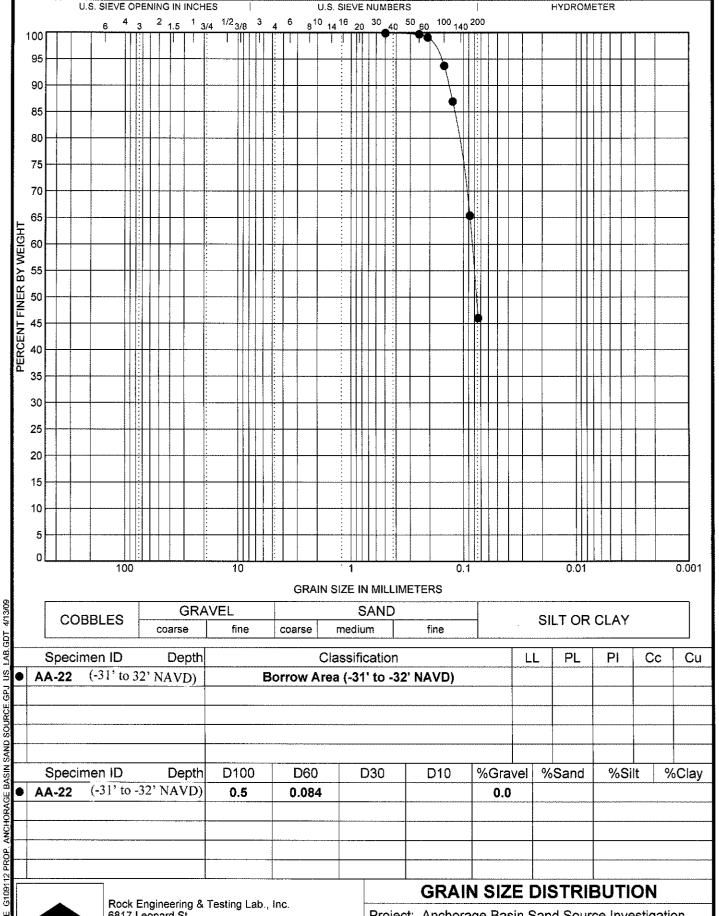
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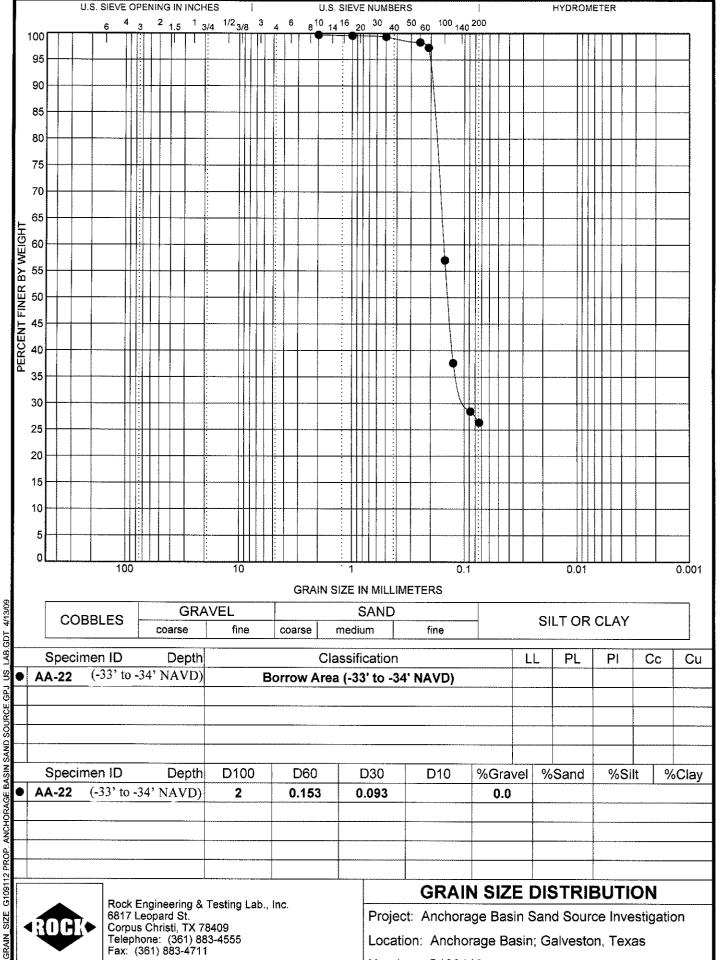
Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas



Project: Anchorage Basin Sand Source Investigation

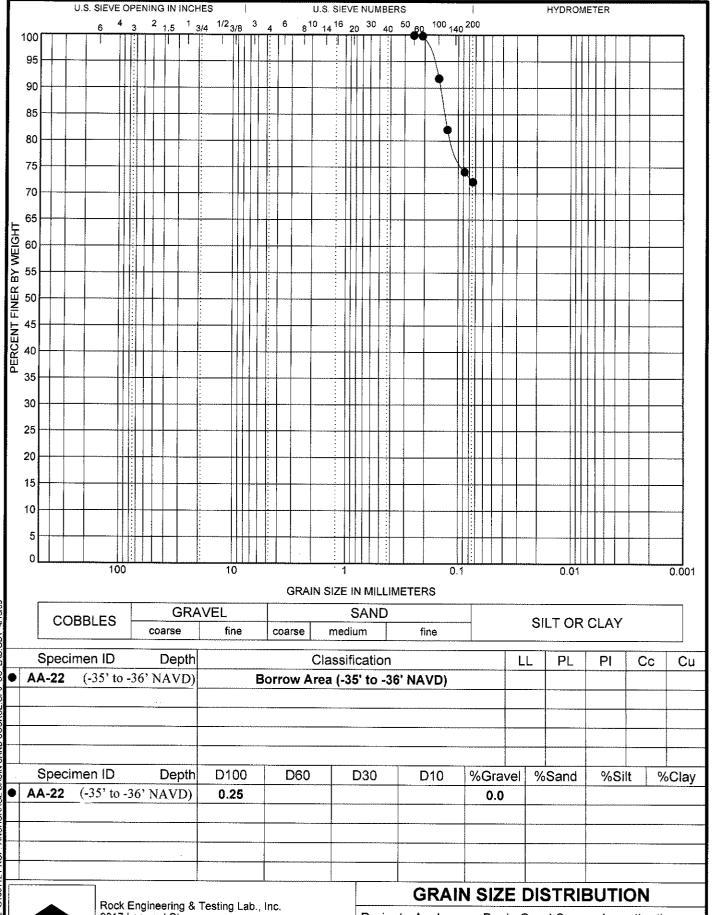
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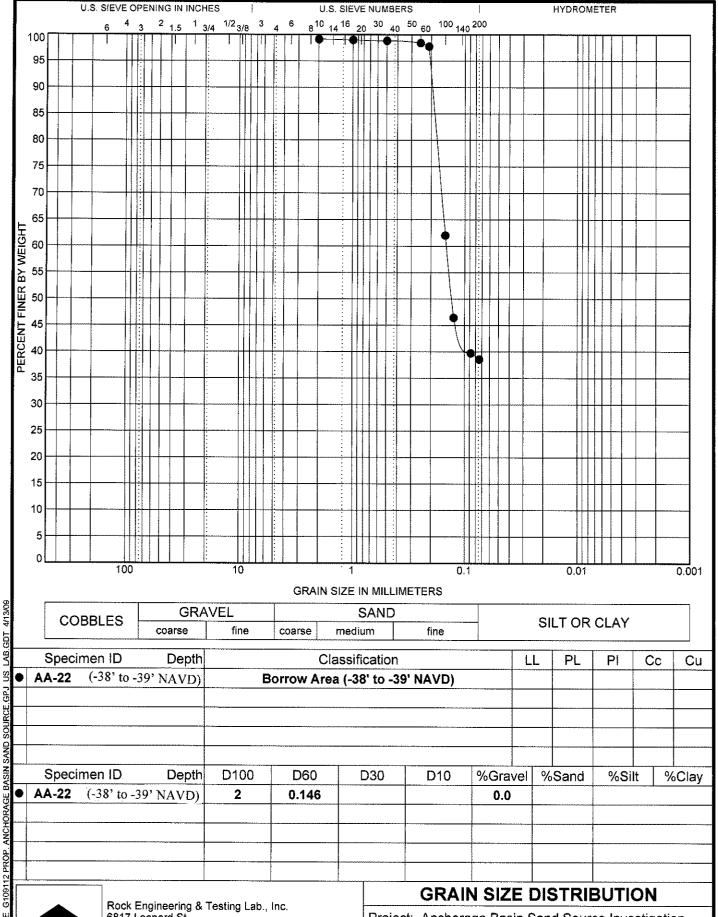
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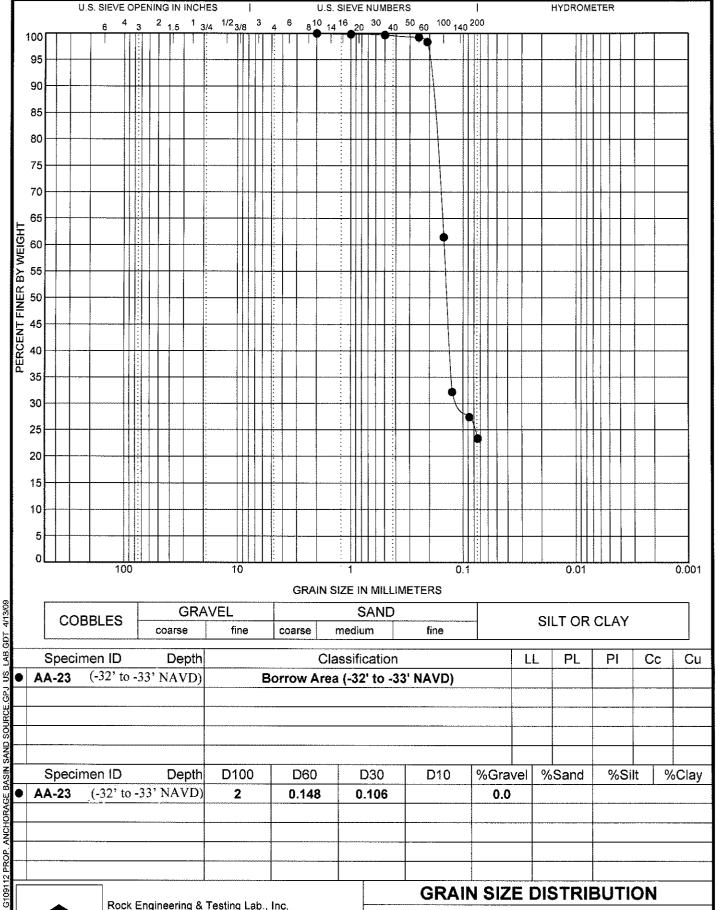
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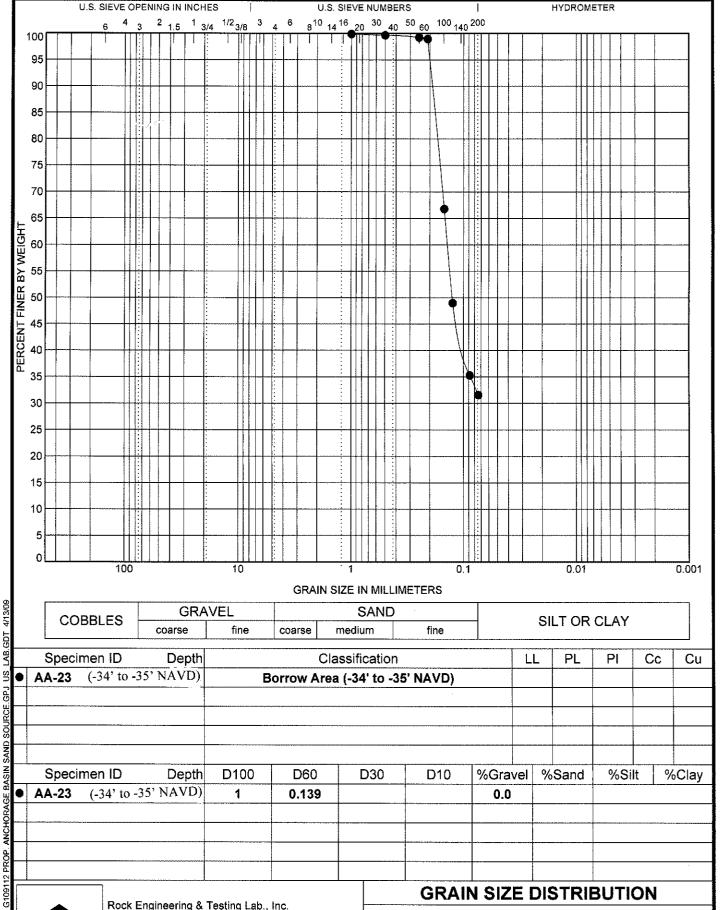




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Project: Anchorage Basin Sand Source Investigation

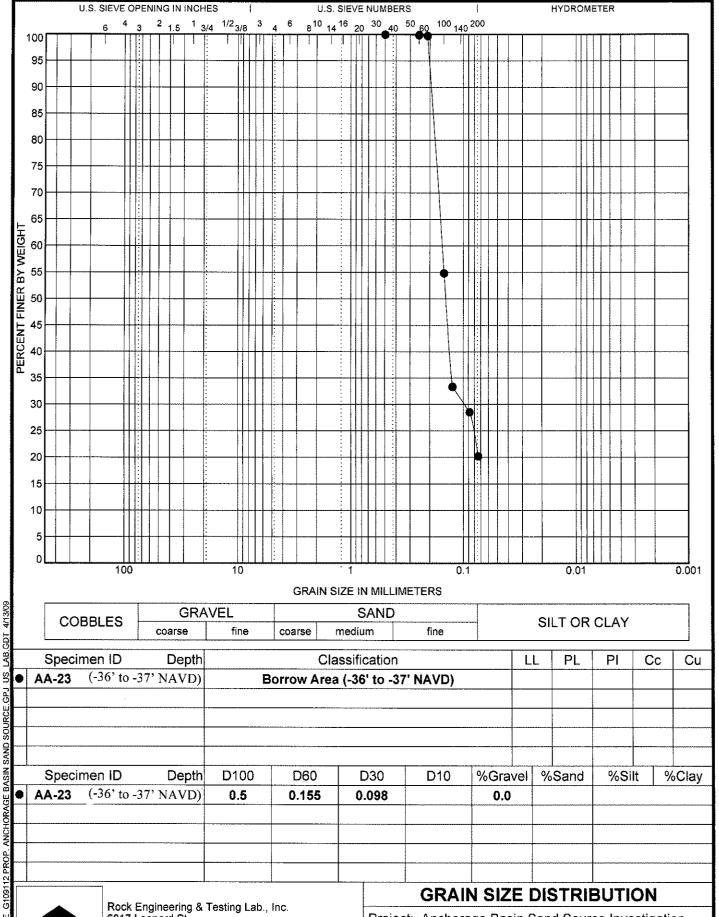
Location: Anchorage Basin; Galveston, Texas





Project: Anchorage Basin Sand Source Investigation

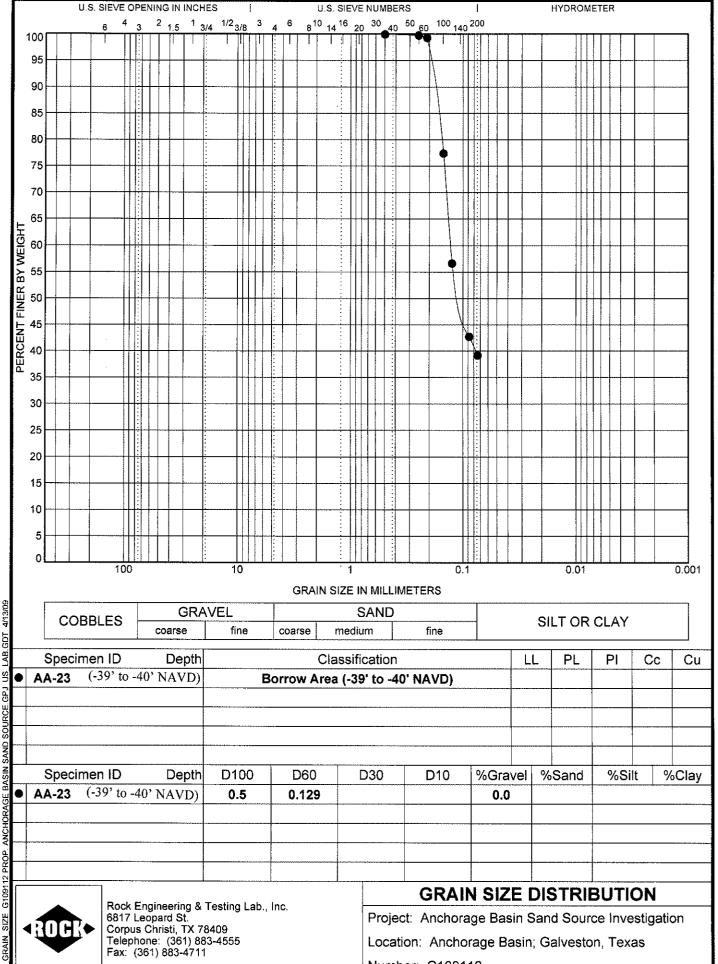
Location: Anchorage Basin; Galveston, Texas





Project: Anchorage Basin Sand Source Investigation

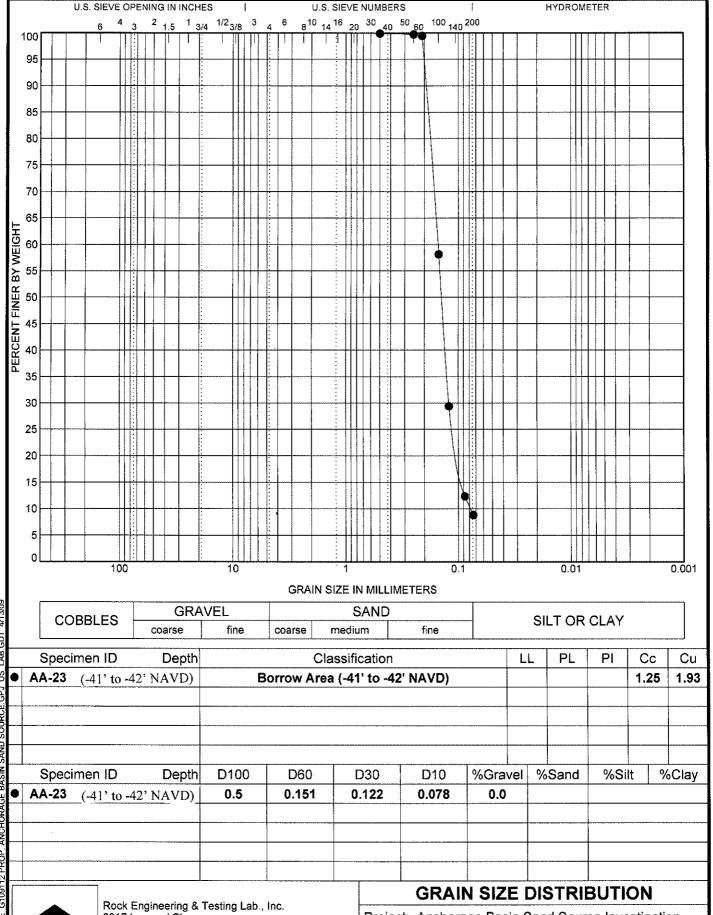
Location: Anchorage Basin; Galveston, Texas





Project: Anchorage Basin Sand Source Investigation

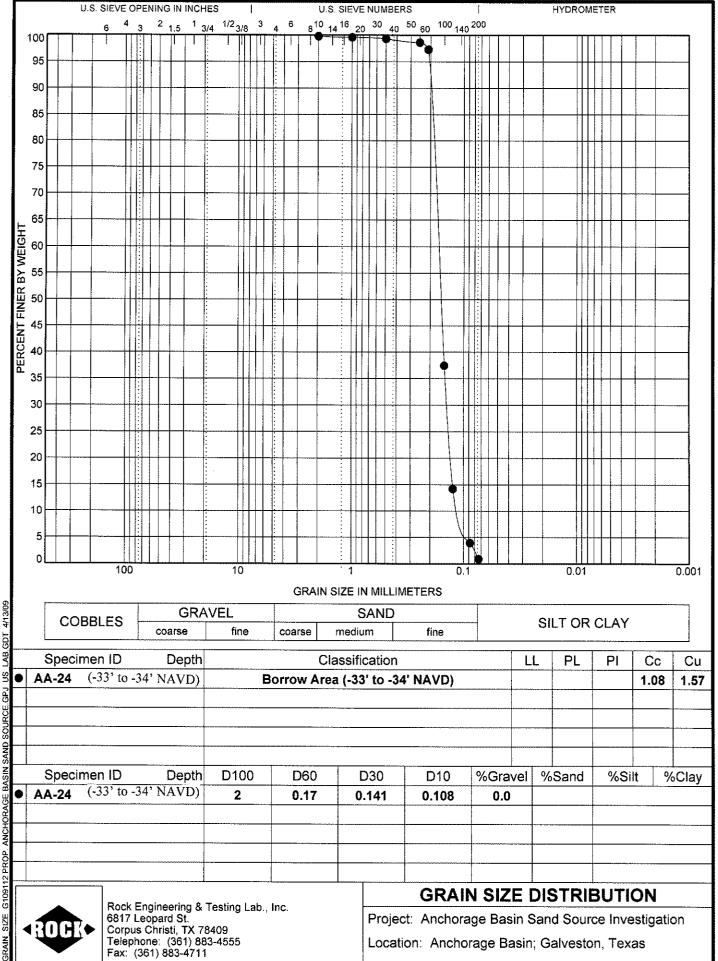
Location: Anchorage Basin; Galveston, Texas





Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas

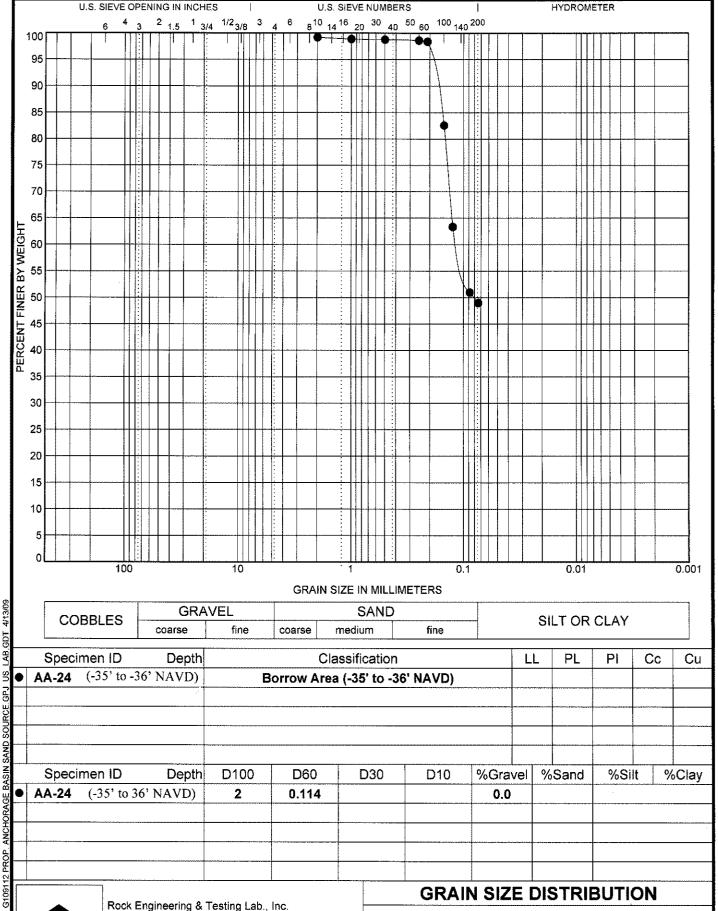




#### **GRAIN SIZE DISTRIBUTION**

Project: Anchorage Basin Sand Source Investigation

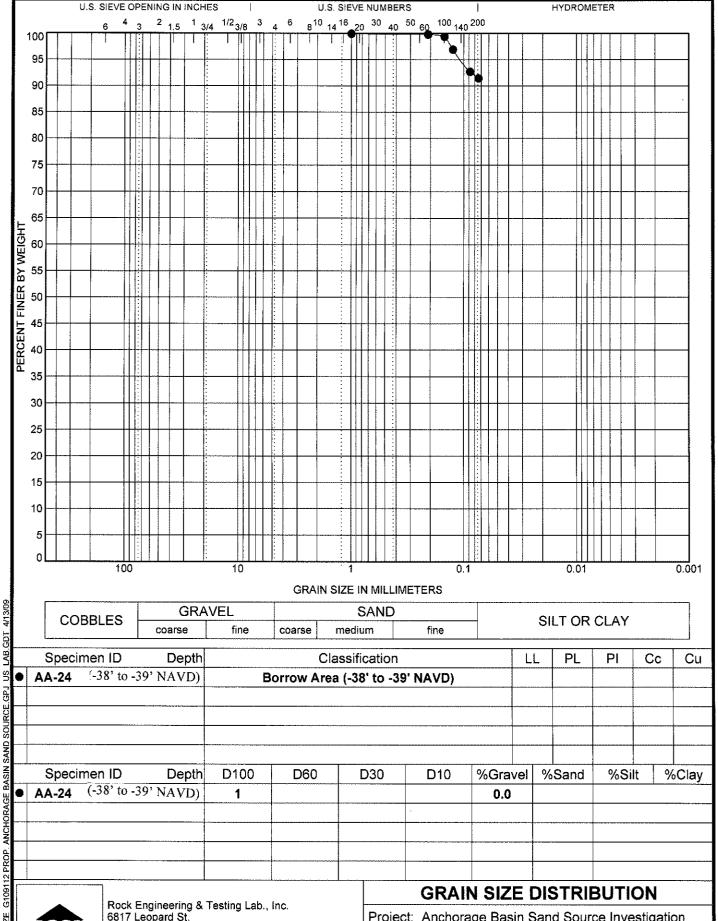
Location: Anchorage Basin; Galveston, Texas





Project: Anchorage Basin Sand Source Investigation

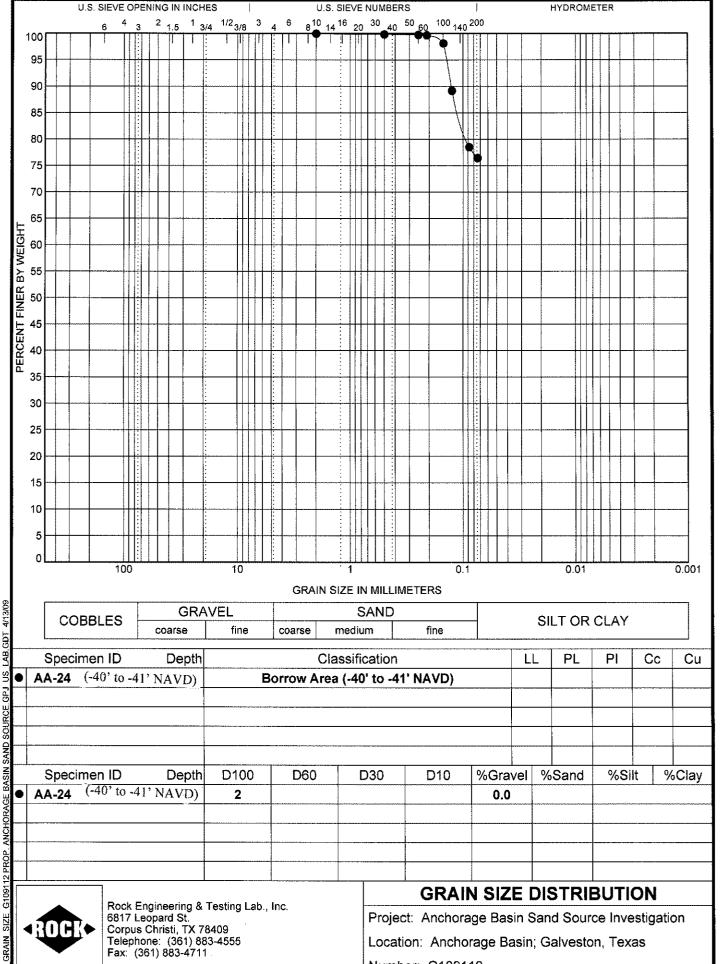
Location: Anchorage Basin; Galveston, Texas





Project: Anchorage Basin Sand Source Investigation

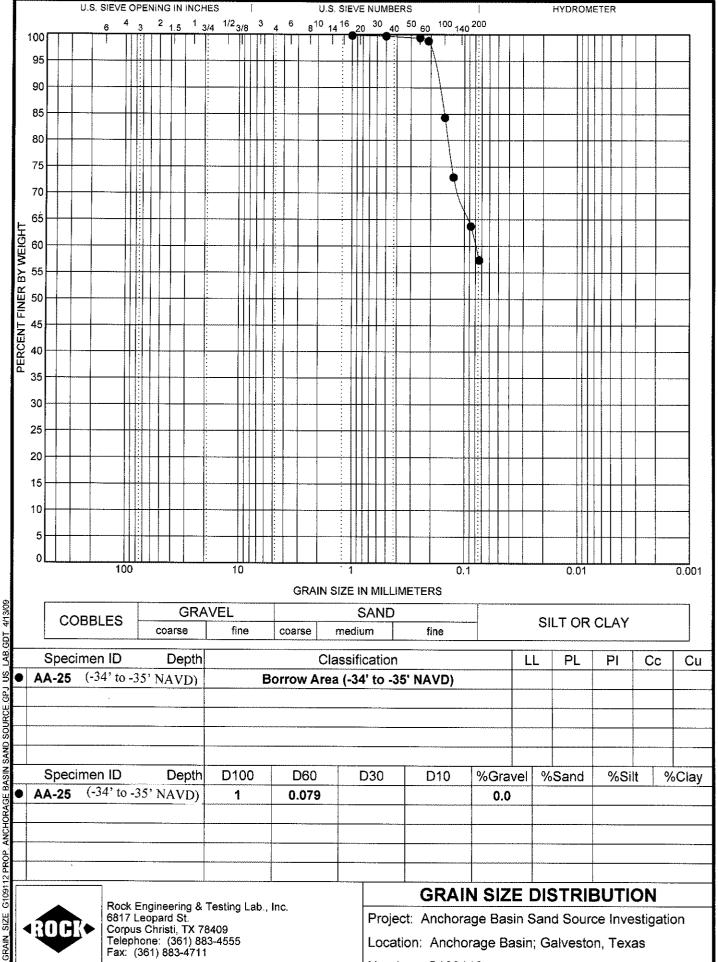
Location: Anchorage Basin; Galveston, Texas





Project: Anchorage Basin Sand Source Investigation

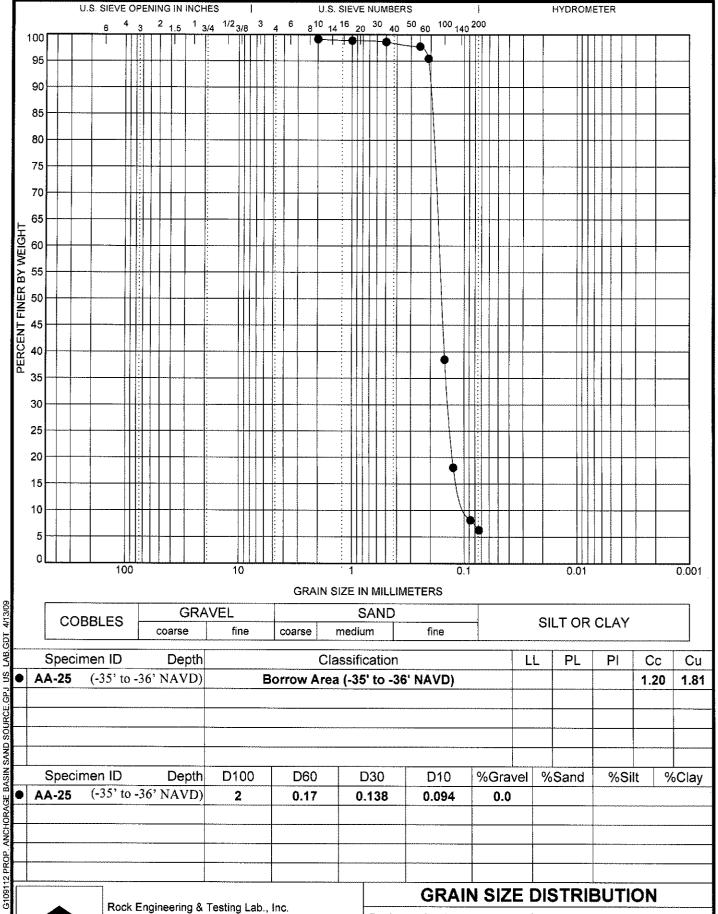
Location: Anchorage Basin; Galveston, Texas





Corpus Christi, TX 78409 Telephone: (361) 883-4555 Fax: (361) 883-4711

Location: Anchorage Basin; Galveston, Texas

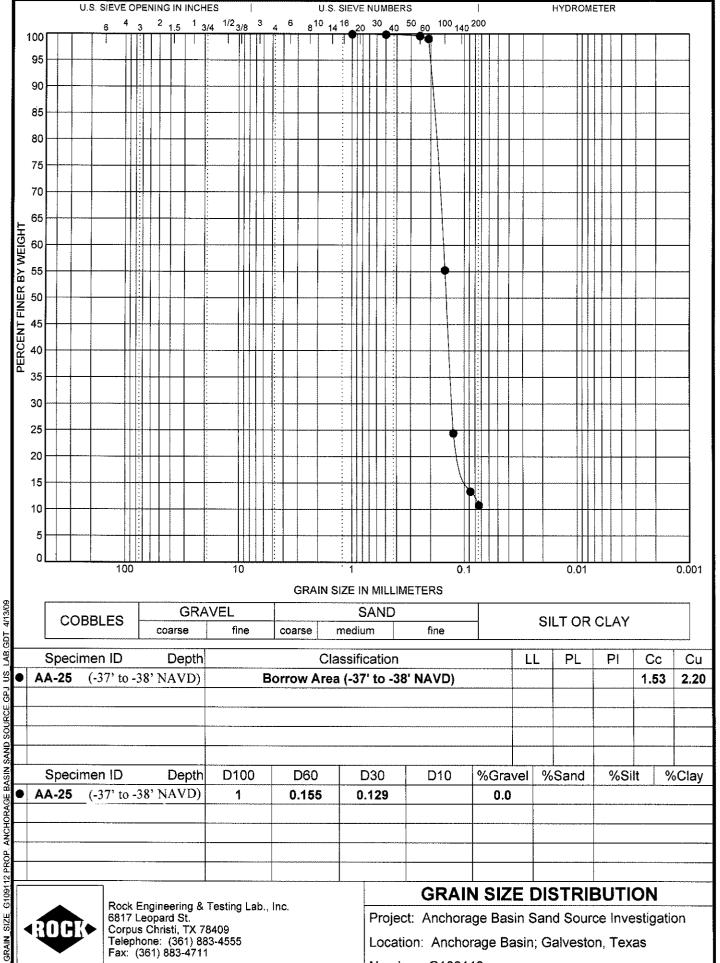




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Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas

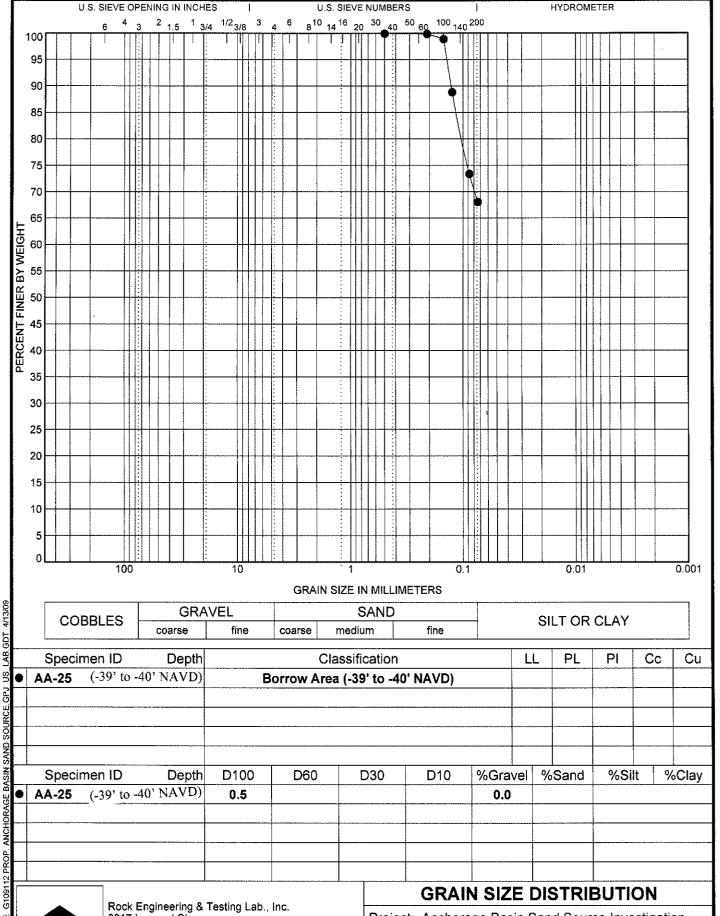




6817 Leopard St. Corpus Christi, TX 78409 Telephone: (361) 883-4555 Fax: (361) 883-4711

Project: Anchorage Basin Sand Source Investigation

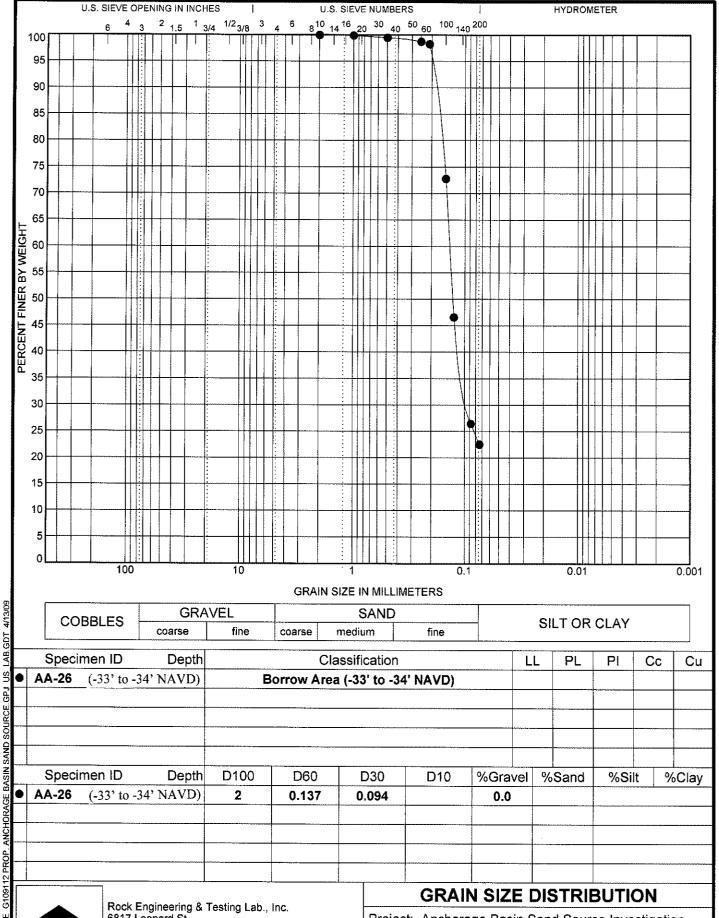
Location: Anchorage Basin; Galveston, Texas





Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas

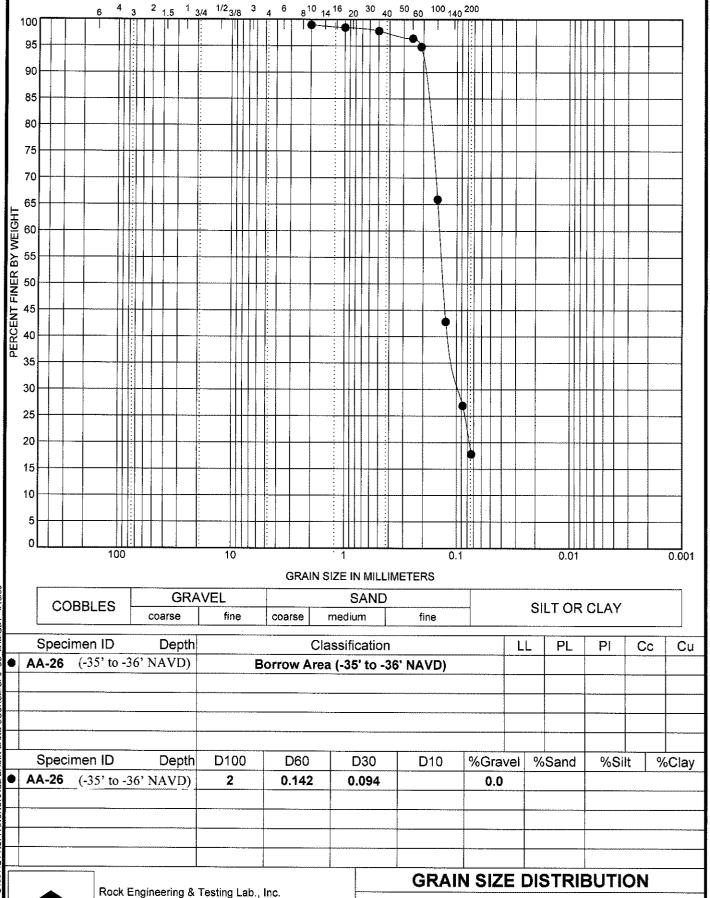




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Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas



U.S. SIEVE NUMBERS

HYDROMETER

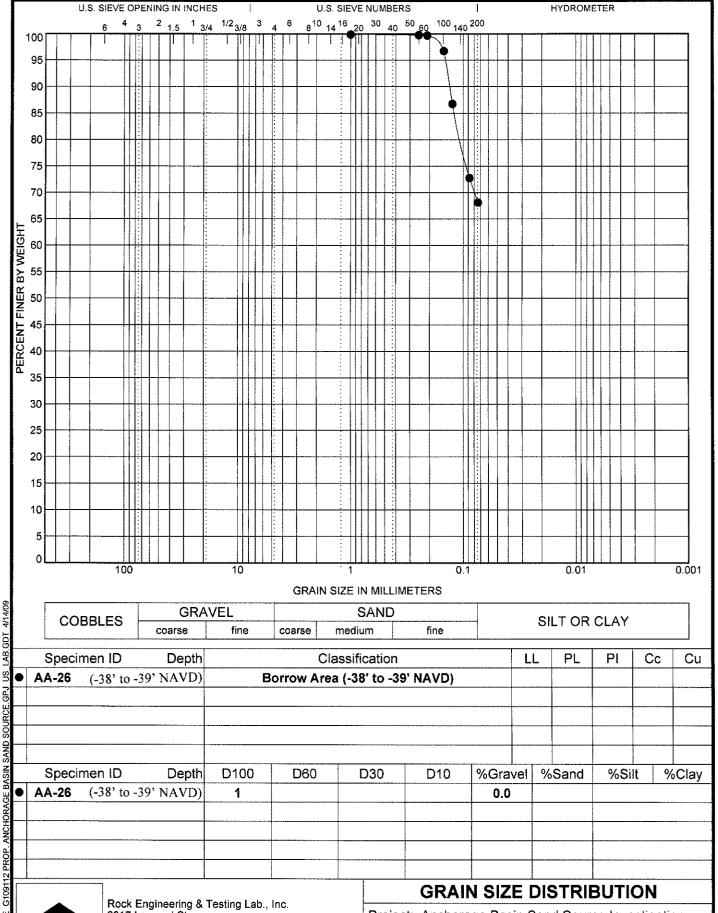


Rock Engineering & Testing Lab., Inc. 6817 Leopard St. Corpus Christi, TX 78409 Telephone: (361) 883-4555 Fax: (361) 883-4711

U.S. SIEVE OPENING IN INCHES

Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas

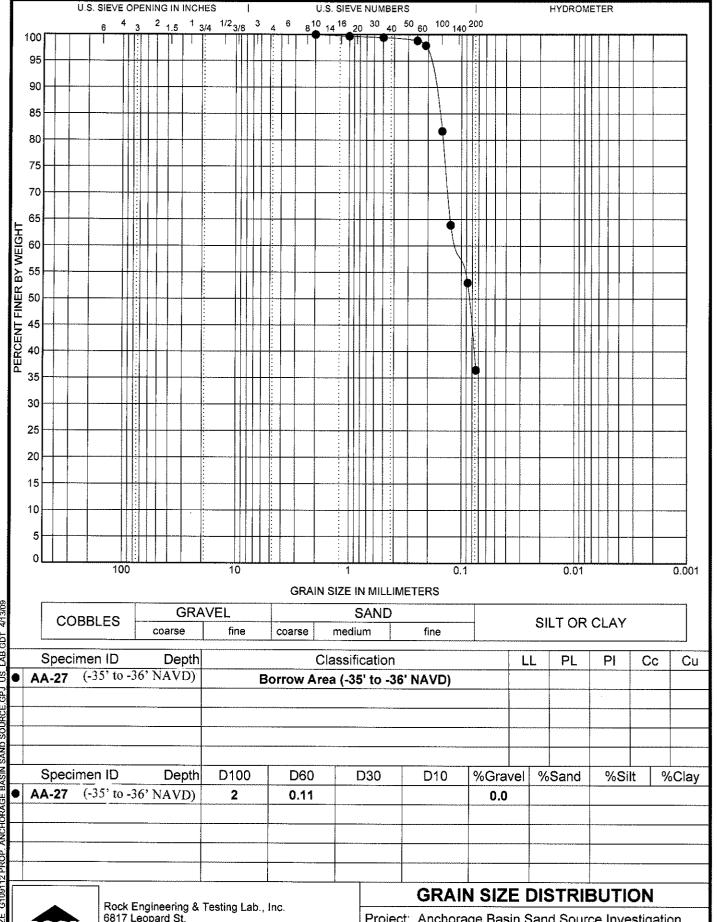


4ROCK►

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

Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas

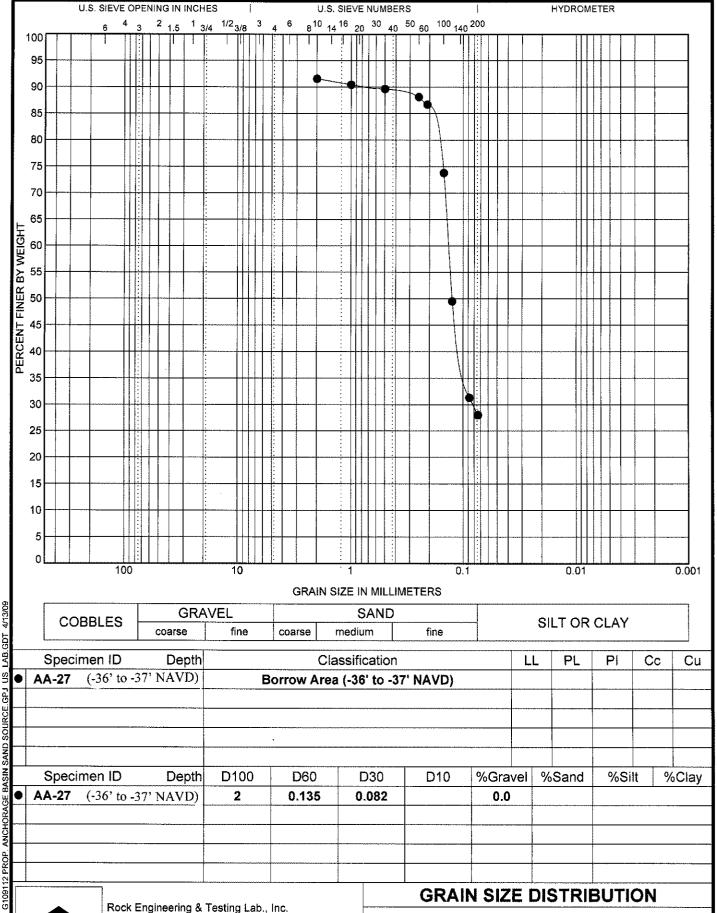




6817 Leopard St. Corpus Christi, TX 78409 Telephone: (361) 883-4555 Fax: (361) 883-4711

Project: Anchorage Basin Sand Source Investigation

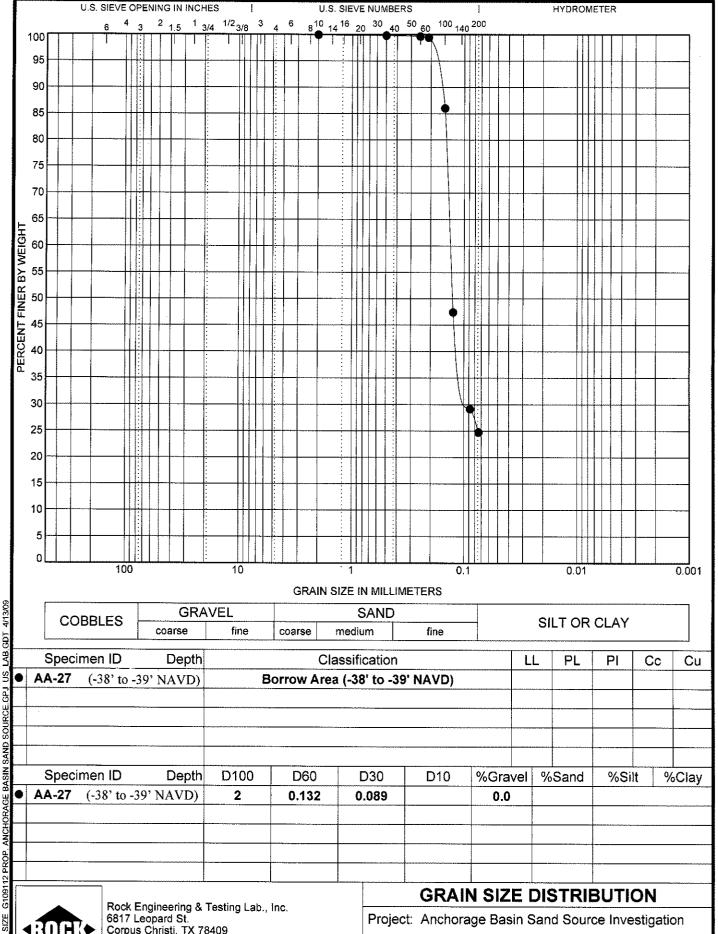
Location: Anchorage Basin; Galveston, Texas





Project: Anchorage Basin Sand Source Investigation

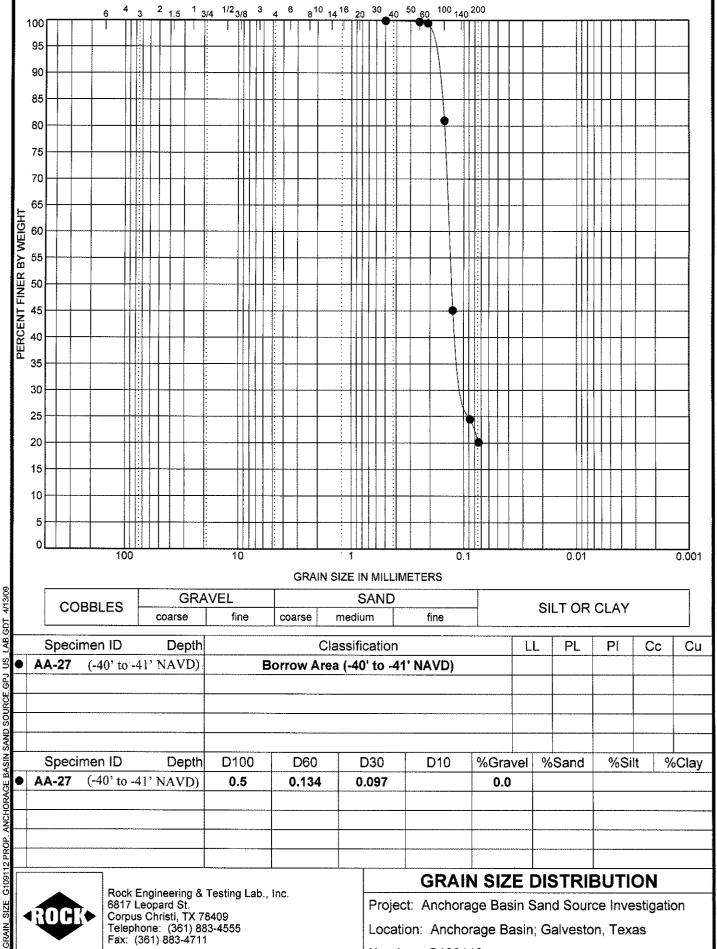
Location: Anchorage Basin; Galveston, Texas



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Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin, Galveston, Texas



U.S. SIEVE NUMBERS

HYDROMETER

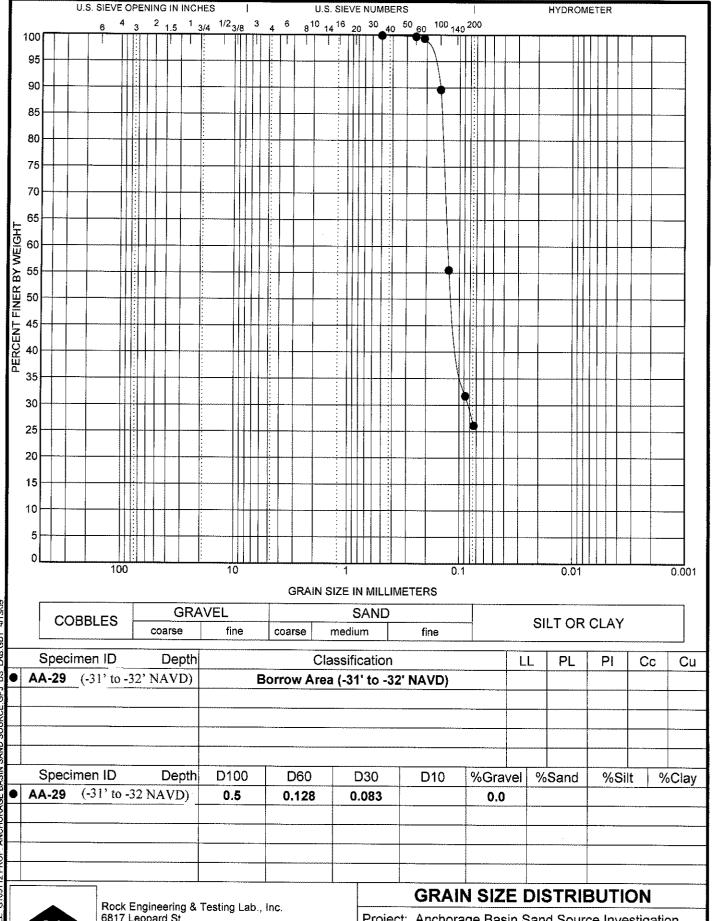


6817 Leopard St. Corpus Christi, TX 78409 Telephone: (361) 883-4555 Fax: (361) 883-4711

U.S. SIEVE OPENING IN INCHES

Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas



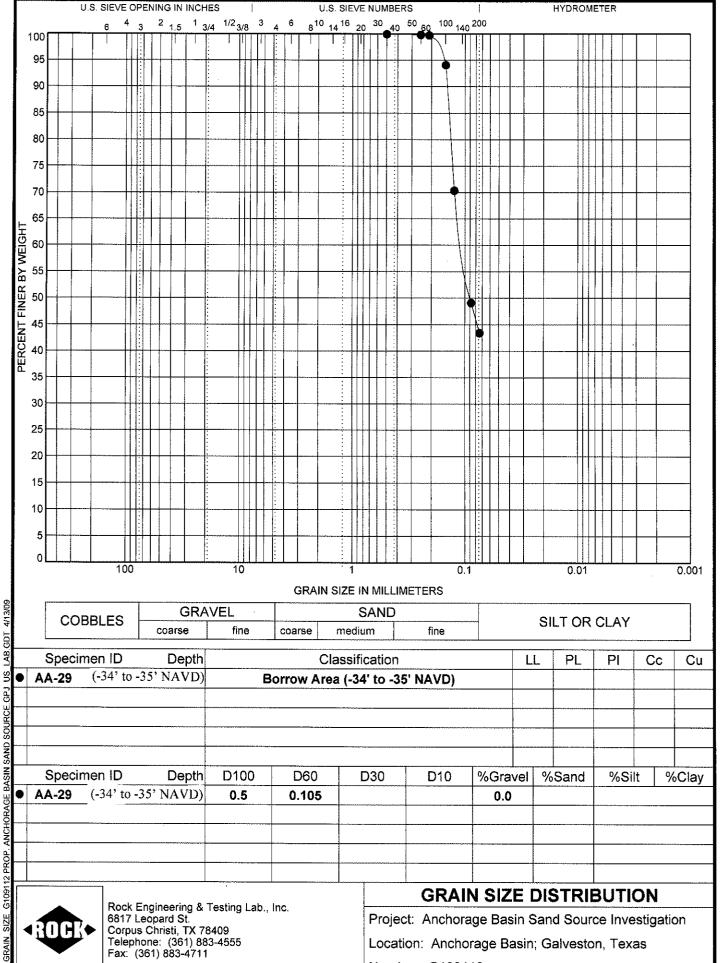


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Project: Anchorage Basin Sand Source Investigation

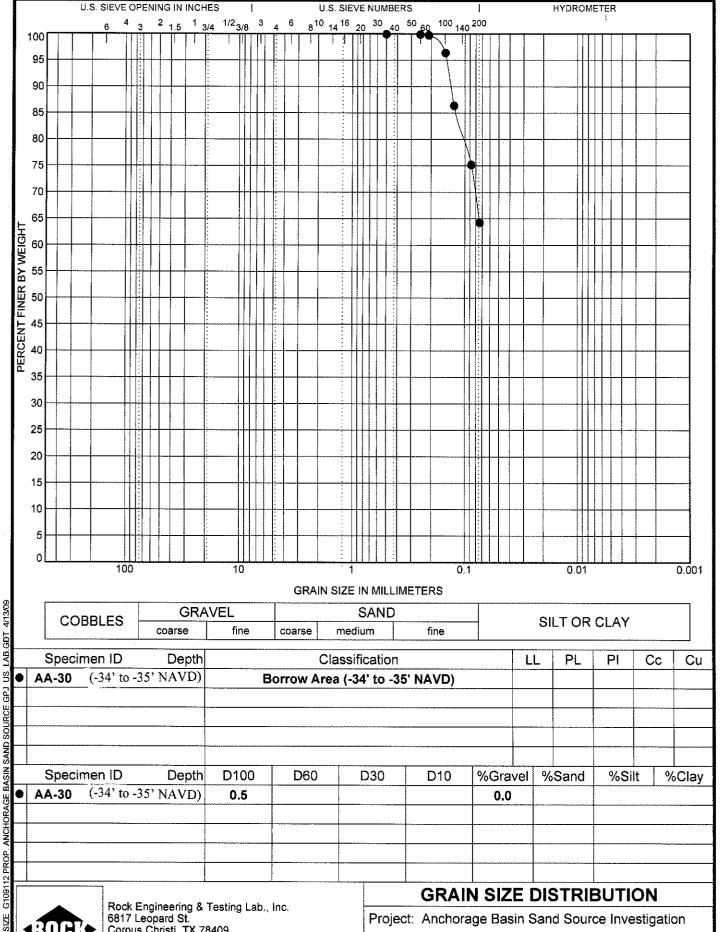
Location: Anchorage Basin; Galveston, Texas





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Location: Anchorage Basin; Galveston, Texas





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Location: Anchorage Basin; Galveston, Texas



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Corpus Christi, TX 78409 Telephone: (361) 883-4555 Fax: (361) 883-4711

T - POCKET TORVANE SHEAR STRENGTH

CLIENT: HDR Engineering, Inc.

PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

NUMBER: G109112

	470	Y INC	OR	- rax	(30)	1) 003-	4711					DATE(S) DRILLED: 03/11/09 - 03/11/09
	FIEL	_D D	ΑT	Α	l	ABC	RAT	ORY	DAT	A		DRILLING METHOD(S):
				NO.			TERBI LIMIT:				_	Vibracore
IBOL.	Elevation, Ft. [NAVD]	SAMPLE NUMBER	(6	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:
SOIL SYMBOL	vatic	PLE	SAMPLES	OWS/SONS/SONS/SONS/SCENT	STUF	JOUI	LAS	, AS	DEN	COMPRESSIV STRENGTH (TONS/SQ FT)	US N	SURFACE ELEVATION: -36' NAVD
SOIL	Ele	SAN	\S∀ /S∀	A C C S S S S S S S S S S S S S S S S S	MO	LL	PL	PI	POU	STR OF	Σ	DESCRIPTION OF STRATUM
			П									
	- 21 -											
	- 22 -								,			
	- 23 -	1										
	- 24 -											
	25 -											
	<u>-</u> 26 -											
	- 27 -											
	- 28 -											
	29 -											
3	- 30 -											
	- 31 -											
NOON LIE OO WAND												
3	- 32											
	- 33											
280	- 34											
NO CINI												
N SA	- 35			<u> </u>								
H UA	36	+					<u> </u>				<u> </u>	POORLY GRADED SAND, with shell fragments, brown and
Š V	37	S-1										gray.
ANC		S-2										Same as above.
PROP	+ 38	_									1	Same as above:
G109112 PROP. ANCHORAGE BASIN SAND SOURCE OF	39	\$-3 S-4										POORLY GRADED SAND, with shell fragments, brown and gray.
S OF BORING	P - P(	TANI OCK	DA ET	RD PENE PENETRO	OME	TER	RES	SISTA	NCE	TANCE		REMARKS: Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc. GPS Coord. N. 13,697,653' E. 3,316,595'

GPS Coord. N. 13,697,653' E. 3,316,595'



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: 03/11/09 - 03/11/09

	`	C.III										DATE(S) DRILLED: 03/11/09 - 03/11/09
	FIEI	_D D			L				DAT	Α		DRILLING METHOD(S):
				NO			TERBE LIMITS					Vibracore
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	F LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  SURFACE ELEVATION: -36' NAVD  DESCRIPTION OF STRATUM
		C =	П									Same as above.
G109112 PROP. ANCHORAGE BASIN SAND SOURCE OF TROOK LITERON WEST	41 -	S-5										Boring was extended to an elevation of -41-feet NAVD during the drilling operations.

N - STANDARD PENETRATION TEST RESISTANCE

P - POCKET PENETROMETER RESISTANCE

OG OF BORING

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. 13,697,653' E. 3,316,595'



Rock Engineering & Testing Lab., Inc. 6817 Leopard St.

Corpus Christi, TX 78409 Telephone: (361) 883-4555 Fax: (361) 883-4711

P - POCKET PENETROMETER RESISTANCE

T - POCKET TORVANE SHEAR STRENGTH

HDR Engineering, Inc. CLIENT:

PROJECT: Anchorage Basin Sand Source Investigation

were performed by Ocean Surveys, Inc. GPS Coord. N. 13,698,267' E, 3,316,725'

LOCATION: Anchorage Basin; Galveston, Texas

NUMBER: G109112

CAP INCOL		DATE(S) DRILLED: 03/13/09 - 03/13/09
FIELD DATA	LABORATORY DATA	DRILLING METHOD(S): Vibracore
SOIL SYMBOL  Elevation, Ft. [NAVD]  SAMPLES  N. BLOWSIT  P. TONSSO FT  T. TONSSO FT  PERCENT RECOVERY//  ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)  The Liquid Limit is a plastic limit is a plasticity index  DRY DENSITY  POUNDS/CU.FT  COMPRESSIVE STRENGTH  (TONS/SQ.FT)  MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  SURFACE ELEVATION: -22' NAVD  DESCRIPTION OF STRATUM
- 21 -		
22 - S-1	38	POORLY GRADED SAND, with shell fragments, brown and gray.  Same as above.  POORLY GRADED SAND, with shell fragments, brown and gray.  Same as above.  CLAYEY SAND, with shell fragments, brown and gray.  Same as above.  POORLY GRADED SAND, with clay and shell fragments, gray.  Same as above.  Boring was extended to an elevation of -31-feet NAVD during the drilling operations.
	ETRATION TEST RESISTANCE	REMARKS:  Boring depth and location was determined by HDR Engineering, Inc. Boring operation



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P - POCKET PENETROMETER RESISTANCE

T - POCKET TORVANE SHEAR STRENGTH

CLIENT: HDR Engineering, Inc.

PROJECT: Anchorage Basin Sand Source Investigation

were performed by Ocean Surveys, Inc. GPS Coord. N. 13,698,824' E. 3,316,993'

LOCATION: Anchorage Basin; Galveston, Texas

NUMBER: G109112

DATE(S) DRILLED: 03/13/09 - 03/13/09

		<u>~~</u>									DATE(S) DRILLED: 03/13/09 - 03/13/09
	FIEL	D DA	TA	1	LABC	RAT	ORY	DAT	Ά		DRILLING METHOD(S):
			·1			TERBI		1			Vibracore
	Elevation, Ft. [NAVD]	ABER	T COVERY/ CY DESIGNATION	MOISTURE CONTENT (%)		LIMIT	PLASTICITY INDEX	, E	VE	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:
SOIL SYMBOL	levation,	SAMPLE NUMBER SAMPLES	N. BLOWS/FT P. TONS/SQ FT T. TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGN	OISTURE C	LIQUID LIMIT	PLASTIC LIMIT		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	NUS NO. 2	SURFACE ELEVATION: -28' NAVD
S	田	& \&	\ <u>\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</u>	ĭ	LL	PL	PI	R 5	3 % E	Σ	DESCRIPTION OF STRATUM
-	21 -										
-	22 -										
-	- 23 -										
	- 24 -										
	25 -		,			:					
	- 26 -						i				
	- 27 -										
	- 28 -	-									POORLY GRADED SAND, with shell fragments, gray.
	- 29 -	S-1	<u> </u>								Same as above.
7777	- 30 -	S-2				1					SANDY CLAY, gray.
	- 31 ·	S-3								55	
		S-4									Same as above.
	- 32	S-5									Same as above.
	- 33	S-6								44	CLAYEY SAND, gray.
	- 34	S-7									Same as above.
	- 35	S-8	-								Same as above.
ANCHORAGE BASIN SHIP SOUNCE	- 36	S-9		†				<b>†</b>	<b> </b>	14	SILTY CLAYEY SAND, gray.
	- 37	S-10		<del> </del>		<del> </del>		+			CLAYEY SAND, gray.
	- 38	S-11									Same as above.
	- 39	1	-							48	Same as above.
	N - S	S-12	ARD PENE	TRA	TION	I TES	ST R	ESIST	L ΓANCE	<u> </u>	REMARKS: Boring depth and location was determined by HDR Engineering, Inc. Boring operations



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Fax: (361) 883-4711

P - POCKET PENETROMETER RESISTANCE

T - POCKET TORVANE SHEAR STRENGTH

10G OF

HDR Engineering, Inc. CLIENT:

PROJECT: Anchorage Basin Sand Source Investigation

Boring depth and location was determined by HDR Engineering, Inc. Boring operations

were performed by Ocean Surveys, Inc. GPS Coord. N. 13,698,824' E. 3,316,993'

LOCATION: Anchorage Basin; Galveston, Texas

NUMBER: G109112

The drilling operations.		V.	- Inc										DATE(S) DRILLED: 03/13/09 - 03/13/09
CONTROL   CONT	П	FIEL	D D			L	ABC	RAT	ORY	DAT	A		
S-14 42 S-15 S-16 S-17 A3 A6		,_			N.								Vibracore
Sand Sand CLAY, gray.  Same as above.  SanDY CLAY gray.  Same as above.  S	OIL SYMBOL	levation, Ft. [NAVD	AMPLE NUMBER	AMPLES	BLOWS/FT TONS/SQ FT TONS/SQ FT ERCENT RECOVERY/ DCK QUALITY DESIGNATI	OISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	RY DENSITY OUNDS/CU.FT	OMPRESSIVE TRENGTH 'ONS/SQ FT)	INUS NO. 200 SIEVE (%)	SURFACE ELEVATION: -28' NAVD
Same as above.  Same as above.  Same as above.  Same as above.  Sandy CLAY, gray.  Sandy CLAY, gray.  Same as above.  Sandy CLAY, gray.  Same as above.  Sandy CLAY, gray.  S	ος 1777	Э	S /	\છ.\ 	/ Z & F & &	Σ	LL	PL	PI	0 4	၁၈၅		
SANDY CLAY, gray.  S-16 S-17 S-18 S-18 S-16 S-17 S-18 S-18 SANDY CLAY, gray.  POORLY GRADED SAND, gray.  Same as above.  Boring was extended to an elevation of -46-feet NAVD during the drilling operations.		ï	S-14									50	Same as above.
44		43 -		H									SANDY CLAY, gray.
Same as above.  Same as above.  Boring was extended to an elevation of -46-feet NAVD during the drilling operations.		44 ~		H		:							POORLY GRADED SAND, gray.
Boring was extended to an elevation of -46-feet NAVD during the drilling operations.		45 -	C 10	П								3	Same as above.
ANCHORAGE BASIN SAND SOURCE GAD ROCK, E IL CUL ALZENZA		46 -	3-10										Boring was extended to an elevation of -46-feet NAVD during
N - STANDARD PENETRATION TEST RESISTANCE  REMARKS:  Rema	G109112 PROP. ANCHORAGE BASIN SAND SOURCE.GF												

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T - POCKET TORVANE SHEAR STRENGTH

CLIENT: HDR Engineering, Inc.

PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

NUMBER: G109112

	100	> IIIC			. ,	,,						DATE(S) DRILLED: 03/12/09 - 03/12/09
T	FIEL	D D			Į				DAT	Α		DRILLING METHOD(S): Vibracore
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)		PLASTIC LIMIT THE		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  SURFACE ELEVATION: -26' NAVD  DESCRIPTION OF STRATUM
	- 21 - - 22 -											
ľ	- 23 -											
İ	~ 24 ~											
Ì	- 25 -											
	- 26 -	S-1									82	SANDY CLAY, gray.
	- 27 -	S-2										Same as above.
	- 28 -											Same as above.
	- 29 -	S-3										SANDY CLAY, gray.
	- 30 -	S-4										Same as above.
	- 31 -	S-5	-									Same as above.
	32	S-6	-				-					POORLY GRADED SAND, gray.
· · · ·	- 33	S-7	L								2	Same as above.
	- 34	S-8	-									Same as above.
	35	S-9										
	36	S-10									4	
	37	S-1	1									Same as above.
		S-12	2									Same as above.
	38	S-1	3							:	1	POORLY GRADED SAND, gray.
	+ 39	S-1	4									Same as above.
	P - P(	TAN OCK	DA ET	RD PENE PENETR	OME	ETER	RES	SIST	ANCE	TANCE	 E	REMARKS: Boring depth and location was determined by HDR Engineering, Inc. Boring operation were performed by Ocean Surveys, Inc. GPS Coord, N. 13 699 436', F. 3 317 401'

GPS Coord. N. 13,699,436' E. 3,317,401'

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

	RATO	er nic	ORF	Fax	(361	) 883-	4711					DATE(S) DRILLED: 03/12/09 - 03/12/09
	FIE	LD D			L				DAT.	A		DRILLING METHOD(S): Vibracore
				NO.			ERBI					Vibracore
SOII SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	SURFACE ELEVATION: -26' NAVD
8	ш	\$ \	\ <sub>S</sub> \	/ z v + g g	ž	LL	PL	PΙ	2 %	ರ % ೬	Σ	DESCRIPTION OF STRATUM SANDY CLAY, gray.
	41	S-15 S-16	Н								77	Same as above.
RING G109112 PROP. ANCHORAGE BASIN SAND SOURCE GPJ ROCK ETL GDT 4/28/09	42											Boring was extended to an elevation of -42-feet NAVD during the drilling operations.

N - STANDARD PENETRATION TEST RESISTANCE

P - POCKET PENETROMETER RESISTANCE

T - POCKET TORVANE SHEAR STRENGTH

-06\_0F

Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc. GPS Coord. N. 13,699,436' E. 3,317,401'

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

T - POCKET TORVANE SHEAR STRENGTH

CLIENT: HDR Engineering, Inc.

PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

NUMBER: G109112

	470	A INC	SRY	1 4 1	. (301	1) 663-	-4711						DATE(S) DRILLED: 03/12/09 - 03/12/09
	FIEL	.D D			L				DAT	A			DRILLING METHOD(S):
	[Q.			Š			TERBI LIMITS						Vibracore
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	LES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH	0/00 r 1)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  SURFACE ELEVATION: -26' NAVD
SOIL	Ele	SAME	SAMPLES	PERC ROCK	MOIS	 	PL	e. Pl	Pour	COM			DESCRIPTION OF STRATUM
<b>S</b>	- 21 -						- 1						
	- 23 -												
	- 24 -				ı								
	- 25 -												
7777	- 26 -												SANDY CLAY, gray.
	- 27 -	S-1									17	78	
		S-2							:	,			Same as above.
	- 28 -	S-3											Same as above.
_	- 29 -	S-4								:	6	69	SANDY CLAY, gray.
4/28/09	- 30 -	S-5											Same as above.
ETL GDT	- 31 -	S-6										21	SILTY CLAYEY SAND, with shell fragments, gray.
ž Ž	- 32 -						<u> </u>		<del> </del>	<u> </u>	+-		CLAYEY SAND, gray.
GP.	- 33 -	S-7	H									34	Same as above.
Sourci	- 34 -	S-8										34	Same as above.
SAND	- 35 -	S-9											CLAYEY SAND, gray.
BASIN	~ 36 ·	S-10											Same as above.
ANCHORAGE	- 37 -	S-11					<u> </u>		<u> </u>	<u></u>	1	46	
1.71.71.4	- 38	S-12											SILTY CLAYEY SAND, gray.
112 PRC		S-13											Same as above.
G G109	39	S-14										14	Same as above.
				RD PENE PENETRO						ANC	Ē	******	REMARKS: Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc.

were performed by Ocean Surveys, Inc. GPS Coord. N. 13,700,293' E. 3,317,717'



Rock Engineering & Testing Lab., Inc. 6817 Leopard St.

Corpus Christi, TX 78409 Telephone: (361) 883-4555 Fax: (361) 883-4711

P - POCKET PENETROMETER RESISTANCE

T - POCKET TORVANE SHEAR STRENGTH

.0G\_0F\_

HDR Engineering, Inc. CLIENT:

PROJECT: Anchorage Basin Sand Source Investigation

Boring depth and location was determined by HDR Engineering, Inc. Boring operations

were performed by Ocean Surveys, Inc. GPS Coord, N. 13,700,293' E. 3,317,717'

LOCATION: Anchorage Basin; Galveston, Texas

NUMBER: G109112

	10	D INC	0		. (00)	,						DATE(S) DRILLED: 03/12/09 - 03/12/09
	FIE	LD D			L				DAT	Α		DRILLING METHOD(S): Vibracore
	) [(d			NO NO			TERBI LIMIT:				)	Albiacola
OL	Elevation, Ft. [NAVD]	JMBER		N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)			PLASTICITY INDEX	T-Y U.F-T	SIVE  -  -	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:
SOIL SYMBOL	evation	SAMPLE NUMBER	SAMPLES	BLOWS/F TONS/SQ TONS/SQ RCENT R RCK QUAL	JISTURE	LIQUID LIMIT	PLASTIC LIMIT		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	NUS NO.	SURFACE ELEVATION: -26' NAVD
8	EI	& ∖	8/	N M H M R	ž	LL	PL	PI	무요	2 2 E	Z	DESCRIPTION OF STRATUM SILTY CLAYEY SAND, gray.
	- 41 -	S-15										Same as above.
	- 42 -	S-16										
	- 43 -											
	- 44 -	S-17		·						:	19	Same as above.
	- 45 - - 46 -											
									-			Boring was extended to an elevation of -46-feet NAVD during the drilling operations.
NOON TELEGOR										-		
5												
GORING G109112 PROP. ANCHORAGE BASIN SAND SOURCE.												
ROP. ANCHOR												
G109112 F												
ZE T	ມ N-Sັ	TANI	) DA	RD PENE	TRA	TION	TES	ST R	ESIST	- TANCE		REMARKS:



T - POCKET TORVANE SHEAR STRENGTH

CLIENT: HDR Engineering, Inc.

PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

G109112 NUMBER:

	VQ.	E HE										DATE(S) DRILLED: 03/13/09 - 03/13/09
	FIE	LD D	ΑT	A	ı	LABC	RAT	ORY	DAT	A		DRILLING METHOD(S):
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)		PLASTIC LIMIT IN		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SO FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  SURFACE ELEVATION: -26' NAVD  DESCRIPTION OF STRATUM
	- 21 -	-										
	- 22 -	<u> </u> 										
	- 23 -											
	- 24 -	-							į			
	- 25 -											
	- 26 -			_								
		S-1	Н						**************************************			<u>POORLY GRADED SAND</u> , with shell fragments, gray and brown.
	- 27 -	S-2										Same as above.
<del></del>	- 28 -	S-3										Same as above.
	- 29 -	S-4									4	POORLY GRADED SAND, with shell fragments, gray.
• • •	- 30 -	S-5	Н									Same as above.
	- 31	-									26	SILTY CLAYEY SAND, gray.
	- 32 -	S-6										Same as above.
	- 33 -	S-7			L					<u> </u>	ļ	
	- 34	S-8				1					12	POORLY GRADED SAND, with clay, gray.
	J4 -											Boring was extended to an elevation of -34-feet NAVD during the drilling operations.
	 N 03			סט טבעיבי		TION	TE 2		-0107	ANOF	<u> </u>	REMARKS:
	P - PC	OCKE	ΞT	RD PENE PENETRO TORVANI	OME	TER	RES	ISTA	NCE	ANCE	:	Boring depth and location was determined by HDR Engineering, Inc. Boring operation were performed by Ocean Surveys, Inc.  GPS Coord N 13 697 692' E. 3.317.372'

GPS Coord. N. 13,697,692' E. 3,317,372'



OG OF BORING

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

N - STANDARD PENETRATION TEST RESISTANCE

P - POCKET PENETROMETER RESISTANCE T - POCKET TORVANE SHEAR STRENGTH

HDR Engineering, Inc. CLIENT:

PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

NUMBER: G109112

DATE(S) DRILLED: 03/13/09 - 03/13/09

DRILLING	METHOD(S):

	FIEL	D D			L	ABC	RAT	ORY	DAT	Α		DRILLING METHOD(S):
				Š			TERBI LIMIT					Vibracore
	t. [NAVD]	3E.R		OVERY/ DESIGNATI	NTENT (%)				<b>-</b>	111	SIEVE (%)	GROUNDWATER INFORMATION:
SOIL SYMBOL	Elevation, Ft.	SAMPLE NUMBER	MPLES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	SURFACE ELEVATION: -26' NAVD
SO	E	SA \	\$/	A T T T O	MO	LL	PL	PΙ	R S	S E OT	ž	DESCRIPTION OF STRATUM
	- 21 -											
	- 22 -											
	Z E											
-	- 23 -											
	- 24 -											
	- 25 -											
	- 26 -											POORLY GRADED SAND, with shell fragments, brown and
	- 27 -	S-1										gray. Same as above.
	- 28 -	S-2		•		,						Same as above.
	20	S-3										
	- 29 -	S-4									6	POORLY GRADED SAND, with clay and shell fragments, gray.
	- 30 -	S-5										Same as above.
	- 31 -											Same as above.
	- 32 -	S-6									3	POORLY GRADED SAND, with shell fragments, gray.
5	- 33 -	S-7										Same as above.
	- 34	S-8	$\mathbb{H}$									Same as above, with clay.
SANDS	- 35	S-9	Ш								9	
BASIN	- 36	S-10									11	POORLY GRADED SAND, with clay and shell fragments, gray.
IG G109112 PROP. ANCHORAGE BASIN SAND SCURREGET	- 30 .											Boring was extended to an elevation of -36-feet NAVD during the drilling operations.
ANCH												
PROF												
3109112												
اق									1	İ	<u> </u>	

REMARKS:

Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc. GPS Coord. N. 13,697,972' E. 3,317,029'



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

	Fax: (361) 883-4711										DATE(S) DRILLED: 03/13/09 - 03/13/09
								DAT	Λ		DRILLING METHOD(S):
-		,U UP		LABORATORY DATA  ATTERBERG							Vibracore
	Elevation, ft. [NAVD]		- NOITI	(%		IMITS		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	(%	CPOHNDWATER INFORMATION:
SOIL SYMBOL		SAMPLE NUMBER	N. BLOWS/FT N. BLOWS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX			MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  SURFACE ELEVATION: -30' NAVD
SOIL	Ele	SAN	ROC PET C	<u>S</u>	LL	PL	PI	DR.	S S S	N	DESCRIPTION OF STRATUM
	- 21 22 23 24 25 26 27 28 29 -										
4/28/09	30 -										POORLY GRADED SAND, with shell fragments, gray.
TL GDT 4/2	- 31 -	S-1 S-2	_								Same as above.
ROCK	32 -		-								Same as above.
<u>g</u>	33 -	S-3								3	POORLY GRADED SAND, gray.
SOURCE	34 -	S-4		<u> </u>		<del> </del>		<del> </del>	<u> </u>	3	SILTY CLAYEY SAND, gray.
BASIN SAND S	35	S-5									Same as above.
BASIN	36	S-6									Same as above.
ANCHORAGE	37	S-7								22	
ANCH		S-8									SILTY CLAYEY SAND, gray.
2 PROF	38	S-9									Same as above.
5 610911	39	S-10								19	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. 13,698,396' E. 3,317,267'	



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

	14/2		R	Fax:	: (361	) 883-	4711	-4000				NUMBER: G109112
	E O RATO	Y INC										DATE(S) DRILLED: 03/13/09 - 03/13/09
	FIEL	D D	AT.	·A	L				DAT	Α		DRILLING METHOD(S):
				NO O			TERBE LIMITS					Vibracore
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	ES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:
IL S	eva	MPL	MPL	RCE CON C	JIST				Z DI	REN ONS	NUS	SURFACE ELEVATION: -30' NAVD
os	Ξ	& ∖	8/	Z T E E S	ž	LL	PL	PI	R 5	3 2 5	Ξ	DESCRIPTION OF STRATUM
		S-11										SILTY CLAYEY SAND, gray.
	- 41 ~	S-11									40	CLAYEY SAND, gray.
	42 -	S-12	-								76	SANDY CLAY, gray.
	- 43 -	S-14	H							:		Same as above.
	- 44 -	0-14	-					·····				Boring was extended to an elevation of -44-feet NAVD during the drilling operations.

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. 13,698,396' E. 3,317,267'

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

		TATO!	A HE	OF	/ rax	. (30	1) 883-	-4711						DATE(S) DRILLED: 03/11/09 - 03/11/09
r		FIEL	.D D	ΑT			LABC	RAT	ORY	DAT	A	DRILLING METHOD(S):		
T	1				Š			TERBI LIMIT				T		Vibracore
		Elevation, Ft. [NAVD]	BER		N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)			PLASTICITY INDEX	<u>.</u>	m		O SIEVE (%)	GROUNDWATER INFORMATION:
	SYMBOL	on, I	SAMPLE NUMBER	Ø	S/FT SQ FT SQ FT F REC	ŽĘ Č	LIQUID LIMIT	PLASTIC LIMIT	E I	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE	(TONS/SQ FT)	MINUS NO. 200	
	S	vati	APLE	SAMPLES	CENTY OF	ISTUI	ngn	PLAS	PLAS	NDS	COMPRESS	S/SN	NS N	SURFACE ELEVATION: -32' NAVD
,	SOIL	Ele	SAN	SA/	N S S S S S S S S S S S S S S S S S S S	Ş N	LL	PL	PI	R S	STR	Ê	Σ	DESCRIPTION OF STRATUM
	ŀ	21 -												
	ŀ	22 -							:					
	L	23 -												
	t	24 -												
	ŀ	25 -												
	-	26 -										Ì		
		27 -												
	ſ	21 -												
	┟	28 -												
	-	29 -												
4/28/09	-	30 -												
DT 4/2		31 -												
ET.G		JI -												
ROCK ETL. GDT A		32 -									POORLY GRADED SAND, with shell fragments, gray.			
- V		33 -	S-1					<del>-</del>				- 🕂		CLAYEY SAND, with shell fragments, gray.
URCE		34 -	S-2	Ц		Ļ		<u> </u>		ļ	ļ	- 📙	37 — —	COLTY OLAVEY CAND ded pro-
OS GNN			S-3										28	SILTY CLAYEY SAND, dark gray.
SIN S/		35 -	S-4											Same as above, gray.
ANCHORAGE BASIN SAND SOURCE GP.		36 -		H									18	Same as above.
CHOR		37 -	S-5	$\mathbb{H}$									10	SILTY CLAYEY SAND, gray.
		- 38 -	S-6	Ш		L	<u>                                     </u>	<u> </u>		L	<u></u>	_		
12 PRC			S-7										4	POORLY GRADED SAND, gray.
NG G1091		39												Boring was extended to an elevation of -39-feet NAVD during the drilling operations.
LOG OF BORING G109112 PROP.	F	- PC	CKE	ΞΤ	RD PENET PENETRO TORVANI	OME	TER	RES	ISTA	NCE	ANC	Ε		REMARKS:  Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc.  GPS Coord. N. 13,698,183' E. 3,317,733'

Rock Engineering & Testing Lab., Inc.

Corpus Christi, TX 78409 Telephone: (361) 883-4555 Fax: (361) 883-4711

6817 Leopard St.

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

DRIL	LING	METHOD(S):	

	FIELD DATA  LABORATORY DATA  ATTERBERG LIMITS											DRILLING METHOD(S): Vibracore
	D]			N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	(3)		TERBI LIMIT:				· ×	
	VAV			SY/	NT (%			ង្គ		ļ	VE (%	GROUNDWATER INFORMATION:
	Elevation, Ft. [NAVD]	BER		COVER Y DES	MOISTURE CONTENT (%)	Ę	M	PLASTICITY INDEX	_ [	ų ,	MINUS NO. 200 SIEVE (%)	
SOIL SYMBOL	ion, ]	SAMPLE NUMBER	S	SQFI SQFI SQFI TREC	REC	LIQUID LIMIT	PLASTIC LIMIT	STICI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	NO. 20	
IIL SY	evat	MPLE	SAMPLES	BLOW TONS, TONS, RCEN	JISTU				Y DE	MPR RENC ONS/	NUS	SURFACE ELEVATION: -30' NAVD
so	Ξ	ζ	\&	/za - # &	ž	LL	PL	PI	품	3 22 E	₫	DESCRIPTION OF STRATUM
	4.0											
	- 19 -											
-	- 20 -											
	- 21 -											
-	- 22 -	!										
	- 23 -											
ŀ	- 24 -											
	- 25 -											
	- 26 -											
	- 27	- -										
	- 28 -											
	20											
	- 29 -											
777.	- 30 ·	_	L				-	-		!		CLAYEY SAND, with shell fragments, gray.
	64	S-1			:						38	
	- 31	S-2									1′	POORLY GRADED SAND, with clay and shell fragments, gray.
777	- 32	- 3-2	-		<u> </u>		<u> </u>		<del></del>	<del> </del>	-	CLAYEY SAND, gray.
	- 33	_ s-3	i								36	
		S-4										Same as above.
	- 34	-	-									Same as above.
	- 35	S-5			<u></u>	<u> </u>	<u> </u>		ļ	<u> </u>	36	
///		S-6										POORLY GRADED SAND, gray.
1	P - P(	TAN OCK	DA ET	RD PENE PENETR TORVAN	OME	TER	RES	SISTA	ANCE	REMARKS:  Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc.  GPS Coord, N. 13,698,835' E. 3,317,844'		



Rock Engineering & Testing Lab., Inc. 6817 Leopard St.

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PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

NUMBER: G109112

	RATO	A HE	OFF	Fax	: (361	) 883-	4711					DATE(S) DRILLED: 03/12/09 - 03/12/09
	FIELD DATA LABORATORY DATA											DRILLING METHOD(S):
$\vdash$	<del>                                     </del>			Š		ATT	ERBE	RG				Vibracore
JOL	Elevation, Ft. [NAVD]	UMBER		N. BLOWS/FT P. TONS/SQ FT T. TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)		PLASTIC LIMIT	PLASTICITY INDEX	IITY U.FT	SIVE 1 FTD	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:
SOIL SYMBOL	Slevatio	SAMPLE NUMBER	<b>AMPLES</b>	BLOWS/R TONS/SC TONS/SC ERCENT F	OISTURE	LIQUID LIMIT	-		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SO FT)	INUS NO	SURFACE ELEVATION: -30' NAVD  DESCRIPTION OF STRATUM
<u> </u>		S)	\s\		Σ	LL	PL	Pl	Οď	ပတင	≥	Same as above.
	37 -	S-7										Same as above.
		S-8										
	38 -		H									SANDY CLAY, gray.
	1	S-9			•						67	
	39 -											Same as above.
	40 -	S-10	Ш									Boring was extended to an elevation of -40-feet NAVD during
NG G109112 PROP. ANCHORAGE BASIN SAND SOURCE GPJ ROCK ETL.GDT 4/28/09			ANALYSIS OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF TH	,								the drilling operations.

N - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETROMETER RESISTANCE

T - POCKET TORVANE SHEAR STRENGTH

OG OF BORIN

**REMARKS**:

Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc. GPS Coord. N. 13,698,835' E. 3,317,844'

ROCK

Rock Engineering & Testing Lab., Inc. 6817 Leopard St.

Corpus Christi, TX 78409 Telephone: (361) 883-4555 Fax: (361) 883-4711

N - STANDARD PENETRATION TEST RESISTANCE

P - POCKET PENETROMETER RESISTANCE

T - POCKET TORVANE SHEAR STRENGTH

.06\_0F

CLIENT: HDR Engineering, Inc.

PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

NUMBER: G109112

	and so	A ITE	3RP	Fax:	(361	1) 883-	4711					DATE(S) DRILLED: 03/12/09 - 03/12/09
	FIEL	D D			L	LABC	RAT	ORY	DAT	Α		DRILLING METHOD(S):
		T		NO			TERBI LIMITS					Vibracore
70	Elevation, Ft. [NAVD]	JMBER		N. BLOWS/FT P. TONS/SQ FT T. TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)			PLASTICITY INDEX	TY J.FT	SIVE T)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:
SOIL SYMBOL	levation	SAMPLE NUMBER	SAMPLES	BLOWS/F TONS/SQ TONS/SQ RCENT R CCENT R	OISTURE	LIQUID LIMIT	PLASTIC LIMIT		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	NUS NO.	SURFACE ELEVATION: -28' NAVD
S	回	\$ /	ಶ/ 	Z T T T Z	Ž	LL	PL	PI	2 2	ည် က E	Σ	DESCRIPTION OF STRATUM
	- 21 -											
	- 22 -									,		
	- 23 -											
	- 24 -											
	- 25 -											
	- 26 -											
	- 27 -											
	28 -	S-1									62	SANDY CLAY, with shell fragments, gray.
	29 -	S-2										SILTY CLAYEY SAND, with shell fragments, gray.
4728/09	30 -		-						†		47	CLAYEY SAND, gray.
5//	31 -	S-3							<del> </del>		21	SILTY CLAYEY SAND, gray.
ROCK ETL GDT	32 -	S-4							E			Same as above.
	33	S-5									4=	Same as above.
SOURCE	34	S-6					<del> </del>		<del></del>	<u> </u>	15	POORLY GRADED SAND, gray.
SANDS	35	S-7										Same as above.
BASIN	36	S-8		•								
ORAGE		S-9									2	Same as above.
ANCH	37	S-10										POORLY GRADED SAND. gray.
09/12 PROP. ANCHORAGE BASIN SAND SOURCE	38			-								Boring was extended to an elevation of -38-feet NAVD during the drilling operations.

REMARKS:

were performed by Ocean Surveys, Inc. GPS Coord. N. 13,699,483' E. 3,318,163'

Boring depth and location was determined by HDR Engineering, Inc. Boring operations



DG OF BOR

P - POCKET PENETROMETER RESISTANCE

T - POCKET TORVANE SHEAR STRENGTH

Rock Engineering & Testing Lab., Inc. 6817 Leopard St.

Corpus Christi, TX 78409 Telephone: (361) 883-4555 Fax: (361) 883-4711

HDR Engineering, Inc. CLIENT:

PROJECT: Anchorage Basin Sand Source Investigation

were performed by Ocean Surveys, Inc. GPS Coord. N. 13,700,304' E. 3,318,392'

LOCATION: Anchorage Basin; Galveston, Texas

	10	A INCO	RX	142	. (50	1) 003-	77711				DATE(S) DRILLED: 03/12/09 - 03/12/09		
	FIEL	D DA			L	_ABC	RAT	ORY	DAT	A			DRILLING METHOD(S):
	[Q			Š	_		TERBE LIMITS						Vibracore
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	SAMPLES	N. BLOWSFT P. TONS/SQ FT T. TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH	(IONS/SQFI)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  SURFACE ELEVATION: -26' NAVD
SO	Щ	\$	\$/	Z T ⊢ ∏ S	ž	LL	PL	PI	<u>P</u> 5	2 22 6	<u> </u>	Σ	DESCRIPTION OF STRATUM
	- 21 -												
	- 23 - - 24 -												
	- 25 -												
	- 26 -												POORLY GRADED SAND, with shell fragments, gray.
1777	- 27 -	S-1									_	2	SANDY CLAY, gray.
	- 28 -	S-2										73	
	- 20	S-3											Same as above.
	- 29 - - 30 -	S-4										83	Same as above.
	- 31 -	S-5											Sandy CLAY, gray.  Same as above.
	- 32 -	S-6											POORLY GRADED SAND, with clay, gray.
	- 33	S-7										8	Same as above.
	- 34	S-8											Boring was extended to an elevation of -34-feet NAVD during
			The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s										the drilling operations.
	N - S	TANE	Α	RD PENE	TRA	TION	I TES	ST R	ESIS	TANC	E		REMARKS:  Boring depth and location was determined by HDR Engineering, Inc. Boring operations



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) DDILLED: 03/11/09 - 03/11/09

	V	N. Heco									DATE(S) DRILLED: 03/11/09 - 03/11/09
	FIEL	D DA	TA	L	ABC	RAT	ORY	DAT.	A		DRILLING METHOD(S):
-	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					TERB					Vibracore
	Elevation, Ft. [NAVD]	SAMPLE NUMBER	N. BLOWS/FT P. TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)		PLASTIC LIMIT	PLASTICITY INDEX	r FT	Æ.	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:
SOIL SYMBOL	ion,	N N	SQ F SQ F SQ F T RE(	RE C	LIQUID LIMIT	STIC	STIC	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	Ď. 2	
SYI	evat	SAMPLE	CEN'S	ISTU	LIQU	PLAS	PLAS	Y DEI	COMPRESS STRENGTH (TONS/SQ F	IUS I	SURFACE ELEVATION: -32' NAVD
SO	Ē	SAN /8	NOR THE SOL	S N	LL	PL	PI	R O	<u>S</u> F 5	ź	DESCRIPTION OF STRATUM
										:	
	- 21 -								!		
	- 22 -										
	- 23 -										
	- 24 -							i E	:		
	- 25 -										=
	26 -										
	- 27 -										
1	- 28 -										
	- 29 -	-									
60/8	- 30 -	_									
3DT 4/2	31 -										
N ROCK ETL. GDT 4/28/09	32 -										POORLY GRADED SAND, with shell fragments, gray.
NOC.		S-1								2	POORET GRADED GARD, Will Shell Hagilierite, gray.
G G	33		-								Same as above.
SOUR	34	S-2	-							11	Same as above, with clay.
SAND	35	S-3	<del> </del>	<del></del>		<del></del>		<del> </del>		<del> </del>	SILTY CLAYEY SAND, gray.
BASIN	36	S-4		<u> </u>				<u></u>	<b></b>	19	POORLY GRADED SAND, with clay, gray.
ANCHORAGE BASIN SAND SOURCE GF	37	S-5									Same as above.
	38	S-6								9	
G109112 PROP		S-7									Same as above.
	39	S-8									POORLY GRADED SAND, with clay, gray.
OG OF BORING	P - P(	CKE	ARD PENE T PENETR T TORVAN	OME	TER	RES	SISTA	NCE	REMARKS:  Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc.  GPS Coord, N. 13,698,028' E. 3,318,672'		



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

P - POCKET PENETROMETER RESISTANCE

T - POCKET TORVANE SHEAR STRENGTH

Р

CLIENT: HDR Engineering, Inc.

PROJECT: Anchorage Basin Sand Source Investigation

Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc. GPS Coord. N. 13,698,028' E. 3,318,672'

LOCATION: Anchorage Basin; Galveston, Texas

NO.	HEOL									DATE(S) DRILLED: 03/11/09 - 03/11/09
FIELD				ABOF	RATO	RY DA	·ΤΑ			DRILLING METHOD(S):
[0]		NO.			RBERO	3			(	Vibracore
SOIL SYMBOL Elevation, Ft. [NAVD]	SAMPLE NUMBER SAMPLES	N. BLOWS/FT P. TONS/SQ FT T. TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)		PLASTIC LIMIT		COMPRESSIVE	STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  SURFACE ELEVATION: -32' NAVD  DESCRIPTION OF STRATUM
41	S-9 S-10	:				·			5	Same as above.  Same as above.
42		RD PENE								Boring was extended to an elevation of -42-feet NAVD during the drilling operations.



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

HDR Engineering, Inc. CLIENT:

PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

	<b>100</b>	F Mcon		,	•						DATE(S) DRILLED: 03/12/09 - 03/12/09
	FIEL	D DA	TA	L	ABC	RAT	ORY	DAT	A		DRILLING METHOD(S):
			Z Z			TERBE					Vibracore
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	N. BLOWS/FT P. TONS/SQ FT T. TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  SURFACE ELEVATION: -30' NAVD
SOIL	Ele	SAM	ROCI PER C	MOK	LL	PL	PI	Pou	STR	Σ	DESCRIPTION OF STRATUM
	- 21 - 22 - 23 - 24 - 25 - 26 - 27 - 28 - 29 - 29 - 29 - 29 - 29 - 29 - 29										
4/28/09	30 -			:						39	CLAYEY SAND, gray.
	3 31 -	S-1		<u> </u>		<u> </u>		<u> </u>			POORLY GRADED SAND, with clay and shell fragments,
J ROCK ETL.GDT	32	S-2								8	gray. Same as above.
년 유	33 -	S-3		<u> </u>		<u> </u>		↓	<u></u>	<u> </u>	SILTY OLAVEY SAND with shall from onto grow
SOURCE	34	S-4								26	SILTY CLAYEY SAND, with shell fragments, gray.  Same as above.
AND .	35	S-5		<u> </u>		<u></u>		1	<u></u>	<u> </u>	
E BASINS	36	S-6								6	POORLY GRADED SAND, with clay, gray.  Same as above.
ORAG		S-7									
OP ANCHK	37	S-8		T						<b>T</b>	SILTY CLAYEY SAND. gray.  Same as above.
G109112 PROP. ANCHORAGE BASIN SAND SOURCE GP	39	S-9					:			15	Same as above.
OG OF BORING G10	P - P(	OCKE.	ARD PENE T PENETR T TORVAN	OME	TER	RES	SISTA	ANCE	     TANCE	<u> </u>	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'



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

FIELD DATA  LABORATORY DATA  ATTERISERS  LABO		SEATE	ed life	ORI	- Fax	: (361	1) 883-	4/11				DATE(S) DRILLED: 03/12/09 - 03/12/09	
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Silly CLAYEY SAND, gray.  Same as above.  Same as above.  Silly CLAYEY SAND, gray.  Silly CLAYEY SAND, gray.  Silly CLAYEY SAND, gray.  Boring was extended to an elevation of -44-feet NAVD during the drilling operations.	<u> </u>												Vibracore
S-11 S-12 S-13 S-14 S-14 S-14 S-14 S-14 S-14 S-15 Sill Y CLAYEY SAND, gray.  Same as above.  Same as above.  Sill TY CLAYEY SAND gray.  Same as above.  Same as above.  Sill TY CLAYEY SAND gray.	SYMBOL	ation, Ft. [NAVI	LE NUMBER	LES	WS/FT 4S/SQ FT 1S/SQ FT ENT RECOVERY/ QUALITY DESIGNATI	TURE CONTENT (%)				DENSITY IDS/CU.FT	PRESSIVE NGTH S/SQ FT)	S NO. 200 SIEVE (%)	
S-11 42 S-12 43 S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-	9	Elev	AMP	AMP	B	NOIS		-		P C UN	TRE	N C	
Same as above.  Same as above.  Same as above.  SILTY CLAYEY SAND. gray.  Boring was extended to an elevation of -44-feet NAVD during the drilling operations.	N N	<del>                                     </del>	S	\s\	/ Z ŭ ;;	2	LL	PL	PI		0 % 0	2	
S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14  S-14			S-12									16	Same as above.
Boring was extended to an elevation of -44-feet NAVD during the drilling operations.		43		Н						<u> </u>			SILTY CLAYEY SAND, gray.
the drilling operations.		44	S-14									ļ	Roring was extended to an elevation of -44-feet NAVD during

N - STANDARD PENETRATION TEST RESISTANCE

P - POCKET PENETROMETER RESISTANCE T - POCKET TORVANE SHEAR STRENGTH

OG OF

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'



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

HDR Engineering, Inc. CLIENT:

PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

	10	V HEO		., (55	.,	,					DATE(S) DRILLED: 03/12/09 - 03/12/09
	FIEL	D DA			LABC	RAT	ORY	DAT	A		DRILLING METHOD(S):
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)		PLASTIC LIMIT STAN		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:
IL SY	levai	MPL	N: BLOWS/ N: BLOWS/ P: TONS/S( PERCENT ROCK QUA	OIST				3Y DE	COMPRESS STRENGTH (TONS/SQ F	NUS	SURFACE ELEVATION: -30' NAVD
SO	E	8 /3	2/27 - g &	ž	LL	PL	PI	70	2 22 E	₹	DESCRIPTION OF STRATUM
	24										
ŀ	- 21 -			!							
	- 22 -										
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	25										
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İ	- 26 -										
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	- 28 -										
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	- 29 -										
ETL GDT 4/28/09	30 -									6	POORLY GRADED SAND, with clay, gray.
977	31 -	S-1		<u> </u>	<u> </u>	<u> </u>		+	<u></u>	<del>-</del> -	CLAYEY SAND, with shell fragments, gray.
	32	S-2		<u></u>		ļ		<u> </u>	<u></u>	41	SILTY CLAYEY SAND, with shell fragments, gray.
Z S		S-3									SILTY CLAYET SAND, With Shell Hagments, gray.
명	33	S-4								22	Same as above.
S //	34	-		<u>_</u>		<del> </del>		<del> </del>	<u> </u>	<del>  -</del> -	CLAYEY SAND, gray.
ONE //	35	S-5									Same as above.
BASIN	36	S-6									
A S		S-7								33	Same as above.
ANCHORAGE BASIN SAND SOURCE GP	37	S-8		<b>†</b>		†		<b>†</b>	T	1-	POORLY GRADED SAND, with clay, gray.
	38	3-0									Same as above.
G109112 PROP	39	S-9									Same as above.
	40	S-10								7	
OG OF BORING	N - S	OCKE	ARD PENE T PENETE T TORVAN	OME	ETER	RES	SISTA	ANCE	TANCE	Ē	REMARKS: Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc. GPS Coord. N. 13,699,240' E. 3,318,962'



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CLIENT: HDR Engineering, Inc.

PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

NUMBER: G109112

FIELD DATA  LABORATORY DATA  ATTERBERG  LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS SAMUL LAGS	ABORA		o Air	Par Fax	ephone : (361	e: (36 ) 883-	1) 883 4711	-4555				NUMBER: G109112
ATTERBERG LIMITS  GROUNDWATER INFORMATION:  SAWALE ROUNDRICE (%)  AUTHORIDITY  SAWALE ROUNDRICE (%)  AUTHORIDITY  SAWALE ROUNDRICE (%)  AUTHORIDITY  SAWALE ROUNDRICE (%)  AUTHORIDITY  SAWALE ROUNDRICE (%)  AUTHORIDITY  SAWALE ROUNDRICE (%)  AUTHORIDITY  SAWALE ROUNDRICE (%)  AUTHORIDITY  SAWALE ROUNDRICE (%)  AUTHORIDITY  SAWALE ROUNDRICE (%)  AUTHORIDITY  SAWALE ROUNDRICE (%)  AUTHORIDITY  SAWALE ROUNDRICE (%)  AUTHORIDITY  SAWALE ROUNDRICE (%)  AUTHORIDITY  SAWALE ROUNDRICE (%)  AUTHORIDITY  SAWALE ROUNDRICE (%)  AUTHORIDITY  SAWALE ROUNDRICE (%)  AUTHORIDITY  SAWALE ROUNDRICE (%)  AUTHORIDITY  SAWALE ROUNDRICE (%)  AUTHORIDITY  SAWALE ROUNDRICE (%)  AUTHORIDITY  SAWALE ROUNDRICE (%)  AUTHORIZE (%)  AUTHORIDITY  SAWALE ROUNDRICE (%)  AUTHORIDITY  SAWALE ROUNDRICE (%)  AUTHORIDITY  SAWALE ROUNDRICE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)  AUTHORIZE (%)		SE HE		.,,								
GROUNDWATER INFORMATION:  SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMPLE NUMBER SAMP	FIE	ELD D			L				DAT	Α		
S-11 S-12 S-13 S-13 Boring was extended to an elevation of -43-feet NAVD during	[2			NO.								Vibracore
S-11 S-12 S-13 S-13 Boring was extended to an elevation of -43-feet NAVD during	mbor tion, Ft. [NAV	NUMBER	S	S/FT SQ FT SQ FT TT RECOVERY/ UALITY DESIGNAT	RE CONTENT (%)	JID LIMIT			NSITY S/CU.FT	ESSIVE STH SQ FT)	40. 200 SIEVE (%	
S-11 S-12 S-13 S-13 Boring was extended to an elevation of -43-feet NAVD during	L sy leva	MPLE	APLE	SCEN CK O	IST	ΓΙΟ	PLA	PLA	Z N	MPR RENC NS/8	IS	
S-11 S-12 S-13 S-13 Boring was extended to an elevation of -43-feet NAVD during		SA (	\&	A T T HOS	MO	LL	PL	Pl	R O	S F S	Ž	
Same as above.  Same as above.  Same as above.  Same as above.  Boring was extended to an elevation of -43-feet NAVD during		0.44	11									POORLY GRADED SAND, with clay, gray.
42 - S-13 - S-13 - Boring was extended to an elevation of -43-feet NAVD during	41		Н									Same as above.
Boring was extended to an elevation of -43-feet NAVD during	42	-	Н								6	Same as above.
	43											Boring was extended to an elevation of -43-feet NAVD during the drilling operations.
						<b>~</b> .~.	,			- 4 1.0	-	REMARKS:

N - STANDARD PENETRATION TEST RESISTANCE

P - POCKET PENETROMETER RESISTANCE

T - POCKET TORVANE SHEAR STRENGTH

OG OF BOR

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LOCATION: Anchorage Basin; Galveston, Texas

G109112 NUMBER:

	NO.	NECO.		(55.	,					DATE(S) DRILLED: 03/12/09 - 03/12/09	
	FIEL	D DA			ABC	RAT	ORY	DAT	A		DRILLING METHOD(S):
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	SAMITLES N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)		PLASTIC LIMIT WEB		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  SURFACE ELEVATION: -28' NAVD  DESCRIPTION OF STRATUM
F											
	19 -										
	- 20 -										
	- 21 -										
	- 22 -										
	- 23 -										
	24 -										
	- 25 -										
	26 -		!								
ROCK_ETL_GDT_4/28/09	- 27 -										
	28									19	SILTY CLAYEY SAND, gray.
I I. I	29	S-1									Same as above.
URCE CP	30	S-2 S-3	anie.							21	Same as above.
S Q	31				<u> </u>						SANDY CLAY, with shell fragments, gray.
SASIN SA	32	S-4									Same as above.
+ORAGE I	33	S-5								72	Same as above.
OP ANCI	34	S-6								35	CLAYEY SAND, gray.
G109112 PROP. ANCHORAGE BASIN SAND SOURCE GP	35	S-7		***************************************						30	Same as above.
OG OF BORING G	P - P(	OCKE	ARD PENE T PENETR T TORVAN	OME	TER	RES	ISTA	NCE		<u> </u>	REMARKS: Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc. GPS Coord. N. 13,699,918' E. 3,319,141'



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G109112 NUMBER:

FIELD DATA  FIELD DATA  LONG/SGO FT  WOINDS/COLF FT  WORKESSIVE  SAMPLE NUMBER: G109112  DATE(S) DRILLED: 03/12/09 - 03/12/09  DRILLING METHOD(S):  Vibracore  Vibracore  GROUNDWATER INFORMATION:  GROUNDS/COLFT  WOINDS/COLFT  WONS/COLFT  WOINDS/COLFT  WOI	
TIELD DIGIT	
TO NOTE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVICE SERVIC	
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SOLL SYMBOL  Elevation, Ft. [NA SAMPLE NUMBER SAMPLE NUMBER SAMPLES N: BLOWS/FT T: TONS/SQ FT T: TON	
SOIL SYMBOL  Elevation, Ft.  Elevation, Ft.  SAMPLES  N. BLOWS/FT  P. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT  T. TONS/SQ FT	
용 변 중 \중/문교투법은 볼 LL PL PI 품요 당동은 불 DESCRIPTION OF STRATUM  Same as above.	
37 POORLY GRADED SAND, gray.	
Same as above	
Game as above.	
39 Same as above.	
S-12 2	
Boring was extended to an elevation of -40-feet NA\	VD during
the drilling operations.	
N STANDARD DENITRATION TEST RESISTANCE REMARKS:	

N - STANDARD PENETRATION TEST RESISTANCE

P - POCKET PENETROMETER RESISTANCE

T - POCKET TORVANE SHEAR STRENGTH

.0G\_OF\_BOR

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	RATO		OH	Fax	: (361	1) 883-	-4711					DATE(O) DDN LED: 00/44/00 00/44/00
$\vdash$												DATE(S) DRILLED: 03/11/09 - 03/11/09
	FIEL	ם ט-	ΑĪ		L				DAT	A	T	DRILLING METHOD(S): Vibracore
	[ <u>[</u>			N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	~		TERBI LIMIT:					
	Elevation, Ft. [NAVD]			NAT	MOISTURE CONTENT (%)						MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:
	Z	ا بي		ESIC	Ë		<u> </u>	PLASTICITY INDEX			三	
٦	, Ft.	SAMPLE NUMBER			CON	LIQUID LIMIT	PLASTIC LIMIT	Ě	2 =	<u> </u>	200	
MBC	ion	N	S	AS/FI /SQ   /SQ   /T RE	RE	OI OI	STIC	STIC	NSI)	ESS STH SQ F	Š	
SOIL SYMBOL	evat	MPLE	SAMPLES	ONS ONS CEN	IST	Lia	PLA	Ä	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	INS I	SURFACE ELEVATION: -31' NAVD
SO	E	SA /	S.	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Σ	LL	PL	PI	P. P.	S # 5	Σ	DESCRIPTION OF STRATUM
			П									
	- 21 -											
	- 22 -											
	- 23 -											
	- 24 -											
	25 -											
	- 26 -								***************************************			
	- 27 -											
	- 28 -		П									
1	20											
	- 29 -											
2												
4/28/09	- 30 -											
	31 -							ļ				BOODLY CRADED CAND with shall from onto gray
E .		S-1									3	POORLY GRADED SAND, with shell fragments, gray.
ZOCK K	- 32 -	,	Н									Same as above.
_		S-2										
8	- 33 -										18	SILTY CLAYEY SAND, with shell fragments, gray.
SOURCE	34 -	S-3		:				ļ				Same as above.
S CN		S-4							į		19	Carrie as above.
AS T	35 -		Н				† <i>– –</i>	1		<del> </del>	†	POORLY GRADED SAND, with clay, gray.
BASIN SAND	: - 36 -	S-5										
AGE		S-6										Same as above.
ANCHORAGE	37 -	3-0	Н									Same as above.
		S-7									10	Game as above.
PROP	38 -						† <i></i> -		†	<b> </b>	<del></del>	SILTY CLAYEY SAND, gray.
	39 -	S-8	Ш									0
G109112		S-9										Same as above.
S III	1 40 -				<u> </u>		<u> </u>		1		1	REMARKS:
LOG_OF_BORING	N - ST	ANE	ΣĄ	RD PENE	TRA	TION	TES	TRI	ESIST	ANCE		Boring depth and location was determined by HDR Engineering, Inc. Boring operations
<u>م</u>				PENETRO TORVANI								were performed by Ocean Surveys, Inc. GPS Coord, N. 13,698,322' E. 3,319,855'
ğ	. , .	. J. \\	_	. ~ ( \ \ / \ \ / \ \ \ \ )				1 ~	- 11 /			



OG\_OF\_BOR

P - POCKET PENETROMETER RESISTANCE T - POCKET TORVANE SHEAR STRENGTH

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

CLIENT: HDR Engineering, Inc.

PROJECT: Anchorage Basin Sand Source Investigation

Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc. GPS Coord. N. 13,698,322' E. 3,319,855'

LOCATION: Anchorage Basin; Galveston, Texas

Fax	ephone: (361) 883-4555 :: (361) 883-4711	NUMBER: G109112
		DATE(S) DRILLED: 03/11/09 - 03/11/09
FIELD DATA	LABORATORY DATA	DRILLING METHOD(S): Vibracore
Elevation, Ft. [NAVD] SAMPLE NUMBER SAMPLES N. BLOWS/FT P. TONS/SQ FT T. TONS/SQ FT F. TONS/SQ FT PERCENT RECOVERY// ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)    LIQUID LIMIT	GROUNDWATER INFORMATION:  SURFACE ELEVATION: -31' NAVD  DESCRIPTION OF STRATUM
S-10	19	Same as above.
		Boring was extended to an elevation of -41-feet NAVD during the drilling operations.

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

	VO.	Inco.		. (55)	,				DATE(S) DRILLED: 03/13/09 - 03/13/09		
	FIEL	D DA		L				DAT	Α		DRILLING METHOD(S):
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	SAMPLES N: BLOWS/FT P: TONS/SQ FT FECENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)		PLASTIC LIMIT FIRE		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  SURFACE ELEVATION: -30' NAVD  DESCRIPTION OF STRATUM
	- 19 -										
	- 20 -										
	- 21 -		:								
	- 22 -				;						
			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				!				
	23 -						:				
	- 24 -										
	- 25 -										
				:					***************************************		
	- 26 -										
8008	- 27 -										
J ROCK ETL.GDT 4/28/09	20										
ETLG	- 28 -										
20 20 20 20 20 20 20 20 20 20 20 20 20 2	- 29 -										
G6	30									-	POORLY GRADED SAND, with shell fragments, gray.
SOURC		S-1								3	TOOKET STABLE SAIRE, WILL STOR REQUIERCE, STAY.
SAND	31										Same as above.
SASIN	32	S-2									Same as above.
¥GE ₽	33	S-3									
NCHO		S-4								1	POORLY GRADED SAND, gray.
₹OP. A	34										Same as above.
G109112 PROP. ANCHORAGE BASIN SAND SOURCE.GR.	35	S-5		<u> </u>		<u> </u>				ļ	CLAYEY SAND, gray.
010		S-6								31	<u> </u>
OG OF BORING	P - P0	OCKE	ARD PENE T PENETRO T TORVAN	OME	TER	RES	IST/	ANCE			REMARKS: Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc. GPS Coord. N. 13,699,496' E. 3,319,957'

ROCK

OG OF BOR

P - POCKET PENETROMETER RESISTANCE

T - POCKET TORVANE SHEAR STRENGTH

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

CLIENT: HDR Engineering, Inc.

PROJECT: Anchorage Basin Sand Source Investigation

Boring depth and location was determined by HDR Engineering, Inc. Boring operations

were performed by Ocean Surveys, Inc. GPS Coord. N. 13,699,496' E. 3,319,957'

LOCATION: Anchorage Basin; Galveston, Texas

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

	10	A High		r un	(00)	, 000	77.1.			DATE(S) DRILLED: 03/11/09 - 03/11/09		
	FIEL	D DA			L	ABC	RAT	ORY	DAT	A		DRILLING METHOD(S):
	AVD]			47 GNATION	IT (%)		TERBI LIMIT:	S	The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s		/E (%)	GROUNDWATER INFORMATION:
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	LES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SO FT)	MINUS NO. 200 SIEVE (%)	SURFACE ELEVATION: -28' NAVD
SOIL	Elev	SAME	SAMPLES	H C C C C C C C C C C C C C C C C C C C	MOIS	 LL	PL	<u>교</u> 면	POUN POUN	STRE	Z	DESCRIPTION OF STRATUM
5	- 21 -			E. M.   Ma 974								
	- 22 -											
	- 23 -											
	- 24 -											
	- 25 -											
	- 26 -			:			The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s					
	- 27 -											
	- 28 -	S-1									4:	
	- 29 -	S-2										Same as above.
	- 30 -	S-3									7	SANDY CLAY, dark gray.
	- 31 -											Same as above.
	- 32 -	S-4										Same as above.
_	- 33 -	S-5	$\dashv$									POORLY GRADED SAND, with clay, gray.
	34	S-6	Ц								}	SANDY CLAY, dark gray.
SANDS	35	S-7	Ш								9	3   1
BASIN (		S-8										Same as above.
RAGE	36	S-9										Same as above.
ANCH WHEH	37	S-10									5	SANDY CLAY, gray.
PRO ///	- 38	_	$\parallel$									POORLY GRADED SAND, with clay, gray.
G109112	39	S-11 S-12	H									Same as above.
OG_OF_BORING_G109112 PROP. ANCHORAGE BASIN SAND SOURCE.GR.	P - P0	TAND OCKE	Т	RD PENE PENETRO TORVANI	OME	TER	RES	SISTA	ANCE		=	REMARKS:  Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc.  GPS Coord. N. 13,700,406' E. 3,320,164'

ROCK

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

CLIENT: HDR Engineering, Inc.

PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

NUMBER: G109112

NO RA	2	758	Fax	: (361	e: (36 I) 883-	4711	-4000	l			NUMBER: G109112
		HC.									DATE(S) DRILLED: 03/11/09 - 03/11/09
FI	ELD	DA:		L				DAT	Α		DRILLING METHOD(S): Vibracore
			NO NO	_		TERBE LIMITS					Vibracore
SOIL SYMBOL Elevation, Ft. [NAVD]	SAMPLE NUMBER		N. BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:
SYM	Ē	SAMPLES	OWS NS/S NS/S ENT	TUR	JIN O	LASI	LASI	DEN.	COMPRESSIV STRENGTH (TONS/SO FT)	S N	SURFACE ELEVATION: -28' NAVD
Ele Solt	SAME	\¥	E C C S S S S S S S S S S S S S S S S S	MOIS	 LL	PL	<u>_</u> Pl	2R₹	STRE		DESCRIPTION OF STRATUM
	+	100	/ 24 - 44					<u> </u>	0 0, 0	1 -	SILTY CLAYEY SAND, gray.
41	S-1	13						E			Same as above.
42	S-1	4								25	
42											Boring was extended to an elevation of -42-feet NAVD during the drilling operations.
								AMADINA MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMAN MANAGAMA			

N - STANDARD PENETRATION TEST RESISTANCE

P - POCKET PENETROMETER RESISTANCE T - POCKET TORVANE SHEAR STRENGTH

.og\_oF\_BORI

**REMARKS:** 

Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc. GPS Coord. N. 13,700,406' E. 3,320,164'



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

HDR Engineering, Inc. CLIENT:

PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

G109112 NUMBER:

	470	A THE	SRI	rax.	(301	:) 003-	'*+∤ I I			DATE(S) DRILLED: 03/11/09 - 03/11/09		
	FIEL	D D	ΑT	A	L	ABC	RAT	ORY	DAT	A		DRILLING METHOD(S):
	<u>-</u> [0			Š			TERBI					Vibracore
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SO FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  SURFACE ELEVATION: -32' NAVD
S	Ä	્ર ∖	ል/		ĭ	LL	PL	PI	R 5	8 P E	₹	DESCRIPTION OF STRATUM
	- 21 -											
	- 22 -											
	- 23 -											
	- 24 -											
	- 25 -		!									
	- 26 -											
	- 27 -											
	- 28 -											
	- 29 -				i							
2												
ROCK EIL GUI 4/20/08	30 -											
3	31 -											
<u>{</u>	32	6.4									7	POORLY GRADED SAND, with clay, gray.
1 1. 1	33	S-1	H									Same as above.
SOCIETY OF THE PROPERTY OF THE	34	S-2										Same as above.
SAN ZZ	35	S-3			 		<del> </del>		<del> </del>		-	CLAYEY SAND, with shell fragments, gray.
BASI	36	S-4	H								31	Same as above.
ANCHORAGE BASIN SAND SOURCE GFU	37	S-5										Same as above.
	38	S-6	Ш									
112 PR	39	S-7			L		<u> </u>		<u></u>		38	
G C109	1 40	S-8										POORLY GRADED SAND, gray.
OG OF BORIN	N - STANDARD PENETRATION TEST RESISTANCE  P - POCKET PENETROMETER RESISTANCE  REM Boring of were pe											REMARKS: Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc. GPS Coord. N. 13,698,014' E. 3,320,905'

LOG\_OF\_BORIN

N - STANDARD PENETRATION TEST RESISTANCE

P - POCKET PENETROMETER RESISTANCE

T - POCKET TORVANE SHEAR STRENGTH

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

HDR Engineering, Inc. CLIENT:

PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

G109112 NUMBER:

T -15	ELD										
1-15		DA I	ΓA	Ĺ	ABO	RAT	ORY	DAT	A	DATE(S) DRILLED: 03/11/09 - 03/11/09  DRILLING METHOD(S):	
			N N			ERBE					Vibracore
SOIL SYMBOL Elevation, Ft. [NAVD]	SAMPLE NUMBER	SAMPLES	N. BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	F LIQUID LIMIT	PLASTIC LIMIT W	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  SURFACE ELEVATION: -32' NAVD  DESCRIPTION OF STRATUM
										3	Same as above.
NG G109112 PROP. ANCHORAGE BASIN SAND SOURCE GPJ ROCK_ETL.GDT 4/28/09	S-	9								3	Boring was extended to an elevation of -41-feet NAVD during the drilling operations.

REMARKS:

were performed by Ocean Surveys, Inc. GPS Coord. N. 13,698,014' E. 3,320,905'

Boring depth and location was determined by HDR Engineering, Inc. Boring operations

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HDR Engineering, Inc. CLIENT:

PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

	NO.	) HE			(	,				DATE(S) DRILLED: 03/11/09 - 03/11/09		
	FIEL	.D D			L	ABC	RAT	ORY	DAT	A		DRILLING METHOD(S):
	[1			N.		AT	TERBE					Vibracore
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  SURFACE ELEVATION: -33' NAVD
SO	Ele	SAI	¥s/	# 7 : T # 9 S	Θ	LL	PL	Pl	R 0	8 E E	ξ	DESCRIPTION OF STRATUM
	- 21 -										778	
	- 22 -											
	- 23 -											
	- 24 -											
	- 25 -						:					
	- 26 -											
	- 27 -			!								
	- 28											
	- 29 -											
4/28/09	- 30 -											
L.GDT	- 31											
J ROCK ETL.GDT 4/28/09	32											
P. SP.	- 33 ·		$\sqcup$							-		POORLY GRADED SAND, gray.
E CONTROL	34	S-1		,		-					4	SANDY CLAY, gray.
NA NA	35	S-2										
SASIN		S-3									74	
RAGE I	36	S-4										Same as above.
ANCHO WCHO	37	S-5	H					<del>                                     </del>			45	CLAYEY SAND, dark gray.
PRO //	38		H									Same as above.
G109112 PROP. ANCHORAGE BASIN SAND SOURCE.GP.	39	S-6							ē.			Same as above.
	1 40	S-7	Ш		L						1.	DELLA DICO.
OG OF BORING	N - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETROMETER RESISTANCE Wer GP T - POCKET TORVANE SHEAR STRENGTH RESISTANCE GP											REMARKS: Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc. GPS Coord. N. 13,698,958' E. 3,321,049'



Rock Engineering & Testing Lab., Inc.

6817 Leopard St.
Corpus Christi, TX 78409
Telephone: (361) 883-4555
Fax: (361) 883-4711

HDR Engineering, Inc. CLIENT:

PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

G109112 NUMBER:

	RATO	EN THE	ORY	- Fax	. (36)	1) 883-	4/11					DATE(S) DRILLED: 03/11/09 - 03/11/09
	FIE	LD D	ΑT		l				DAT.	A		DRILLING METHOD(S):  Vibracore
	[UN]			ATION	(%)		TERBE LIMITS	3			(%)	GROUNDWATER INFORMATION:
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ.FT)	MINUS NO. 200 SIEVE (%)	SURFACE ELEVATION: -33' NAVD
SOIL	Ele	SAN	SAN/	ROS ROS	O <sub>M</sub>	LL	PL.	PI	P.O.L	STR TO	N	DESCRIPTION OF STRATUM
		6.0									23	SILTY CLAYEY SAND, dark gray.
	- 41	S-8										Boring was extended to an elevation of -41-feet NAVD during the drilling operations.
			The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s									

N - STANDARD PENETRATION TEST RESISTANCE

P - POCKET PENETROMETER RESISTANCE

OG OF BORING G1

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. 13,698,958' E. 3,321,049'



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

1	"ATO	A HIGG	Fax	(301	) 883-	4711					DATE(S) DRILLED: 03/10/09 - 03/10/09
h		.D DA	·ΤΑ	i	ABC	RAT	ORY	DAT	A		DRILLING METHOD(S):
					ATT	TERBE	RG				Vibracore
	Elevation, Ft. [NAVD]	BER	SAMITLES N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)		LIMITS	PLASTICITY INDEX	\ <u> </u>	fi "	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:
SOIL SYMBOL	on, ]	SAMPLE NUMBER	SOFI SOFI FREC	REC	LIQUID LIMIT	PLASTIC LIMIT	) HC	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	<u>0</u>	
SYN	vati	APLE 101	N: BLOWS/ N: BLOWS/ P: TONS/SC T: TONS/SC PERCENT ROCK QUA	ISTUI	non	PLAS	PLAS	NDS	COMPRESS STRENGTH (TONS/SQ F	US N	SURFACE ELEVATION: -31' NAVD
SOII	Ele	SAI S	S S S S S S S S S S S S S S S S S S S	Θ	LL	PL	PI	P.O.	STR OF	Z	DESCRIPTION OF STRATUM
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	- 26 -										
	- 27 -						:				
	- 28 -										
	20										
	- 29 -										
608	- 30 -										
ROCK ETL GDT 4/28/09											
	31 -	S-1								46	CLAYEY SAND, gray.
ž//	32 -	3-1			<u> </u>	ļ					SANDY CLAY, gray.
1///	33 -	S-2								93	DU TV CLAVEV CAND Grove
SE.		S-3								26	SILTY CLAYEY SAND, gray.
S I	34										Same as above.
SAN	35	S-4					-			-	SANDY CLAY, gray.
NS W	<b>1</b>	S-5								72	
AGE.	36	S-6									Same as above.
ANCHORAGE BASIN SAND SOURCE.GPJ	37	- 5-0									Same as above
¥ ///	38	S-7					_				CI AVEV SAND grav
12 P.R.		S-8								39	CLAYEY SAND, gray.
60 // 10 //	39	1									Same as above.
§ //	40	S-9							1		REMARKS:
OG OF BORING G109112 PROP	P - P0	CKE	ARD PENE T PENETR T TORVAN	OME	TER	RES	SISTA	NCE		Ē	Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc.  GPS Coord, N. 13,700,020' E. 3,321,179'

ROGR

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

	NO PRATO	<u> </u>	ORF	Fax	; (361	e: (36 ) 883-	4711	-4000					NUMBER: G109112
$\vdash$										_		_	DATE(S) DRILLED: 03/10/09 - 03/10/09
	FIE	LD D			L		RAT		DAT.	A	Т	_	DRILLING METHOD(S): Vibracore
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)		PLASTIC LIMIT		DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH TONS/SQ FT)	( /o/ Life Life Cook of Indian	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  SURFACE ELEVATION: -31' NAVD  DESCRIPTION OF STRATUM
		S-10											Same as above.
RING G109112 PROP. ANCHORAGE BASIN SAND SOURCE GPJ ROCK ETL.GDT 4/28/09	41	3-10											Boring was extended to an elevation of -41-feet NAVD during the drilling operations.

N - STANDARD PENETRATION TEST RESISTANCE

P - POCKET PENETROMETER RESISTANCE

T - POCKET TORVANE SHEAR STRENGTH

OG\_OF\_BORI

#### REMARKS:

Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc. GPS Coord. N. 13,700,020' E. 3,321,179'

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

HDR Engineering, Inc. CLIENT:

PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

NUMBER: G109112

	A SO	N. III.	ORY	/ rax	. (50	1) 003	<del>- 4</del> / 1 i					DATE(S) DRILLED: 03/11/09 - 03/11/09
	FIEL	D D	ΑΊ		I	_ABC	RAT	ORY	DAT	A		DRILLING METHOD(S):
	]			S			TERBI LIMIT:					Vibracore
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	SAMPLES	N. BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION: SURFACE ELEVATION: -32' NAVD
SOI	Ele	SA (	\&		Š	LL	PL	PΙ	DR. POI	S F S	Σ	DESCRIPTION OF STRATUM
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	- 25 -				l							
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	- 27 -											
	- 28 -											
	- 29 -											
	- 30 -											
	- 31 -											
	- 32 -											SILTY CLAYEY SAND, gray.
	33 -	S-1									23	Same as shows
		S-2										Same as above.
	34 -	S-3					T		<b>†</b>	<b> </b>	32	CLAYEY SAND, gray.
	35 -											Same as above.
4	36 -	S-4	L		<b></b>		<u> </u>					SILTY CLAYEY SAND, gray.
	37	S-5									20	Same as above.
	38	S-6	·				<u></u>		<u></u>		ļ	
		S-7										CLAYEY SAND, gray.
	39	S-8									39	Same as above.
O BOKING	N - ST P - PC	OCK	ΕT	RD PENE PENETRO TORVAN	OME	TER	RES	SISTA	NCE	TANCE		REMARKS:  Boring depth and location was determined by HDR Engineering, Inc. Boring operation were performed by Ocean Surveys, Inc.  GPS Coord. N. 13,698,522' E. 3,321,488'

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N - STANDARD PENETRATION TEST RESISTANCE

P - POCKET PENETROMETER RESISTANCE

T - POCKET TORVANE SHEAR STRENGTH

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

CLIENT: HDR Engineering, Inc.

PROJECT: Anchorage Basin Sand Source Investigation

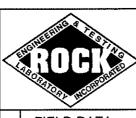
Boring depth and location was determined by HDR Engineering, Inc. Boring operations

were performed by Ocean Surveys, Inc. GPS Coord. N. 13,698,522' E. 3,321,488'

LOCATION: Anchorage Basin; Galveston, Texas

	i e charce		ORE	Fax	: (361	e. (36 i) 883	1) 883 -4711	-4000	•			NUMBER: G109112
		<u> </u>										DATE(S) DRILLED: 03/11/09 - 03/11/09
	FIE	LD D	AT	Α	<u></u>				DAT.	Α		DRILLING METHOD(S): Vibracore
	AVD]			', SNATION	L (%)		TERBE LIMITS	3			E (%)	GROUNDWATER INFORMATION:
	Elevation, Ft. [NAVD]	SAMPLE NUMBER	LES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH TONS/SO FT)	MINUS NO. 200 SIEVE (%)	SURFACE ELEVATION: -32' NAVD
	Elev	SAME	AMP.	S TOP	MOIS	 LL	ը PL	ā. Pl	NO.	STRE	NE	DESCRIPTION OF STRATUM
		<del>  ",                                   </del>		/ 24 - 44	_		'-	, ,	<u> </u>	0 0, 0	1=	Same as above.
	- 41 -	S-9 S-10									9	POORLY GRADED SAND, with clay, gray.
	- 42 -	3-10						,				Boring was extended to an elevation of -42-feet NAVD during the drilling operations.
									and the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of t			
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-	) ~-			RD PENE				<u> </u>	-0.0-	- 4 2 1 0 -	 -	REMARKS:

HDR Engineering, Inc. CLIENT: PROJECT: Anchorage Basin Sand Source Investigation Rock Engineering & Testing Lab., Inc. 6817 Leopard St. LOCATION: Anchorage Basin; Galveston, Texas Corpus Christi, TX 78409 Telephone: (361) 883-4555 NUMBER: G109112 Fax: (361) 883-4711 DATE(S) DRILLED: 03/10/09 - 03/10/09 DRILLING METHOD(S): LABORATORY DATA FIELD DATA Vibracore N: BLOWS/FT
P: TONS/SQ FT
T: TONS/SQ FT
PERCENT RECOVERY/
ROCK QUALITY DESIGNATION **ATTERBERG** <u>LIMITS</u> Elevation, Ft. [NAVD] 8 MINUS NO. 200 SIEVE (%) **GROUNDWATER INFORMATION:** MOISTURE CONTENT SAMPLE NUMBER PLASTIC LIMIT DRY DENSITY POUNDS/CU.FT COMPRESSIVE STRENGTH (TONS/SQ FT) LIQUID LIMIT PLASTICITY SOIL SYMBOL SAMPLES SURFACE ELEVATION: -33' NAVD DESCRIPTION OF STRATUM LL PL ы 21 22 23 24 25 26 27 28 29 30 ETL. GDT 31 ROCK 32 SAND SOURCE.GPJ 33 POORLY GRADED SAND, gray. 1 S-1 34 Same as above, with shell fragments. S-2 35 CLAYEY SAND, gray. 49 S-3 36 SANDY CLAY, gray. S-4 37 Same as above. S-5 38 Same as above. 92 S-6 39 SANDY CLAY, gray. S-7 OF\_BORING REMARKS: N - STANDARD PENETRATION TEST RESISTANCE Boring depth and location was determined by HDR Engineering, Inc. Boring operations P - POCKET PENETROMETER RESISTANCE were performed by Ocean Surveys, Inc. GPS Coord. N. 13,698,450' E. 3,322,163' T - POCKET TORVANE SHEAR STRENGTH



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

HDR Engineering, Inc. CLIENT:

PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

NUMBER: G109112

`	ABORATO		ALC:	RATEL Tele Fax	ephone : (361	e: (36 ) 883-	1) 883 4711	-4555				NUMBER: G109112
		S Inc										DATE(S) DRILLED: 03/10/09 - 03/10/09
	FIEL	D D			L				DAT	Α		DRILLING METHOD(S): Vibracore
	[]			NO NO			ERBE					VISIACOTO
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	PLES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  SURFACE ELEVATION: -33' NAVD
SOIL	Ele	SAM	SAM	N B N B 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 170 TO 1	ğ	LL	PL	PI	DRY	STR	MIN	DESCRIPTION OF STRATUM
											77	Same as above.
	41 -	S-8	Ш									Boring was extended to an elevation of -41-feet NAVD during
NG G109112 PROP. ANCHORAGE BASIN SAND SOURCE. GFO ROCK, ETLIGOT 4/28/09												the drilling operations.

N - STANDARD PENETRATION TEST RESISTANCE

P - POCKET PENETROMETER RESISTANCE

OF BORIN

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. 13,698,450' E. 3,322,163'



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

HDR Engineering, Inc. CLIENT:

PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

G109112 NUMBER:

	410	A INCO	A.	1 44.	(001	) 003-	71 11						DATE(S) DRILLED: 03/10/09 - 03/10/09
	FIEL	D DA			L				DAT	Α			DRILLING METHOD(S): Vibracore
	D]			TION	· ·		ERBE						
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	F LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH	(TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  SURFACE ELEVATION: -34' NAVD  DESCRIPTION OF STRATUM
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	- 20 -												
	20												
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ROCK_ETL.GDT_4/28/09	[ 2'												
	- 28 -												
Ş	- 29 -	<u> </u>	-										
	- 30 -												
OURC									-				
SANDS	- 31 -												
BASIN	- 32												
RAGE	- 33												
ANCHC													
PRO///	34	S-1		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,								57	SANDY CLAY, gray.
109112	35		+									6	POORLY GRADED SAND, with clay, gray.
	36	S-2										_	REMARKS:
OG OF BORING G109112 PROP. ANCHORAGE BASIN SAND SOURCE.GPJ	P - P0	DCKE	T	RD PENE PENETRO TORVANI	OME	TER	RES	SISTA	NCE	IAN	CE		Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc. GPS Coord. N. 13,699,095' E. 3,322,545'

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

HDR Engineering, Inc. CLIENT:

PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

NUMBER: G109112

	No.	EN THE	9									DATE(S) DRILLED: 03/10/09 - 03/10/09
	FIEI	D D			L				DAT	A		DRILLING METHOD(S): Vibracore
	[Q			NO.	_		TERBE LIMITS					Vibracore
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  SURFACE ELEVATION: -34' NAVD
SOIL	Ele	SAM	\&\ ∖&\	N: BI P: TC T: TC PER	Š		PL	Pl	P. P. P. P. P. P. P. P. P. P. P. P. P. P	STR	Ž Ž	DESCRIPTION OF STRATUM
	- 37 -	S-3 S-4									11	Same as above.  Same as above.
	- 38 -		H									SANDY CLAY, gray.
	- 39 -	S-5 S-6							E		68	Same as above.
	40											Boring was extended to an elevation of -40-feet NAVD during the drilling operations.

N - STANDARD PENETRATION TEST RESISTANCE

P - POCKET PENETROMETER RESISTANCE

T - POCKET TORVANE SHEAR STRENGTH

LOG\_OF\_

REMARKS:

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

PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

NUMBER: G109112

DATE(S) DRILLED: 03/10/09 - 03/10/09

												DATE(S) DRILLED: 03/10/09 - 03/10/09
	FIEL	D D			L	_ABC	RAT	ORY	DAT	Α		DRILLING METHOD(S):
				Z			FERBE					Vibracore
OL.	Elevation, Ft. [NAVD]	SAMPLE NUMBER		N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	SIVE 1 FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:
SOIL SYMBOL	ation	Z H	LES.	WS/F VS/SC VS/SC VS/SC COUA	TURE	auıb	AST	AST	DENS IDS/C	COMPRESSIVE STRENGTH (TONS/SQ FT)	S NO	SURFACE ELEVATION: -33' NAVD
SOP S	Elev	SAMP	SAMPLES	SCK	MOIS	LL.	티	<u>ਕ</u> Pl	2RY I	STRE	NIN	DESCRIPTION OF STRATUM
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	- 22 -											
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T 4/28/(	- 30											
E 6	- 31											
SOCK	32											
	33		H	***************************************		-			<u> </u>		23	SILTY CLAYEY SAND, gray.
SOURCE	34	S-1	H								23	Same as above.
ANDS	35	S-2										
BASIN	20	S-3									18	
NAGE	36	S-4										SANDY CLAY, dark gray.
ANCHC	37	S-5										Same as above
PROP	38	S-6									68	Same as above.
3109112	39	1	-									SANDY CLAY, dark gray.
SING	40	S-7						<u> </u>		<u> </u>		REMARKS:
OG OF BORING G109112 PROP. ANCHORAGE BASIN SAND SOURCE GPJ. ROCK ETL.GDT 4/28/09	N - S P - P( T - P(	OCK	ΞT	RD PENE PENETR TORVAN	OME	TER	RES	SISTA	ANCE		Ξ	Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc.  GPS Coord. N. 13,699,510° E. 3,322,110°

ROGI

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

FIRELD DATA  FIELD DATA  LABORATORY DATA  TOTAL THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE PRETTY DATE OF THE		"ORATO		OH	Fax	: (361	883-	4711						NUMBER. G109112
ATTERBERG LIMITS    CAMPLES   CAMPRO		т —					4.00			, DAT				DATE(S) DRILLED: 03/10/09 - 03/10/09
Same as above.  Same as above.  Boring was extended to an elevation of -41-feet NAVD during the drilling operations.	<u> </u> _	FIEI				L				DAL	Α		_	
Same as above.  Same as above.  Boring was extended to an elevation of -41-feet NAVD during the drilling operations.	SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	SAMPLES	N. BLOWS/FT P. TONS/SQ FT T. TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT WI	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH TONSISO ET	(IONS/SOLTI)	MINUS NO. 200 SIEVE (%)	SURFACE ELEVATION: -33' NAVD  DESCRIPTION OF STRATUM
Boring was extended to an elevation of -41-feet NAVD during the drilling operations.												Ţ		Same as above.
	4/28/09	41 -	S-8											Boring was extended to an elevation of -41-feet NAVD during the drilling operations.

N - STANDARD PENETRATION TEST RESISTANCE

P - POCKET PENETROMETER RESISTANCE T - POCKET TORVANE SHEAR STRENGTH

OG\_OF\_BORIN

REMARKS:

Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc. GPS Coord. N. 13,699,510' E. 3,322,110'

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T - POCKET TORVANE SHEAR STRENGTH

HDR Engineering, Inc. CLIENT:

PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

NUMBER: G109112

	410	> nice	Ar	rax.	. (30	1) 000-	<del></del>						DATE(S) DRILLED: 03/11/09 - 03/11/09
	FIEL	D DA			1				' DAT	Α			DRILLING METHOD(S): Vibracore
	Dj			NOI	~		TERBI LIMIT:						
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH	(TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  SURFACE ELEVATION: -35' NAVD
los	Ele	SAIN	SAN SAN	ROS 7.1.	Θ	LL	PL	Pl	DRY POL	STR	힡	Z Z	DESCRIPTION OF STRATUM
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	- 22 -												
	- 23 -												
			***************************************			:							
	- 24 -												
	- 25 -												
	- 26 -												
	- 27 -			:									
	28 -		A										,
	- 29 -												
2	- 30 -												
4/28/													
G 1	31 -				:								
ROCK_ETL.GDI 4/28/09	- 32 -												
	- 33 -								-				
ANCHORAGE BASIN SAND SOURCE GPJ	- 34	1											
SANDS	35									ļ			
SIN S		S-1										37	CLAYEY SAND, with shell fragments, gray.
R GE	36	S-2			<b>†</b>		<b>†</b>		T	<b>*</b>		28	SILTY CLAYEY SAND, gray.
NCHOR	37		Ц										Same as above.
	38	S-3								İ			Same as above.
G109112 PROP	39	S-4	Ц									25	
		S-5											SILTY CLAYEY SAND, gray.
OF BORING	P - P(	OCKE	T	RD PENE PENETRO	OME	TER	RES	SIST/	<b>INCE</b>	ΓAΝ	CE		REMARKS: Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc. GPS Coord N. 13 699 532' E. 3.323.082'

GPS Coord. N. 13,699,532' E. 3,323,082'

ROGIC

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Corpus Christi, TX 78409 Telephone: (361) 883-4555 Fax: (361) 883-4711

N - STANDARD PENETRATION TEST RESISTANCE

P - POCKET PENETROMETER RESISTANCE

T - POCKET TORVANE SHEAR STRENGTH

LOG\_0F\_

CLIENT: HDR Engineering, Inc.

PROJECT: Anchorage Basin Sand Source Investigation

Boring depth and location was determined by HDR Engineering, Inc. Boring operations

were performed by Ocean Surveys, Inc. GPS Coord. N. 13,699,532' E. 3,323,082'

LOCATION: Anchorage Basin; Galveston, Texas

	SEATO!	EN THE	ORP	Fax	: (361	) 883-	4711					DATE(S) DRILLED: 03/11/09 - 03/11/09
	FIE	LD D	AT	A	L	ABC	RAT	ORY	DAT.	A		DRILLING METHOD(S):
				N.			ERBE				*****	Vibracore
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	LES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:  SURFACE ELEVATION: -35' NAVD
SOIL !	Elev	SAMF	SAMPLES	S TOP	MOIS		PL	E Pl	20 UN	STRE	NIN	DESCRIPTION OF STRATUM
37 33		0,	17	24744			1 12			0 0, 0		Same as above.
	- 41 -	S-6									20	Boring was extended to an elevation of -41-feet NAVD during the drilling operations.
					-				***************************************			
							:					
									***************************************			
	_						<u></u>					DEMARKO
	N - S	TANI	DΑ	RD PENE	TRA	TION	TES	ST R	ESIST	ANCE		REMARKS:



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HDR Engineering, Inc. CLIENT:

PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

	<b>10</b>	F HGO		·	,						DATE(S) DRILLED: 03/10/09 - 03/10/09
<b></b>	FIEL	D DA		1	ABC	RAT	ORY	DAT	A		DRILLING METHOD(S):
			N N			TERBE					Vibracore
	. [NAVD	ER	NERY/ DESIGNATIO	NTENT (%)		LIMIT:		į,		SIEVE (%)	GROUNDWATER INFORMATION:
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	N: BLOWS/FT N: BLOWS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	SURFACE ELEVATION: -32' NAVD
SOIL	Ele	SAN	8 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	Ø	LL .	PL	Pl	2 2 E	STR OT	Z	DESCRIPTION OF STRATUM
	- 19 -										
	- 20 -						į		:		
	- 21 -										
	22 -										
	- 23 -		and the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of th								
	24 -										
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4/28/09	- 27 -					Ė					
ETL.GDT	- 28 -										
J ROCK	- 29										
URCE.GP	- 30										
SAND SO	- 31										
ORAGE BASIN SAND SOURCE GPJ ROCK ETL GDT 4/28/09	32	S-1									POORLY GRADED SAND, with shell fragments, light brown.
ACHORAC	33	S-2					:				SANDY CLAY, dark gray.
PROP A	34	S-3	-								Same as above.
G109112	35	S-4									Same as above.
OG_OF_BORING	P - P0	CKE	ARD PENE T PENETR T TORVAN	OME	ETER	RES	SISTA	ANCE	TANCE		REMARKS:  Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc.  GPS Coord. N. 13,700,599' E. 3,324,100'



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PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

NUMBER: G109112

	TATO!	E THE	ORF	- Fax	: (361	1) 883-	4/11					DATE(S) DRILLED: 03/10/09 - 03/10/09
	FIEL	D D	ΑT	Ā	L	ABO	RAT	ORY	DAT.	A	DRILLING METHOD(S):	
П				₹.			ERBE					Vibracore
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	s	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:
JL S	leva	MPL	SAMPLES	BLO TON SCE	DIST				3√ D	CINE ONS.	NO.	SURFACE ELEVATION: -32' NAVD
S	E	8 /	\ <u>w</u> \	2 4 1 E E E	ž	LL	PL	PI	2 2	5 % E	Σ	DESCRIPTION OF STRATUM
	- 37 -	S-5 S-6										SANDY CLAY, dark gray.  Same as above.
	- 38 -	S-7										Same as above.
	- 39 -	S-8										SANDY CLAY, dark gray.
G109112 PKUP. ANCHURANGE BASIN SAND SUURCE. GTS. RUCK, ETE. GGT WESTERS	40 -											Boring was extended to an elevation of -40-feet NAVD during the drilling operations.
	N 6.			DD DENE							 -	REMARKS:

N - STANDARD PENETRATION TEST RESISTANCE

P - POCKET PENETROMETER RESISTANCE

T - POCKET TORVANE SHEAR STRENGTH

OG\_OF\_BOR

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PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

	1410	A HE	Fax	. (30)	) 883-	4711					DATE(S) DRILLED: 03/10/09 - 03/10/09
	FIEL	.D D/	ATA	L	ABC	RAT	ORY	DAT	A		DRILLING METHOD(S):
	_		NO			TERBE					Vibracore
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	SAMPLES N. BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:
L S	vat	MPL	SAMPLES N: BLOWS/ P: TONS/S/ PERCENT ROCK QUA	JISTI	L E	PLA	PLA	Z OND	REN NS/	SN.	SURFACE ELEVATION: -30' NAVD
SOI	Ele	S \	SA HE HE SA	MC	LL	PL	PΙ	DR PO	8 E E	Ē	DESCRIPTION OF STRATUM
<u> </u>	- 19 -										·
	- 20 - - 21 -										
	- 22 -	:									
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	- 24 -								٠.		
	- 25 -										
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4/28/09	- 27 -			:							
ROCK ETL.GD1 4/28/09	- 28 -										
	- 29 -				!						
URCE GP	30	6.4						-		47	CLAYEY SAND, dark gray.
\$ <del> </del>	31	S-1		<del> </del>		<u> </u>		<del> </del>	<b>+</b> -	<del> </del>	SILTY CLAYEY SAND, dark gray.
SS I	1	S-2								26	
BAS	32	1		T		T	1	T		T	CLAYEY SAND, dark gray.
PAGE //	33	S-3									Same as above.
Ā//		S-4									
og //	34	S-5								43	Same as above.
G109112 PROP, ANCHORAGE BASIN SAND SOURCE GPJ	35	S-6									CLAYEY SAND, dark gray.
SORING	2L <sub>36</sub> N-S⊺	TANE	ARD PENE	TRA	TION	I TES	ST RI	ESIS	TANCE	<u> </u>	REMARKS: Boring depth and location was determined by HDR Engineering, Inc. Boring operations
OG OF BORING	P - P0	OCKE	T PENETR T TORVAN	OME	TER	RES	SISTA	NCE			were performed by Ocean Surveys, Inc.  GPS Coord. N. 13,700,790' E. 3,322,827'

ROCK

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PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

NUMBER: G109112

	NO.	ST INC			,	,	·++/						DATE(S) DRILLED: 03/10/09 - 03/10/09
	FIEL	D D	ΑΊ						DAT.	A			DRILLING METHOD(S): Vibracore
П	)]			Š	_		TERBI LIMIT:					brack	Vibracore
SOIL SYMBOL	Elevation, Ft. [NAVD]	SAMPLE NUMBER	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	(TONS/SQ FT) MINUS NO. 200 SIEVE (%)		GROUNDWATER INFORMATION: SURFACE ELEVATION: -30' NAVD
SOIL	Ele	SAN	SA,	# # # # # # # # # # # # # # # # # # #	Θ	LL	PL	Ρl	P. 0.	O F. S	Z		DESCRIPTION OF STRATUM
		S-7											Same as above.
	- 37 -								<u> </u>		24	- 1	SILTY CLAYEY SAND, dark gray.
	- 38 -	S-8											Same as above.
	- 39 -	S-9											Same as above.
KING G 109 12 TRUE ANGIGINAGE DAGIN GRIEG GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GREEGE GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODGE OF GOODG	- 40 -	S-10											Boring was extended to an elevation of -40-feet NAVD during the drilling operations.
<u></u>	_				<u> </u>						Ц		REMARKS:

N - STANDARD PENETRATION TEST RESISTANCE

P - POCKET PENETROMETER RESISTANCE

T - POCKET TORVANE SHEAR STRENGTH

.OG\_OF\_BORI

REMARKS:

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T - POCKET TORVANE SHEAR STRENGTH

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PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

NUMBER: G109112

	RATORI	-									•
		<u> </u>							DATE(S) DRILLED: 03/10/09 - 03/10/09		
F	FIELI	D DA	<del></del>	L	LABORATORY DATA ATTERBERG						DRILLING METHOD(S): Vibracore
Elevation, Ft. [NAVD]		ËR	N. BLOWS/FT P. TONS/SQ FT T. TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	NTENT (%)		LIMITS	3	DRY DENSITY POUNDS/CU.FT		SIEVE (%)	GROUNDWATER INFORMATION:
Elevation, Fi	, vanour,	SAMPLE NUMBER	P. BLOWS/FT P. TONS/SQ FT T. TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGN	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	SURFACE ELEVATION: -34' NAVD
<u> </u>		SA / SA	NOR HERON	OM M	LL.	PL	PI	PO.	S # 5	Z	DESCRIPTION OF STRATUM
- 19	19 -										
- 20	20 -										
- 2°	21 -									1	
- 2	22										
- 2	23										
- 2	24 -										
- 2	25 -										
- 2	26										
- 2	27 -										
- 2	28										
- 2	29										
- 3	30			-							
- 3	31										
- 3	32										
- 3	33 -										
3	34	-									SANDY CLAY, gray.
3	35	S-1 S-2								84	Same as above, dark gray.

were performed by Ocean Surveys, Inc. GPS Coord. N. 13,700,597' E. 3,325,148'

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PROJECT: Anchorage Basin Sand Source Investigation

LOCATION: Anchorage Basin; Galveston, Texas

Field DATA  LABORATORY DATA  ATTERERS  LEGGE STORY DATA  LEGGE STORY DATA  LEGGE STORY DATA  ATTERERS  LEGGE STORY DATA  ATTERERS  LEGGE STORY DATA  ATTERERS  LEGGE STORY DATA  ATTERERS  LEGGE STORY DATA  ATTERERS  LEGGE STORY DATA  ATTERERS  LEGGE STORY DATA  ATTERERS  LEGGE STORY DATA  ATTERERS  LEGGE STORY DATA  ATTERERS  LEGGE STORY DATA  ATTERERS  LEGGE STORY DATA  ATTERERS  LEGGE STORY DATA  ATTERERS  LEGGE STORY DATA  ATTERERS  LEGGE STORY  ATTERERS  SURFACE ELEVATION: -34' NAVD  DESCRIPTION OF STRATUM  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same as above.  Same a	16	Q. A.		ORIE!	RATE Tele	ephon : (361	e: (36 I) 883-	1) 883 4711	3-4555	5			NUMBER: G109112
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Same as above.  Same as above, dark gray and gray.  Same as above, dark gray and gray.  Boring was extended to an elevation of -40-feet NAVD during the drilling operations.	δ   7///	山	Ø /	\ <sub>S</sub>	/ Z G H G &	Σ	LL	PL	Pl	2 2	OBE	_ ≥	
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Same as above, dark gray and gray.  Boring was extended to an elevation of -40-feet NAVD during the drilling operations.		38 -											Same as above.
Boring was extended to an elevation of -40-feet NAVD during the drilling operations.		39 -		H									Same as above, dark gray and gray.
the drilling operations.		40 -	S-6	1									Boring was extended to an elevation of -40-feet NAVD during
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N - STANDARD PENETRATION TEST RESISTANCE

P - POCKET PENETROMETER RESISTANCE

T - POCKET TORVANE SHEAR STRENGTH

Boring depth and location was determined by HDR Engineering, inc. Boring operations were performed by Ocean Surveys, Inc. GPS Coord. N. 13,700,597' £. 3,325,148'