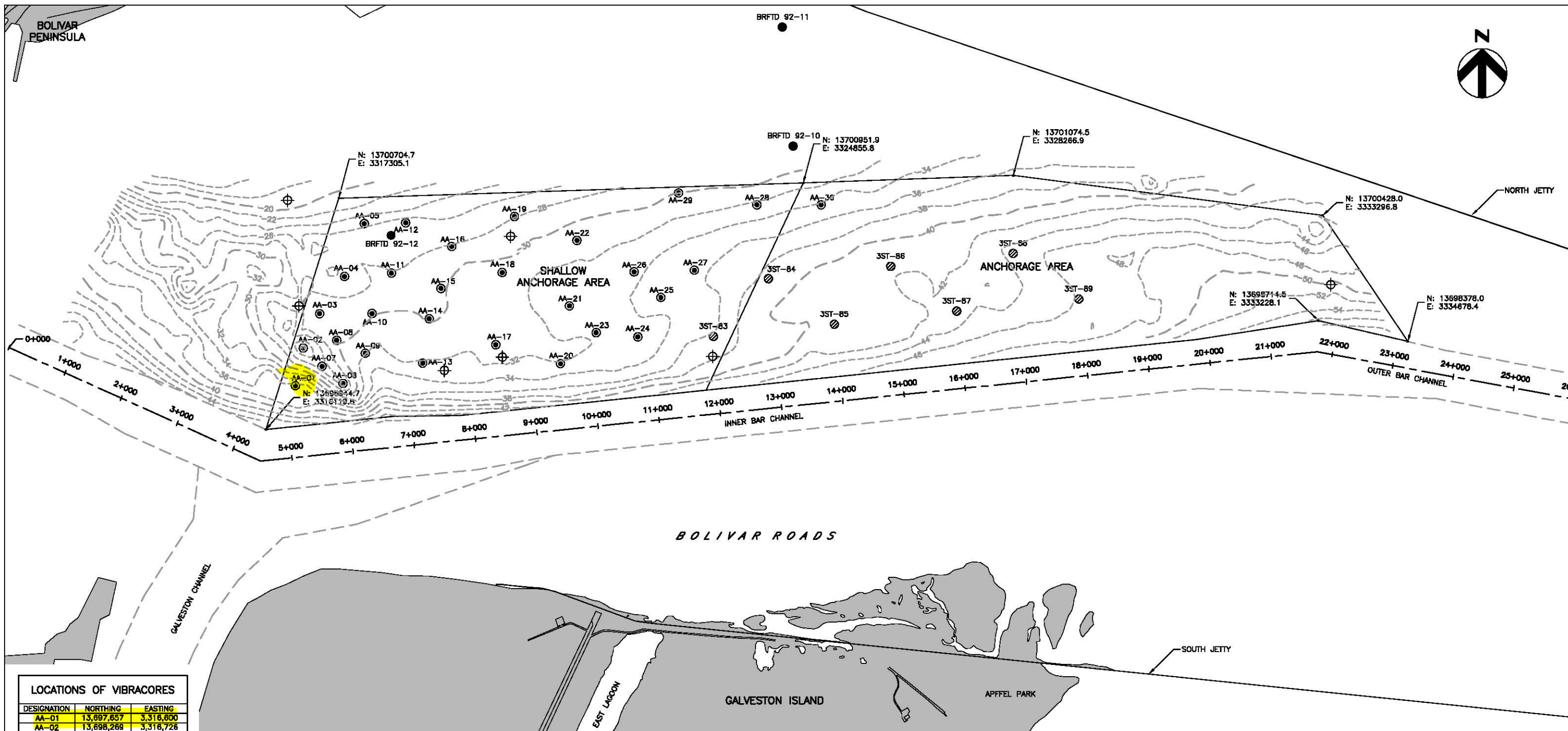




LOCATIONS OF VIBRACORES

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	13,697,873	3,317,033
AA-08	13,698,395	3,317,271
AA-09	13,698,165	3,317,736
AA-10	13,698,831	3,317,845
AA-11	13,699,487	3,318,181
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

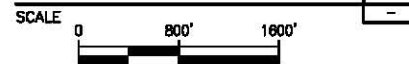
NOTES:

- 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 MTL TO NAVD '88 USING THE FOLLOWING CORRELATION: 0 NAVD '88 = 1.42' MTL.
- 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 (1986)
- VIBRACORE LOCATIONS
- APPROXIMATE LOCATION OF POTENTIAL OBSTRUCTION (SEE NOTE 4)
- VIBRACORE LOCATION FROM RICE UNIVERSITY

BORING LOCATION



HDR

HDR Engineering, Inc.
TEXAS PERM REGISTRATION NUMBER 2010

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

DATE

4/22/09

FIGURE

EX A

April 20, 2009
Attn.: Mr. Daniel Heilman, P.E.
RETL Job No.: G109112

ANCHORAGE BASIN SAND SOURCE INVESTIGATION

Anchorage Basin
Galveston Island, Texas

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.

SAMPLE ID.: AA-01

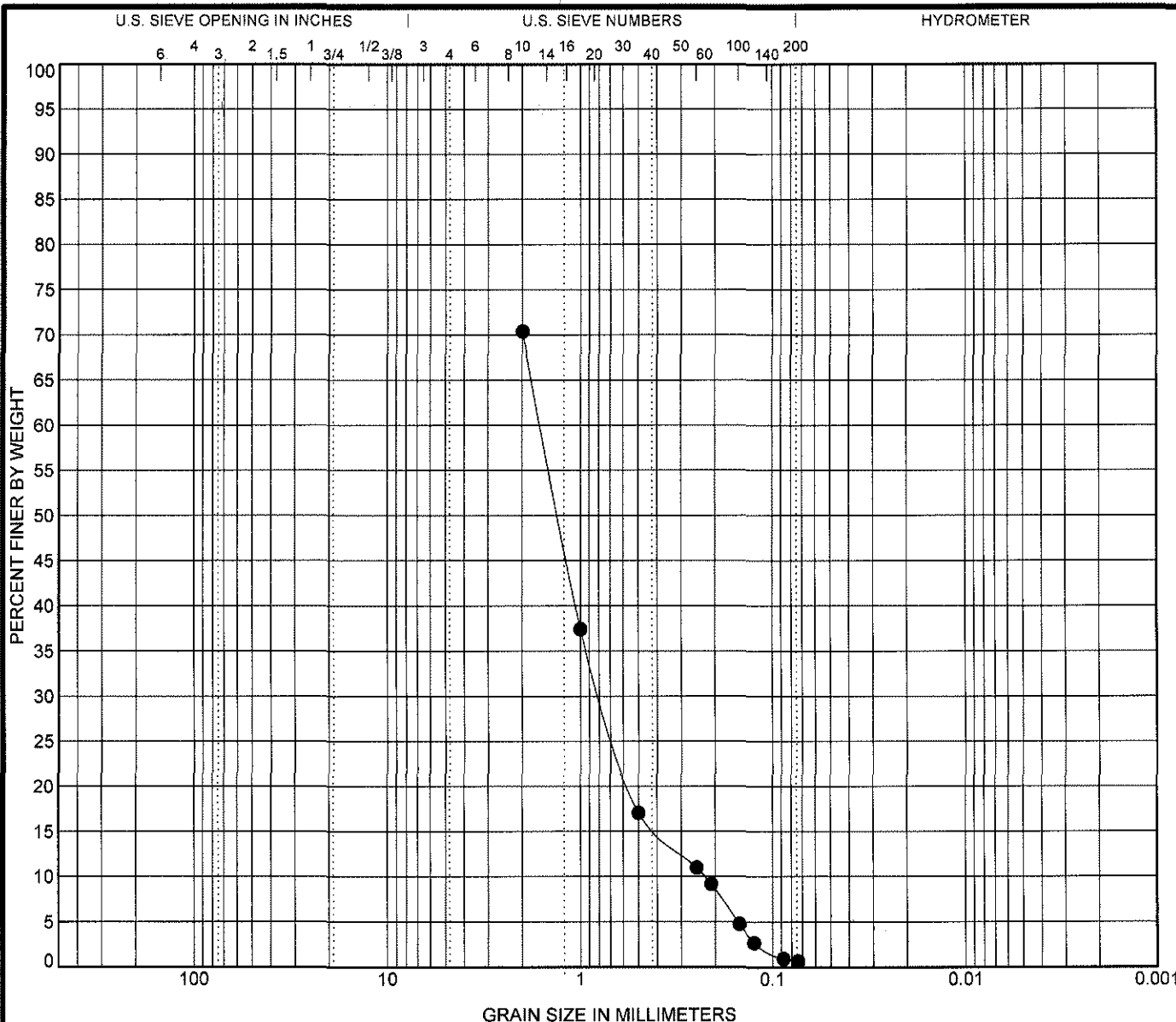
DESCRIPTION: Anchorage Basin Borrow Source Area

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

ASTM MESH	% FINER BY WEIGHT AFTER REMOVING SHELL
	-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

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

US GRAIN SIZE G109112 PROP. ANCHORAGE BASIN SAND SOURCE GPJ US LAB GDT 4/8/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen ID	Depth	Classification	LL	PL	PI	Cc	Cu
● AA-01 (-38' to -39' NAVD)		Borrow Area (-38' to -39' NAVD)				1.65	7.06

Specimen ID	Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● AA-01 (-38' to -39' NAVD)		2	1.607	0.777	0.228	0.0			



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

GRAIN SIZE DISTRIBUTION

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

LOG OF BORING AA-01

SHEET 1 OF 2



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

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

DATE(S) DRILLED: 03/11/09 - 03/11/09

DRILLING METHOD(S):

Vibracore

GROUNDWATER INFORMATION:

SURFACE ELEVATION: -36' NAVD

DESCRIPTION OF STRATUM

	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			DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	
						LL	PL	PI				
	21											
	22											
	23											
	24											
	25											
	26											
	27											
	28											
	29											
	30											
	31											
	32											
	33											
	34											
	35											
	36											
	37	S-1										
	38	S-2										
	39	S-3									1	
	40	S-4										

POORLY GRADED SAND, with shell fragments, brown and gray.

Same as above.

Same as above.

POORLY GRADED SAND, with shell fragments, brown and gray.

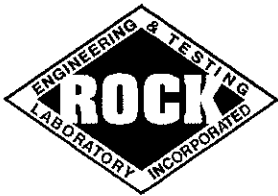
N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - POCKET TORVANE SHEAR STRENGTH

REMARKS:

Boring depth and location was determined by HDR Engineering, Inc. Boring operations were performed by Ocean Surveys, Inc.
GPS Coord. N. 13,697,653' E. 3,316,595'

LOG OF BORING AA-01

SHEET 2 OF 2



Rock Engineering & Testing Lab., Inc.
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Corpus Christi, TX 78409
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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: -36' NAVD

DESCRIPTION OF STRATUM

Same as above.

Boring was extended to an elevation of -41-feet NAVD during the drilling operations.

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			DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ.FT)	MINUS NO. 200 SIEVE (%)
						LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI			
	41	S-5									

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