



LOCATIONS OF VIBRACORES

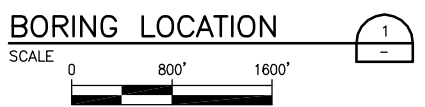
DESIGNATION	NORTHING	EASTING
AA-01	13,697,657	3,316,600
AA-02	13,698,269	3,316,726
AA-03	13,698,827	3,316,994
AA-04	13,699,433	3,317,399
AA-05	13,700,291	3,317,718
AA-06	13,697,693	3,317,373
AA-07	13,697,973	3,317,033
AA-08	13,698,395	3,317,271
AA-09	13,698,185	3,317,736
AA-10	13,698,831	3,317,845
AA-11	13,699,487	3,318,161
AA-12	13,700,304	3,318,392
AA-13	13,698,024	3,318,669
AA-14	13,698,746	3,318,774
AA-15	13,699,238	3,318,965
AA-16	13,699,919	3,319,140
AA-17	13,698,323	3,319,857
AA-18	13,699,497	3,319,959
AA-19	13,700,407	3,320,159
AA-20	13,698,016	3,320,908
AA-21	13,698,954	3,321,053
AA-22	13,700,018	3,321,176
AA-23	13,698,519	3,321,488
AA-24	13,698,450	3,322,165
AA-25	13,699,092	3,322,539
AA-26	13,699,507	3,322,105
AA-27	13,699,534	3,323,083
AA-28	13,700,598	3,324,099
AA-29	13,700,790	3,322,827
AA-30	13,700,598	3,325,145

NOTES:

- NORTHINGS AND EASTINGS ARE STATE PLANE GRID, NAD'83, TEXAS SOUTH CENTRAL ZONE IN U.S. FEET. GEOGRAPHIC COORDINATES (LAT/LONG) ARE IN NAD'83.
- ELEVATION CONTOURS ARE IN NAVD'88 DATUM.
- ELEVATION CONTOURS BASED ON INFORMATION PROVIDED BY THE U.S. ARMY CORPS OF ENGINEERS, GALVESTON DISTRICT. SURVEY DATE WAS OCTOBER 2008. ELEVATIONS WERE CONVERTED FROM USACE MLT TO NAVD '88 USING THE FOLLOWING CORRELATION: 0 NAVD '88 = 1.42' MLT.
- APPROXIMATE LOCATIONS OF POTENTIAL OBSTRUCTIONS BASED ON NOAA CHART 11324. HDR DOES NOT GUARANTEE ACCURACY OR COMPLETENESS OF THESE LOCATIONS. ADDITIONAL OBSTRUCTIONS ARE LIKELY TO EXIST.

LEGEND:

- HISTORICAL BORING LOCATIONS FROM USACE (1966)
- VIBRACORE LOCATIONS
- ⊕ APPROXIMATE LOCATION OF POTENTIAL OBSTRUCTION (SEE NOTE 4)
- VIBRACORE LOCATION FROM RICE UNIVERSITY



TEXAS GENERAL LAND OFFICE  
 WEST GALVESTON ISLAND  
 END OF SEAWALL NOURISHMENT  
 EXHIBIT A – GALVESTON ANCHORAGE AREA

DATE	4/22/09
FIGURE	EX A

BORING NO.	GPS COORDINATES	
	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.





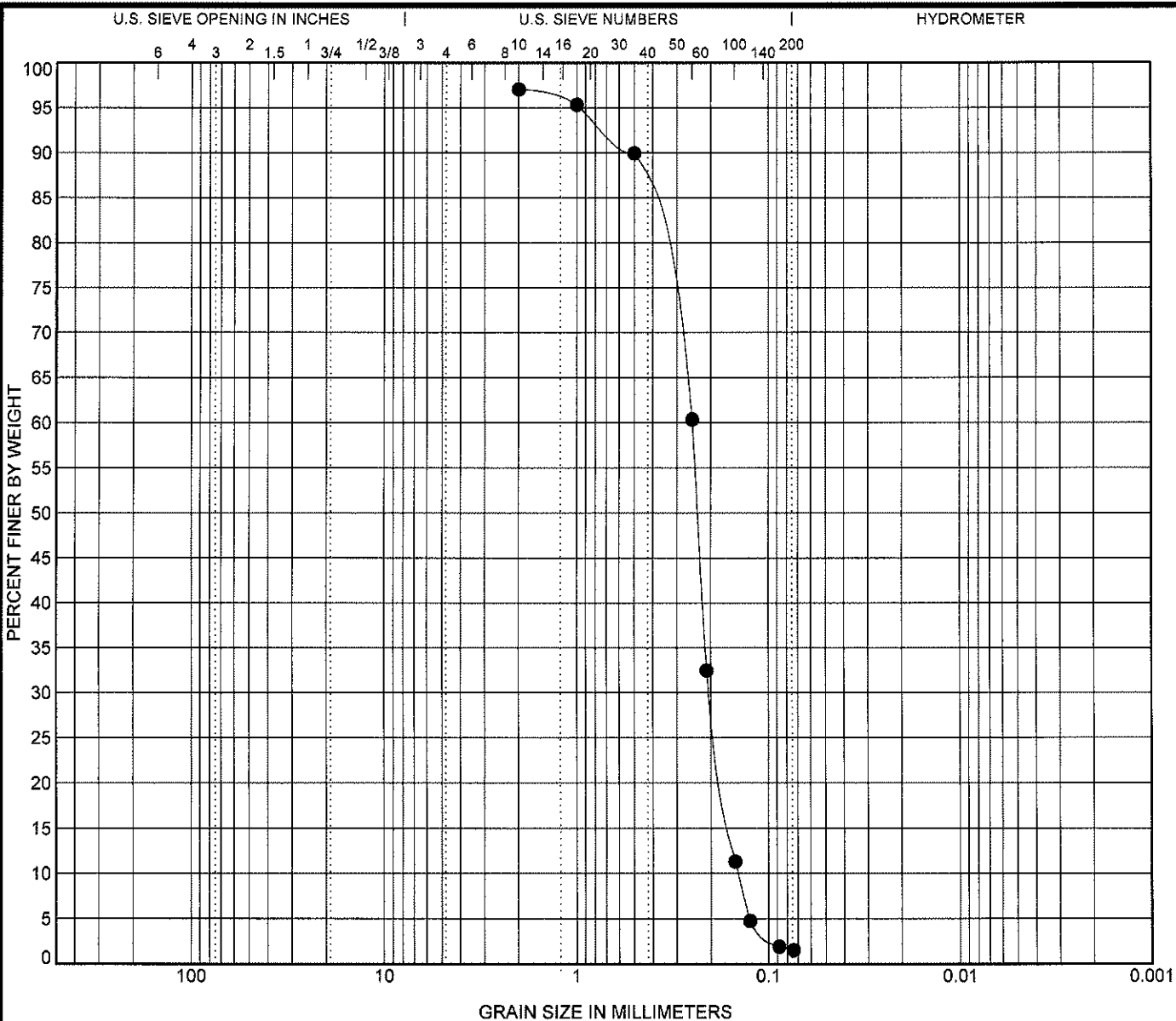
- Geotechnical Engineering
- Construction Materials Testing

**PROJECT NAME:** Anchorage Basin Sand Source Investigation  
**CLIENT:** HDR Engineering, Inc.  
**BORING ID.:** AA-12  
**DESCRIPTION:** Anchorage Basin Borrow Source Area

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 MESH	% FINER BY WEIGHT AFTER REMOVING SHELL			
	-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
STATISTICS (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 ( $\sigma$ )	0.67	N/A	N/A	N/A

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



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen ID	Depth	Classification	LL	PL	PI	Cc	Cu
● AA-12	(-26' to -27' NAVD)	Borrow Area (-26' to -27' NAVD)				1.13	1.73

Specimen ID	Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● AA-12	(-26' to -27' NAVD)	2	0.249	0.202	0.144	0.0			

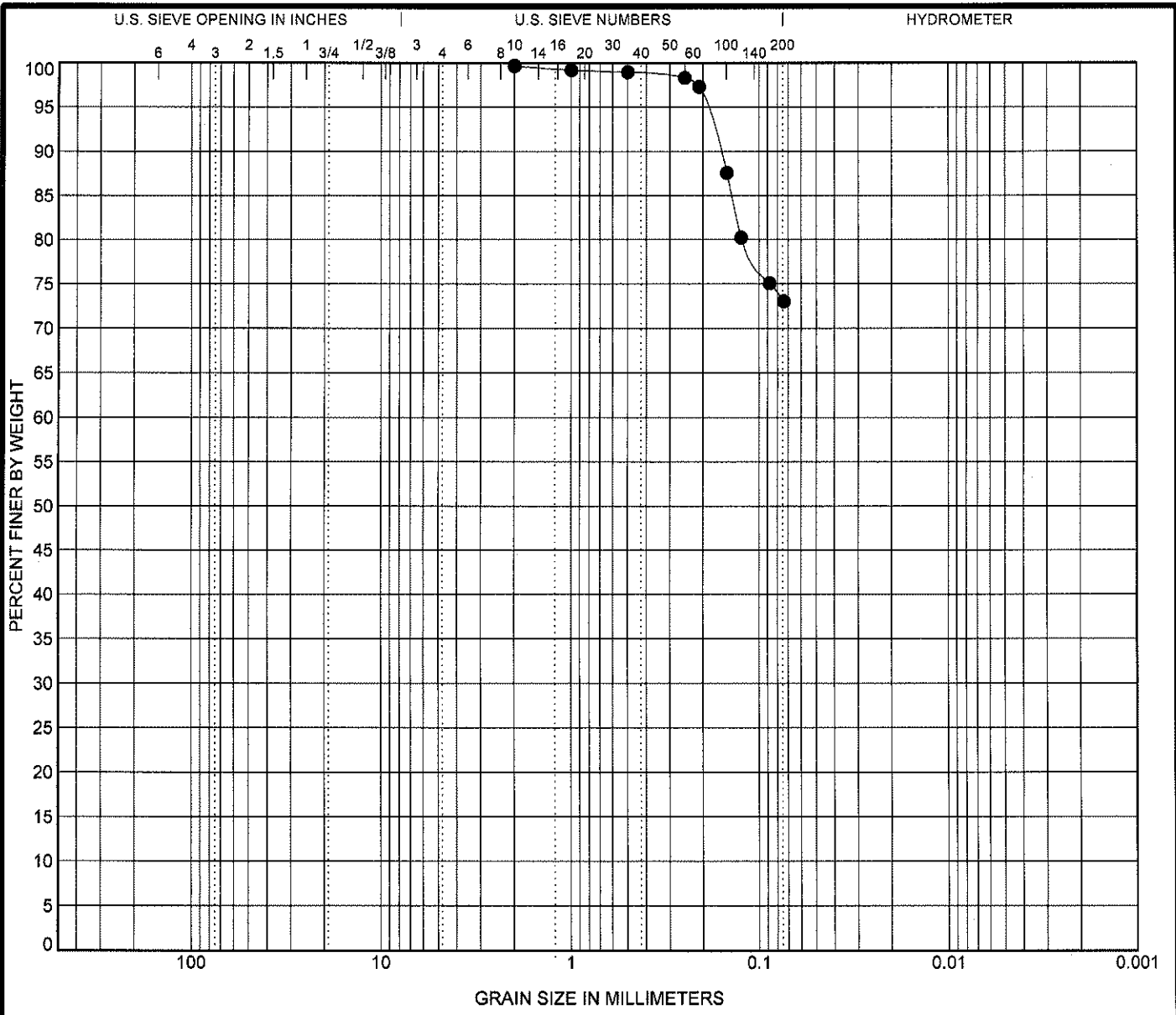
U.S. GRAIN SIZE G109112 PROP. ANCHORAGE BASIN SAND SOURCE.GPJ US LAB.GDT 4/6/09



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

### GRAIN SIZE DISTRIBUTION

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



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen ID	Depth	Classification	LL	PL	PI	Cc	Cu
● AA-12	(-27' to -28' NAVD)	<b>Borrow Area (-27' to -28' NAVD)</b>					

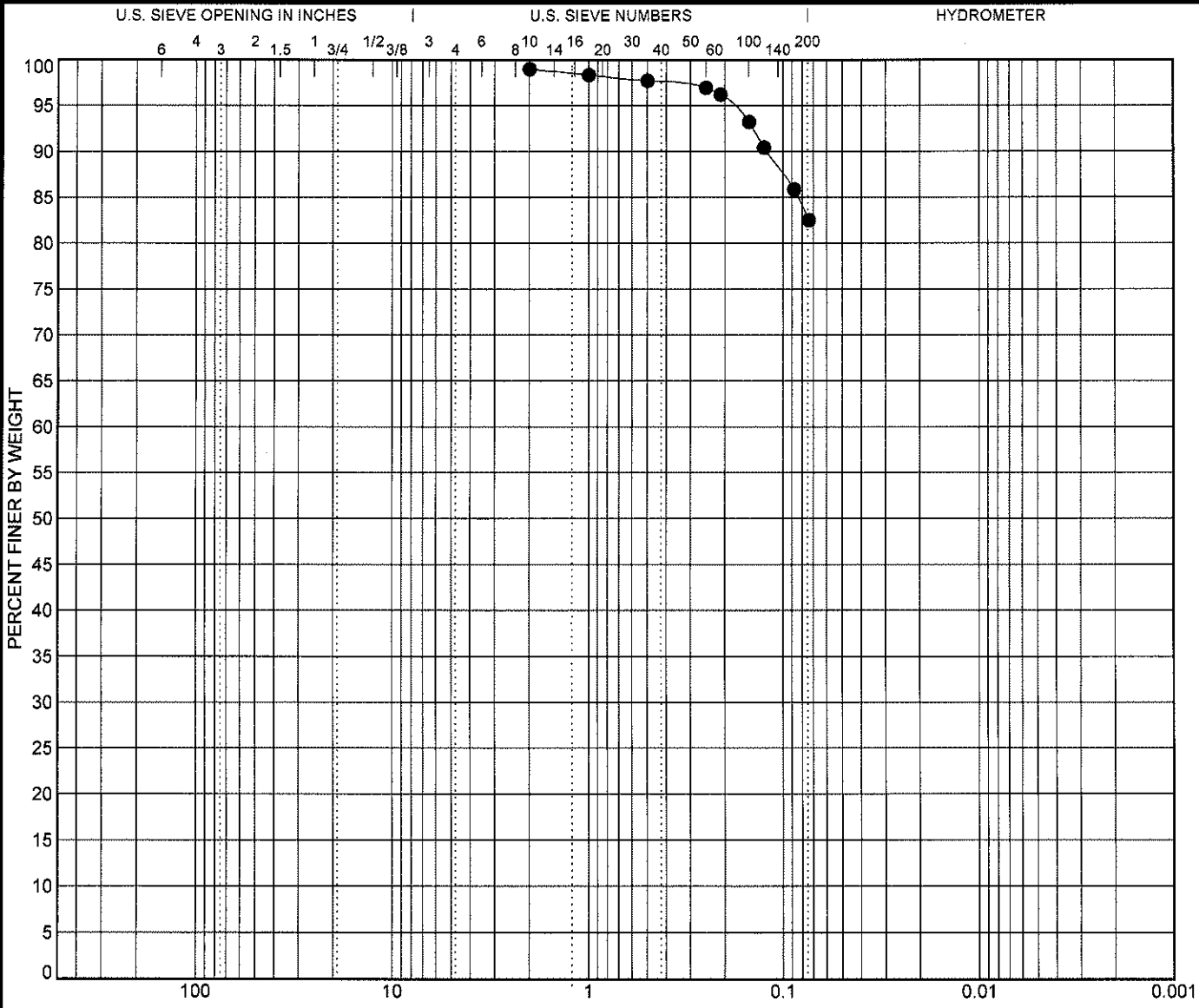
Specimen ID	Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● AA-12	(-27' to -28' NAVD)	<b>2</b>				<b>0.0</b>			

US GRAIN SIZE G109112 PROP. ANCHORAGE BASIN SAND SOURCE.GPJ US LAB.GDT 4/6/09



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**GRAIN SIZE DISTRIBUTION**  
 Project: Anchorage Basin Sand Source Investigation  
 Location: Anchorage Basin; Galveston, Texas  
 Number: G109112



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen ID	Depth	Classification	LL	PL	PI	Cc	Cu
● AA-12	(-29' to -30' NAVD)	<b>Borrow Area (-29' to -30' NAVD)</b>					

Specimen ID	Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● AA-12	(-29' to -30' NAVD)	<b>2</b>				<b>0.0</b>			

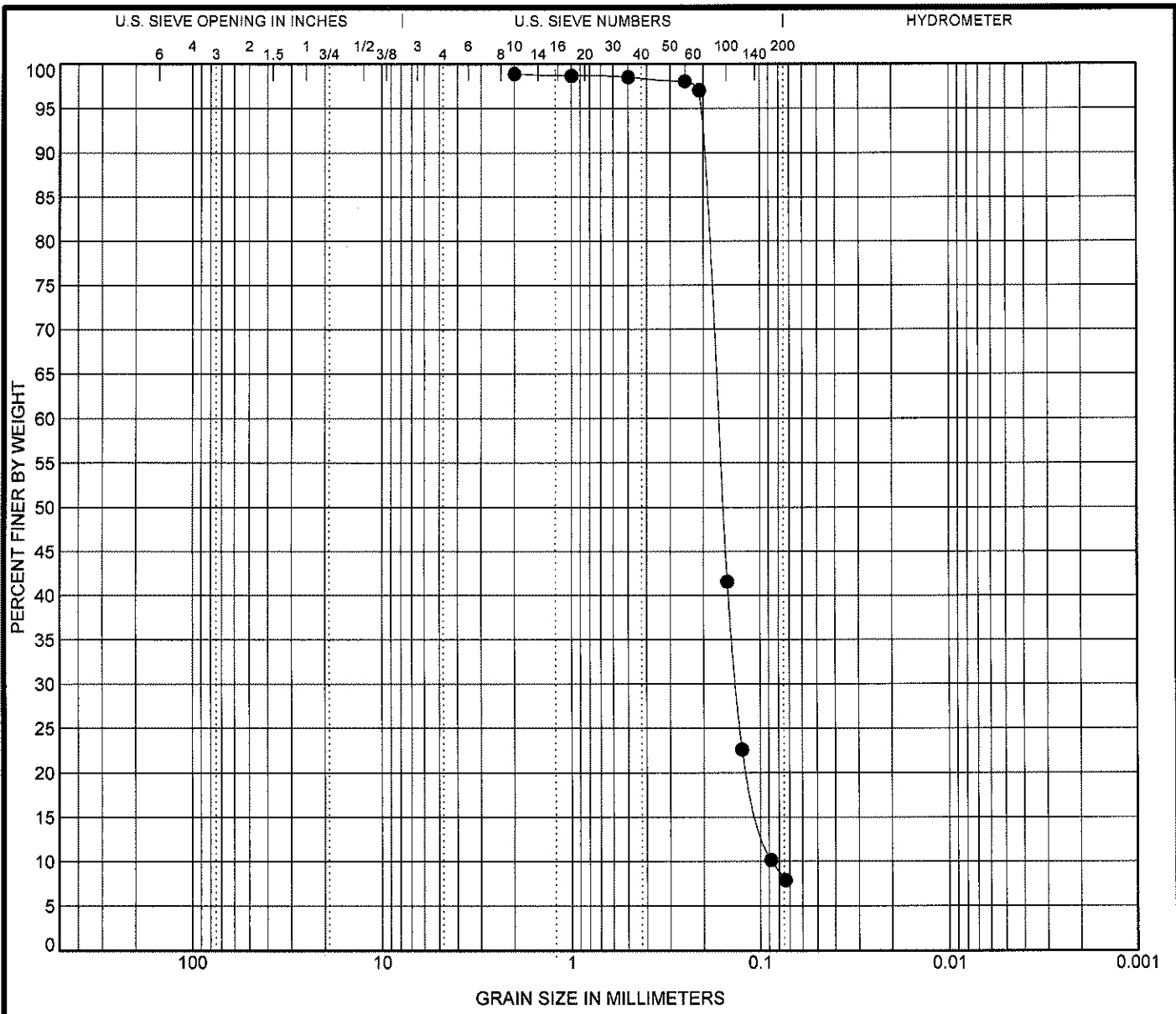
U.S. GRAIN SIZE G109112 PROP. ANCHORAGE BASIN SAND SOURCE.GPJ US LAB.GDT. 4/6/09



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**GRAIN SIZE DISTRIBUTION**

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



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen ID	Depth	Classification	LL	PL	PI	Cc	Cu
● AA-12	(-32' to -33' NAVD)	Borrow Area (-32' to -33' NAVD)				1.24	1.92

Specimen ID	Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● AA-12	(-32' to -33' NAVD)	2	0.167	0.134	0.087	0.0			

U.S. GRAIN SIZE G109112 PROP. ANCHORAGE BASIN SAND SOURCE GP.1 US LAB GDT 4/6/09



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### GRAIN SIZE DISTRIBUTION

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

# LOG OF BORING AA-12



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

CLIENT: HDR Engineering, Inc.  
PROJECT: Anchorage Basin Sand Source Investigation  
LOCATION: Anchorage Basin; Galveston, Texas  
NUMBER: G109112  
DATE(S) DRILLED: 03/12/09 - 03/12/09

DRILLING METHOD(S):  
Vibracore

GROUNDWATER INFORMATION:  
  
SURFACE ELEVATION: -26' NAVD

DESCRIPTION OF STRATUM

SOIL SYMBOL	FIELD DATA					LABORATORY DATA						
	Elevation, Ft. [NAVD]	SAMPLE NUMBER	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	ATTERBERG LIMITS			DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	
						LL	PL	PI				
21												
22												
23												
24												
25												
26												
27		S-1								2		
28		S-2								73		
29		S-3										
30		S-4								83		
31		S-5										
32		S-6										
33		S-7								8		
34		S-8										

**POORLY GRADED SAND**, with shell fragments, gray.

**SANDY CLAY**, gray.  
Same as above.

Same as above.

**SANDY CLAY**, gray.  
Same as above.

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

Boring was extended to an elevation of -34-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. 13,700,304' E. 3,318,392'

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