JUPITER CARLIN SEGMENT
PALM BEACH COUNTY
SHORE PROTECTION PROJECT

Final Integrated Section 934 Report and Environmental Assessment

APPENDIX D
Geotechnical

August 2018

US Army Corps
of Engineers
Jacksonville District

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TABLE OF CONTENTS

1 Background 4
1.1 Regional Geology 4
1.2 Local Geology 4
2 Native Beach 5
2.1 General 5
2.2 Native Beach Sampling and Analysis 5
3 Sand sources 7
3.1 Proposed Offshore Sand Source 7
3.2 Potential Upland Sand Sources 7
3.2.1 Stewart Mining Industries – Fort Pierce 8
3.2.2 Stewart Mining Industries – Immokalee 8
3.2.3 Vulcan Materials – Witherspoon 9
3.2.4 E.R. Jahna – Ortona 9
3.2.5 Atlantic Civil, Inc. – Homestead 9
4 Compatibility of the Sand sources with the Beaches 9
4.1 Overfill and Renourishment Factor 10
4.2 Offshore Sand Source 11
4.3 Upland Sand Sources 11
5 References 13

INDEX OF TABLES

Table 1: Beach Characteristics (2009) 6
Table 2: Composite Beach Characteristics (1994) 6
Table 3: Characteristics of Upland Sand Mines 8
Table 4: Sand Source Compatibility 11

INDEX OF PLATES

Plate 1: Jupiter Carlin Segment of the Palm Beach County Shore Protection Project Site Vicinity Map 13

Plate 2: Jupiter Carlin Segment of the Palm Beach County Shore Protection Project Proposed Offshore Sand Source 14

Plate 3: Potential Upland Sand Sources 15

APPENDICES

Sand Source: Boring Logs and Laboratory Testing Results 16

1 BACKGROUND

This report includes a description of the regional and local geology of Palm Beach County, a sediment characterization of the native beach and a preliminary sand source evaluation. Native beach characteristics are summarized in **Tables 1 and 2**. The proposed offshore sand source and existing core borings are depicted on **Plates 1 and 2**. Potential upland sand sources are depicted on **Plate 3**. Boring logs and available laboratory results are attached in the Appendix. Additional borings may be needed within the sand source during the design phase of this project.

1.1 REGIONAL GEOLOGY

The Florida Peninsula occupies a portion of the much larger geologic unit called the Florida Plateau. Deep water in the Gulf of Mexico is separated from deep water of the Atlantic Ocean by this partially submerged platform nearly 500 miles long and 450 miles wide. In the last 200 million years, the plateau has been alternately dry land or covered by shallow seas. During that time up to 20,000 feet of carbonate and marine sediments were deposited. There has been a tilting of the Florida Plateau about its longitudinal axis. The west coast is partially submerged, as indicated by the wide estuaries and offshore channels, while the east coast is correspondingly elevated, showing the characteristics of an emergent coastline.

During the last million years, a series of four glacial periods, or ice ages, brought about significant changes in sea level. As a result of these sea level fluctuations, the Florida peninsula was again covered and uncovered by shallow seas. Following the first glacial period, sea level rose 270 ft. above its present level. Dry land on the Florida peninsula was then restricted to a few small islands along the central Florida ridge and in northeast Florida.

About 100,000 years ago, the last glacial period began. Sea level fell to 300 feet below its present level and the Florida Plateau emerged as dry land. Approximately 15,000 years ago, sea level began its most recent rise towards present sea level (Shinn, 1988). Sea level rose at an average rate of 30 feet per 1,000 years. About 7,000 years ago, the rate of sea level rise slowed when the sea level was about 30 feet below its present level. It was at this most recent slowing of sea level rise that the modern barrier islands of southeast peninsular Florida formed.

1.2 LOCAL GEOLOGY

Four inlets link the Intracoastal Waterway with the Atlantic Ocean along Palm Beach County's 45 miles of open-ocean shoreline. Jupiter Inlet, at the northern end of the county, was a natural waterway, connecting the Loxahatchee River with the ocean. Originally, the inlet was

kept open naturally but flow was reduced after the construction of the Intracoastal Waterway and Lake Worth Inlet. Since 1947, the inlet has remained open with regular dredging.

The Jupiter Carlin Segment of the Palm Beach County Shore Protection Project is located in northern Palm Beach County, on the barrier island beach, immediately south of Jupiter Inlet in the Atlantic Coastal Ridge physiographic region. The Savannah, Altamaha, and other rivers of Georgia and the Carolinas have transported sand to the Florida east coast; shore currents and wave action gradually shifted this sand southward. The combined effect of wind and wave action has formed much of this sand into successive parallel ridges or dunes. Unconsolidated sand and shell underlain by a limestone/sandstone base compose the Florida beaches.

The foundation for most of the barrier islands in Palm Beach County is the Anastasia Formation. This rock formation appears at several places in the county as a submerged reef that generally parallels the shoreline. The exposed formation appears at various locations from the high water line to approximately 1,000 feet (ft) offshore. Nearshore rock outcroppings exist in the project area. The most prominent outcropping occurs near Florida Department of Environmental Protection (FDEP) range monument R-18. A portion of this outcropping extends above mean high water, and the remainder extends into the nearshore area.

2 NATIVE BEACH

2.1 GENERAL

The following native beach information was taken from "Geologic Investigation of Potential Borrow Areas, Offshore Singer Island Site, Palm Beach County, Florida," prepared by RWParkinson Consulting, Inc. for Taylor Engineering, Inc. on August 9, 2012 and updated October 12, 2012.

2.2 NATIVE BEACH SAMPLING AND ANALYSIS

In February 2009 Taylor Engineering collected beach samples to characterize existing conditions from FDEP reference monuments R-13 to R-15 in Palm Beach County (Table 1). This area has been subjected to numerous beach fill projects using sand derived from offshore sources and periodic maintenance dredging of the ICWW and Jupiter Inlet sand trap. As such, the sedimentology of these samples reflects the presence of fill in addition to what has accumulated naturally on the beach.

Table 1: Beach Characteristics (2009)

Monument	Location	Mean (mm)	Mean (phi)	% Carbonates	% Fines (230)	Sorting	Munsell Color
R-13	Dune	0.5	1.01	63.2	0.09	0.94	5Y 5/1
	Berm	0.6	0.73	64.9	0.27	1.32	5Y 5/2
	MHW	0.35	1.51	40.5	0.06	0.59	5Y 5/2
R-14	Dune	0.38	1.38	47.9	0.28	1.18	5Y 5/1
	Berm	0.31	1.69	44.2	0.09	0.74	5Y 4/1
	MHW	0.31	1.69	41.9	0.11	0.76	5Y 4/1
R-15	Dune	0.38	1.38	24.1	0.28	1.18	10YR 6/1
	Berm	0.39	1.36	42.6	0.08	0.59	5Y 5/1
	MHW	0.29	1.79	30.8	0.05	0.67	5Y 4/1
AVERAGE		0.39	1.39	44.46	0.15	0.89	5Y 4/1 to 5Y 5/1

Taylor (2009) noted the "truest measure of native beach sand" was that reported by CPE and ERM in 1994 (Table 2) because those samples were collected before the 1995 nourishment project. Both data sets indicated that the beach consisted of fine-grained sand. The CPE and ERM sediment is more poorly sorted, which likely reflects the inclusion of coarse-grained shell fragments; a common occurrence in the nearshore, sub-tidal zone. Taylor did not collect samples below the intertidal zone.

Table 2: Composite Beach Characteristics (1994)

Monument	Sample Elevation	Mean (mm)	Mean (phi)	% Carbonates	% Fines (230)	Sorting	Munsell Color
R-13, R-17	+6.5'	0.34	1.55	ND	0.97	1.49	ND
	+2.5'						
	-1.5'						
	-5.5'						
	-9.5'						

3 SAND SOURCES

3.1 PROPOSED OFFSHORE SAND SOURCE

One sand source, "Jupiter/Carlin A," was identified by the project sponsor as the preferred source of material for the Project. The sand source lies in water depths of approximately 60 to 70 feet, centered about two miles offshore, between the Palm Beach county line, south to FDEP range monument R-10. Irregular in shape, the sand source encompasses approximately 700 acres. The vicinity map, shown on **Plate B-1**, illustrates the location of the sand source**.** **Plate B-2** shows the location of previously collected vibracores.

Palm Beach County collected 29 vibracores within the proposed sand source in 1995 and 1996 and performed grain size analyses on selected samples. Boring logs and laboratory testing results are attached in the **Appendix**. Palm Beach County collected 20 additional vibracores in 2016. As of the writing of this document, the laboratory results had not been finalized. Based on the 1995 and 1996 data, the thickness of potential beach-compatible material ranges from 4 to 20 feet, with an average thickness of more than 10 feet. Conservative dredge cut depths and a 15-year-old bathymetric survey were used to estimate an available volume of approximately 5 million cubic yards. This should allow for plenty of material in the sand source for the Project beach fill, which is anticipated to be approximately 800,000 cubic yards. The sand source does contain rock and large shell that will require screening. Vibracores were typically collected at a spacing greater than 1,000 feet, which is the minimum distance required for permitted sand sources. As such, it is expected that additional core borings will be collected and laboratory analyses performed to ensure that the material is compatible with the beach placement area and is in compliance with FDEP's "Sand Rule" guidelines.

3.2 UPLAND SAND SOURCES

For purposes of plan formulation, only offshore dredge costs were considered. However, upland sand mines have been used by the sponsor in the past and, due to budgeting, scheduling and future material availability, sand mines may need to be used again.

Five commercial sand venders have been identified for truck haul nourishments (**Plate B-3**). Sand vendors were identified based on their proximity to Palm Beach County, their ability to meet the sand quality criteria and their ability to meet the anticipated quantity and production requirements for the project. Sand from all five mines is natural, not manufactured, and each will require processing to meet the project's sand specification. All five mines have an available volume of sand that far exceeds the required volume for the project. **Table 3** summarizes the characteristics of the potential upland sand sources.

Table 3: Characteristics of Upland Sand Mines

Sand Mine	Mean Grain Size (mm)	Sorting (Phi)	% Fines Passing #230	% Retained on #4	Munsell Color Value
Stewart – Fort Pierce[1]	0.46	1.19	1.17	0.0	6
Stewart – Immokalee[1,2]	0.35, 0.57	0.90, 1.01	0.46, 0.88	0.0	8, 7
Vulcan – Witherspoon[2]	0.59	0.61	0.22	0.0	8
Jahna – Ortona[2]	0.46	0.82	0.10	0.0	7
A.C.I. – Homestead[3]	0.45	1.11	1.57[4]	0.0	7

1. Geotechnical data obtained from the report "Feasibility Evaluation of Upland Truck Haul as a Beach Fill Construction Method in Broward County, FL – Segment II" prepared by Olsen Associates, Inc and Coastal Planning and Engineering, Inc, June 2012.
2. Stewart Immokalee values shown represent products identified as "Beach Sand" and "Beach Sand #2," respectively.
3. Geotechnical data provided by Atlantic Civil, Inc.
4. Percent Fines for the ACI mine are based on material passing the #200 sieve.

3.2.1 Stewart Mining Industries – Fort Pierce

The Stewart Fort Pierce mine is located in northern St. Lucie County. The mine produces two types of sand: silica and silica with carbonates, mostly in the form of broken shells. The material produced is mined by a dragline excavator. The dragline bucket dumps the material into piles and a front end loader transports the material to a processing plant. The processing plant first removes larger material using vibrating screens with spray bars. The sand is then fed into dewatering screws that remove the remaining fines. The resulting sand is placed onto a conveyor and stacked in piles, from which it is loaded into trucks. The Fort Pierce mine has been the primary source of upland sand for the Jupiter Carlin Segment of the Palm Beach County Shore Protection Project.

3.2.2 Stewart Mining Industries – Immokalee

The Stewart Immokalee mine is located just northwest of the City of Immokalee in northwestern Collier County. The Immokalee sand is extracted from the lake pit by hydraulic dredge and pumped through pipes to a sand processing plant. The processing plant first removes larger material using vibrating screens with spray bars. The remaining smaller grains are separated into 11 different gradations using water and gravity. The sand is then remixed depending on the client's specifications and fed into dewatering screws. The dewatering screws remove remaining fines due to their weir-like effect. The resulting sand is placed onto a conveyor and stacked in a sand pile.

3.2.3 Vulcan Materials – Witherspoon

The Vulcan Witherspoon mine is located in southern Glades County, near the city of LaBelle, approximately 120 miles from the project area. The Witherspoon mine claims to have the deepest dredge in the western hemisphere. The sand is extracted from the lake pit by hydraulic dredge and pumped to a sand processing plant. The processing plant first removes larger material using vibrating screens. The remaining grains are separated using water and gravity. The sand is then mixed, based on the desired specifications, and fed into dewatering screws to remove the fine-grained material. The resulting material is then stockpiled on site.

3.2.4 E.R. Jahna – Ortona

The E.R. Jahna Ortona mine is also located in southern Glades County, adjacent to the Witherspoon mine and approximately 120 miles from the project area. Sand from the Ortona mine has been used extensively for beach fill projects throughout southeast Florida. Sand is extracted from the mine pit using one of two cutter-head dredges and pumped to a central processing plant. The processing plant first removes larger material using vibrating screens with spray bars. The remaining material is sent through a gravity classifier and remixed to match the desired specifications, then fed into dewatering screws to remove the remaining fine-grained material. The resulting material is then stockpiled on site.

3.2.5 Atlantic Civil, Inc. – Homestead

The ACI mine is located in southern Miami-Dade County, in the city of Homestead and approximately 35 miles from the project area. The ACI mine has not been used previously to produce fill material for beach nourishment. Sand will be extracted using either a dragline or gantry dredge. The material will be screened to remove the oversized material using a mobile vibrating screen. The sand will then be transported to the central wash facility where it will be screened and washed through sand classifying screws and cyclone(s). The material will then be stockpiled on-site.

4 COMPATIBILITY OF THE SAND SOURCES WITH THE BEACHES

Florida Administrative Code 62B-41.007(2) (the Florida Sand Rule) requires that beach fill maintains the general character and functionality of the material occurring on the beach and in the adjacent dune and coastal system. Such material shall be predominately of carbonate, quartz or similar material with a particle size distribution ranging between 0.062 mm and 4.76 mm, shall be similar in color and grain size distribution to the material in the existing coastal system at the disposal site and shall not contain:

- Greater than 5 percent, by weight, silt, clay or colloids passing the #230 sieve
- Greater than 5 percent, by weight, fine gravel retained on the #4 sieve
- Coarse gravel, cobbles or material retained on the 3/4 inch sieve in a percentage or size greater than found on the native beach
- Construction debris, toxic material or other foreign matter
- And shall not result in cementation of the beach

4.1 OVERFILL AND RENOURISHMENT FACTOR

The Overfill and Renourishment Factors were calculated to estimate the predicted performance of the sand sources with respect to the native beach materials, both during initial beach stabilization and over the long term. Thus, they help in choosing the best available material. The factors also are used to calculate fill construction volume and renourishment volumes. Overfill and Renourishment Factors are calculated using the sediment mean grain size and standard deviation of the native beach and the sand source in phi units.

The Overfill Factor (R_a) is primarily a volume factor which may be used to calculate an intentional overfill to compensate for volume loss during the initial construction. The R_a is used to determine which of the proposed sand sources will provide the lowest placement volume, and thus is most compatible with the existing beach. The Ra for all potential sand sources was calculated using the USACE Coastal Engineering Manual (CEM) software program.

The Renourishment Factor (R_J) estimates long term relative erosion rates of sand source materials with respect to native materials. This is done by assuming all grains have a finite residence time in the local littoral system before being transported offshore or alongshore. Larger grains remain longer. The R_J is primarily a measure of relative long-term stability. R_J values greater than one predict the sand source will erode at a higher rate than the native beach. Conversely, values of less than one predict the sand source is more stable than the native beach. Sand source compatibility is summarized in **Table 4**.

Table 4: Sand Source Compatibility

Parameter	Offshore	Upland					Native Beach (1994)
	Jupiter/ Carlin A	Ft. Pierce	Immokalee[1]	Witherspoon	Ortona	ACI	
Mean (mm)	0.59	0.46	0.35, 0.57	0.59	0.46	0.45	0.34
Sorting (phi)	1.27	1.19	0.90, 1.01	0.61	0.82	1.11	1.49
Munsell Value	ND	6	8, 7	8	7	7	ND
Overfill Ratio (Ra)	1.0	1.0	1.65, 1.0	1.03	1.0	1.0	NA
Renourish ment Ratio (Rj)	0.67	0.89	1.33, 0.68	0.80	0.68	0.59	NA

1. Stewart Immokalee values shown represent products identified as "Beach Sand" and "Beach Sand #2," respectively.

4.2 OFFSHORE SAND SOURCE

Based on the sediment classifications shown on the logs, laboratory testing was performed on most of the core borings. However, limited statistical analyses were available for only six of the 29 vibracores within the proposed offshore sand source, Jupiter/Carlin A. A review of the available geotechnical data for the proposed sand source suggests that the material is compatible with the beach placement area. The mean grain size of the surficial sand from the six analyzed vibracores was 0.59 mm with a standard deviation of 1.27. The mean grain size is expected to be reduced after in-situ rock is screened out during the dredging process. **Table 4** shows a comparison of the 1994 native beach data with the available sand source data. Additionally, the sand source sediment color was described typically as gray to dark gray and tan to brown. Based on these descriptions the sand source color appears to be compatible with Taylor's (2009) beach characterization of gray to dark gray sand. A more comprehensive geotechnical investigation will be required to perform a full compatibility analysis.

4.3 UPLAND SAND SOURCES

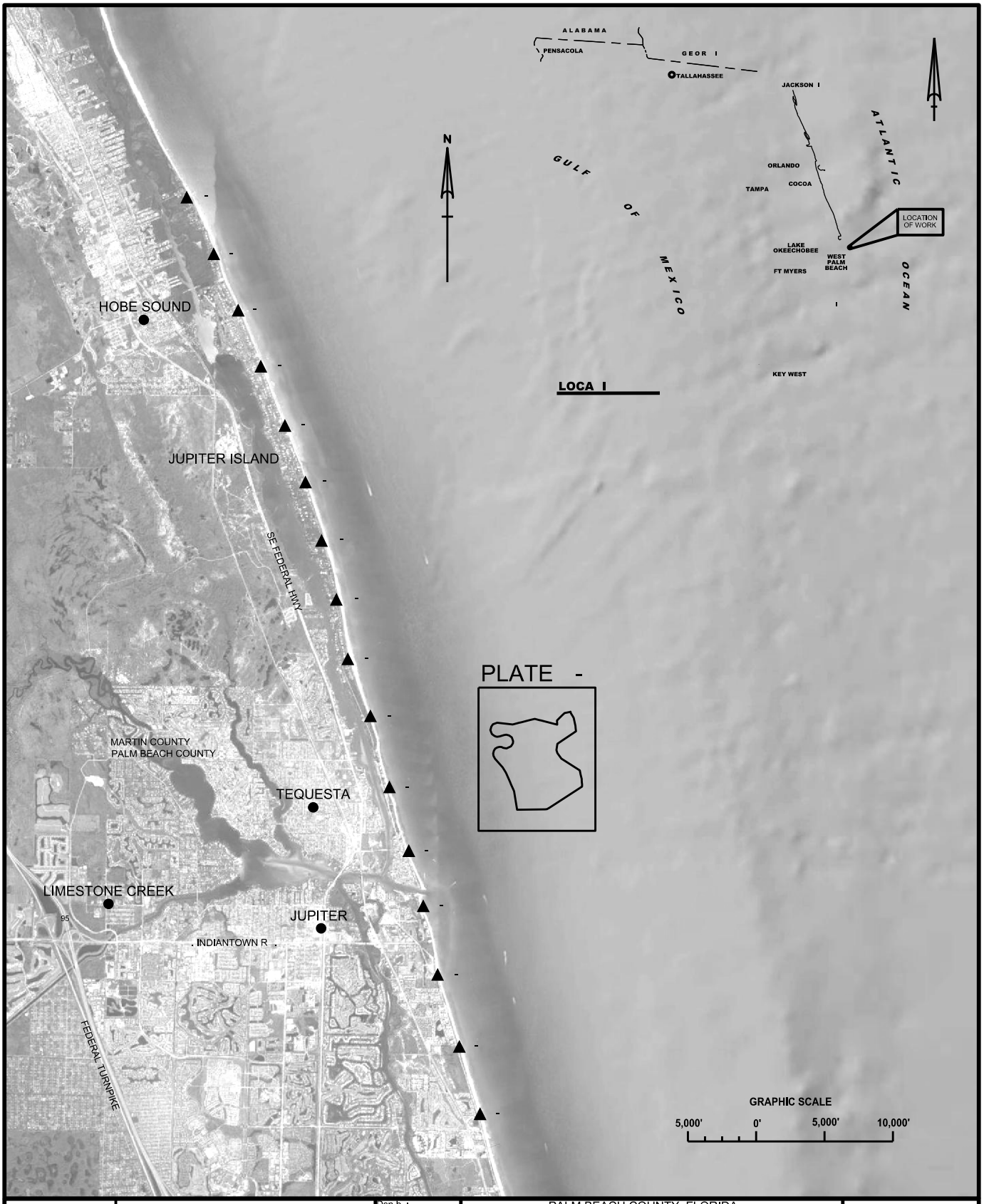
Five upland sand mines were identified as potential sand sources. The material from all five mines is natural but requires processing to remove the course-grained and fine-grained material in order to meet the sand specification. As a result of the sand processing, material from all mines is very similar. The main difference between the mines is that the Immokalee, Witherspoon, and Ortona mines are almost 100% quartz and the Homestead and Fort Pierce

mines are a mix of carbonate and quartz material, based on available laboratory data. **Table 4** is a comparison of characteristics of the native beach and the potential upland sand sources.

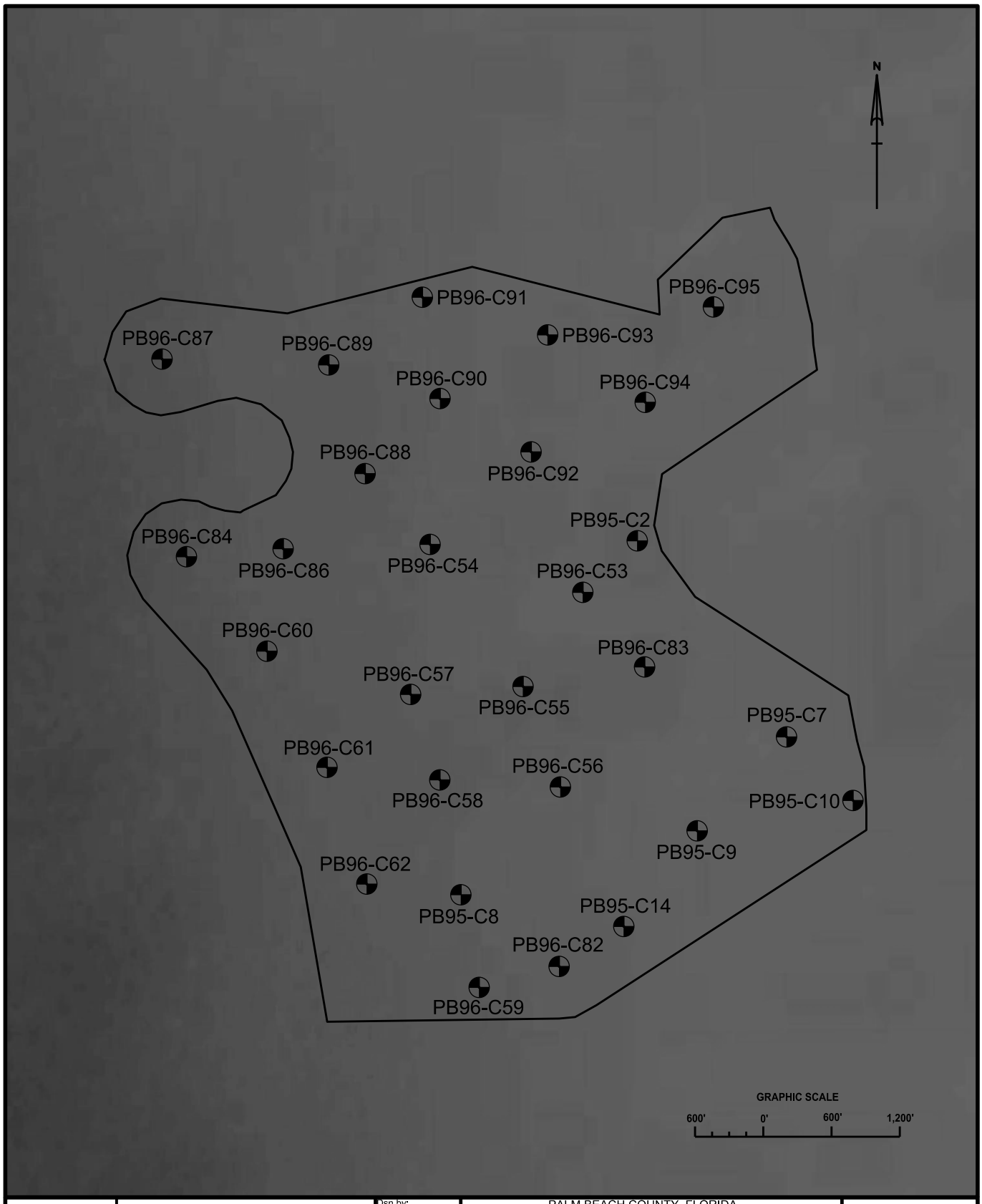
5 REFERENCES

Parkinson, Randall W, 2012 (August). Geologic Investigation of Potential Borrow Areas, Offshore Singer Island Site, Palm Beach County, Florida, 105 p.

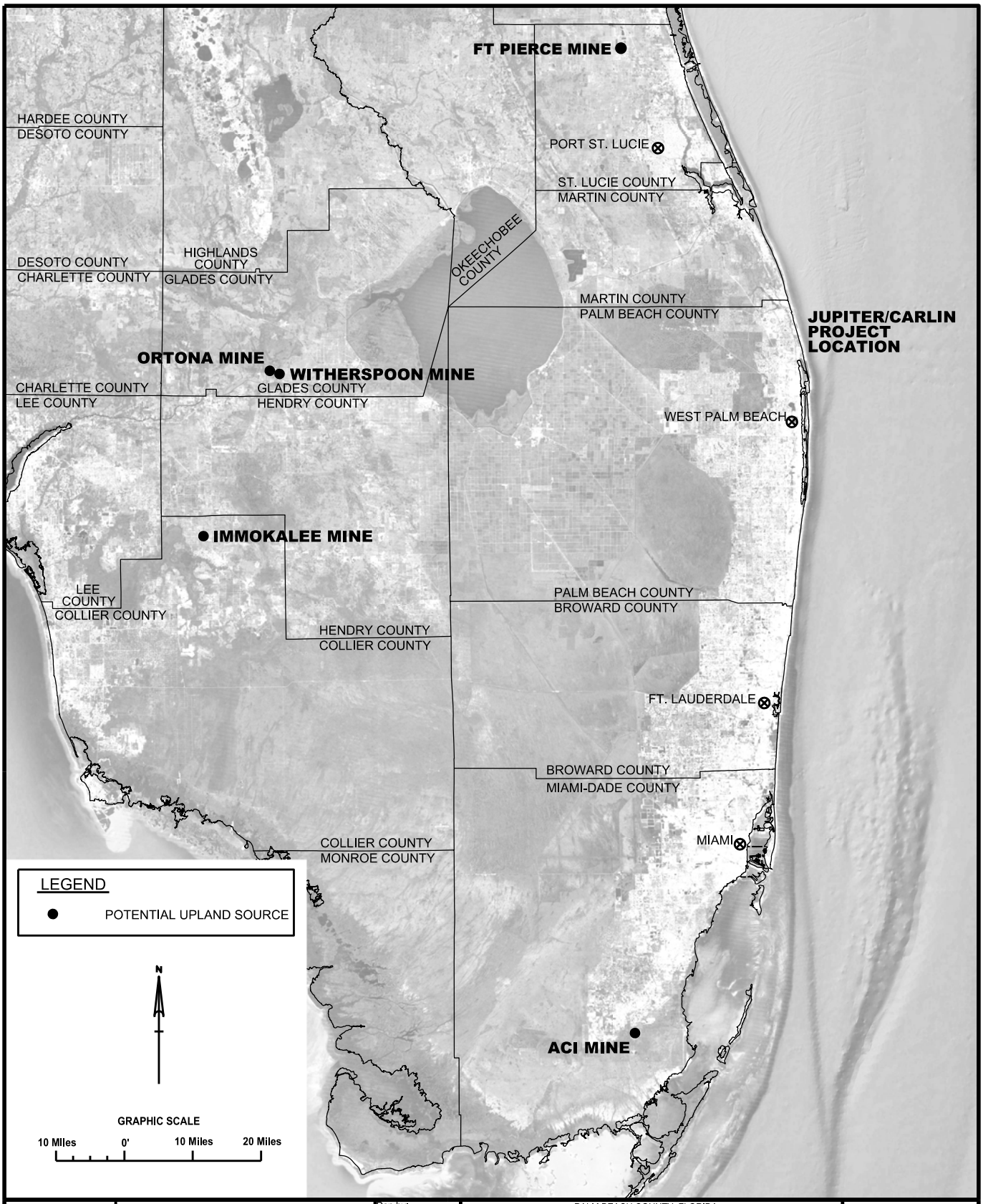
Taylor Engineering, 2009 (December). Attachment B Coastal Engineering Narrative, Jupiter Carlin Beach Restoration Project, 7 p.



US Army Corps of Engineers Jacksonville District	GEOTECHNICAL DRAWINGS	Dsn b : TAM	PALM BEACH COUNTY, FLORIDA SHORE PROTECTION PROJECT	PLATE
		Dwn b : CJB	JUPITER/CARLIN SEGMENT SECTION 934 REEVALUATION STUDY	-
	DEPARTMENT OF THE ARMY JACKSONVILLE DISTRICT, CORPS OF ENGINEERS JACKSONVILLE, FLORIDA	Ckd b : TAM		
		Date : JULY 2014	SITE VICINITY MAP	



US Army Corps of Engineers Jacksonville District	GEOTECHNICAL DRAWINGS	Dsn by: TAM	PALM BEACH COUNTY, FLORIDA SHORE PROTECTION PROJECT	PLATE
		Dwn by: CJB	JUPITER/CARLIN SEGMENT SECTION 934 REEVALUATION STUDY	**B-2**
	DEPARTMENT OF THE ARMY JACKSONVILLE DISTRICT, CORPS OF ENGINEERS JACKSONVILLE, FLORIDA	Ckd by: TAM		
		Dated: JULY 2014	PROPOSED OFFSHORE SAND SOURCE	



US Army Corps of Engineers
Jacksonville District

GEOTECHNICAL DRAWINGS

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

Dsn by: TAM
Dwn by: MPN
Ckd by: TAM
Dated: SEP 2016

PALM BEACH COUNTY, FLORIDA
SHORE PROTECTION PROJECT

JUPITER/CARLIN SEGMENT
SECTION 934 REEVALUATION STUDY

PROPOSED UPLAND SAND SOURCES

PLATE
B-3

APPENDIX

SAND SOURCE:

BORING LOGS AND LABORATORY TESTING RESULTS

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County 1995	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (*Coordinates or Station*): 812392 E, 959050 N	11. DATUM FOR ELEVATION SHOWN (*TBM or MSL*): MLW
3. DRILLING AGENCY: Alpine Ocean Seismic Survey, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (*As shown on drawing title and file number*): PB95-C2	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	15. ELEVATION GROUND WATER
7. Water Depth: 65.9'	16. DATE HOLE: STARTED 8/9/95, COMPLETED 8/9/95
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE: -65.9'
9. TOTAL DEPTH OF HOLE: 12.9'	18. TOTAL CORE RECOVERY FOR BORING
	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-65.9	0.0					
-66.9	1.0		Gray, medium-to-fine sand and gravel, some coarse sand, lens of ~50% coarse grave (whole shells) at 0.7'. (SP)	100	0.5, 2.5	
-75.9	10.0		Gray, medium-to-fine sand, occasional whole shell, occasional lens of fine gravel (20%) and coarse sand. (SP)	100	4.5, 6.5, 8.5	
-77.5	11.6		Gray, coarse-to-fine sand, some gravel. (SP)	100	10.5	
-78.8	12.9		Gray, medium-to-fine sand, some fine gravel and coarse sand. (SP)		12.5	
			End at 12.9'			

Laboratory Classification

Sample #	Description
0.5	SP
2.5	SP
4.5	SP
6.5	SP
8.5	SP
10.5	SP
12.5	SP

0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: Palm Beach County 1995 | HOLE NUMBER: PB95-C2

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County 1995	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (*Coordinates or Station*): 813702 E, 957328 N	11. DATUM FOR ELEVATION SHOWN (*TBM or MSL*): MLW
3. DRILLING AGENCY: Alpine Ocean Seismic Survey, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (*As shown on drawing title and file number*): PB95-C7	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	16. DATE HOLE: STARTED 8/10/95, COMPLETED 8/10/95
7. Water Depth: 57.8'	17. ELEVATION TOP OF HOLE: -57.8'
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING
9. TOTAL DEPTH OF HOLE: 19.7'	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-57.8	0.0					
-65.2	7.4		Dark gray, medium-to-fine sand, trace of coarse sand and gravel. (SP)	100	0.5, 4.5, 6.5	
-66.3	8.5		Brown, fine sand. (SP)	100		
-67.3	9.5		Dark brown, fine sand and clay. (SC)		9.5	
-70.1	12.3		Black organic clay and peat. (CL)			
-70.9	13.1		Brown, fine sand. (SP)		12.5	
-72.1	14.6		Light-brown clay. (CL)			
-77.5	19.7		Brown, fine sand, gravel, carbonate cobbles at 19.0'-19.5'. (SP)	30		30% recovery in final section, 14.6'-19.7'.
			End at 19.7'			

0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: Palm Beach County 1995 | HOLE NUMBER: PB95-C

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County 1995	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (Coordinates or Station): 810841 E, 955939 N	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
3. DRILLING AGENCY: Alpine Ocean Seismic Survey, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (As shown on drawing title and file number): PB95-C8	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	15. ELEVATION GROUND WATER
7. WATER DEPTH: 65.1'	16. DATE HOLE: STARTED 8/9/95, COMPLETED 8/9/95
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE: -65.1'
9. TOTAL DEPTH OF HOLE: 20.3'	18. TOTAL CORE RECOVERY FOR BORING
	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-65.1	0.0					
-73.7	8.6		Gray, medium-to-fine sand, some coarse sand and gravel. (SP) Gravel layers at 0.5'-0.7', 1.6'-2', 2.6'-3'	100	0.5, 2.5, 4.5, 6.5	
-74.7	9.6		Dark brown, fine sand. (SP)	100	8.5	
-77.6	12.5		Dark brown, muddy, fine sand. (SM)		10.5, 12.5	
-81.1	16		Light brown, fine sand, some coarse sand, gravel at 15'. (SP)	100	15.5	
-84.3	19.2		Medium-to-fine sand, gravel well graded. (SW)		17.5	
-85.4	20.3		Tan, fine-to-medium sand, gravel. (SP)			
			End at 20.3'			

Laboratory Classification

Sample #	Description
0.5	SP
2.5	SP
4.5	SP
6.5	SP
8.5	SP
10.5	SM
12.5	SM
15.5	SP
17.5	SW

0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: Palm Beach County 1995 | HOLE NUMBER: PB95-C8

DRILLING LOG

DIVISION	
INSTALLATION	SHEET 1 OF 1
1. PROJECT	Palm Beach County 1995
2. LOCATION (*Coordinates or Station*)	812916 E 956500 N
3. DRILLING AGENCY	Alpine Ocean Seismic Survey, Inc.
4. HOLE NO. (*As shown on drawing title and file number*)	PB95-C9
5. NAME OF DRILLER	G. Zarillo
6. DIRECTION OF HOLE	[x] VERTICAL [ ] INCLINED
7. WATER DEPTH	68.2'
8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE	18.6'
10. SIZE AND TYPE OF BIT	4" Vibracore
11. DATUM FOR ELEVATION SHOWN (*TBM or MSL*)	MLW
12. MANUFACTURER'S DESIGNATION OF DRILL	Alpine Pneumatic Vibracore
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	disturbed: undisturbed:
14. TOTAL NUMBER OF CORE BOXES	
15. ELEVATION GROUND WATER	
16. DATE HOLE	STARTED 8/10/95 COMPLETED 8/10/95
17. ELEVATION TOP OF HOLE	-68.2'
18. TOTAL CORE RECOVERY FOR BORING	
19. SIGNATURE OF GEOLOGIST	G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-68.2	0.0					
			Gray, medium-to-fine sand, 50% carbonate, trace of gravel in upper foot. (SP)	100	0.5	
					2.5	Brown zones have marbled appearance.
					4.5	
			Sand becomes finer at 5.5'			
-74.6	6.4				6.5	
			Brown, fine sand, maybe some silt, trace of gravel. (SP)	100		
					8.5	
-77.6	9.4		Zone of gravel (whole shells) at 8.8'-9', followed by cobbles, 9'-9.4'.			
-78.2	10.0				10.5	
			Lens of organic black clay at 9.9'-10.2'. (OH)			
			Brown, silty clay, trace of gravel.		12.5	
			Medium-to-fine carbonate sand, loose, some silt. (SP)		14.5	
-84.2	16.0			100		
			Medium fine sand and gravel. (GW)		16.5	
-86.8	18.6				18	
			End at 18.6'			

0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT Palm Beach County 1995 | HOLE NUMBER PB95-C9

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County 1995	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (*Coordinates or Station*): 814285 E, 956768 N	11. DATUM FOR ELEVATION SHOWN (*TBM or MSL*): MLW
3. DRILLING AGENCY: Alpine Ocean Seismic Survey, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (*As shown on drawing title and file number*): PB95-C10	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	16. DATE HOLE: STARTED 8/10/95, COMPLETED 8/10/95
7. Water Depth: 67.4'	17. ELEVATION TOP OF HOLE: -67.4'
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING
9. TOTAL DEPTH OF HOLE: 20.3'	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-67.4	0.0					
			Gray, medium-to-fine sand (80% carbonate), little coarse sand, some gravel in upper foot. (SP)	100	0.5, 2.5, 4.5, 6.5, 8.5	
-77.5	10.1			100		
			Light brown, fine sand, some medium sand. (SP)	100	10.5, 12.5, 14.5, 16.5, 18.5	
-87.7	20.3					
			End at 20.3'			

0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: Palm Beach County 1995

HOLE NUMBER: PB95-C10

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County 1995	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (*Coordinates or Station*): 812271 E, 955660 N	11. DATUM FOR ELEVATION SHOWN (*TBM or MSL*): MLW
3. DRILLING AGENCY: Alpine Ocean Seismic Survey, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (*As shown on drawing title and file number*): PB95-C14	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	15. ELEVATION GROUND WATER
7. Water Depth: 66.6'	16. DATE HOLE: STARTED 8/10/95, COMPLETED 8/10/95
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE: -66.6'
9. TOTAL DEPTH OF HOLE: 20.1'	18. TOTAL CORE RECOVERY FOR BORING
	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-66.6	0.0					
-69.6	3.0		Gray, medium-to-fine sand, little coarse sand, trace of gravel. (SP)	100	0.5, 2.5	
-72.5	5.9		Brown quartz sand, trace of gravel. (SP)		4.5, 5.4	
-74.5	7.5		Black, peaty organic clay. (OH-PT)			
-81.6	15.0		Brown, fine sand and silt, some medium sand, some clay, occasional irregular lenses of brown silty clay. Transition zone of increasing medium sand from 12.0'-15.0'. (SM)	100	8.5, 10.5, 12.5, 14.5	
-83.2	16.6		Brown, medium-to-fine sand. (SP)	100	16.5	
-86.7	20.1		Coarse-to-fine carbonate sand and clay, weakly cemented, cemented into cobbles to a large degree at 18.0'-19.5'. (SW)		17.5, 19.5	
			End at 20.1'			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: Palm Beach County 1995

HOLE NUMBER: PB95-C14

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (*Coordinates or Station*): 811910.6 E, 958597.0 N	11. DATUM FOR ELEVATION SHOWN (*TBM or MSL*): MSL
3. DRILLING AGENCY: SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (*As shown on drawing title and file number*): PB96 C53	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 7 undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	15. ELEVATION GROUND WATER
7. WATER DEPTH: 66.0'	16. DATE HOLE: STARTED 7/26/96, COMPLETED 7/26/96
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE: -66.0
9. TOTAL DEPTH OF HOLE: 19.4'	18. TOTAL CORE RECOVERY FOR BORING: 19.4 ft
	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-66.0	0.0					
-66.6	0.6		Light-brown–tan, medium-fine sand, shell fragments. (SP)	100	0.5	
-67.9	1.9		Gray, fine sand and coarse shell fragments. (SP)			
-71.1	5.1		Dark-gray, fine sand, fine-to-medium shell fragments. (SP)	100	3.0	
-73.0	7.0		Dark-gray, very fine sand, some mud, shell fragments. (SM)		6.0	
-76.1	10.1		Dark-gray, fine sand, medium–coarse shell fragments. (SP)		9.0	
-80.5	14.5		Dark-gray, fine sand, some mud. (SM)		12.0	
-84.9	18.9		Gray-brown, fine sand. (SP)		15.0	
-85.4	19.4		Light-gray, partially lithified, carbonate sand. (SP)	100		
			End at 19.4'			

Laboratory Classification

Sample #	Description
0.5	SP
3.0	SP
6.0	SM
9.0	SP
12.0	SM
15.0	SP

0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: Palm Beach County Shore Protection 1996 | HOLE NUMBER: PB-53

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (*Coordinates or Station*): 810567.5 E, 959018.4 N	11. DATUM FOR ELEVATION SHOWN (*TBM or MSL*): MSL
3. DRILLING AGENCY: SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (*As shown on drawing title and file number*): PB96 C54	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 8 undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	15. ELEVATION GROUND WATER
	16. DATE HOLE: STARTED 8/1/96, COMPLETED 8/1/96
7. WATER DEPTH: 63.1'	17. ELEVATION TOP OF HOLE: -63.1
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING: 20.2 ft
9. TOTAL DEPTH OF HOLE: 20.2'	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-63.1	0.0					
-69.3	6.2		Gray, medium-fine sand, whole shells and shell fragments. (SP)	100	0.5, 3.0	
-73.1	10.0		Gray, medium-fine sand, medium-coarse shell fragments, some mud. (SP)		7.0	
-83.2	20.2		Gray, muddy, fine sand, shell fragments. (SM)	100, 100	10.0, 13.0, 16.0, 19.0	
			End at 20.2'			

Laboratory Classification

Sample #	Description
0.5	SP
3.0	SP
7.0	SP
10.0	SP
13.0	SM
16.0	SM
19.0	SM

0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: Palm Beach County Shore Protection 1996 | HOLE NUMBER: PB-54

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT 4" Vibracore
2. LOCATION (Coordinates or Station) 811384.9 E 967768.5 N	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL Alpine Pneumatic Vibracore
4. HOLE NO. (As shown on drawing title and file number) PB96 C-55	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 8 undisturbed:
5. NAME OF DRILLER G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE [x] VERTICAL [ ] INCLINED	16. DATE HOLE STARTED 7/27/96 COMPLETED 7/27/96
7. WATER DEPTH 65.9'	17. ELEVATION TOP OF HOLE -65.9
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 19.1
9. TOTAL DEPTH OF HOLE 19.1'	19. SIGNATURE OF GEOLOGIST G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-65.9	0.0					
-66.9	1.0		Brown, medium-fine sand and shell fragments. (SP)	100	0.5	
-68.6	2.7		Gray, medium-fine sand, medium-coarse shell fragments, whole shells. (SP)		2.0	
-76.9	11.0		Gray, fine sand, medium-fine shell fragments. (SP)	100	5.0 8.0	9.8' Mud ball
-83.5	17.6		Gray, medium-fine sand, fine–coarse shell fragments. (SP)		11.0 15.0	
-85.0	19.1		Light-medium-gray, fine sand and medium-fine shell fragments. (SP)		18.0	
			End at 19.1'			

Laboratory Classification

Sample #	Description
0.5	SP
2.0	SP
5.0	SP
8.0	SP
11.0	SP
15.0	SP
18.0	SP

0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT Palm Beach County Shore Protection 1996 | HOLE NUMBER PB-55

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT 4" Vibracore
2. LOCATION (*Coordinates or Station*) 811713.3 E 956885.7 N	11. DATUM FOR ELEVATION SHOWN (*TBM or MSL*) MSL
3. DRILLING AGENCY SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL Alpine Pneumatic Vibracore
4. HOLE NO. (*As shown on drawing title and file number*) PB96 C-56	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 8 undisturbed:
5. NAME OF DRILLER G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE [x] VERTICAL [ ] INCLINED	16. DATE HOLE STARTED 7/27/96 COMPLETED 7/27/96
7. WATER DEPTH 67.2'	17. ELEVATION TOP OF HOLE -67.2
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 19.2
9. TOTAL DEPTH OF HOLE 19.2'	19. SIGNATURE OF GEOLOGIST G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-67.2	0.0					
-68.2	1.0		Dark-tan, medium-fine sand. (SP)		0.5	
-70.7	3.5		Gray, fine–medium sand, whole shells and coarse shell fragments. (SP)		2.0	
-79.6	12.4		Gray, fine–medium sand, some shell fragments. (SP)		5.0 8.0 11.0	
-81.2	14.0		Gray, fine–medium sand and compacted coarse shell fragments. (SP)			
-82.6	15.4		Light-tan, fine sand and mud. (SM)		15.0	
-86.4	19.2		Light-tan, very fine, sandy mud. (ML)		18.0	
			End at 19.2'			

Laboratory Classification

Sample #	Description
0.5	SP
2.0	SP
5.0	SP
8.0	SP
11.0	SP
15.0	SM
18.0	ML

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT Palm Beach County Shore Protection 1996 | HOLE NUMBER PB-56

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (Coordinates or Station): 810396.7 E, 957699.4 N	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
3. DRILLING AGENCY: SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (As shown on drawing title and file number): PB96 C57	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 8 undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	15. ELEVATION GROUND WATER
	16. DATE HOLE: STARTED 8/1/96, COMPLETED 8/1/96
7. WATER DEPTH: 63.4'	17. ELEVATION TOP OF HOLE: -63.4
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING: 20.2 ft
9. TOTAL DEPTH OF HOLE: 20.2'	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-63.4	0.0					
			Gray-to-dark-gray, medium-to-fine sand and shell, shell fragments and whole shell. (SW)	100	0.5	
					3.0	
					6.0	
					9.0	
-73.5	10.1					
-74.3	10.9		Gray, fine, muddy sand, fine shell fragments. (SM)	100	11.0	
			Gray, fine sand and fine shell fragments, some mud. (SM)			12.5'–12.7' Mud layer
					15.0	
						16.2'–16.3' Mud layer
					18.0	
-83.4	20.0					
-83.6	20.2		Lithified carbonate and mud. (SM)	100		
			End at 20.2'			

Laboratory Classification

Sample #	Description
0.5	SW
3.0	SW
6.0	SW
9.0	SW
11.0	SM
15.0	SM
18.0	SM

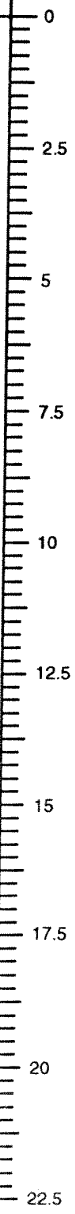
0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: Palm Beach County Shore Protection 1996 | HOLE NUMBER: PB-57

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT 4" Vibracore
2. LOCATION (*Coordinates or Station*) 810653.2 E 956947.7 N	11. DATUM FOR ELEVATION SHOWN (*TBM or MSL*) MSL
3. DRILLING AGENCY SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL Alpine Pneumatic Vibracore
4. HOLE NO. (*As shown on drawing title and file number*) PB96 C-58	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 6 undisturbed:
5. NAME OF DRILLER G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE [x] VERTICAL [ ] INCLINED	16. DATE HOLE STARTED 7/27/96 COMPLETED 7/27/96
7. WATER DEPTH 65.4'	17. ELEVATION TOP OF HOLE -65.4
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 16.6
9. TOTAL DEPTH OF HOLE 16.6'	19. SIGNATURE OF GEOLOGIST G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-65.4	0.0					
-67.8	2.4		Tan-to-light-gray, medium-fine sand, coarse-to-fine shell fragments. (SP)	100	0.5	1.2' Layer of whole shells
-70.8	5.4		Gray, fine sand, large shells, coarse-to-medium shell fragments. (SW)		3.0	
-75.4	10.0		Gray, medium-fine sand and fine shell fragments, scattered small, whole shells. (SP)	100	6.0	
-76.8	11.4		Light-tan, medium-fine sand. (SP)		10.0	
-79.7	14.3		Gray, medium-fine sand and fine shell, some mud. (SM)		14.0	
-81.7	16.3		Gray, medium-fine shell fragments, fine sand. (SP)	100		
-82.0	16.6		Light-gray, carbonate sand, lithified clasts. (GW)			Lithified carbonate at base of core
			End at 16.6'			



Laboratory Classification

Sample #	Description
0.5	SP
3.0	SW
6.0	SP
10.0	SP
14.0	SM

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT Palm Beach County Shore Protection 1996 | HOLE NUMBER PB-58

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (*Coordinates or Station*): 810999.2 E, 955123.5 N	11. DATUM FOR ELEVATION SHOWN (*TBM or MSL*): MSL
3. DRILLING AGENCY: SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (*As shown on drawing title and file number*): PB96 C59	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 5 undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES: 1
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	15. ELEVATION GROUND WATER
7. WATER DEPTH: 66.5'	16. DATE HOLE: STARTED 7/27/96, COMPLETED 7/27/96
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE: -66.5
9. TOTAL DEPTH OF HOLE: 20.0'	18. TOTAL CORE RECOVERY FOR BORING: -20.0 ft
	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-66.5	0.0					
-67.1	0.6		Gray, medium sand, medium shell fragments. (SP)	100	0.5	0.0'–7.9' Composite sample
-68.5	2.0		Gray, fine sand, coarse shell fragments and whole 1" shells. (SP)		2.0	
-70.2	3.7		Gray, fine sand, trace of small shell fragments. (SP)			
-71.1	4.6		Tannish-gray, fine sand, coarse shell fragments. (SP)		5.0	
-72.9	6.4		Gray, fine sand. (SP)			
-74.4	7.9		Light tan, very fine sand, compacted with localized shell fragments. (SP)		8.0	
-74.8	8.3		Very dark-gray mud, coarse shell fragments. (SM)	100		
-75.7	9.2		Light tan, fine quartz sand. (SP)			
-79.0	12.5		Black organic clay. (OH)			
-81.5	15.0		Tan, very fine, muddy sand. (SM)			
-86.5	20.0		Grayish-tan, very fine sand, root fragments. (SP)	100		
			End at 20.0'			

Laboratory Classification

Sample #	Description
0.5	SP
2.0	SP
5.0	SP
8.0	SP

0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: Palm Beach County Shore Protection 1996 | HOLE NUMBER: PB-59

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (*Coordinates or Station*): 809132.9 E, 958079.4 N	11. DATUM FOR ELEVATION SHOWN (*TBM or MSL*): MSL
3. DRILLING AGENCY: SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (*As shown on drawing title and file number*): PB96 C60	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 5 undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	15. ELEVATION GROUND WATER
	16. DATE HOLE: STARTED 8/1/96, COMPLETED 8/1/96
7. WATER DEPTH: 61.5'	17. ELEVATION TOP OF HOLE: -61.5
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING: 6.6 ft
9. TOTAL DEPTH OF HOLE: 6.6'	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-61.5	0.0					
-62.1	0.6		Gray, medium sand, medium-to-coarse shell fragments. (SP)	100	0.5	
-64.3	2.8		Gray, fine sand, medium-to-coarse shell fragments. (SP)		2.0	
-65.3	3.8		Gray–brown, fine sand, medium-fine shell fragments. (SP)		4.0	
-67.2	5.7		Light, medium-fine sand, medium-coarse shell fragments. (SW)	100	6.0	
-68.1	6.6		Gray, medium-fine sand, coarse shells, medium-coarse shell and shell fragments. (SW)			
			End at 6.6'			

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

Laboratory Classification

Sample #	Description
0.5	SP
2.0	SP
4.0	SW
6.0	SW

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: Palm Beach County Shore Protection 1996 | HOLE NUMBER: PB-60

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (*Coordinates or Station*): 809651.2 E, 957058.4 N	11. DATUM FOR ELEVATION SHOWN (*TBM or MSL*): MSL
3. DRILLING AGENCY: SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (*As shown on drawing title and file number*): PB96 C-61	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 8 undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	16. DATE HOLE: STARTED 7/27/96, COMPLETED 7/27/96
7. WATER DEPTH: 63.0'	17. ELEVATION TOP OF HOLE: -63.0
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING: 20.2
9. TOTAL DEPTH OF HOLE: 20.2'	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-63.0	0.0					
-67.4	4.4		Tan–gray, medium-fine sand, medium-coarse shell fragments, whole shells. (SW)	100	0.5 3.0	Laboratory Classification Sample # / Description 0.5 SW 3.0 SW 6.0 SW 9.0 SP 12.0 SP 15.0 SP 18.0 SP
-68.4	5.4		Brown–red, plastic clay. (CL)			
-71.7	8.7		Gray, fine sand, medium-to-coarse shell fragments, whole shells. (SW)		6.0	
-73.3	10.3		Gray, fine sand, fine shell fragments. (SP)	100	9.0	
-80.7	17.7		Gray, fine sand, very fine shell fragments. (SP)		12.0 15.0	13.0'–13.1' Lithified clast of shell, shell fragments
-82.8	19.8		Brown, fine sand, medium-coarse shell fragments. (SP)		18.0	19.3'–19.6' Articulated shells
-83.2	20.2		Black peat. (PT) End at 20.2'	100		

0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: Palm Beach County Shore Protection 1996 | HOLE NUMBER: PB-61

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (*Coordinates or Station*): 810011.2 E, 956032.3 N	11. DATUM FOR ELEVATION SHOWN (*TBM or MSL*): MSL
3. DRILLING AGENCY: SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (*As shown on drawing title and file number*): PB96 C-62	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 6 undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	15. ELEVATION GROUND WATER
7. WATER DEPTH: 65.5'	16. DATE HOLE: STARTED 7/27/96, COMPLETED 7/27/96
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE: -65.3
9. TOTAL DEPTH OF HOLE: 16.4'	18. TOTAL CORE RECOVERY FOR BORING: 16.4
	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-65.5	0.0					
-68.4	2.9		Brown-to-gray, fine sand, medium-coarse shell fragments, whole shells. (SP)	100	0.5 2.0	0.0'–11.1' Composite sample .74
-71.2	5.7		Gray, fine sand, medium-coarse shell fragments, abundant whole shells. (SW)		5.0	1.74
-72.6	7.1		Gray, fine sand, medium-coarse shell fragments, whole shells. (SP)	100	7.0	1.21
-76.6	11.1		Gray, fine sand, medium-fine shell fragments. (SP)		10.0	.34
-78.5	13.0		Black-to-dark-brown peat. (PT)	100		
-81.9	16.4		Light-gray, fine carbonate sand and silt. (SM)			
			End at 16.4'			

Laboratory Classification

Sample #	Description
0.5	SP
2.0	SW
5.0	SP
7.0	SP
10.0	SP

0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: Palm Beach County Shore Protection 1996 | HOLE NUMBER: PB-62

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (*Coordinates or Station*): 811702.2 E, 955308.1 N	11. DATUM FOR ELEVATION SHOWN (*TBM or MSL*): MSL
3. DRILLING AGENCY: SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (*As shown on drawing title and file number*): PB96 C82	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 4 undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	16. DATE HOLE: STARTED 8/2/96, COMPLETED 8/2/96
7. WATER DEPTH: 68.2'	17. ELEVATION TOP OF HOLE: -68.2
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING: -14.1 ft
9. TOTAL DEPTH OF HOLE: 14.1'	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-68.2	0.0					
-69.3	1.1		Gray, shelly, medium sand. (SP)	100	0.5	0.0'–8.4' Composite sample
-70.2	2.0		Gray, fine, medium-shelly sand with coarse shell fragments and whole shells. (SP)		3.0	
-76.6	8.4		Gray, fine sand, some shell fragments. (SP)	100	7.0	
-78.9	10.7		Black, organic mud. (OH)			
-82.3	14.1		Tan, very fine sand. (SP)	100		
			End at 14.1'	100		

Laboratory Classification

Sample #	Description
0.5	SP
3.0	SP
7.0	SP

0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: Palm Beach County Shore Protection 1996 | HOLE NUMBER: PB-82

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (*Coordinates or Station*): 817454.2 E, 957941.4 N	11. DATUM FOR ELEVATION SHOWN (*TBM or MSL*): MSL
3. DRILLING AGENCY: SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (*As shown on drawing title and file number*): PB96 C83	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 8 undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	15. ELEVATION GROUND WATER
7. WATER DEPTH: 67.5'	16. DATE HOLE: STARTED 8/2/96, COMPLETED 8/2/96
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE: -67.5
9. TOTAL DEPTH OF HOLE: 15.1'	18. TOTAL CORE RECOVERY FOR BORING: -15.1 ft
	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-67.5	0.0					
-68.3	0.8		Gray–tan, medium-fine sand, shell fragments, some 1" whole shells. (SP)	100	0.5	
-69.1	1.6					
-71.2	3.7		Gray, medium sand, coarse shell fragments and lots of whole shells. (SP)		3.0	
			Gray, fine–medium sand, trace shell fragments. (SP)			
-73.5	6.0		Gray, medium-fine sand, coarse shell fragments. (SP)		5.0	
-81.9	14.4		Gray, fine sand, trace shell fragments. (SP)	100	8.0	
					11.0	
					13.0	
-82.6	15.1		Tannish-gray, fine sand, coarse shell fragments. (SP)	100	15.0	
			End at 15.1'			

Laboratory Classification

Sample #	Description
0.5	SP
3.0	SP
5.0	SP
8.0	SP
11.0	SP
13.0	SP
15.0	SP

0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: Palm Beach County Shore Protection 1996 | HOLE NUMBER: PB-83

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (*Coordinates or Station*): 808425.3 E, 958910.2 N	11. DATUM FOR ELEVATION SHOWN (*TBM or MSL*): MSL
3. DRILLING AGENCY: SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (*As shown on drawing title and file number*): PB96 C-84	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 4 undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	16. DATE HOLE: STARTED 8/2/96, COMPLETED 8/2/96
7. WATER DEPTH: 59.3'	17. ELEVATION TOP OF HOLE: -59.3
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING: 5.5
9. TOTAL DEPTH OF HOLE: 5.5'	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-59.3	0.0					
-60.5	1.2		Gray, fine sand, fine shell fragments. (SP)	100	0.5	
-63.5	4.2		Gray, medium-fine sand, coarse shell fragments. (SP)		3.0	
-64.8	5.5		Tan–gray, fine consolidated sand, large carbonate clasts 1"–2" diameter. (SP)	100	5.0	45% gravel 2.08mm mean
			End at 5.5'			

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

Laboratory Classification

Sample #	Description
0.5	SP
3.0	SP
5.0	SP

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: Palm Beach County Shore Protection 1996 | HOLE NUMBER: PB-84

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (*Coordinates or Station*): 809275.5 E, 958980.2 N	11. DATUM FOR ELEVATION SHOWN (*TBM or MSL*): MSL
3. DRILLING AGENCY: SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (*As shown on drawing title and file number*): PB96 C86	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 7 undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	15. ELEVATION GROUND WATER
7. WATER DEPTH: 61.1'	16. DATE HOLE: STARTED 8/1/96, COMPLETED 8/1/96
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE: -61.1
9. TOTAL DEPTH OF HOLE: 20.1'	18. TOTAL CORE RECOVERY FOR BORING: -20.1 ft
	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-61.1	0.0					
-65.1	4.0		Tan-to-gray, fine sand and medium-fine shell fragments. (SP)	100	0.5 3.0	0.0'–9.1' Composite sample
-67.0	5.9		Light-gray-to-tan, coarse shell and medium-fine sand. (SW)		5.0	5.2'–5.4' Layer of crushed shell
-69.6	8.5		Gray, fine sand and coarse shell material. (SW)		7.0	
-70.2	9.1		Gray-to-dark-gray, medium-fine sand and shell fragments. (SP)	100	8.7	
-81.2	20.1		Light-gray, whole fine calcareous sand, clasts of lithified carbonate, some mud. (SM)	100	12.0	
			End at 20.1'			

Laboratory Classification

Sample #	Description
0.5	SP
3.0	SP
5.0	SW
7.0	SW
8.7	SP
12.0	SM

0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: Palm Beach County Shore Protection 1996 | HOLE NUMBER: PB-86

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (*Coordinates or Station*): 808210.7 E, 960647.7 N	11. DATUM FOR ELEVATION SHOWN (*TBM or MSL*): MSL
3. DRILLING AGENCY: SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (*As shown on drawing title and file number*): PB96 C87	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 5 undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	15. ELEVATION GROUND WATER
7. WATER DEPTH: 58.2'	16. DATE HOLE: STARTED 8/1/96, COMPLETED 8/1/96
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE: -58.2
9. TOTAL DEPTH OF HOLE: 9.4'	18. TOTAL CORE RECOVERY FOR BORING: -9.4 ft
	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-58.2	0.0					
			Gray, medium-fine sand, coarse shells. (SP)		0.5	0%, .43mm
					3.0	15% .97 mm
-64.6	6.4				6.0	2%, .58mm
-66.4	8.2		Tan–gray, medium-fine sand, medium-coarse shell fragments and carbonate clasts. (SW)		8.0	8.2'–9.4' Semilithified 38% 1.57mm
-67.6	9.4		Light-gray, whole, fine carbonate sand. (SP)			
			End at 9.4'			

S/C = ? for #23

comp 32% gravel 1.5mm

Laboratory Classification

Sample #	Description
0.5	SP
3.0	SP
6.0	SP
8.0	SW

0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: Palm Beach County Shore Protection 1996 | HOLE NUMBER: PB-87

DRILLING LOG

DIVISION	
INSTALLATION	SHEET 1 OF 1
1. PROJECT	Palm Beach County Shore Protection 1996
2. LOCATION (Coordinates or Station)	809995.9 E 959640.6 N
3. DRILLING AGENCY	SEA, Inc.
4. HOLE NO. (As shown on drawing title and file number)	PB96 C88
5. NAME OF DRILLER	G. Zarillo
6. DIRECTION OF HOLE	[x] VERTICAL [ ] INCLINED
7. WATER DEPTH	61.9'
8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE	11.5'
10. SIZE AND TYPE OF BIT	4" Vibracore
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	MSL
12. MANUFACTURER'S DESIGNATION OF DRILL	Alpine Pneumatic Vibracore
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	disturbed: 4 undisturbed:
14. TOTAL NUMBER OF CORE BOXES	
15. ELEVATION GROUND WATER	
16. DATE HOLE	STARTED 8/1/96 COMPLETED 8/1/96
17. ELEVATION TOP OF HOLE	-61.9
18. TOTAL CORE RECOVERY FOR BORING	-11.5 ft
19. SIGNATURE OF GEOLOGIST	G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-61.9	0.0					
-64.3	2.4		Gray, fine–medium sand. (SP)	100	0.5	
-68.8	6.9		Gray, medium-fine sand, coarse shell fragments and whole shells. (SP)	100	4.0	
-70.5	8.6		Gray, medium-fine sand. (SP)		8.0	
-73.4	11.5		Gray, medium-fine sand, coarse shell fragments. (SP)	100		
			End at 11.5'			

Laboratory Classification

Sample #	Description
0.5	SP
4.0	SP
8.0	SP

0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: Palm Beach County Shore Protection 1996

HOLE NUMBER: PB-88

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (*Coordinates or Station*): 809676.5 E, 960596.3 N	11. DATUM FOR ELEVATION SHOWN (*TBM or MSL*): MSL
3. DRILLING AGENCY: SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (*As shown on drawing title and file number*): PB96 C89	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 7 undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	16. DATE HOLE: STARTED 8/2/96, COMPLETED 8/2/96
7. WATER DEPTH: 61.0'	17. ELEVATION TOP OF HOLE: -61.0
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING: -20.2 ft
9. TOTAL DEPTH OF HOLE: 20.2'	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
61.0	0.0					
-62.5	1.5		Tan-to-light-brown, fine sand, crushed shell. (SP)	100	0.5	0.0'–15.2' Composite sample
-67.8	6.8		Gray-to-light-gray, medium-fine sand, coarse shell, shell fragments. (SP)		2.0 4.0	5.0'–6.0' Layer of large, whole shells
-72.6	11.6		Gray-to-dark-gray, medium-fine sand, shell fragments, and whole shells. (SP)	100	8.0	
-74.1	13.1		Gray mud, plastic. (ML)	100		12.4'–12.5' Layer of fine, dark-gray sand
-75.5	14.5		Gray, fine sand. (SP)		13.5	13.6'–13.8' Plastic mud layer
-76.2	15.2		Dark-gray, medium-fine sand and shell. (SP)		15.0	15.2'–15.3' Calcarous rock fragment
-81.2	20.2		Light-tan–gray, fine calcarous sand. (SP)	100		15.2'–20.2' Fragments of carbonate rock
			End at 20.2'			

Laboratory Classification

Sample #	Description
0.5	SP
2.0	SP
4.0	SP
8.0	SP
13.5	SP
15.0	SP

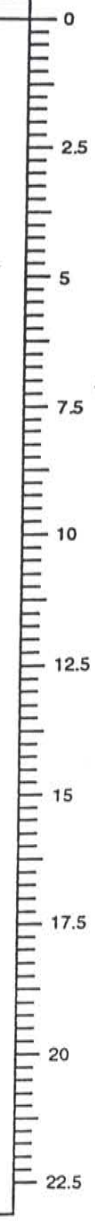
0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: Palm Beach County Shore Protection 1996 | HOLE NUMBER: PB-89

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (Coordinates or Station): 810654.9 E, 960300.7 N	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
3. DRILLING AGENCY: SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (As shown on drawing title and file number): PB96 C90	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 8 undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED	16. DATE HOLE: STARTED 8/1/96, COMPLETED 8/1/96
7. WATER DEPTH: 63.4'	17. ELEVATION TOP OF HOLE: -63.4
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING: -19.3 ft
9. TOTAL DEPTH OF HOLE: 19.3'	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-63.4	0.0					
-64.6	1.2		Gray, medium-fine sand, fine shell fragments. (SP)	100	0.5	
-66.8	3.4		Gray, fine sand, coarse shell fragments, whole shells. (SP)		2.0	
-72.0	8.6		Gray, medium-fine sand, medium-fine shell fragments. (SP)		5.0 8.0	
-73.0	9.6		Gray, fine sand, medium-coarse shell fragments, whole shells. (SP)	100		
-74.5	11.1		Dark-gray, fine sand, fine shell fragments. (SP)			
-75.9	12.5		Gray, very fine sand, some mud. (SP)		11.0	
-76.8	13.4		Gray, fine sand, medium-fine shell fragments. (SP)			
-81.8	18.4		Dark-gray, very fine sand and mud. (SM)		15.0 18.0	
-82.7	19.3		Gray, fine sand, shell fragments, clasts of carbonate rock. (SP)	100		
			End at 19.3'			



ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT | HOLE NUMBER

Sediment Analysis Data Sheet

PB96 C90 0.5

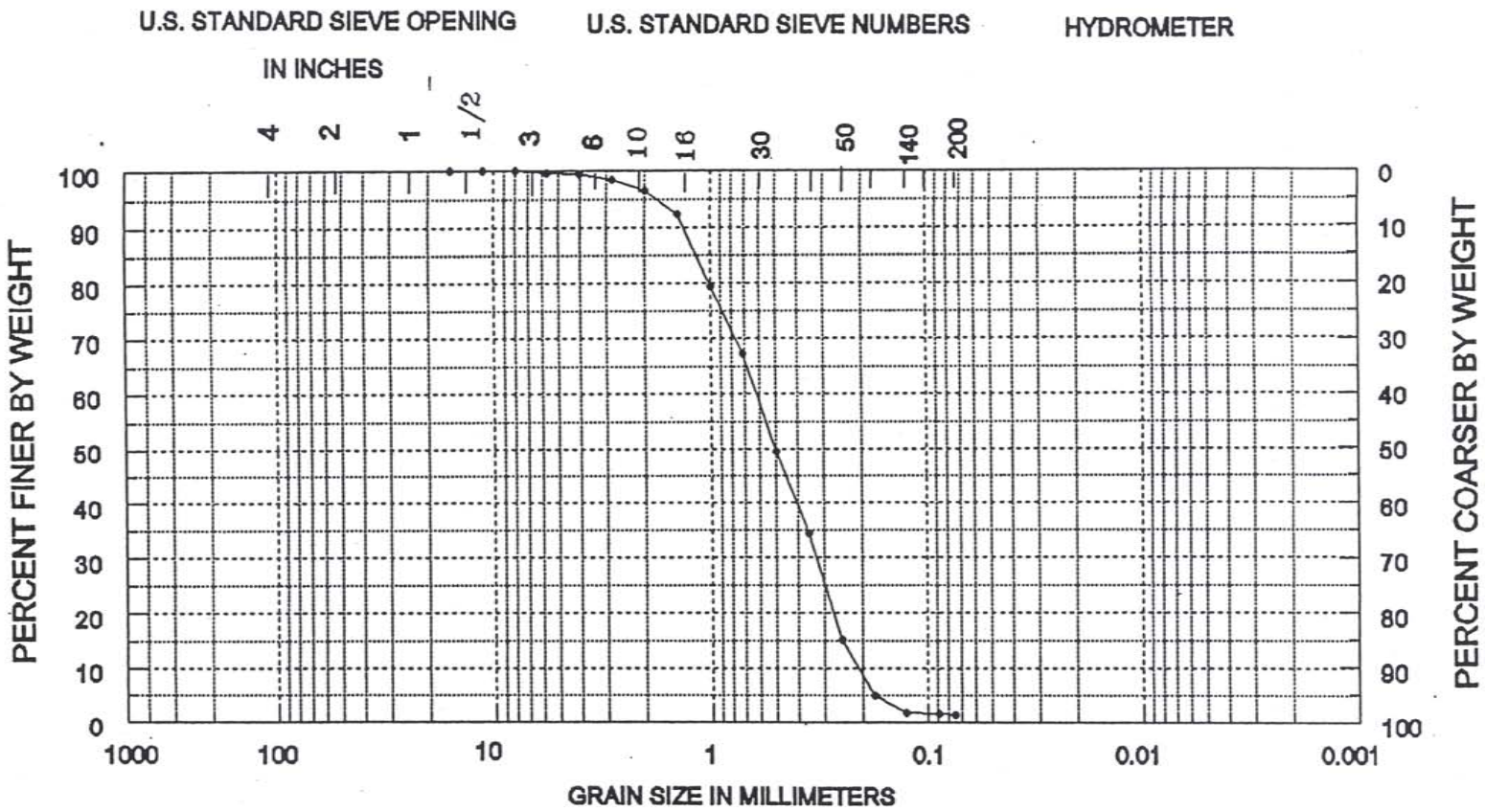
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.12	0.48	0.48
5	4.00	-2.00	0.04	0.15	0.63
7	2.83	-1.50	0.24	0.96	1.60
10	2.00	-1.00	0.49	1.99	3.58
14	1.41	-0.50	1.01	4.11	7.69
18	1.00	0.00	3.15	12.82	20.51
25	0.71	0.50	3.01	12.23	32.74
35	0.50	1.00	4.35	17.70	50.44
45	0.35	1.50	3.74	15.21	65.64
60	0.25	2.00	4.75	19.31	84.96
80	0.18	2.50	2.49	10.12	95.08
120	0.13	3.00	0.76	3.07	98.15
170	0.09	3.50	0.08	0.34	98.48
200	0.07	3.75	0.02	0.09	98.57
Pan			0.03	0.13	98.70
Total			24.28	98.70	98.70

Folk Statistics		phi	mm
5%	:	-0.83	1.77
16%	:	-0.18	1.13
25%	:	0.18	0.88
50%	:	0.99	0.50
75%	:	1.74	0.30
84%	:	1.98	0.25
95%	:	2.50	0.18
Med.		0.99	0.50
Mean		0.89	0.54
St Dev.		1.04	
Skew		-0.09	
Kurt.		0.87	

Moment Statistics	Phi	mm
Mean	1.16	0.45
St. Dev.	1.03	0.49
Skewness	-0.44	
Kurtosis	3.06	

Cu =	2.92	Gravel		1	%
		Coarse	Sand	3	%
		Med.	Sand	54	%
Cc =	0.83	Fine	Sand	41	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
0.5	-53.9	Medium to fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C90
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C90 2.0

Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	9.44	27.09	27.09
	11.31	-3.50	1.28	3.67	30.76
	8.00	-3.00	0.48	1.38	32.13
	5.66	-2.50	0.87	2.49	34.62
5	4.00	-2.00	1.16	3.33	37.96
7	2.83	-1.50	1.00	2.88	40.83
10	2.00	-1.00	1.44	4.13	44.96
14	1.41	-0.50	1.80	5.15	50.11
18	1.00	0.00	2.21	6.33	56.45
25	0.71	0.50	2.38	6.82	63.26
35	0.50	1.00	1.88	5.40	68.66
45	0.35	1.50	3.54	10.14	78.81
60	0.25	2.00	2.30	6.60	85.41
80	0.18	2.50	3.85	11.05	96.46
120	0.13	3.00	0.45	1.28	97.74
170	0.09	3.50	0.14	0.40	98.14
200	0.07	3.75	0.08	0.22	98.36
Pan			0.01	0.04	98.40
Total			34.30	98.40	98.40

Folk Statistics	phi	mm
5% :	-5.00	32.00
16% :	-4.50	22.63
25% :	-4.10	17.15
50% :	-0.51	1.42
75% :	1.31	0.40
84% :	1.89	0.27
95% :	2.43	0.19
Med.	-0.51	1.42
Mean	-1.14	2.20
St Dev.	2.72	
Skew	-0.23	
Kurt.	0.56	

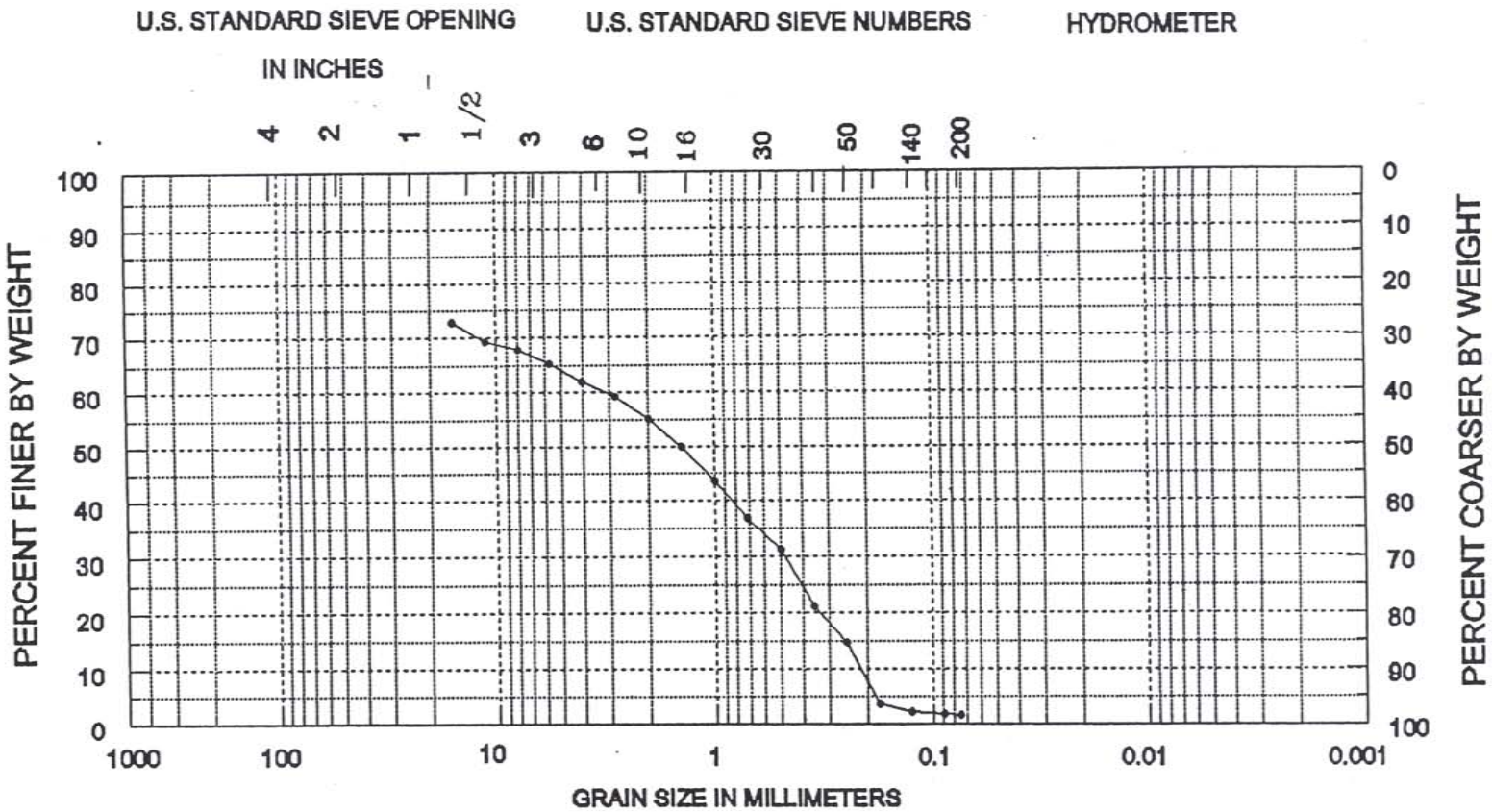
Moment Statistics	Phi	mm
Mean	-1.05	2.07
St. Dev.	2.50	0.18
Skewness	-0.11	
Kurtosis	1.48	

Cu = 14.44

Cc = 0.34

Gravel	36	%
Coarse Sand	9	%
Med. Sand	29	%
Fine Sand	25	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
2.0	-55.4	Well graded sand and gravel (SW)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C90
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C90 5.0

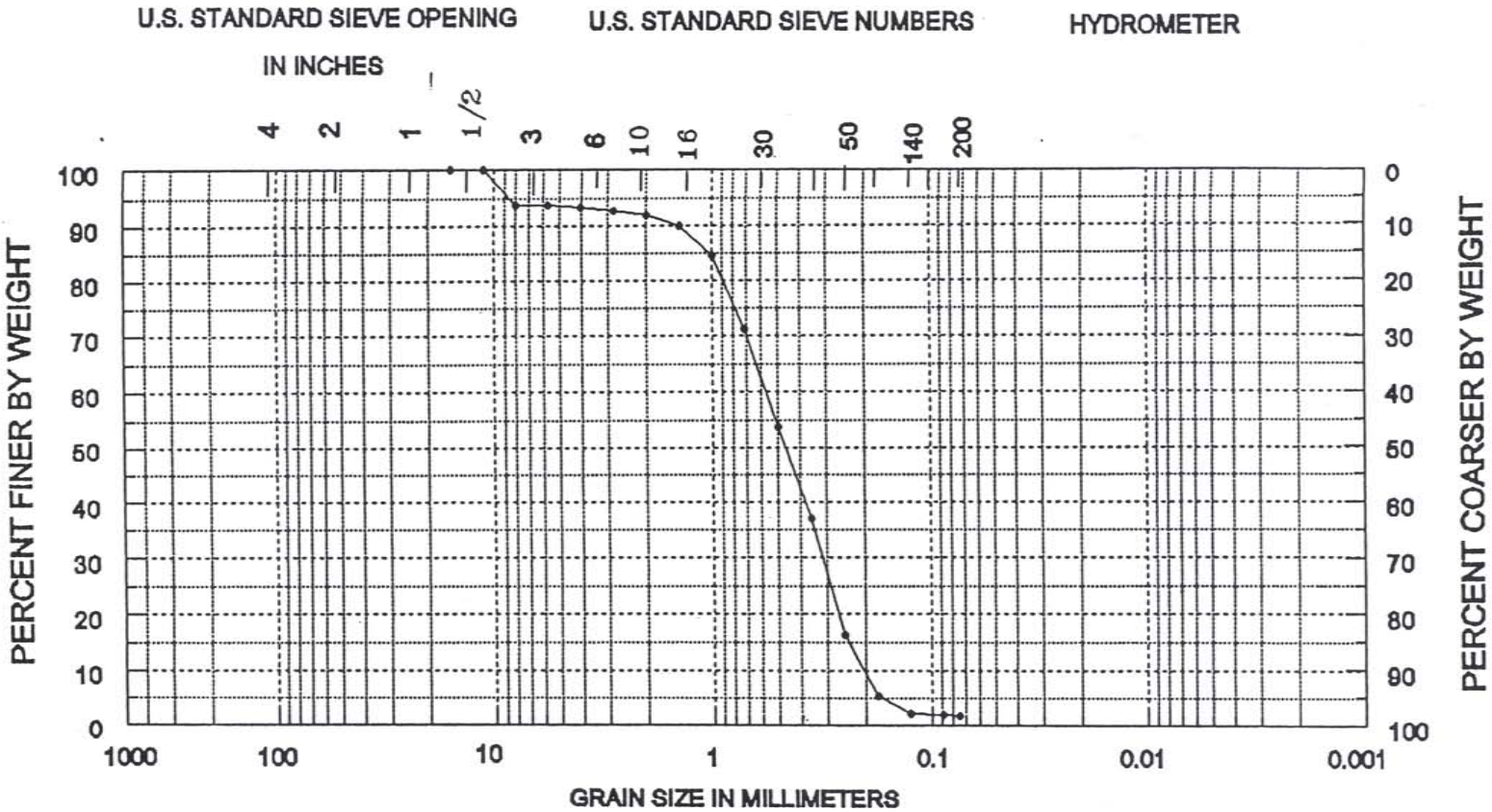
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	1.89	6.37	6.37
	5.66	-2.50	0.00	0.00	6.37
5	4.00	-2.00	0.13	0.44	6.81
7	2.83	-1.50	0.18	0.60	7.41
10	2.00	-1.00	0.20	0.66	8.07
14	1.41	-0.50	0.59	2.01	10.08
18	1.00	0.00	1.61	5.44	15.52
25	0.71	0.50	3.89	13.14	28.66
35	0.50	1.00	5.24	17.69	46.35
45	0.35	1.50	4.94	16.68	63.03
60	0.25	2.00	6.15	20.78	83.81
80	0.18	2.50	3.23	10.89	94.70
120	0.13	3.00	0.91	3.07	97.78
170	0.09	3.50	0.10	0.33	98.11
200	0.07	3.75	0.02	0.07	98.18
Pan			0.01	0.02	98.20
Total			29.07	98.20	98.20

Folk Statistics		phi	mm
5%	:	-3.11	8.62
16%	:	0.02	0.99
25%	:	0.36	0.78
50%	:	1.11	0.46
75%	:	1.79	0.29
84%	:	2.01	0.25
95%	:	2.55	0.17
Med.		1.11	0.46
Mean		0.52	0.70
St Dev.		1.35	
Skew		-0.29	
Kurt.		1.62	

Cu =	2.76	Gravel		7	%
		Coarse	Sand	1	%
		Med.	Sand	47	%
Cc =	0.85	Fine	Sand	43	%

Moment Statistics	Phi	mm
Mean	1.08	0.47
St. Dev.	1.39	0.38
Skewness	-1.54	
Kurtosis	5.44	

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
5.0	-58.4	Medium to fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C90
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C90 8.0

Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.00	0.00	0.00
5	4.00	-2.00	0.00	0.00	0.00
7	2.83	-1.50	0.04	0.16	0.16
10	2.00	-1.00	0.18	0.72	0.88
14	1.41	-0.50	0.41	1.65	2.53
18	1.00	0.00	0.51	2.05	4.58
25	0.71	0.50	0.84	3.36	7.93
35	0.50	1.00	1.30	5.22	13.16
45	0.35	1.50	2.98	11.96	25.12
60	0.25	2.00	5.36	21.55	46.66
80	0.18	2.50	6.88	27.63	74.29
120	0.13	3.00	3.75	15.05	89.34
170	0.09	3.50	1.71	6.89	96.23
200	0.07	3.75	0.25	1.02	97.25
Pan			0.06	0.25	97.50
Total			24.26	97.50	97.50

Folk Statistics	phi	mm
5% :	0.06	0.96
16% :	1.12	0.46
25% :	1.50	0.35
50% :	2.06	0.24
75% :	2.52	0.17
84% :	2.82	0.14
95% :	3.41	0.09
Med.	2.06	0.24
Mean	1.90	0.27
St Dev.	0.93	
Skew	-0.15	
Kurt.	1.33	

Cu =	2.30		Gravel		0	%
			Coarse	Sand	1	%
			Med.	Sand	18	%
Cc =	1.03		Fine	Sand	78	%

Moment Statistics	Phi	mm
Mean	2.14	0.23
St. Dev.	0.91	0.53
Skewness	-1.00	
Kurtosis	4.35	

SEA,INC.

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (Coordinates or Station): 810499.5 E, 961191.5 N	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
3. DRILLING AGENCY: SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (As shown on drawing title and file number): PB96 C91	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 8 undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	15. ELEVATION GROUND WATER
7. WATER DEPTH: 62.2'	16. DATE HOLE: STARTED 8/2/96, COMPLETED 8/2/96
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE: -62.2
9. TOTAL DEPTH OF HOLE: 10.7'	18. TOTAL CORE RECOVERY FOR BORING: -10.7 ft
	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-62.2	0.0					
-63.2	1.0		Gray, medium-fine, shelly sand. (SP)	100	0.5	1.0'–4.2' Whole shells
-66.4	4.2		Gray, medium-fine, shelly sand, coarse shell fragments to 2" diameter. (SW)		2.5	
-72.9	10.7		Gray–dark-gray, medium-fine sand, fine shell fragments. (SP)	100	4.5	
					7.0	7.5'–7.6' Plastic mud clast
				100	10.0	
			End at 10.7'			

0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT | HOLE NUMBER

Sediment Analysis Data Sheet

PB96 C91 0.5

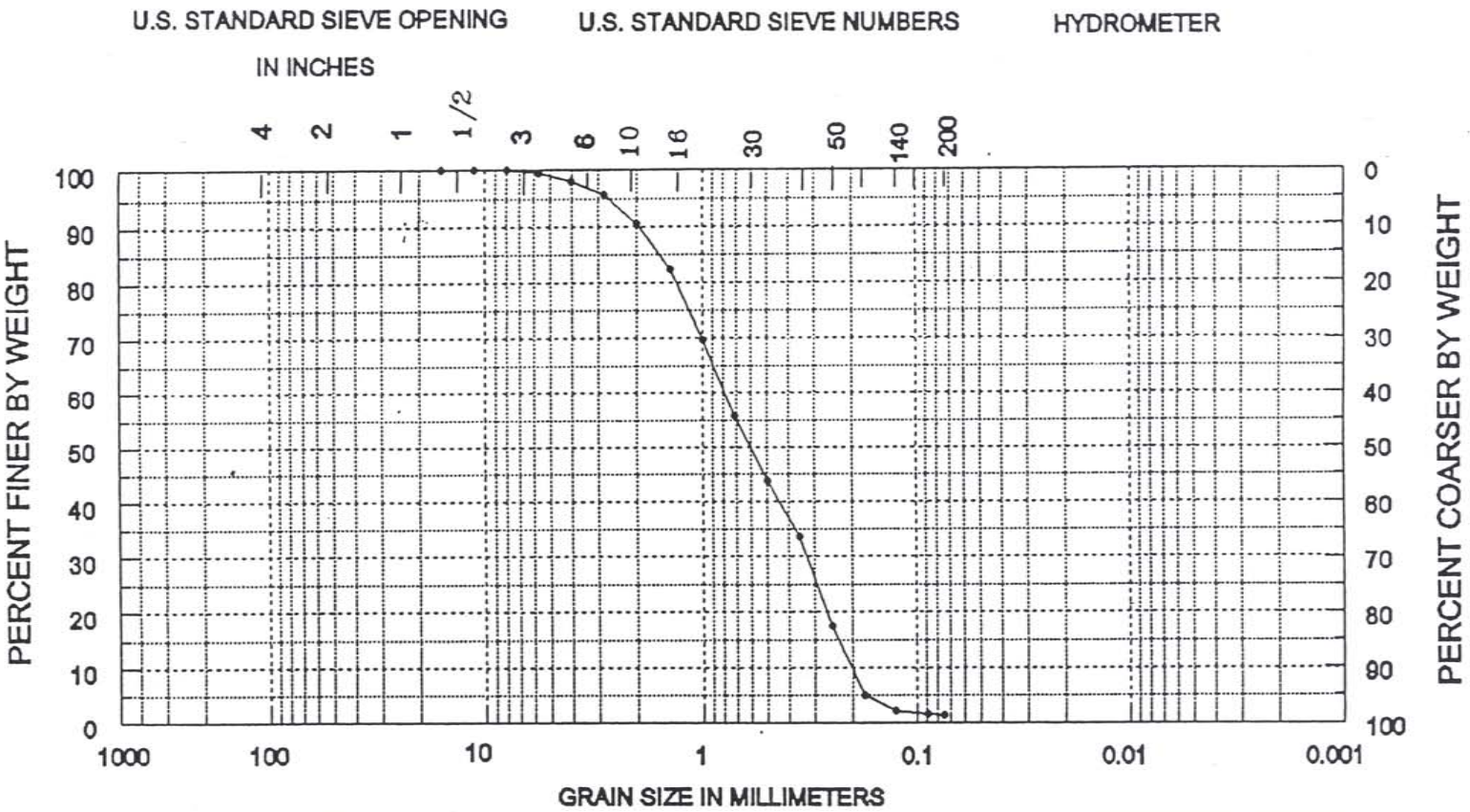
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.18	0.54	0.54
5	4.00	-2.00	0.48	1.44	1.98
7	2.83	-1.50	0.81	2.43	4.40
10	2.00	-1.00	1.69	5.03	9.44
14	1.41	-0.50	2.72	8.13	17.56
18	1.00	0.00	4.26	12.72	30.28
25	0.71	0.50	4.75	14.17	44.45
35	0.50	1.00	3.92	11.69	56.14
45	0.35	1.50	3.45	10.28	66.42
60	0.25	2.00	5.44	16.22	82.65
80	0.18	2.50	4.17	12.44	95.09
120	0.13	3.00	0.92	2.74	97.83
170	0.09	3.50	0.19	0.56	98.39
200	0.07	3.75	0.06	0.19	98.58
Pan			0.01	0.02	98.60
Total			33.04	98.60	98.60

Folk Statistics	phi	mm
5% :	-1.44	2.71
16% :	-0.60	1.51
25% :	-0.21	1.15
50% :	0.74	0.60
75% :	1.76	0.29
84% :	2.05	0.24
95% :	2.50	0.18
Med.	0.74	0.60
Mean	0.65	0.64
St Dev.	1.26	
Skew	-0.06	
Kurt.	0.82	

Moment Statistics	Phi	mm
Mean	0.93	0.52
St. Dev.	1.24	0.42
Skewness	-0.30	
Kurtosis	2.42	

Cu =	3.87	Gravel		1	%
		Coarse	Sand	8	%
		Med.	Sand	52	%
Cc =	0.67	Fine	Sand	37	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
0.5	-52.7	Medium to fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C91
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C91 2.5

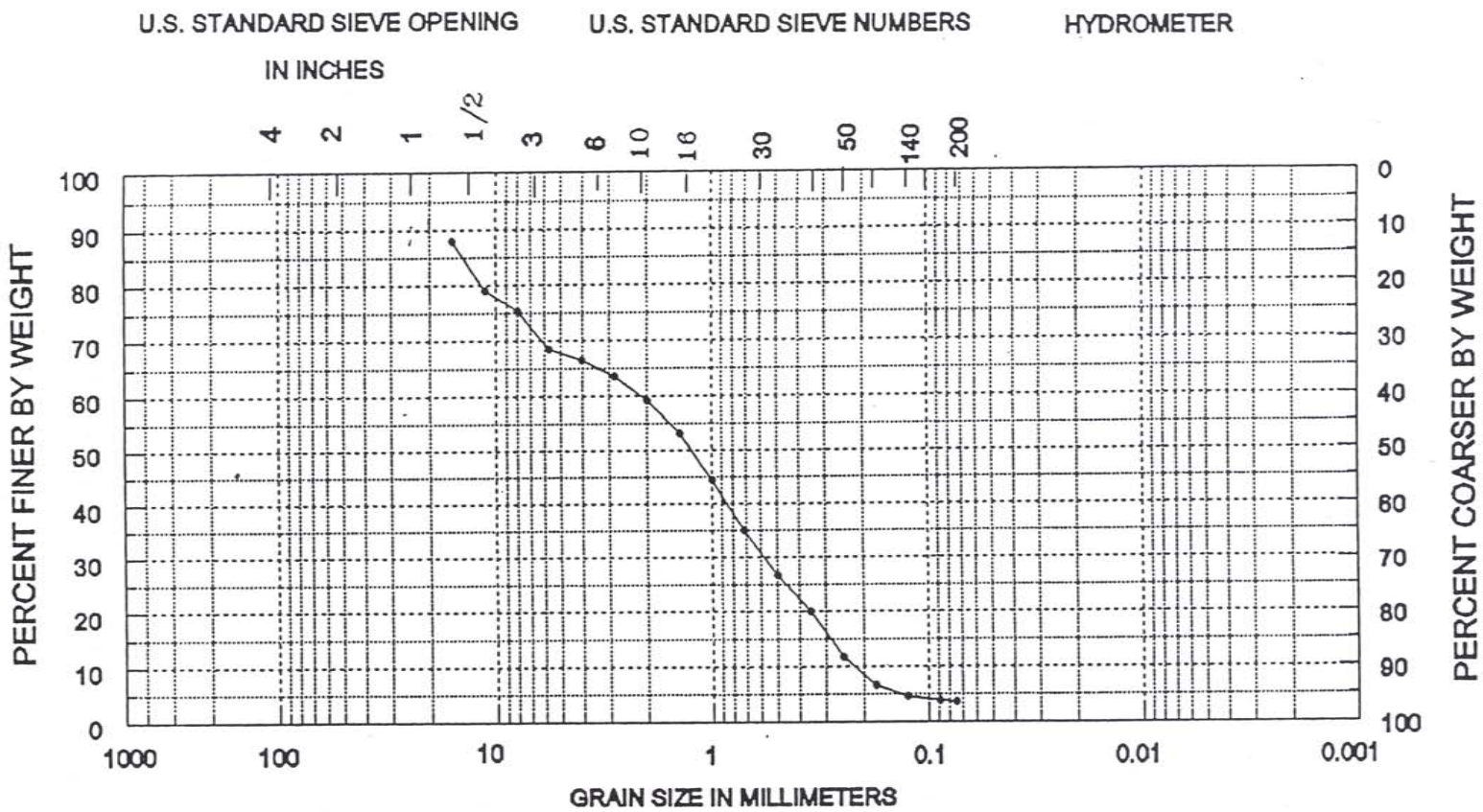
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	4.93	12.01	12.01
	11.31	-3.50	3.65	8.90	20.91
	8.00	-3.00	1.47	3.57	24.49
	5.66	-2.50	2.88	7.02	31.50
5	4.00	-2.00	0.81	1.97	33.47
7	2.83	-1.50	1.19	2.90	36.37
10	2.00	-1.00	1.83	4.46	40.82
14	1.41	-0.50	2.54	6.20	47.02
18	1.00	0.00	3.56	8.69	55.71
25	0.71	0.50	3.79	9.24	64.95
35	0.50	1.00	3.44	8.38	73.33
45	0.35	1.50	2.75	6.70	80.03
60	0.25	2.00	3.44	8.38	88.41
80	0.18	2.50	2.08	5.06	93.47
120	0.13	3.00	0.85	2.06	95.53
170	0.09	3.50	0.25	0.61	96.14
200	0.07	3.75	0.15	0.36	96.51
Pan			0.04	0.09	96.60
Total			39.63	96.60	96.60

Folk Statistics		phi	mm
5%	:	-4.20	18.38
16%	:	-3.78	13.70
25%	:	-2.96	7.80
50%	:	-0.33	1.26
75%	:	1.12	0.46
84%	:	1.74	0.30
95%	:	2.87	0.14
Med.		-0.33	1.26
Mean		-0.74	1.67
St Dev.		2.45	
Skew		-0.17	
Kurt.		0.71	

Moment Statistics	Phi	mm
Mean	-0.63	1.55
St. Dev.	2.23	0.21
Skewness	-0.16	
Kurtosis	1.72	

Cu =	9.51	Gravel	32	%
		Coarse Sand	8	%
		Med. Sand	36	%
Cc =	0.69	Fine Sand	20	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
2.5	-54.7	Well graded sand and gravel (SW)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C91
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C91 4.5

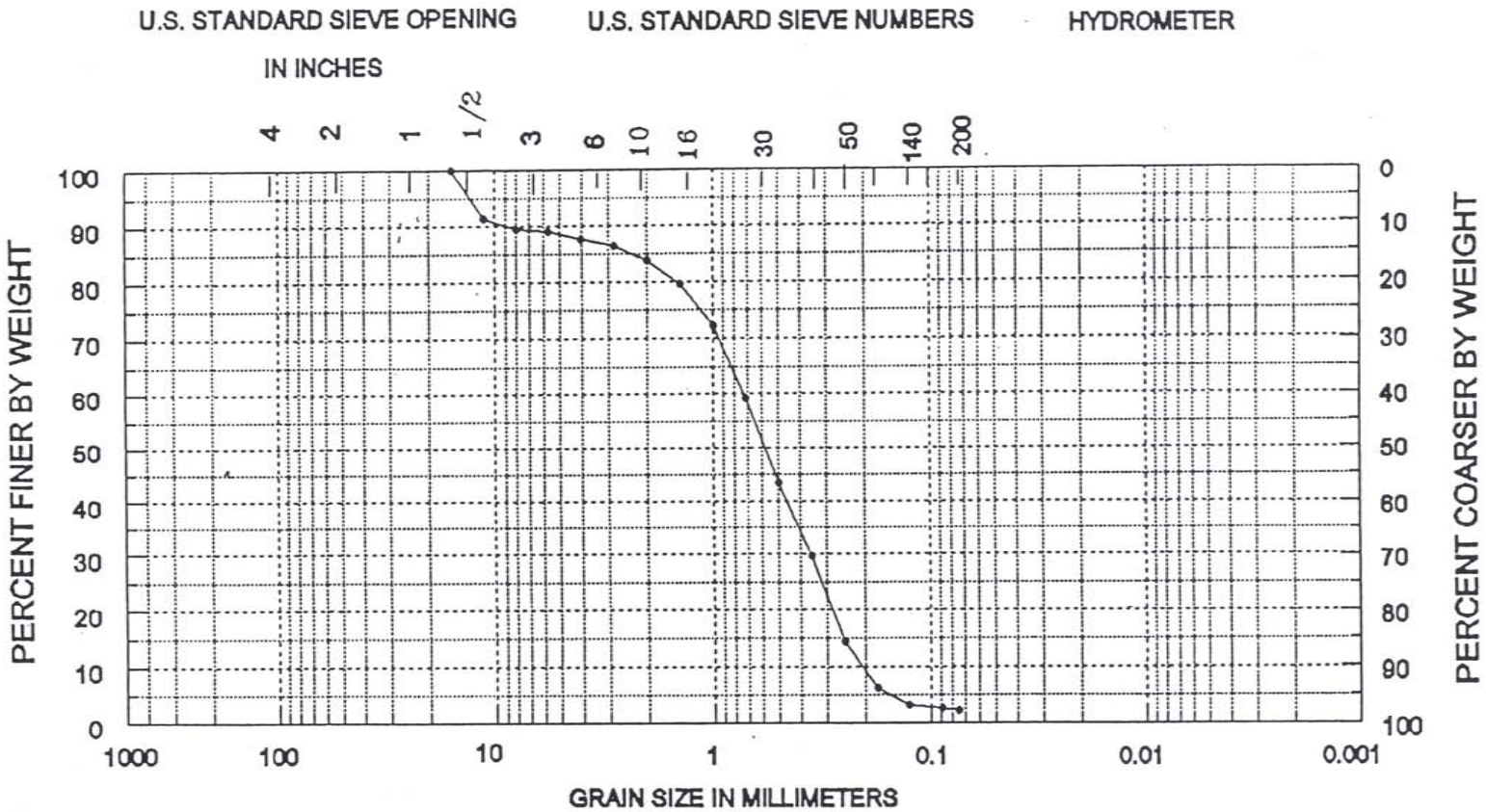
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	2.68	8.75	8.75
	8.00	-3.00	0.59	1.94	10.69
	5.66	-2.50	0.10	0.33	11.01
5	4.00	-2.00	0.43	1.41	12.42
7	2.83	-1.50	0.40	1.30	13.72
10	2.00	-1.00	0.75	2.45	16.17
14	1.41	-0.50	1.28	4.18	20.35
18	1.00	0.00	2.26	7.37	27.72
25	0.71	0.50	4.01	13.09	40.81
35	0.50	1.00	4.88	15.92	56.73
45	0.35	1.50	4.18	13.63	70.36
60	0.25	2.00	4.69	15.30	85.66
80	0.18	2.50	2.52	8.24	93.90
120	0.13	3.00	0.91	2.97	96.87
170	0.09	3.50	0.20	0.64	97.51
200	0.07	3.75	0.10	0.32	97.83
Pan			0.02	0.07	97.90
Total			29.98	97.90	97.90

Folk Statistics	phi	mm
5% :	-3.71	13.12
16% :	-1.03	2.05
25% :	-0.18	1.14
50% :	0.79	0.58
75% :	1.65	0.32
84% :	1.95	0.26
95% :	2.68	0.16
Med.	0.79	0.58
Mean	0.13	0.91
St Dev.	1.71	
Skew	-0.32	
Kurt.	1.43	

Moment Statistics	Phi	mm
Mean	0.61	0.65
St. Dev.	1.76	0.29
Skewness	-1.11	
Kurtosis	3.52	

Cu =	3.47	Gravel		12	%
		Coarse	Sand	4	%
		Med.	Sand	47	%
Cc =	0.85	Fine	Sand	34	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
4.5	-56.7	Medium to fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C91
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C91 7.0

Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.00	0.00	0.00
5	4.00	-2.00	0.00	0.00	0.00
7	2.83	-1.50	0.00	0.00	0.00
10	2.00	-1.00	0.15	0.58	0.58
14	1.41	-0.50	0.62	2.48	3.07
18	1.00	0.00	1.74	6.92	9.99
25	0.71	0.50	4.02	15.98	25.97
35	0.50	1.00	4.86	19.35	45.33
45	0.35	1.50	4.22	16.80	62.12
60	0.25	2.00	5.06	20.15	82.28
80	0.18	2.50	2.28	9.09	91.37
120	0.13	3.00	1.20	4.78	96.15
170	0.09	3.50	0.24	0.96	97.10
200	0.07	3.75	0.17	0.66	97.76
Pan			0.04	0.14	97.90
Total			24.60	97.90	97.90

Folk Statistics	phi	mm
5% :	-0.36	1.28
16% :	0.19	0.88
25% :	0.47	0.72
50% :	1.14	0.45
75% :	1.82	0.28
84% :	2.09	0.23
95% :	2.88	0.14
Med.	1.14	0.45
Mean	1.19	0.44
St Dev.	0.97	
Skew	0.04	
Kurt.	0.98	

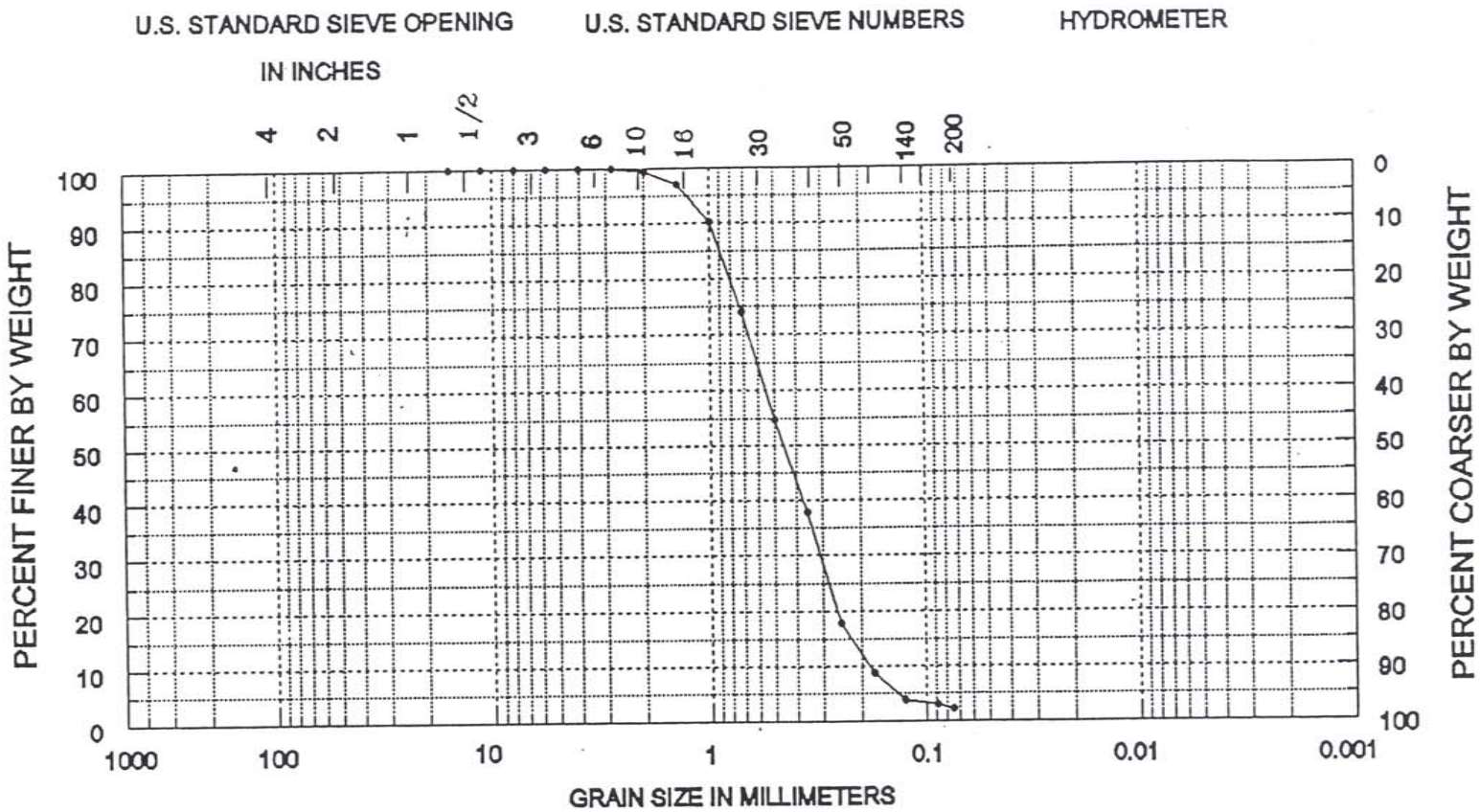
Moment Statistics	Phi	mm
Mean	1.37	0.39
St. Dev.	0.91	0.53
Skewness	0.05	
Kurtosis	2.65	

Cu = 2.95

Cc = 0.93

Gravel		0	%
Coarse	Sand	1	%
Med.	Sand	53	%
Fine	Sand	44	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
7.0	-59.2	Medium to fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C91
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C91 10.0

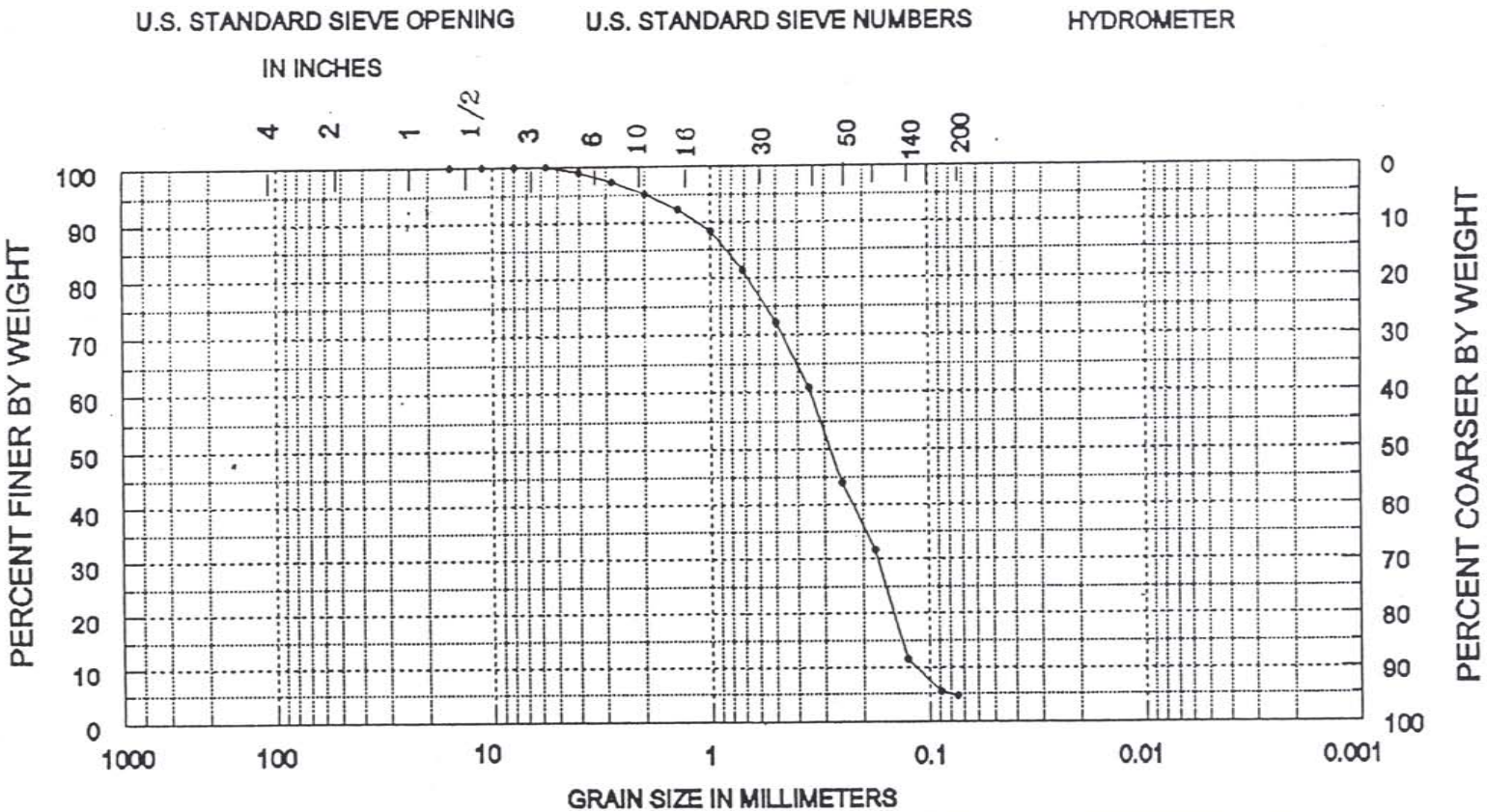
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.00	0.00	0.00
5	4.00	-2.00	0.31	0.97	0.97
7	2.83	-1.50	0.56	1.78	2.75
10	2.00	-1.00	0.73	2.29	5.03
14	1.41	-0.50	0.85	2.67	7.70
18	1.00	0.00	1.27	3.99	11.69
25	0.71	0.50	2.18	6.87	18.56
35	0.50	1.00	2.94	9.25	27.81
45	0.35	1.50	3.61	11.37	39.18
60	0.25	2.00	5.38	16.95	56.13
80	0.18	2.50	3.87	12.19	68.32
120	0.13	3.00	6.43	20.26	88.58
170	0.09	3.50	1.91	6.01	94.59
200	0.07	3.75	0.30	0.93	95.52
Pan			0.09	0.28	95.80
Total			30.41	95.80	95.80

Folk Statistics		phi	mm
5%	:	-1.01	2.01
16%	:	0.31	0.80
25%	:	0.85	0.56
50%	:	1.82	0.28
75%	:	2.66	0.16
84%	:	2.89	0.14
95%	:	3.47	0.09
Med.		1.82	0.28
Mean		1.50	0.35
St Dev.		1.32	
Skew		-0.22	
Kurt.		1.01	

Moment Statistics	Phi	mm
Mean	1.79	0.29
St. Dev.	1.27	0.42
Skewness	-0.84	
Kurtosis	3.23	

Cu =	3.02	Gravel	0	%
		Coarse Sand	5	%
		Med. Sand	28	%
Cc =	0.74	Fine Sand	62	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
10.0	-62.2	Fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C91
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C91 COMP

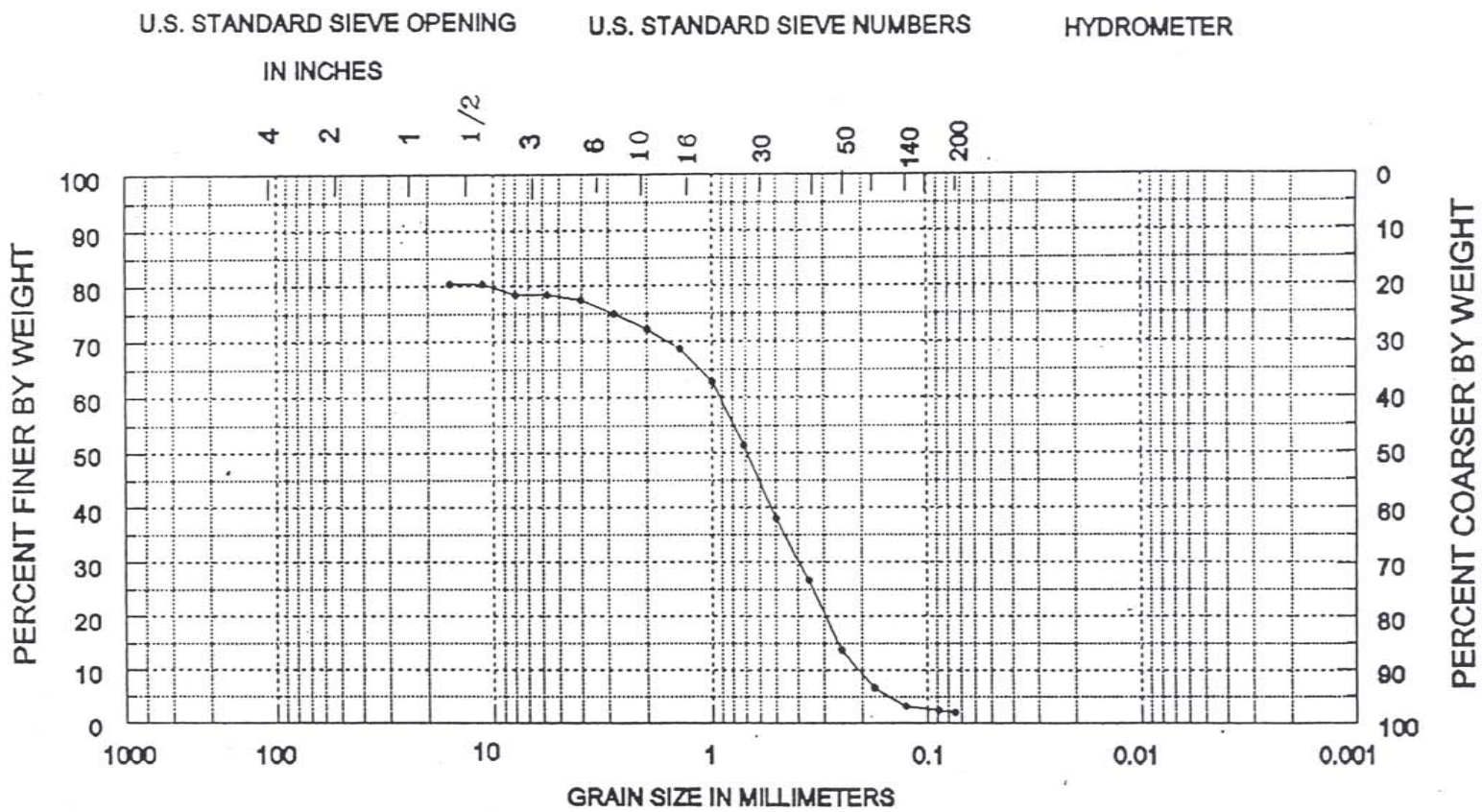
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	5.26	19.67	19.67
	11.31	-3.50	0.00	0.00	19.67
	8.00	-3.00	0.51	1.89	21.56
	5.66	-2.50	0.00	0.00	21.56
5	4.00	-2.00	0.29	1.08	22.63
7	2.83	-1.50	0.61	2.30	24.93
10	2.00	-1.00	0.73	2.73	27.66
14	1.41	-0.50	0.95	3.54	31.20
18	1.00	0.00	1.61	6.03	37.24
25	0.71	0.50	3.06	11.43	48.67
35	0.50	1.00	3.54	13.24	61.91
45	0.35	1.50	3.02	11.30	73.21
60	0.25	2.00	3.53	13.20	86.41
80	0.18	2.50	1.89	7.07	93.48
120	0.13	3.00	0.89	3.33	96.81
170	0.09	3.50	0.23	0.84	97.66
200	0.07	3.75	0.07	0.27	97.93
Pan			0.02	0.07	98.00
Total			26.19	98.00	98.00

Folk Statistics		phi	mm
5%	:	-4.60	24.25
16%	:	-4.20	18.38
25%	:	-1.49	2.80
50%	:	0.55	0.68
75%	:	1.57	0.34
84%	:	1.91	0.27
95%	:	2.73	0.15
Med.		0.55	0.68
Mean		-0.72	1.65
St Dev.		2.64	
Skew		-0.48	
Kurt.		0.98	

Moment Statistics	Phi	mm
Mean	-0.67	1.59
St. Dev.	2.32	0.20
Skewness	-0.75	
Kurtosis	2.19	

Cu =	4.39	Gravel		22	%
		Coarse	Sand	6	%
		Med.	Sand	40	%
Cc =	0.79	Fine	Sand	30	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
COMP		Medium to fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C91
			DATE November 1996

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (Coordinates or Station): 811455.6 E, 959831.6 N	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
3. DRILLING AGENCY: SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (As shown on drawing title and file number): PB96 C92	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 7 undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	16. DATE HOLE: STARTED 8/1/96, COMPLETED 8/1/96
7. WATER DEPTH: 64.5'	17. ELEVATION TOP OF HOLE: -64.5
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING: -18.5 ft
9. TOTAL DEPTH OF HOLE: 18.5'	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-64.5	0.0					
-65.7	1.2		Light-gray, medium-fine sand grading to fine–medium shelly sand, whole shells and coarse shell fragments. (SP)	100	0.5	
			Gray, fine sand, medium-fine shell fragments. (SP)		3.0	
					7.0	
				100		
					11.0	
-76.5	12.0					
			Gray, fine, muddy sand. (SM)		14.0	
-81.2	16.7					
-81.5	17.0		Gray, medium-fine sand, medium-fine shell fragments. (SP)		18.0	
-83.0	18.5					
			Gray, fine sand, shell fragments. (SP)	100		
			End at 18.5'			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: Palm Beach County Shore Protection 1996 | HOLE NUMBER: PB-92

Sediment Analysis Data Sheet

PB96 C92 0.5

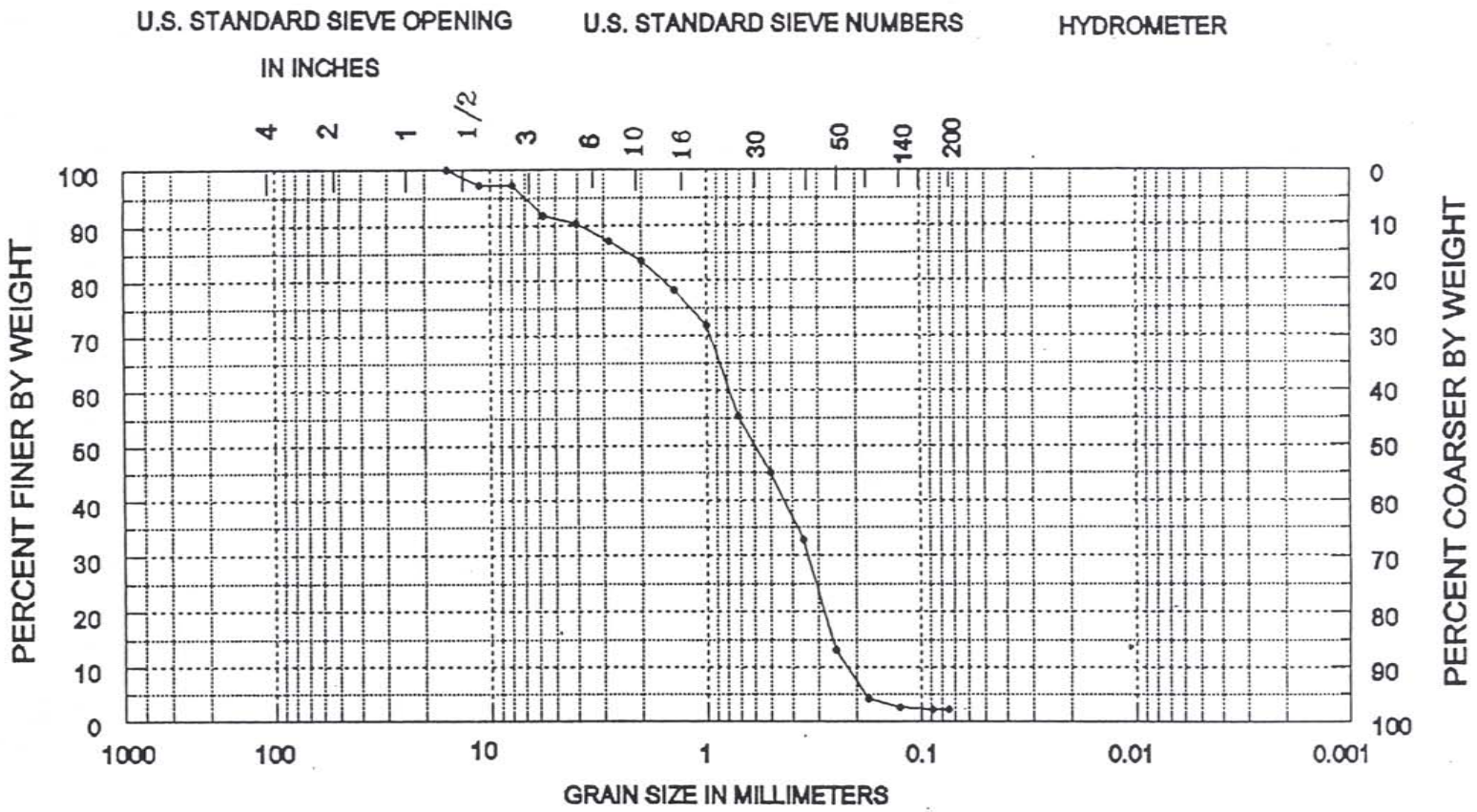
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.67	2.85	2.85
	8.00	-3.00	0.00	0.00	2.85
	5.66	-2.50	1.28	5.47	8.31
5	4.00	-2.00	0.35	1.48	9.79
7	2.83	-1.50	0.73	3.11	12.91
10	2.00	-1.00	0.81	3.46	16.37
14	1.41	-0.50	1.25	5.34	21.71
18	1.00	0.00	1.50	6.38	28.09
25	0.71	0.50	3.93	16.74	44.83
35	0.50	1.00	2.40	10.21	55.04
45	0.35	1.50	2.82	12.01	67.05
60	0.25	2.00	4.68	19.94	87.00
80	0.18	2.50	2.09	8.92	95.92
120	0.13	3.00	0.37	1.58	97.50
170	0.09	3.50	0.08	0.35	97.85
200	0.07	3.75	0.01	0.05	97.90
Pan			0.00	0.00	97.90
Total			22.96	97.90	97.90

Folk Statistics		phi	mm
5%	:	-2.80	6.98
16%	:	-1.05	2.08
25%	:	-0.24	1.18
50%	:	0.75	0.59
75%	:	1.70	0.31
84%	:	1.92	0.26
95%	:	2.45	0.18
Med.		0.75	0.59
Mean		0.25	0.84
St Dev.		1.54	
Skew		-0.28	
Kurt.		1.11	

Moment Statistics	Phi	mm
Mean	0.69	0.62
St. Dev.	1.55	0.34
Skewness	-0.93	
Kurtosis	3.27	

Cu =	3.51	Gravel		9	%
		Coarse	Sand	7	%
		Med.	Sand	45	%
Cc =	0.65	Fine	Sand	37	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	PROJECT Palm Beach County 1996
0.5	-55.0	Medium to fine sand (SP)	AREA Palm Beach County
			BORING NO. PB96 C92
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C92 3.0

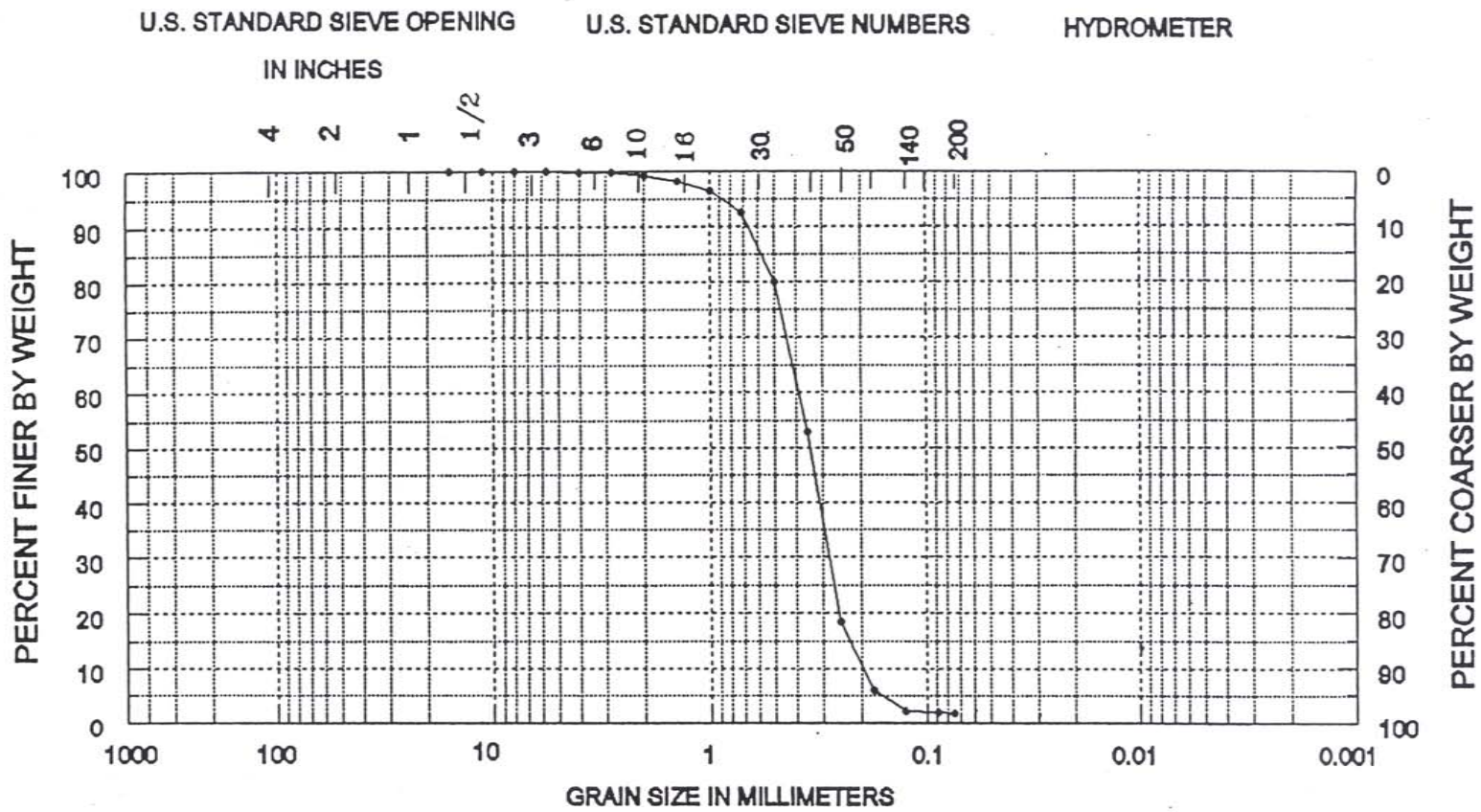
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.00	0.00	0.00
5	4.00	-2.00	0.03	0.11	0.11
7	2.83	-1.50	0.04	0.13	0.24
10	2.00	-1.00	0.14	0.47	0.71
14	1.41	-0.50	0.33	1.12	1.83
18	1.00	0.00	0.51	1.71	3.54
25	0.71	0.50	1.16	3.92	7.46
35	0.50	1.00	3.70	12.52	19.98
45	0.35	1.50	8.02	27.10	47.08
60	0.25	2.00	10.19	34.47	81.55
80	0.18	2.50	3.67	12.42	93.96
120	0.13	3.00	1.12	3.78	97.75
170	0.09	3.50	0.10	0.34	98.09
200	0.07	3.75	0.02	0.07	98.16
Pan			0.01	0.04	98.20
Total			29.05	98.20	98.20

Folk Statistics	phi	mm
5% :	0.19	0.88
16% :	0.84	0.56
25% :	1.09	0.47
50% :	1.54	0.34
75% :	1.91	0.27
84% :	2.10	0.23
95% :	2.64	0.16
Med.	1.54	0.34
Mean	1.46	0.36
St Dev.	0.69	
Skew	-0.11	
Kurt.	1.24	

Moment Statistics	Phi	mm
Mean	1.70	0.31
St. Dev.	0.70	0.61
Skewness	-0.94	
Kurtosis	5.52	

Cu =	1.96	Gravel		0	%
		Coarse	Sand	1	%
		Med.	Sand	33	%
Cc =	1.03	Fine	Sand	65	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
3.0	-57.5	Medium to fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C92
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C92 7.0

Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.75	2.78	2.78
5	4.00	-2.00	0.36	1.31	4.09
7	2.83	-1.50	0.55	2.03	6.13
10	2.00	-1.00	0.54	2.01	8.14
14	1.41	-0.50	0.63	2.32	10.45
18	1.00	0.00	0.61	2.25	12.70
25	0.71	0.50	0.82	3.02	15.72
35	0.50	1.00	1.40	5.17	20.90
45	0.35	1.50	3.42	12.62	33.52
60	0.25	2.00	8.85	32.69	66.21
80	0.18	2.50	5.87	21.69	87.90
120	0.13	3.00	2.43	8.98	96.88
170	0.09	3.50	0.16	0.59	97.47
200	0.07	3.75	0.03	0.11	97.58
Pan			0.01	0.02	97.60
Total			26.43	97.60	97.60

Folk Statistics	phi	mm
5% :	-1.78	3.43
16% :	0.53	0.69
25% :	1.16	0.45
50% :	1.75	0.30
75% :	2.20	0.22
84% :	2.41	0.19
95% :	2.90	0.13
Med.	1.75	0.30
Mean	1.16	0.45
St Dev.	1.18	
Skew	-0.41	
Kurt.	1.84	

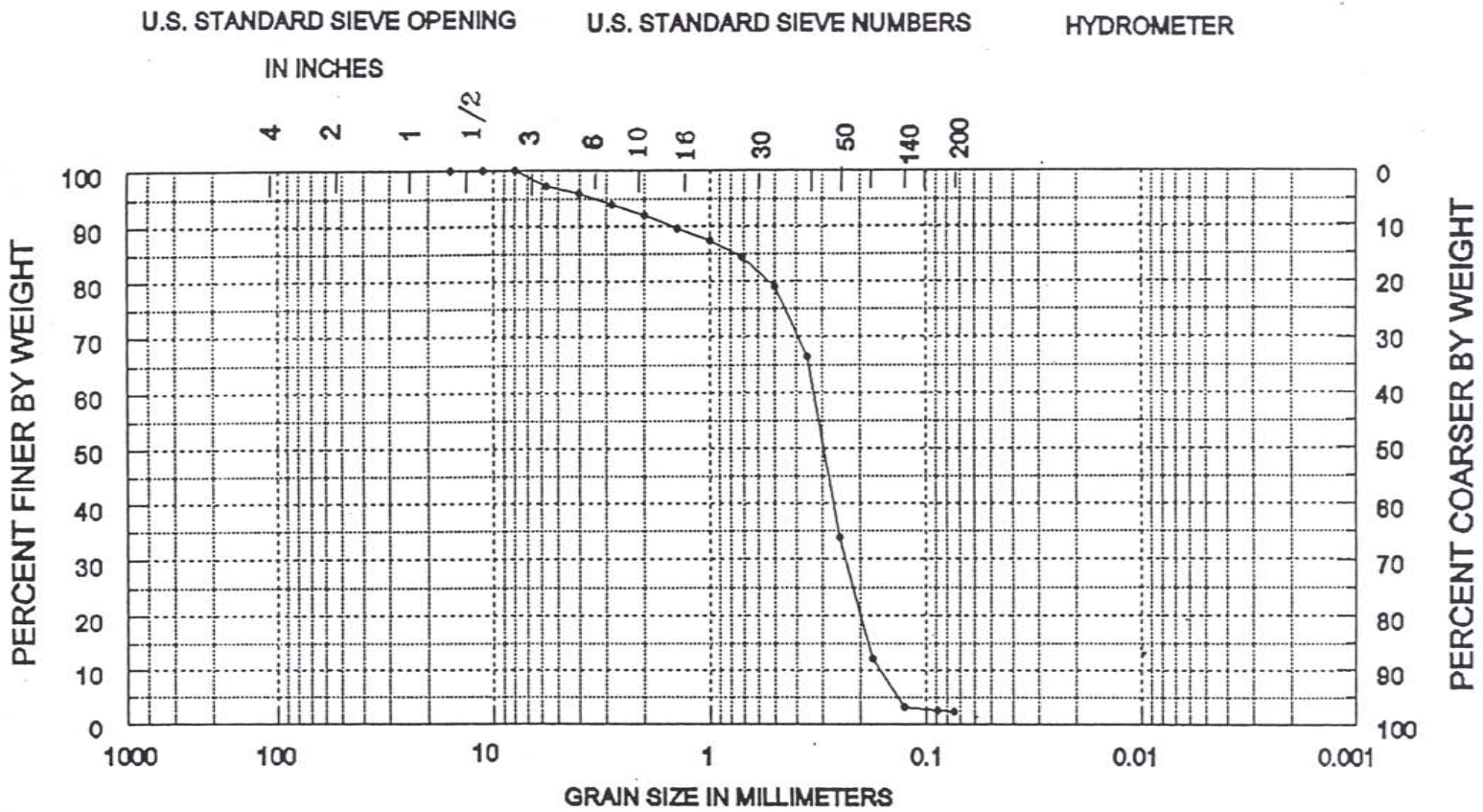
Moment Statistics	Phi	mm
Mean	1.63	0.32
St. Dev.	1.29	0.41
Skewness	-1.69	
Kurtosis	5.42	

Cu = 2.02

Cc = 1.03

Gravel	3	%
Coarse Sand	5	%
Med. Sand	19	%
Fine Sand	70	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
7.0	-61.5	Fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C92
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C92 11.0

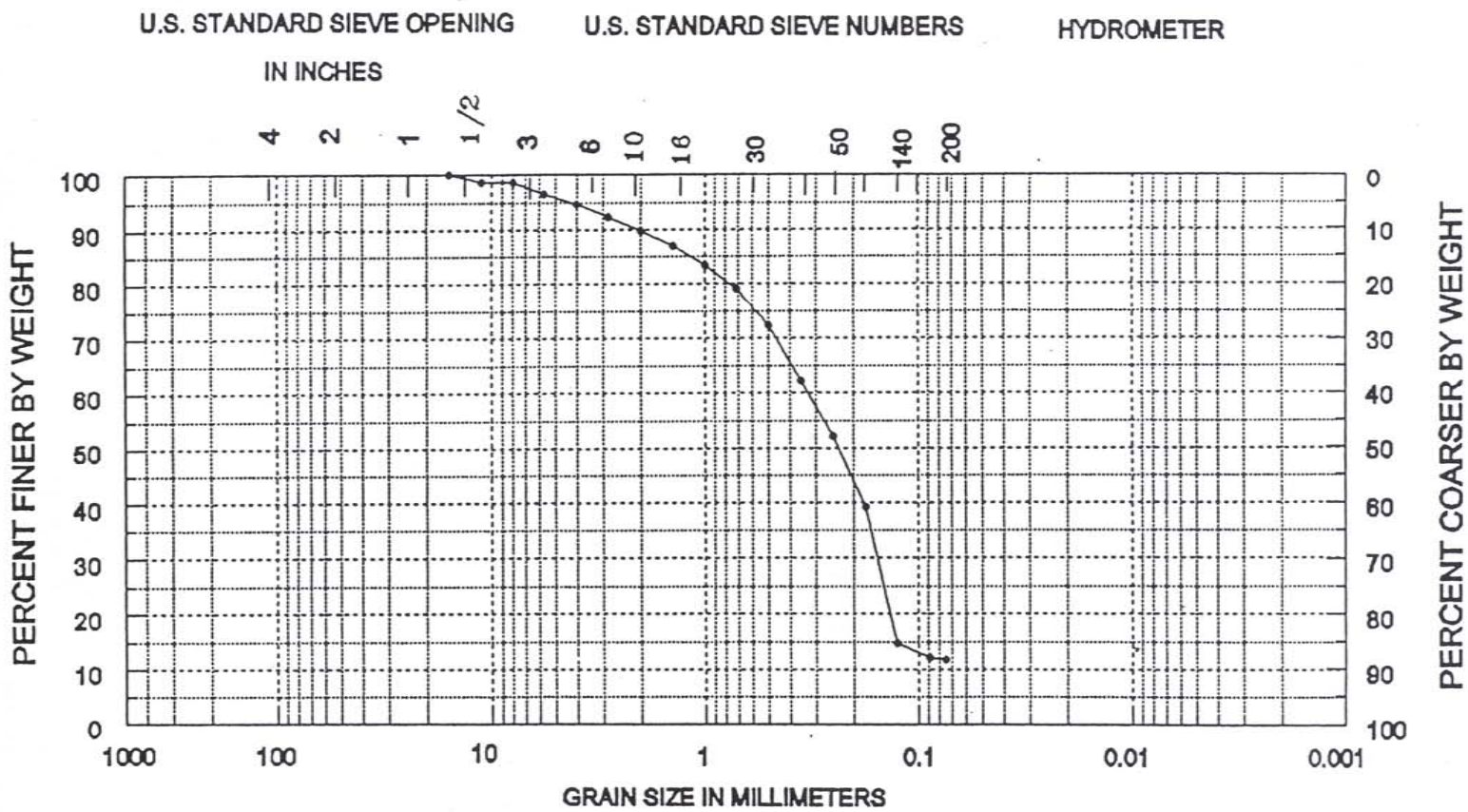
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.34	1.31	1.31
	8.00	-3.00	0.00	0.00	1.31
	5.66	-2.50	0.57	2.16	3.47
5	4.00	-2.00	0.51	1.94	5.41
7	2.83	-1.50	0.60	2.29	7.70
10	2.00	-1.00	0.66	2.50	10.20
14	1.41	-0.50	0.73	2.78	12.98
18	1.00	0.00	0.97	3.69	16.67
25	0.71	0.50	1.13	4.33	20.99
35	0.50	1.00	1.70	6.48	27.47
45	0.35	1.50	2.70	10.32	37.79
60	0.25	2.00	2.63	10.04	47.83
80	0.18	2.50	3.42	13.06	60.89
120	0.13	3.00	6.40	24.46	85.35
170	0.09	3.50	0.67	2.57	87.93
200	0.07	3.75	0.08	0.31	88.23
Pan			0.02	0.07	88.30
Total			23.11	88.30	88.30

Folk Statistics		phi	mm
5%	:	-2.11	4.31
16%	:	-0.09	1.06
25%	:	0.81	0.57
50%	:	2.08	0.24
75%	:	2.79	0.14
84%	:	2.97	0.13
95%	:	4.20	0.05
Med.		2.08	0.24
Mean		1.41	0.38
St Dev.		1.72	
Skew		-0.37	
Kurt.		1.31	

Cu =	0.33		Gravel		4	%
			Coarse	Sand	6	%
			Med.	Sand	22	%
Cc =	0.07		Fine	Sand	56	%

Moment Statistics	Phi	mm
Mean	1.58	0.34
St. Dev.	1.63	0.32
Skewness	-1.20	
Kurtosis	3.74	

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
11.0	-65.5	Fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C92
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C92 14.0

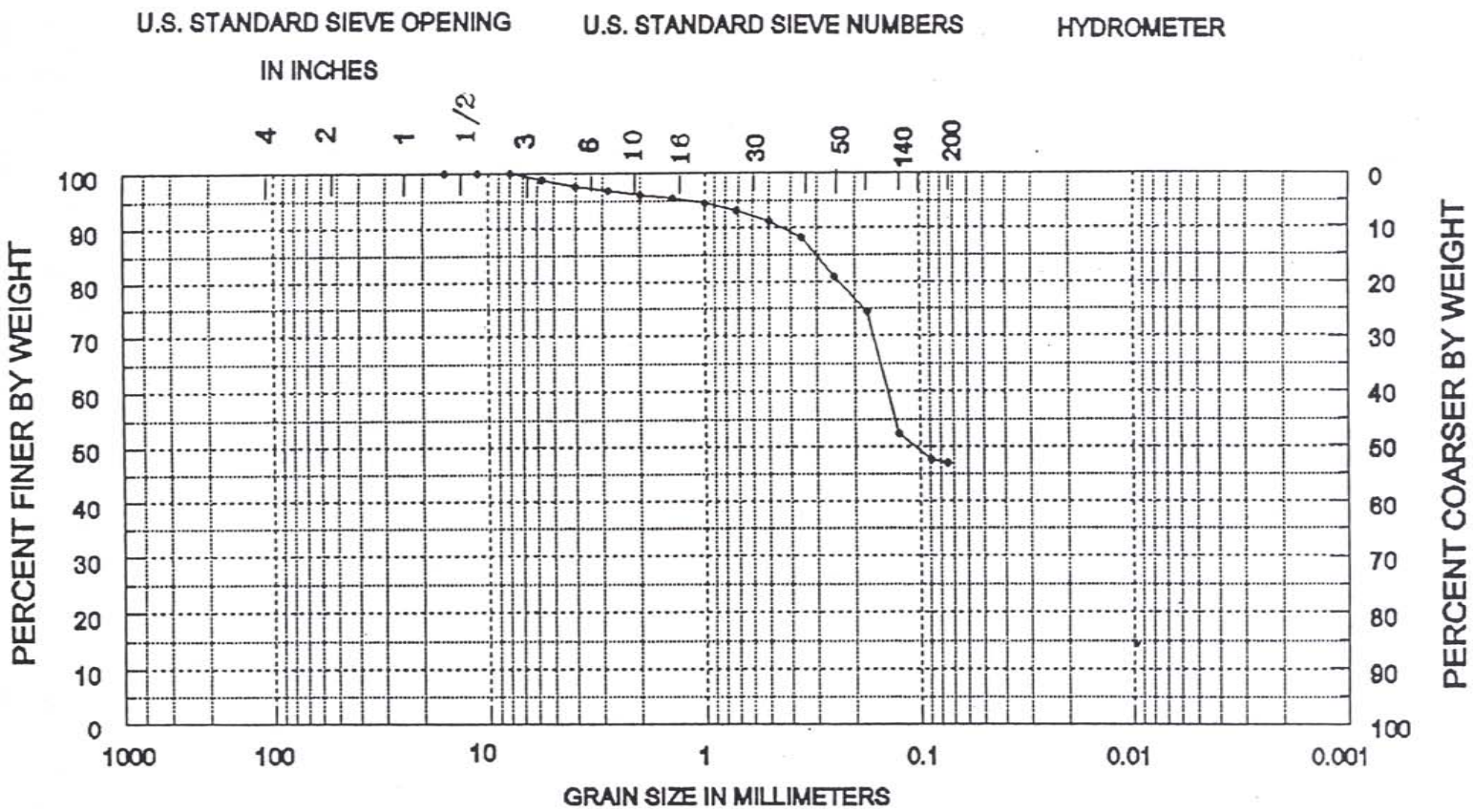
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.45	1.15	1.15
5	4.00	-2.00	0.44	1.13	2.28
7	2.83	-1.50	0.36	0.93	3.20
10	2.00	-1.00	0.27	0.70	3.90
14	1.41	-0.50	0.29	0.74	4.64
18	1.00	0.00	0.34	0.88	5.52
25	0.71	0.50	0.52	1.34	6.86
35	0.50	1.00	0.77	2.00	8.86
45	0.35	1.50	1.15	2.98	11.84
60	0.25	2.00	2.74	7.09	18.93
80	0.18	2.50	2.57	6.64	25.58
120	0.13	3.00	8.59	22.21	47.79
170	0.09	3.50	1.83	4.74	52.53
200	0.07	3.75	0.25	0.64	53.17
Pan			0.05	0.13	53.30
Total			20.61	53.30	53.30

Folk Statistics	phi	mm
5% :	-0.30	1.23
16% :	1.79	0.29
25% :	2.46	0.18
50% :	3.23	0.11
75% :	4.10	0.06
84% :	5.00	0.03
95% :	6.10	0.01
Med.	3.23	0.11
Mean	3.17	0.11
St Dev.	1.77	
Skew	-0.00	
Kurt.	1.60	

Moment Statistics	Phi	mm
Mean	2.95	0.13
St. Dev.	1.42	0.37
Skewness	-1.81	
Kurtosis	5.69	

Cu =	0.14	Gravel		2	%
		Coarse	Sand	2	%
		Med.	Sand	6	%
Cc =	7.08	Fine	Sand	43	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
14.0	-68.5	Fine muddy sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C92
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C92 18.0

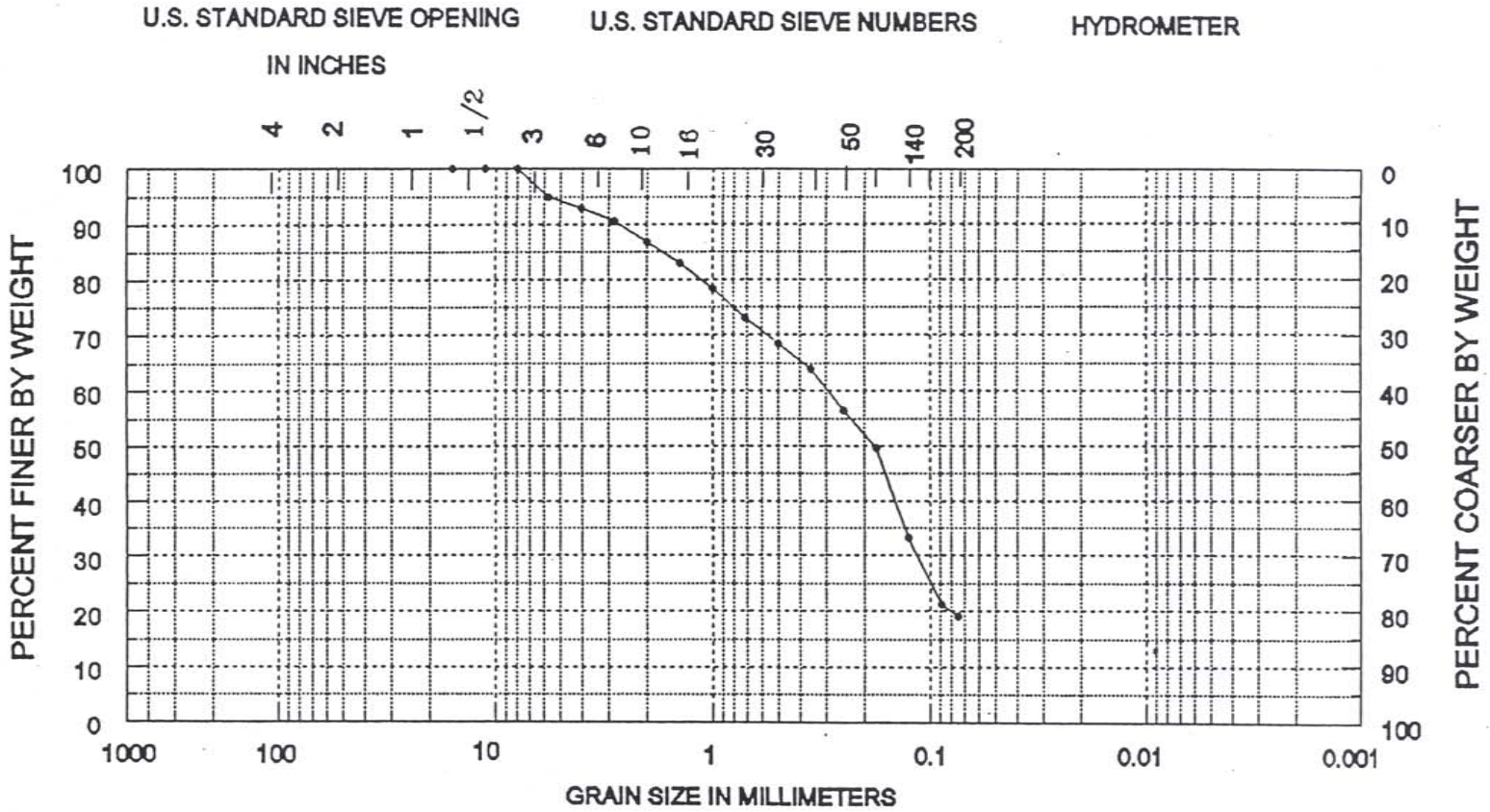
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	1.48	6.31	6.31
5	4.00	-2.00	0.54	2.31	8.62
7	2.83	-1.50	0.67	2.88	11.49
10	2.00	-1.00	1.09	4.66	16.15
14	1.41	-0.50	1.09	4.64	20.79
18	1.00	0.00	1.30	5.54	26.32
25	0.71	0.50	1.50	6.40	32.72
35	0.50	1.00	1.33	5.68	38.41
45	0.35	1.50	1.27	5.44	43.85
60	0.25	2.00	2.15	9.19	53.03
80	0.18	2.50	1.98	8.44	61.47
120	0.13	3.00	4.63	19.77	81.24
170	0.09	3.50	3.46	14.77	96.01
200	0.07	3.75	0.64	2.72	98.73
Pan			0.06	0.27	99.00
Total			23.20	99.00	99.00

Folk Statistics		phi	mm
5%	:	-2.60	6.08
16%	:	-1.02	2.02
25%	:	-0.12	1.09
50%	:	1.83	0.28
75%	:	2.84	0.14
84%	:	3.09	0.12
95%	:	3.47	0.09
Med.		1.83	0.28
Mean		0.95	0.52
St Dev.		1.95	
Skew		-0.43	
Kurt.		0.84	

Moment Statistics	Phi	mm
Mean	1.48	0.36
St. Dev.	1.89	0.27
Skewness	-0.71	
Kurtosis	2.29	

Cu =	4.44	Gravel	7	%
		Coarse Sand	9	%
		Med. Sand	25	%
Cc =	0.50	Fine Sand	58	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
18.0	-72.5	Fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C92
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C92 COMP

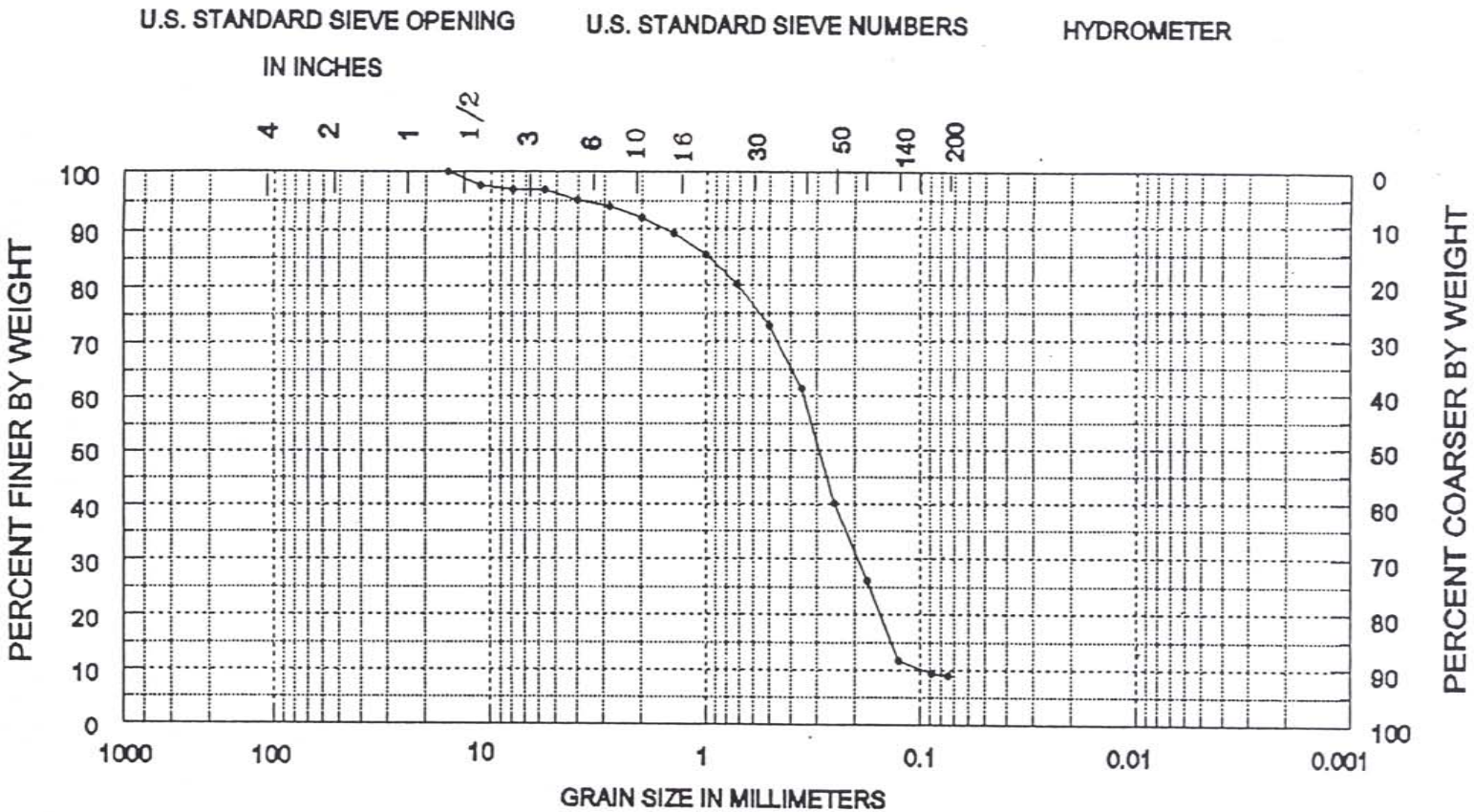
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.60	2.31	2.31
	8.00	-3.00	0.23	0.88	3.19
	5.66	-2.50	0.00	0.00	3.19
5	4.00	-2.00	0.44	1.71	4.91
7	2.83	-1.50	0.34	1.29	6.20
10	2.00	-1.00	0.48	1.85	8.05
14	1.41	-0.50	0.72	2.79	10.83
18	1.00	0.00	1.01	3.89	14.73
25	0.71	0.50	1.31	5.04	19.77
35	0.50	1.00	1.92	7.39	27.16
45	0.35	1.50	2.96	11.43	38.59
60	0.25	2.00	5.47	21.12	59.71
80	0.18	2.50	3.68	14.21	73.92
120	0.13	3.00	3.71	14.30	88.22
170	0.09	3.50	0.65	2.51	90.73
200	0.07	3.75	0.11	0.41	91.15
Pan			0.01	0.05	91.20
Total			23.63	91.20	91.20

Folk Statistics	phi	mm
5% :	-1.96	3.90
16% :	0.13	0.92
25% :	0.85	0.55
50% :	1.77	0.29
75% :	2.54	0.17
84% :	2.85	0.14
95% :	4.50	0.04
Med.	1.77	0.29
Mean	1.46	0.36
St Dev.	1.66	
Skew	-0.18	
Kurt.	1.57	

Moment Statistics	Phi	mm
Mean	1.52	0.35
St. Dev.	1.52	0.35
Skewness	-1.48	
Kurtosis	5.13	

Cu =	3.53	Gravel		4	%
		Coarse	Sand	4	%
		Med.	Sand	25	%
Cc =	1.12	Fine	Sand	58	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
COMP		Fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C92
			DATE November 1996

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (Coordinates or Station): 811601.4 E, 960860.4 N	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
3. DRILLING AGENCY: SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (As shown on drawing title and file number): PB96 C93	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 7 undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	15. ELEVATION GROUND WATER
7. WATER DEPTH: 64.3'	16. DATE HOLE: STARTED 8/2/96, COMPLETED 8/2/96
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE: -64.3
9. TOTAL DEPTH OF HOLE: 15.4'	18. TOTAL CORE RECOVERY FOR BORING: -15.4 ft
	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-64.3	0.0					
-66.1	1.8		Gray, medium sand and coarse shell fragments, whole shells. (SP)	100	0.5	
-76.0	11.7		Gray, fine sand, shell fragments and scattered whole shells. (SP)	100	3.0, 6.0, 9.0, 11.0	
-78.2	13.9		Gray, fine sand and mud, fine-to-medium shell fragments. (SP)			11.7'–12.4' Plastic mud
-79.7	15.4		Gray, fine sand, shell fragments, whole shells to 3" diameter. (SP)	100	14.5	
			End at 15.4'			

0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: Palm Beach County Shore Protection 1996 | HOLE NUMBER: PB-93

Sediment Analysis Data Sheet

PB96 C93 0.5

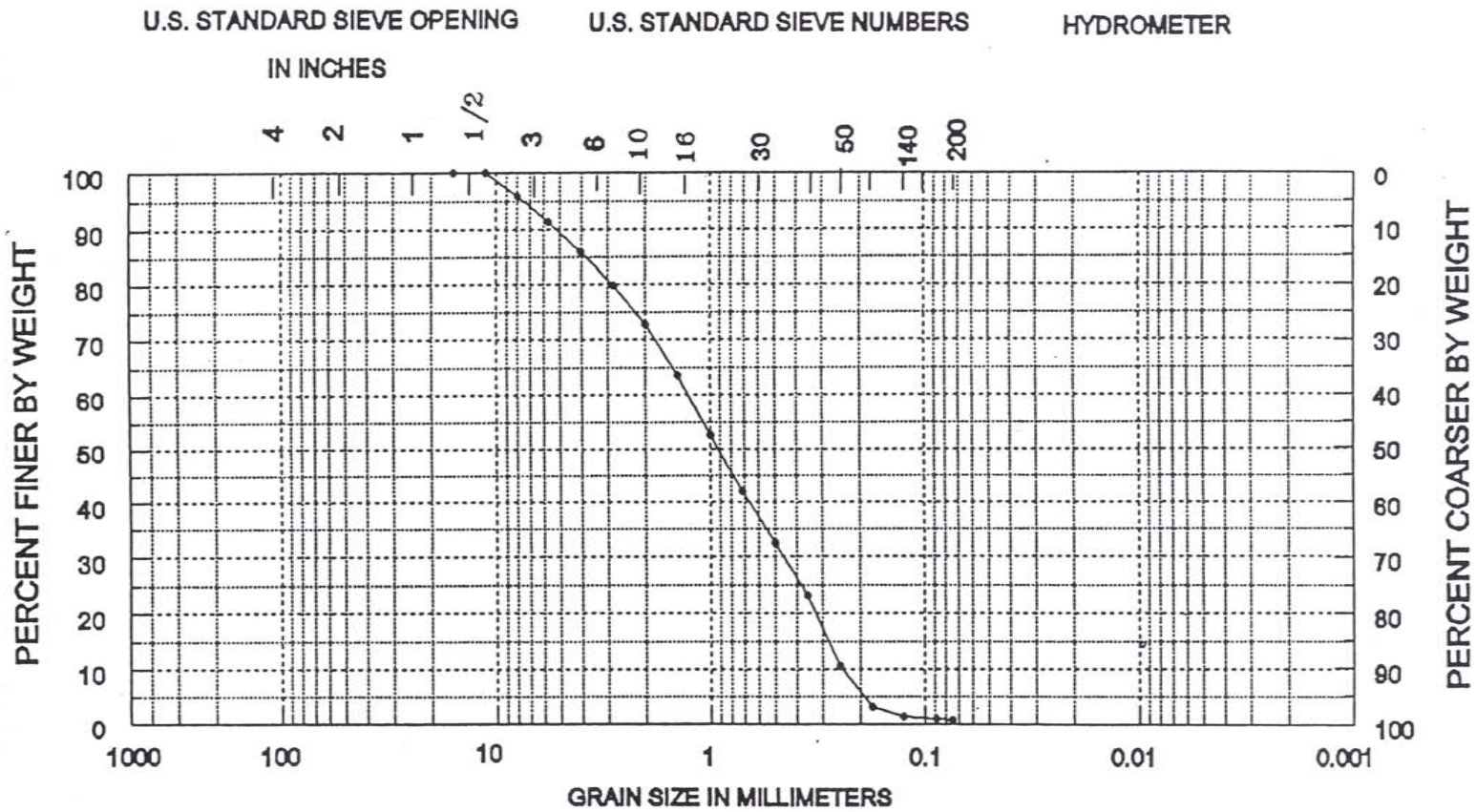
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.99	4.16	4.16
	5.66	-2.50	1.06	4.46	8.62
5	4.00	-2.00	1.28	5.39	14.01
7	2.83	-1.50	1.46	6.14	20.15
10	2.00	-1.00	1.66	6.99	27.14
14	1.41	-0.50	2.21	9.29	36.43
18	1.00	0.00	2.65	11.15	47.58
25	0.71	0.50	2.50	10.52	58.10
35	0.50	1.00	2.24	9.44	67.55
45	0.35	1.50	2.20	9.27	76.82
60	0.25	2.00	3.02	12.70	89.52
80	0.18	2.50	1.75	7.37	96.89
120	0.13	3.00	0.43	1.82	98.70
170	0.09	3.50	0.09	0.37	99.07
200	0.07	3.75	0.03	0.11	99.18
Pan			0.01	0.02	99.20
Total			23.58	99.20	99.20

Folk Statistics	phi	mm
5% :	-2.91	7.50
16% :	-1.84	3.57
25% :	-1.15	2.22
50% :	0.11	0.92
75% :	1.40	0.38
84% :	1.78	0.29
95% :	2.37	0.19
Med.	0.11	0.92
Mean	-0.09	1.07
St Dev.	1.70	
Skew	-0.11	
Kurt.	0.85	

Moment Statistics	Phi	mm
Mean	0.25	0.84
St. Dev.	1.61	0.33
Skewness	-0.28	
Kurtosis	2.16	

Cu =	5.18	Gravel	11	%
		Coarse Sand	16	%
		Med. Sand	45	%
Cc =	0.67	Fine Sand	27	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
0.5	-54.8	Fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C93
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C93 3.0

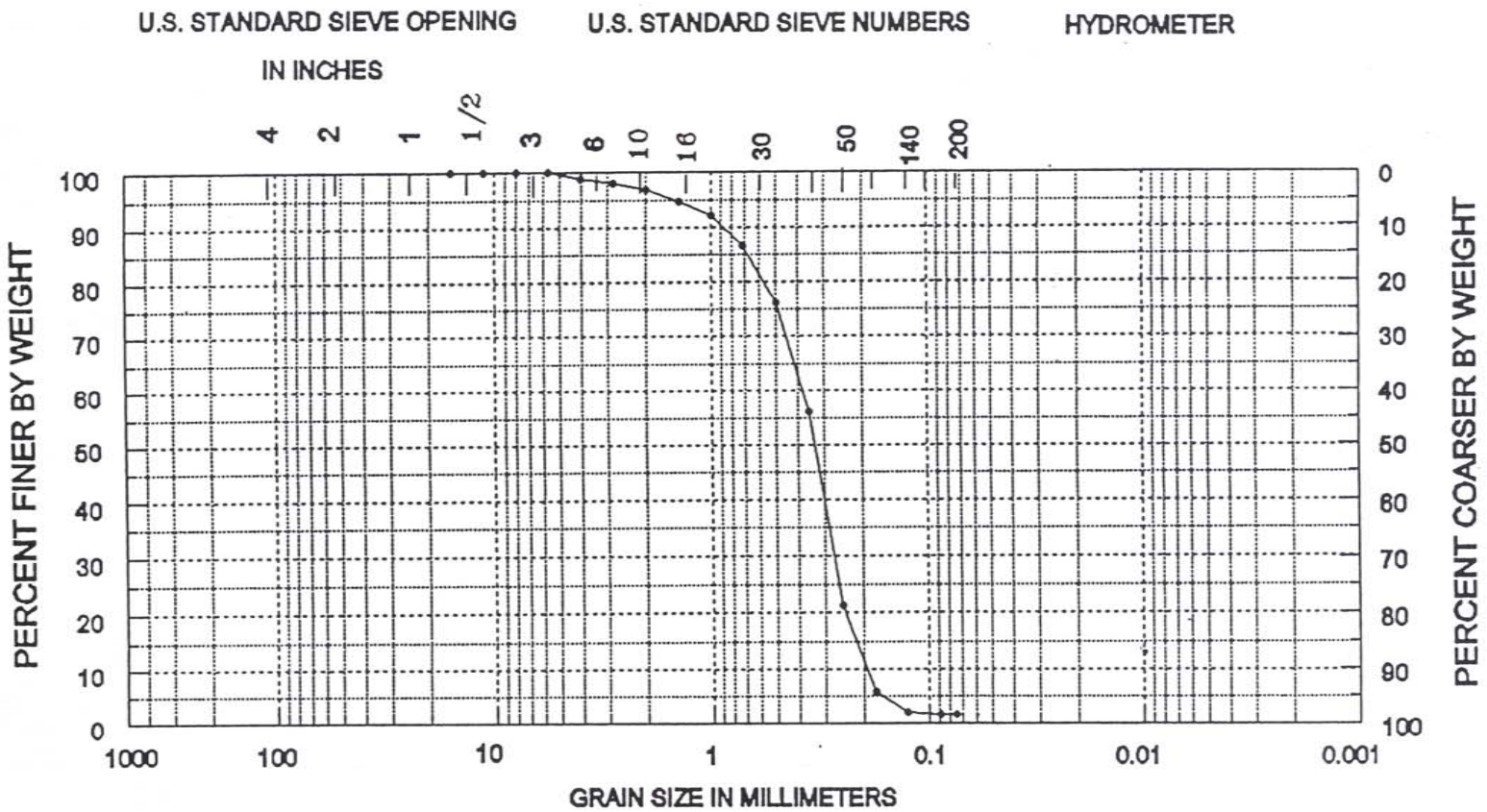
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.00	0.00	0.00
5	4.00	-2.00	0.43	1.26	1.26
7	2.83	-1.50	0.27	0.79	2.05
10	2.00	-1.00	0.36	1.04	3.09
14	1.41	-0.50	0.79	2.31	5.40
18	1.00	0.00	0.89	2.61	8.01
25	0.71	0.50	1.84	5.37	13.38
35	0.50	1.00	3.58	10.47	23.85
45	0.35	1.50	6.88	20.11	43.96
60	0.25	2.00	11.90	34.78	78.74
80	0.18	2.50	5.31	15.52	94.27
120	0.13	3.00	1.29	3.78	98.05
170	0.09	3.50	0.09	0.27	98.32
200	0.07	3.75	0.02	0.06	98.38
Pan			0.01	0.02	98.40
Total			33.66	98.40	98.40

Folk Statistics		phi	mm
5%	:	-0.59	1.50
16%	:	0.63	0.65
25%	:	1.03	0.49
50%	:	1.59	0.33
75%	:	1.95	0.26
84%	:	2.17	0.22
95%	:	2.60	0.17
Med.		1.59	0.33
Mean		1.28	0.41
St Dev.		0.87	
Skew		-0.31	
Kurt.		1.42	

Cu =	1.95	Gravel		1	%
		Coarse	Sand	2	%
		Med.	Sand	31	%
Cc =	1.01	Fine	Sand	64	%

Moment Statistics	Phi	mm
Mean	1.61	0.33
St. Dev.	0.93	0.52
Skewness	-1.49	
Kurtosis	5.95	

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
3.0	-57.3	Medium to fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C93
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C93 6.0

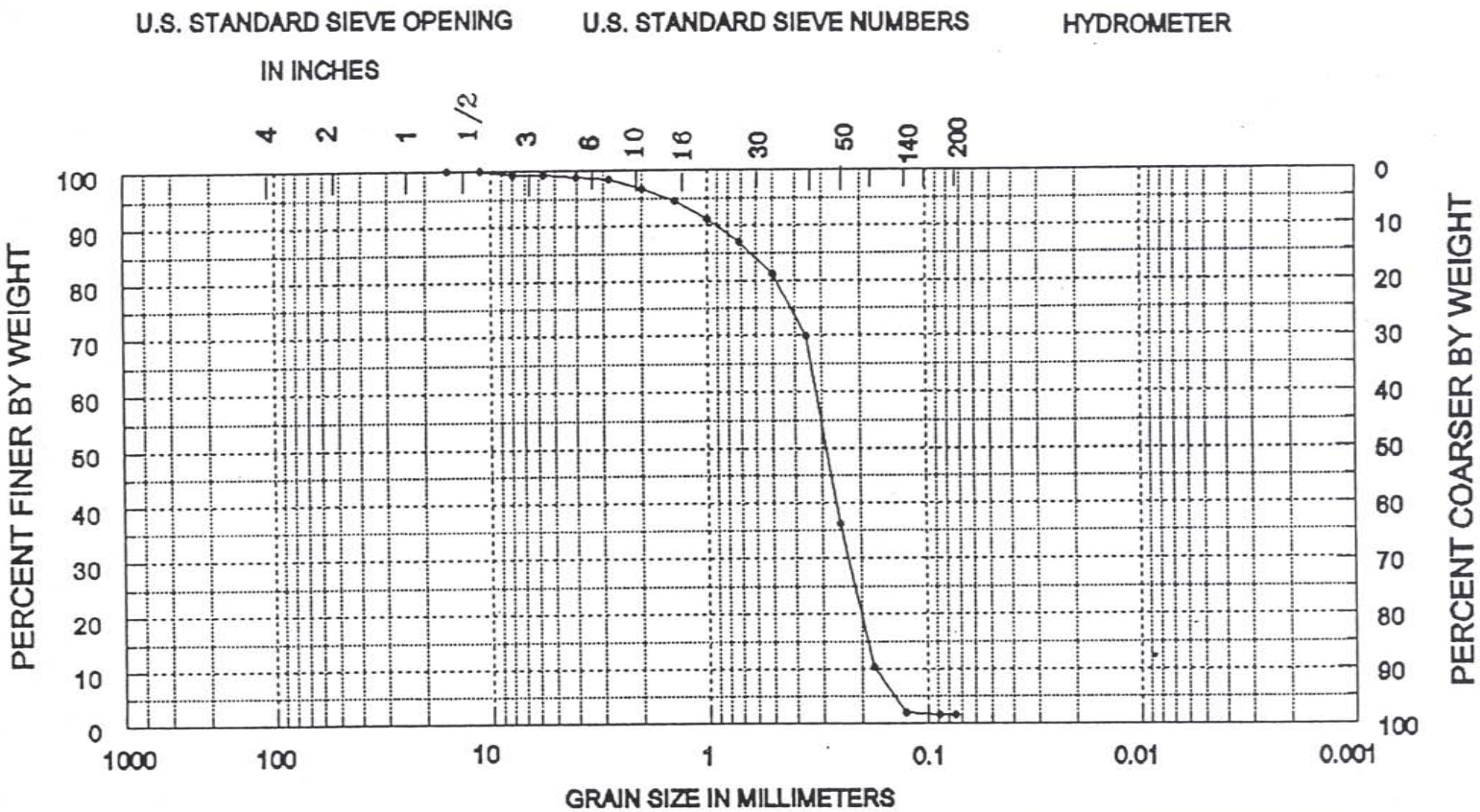
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.33	0.83	0.83
	5.66	-2.50	0.00	0.00	0.83
5	4.00	-2.00	0.12	0.32	1.15
7	2.83	-1.50	0.15	0.38	1.53
10	2.00	-1.00	0.69	1.75	3.27
14	1.41	-0.50	0.87	2.22	5.49
18	1.00	0.00	1.32	3.36	8.85
25	0.71	0.50	1.70	4.31	13.17
35	0.50	1.00	2.25	5.72	18.89
45	0.35	1.50	4.40	11.17	30.06
60	0.25	2.00	13.23	33.60	63.67
80	0.18	2.50	10.26	26.06	89.73
120	0.13	3.00	3.26	8.29	98.02
170	0.09	3.50	0.16	0.40	98.42
200	0.07	3.75	0.03	0.07	98.48
Pan			0.01	0.02	98.50
Total			38.77	98.50	98.50

Folk Statistics		phi	mm
5%	:	-0.61	1.53
16%	:	0.75	0.60
25%	:	1.27	0.41
50%	:	1.80	0.29
75%	:	2.22	0.22
84%	:	2.39	0.19
95%	:	2.82	0.14
Med.		1.80	0.29
Mean		1.43	0.37
St Dev.		0.93	
Skew		-0.34	
Kurt.		1.49	

Cu =	1.83		Gravel		1	%
			Coarse	Sand	2	%
			Med.	Sand	21	%
Cc =	0.95		Fine	Sand	74	%

Moment Statistics	Phi	mm
Mean	1.80	0.29
St. Dev.	1.03	0.49
Skewness	-1.82	
Kurtosis	7.32	

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
6.0	-60.3	Fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C93
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C93 9.0

Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.00	0.00	0.00
5	4.00	-2.00	0.00	0.00	0.00
7	2.83	-1.50	0.08	0.33	0.33
10	2.00	-1.00	0.21	0.84	1.18
14	1.41	-0.50	0.19	0.78	1.96
18	1.00	0.00	0.41	1.66	3.62
25	0.71	0.50	0.77	3.12	6.74
35	0.50	1.00	1.26	5.10	11.83
45	0.35	1.50	1.80	7.30	19.13
60	0.25	2.00	3.71	15.06	34.19
80	0.18	2.50	4.46	18.09	52.28
120	0.13	3.00	9.50	38.56	90.85
170	0.09	3.50	1.72	6.98	97.83
200	0.07	3.75	0.08	0.32	98.15
Pan			0.01	0.05	98.20
Total			24.18	98.20	98.20

Folk Statistics	phi	mm
5% :	0.22	0.86
16% :	1.29	0.41
25% :	1.69	0.31
50% :	2.44	0.18
75% :	2.79	0.14
84% :	2.91	0.13
95% :	3.30	0.10
Med.	2.44	0.18
Mean	2.03	0.24
St Dev.	0.87	
Skew	-0.43	
Kurt.	1.15	

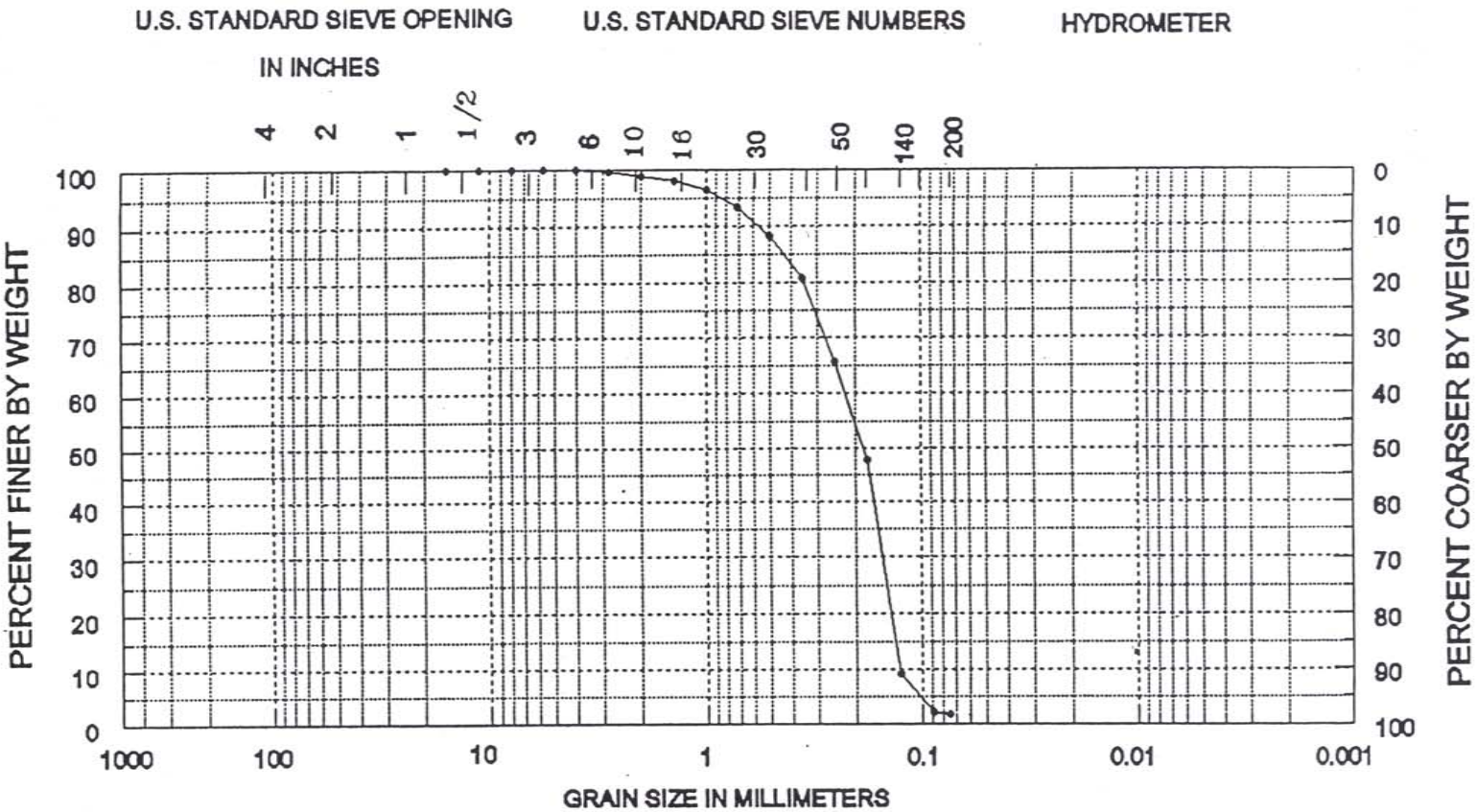
Moment Statistics	Phi	mm
Mean	2.37	0.19
St. Dev.	0.92	0.53
Skewness	-1.43	
Kurtosis	5.17	

Cu = 1.78

Cc = 0.81

Gravel	0	%
Coarse Sand	1	%
Med. Sand	14	%
Fine Sand	83	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
9.0	-63.3	Fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C93
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C93 11.0

Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.00	0.00	0.00
5	4.00	-2.00	0.00	0.00	0.00
7	2.83	-1.50	0.03	0.07	0.07
10	2.00	-1.00	0.04	0.12	0.19
14	1.41	-0.50	0.12	0.32	0.51
18	1.00	0.00	0.23	0.64	1.14
25	0.71	0.50	0.40	1.09	2.24
35	0.50	1.00	0.61	1.67	3.90
45	0.35	1.50	0.78	2.13	6.04
60	0.25	2.00	2.03	5.54	11.58
80	0.18	2.50	4.99	13.63	25.21
120	0.13	3.00	21.20	57.92	83.13
170	0.09	3.50	4.45	12.15	95.28
200	0.07	3.75	0.14	0.38	95.66
Pan			0.05	0.14	95.80
Total			35.06	95.80	95.80

Folk Statistics	phi	mm
5% :	1.26	0.42
16% :	2.16	0.22
25% :	2.49	0.18
50% :	2.71	0.15
75% :	2.93	0.13
84% :	3.04	0.12
95% :	3.49	0.09
Med.	2.71	0.15
Mean	2.53	0.17
St Dev.	0.56	
Skew	-0.28	
Kurt.	2.09	

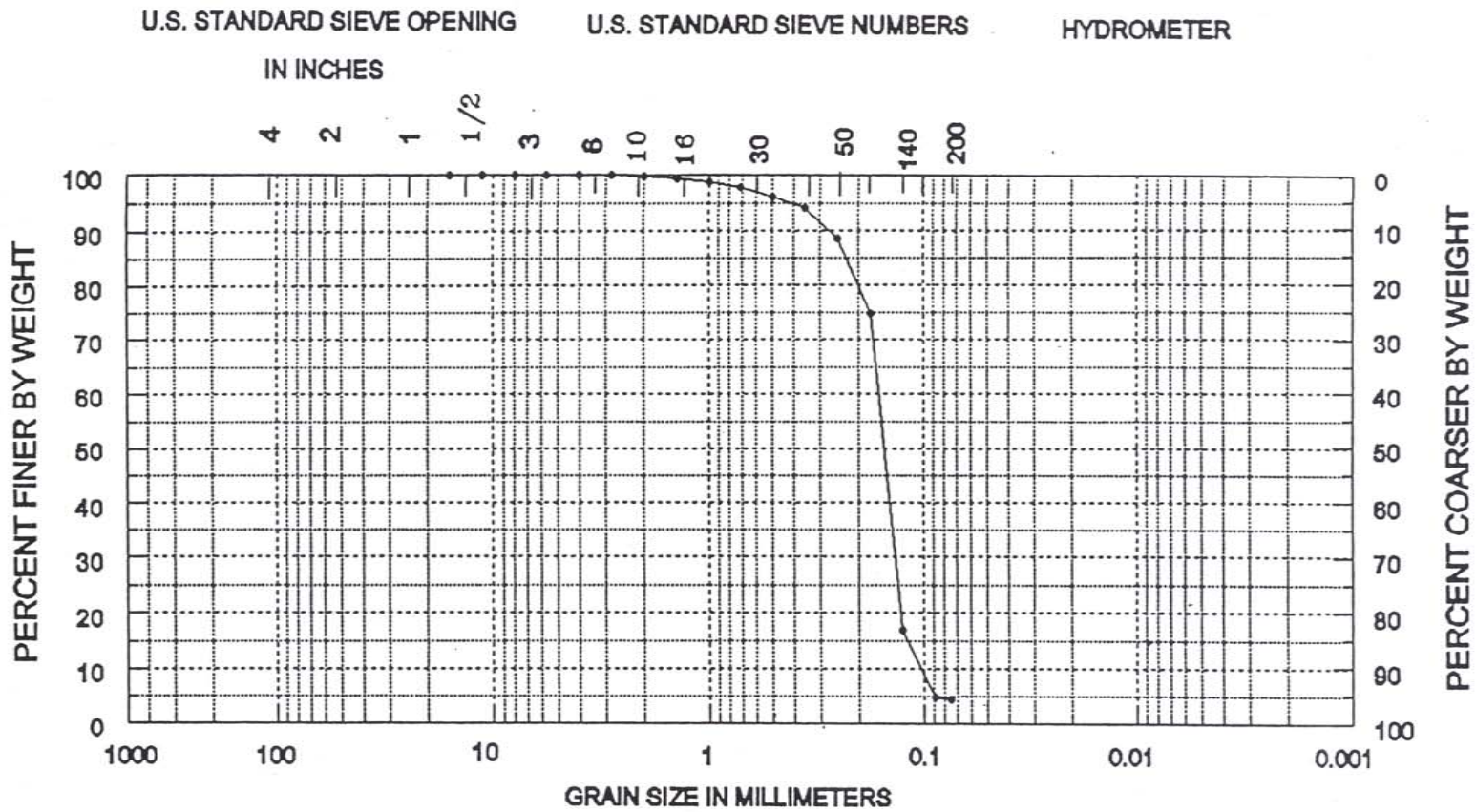
Moment Statistics	Phi	mm
Mean	2.80	0.14
St. Dev.	0.64	0.64
Skewness	-2.49	
Kurtosis	11.28	

Cu = 1.57

Cc = 1.10

Gravel	0	%
Coarse Sand	0	%
Med. Sand	5	%
Fine Sand	91	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
11.0	-65.3	Fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C93
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C93 14.5

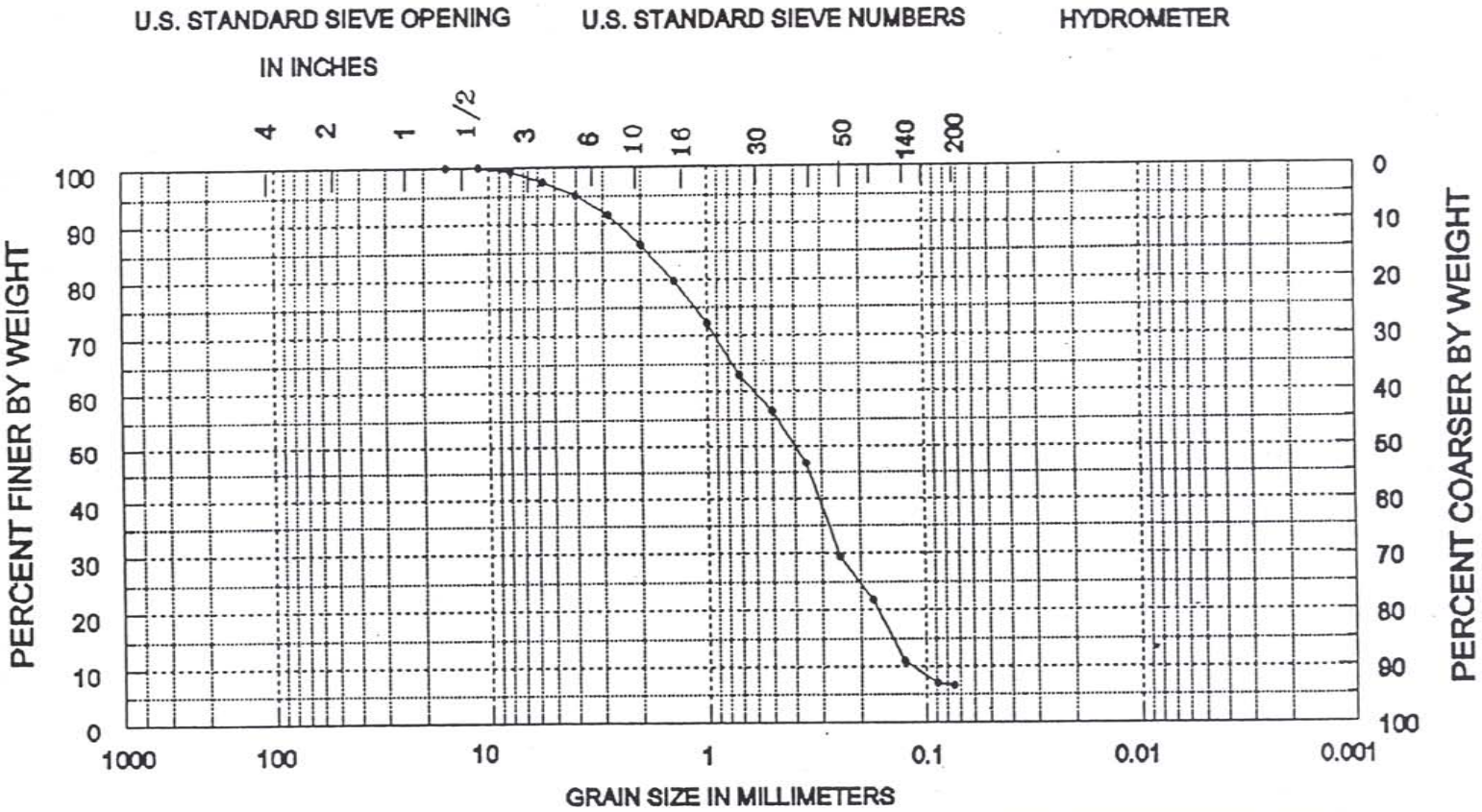
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.23	0.75	0.75
	5.66	-2.50	0.56	1.87	2.62
5	4.00	-2.00	0.73	2.43	5.04
7	2.83	-1.50	1.04	3.47	8.51
10	2.00	-1.00	1.63	5.41	13.92
14	1.41	-0.50	1.91	6.36	20.28
18	1.00	0.00	2.25	7.50	27.78
25	0.71	0.50	2.81	9.35	37.13
35	0.50	1.00	1.91	6.35	43.47
45	0.35	1.50	2.92	9.70	53.18
60	0.25	2.00	5.21	17.34	70.52
80	0.18	2.50	2.31	7.68	78.20
120	0.13	3.00	3.31	11.00	89.20
170	0.09	3.50	1.16	3.86	93.06
200	0.07	3.75	0.10	0.32	93.38
Pan			0.04	0.12	93.50
Total			28.10	93.50	93.50

Folk Statistics		phi	mm
5%	:	-2.01	4.03
16%	:	-0.84	1.79
25%	:	-0.19	1.14
50%	:	1.34	0.40
75%	:	2.29	0.20
84%	:	2.76	0.15
95%	:	3.80	0.07
Med.		1.34	0.40
Mean		1.01	0.50
St Dev.		1.78	
Skew		-0.18	
Kurt.		0.96	

Moment Statistics	Phi	mm
Mean	1.09	0.47
St. Dev.	1.57	0.34
Skewness	-0.50	
Kurtosis	2.43	

Cu =	5.20	Gravel	4	%
		Coarse Sand	10	%
		Med. Sand	34	%
Cc =	0.91	Fine Sand	45	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
14.5	-68.3	Medium to fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C93
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C93 COMP

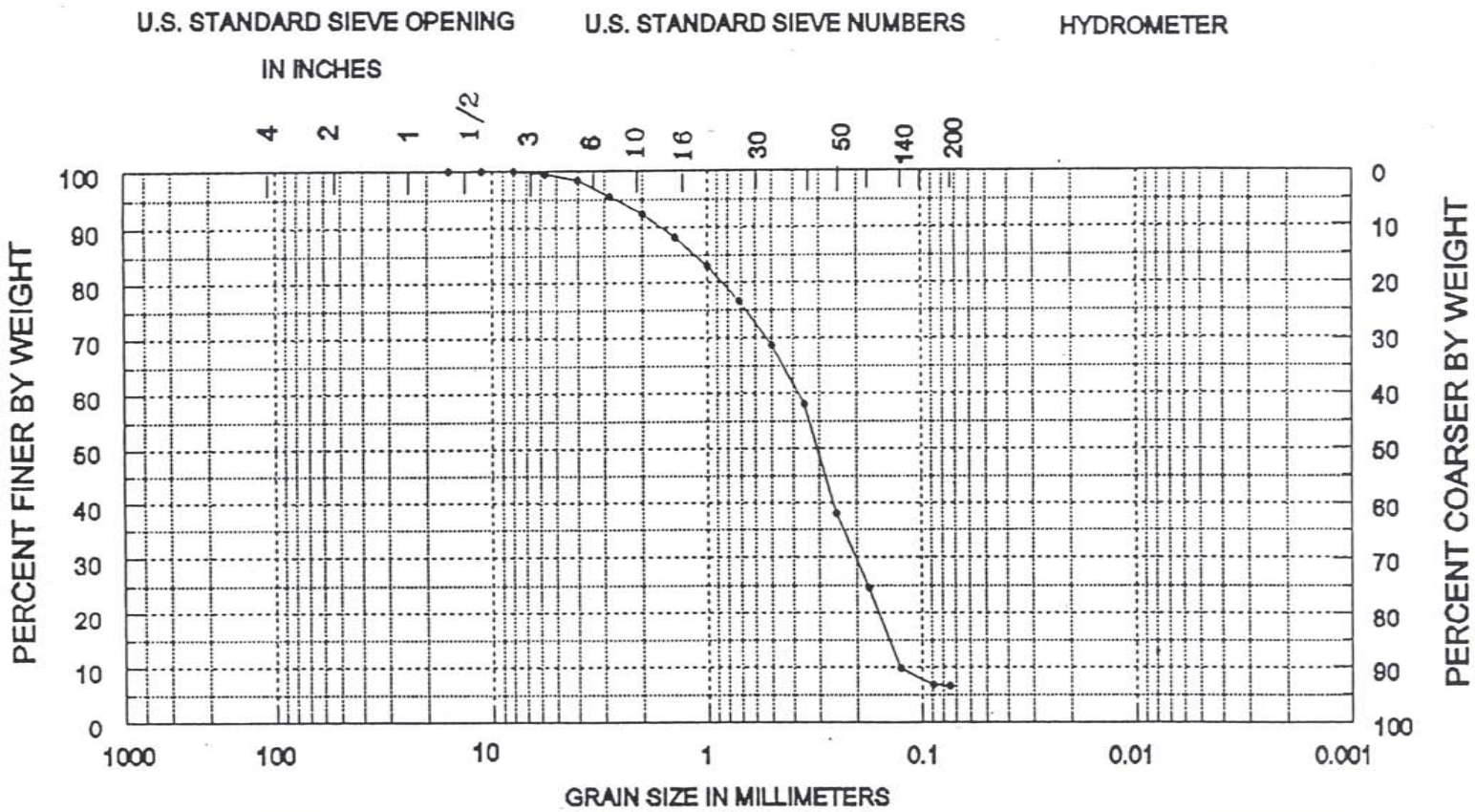
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.26	0.60	0.60
5	4.00	-2.00	0.43	1.00	1.61
7	2.83	-1.50	1.29	3.02	4.63
10	2.00	-1.00	1.35	3.17	7.79
14	1.41	-0.50	1.76	4.12	11.91
18	1.00	0.00	2.23	5.21	17.12
25	0.71	0.50	2.71	6.34	23.46
35	0.50	1.00	3.31	7.75	31.22
45	0.35	1.50	4.56	10.67	41.89
60	0.25	2.00	8.56	20.03	61.92
80	0.18	2.50	5.77	13.50	75.42
120	0.13	3.00	6.35	14.85	90.27
170	0.09	3.50	1.29	3.01	93.28
200	0.07	3.75	0.10	0.24	93.51
Pan			0.04	0.09	93.60
Total			40.01	93.60	93.60

Folk Statistics		phi	mm
5%	:	-1.44	2.71
16%	:	-0.11	1.08
25%	:	0.60	0.66
50%	:	1.70	0.31
75%	:	2.48	0.18
84%	:	2.79	0.14
95%	:	4.00	0.06
Med.		1.70	0.31
Mean		1.39	0.38
St Dev.		1.55	
Skew		-0.20	
Kurt.		1.18	

Moment Statistics	Phi	mm
Mean	1.53	0.35
St. Dev.	1.35	0.39
Skewness	-0.85	
Kurtosis	3.03	

Cu =	2.99	Gravel		1	%
		Coarse	Sand	7	%
		Med.	Sand	29	%
Cc =	0.87	Fine	Sand	57	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
COMP		Medium to fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C93
			DATE November 1996

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT 4" Vibracore
2. LOCATION (Coordinates or Station) 812459.4 E 960267.6 N	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL Alpine Pneumatic Vibracore
4. HOLE NO. (As shown on drawing title and file number) PB96 C-94	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN disturbed: 8 undisturbed:
5. NAME OF DRILLER G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE [x] VERTICAL [ ] INCLINED	16. DATE HOLE STARTED 8/1/96 COMPLETED 8/1/96
7. WATER DEPTH 65.4'	17. ELEVATION TOP OF HOLE -65.4
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 14.9
9. TOTAL DEPTH OF HOLE 14.9'	19. SIGNATURE OF GEOLOGIST G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-65.4	0.0					
-66.3	0.9		Brown, fine sand, medium-fine shell fragments. (SP)	100		0.0'–13.1' Composite sample
-66.8	1.4		Brown, fine sand, coarse shell, whole shells. (SW)		1.0	
-67.9	2.5		Light-brown, fine sand, fine shell fragments. (SP)		3.0	
			Dark-gray, fine sand, fine shell fragments, scattered whole shells. (SP)	100	6.0	
-74.4	9.0					
-74.7	9.3		Brown, plastic mud. (ML)		9.0	
			Dark-brown, fine sand, few whole shells. (SP)		12.5	
-78.6	13.2					12.8'–13.1' Coarse shell, large carbonate clasts
-79.1	13.7		Dark-brown mud. (ML)	100		
-79.5	14.1		Dark-brown, fine sand and coarse shell. (SP)			
-79.9	14.5					
-80.3	14.9		Dark-brown, muddy, fine sand. (SM)			
			Dark-brown, fine sand and coarse shell. (SW)			
			End at 14.9'			

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT Palm Beach County Shore Protection 1996 | HOLE NUMBER PB-94

Sediment Analysis Data Sheet

PB96 C94 1.0

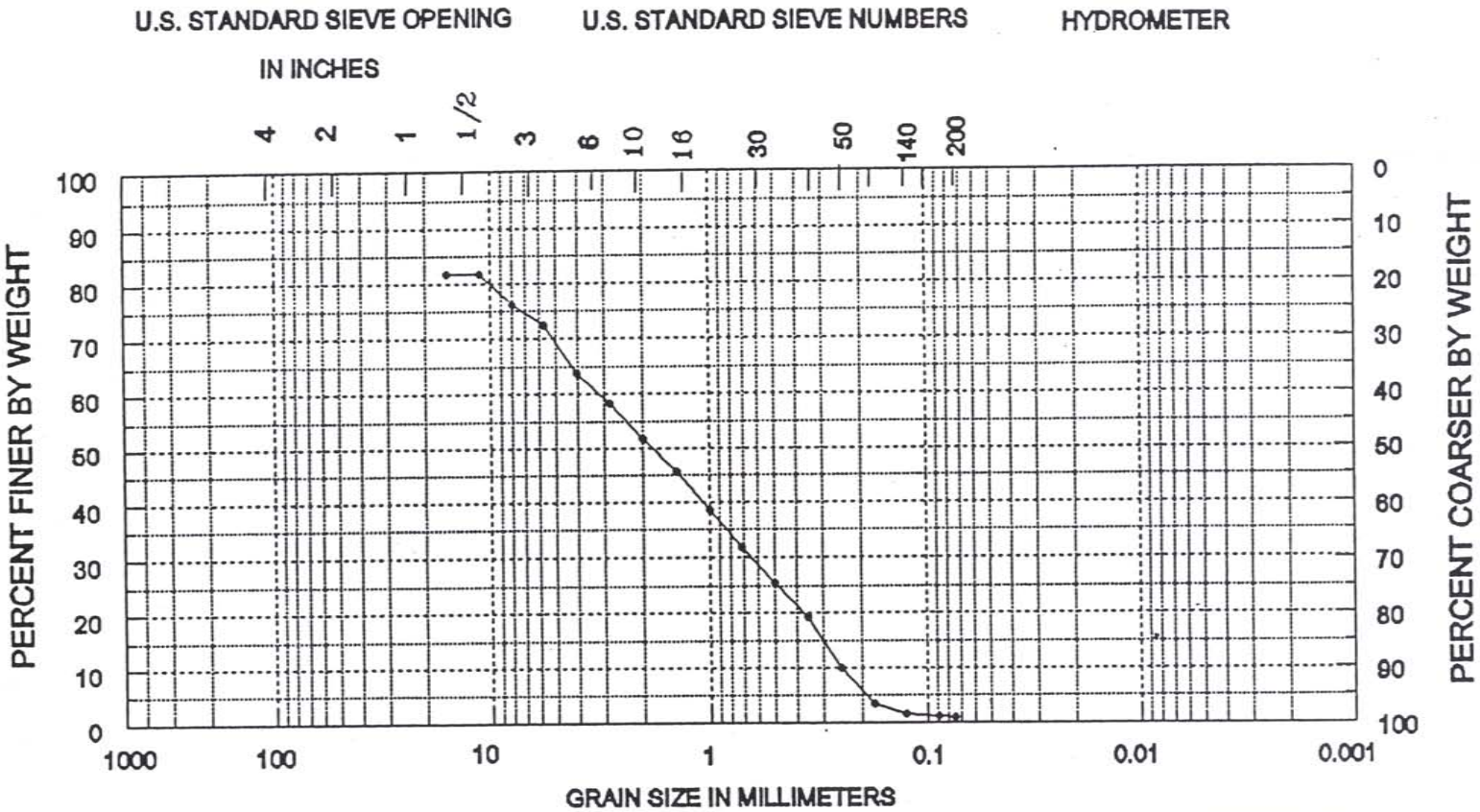
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	5.31	18.26	18.26
	11.31	-3.50	0.00	0.00	18.26
	8.00	-3.00	1.59	5.47	23.73
	5.66	-2.50	1.13	3.87	27.60
5	4.00	-2.00	2.50	8.59	36.19
7	2.83	-1.50	1.61	5.52	41.71
10	2.00	-1.00	1.95	6.69	48.39
14	1.41	-0.50	1.74	5.97	54.36
18	1.00	0.00	2.07	7.11	61.47
25	0.71	0.50	1.93	6.63	68.10
35	0.50	1.00	1.83	6.28	74.38
45	0.35	1.50	1.88	6.46	80.85
60	0.25	2.00	2.70	9.28	90.13
80	0.18	2.50	1.87	6.43	96.55
120	0.13	3.00	0.57	1.94	98.50
170	0.09	3.50	0.10	0.33	98.83
200	0.07	3.75	0.04	0.13	98.97
Pan			0.01	0.03	99.00
Total			28.81	99.00	99.00

Folk Statistics		phi	mm
5%	:	-4.70	25.99
16%	:	-4.20	18.38
25%	:	-2.84	7.14
50%	:	-0.87	1.82
75%	:	1.05	0.48
84%	:	1.67	0.31
95%	:	2.38	0.19
Med.		-0.87	1.82
Mean		-1.14	2.21
St Dev.		2.54	
Skew		-0.11	
Kurt.		0.75	

Moment Statistics	Phi	mm
Mean	-1.10	2.14
St. Dev.	2.23	0.21
Skewness	-0.07	
Kurtosis	1.76	

Cu =	12.54	Gravel		32	%
		Coarse	Sand	17	%
		Med.	Sand	29	%
Cc =	0.51	Fine	Sand	21	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
1.0	-56.8	Well graded sand and gravel (SW)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C94
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C94 3.0

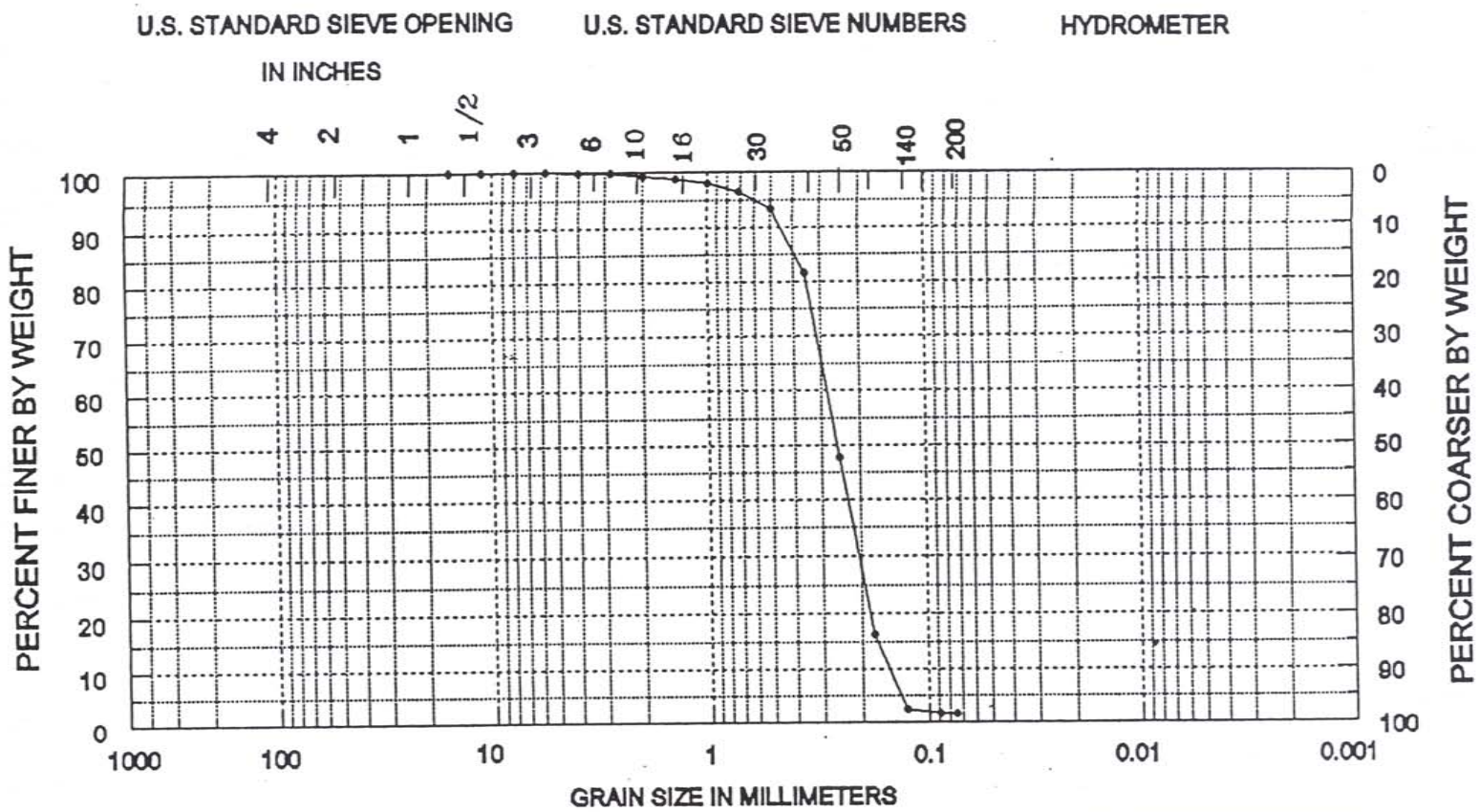
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.00	0.00	0.00
5	4.00	-2.00	0.04	0.13	0.13
7	2.83	-1.50	0.03	0.09	0.23
10	2.00	-1.00	0.15	0.48	0.70
14	1.41	-0.50	0.17	0.52	1.23
18	1.00	0.00	0.27	0.85	2.08
25	0.71	0.50	0.47	1.45	3.53
35	0.50	1.00	1.03	3.20	6.73
45	0.35	1.50	3.77	11.70	18.43
60	0.25	2.00	10.89	33.80	52.23
80	0.18	2.50	10.16	31.56	83.80
120	0.13	3.00	4.44	13.79	97.58
170	0.09	3.50	0.24	0.76	98.34
200	0.07	3.75	0.04	0.13	98.47
Pan			0.01	0.03	98.50
Total			31.72	98.50	98.50

Folk Statistics	phi	mm
5% :	0.73	0.60
16% :	1.40	0.38
25% :	1.60	0.33
50% :	1.97	0.26
75% :	2.36	0.19
84% :	2.51	0.18
95% :	2.91	0.13
Med.	1.97	0.26
Mean	1.90	0.27
St Dev.	0.61	
Skew	-0.08	
Kurt.	1.17	

Moment Statistics	Phi	mm
Mean	2.15	0.23
St. Dev.	0.68	0.62
Skewness	-1.60	
Kurtosis	8.44	

Cu =	1.87	Gravel		0	%
		Coarse	Sand	1	%
		Med.	Sand	12	%
Cc =	0.99	Fine	Sand	86	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
3.0	-58.8	Fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C94
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C94 6.0

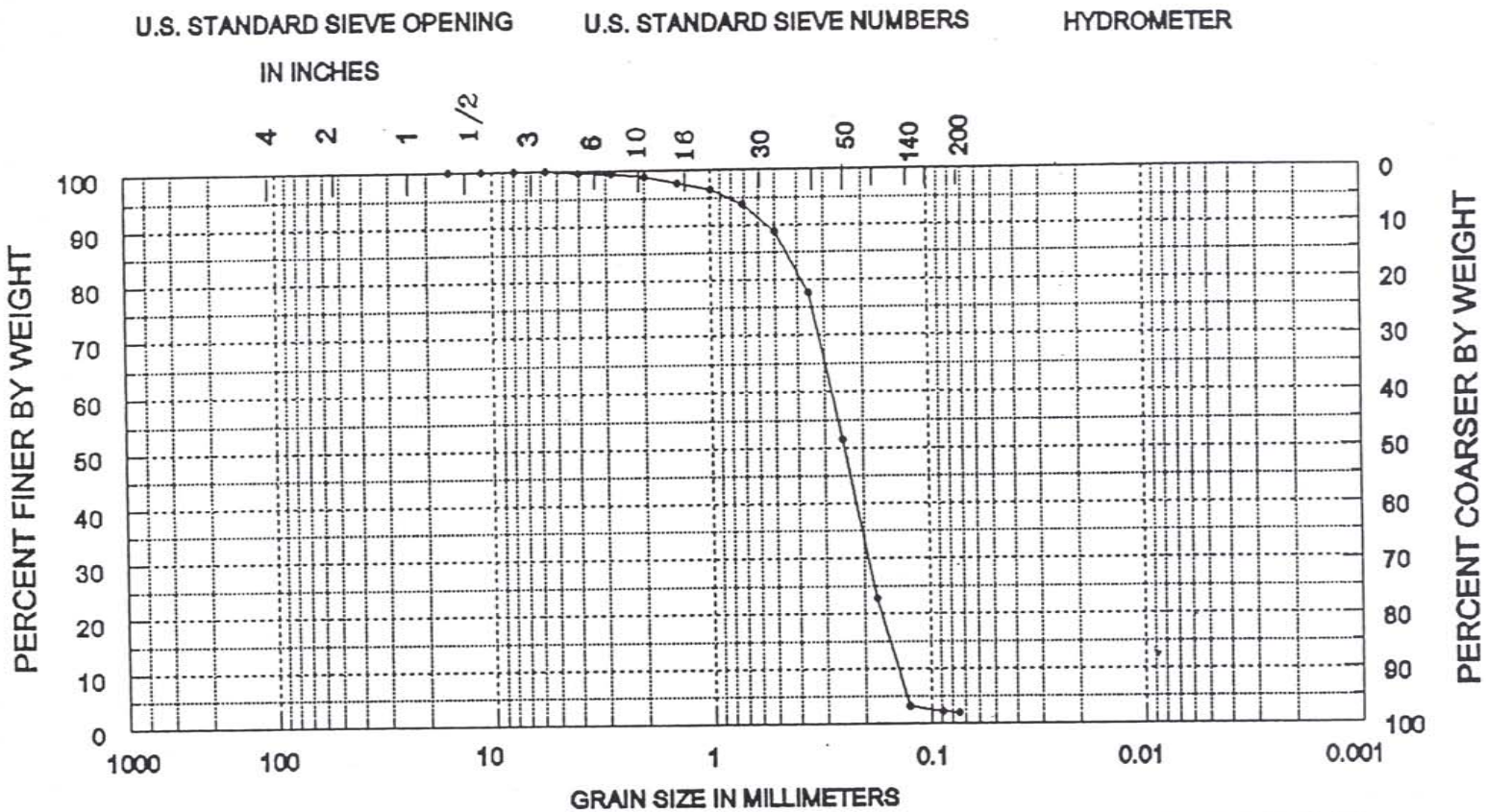
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.00	0.00	0.00
5	4.00	-2.00	0.10	0.40	0.40
7	2.83	-1.50	0.05	0.20	0.60
10	2.00	-1.00	0.16	0.63	1.23
14	1.41	-0.50	0.27	1.06	2.29
18	1.00	0.00	0.34	1.35	3.64
25	0.71	0.50	0.67	2.69	6.32
35	0.50	1.00	1.27	5.06	11.38
45	0.35	1.50	2.77	11.06	22.45
60	0.25	2.00	6.51	25.98	48.43
80	0.18	2.50	7.23	28.85	77.28
120	0.13	3.00	4.90	19.56	96.83
170	0.09	3.50	0.27	1.07	97.91
200	0.07	3.75	0.02	0.09	98.00
Pan			0.00	0.00	98.00
Total			24.54	98.00	98.00

Folk Statistics	phi	mm
5% :	0.25	0.84
16% :	1.21	0.43
25% :	1.55	0.34
50% :	2.03	0.25
75% :	2.46	0.18
84% :	2.67	0.16
95% :	2.95	0.13
Med.	2.03	0.25
Mean	1.82	0.28
St Dev.	0.77	
Skew	-0.22	
Kurt.	1.21	

Moment Statistics	Phi	mm
Mean	2.12	0.23
St. Dev.	0.84	0.56
Skewness	-1.59	
Kurtosis	6.91	

Cu =	1.98	Gravel		0	%
		Coarse	Sand	1	%
		Med.	Sand	16	%
Cc =	0.94	Fine	Sand	81	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
6.0	-61.8	Fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C94
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C94 9.0

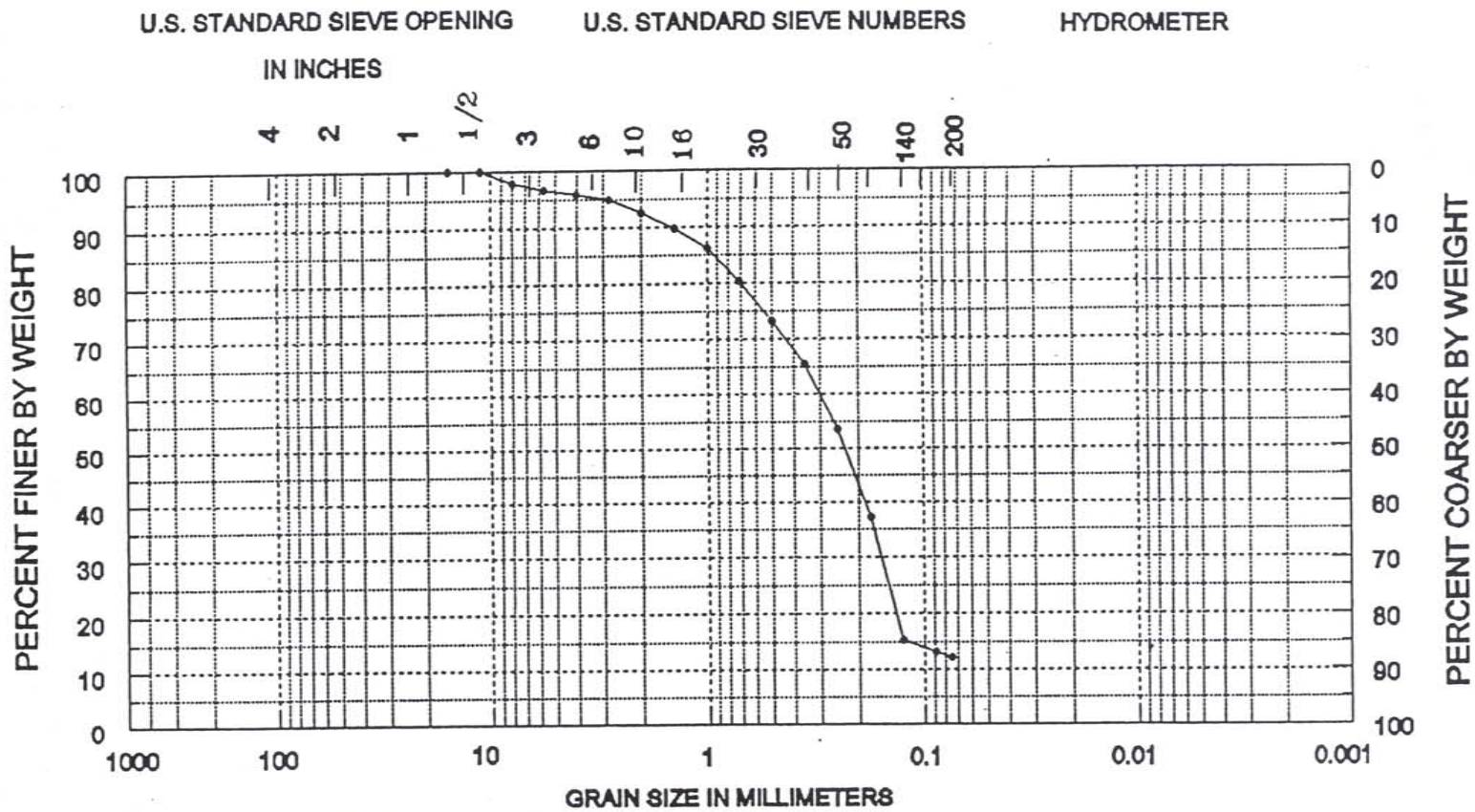
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.69	2.18	2.18
	5.66	-2.50	0.37	1.18	3.37
5	4.00	-2.00	0.25	0.80	4.16
7	2.83	-1.50	0.34	1.07	5.23
10	2.00	-1.00	0.71	2.24	7.48
14	1.41	-0.50	0.92	2.91	10.38
18	1.00	0.00	1.11	3.50	13.88
25	0.71	0.50	1.83	5.77	19.65
35	0.50	1.00	2.26	7.14	26.79
45	0.35	1.50	2.43	7.68	34.47
60	0.25	2.00	3.83	12.09	46.57
80	0.18	2.50	5.16	16.27	62.84
120	0.13	3.00	6.92	21.84	84.69
170	0.09	3.50	0.71	2.25	86.94
200	0.07	3.75	0.34	1.07	88.01
Pan			0.06	0.19	88.20
Total			27.94	88.20	88.20

Folk Statistics	phi	mm
5% :	-1.61	3.05
16% :	0.18	0.88
25% :	0.87	0.55
50% :	2.11	0.23
75% :	2.78	0.15
84% :	2.98	0.13
95% :	4.10	0.06
Med.	2.11	0.23
Mean	1.55	0.34
St Dev.	1.57	
Skew	-0.34	
Kurt.	1.23	

Moment Statistics	Phi	mm
Mean	1.68	0.31
St. Dev.	1.52	0.35
Skewness	-1.29	
Kurtosis	4.23	

Cu =	0.30	Gravel		4	%
		Coarse	Sand	4	%
		Med.	Sand	23	%
Cc =	0.08	Fine	Sand	57	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
9.0	-64.8		PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C94
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C94 12.5

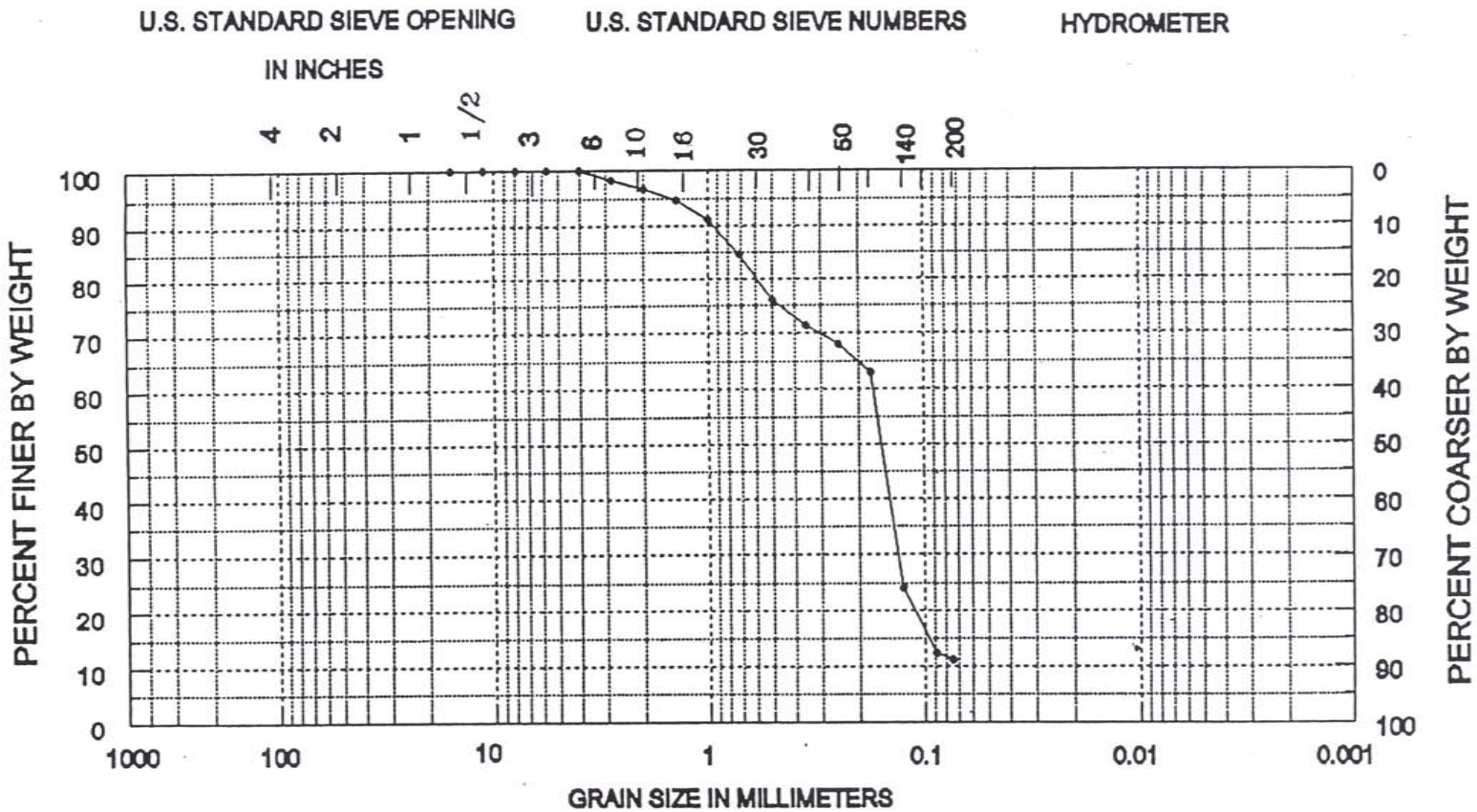
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.00	0.00	0.00
5	4.00	-2.00	0.00	0.00	0.00
7	2.83	-1.50	0.49	1.69	1.69
10	2.00	-1.00	0.47	1.60	3.29
14	1.41	-0.50	0.58	1.99	5.28
18	1.00	0.00	1.06	3.63	8.91
25	0.71	0.50	1.92	6.58	15.49
35	0.50	1.00	2.48	8.46	23.95
45	0.35	1.50	1.32	4.51	28.46
60	0.25	2.00	0.99	3.38	31.84
80	0.18	2.50	1.51	5.18	37.02
120	0.13	3.00	11.35	38.81	75.82
170	0.09	3.50	3.51	11.99	87.81
200	0.07	3.75	0.33	1.12	88.93
Pan			0.02	0.07	89.00
Total			26.02	89.00	89.00

Folk Statistics		phi	mm
5%	:	-0.57	1.48
16%	:	0.53	0.69
25%	:	1.12	0.46
50%	:	2.67	0.16
75%	:	2.99	0.13
84%	:	3.34	0.10
95%	:	4.20	0.05
Med.		2.67	0.16
Mean		2.03	0.24
St Dev.		1.43	
Skew		-0.44	
Kurt.		1.04	

Cu =	0.17		Gravel		0	%
			Coarse	Sand	3	%
			Med.	Sand	23	%
Cc =	0.10		Fine	Sand	63	%

Moment Statistics	Phi	mm
Mean	2.20	0.22
St. Dev.	1.31	0.40
Skewness	-1.06	
Kurtosis	3.04	

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
12.5	-68.3	Fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C94
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C94 COMP

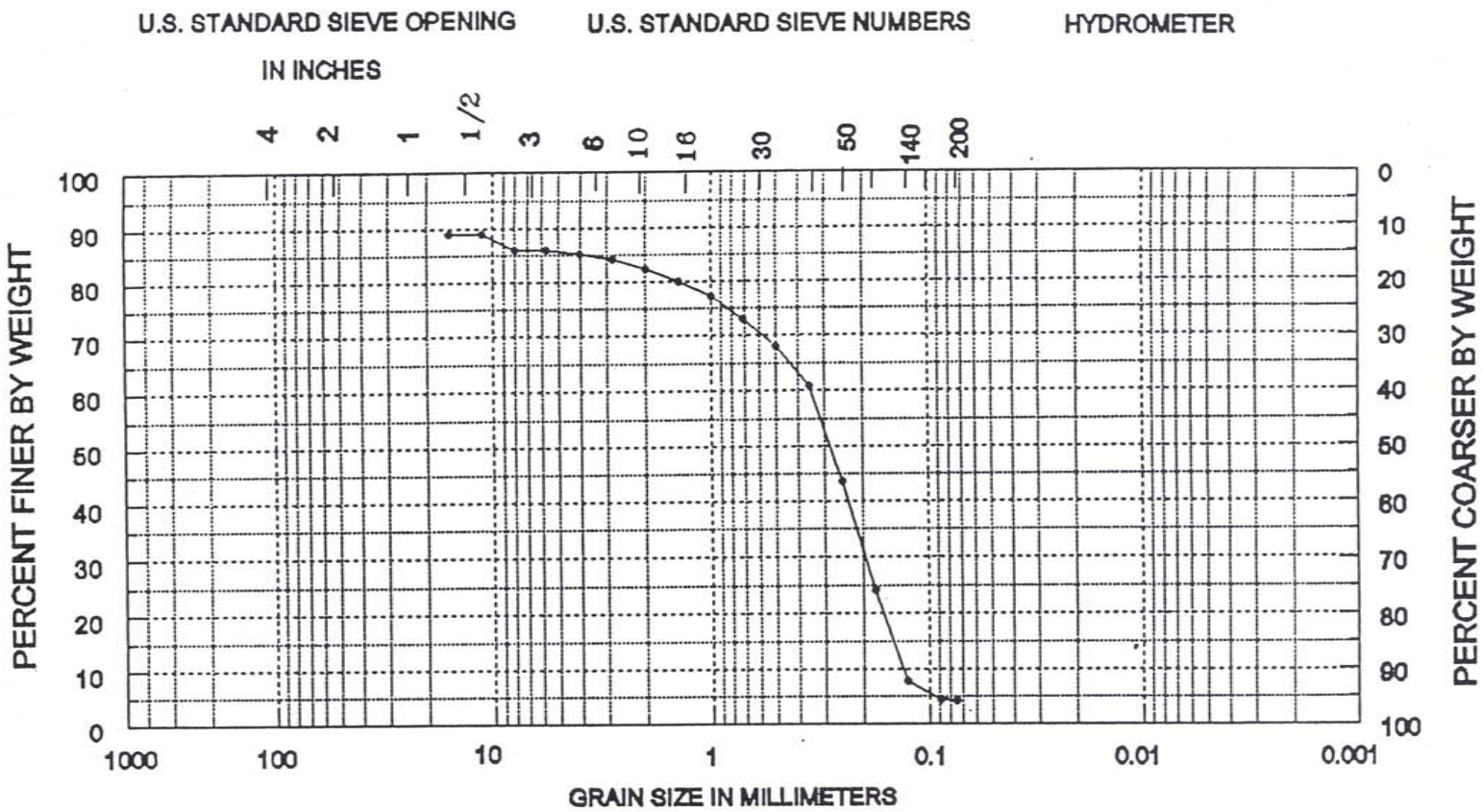
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	2.96	11.06	11.06
	11.31	-3.50	0.00	0.00	11.06
	8.00	-3.00	0.82	3.06	14.12
	5.66	-2.50	0.00	0.00	14.12
5	4.00	-2.00	0.19	0.70	14.82
7	2.83	-1.50	0.25	0.94	15.76
10	2.00	-1.00	0.50	1.88	17.64
14	1.41	-0.50	0.61	2.26	19.90
18	1.00	0.00	0.78	2.93	22.83
25	0.71	0.50	1.10	4.10	26.93
35	0.50	1.00	1.35	5.03	31.96
45	0.35	1.50	1.94	7.25	39.21
60	0.25	2.00	4.59	17.14	56.35
80	0.18	2.50	5.24	19.57	75.92
120	0.13	3.00	4.38	16.38	92.30
170	0.09	3.50	0.88	3.27	95.57
200	0.07	3.75	0.09	0.33	95.90
Pan			0.00	0.00	95.90
Total			25.66	95.90	95.90

Folk Statistics	phi	mm
5% :	-4.10	17.15
16% :	-1.44	2.71
25% :	0.26	0.83
50% :	1.81	0.28
75% :	2.48	0.18
84% :	2.75	0.15
95% :	3.41	0.09
Med.	1.81	0.28
Mean	0.49	0.71
St Dev.	2.18	
Skew	-0.56	
Kurt.	1.39	

Moment Statistics	Phi	mm
Mean	0.59	0.66
St. Dev.	2.29	0.20
Skewness	-1.28	
Kurtosis	3.32	

Cu =	2.65	Gravel		14	%
		Coarse	Sand	3	%
		Med.	Sand	18	%
Cc =	0.84	Fine	Sand	60	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	PROJECT Palm Beach County 1996
COMP		Fine sand (SP)	AREA Palm Beach County
			BORING NO. PB96 C94
			DATE November 1996

DRILLING LOG

DIVISION	INSTALLATION
SHEET 1 OF 1	
1. PROJECT: Palm Beach County Shore Protection 1996	10. SIZE AND TYPE OF BIT: 4" Vibracore
2. LOCATION (Coordinates or Station): 813059.0 E, 961108.3 N	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
3. DRILLING AGENCY: SEA, Inc.	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Pneumatic Vibracore
4. HOLE NO. (As shown on drawing title and file number): PB96 C95	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 7 undisturbed:
5. NAME OF DRILLER: G. Zarillo	14. TOTAL NUMBER OF CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED	16. DATE HOLE: STARTED 8/1/96, COMPLETED 8/1/96
7. WATER DEPTH: 65.0'	17. ELEVATION TOP OF HOLE: -65.0
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING: -17.2 ft
9. TOTAL DEPTH OF HOLE: 17.2'	19. SIGNATURE OF GEOLOGIST: G. Zarillo

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-65.0	0.0					
-65.9	0.9		Gray, medium-fine sand and shell. (SP)	100	0.5	0.0'–0.4' Layer of whole shells
			Gray-to-dark-gray, fine sand and shell. (SP)		3.0	3.8' Whole gastropod shell
-70.0	5.0					
-70.4	5.4		Coarse shell and fine sand. (SP)		6.0	
			Gray-to-dark-gray, fine sand and shell fragments. (SP)		9.0	8.3' Sand dollar (open marine)
-74.9	9.9					
			Gray-to-dark-gray, fine sand and shell fragments. (SP)	100	12.0	
-78.8	13.8					
			Gray, medium-fine sand and coarse shell. (SW)		15.0	
-81.8	16.8					
-82.2	17.2		Fine-to-coarse carbonate sand, rock fragments. (SW)	100		
			End at 17.2'			

0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: Palm Beach County Shore Protection 1996 | HOLE NUMBER: PB-96

Sediment Analysis Data Sheet

PB96 C95 0.5

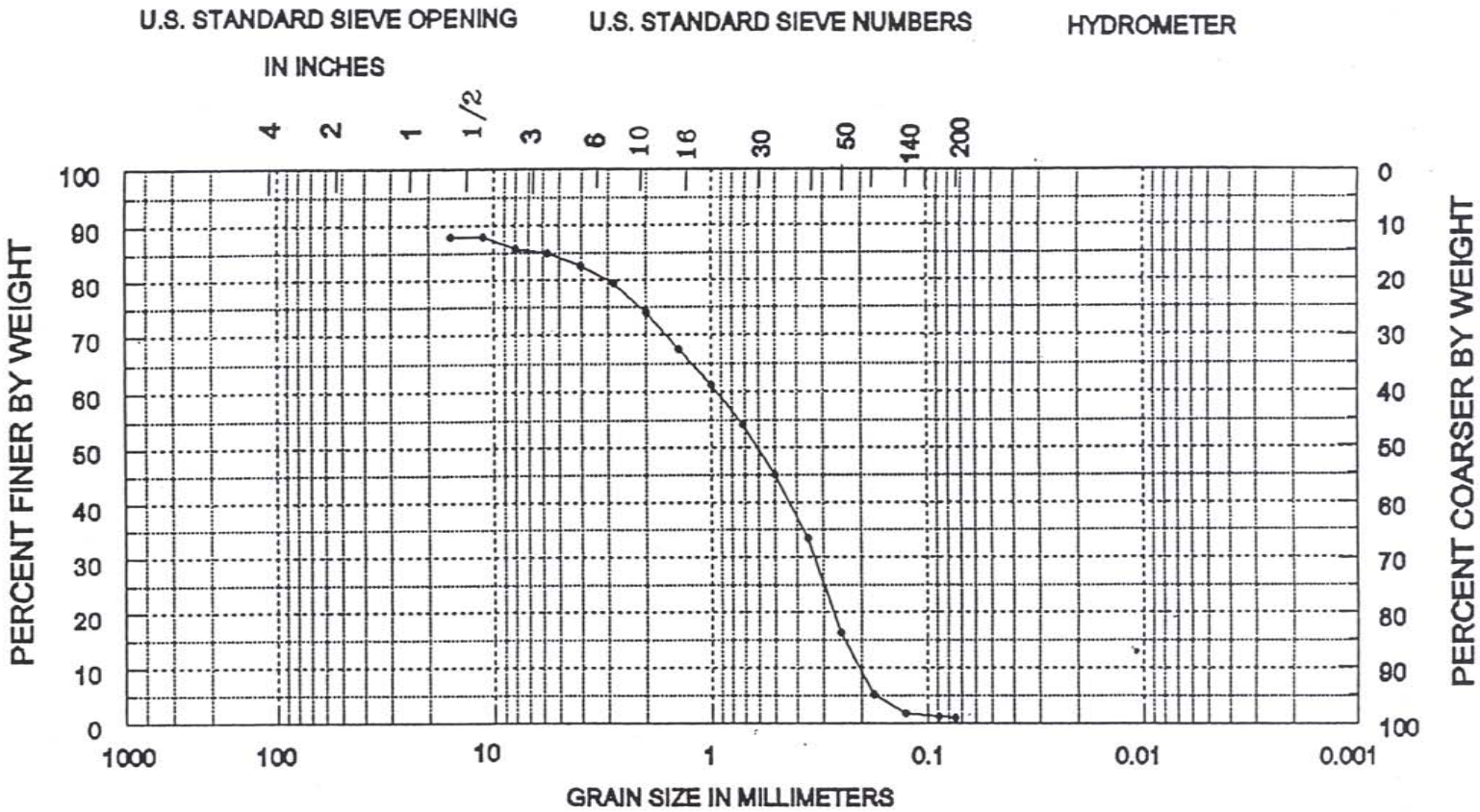
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	5.00	12.01	12.01
	11.31	-3.50	0.00	0.00	12.01
	8.00	-3.00	0.95	2.29	14.30
	5.66	-2.50	0.29	0.69	14.99
5	4.00	-2.00	1.05	2.52	17.51
7	2.83	-1.50	1.25	2.99	20.51
10	2.00	-1.00	2.29	5.50	26.00
14	1.41	-0.50	2.73	6.56	32.56
18	1.00	0.00	2.59	6.22	38.78
25	0.71	0.50	2.97	7.14	45.92
35	0.50	1.00	3.80	9.14	55.06
45	0.35	1.50	4.74	11.39	66.45
60	0.25	2.00	7.20	17.32	83.76
80	0.18	2.50	4.58	11.01	94.78
120	0.13	3.00	1.46	3.51	98.28
170	0.09	3.50	0.22	0.52	98.80
200	0.07	3.75	0.10	0.23	99.04
Pan			0.03	0.06	99.10
Total			41.21	99.10	99.10

Folk Statistics	phi	mm
5% :	-4.10	17.15
16% :	-2.30	4.93
25% :	-1.09	2.13
50% :	0.72	0.61
75% :	1.75	0.30
84% :	2.01	0.25
95% :	2.53	0.17
Med.	0.72	0.61
Mean	-0.23	1.17
St Dev.	2.08	
Skew	-0.43	
Kurt.	0.96	

Moment Statistics	Phi	mm
Mean	-0.18	1.13
St. Dev.	2.13	0.23
Skewness	-0.84	
Kurtosis	2.60	

Cu =	4.59	Gravel		16	%
		Coarse	Sand	10	%
		Med.	Sand	35	%
Cc =	0.56	Fine	Sand	38	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
0.5	-55.5	Medium to fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C95
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C95 3.0

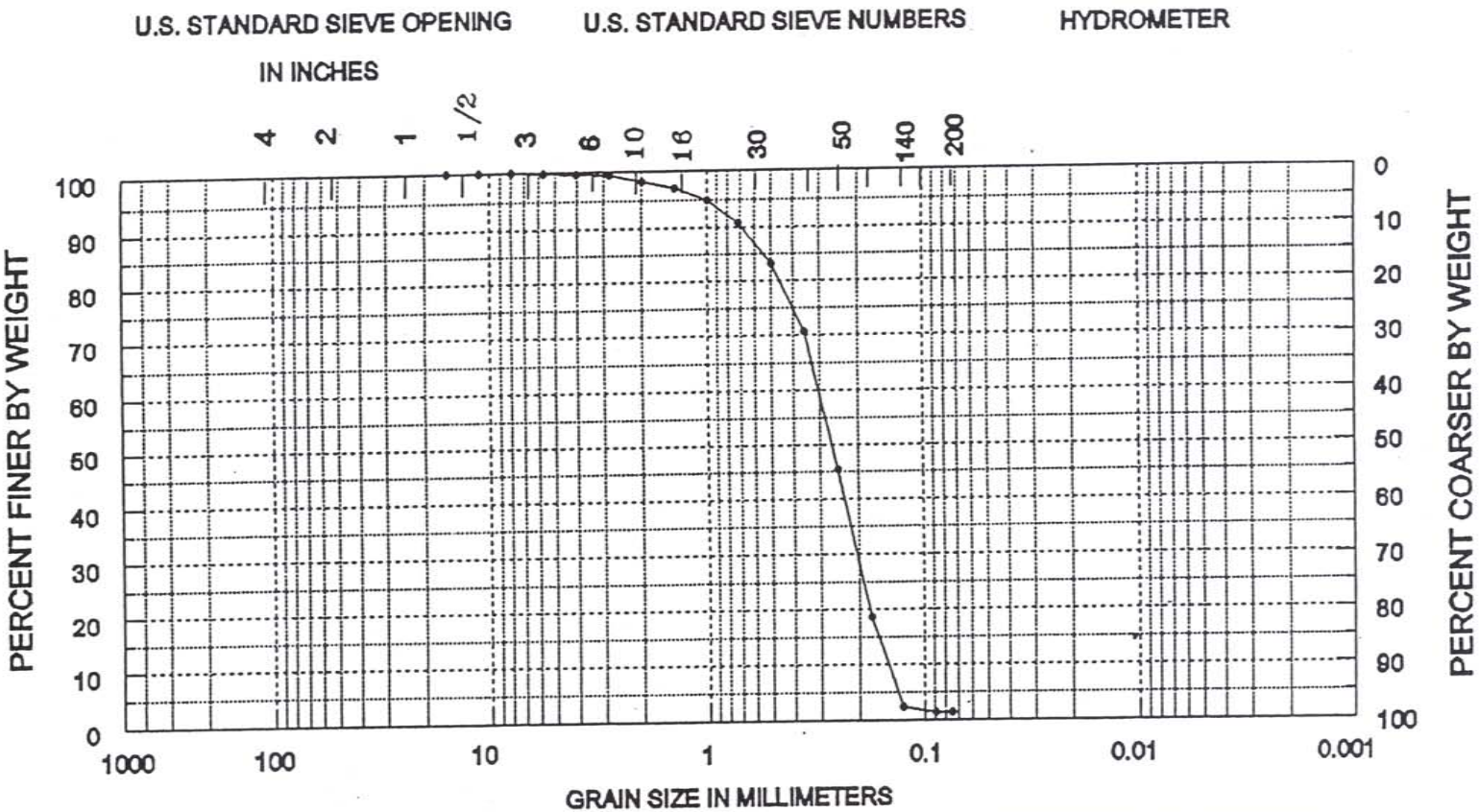
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.08	0.17	0.17
5	4.00	-2.00	0.07	0.15	0.32
7	2.83	-1.50	0.16	0.34	0.66
10	2.00	-1.00	0.49	1.03	1.69
14	1.41	-0.50	0.63	1.32	3.01
18	1.00	0.00	1.05	2.21	5.22
25	0.71	0.50	1.93	4.04	9.26
35	0.50	1.00	3.63	7.62	16.88
45	0.35	1.50	5.94	12.46	29.34
60	0.25	2.00	12.05	25.28	54.62
80	0.18	2.50	12.78	26.80	81.42
120	0.13	3.00	7.68	16.11	97.53
170	0.09	3.50	0.48	1.00	98.53
200	0.07	3.75	0.06	0.13	98.66
Pan			0.02	0.04	98.70
Total			47.07	98.70	98.70

Folk Statistics	phi	mm
5% :	-0.05	1.03
16% :	0.94	0.52
25% :	1.33	0.40
50% :	1.91	0.27
75% :	2.38	0.19
84% :	2.58	0.17
95% :	2.92	0.13
Med.	1.91	0.27
Mean	1.66	0.32
St Dev.	0.86	
Skew	-0.25	
Kurt.	1.15	

Moment Statistics	Phi	mm
Mean	1.98	0.25
St. Dev.	0.91	0.53
Skewness	-1.35	
Kurtosis	5.53	

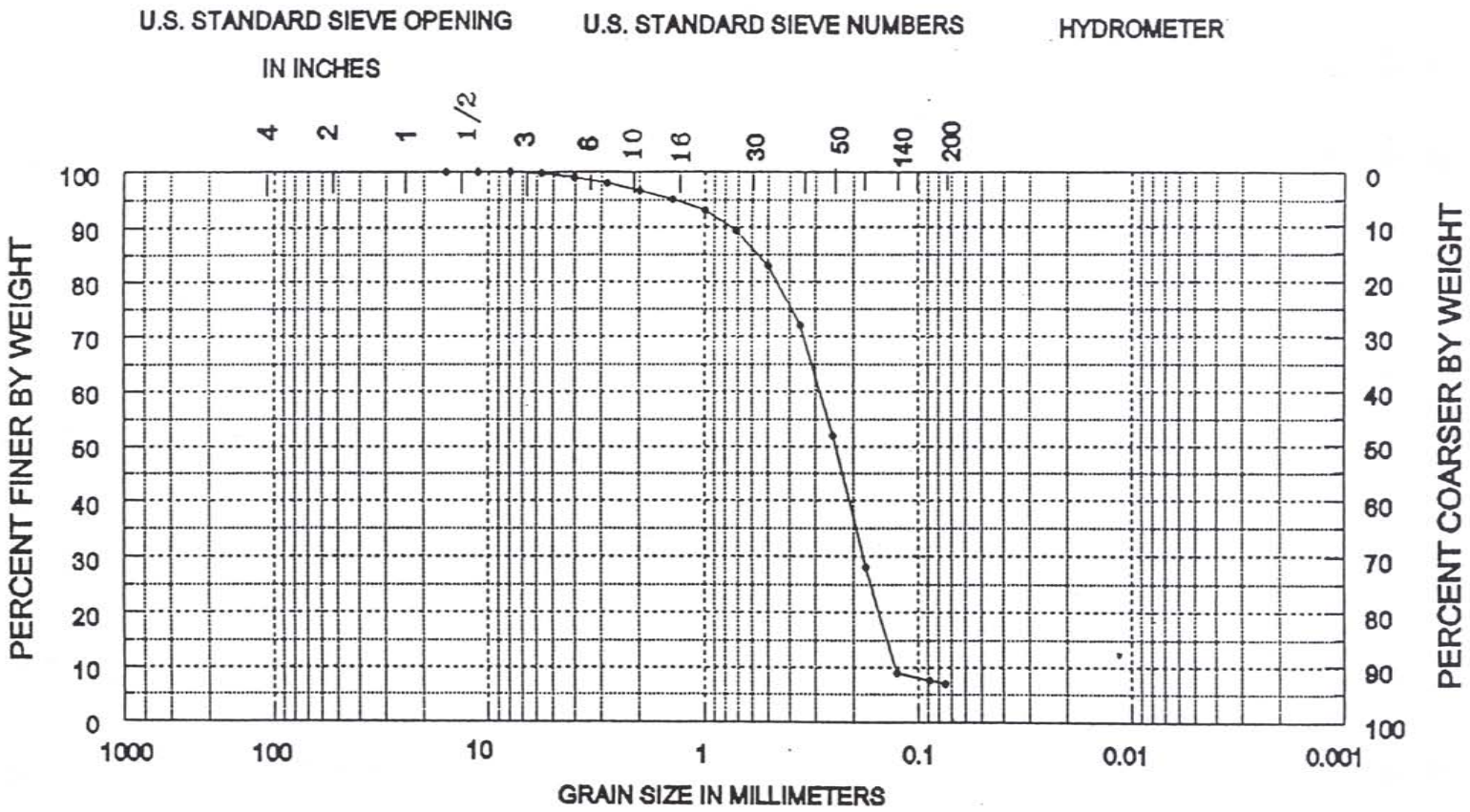
Cu =	2.08	Gravel		0	%
		Coarse	Sand	1	%
		Med.	Sand	21	%
Cc =	0.94	Fine	Sand	76	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
3.0	-58.0	Fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C95
			DATE November 1996



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
6.0	-61.0	Fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C95
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C95 9.0

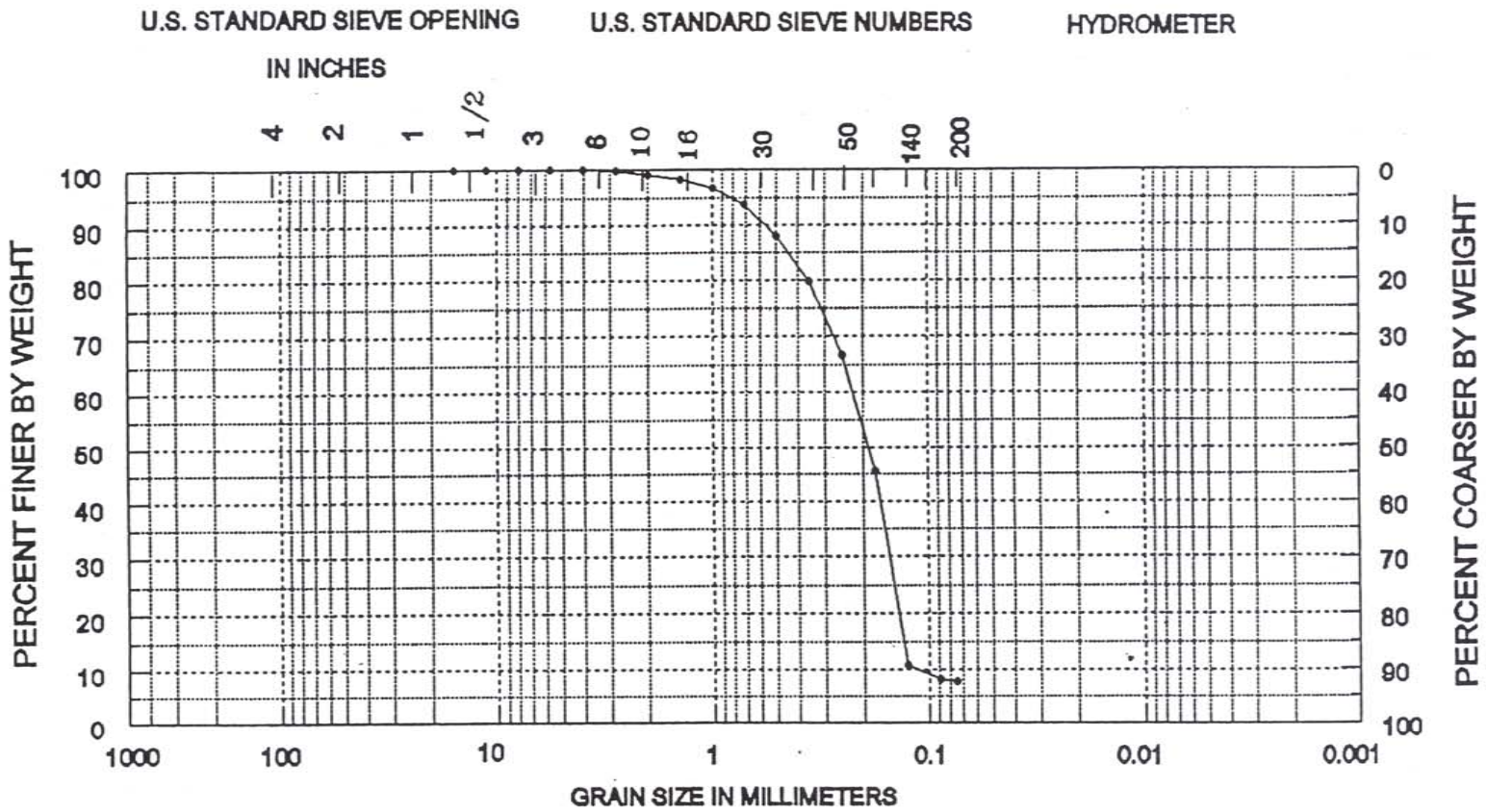
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.03	0.08	0.08
5	4.00	-2.00	0.00	0.00	0.08
7	2.83	-1.50	0.06	0.18	0.27
10	2.00	-1.00	0.22	0.67	0.93
14	1.41	-0.50	0.26	0.78	1.72
18	1.00	0.00	0.53	1.57	3.29
25	0.71	0.50	1.02	3.05	6.34
35	0.50	1.00	1.93	5.80	12.13
45	0.35	1.50	2.71	8.13	20.26
60	0.25	2.00	4.31	12.93	33.19
80	0.18	2.50	7.08	21.24	54.43
120	0.13	3.00	11.66	34.95	89.37
170	0.09	3.50	0.85	2.56	91.93
200	0.07	3.75	0.13	0.38	92.32
Pan			0.10	0.28	92.60
Total			30.88	92.60	92.60

Folk Statistics		phi	mm
5%	:	0.28	0.82
16%	:	1.24	0.42
25%	:	1.68	0.31
50%	:	2.40	0.19
75%	:	2.79	0.14
84%	:	2.92	0.13
95%	:	3.80	0.07
Med.		2.40	0.19
Mean		2.13	0.23
St Dev.		0.95	
Skew		-0.29	
Kurt.		1.30	

Cu =	1.95		Gravel		0	%
			Coarse	Sand	1	%
			Med.	Sand	15	%
Cc =	0.89		Fine	Sand	76	%

Moment Statistics	Phi	mm
Mean	2.30	0.20
St. Dev.	0.90	0.54
Skewness	-1.43	
Kurtosis	5.29	

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
9.0	-64.0	Fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C95
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C95 12.0

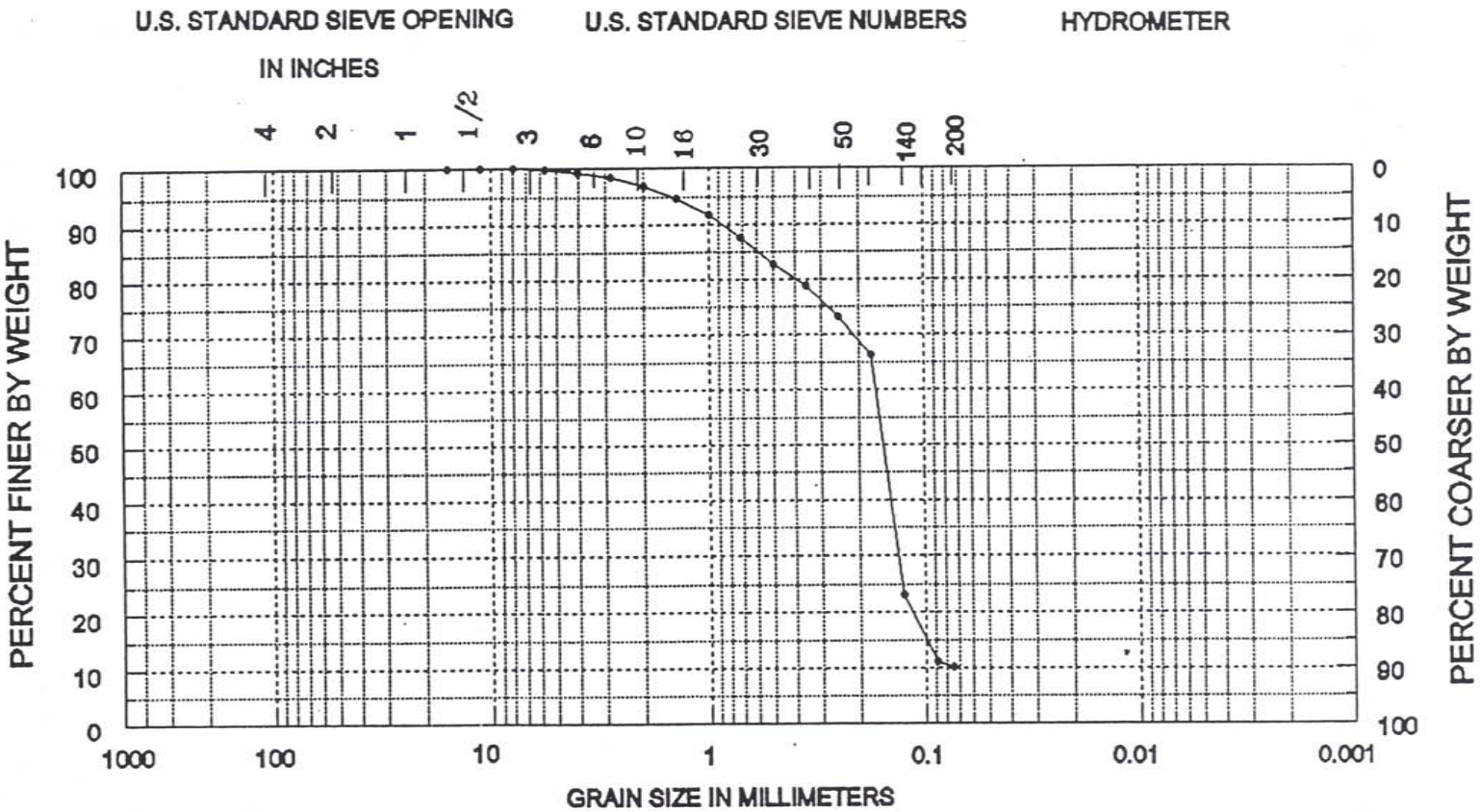
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.06	0.14	0.14
5	4.00	-2.00	0.28	0.64	0.78
7	2.83	-1.50	0.37	0.84	1.62
10	2.00	-1.00	0.67	1.53	3.15
14	1.41	-0.50	1.00	2.29	5.44
18	1.00	0.00	1.25	2.85	8.29
25	0.71	0.50	1.86	4.24	12.53
35	0.50	1.00	2.04	4.66	17.19
45	0.35	1.50	1.79	4.09	21.28
60	0.25	2.00	2.39	5.46	26.75
80	0.18	2.50	3.05	6.97	33.72
120	0.13	3.00	18.91	43.17	76.89
170	0.09	3.50	5.30	12.11	88.99
200	0.07	3.75	0.37	0.85	89.84
Pan			0.29	0.66	90.50
Total			39.64	90.50	90.50

Folk Statistics	phi	mm
5% :	-0.60	1.51
16% :	0.87	0.55
25% :	1.84	0.28
50% :	2.69	0.16
75% :	2.98	0.13
84% :	3.29	0.10
95% :	3.90	0.07
Med.	2.69	0.16
Mean	2.03	0.24
St Dev.	1.29	
Skew	-0.48	
Kurt.	1.62	

Cu =	0.13		Gravel		0	%
			Coarse	Sand	3	%
			Med.	Sand	16	%
Cc =	0.08		Fine	Sand	71	%

Moment Statistics	Phi	mm
Mean	2.15	0.23
St. Dev.	1.26	0.42
Skewness	-1.52	
Kurtosis	4.53	

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
12.0	-67.0	Fine sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C95
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C95 15.0

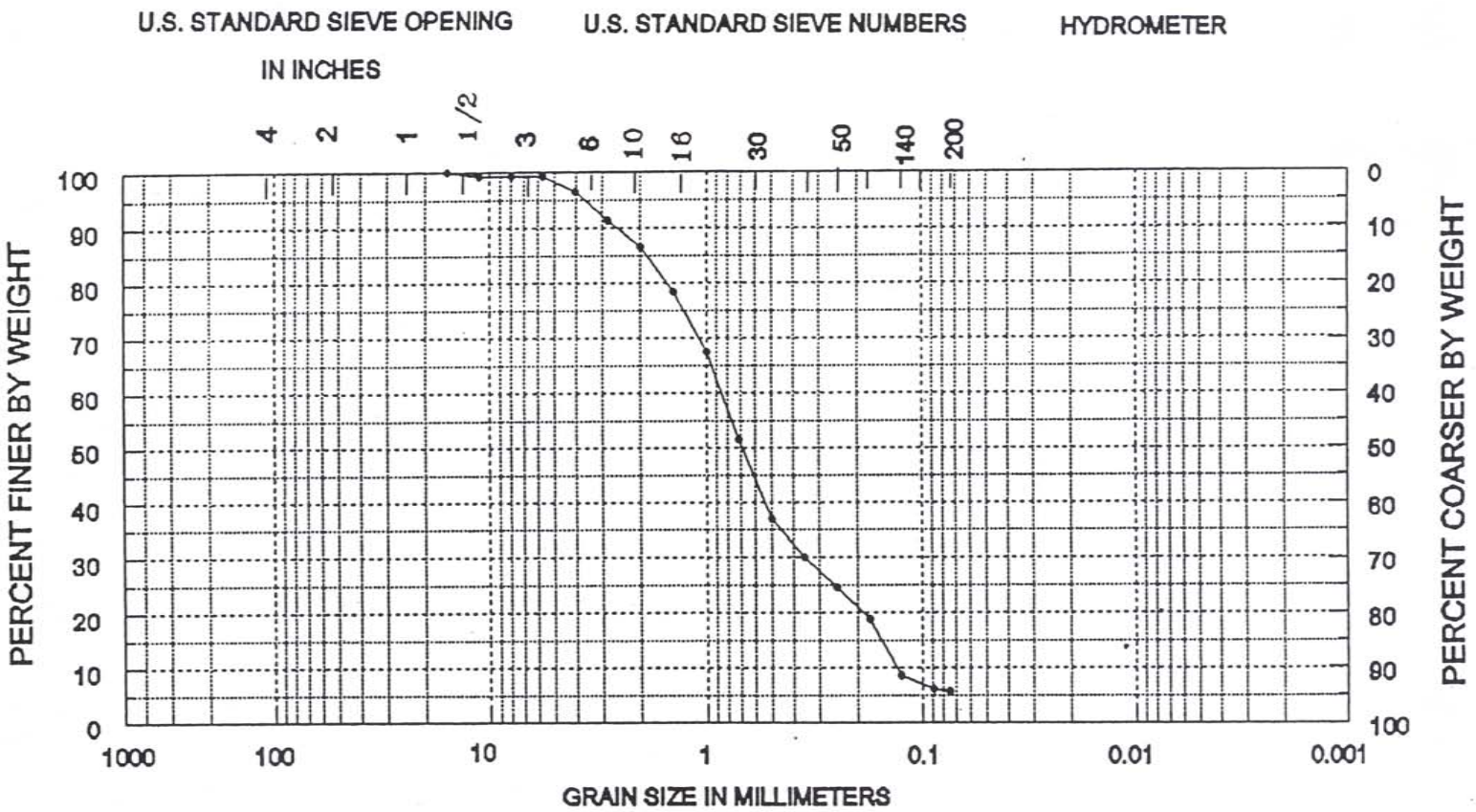
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.30	0.83	0.83
	8.00	-3.00	0.00	0.00	0.83
	5.66	-2.50	0.00	0.00	0.83
5	4.00	-2.00	0.96	2.67	3.50
7	2.83	-1.50	1.85	5.15	8.65
10	2.00	-1.00	1.72	4.80	13.45
14	1.41	-0.50	2.90	8.06	21.50
18	1.00	0.00	3.92	10.89	32.40
25	0.71	0.50	5.81	16.16	48.56
35	0.50	1.00	5.15	14.34	62.90
45	0.35	1.50	2.55	7.09	69.98
60	0.25	2.00	1.99	5.53	75.51
80	0.18	2.50	2.07	5.77	81.27
120	0.13	3.00	3.64	10.12	91.39
170	0.09	3.50	0.89	2.48	93.87
200	0.07	3.75	0.12	0.32	94.20
Pan			0.07	0.20	94.40
Total			33.93	94.40	94.40

Folk Statistics		phi	mm
5%	:	-1.85	3.62
16%	:	-0.84	1.79
25%	:	-0.34	1.27
50%	:	0.55	0.68
75%	:	1.95	0.26
84%	:	2.63	0.16
95%	:	3.80	0.07
Med.		0.55	0.68
Mean		0.86	0.55
St Dev.		1.73	
Skew		0.17	
Kurt.		1.01	

Moment Statistics	Phi	mm
Mean	0.79	0.58
St. Dev.	1.46	0.36
Skewness	-0.09	
Kurtosis	2.66	

Cu =	6.48	Gravel		2	%
		Coarse	Sand	11	%
		Med.	Sand	53	%
Cc =	1.12	Fine	Sand	28	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
15.0	-70.0	Medium sand (SP)	PROJECT Palm Beach County 1996
			AREA Palm Beach County
			BORING NO. PB96 C95
			DATE November 1996

Sediment Analysis Data Sheet

PB96 C95 COMP

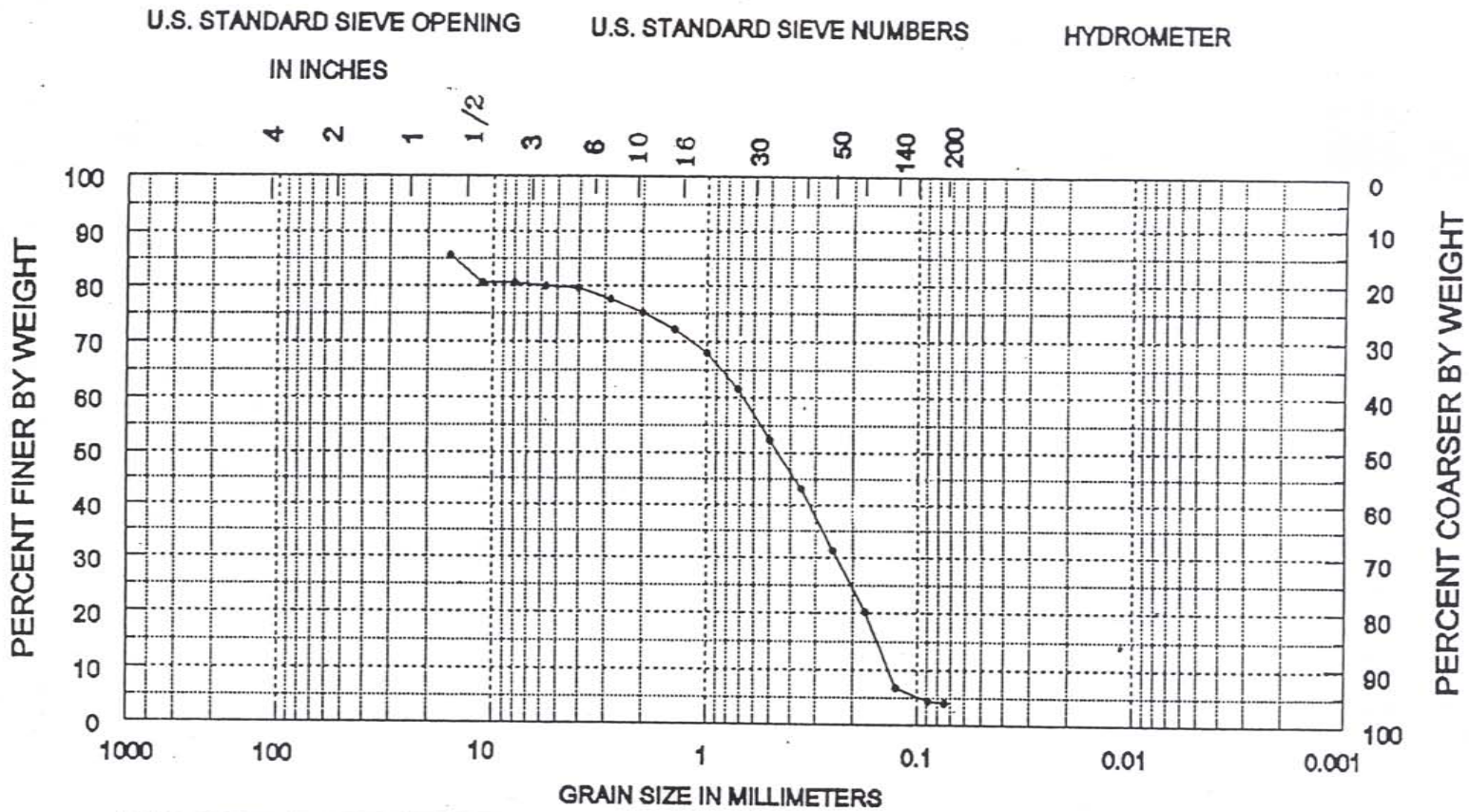
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	6.35	14.41	14.41
	11.31	-3.50	2.17	4.93	19.34
	8.00	-3.00	0.00	0.00	19.34
	5.66	-2.50	0.32	0.74	20.08
5	4.00	-2.00	0.17	0.38	20.46
7	2.83	-1.50	0.85	1.93	22.39
10	2.00	-1.00	1.01	2.30	24.69
14	1.41	-0.50	1.34	3.05	27.74
18	1.00	0.00	1.82	4.12	31.86
25	0.71	0.50	2.93	6.64	38.51
35	0.50	1.00	4.03	9.15	47.66
45	0.35	1.50	4.02	9.14	56.79
60	0.25	2.00	5.20	11.82	68.61
80	0.18	2.50	4.95	11.24	79.85
120	0.13	3.00	5.89	13.38	93.23
170	0.09	3.50	1.04	2.37	95.60
200	0.07	3.75	0.15	0.35	95.95
Pan			0.11	0.25	96.20
Total			42.35	96.20	96.20

Folk Statistics		phi	mm
5%	:	-4.10	17.15
16%	:	-3.84	14.31
25%	:	-0.95	1.93
50%	:	1.13	0.46
75%	:	2.28	0.21
84%	:	2.65	0.16
95%	:	3.37	0.10
Med.		1.13	0.46
Mean		-0.16	1.11
St Dev.		2.76	
Skew		-0.46	
Kurt.		0.95	

Moment Statistics	Phi	mm
Mean	-0.10	1.07
St. Dev.	2.48	0.18
Skewness	-0.81	
Kurtosis	2.24	

Cu =	4.92	Gravel		20	%
		Coarse	Sand	4	%
		Med.	Sand	28	%
Cc =	0.63	Fine	Sand	44	%

SEA,INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	PROJECT Palm Beach County 1996
COMP		Fine sand (SP)	AREA Palm Beach County
			BORING NO. PB96 C95
			DATE November 1996