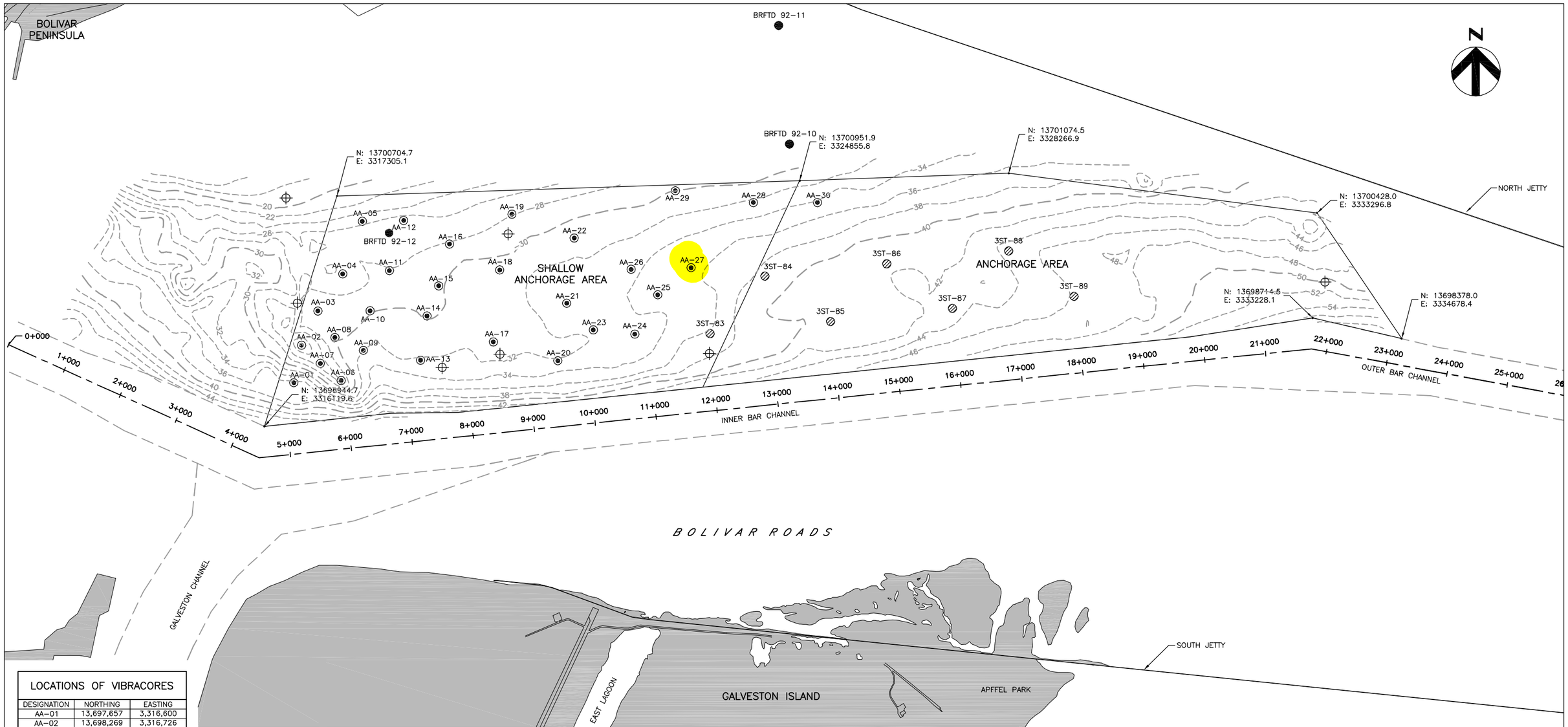


LOCATIONS OF VIBRACORES

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:

1. 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.
2. ELEVATION CONTOURS ARE IN NAVD'88 DATUM.
3. 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.
4. 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

BORING LOCATION 1 –

SCALE 0 800' 1600'

HDR

HDR Engineering, Inc.
TEXAS FIRM REGISTRATION NUMBER 754

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.

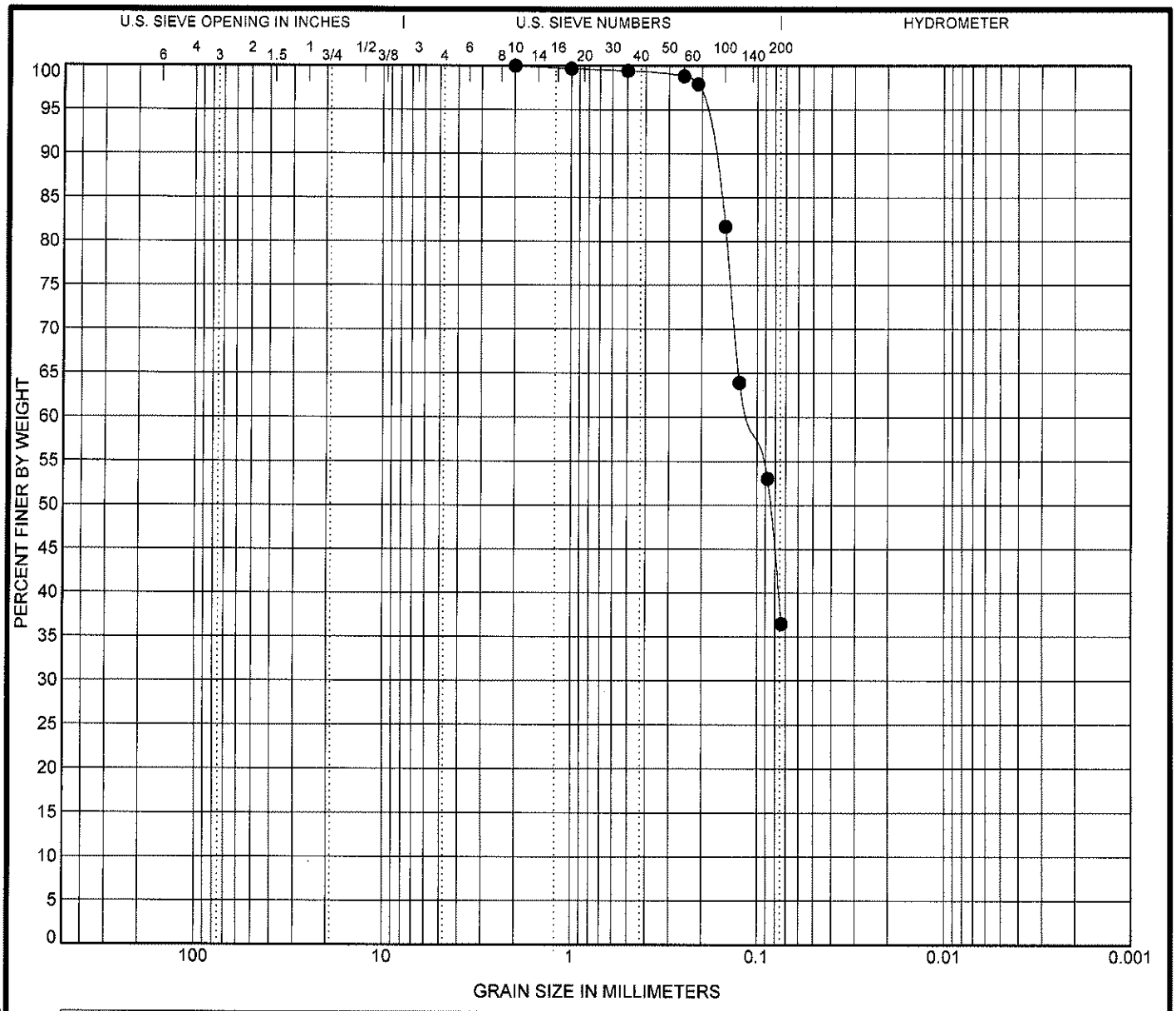
· Geotechnical Engineering
· Construction Materials Testing

PROJECT NAME: Anchorage Basin Sand Source Investigation
CLIENT: HDR Engineering, Inc.
BORING ID.: AA-27
DESCRIPTION: Anchorage Basin Borrow Source Area

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 MESH	% FINER BY WEIGHT AFTER REMOVING SHELL			
	-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
STATISTICS (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

*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-27**	(-35' to -36' NAVD)	**Borrow Area (-35' to -36' NAVD)**					

	Specimen ID	Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**AA-27**	(-35' to -36' NAVD)	**2**	**0.11**			**0.0**			

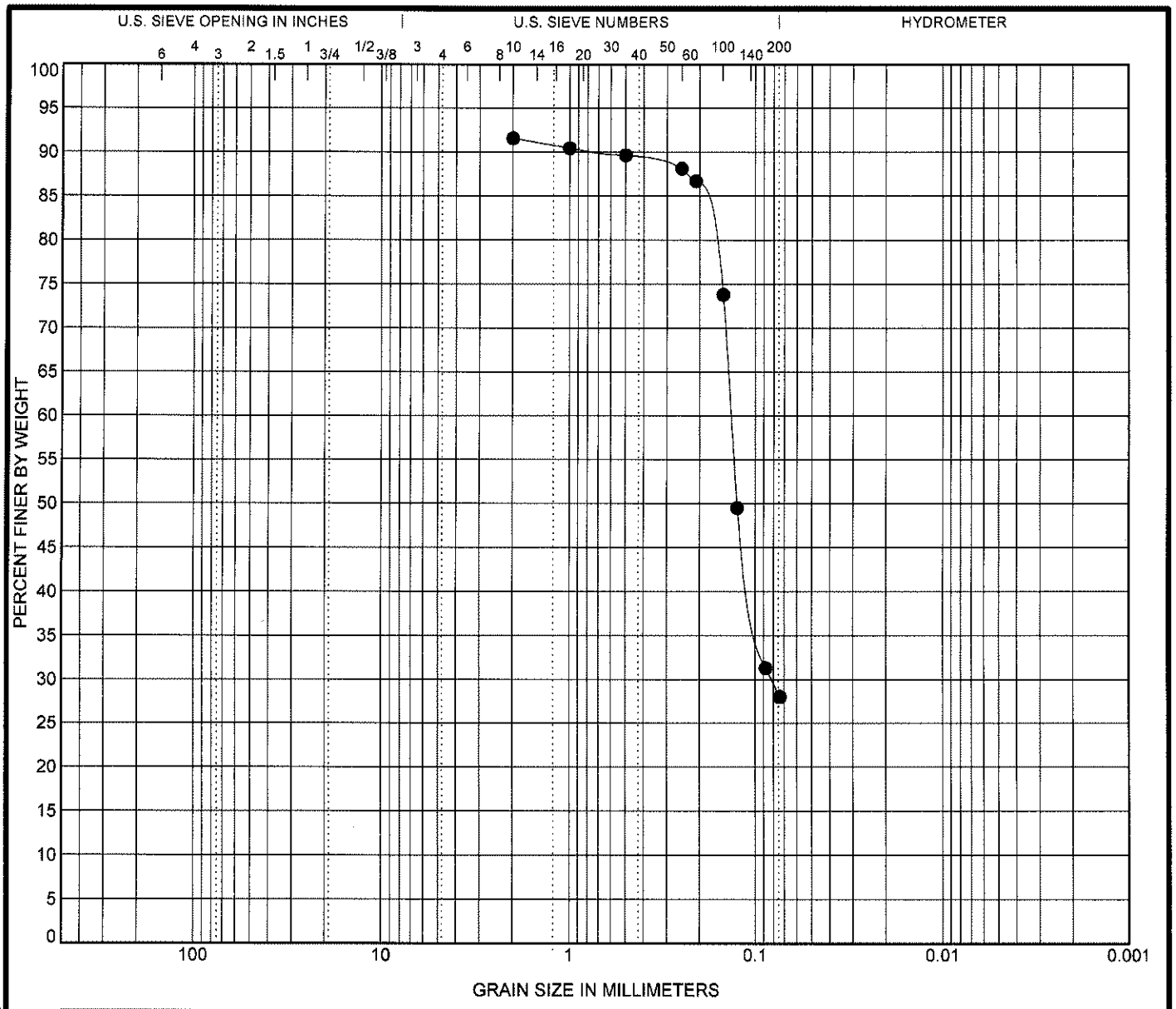
Rock Engineering & Testing Lab., Inc.
6817 Leopard St.
Corpus Christi, TX 78409
Telephone: (361) 883-4555
Fax: (361) 883-4711

GRAIN SIZE DISTRIBUTION

Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas

Number: G109112



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen ID	Depth	Classification	LL	PL	PI	Cc	Cu
●	**AA-27**	(-36' to -37' NAVD)	**Borrow Area (-36' to -37' NAVD)**					

	Specimen ID	Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**AA-27**	(-36' to -37' NAVD)	**2**	**0.135**	**0.082**		**0.0**			

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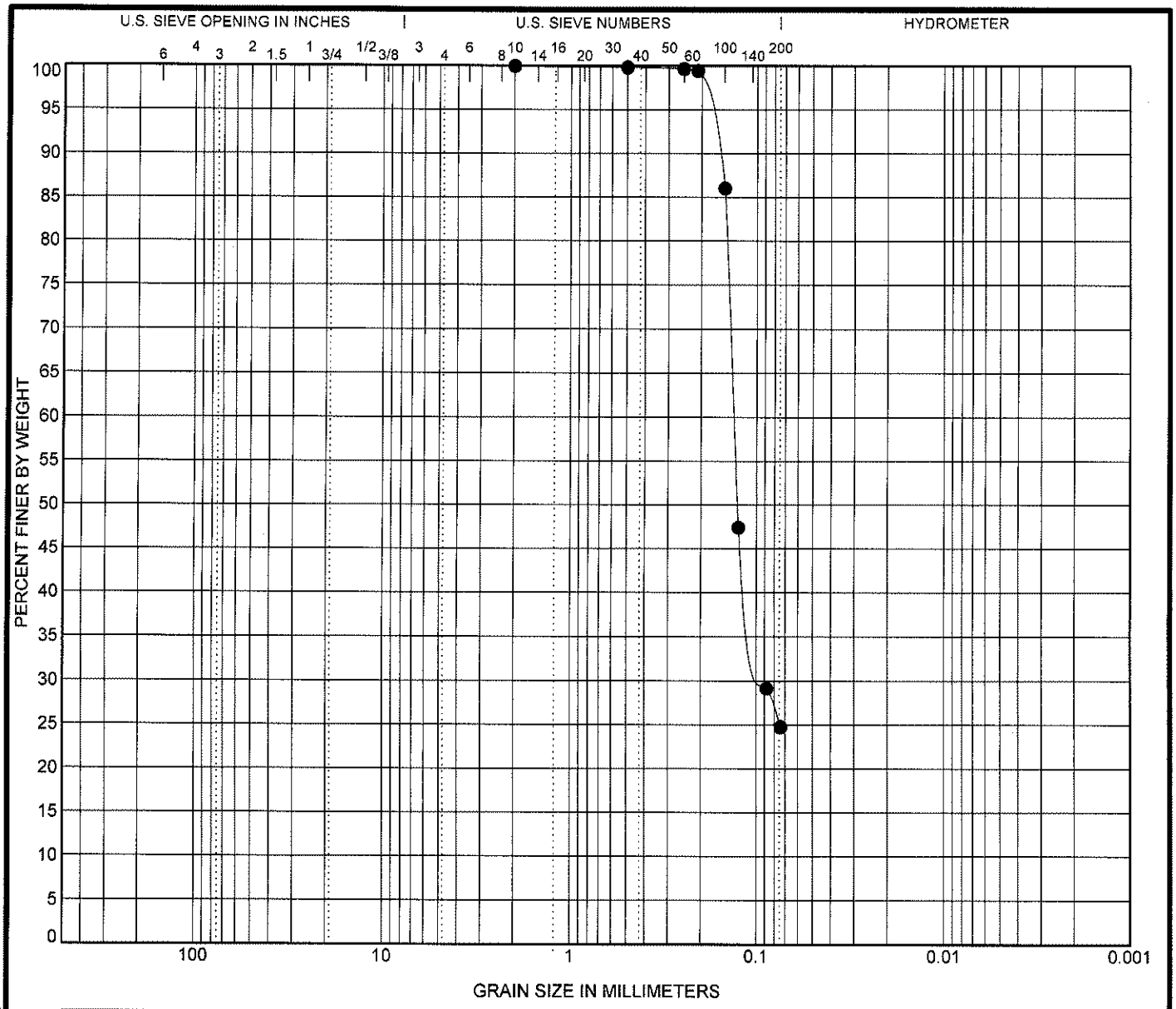

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen ID	Depth	Classification	LL	PL	PI	Cc	Cu
● **AA-27**	(-38' to -39' NAVD)	**Borrow Area (-38' to -39' NAVD)**					

Specimen ID	Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **AA-27**	(-38' to -39' NAVD)	**2**	**0.132**	**0.089**		**0.0**			

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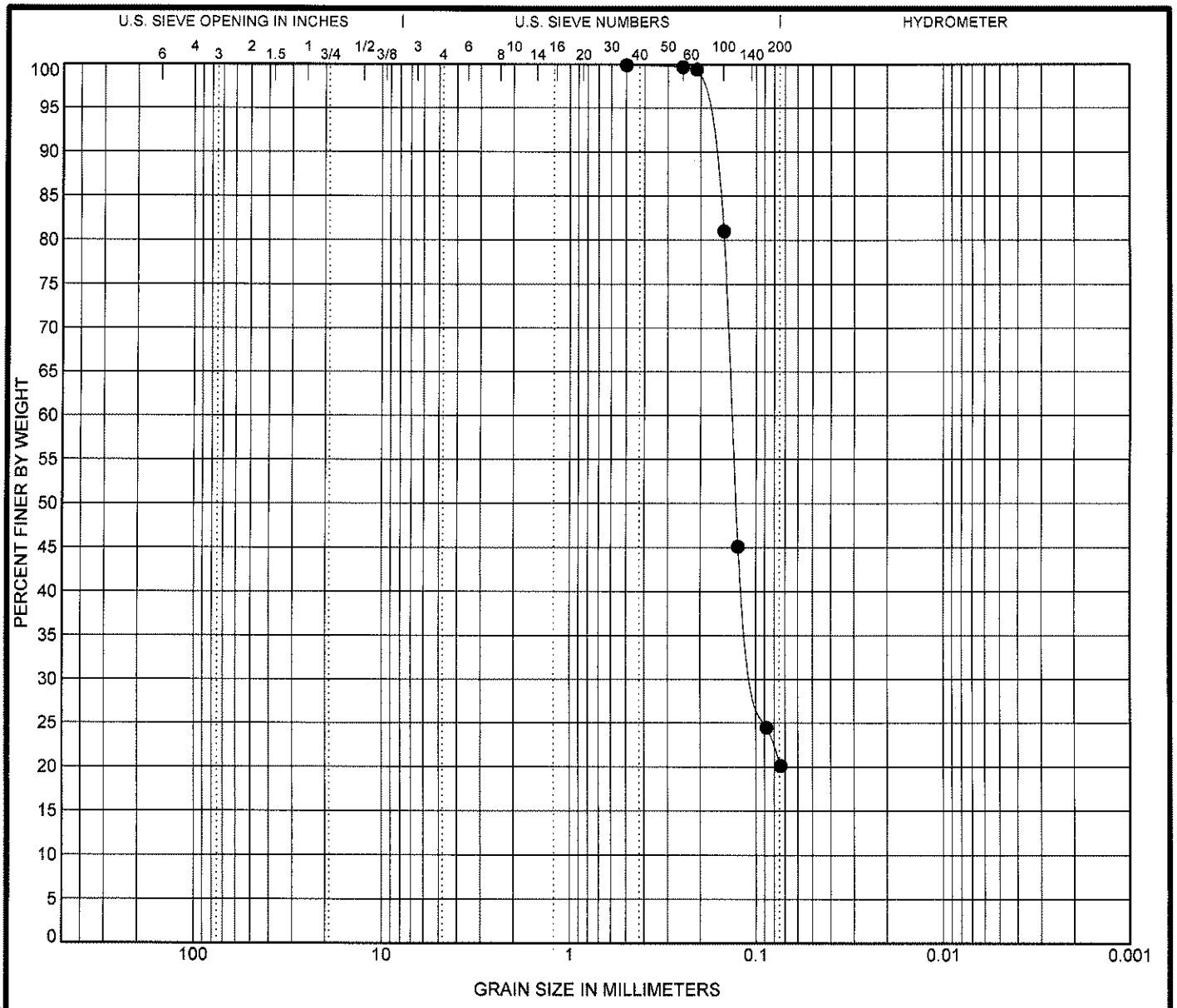
GRAIN SIZE DISTRIBUTION

Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas

Number: G109112

US_GRAIN_SIZE_G109112 PROP. ANCHORAGE BASIN SAND SOURCE.GPJ US_LAB.GDT 4/13/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen ID	Depth	Classification	LL	PL	PI	Cc	Cu
●	**AA-27**	(-40' to -41' NAVD)	**Borrow Area (-40' to -41' NAVD)**					

	Specimen ID	Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**AA-27**	(-40' to -41' NAVD)	**0.5**	**0.134**	**0.097**		**0.0**			

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GRAIN SIZE DISTRIBUTION

Project: Anchorage Basin Sand Source Investigation

Location: Anchorage Basin; Galveston, Texas

Number: G109112

US_GRAIN_SIZE_G109112.PROP_ANCHORAGE BASIN SAND SOURCE.GPJ US_LAB.GDT 4/13/09

LOG OF BORING AA-27

Rock Engineering & Testing Lab., Inc.
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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

DRILLING METHOD(S):
Vibracore

GROUNDWATER INFORMATION:

SURFACE ELEVATION: -35' NAVD

FIELD DATA				LABORATORY DATA							
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 (%)	ATTERBERG LIMITS: LIQUID LIMIT LL	ATTERBERG LIMITS: PLASTIC LIMIT PL	ATTERBERG LIMITS: PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ.FT)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
	21											
	22											
	23											
	24											
	25											
	26											
	27											
	28											
	29											
	30											
	31											
	32											
	33											
	34											
	35	S-1									37	**CLAYEY SAND**, with shell fragments, gray.
	36	S-2									28	**SILTY CLAYEY SAND**, gray.
	37	S-3										Same as above.
	38	S-4									25	Same as above.
	39	S-5										**SILTY CLAYEY SAND**, gray.
	40											

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. 13,699,532' E. 3,323,082'

LOG OF BORING AA-27

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

DRILLING METHOD(S):
Vibracore

GROUNDWATER INFORMATION:

SURFACE ELEVATION: -35' NAVD

FIELD DATA				LABORATORY DATA							
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 (%)	ATTERBERG LIMITS: LIQUID LIMIT LL	ATTERBERG LIMITS: PLASTIC LIMIT PL	ATTERBERG LIMITS: PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
		S-6									20	Same as above.
	41											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

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'