Site Investigation Report

for

Southeast Florida Sediment Assessment and Needs Determination (SAND)

Prepared by

Geotechnical Branch

Engineering Division

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Site Investigation Report

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Site Investigation Report

Southeast Florida Sediment Assessment and Needs Determination (SAND)

1.0 INVESTIGATION SCOPE

This report encompasses the geotechnical field investigation data obtained for the Southeast Florida Sediment Assessment and Needs Determination (SAND) Study. The investigation consists of 199 vibracore borings collected offshore of St. Lucie, Martin and Palm Beach Counties, Florida. Vibracore locations did not take demarcations between counties, or State/Federal waters into account. The associated boring logs, laboratory data, penetration graphs, grain size statistics and photographs are presented herein. Also included in this report are definitions of terms, testing and procedures that provide additional explanation of the boring logs and drilling techniques.

2.0 INVESTIGATION PURPOSE

Beach nourishment has been an on-going practice in Southeast Florida since the late 1950's. As beach nourishment continues to be a preferred method for soft armoring and shore protection of the coastline, appropriate offshore sediment sources are consumed. In addition, heightened environmental concerns has led to tighter permitting restrictions that ultimately result in reduced volumes of delineated permittable sand. In order to address sediment quantity and apportioning, Regional Sediment Management (RSM) has been employed to assess long term sediment need and sediment availability on a regional level. The purpose of this investigation is to gather additional geotechnical data on southeast Florida sediment characteristics for refining the existing 2009 SE Florida RSM Plan (Taylor Engineering, 2009).

Vibracores represent the primary source for determining the stratification, grain sizes, colors and chemical compositions of offshore sediments. Additionally, vibracores are used to delineate and calculate volumes of compatible sand available in offshore sediment sources. Here, compatible sand is defined as any material that meets FDEP "Sand Rule" guidelines (F.A.C. 62B-41.0072 (j) for beach placement. The vibracoring program documented herein is a reconnaissance level study targeting potential sand sources as indicated by existing borings and geophysical data.

3.0 GEOLOGICAL SETTING

3.1 Stratigraphy

As shown in Table 1, the surficial geology of the eastern Florida continental shelf consists of Holocene age unconsolidated sediments associated with paleo-shore lines, beach ridges and troughs, paleo-ebb deltas, and sand waves (Demopoulos et al, 2011). Pliocene to Cretaceous lithological formations indicate deposition during fluctuating sea levels over a large shallow marginal shelf of the Florida carbonate platform (Hoenstine et al. 2002). The Florida platform, lies unconformably atop Mesozoic sedimentary and volcanic rocks that

originated with the formation and separation of Pangaea (Scott et al, 2001).

Table 1. Stratigraphic Column; Mid-Mesozoic to Recent: St. Lucie to Palm Beach County, Florida, Coastal Zone (modified/expanded from Meisburger and Duane, 1971).

Age		Formation	Depth to Top of Formation (Below NAVD88)	Lithological Character
Cenozoic	Holocene		0 to +30	Unconsolidated quartzose sand, calcareous sand, silty sand, silt, clay, shell
	Pliocene-Pleistocene	Pamlico	Around 30+	Unconsolidated quartzose sand
		Fort Thompson	0 to 80 feet	Sand, marl, shell marl, sandstone, limestone
		Anastasia	0 to 100 feet	Sand, shell beds, marl, calcareous sandstone (coquina/calcarenite)
		Caloosahatchee	230 to 330 feet	Sandy marl, clay, silt with interbedded sand and shell beds
	Miocene	Tamiami	230 to 400 feet	silty limestone, silty sand, clayey marl, shell marl
		Hawthorn	400 to 890 feet	Undifferentiated clays, marls, sands, limestone, and fine grained dolomites and phosphorites
	Oligocene	Suwannee	Up to 1000	Limestone, Marlstone, phosphatic sand
	Eocene	Ocala	600 to over 1100 feet	Limestone and dolostone
		Avon Park		Micritic or chalky Limestone, grainstone, packestone, wackestone
		Oldsmar		Micritic Limestone
	Eocene-Paleocene	Cedar Key	300 to over 2000 feet	Dolomite, limestone, anhydrite
Mesozoic			4000 to 15000 feet	Undifferentiated sedimentary and volcanic rocks

3.2 Geomorphology

Generally, the east coast Florida margin is characterized as a gently eastward dipping shelf-slope system sitting atop the older Floridian carbonate platform. The latitudinal geomorphology of the study area extends from the southern end of the Canaveral cuspate foreland taper in St. Lucie County to the shore parallel linear paleo-reef ridge and trough features of Palm Beach County (Hine, 1997). Meisburger and Duane (1971) categorize geomorphic features of the continental shelf by cross shore morphology; the shoreface zone, the inner shelf plain, and the outer shelf zone as seen in Figure 1.

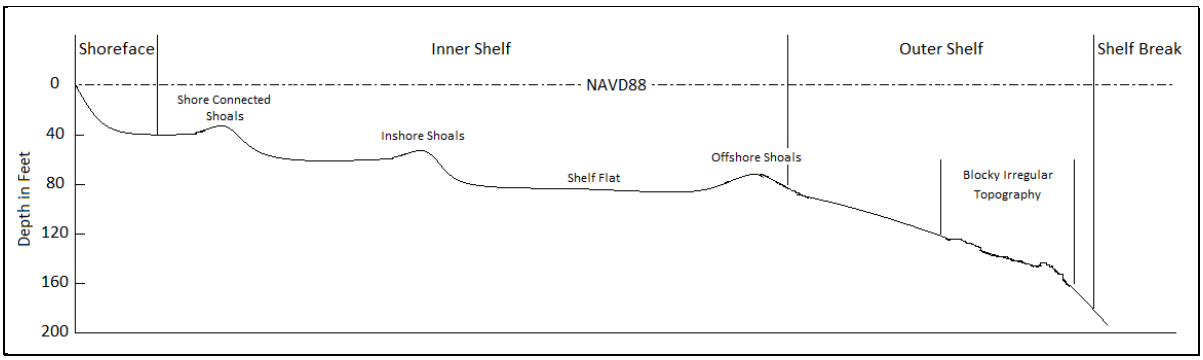

Figure 1. Schematic Profile of Shelf Morphology Typical of the Study Area and Descriptive Terminology (Meisburger and Duane, 1971)

3.2.1 Shoreface Zone

The shoreface zone between Cape Canaveral and just north of Palm Beach County consists of a terrace like feature with a 1 on 80 slope extending to elevations near -43 ft NAVD88 and varying between approximately 500 ft and 3000 feet in width. Shoals commonly extend into shoreface zone and are thought to play an integral role in the dynamics of the zone. Coquina outcrops are observed in the shoreface correlated to the semi-consolidated to consolidated stratigraphy of the Anastasia formation. Historical borings in the shoreface zone indicate that unconsolidated sediments extend 5-10 feet below the sediment water interface before encountering consolidated materials (Meisburger and Duane, 1971; URS, 2007).

3.2.2 Inner Shelf Plain

The inner shelf plain, from approximately -43 to -78 ft NAVD88, consists of gently dipping plateaus with minimal change in depth range. Northeasterly trending symmetric and asymmetric shoals are interspersed with flats of minimal topographical relief (±5 ft). Asymmetric shoals generally have seaward facing lee slopes. Two anomalous shoals in the study area trend to the northwest and are thought to differ from the northeasterly trending shoals in deposition time or process of formation. Seismic reflection studies indicate that inner shelf plain shoals are superposed on the surface of the flats (Meisburger and Duane, 1971; URS, 2007).

3.2.3 Outer Shelf Zone

The outer shelf zone is a discontinuous broken topography of generally low relief (Meisburger and Duane, 1971). Geomorphic features of this zone include rocky or coral reef patches, ridges, ledges, cliffs or depressions. While characterized as discontinuous, there is indication that some linear ridges continue as deep as -95 ft NAVD88. Areas of the outer shelf zone that do not stand in relief as ridges are considered flats. However, unlike the flats in the inner shelf zone, those in the outer shelf zone have a more irregular or hummocky surface (Meisburger and Duane, 1971; URS, 2007). Flats of the outer self zone decrease in lateral width until distinct zones are no longer observed south of Lake Worth Inlet.

4.0 PREVIOUS INVESTIGATIONS

Many previous investigations have been conducted in the project area. Geotechnical, geophysical, and environmental data from previous investigations can be found in the FDEP ROSS Database. The information available in the ROSS Database ranges from reconnaissance level to design/construction level identification of sand sources for discreet areas throughout St. Lucie, Martin and Palm Beach Counties.

5.0 PERTINENT PROJECT DETAILS

Core boring locations were provided by the USACE Jacksonville POC to the USACE office in Wilmington, NC, formatted and loaded into a HYPACK system aboard the drilling vessel. All borings were recorded in Florida East-NAD83 State Plane Coordinates.

For this work, boring locations in St Lucie County were between 0.8 and 6.3 miles offshore and covered an area of approximately 37 mi^2, in Martin County borings were between 1.9 and 6.0 miles offshore and covered an area of approximately 45 mi^2 and in Palm Beach County borings were located approximately 0.3 to 3.2 miles offshore and cover an area of approximately 10 mi^2.

Borings 76, 96, 107, 114 and 116 were proposed in water depths that exceeded the drilling vessel's anchoring capability and could not be sampled. The drilling vessel was able to drill in water depths up to 90 feet as read on the echo sounder.

Standard Boring and Laboratory data presented here were generated with the geotechnical integrator "gINT" software. The USACE script/library files were used to generate the boring logs. The Florida Department of Environmental Protection (FDEP) script/library files were used to create the laboratory data sheets.

Data found in this site investigation report is also available in the FDEP ROSS/OSSI database.

6.0 FINDINGS

The field investigation and laboratory testing in this report represent the materials found throughout the Continental Shelf from St. Lucie County to Palm Beach County. The materials encountered include fine sand size quartz and carbonate, sand sized materials with silt and clay, silty/clayey sands, silts, clays, coarse sand sized to fine gravel sized shell, calcarenite (cemented carbonate sand), highly to moderately weathered quartzose sandstone and highly weathered (sapprolitic) to moderately weathered hard limestone.

This reconnaissance level report provides sufficient data to indicate areas where existing materials exhibit characteristics that may be suitable for beach placement in Southeast Florida. Additional drilling and testing will be required to fully delineate the extent of compatible materials for the purposes of design and construction.

7.0 REFERENCES

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8.2 Field Investigations and Laboratory Testing Procedures

8.2.1 Field Investigation Procedures

Vibracoring was conducted with the USACE Wilmington District, multi-purpose vessel SNELL (M/V SNELL). The M/V SNELL is a 104'x 32' vessel drawing 6' of water equipped with 35 ton crane capable of multiple functions from drilling to dredging and dock/snag removal.

The vibracoring duration spanned 2 April 2012 to 12 June 2012. The execution of the vibracoring program was impacted by adverse weather that included both wind and bi-directional seas ranging from 2 ft to 8 ft swells. Operations were only conducted in daylight during the drilling period. The vessel returned to dock each night and the drilling crew remained aboard.

A geologist from either the USACE Wilmington District office or Jacksonville District office was on board during all drilling operations to collect drilling data and verify penetration and recovery percentage.

The SNELL is equipped with Furuno NavNet 3D GPS navigational system tied into HYPACK with DREDGEPACK. The GPS receiver was mounted on the end of the crane recording the exact easting and northing of boring locations.

All borings were sampled using an ICE Model 2 Hydraulic vibratory driver with a Model 50 power unit. The vibracore drilling apparatus is a self contained, free standing base with a crane mounted vertical hammer producing 11.8 tons of driving force at 2000 vibrations per minute (vpm). Drilling with hydraulic fluid prevented collapse of the drill lines and retained driving force while sampling on the edge of the continental shelf. A continuous 20-foot by 4-inch core barrel with clear plastic core liner and sediment catcher were driven until full penetration or refusal was encountered.

The vibracore apparatus was equipped with a graph-type penetration depth recorder a few weeks following the initiation of drilling. If collected, penetration graphs are included for the respective core boring to indicate comparative in-situ density of the sediments encountered for each foot of depth.

Penetration of at least eighty percent (80%) of the specified sample length (16 feet of 20 feet) was required unless refusal was due to rock and so noted on the drilling log. If refusal was not due to rock, then the partially filled core liner was removed and a new one fitted to make an additional attempt to meet the penetration requirement. The average penetration for the project was 18.9 feet.

Refusal criteria for this study is defined as no additional penetration of the vibracore with 45 seconds of additional effort applied to penetrate through the resistant layer at maximum vibration. Exceeding 45 seconds of vibration without advancement of the boring resulted in bending of the core barrel, pipe threading and/or cutting head.

Due to the nature of this investigation, emphasis was placed on obtaining the maximum possible sediment recovery. Acceptable recovery was defined as the percentage of representative sample obtained from an individual sampling event, specifically the number of feet recovered in

the tube divided by the number of feet penetrated. The average percent recovery for the project was 91%.

8.2.2 Laboratory Testing and Methods

Laboratory testing of 619 samples was completed by Coastal Planning and Engineering, Inc. (CPE), a Shaw Group Company, as negotiated and funded by the Florida Department of Environmental Protection (FDEP). CPE is a Construction Materials Engineering Council (CMEC) certified laboratory. Additionally, laboratory analysis was submitted to FDEP and USACE, signed and sealed by a Professional Geologist certified in the State of Florida.

Sediment samples were delivered by USACE to CPE's Boca Raton, FL laboratory on 31 July 2012. Testing procedures are listed in Table 2.

The sediment samples were analyzed to determine color and grain size distribution. During sieve analysis, the wet (moist), dry and washed Munsell colors were noted. Shell content was visually estimated (bulk shell estimate).

Sieve analysis of the sediment samples was performed in accordance with the American Society for Testing and Materials (ASTM) Standard Methods Designation D 422-63 for particle size analysis of soils. This method covers the quantitative determination of the distribution of sand size particles. Weights retained on each sieve were recorded cumulatively.

Carbonate content was determined by percent weight using the acid leaching methodology described in Twenhofel, W.H. and Tyler, S.A. 1941. Samples were re-sieved following carbonate analysis, using the same sieving method described previously.

Laboratory results were entered into the gINT software program using the FDEP library, which computes the mean and median grain size, sorting, silt/clay percentages for each sample using the moment method. This data was merged with project files containing the vibracore logs.

Table 2. Index Testing and Procedure Methods

Test/Procedure	**Method**
Carbonate Content, Non-ASTM	Twenhofel and Tyler, 1941
Grain Size Sieve Analysis (Using Sieve Sizes No. 3/4", 5/8", 7/16", 5/16", 3.5, 4, 5, 7, 10, 14, 18, 25, 35, 45, 60, 80, 120, 170, 200, 230)	ASTM D422-63
Munsell Color	Munsell Soil Color Charts
Soil Classification (Boring logs)	ASTM D 2488
Visual Percent Shell	No ASTM

8.2.3 Material Classification

Collected samples in vibracore tubes were stored at the USACE Jacksonville District warehouse on Talleyrand Avenue in Jacksonville FL until drilling was complete at which time, the cores were split and the materials visually classified by USACE Jacksonville District geologists.

The vibracores were visually classified in accordance with the Unified Soils Classification System (USCS) and Munsell soil color charts. All Munsell colors indicated on the boring logs represent moist Munsell color.

After the sample was logged, half of each tube was wrapped in plastic sleeving, annotated with boring name and depth interval, duct taped and placed in labeled wooden core boxes for future examination. Discrete samples were taken from the other half of the core for laboratory analysis. Remaining un-sampled materials were discarded.

8.2.4 Definitions

Definitions not explicitly indicated in the sections below are typical industry standard definitions from their respective ASTMs.

Calcarenite – A limestone consisting predominately (more than 50%) of recycled calcite particles of sand size; a consolidated calcareous sand.

Carbonate – Soil component that reacts with HCl of an indeterminate origin (shell, rock, etc.).

Layer – Rock or soil with a thickness of 6 inches or less.

Lens – A geologic deposit of variable thickness, which disappears laterally in all directions and cannot be correlated to adjacent borings.

Rock – A naturally occurring substance composed of one or more minerals bound together. This geologic term includes a range of engineering properties: strength, hardness, permeability, weathering, and discontinuity. These properties are noted or can be inferred from the boring logs as blow counts, penetration rate, RQD, hardness, etc.

Shell – Material composed of predominantly (>75%) coarse-grained sand to gravel-sized whole or broken shell.

Component Percentages:

Trace – Particles are present but estimated to be less than 5%
Few – Particles constitute 5-12% of material
Little – Particles constitute 12-25% of material
Some – Particles constitute 25-50% of material
Mostly – Particles constitute 50-100% of material

Decomposed – Applicable to saprolitic rock; rock is essentially reduced to a soil with a relic rock texture; can be molded or crumbled by hand.

Discontinue – Particles were present within the unit above but are no longer present.

8.3 Field and Laboratory Data Summary Sheets

8.3.1 Summary of Field Investigation Data

The following table contains a summary of the Field Investigation Data collected during drilling. Data pertinent to Tide Data is also included herein.

** Tide readings were taken as the average of the two tide stations indicated.

Table 3. Summary of Field Investigation Data

Designation	State Plane, FL-East, NAD83		Time	Tide Station	Datum Δ	Elevation NAVD88
	X	Y				
VB-PBC12-1	962685	738108	11:30:02	**5/6	-2.36	-29.9
VB-PBC12-2	965004	747401	12:17:14	**5/6	-2.37	-53.2
VB-PBC12-3	965113	748241	12:37:38	**5/6	-2.37	-55.2
VB-PBC12-4	965115	748722	12:50:31	**5/6	-2.37	-55.8
VB-PBC12-5	963608	751240	9:53:50	**5/6	-2.37	-29.0
VB-PBC12-6	966640	771874	10:51:07	**5/6	-2.39	-42.9
VB-PBC12-7	966978	774682	11:20:00	**5/6	-2.39	-43.9
VB-PBC12-8	972075	813265	14:52:49	5	-2.43	-33.0
VB-PBC12-9	972313	816392	15:11:14	5	-2.44	-29.9
VB-PBC12-10	972596	818750	15:27:45	5	-2.44	-31.8
VB-PBC12-11	976178	855506	13:24:55	**4/5	-2.49	-52.8
VB-PBC12-12	976209	859678	14:02:35	**4/5	-2.50	-53.9
VB-PBC12-13	971417	910201	8:26:47	**3/4	-2.59	-32.2
VB-PBC12-14	972527	914459	9:03:17	**3/4	-2.60	-63.2
VB-PBC12-15	977731	914737	9:34:04	**3/4	-2.59	-82.7
VB-PBC12-16	969332	919478	10:42:22	**3/4	-2.61	-28.5
VB-PBC12-17	970938	923505	11:13:21	**3/4	-2.62	-70.5
VB-PBC12-18	967554	927123	11:57:33	**3/4	-2.63	-29.3
VB-PBC12-19	969311	930154	12:38:05	**3/4	-2.64	-59.9
VB-PBC12-20	966436	932167	13:19:45	**3/4	-2.65	-31.3
VB-PBC12-21	967441	936793	7:42:18	3	-2.67	-53.1
VB-PBC12-22	967083	940781	8:08:17	3	-2.68	-59.9
VB-PBC12-23	964019	941277	9:06:32	3	-2.70	-29.6
VB-PBC12-24	966531	944846	13:35:18	3	-2.70	-61.8
VB-PBC12-25	962932	945903	10:28:40	3	-2.73	-26.0
VB-PBC12-26	962588	948466	11:16:06	3	-2.74	-30.8
VB-PBC12-27	966188	949158	14:59:42	3	-2.71	-68.0
VB-PBC12-28	961281	951562	11:50:33	3	-2.75	-27.6
VB-PBC12-29	961773	955997	15:47:26	**2/3	-2.73	-37.8
VB-PBC12-30	958699	959192	11:30:02	**2/3	-2.72	-29.3
VB-MC12-31	977280	962333	8:40:45	**2/3	-2.65	-75.6
VB-MC12-32	972257	962445	9:47:00	**2/3	-2.67	-63.7
VB-MC12-33	964186	967143	14:28:55	**2/3	-2.69	-56.2
VB-MC12-34	970092	967485	10:47:54	**2/3	-2.67	-60.2
VB-MC12-35	978666	969365	7:54:49	**2/3	-2.65	-81.5
VB-MC12-36	966955	972237	13:16:54	**2/3	-2.68	-50.7
VB-MC12-37	977138	972719	14:03:40	**2/3	-2.65	-77.7
VB-MC12-38	972546	973449	11:24:51	**2/3	-2.66	-63.2
VB-MC12-39	969458	977487	12:37:54	**2/3	-2.67	-49.5
VB-MC12-40	973827	980118	13:06:01	**2/3	-2.66	-73.0
VB-MC12-41	971446	983335	12:24:35	**2/3	-2.66	-68.4
VB-MC12-42	968427	989121	11:32:50	**2/3	-2.66	-77.7
VB-MC12-43	974662	989177	9:20:30	**2/3	-2.65	-85.7
VB-MC12-44	957765	994317	10:14:15	**2/3	-2.68	-47.6
VB-MC12-45	954441	995305	12:09:31	**2/3	-2.69	-42.7
VB-MC12-46	959186	995307	10:32:36	**2/3	-2.68	-59.9
VB-MC12-47	968857	995487	10:46:27	**2/3	-2.66	-74.7
VB-MC12-48	973051	995619	9:59:33	**2/3	-2.66	-75.5
VB-MC12-49	958195	996944	10:51:59	**2/3	-2.68	-53.0
VB-MC12-50	953565	998026	12:51:34	**2/3	-2.69	-47.5
VB-MC12-51	953396	999551	14:00:01	**2/3	-2.69	-40.3
VB-MC12-52	957050	1000547	11:32:58	**2/3	-2.68	-51.9
VB-MC12-53	950288	1004479	14:26:44	**2/3	-2.69	-40.8
VB-MC12-54	946620	1009362	15:41:35	**2/3	-2.70	-44.7
VB-MC12-55	949233	1009608	15:04:20	**2/3	-2.70	-41.0

Designation	State Plane, FL-East, NAD83		Time	Tide Station	Datum Δ	Elevation NAVD88
	X	Y				
VB-MC12-56	965356	1010331	9:43:47	**2/3	-2.67	-63.2
VB-MC12-57	948159	1011642	16:18:20	**2/3	-2.70	-43.2
VB-MC12-58	947208	1013519	9:12:14	**2/3	-2.70	-41.9
VB-MC12-59	968175	1013532	11:16:09	**2/3	-2.67	-68.1
VB-MC12-60	950264	1013554	8:35:44	**2/3	-2.69	-39.2
VB-MC12-61	958342	1013550	10:30:05	**2/3	-2.68	-54.0
VB-MC12-62	949185	1015360	9:49:44	**2/3	-2.70	-40.6
VB-MC12-63	951115	1016049	10:26:16	**2/3	-2.69	-42.8
VB-MC12-64	970664	1016641	11:49:22	**2/3	-2.66	-79.2
VB-MC12-65	948213	1017583	11:17:46	**2/3	-2.70	-43.7
VB-MC12-66	950037	1018961	11:39:56	**2/3	-2.70	-40.5
VB-MC12-67	965796	1019772	12:18:57	**2/3	-2.67	-66.4
VB-MC12-68	948934	1020970	11:59:42	**2/3	-2.70	-42.3
VB-MC12-69	951788	1021431	12:23:40	2	-2.70	-43.2
VB-MC12-70	965673	1022306	12:39:57	2	-2.68	-66.5
VB-MC12-71	960457	1022679	13:09:47	2	-2.68	-57.6
VB-MC12-72	951206	1025632	12:59:49	2	-2.70	-41.0
VB-MC12-73	969182	1025768	13:52:03	2	-2.67	-81.0
VB-MC12-74	950645	1028337	13:24:40	2	-2.70	-36.7
VB-MC12-75	969359	1028844	14:29:55	2	-2.67	-84.7
VB-MC12-77	955413	1031805	8:12:22	2	-2.70	-54.3
VB-MC12-78	965338	1032001	15:07:26	2	-2.68	-71.0
VB-MC12-79	968858	1034419	15:32:06	2	-2.68	-85.2
VB-MC12-80	963013	1034752	9:21:13	2	-2.69	-67.8
VB-MC12-81	952386	1034753	14:42:17	2	-2.70	-45.1
VB-MC12-82	957229	1037703	8:44:20	2	-2.70	-61.2
VB-MC12-83	965744	1037853	15:59:15	2	-2.68	-75.3
VB-MC12-84	959068	1041164	10:42:57	2	-2.69	-65.3
VB-MC12-85	965685	1041264	9:53:12	2	-2.68	-77.4
VB-MC12-86	960002	1044246	11:06:15	2	-2.69	-66.1
VB-MC12-87	963227	1044408	11:46:13	2	-2.69	-71.1
VB-MC12-88	957940	1047284	12:59:10	2	-2.69	-65.5
VB-MC12-89	963604	1047511	12:28:14	2	-2.68	-73.3
VB-MC12-90	960831	1050229	13:37:51	2	-2.69	-67.7
VB-MC12-91	958643	1053461	14:06:25	2	-2.69	-61.9
VB-MC12-92	949681	1053760	15:08:23	2	-2.70	-61.6
VB-MC12-93	927923	1055546	10:16:43	2	-2.73	-41.9
VB-MC12-94	930325	1055710	9:48:09	2	-2.72	-46.0
VB-MC12-95	952198	1056412	14:40:11	2	-2.70	-58.2
VB-MC12-97	964617	1056595	8:16:01	2	-2.68	-81.7
VB-MC12-98	929677	1057719	10:45:29	2	-2.72	-43.2
VB-MC12-99	964005	1059344	8:35:48	2	-2.68	-79.6
VB-MC12-100	951344	1059357	8:45:57	2	-2.70	-61.6
VB-MC12-101	947669	1059440	15:38:48	2	-2.70	-63.9
VB-MC12-102	928649	1059521	11:05:44	2	-2.72	-44.6
VB-MC12-103	930956	1060163	11:30:33	2	-2.72	-44.9
VB-MC12-104	930139	1061991	11:55:51	2	-2.72	-46.1
VB-MC12-105	953518	1062366	9:50:02	2	-2.70	-57.4
VB-MC12-106	963522	1062467	9:24:34	2	-2.68	-79.1
VB-MC12-108	929233	1063518	12:36:30	2	-2.72	-47.4
VB-MC12-109	931588	1064250	13:17:15	2	-2.72	-48.3
VB-MC12-110	944125	1065394	15:14:30	2	-2.71	-61.0
VB-MC12-111	950892	1065404	10:24:45	2	-2.70	-65.2
VB-SLC12-112	963485	1065544	10:03:56	2	-2.68	-77.8
VB-SLC12-113	938764	1068313	13:56:03	2	-2.71	-63.0
VB-SLC12-115	957800	1068896	15:38:59	2	-2.69	-66.3
VB-SLC12-117	953306	1070714	15:07:08	2	-2.69	-68.2

Designation	State Plane, FL-East, NAD83		Time	Tide Station	Datum Δ	Elevation NAVD88
	X	Y				
VB-SLC12-118	937118	1071627	9:21:16	2	-2.71	-62.9
VB-SLC12-119	937837	1074580	9:41:04	**1/2	-2.71	-63.0
VB-SLC12-120	961161	1074807	10:50:15	**1/2	-2.68	-75.7
VB-SLC12-121	955550	1074826	14:37:15	**1/2	-2.69	-73.7
VB-SLC12-122	938228	1077068	10:05:27	**1/2	-2.71	-62.2
VB-SLC12-123	959714	1078089	12:07:02	**1/2	-2.69	-79.1
VB-SLC12-124	937658	1083698	11:07:47	**1/2	-2.71	-64.1
VB-SLC12-125	958595	1083792	13:35:34	**1/2	-2.69	-78.3
VB-SLC12-126	961814	1086824	12:49:13	**1/2	-2.69	-86.2
VB-SLC12-127	959689	1087044	13:09:30	**1/2	-2.69	-78.3
VB-SLC12-128	937551	1089813	12:38:38	**1/2	-2.71	-63.1
VB-SLC12-129	942832	1089866	14:20:13	**1/2	-2.71	-55.6
VB-SLC12-130	934182	1089868	12:08:33	**1/2	-2.72	-52.0
VB-SLC12-131	947379	1089901	14:46:17	**1/2	-2.70	-59.6
VB-SLC12-132	929281	1092939	15:51:52	**1/2	-2.72	-46.8
VB-SLC12-133	939307	1093137	13:07:44	**1/2	-2.71	-57.0
VB-SLC12-134	938407	1096110	13:34:34	**1/2	-2.71	-54.3
VB-SLC12-135	958155	1102377	12:40:14	**1/2	-2.69	-81.2
VB-SLC12-136	952703	1102606	13:05:04	**1/2	-2.70	-57.4
VB-SLC12-137	929237	1105220	9:56:25	**1/2	-2.72	-44.7
VB-SLC12-138	924758	1108197	11:38:06	**1/2	-2.73	-47.8
VB-SLC12-139	946317	1108232	13:42:53	**1/2	-2.71	-66.5
VB-SLC12-140	932764	1108199	11:01:07	**1/2	-2.72	-43.2
VB-SLC12-141	926926	1110991	12:17:38	**1/2	-2.73	-38.9
VB-SLC12-142	927457	1114140	12:39:36	**1/2	-2.73	-40.8
VB-SLC12-143	921793	1116157	13:11:48	**1/2	-2.73	-39.7
VB-SLC12-144	922862	1118448	13:32:10	**1/2	-2.73	-39.0
VB-SLC12-145	917844	1120163	9:39:31	1	-2.74	-37.0
VB-SLC12-146	944142	1120160	9:04:44	1	-2.71	-71.0
VB-SLC12-147	934460	1120539	9:47:04	1	-2.73	-62.2
VB-SLC12-148	910847	1121666	8:06:57	1	-2.74	-43.5
VB-SLC12-149	919323	1123243	10:04:32	1	-2.74	-41.4
VB-SLC12-150	915136	1123470	9:11:05	1	-2.74	-39.2
VB-SLC12-151	921139	1126217	8:05:00	1	-2.74	-44.7
VB-SLC12-152	916091	1126290	10:41:28	1	-2.74	-41.6
VB-SLC12-153	945624	1126350	10:38:51	1	-2.71	-74.7
VB-SLC12-154	911067	1126385	8:39:52	1	-2.75	-38.5
VB-SLC12-155	939689	1132732	11:20:21	1	-2.72	-59.9
VB-SLC12-156	933206	1135528	13:07:52	1	-2.73	-70.1
VB-SLC12-157	941245	1135611	11:56:54	1	-2.72	-64.0
VB-SLC12-158	944487	1137520	12:21:01	1	-2.72	-61.4
VB-SCL12-159	891618	1138202	13:11:21	1	-2.76	-26.9
VB-SLC12-160	927145	1138263	13:44:05	1	-2.74	-61.2
VB-SLC12-161	907548	1141500	11:51:20	1	-2.76	-40.8
VB-SLC12-162	926866	1141581	14:11:29	1	-2.74	-56.1
VB-SLC12-163	937448	1144586	8:27:46	1	-2.73	-62.8
VB-SLC12-164	891838	1145391	13:46:24	1	-2.79	-32.9
VB-SLC12-165	922802	1147482	15:37:07	1	-2.75	-63.7
VB-SLC12-166	928861	1147609	14:48:50	1	-2.74	-59.9
VB-SLC12-167	936973	1147943	8:52:15	1	-2.73	-60.8
VB-SLC12-168	937426	1150385	9:14:29	1	-2.73	-59.3
VB-SLC12-169	908717	1150473	10:43:45	1	-2.77	-48.4
VB-SLC12-170	906442	1150486	11:04:33	1	-2.78	-38.9
VB-SLC12-171	914243	1150526	8:57:32	1	-2.76	-54.0
VB-SLC12-172	917222	1150512	9:49:57	1	-2.76	-51.1
VB-SLC12-173	933510	1150753	9:50:01	1	-2.74	-56.1
VB-SLC12-174	890495	1151827	8:04:02	1	-2.80	-38.6

Designation	State Plane, FL-East, NAD83		Time	Tide Station	Datum Δ	Elevation NAVD88
	X	Y				
VB-SLC12-175 A	907113	1155394	9:38:02	1	-2.78	-47.7
VB-SLC12-175 B	907107	1155404	10:18:00	1	-2.78	-47.4
VB-SLC12-176	917181	1156538	11:33:20	1	-2.76	-50.9
VB-SLC12-177	909619	1156593	10:36:19	1	-2.78	-53.3
VB-SLC12-178	925957	1156683	14:03:26	1	-2.75	-60.3
VB-SLC12-179	892810	1156658	9:26:33	1	-2.80	-36.4
VB-SLC12-180	935055	1156712	10:21:29	1	-2.74	-59.8
VB-SLC12-181	941857	1158231	11:17:13	1	-2.73	-68.3
VB-SLC12-182	908492	1159309	15:30:40	1	-2.78	-49.8
VB-SLC12-183	926399	1159778	13:39:40	1	-2.75	-56.5
VB-SLC12-184	935955	1159976	10:43:50	1	-2.74	-61.9
VB-SLC12-185	930865	1160024	13:13:40	1	-2.75	-67.8
VB-SLC12-186	892661	1160759	9:48:48	1	-2.81	-40.1
VB-SLC12-187	897979	1160887	10:29:13	1	-2.80	-36.8
VB-SLC12-188	923894	1162602	15:16:19	1	-2.76	-60.7
VB-SLC12-189	916193	1162622	12:34:20	1	-2.77	-55.7
VB-SLC12-190	908615	1162651	15:05:37	1	-2.78	-46.3
VB-SLC12-191	913633	1162644	12:10:59	1	-2.77	-54.7
VB-SLC12-192	919851	1162690	14:44:40	1	-2.76	-51.4
VB-SLC12-193	928657	1162785	12:49:50	1	-2.75	-55.4
VB-SLC12-194	899217	1163829	11:07:37	1	-2.80	-34.7
VB-SLC12-195	903358	1165918	13:16:34	1	-2.80	-50.1
VB-SLC12-196	898832	1165931	11:26:33	1	-2.80	-36.6
VB-SLC12-197	932406	1166141	12:10:10	1	-2.75	-64.6
VB-SLC12-198	891697	1168069	12:04:08	1	-2.82	-42.6
VB-SLC12-199	899836	1168542	12:37:34	1	-2.80	-36.8
VB-SLC12-200	904339	1168639	13:52:47	1	-2.79	-49.8
VB-SLC12-201	915798	1168756	13:26:37	1	-2.78	-52.9
VB-SLC12-202	919058	1168886	14:13:32	1	-2.77	-57.1
VB-SLC12-203	914264	1171725	13:46:26	1	-2.78	-58.9

8.3.2 Summary of Index Testing Performed for Data Set

The following table contains a summary of index testing performed for the collected vibracore.

Table 4. Summary of Index Testing Performed for Data Set

Boring Designation	Sample Designation	Sample Depth	USCS	% Passing #230	Visual Shell %	CO_3 %	Munsell Color (Dry)
VB-PBC12-1	1	3.7'-4.0'	SW	3.01	65	67	2.5Y 4/1
	2	7.4'-7.8'	SM	11.68	60	82	5Y 6/1
	3	12.7'-12.9'	SW-SM	5.22	70	83	5Y 4/1
VB-PBC12-2	1	3.0'-3.2'	SW-SM	8.04	30	46	5Y 6/1
	2	8.5'-8.7'	SM	20.82	20	48	5Y 6/1
	3	13.8'-14.0'	SW-SM	3.86	20	51	5Y 5/1
	4	18.2'-18.6'	SM	18.01	20	52	5Y 6/1
VB-PBC12-3	1	3.0'-3.2'	SW-SM	4.63	50	53	2.5Y 5/1
	2	10.0'-10.2'	SM	13.65	30	52	5Y 7/1
	3	17.8'-18.0'	SW	2.93	30	57	2.5Y 4/1
VB-PBC12-4	1	2.0'-2.2'	SW	2.21	15	50	5Y 4/1
	2	8.5'-8.7'	SM	11.73	30	50	5Y 6/1
	3	17.0'-17.2'	SM	17.25	30	60	5Y 7/1
VB-PBC12-5	1	2.0'-2.2'	SW	1.4	20	50	2.5Y 4/1
	2	4.5'-4.7'	SM	11.6	60	79	5Y 6/1
VB-PBC12-6	1	2.0'-2.2'	SM	15.08	30	49	5Y 6/1
	2	7.5'-7.7'	SM	9.35	20	53	5Y 5/1
	3	12.5'-12.7'	SM	12.8	20	45	5Y 6/1
	4	18.8'-19.0'	SM	9.71	20	55	5Y 6/1
VB-PBC12-7	1	2.0'-2.2'	SW-SM	8.39	20	42	5Y 6/1
	2	7.0'-7.2'	SW	1.76	30	45	2.5Y 4/1
	3	12.8'-13.0'	SW-SM	4.47	5	45	5Y 4/1
	4	18.1'-18.3'	SM	14.13	10	50	5Y 6/1
VB-PBC12-8	1	3.0'-3.2'	SM	13.31	3	41	5Y 6/1
	2	7.5'-7.7'	SP	2.71	10	56	5Y 4/1
	3	10.4'-10.6'	SW-SM	9.76	10	56	5Y 4/1
	4	17.9'-18.1'	SM	13.31	5	66	5Y 6/1
VB-PBC12-9	1	2.0'-2.2'	SW	3.85	3	38	5Y 7/1
	2	9.0'-9.2'	SW-SM	6.18	5	49	2.5Y 4/1
	3	14.0'-14.2'	SM	12.42	3	55	5Y 5/1
VB-PBC12-10	1	3.0'-3.2'	SM	16.09	5	36	5Y 5/1
	2	8.0'-8.2'	SW-SM	7.27	10	47	5Y 6/1
	3	13.0'-13.2'	SW-SM	6.55	10	54	5Y 4/1
	4	16.8'-17.0'	SW-SM	6.32	20	62	5Y 4/1
VB-PBC12-11	1	2.0'-2.2'	SW	3.88	30	50	5Y 4/1
	2	7.3'-7.5'	SM	19.78	50	62	N 5/0
	3	10.8'-11.0'	SM	6.56	60	74	5Y 6/1
VB-PBC12-12	1	2.0'-2.2'	SW-SM	6.3			5Y 6/1
	2	8.1'-8.3'	SM	12.1	60	75	5Y 6/1
VB-PBC12-13	1	3.0'-3.2'	SM	16.14	90	99	10Y 7/1
	2	12.6'-12.8'	SW	1.59	3	20	5Y 4/1
VB-PBC12-14	1	3.0'-3.2'	SW-SM	7.47	40	65	5Y 6/1
	2	12.0'-12.2'	SM	12.49	3	24	5Y 6/1
	3	15.3'-15.5'	SM	11.78	40	80	5Y 6/1
VB-PBC12-15	1	2.0'-2.2'	SM	10.36	40	50	5Y 6/1
VB-PBC12-16	1	1.5'-1.7'	SM	27.23	10	23	5Y 8/1
	2	7.0'-7.2'	SW-SM	5.78	3	19	5Y 6/1
	3	12.0'-12.2'	SM	13.04	3	27	5Y 6/1
	4	17.5'-17.7'	SM	9.41	10	43	5Y 5/1
VB-PBC12-18	1	2.0'-2.2'	SM	13.4	30	59	10Y 5/1
	2	7.0'-7.2'	SM	17.57	3	22	10Y 6/1
	3	13.0'-13.2'	SM	16.1	10	25	5Y 8/1
VB-PBC12-19	1	2.0'-2.2'	SM	14.13	30	36	5Y 7/1
	2	7.0'-7.2'	SM	13.33	20	24	5Y 7/1
VB-PBC12-20	1	4.0'-4.2'	SM	13.37	20	22	5Y 6/1
	2	12.0'-12.2'	SW-SM	7.22	30	34	5Y 6/2

Boring Designation	Sample Designation	Sample Depth	USCS	% Passing #230	Visual Shell %	CO_3 %	Munsell Color (Dry)
VB-PBC12-21	1	3.0'-3.4'	SM	16.09	30	25	5Y 6/1
	2	12.0'-12.2'	SW-SM	9.67	80	52	5Y 5/1
	3	17.5'-17.7'	SM	12.19	15	22	5Y 6/1
VB-PBC12-22	1	2.0'-2.2'	SM	31.68	15	18	5Y 6/1
	2	9.0'-9.2'	SW	3.49	60	8	5Y 6/2
VB-PBC12-23	1	2.0'-2.2'	SW	1.21	5	20	2.5Y 5/1
	2	8.0'-8.2'	SW	1.6	15	24	2.5Y 5/1
	3	12.0'-12.2'	SW	3.87	5	27	2.5Y 5/1
	4	16.5'-16.7'	SW	1.64	5	39	N 4/0
VB-PBC12-24	1	2.0'-2.2'	SP	2.13	20	34	N 4/0
	2	8.4'-8.6'	SM	14.64	20	16	N 6/0
VB-PBC12-25	1	3.0'-3.2'	SW-SM	4.86	5	18	5Y 5/1
	2	7.0'-7.2'	SM	18.9	5	19	5Y 7/1
	3	12.0'-12.2'	SP-SM	7.17	5	19	N 5/0
	4	16.3'-16.5'	SW	2.3	10	36	N 4/0
VB-PBC12-26	1	3.0'-3.2'	SW	2.26	15	18	N 3/0
	2	7.5'-7.7'	SP	4.31	5	17	N 3/0
	3	12.0'-12.2'	SW	3.19	15	24	N 3/0
	4	17.0'-17.2'	SP	1.8	5	34	N 4/0
VB-PBC12-27	1	3.3'-3.5'	SP	2.49	15	51	N 4/0
	2	8.0'-8.2'	SP	1.69	2	1	N 5/0
VB-PBC12-28	1	3.0'-3.2'	SW	1.52	5	18	N 5/0
	2	8.4'-8.6'	SW	1.66	5	18	N 3/0
	3	16.0'-16.2'	SW-SM	4.71	2	18	N 5/0
	4	18.4'-18.6'	SW	3.44	10	36	N 5/0
VB-PBC12-29	1	1.8'-2.0'	SW-SM	7.73	5	18	N 6/0
	2	7.0'-7.2'	SW	1.05	10	26	N 5/0
	3	13.4'-13.8'	SP	2.04	10	38	N 3/0
VB-PBC12-30	1	2.6'-2.8'	SW	2.35	5	20	N 3/0
	2	7.0'-7.2'	SM	19.69	5	17	5Y 5/1
	3	12.0'-12.2'	SW	1.01	20	32	N 4/0
	4	16.0'-16.2'	SW	1.28	10	27	2.5Y 4/1
VB-MC12-31	1	0.5'-0.7'	SW	1.91	50	82	N 5/0
VB-MC12-32	1	3.0'-3.5'	SW-SM	8.49	20	76	2.5Y 6/2
	2	7.3'-8.0'	SP	0.99	20	78	2.5Y 6/2
	3	11.5'-12.0'	SP	3.37	10	66	5Y 7/2
VB-MC12-33	1	2.8'-3.0'	SW-SM	4.73	40	77	5Y 7/2
	2	9.0'-9.2'	SW	1.04	20	71	N 5/0
	3	15.5'-15.7'	SW	1.06	30	78	5Y 5/1
VB-MC12-34	1	0.0'-0.4'	SW	3.26	50	78	5Y 5/1
	2	4.3'-4.6'	SM	10.57	20	80	5Y 6/2
	3	8.5'8.7'	SW-SM	10.08	30	73	5Y 8/1
VB-MC12-35	1	3.0'-3.2'	SM	12.41	50	84	5Y 6/2
	2	13.0'-13.2'	SM	22.55	30	85	5Y 6/2
	3	18.0'-18.2'	ML	39.04	5	81	2.5Y 6/2
VB-MC12-36	1	3.0'-3.2'	SW	4.11	40	66	2.5Y 5/1
	2	9.0'-9.2'	SP-SM	7.42	50	70	5Y 6/1
	3	14.4'-14.6'	SP	2.33	40	71	5Y 6/1
	4	19.6'-19.8'	SW-SM	4.77	50	68	5Y 6/1
VB-MC12-37	1	2.0'-2.2'	SP-SM	5.46	70	78	5Y 6/1
	2	5.5'-5.7'	SP	3.34	70	81	5Y 6/1
	3	8.0'-8.2'	SP-SM	6.69	40	77	5Y 6/1
	4	9.5'-9.7'	SM	9.01	60	80	5Y 6/1
	5	12.0'-12.2'	SM	13.98	70	77	5Y 6/1
VB-MC12-38	1	0.8'-1.0'	SW-SM	6.55	70	71	5Y 6/1
	2	7.0'-7.2'	SM	23.02	40	76	5Y 8/1
	3	12.0'-12.2'	SM	10.54	30	76	5Y 5/1

Boring Designation	Sample Designation	Sample Depth	USCS	% Passing #230	Visual Shell %	CO_3 %	Munsell Color (Dry)
VB-MC12-38	4	13.4'-13.6'	SP-SM	4.59	40	75	5Y 5/1
VB-MC12-39	1	4.0'-4.5'	SM	10.91	40	72	5Y 6/1
	2	8.5'-9.0'	SM	13.61	40	78	5Y 6/1
	3	14.0'-15.0'	SW	3.16	30	72	5Y 6/1
VB-MC12-40	1	1.0'-1.2'	SP-SM	6.16	40	76	5Y 6/1
	2	2.5'-2.7'	SP-SM	3.55	20	73	5Y 5/1
	3	5.5'-5.7'	SP-SM	3.52	50	79	5Y 6/1
	4	8.0'-8.2'	SM	5.71	60	81	5Y 6/1
VB-MC12-41	1	2.8'-3.0'	SW	1.22	40	72	5Y 4/1
	2	8.0'-8.2'	SW-SM	8.02	80	79	5Y 6/1
	3	12.5'-12.7'	SP	2.93	80	72	5Y 6/1
	4	17.5'-17.7'	SW-SM	7.06	40	55	5Y 6/1
VB-MC12-42	1	3.0'-3.2'	SP-SM	4.28	95	82	5Y 6/1
VB-MC12-43	1	3.0'-3.2'	SW-SM	3.43	15	51	5Y 5/1
	2	8.0'-8.2'	SP-SM	3.58	30	46	5Y 5/1
	3	12.0'-12.2'	SW	2.11	30	61	5Y 4/1
	4	15.0'-15.2'	SP-SM	3.59	80	86	5Y 5/1
VB-MC12-44	1	3.0'-3.5'	SW	2.84	30	18	5Y 4/1
	2	8.0'-8.3'	SM	14.34	40	13	5Y 5/2
	3	13.0'-13.5'	SM	8.53	65	55	5Y 6/1
VB-MC12-45	1	3.2'-3.4'	SP-SM	3.11	20	13	5Y 6/2
	2	10.0'-10.2'	SP-SM	4.24	45	28	5Y 6/1
	3	13.4'-13.6'	SM	13.31	20	19	5Y 6/2
	4	16.4'-16.6'	SM	17.19	20	31	5Y 6/1
VB-MC12-46	1	0.5'-0.7'	SW	2.52	10	21	5Y 5/1
	2	7.0'-7.3'	SW-SM	5.7	20	32	5Y 6/1
	3	10.8'-11.0'	SW-SM	4.37	90	75	5Y 6/1
VB-MC12-48	1	1.0'-1.2'	SW-SM	6.61	80	62	5Y 6/1
	2	3.5'-3.7'	SW-SM	6.75	40	45	5Y 6/2
VB-MC12-49	1	3.0'-3.2'	SP-SM	3.3	10	18	5Y 6/1
	2	7.0'-7.2'	SW-SM	7.13	30	62	5Y 6/1
	3	11.4'-11.6'	SM	11.44	10	30	5Y 6/1
VB-MC12-50	1	2.0'-2.2'	SM	19.57	5	11	5Y 5/2
	2	8.0'-8.2'	SP	2.05	10	20	5Y 4/1
VB-MC12-51	1	2.0'-3.0'	SW-SM	3.62	5	13	5Y 6/1
	2	9.0'-10.0'	SW-SM	3.83	30	36	5Y 6/1
VB-MC12-52	1	0.0'-0.2'	SP	2.23	60	83	5Y 6/1
	2	1.8'-2.0'	SP	2.01	10	21	5Y 6/1
	3	5.8'-6.0'	SW	2.79	5	15	5Y 6/1
	4	10.0'-10.2'	SW-SM	4.25	10	20	5Y 6/1
VB-MC12-53	1	2.0'-2.2'	SW	1.84	5	11	5Y 4/1
	2	12.6'-12.8'	SM	8.8	40	38	5Y 6/1
VB-MC12-54	1	2.5'-2.7'	SW-SM	6.61	10	14	5Y 6/1
VB-MC12-55	1	0.0'-0.3'	SW-SM	4.9	60	55	5Y 6/1
	2	4.8'-5.0'	SW-SM	3.95	20	18	5Y 6/1
	3	9.0'-9.2'	SM	9.12	50	44	5Y 6/1
	4	14.0'-14.2'	SP-SM	4.64	30	38	5Y 6/1
	5	17.0'-17.3'	SM	13.28	60	66	5Y 6/1
VB-MC12-56	1	0.0'-0.3'	SM	8.43	5	23	5Y 6/1
	2	4.7'-5.0'	SM	23.69	5	18	5Y 6/1
	3	8.8'-9.0'	SM	31.13	10	25	5Y 6/1
	4	11.0'-11.2	SW	1.04	50	64	5Y 4/1
VB-MC12-57	1	3.0'-3.5'	SW-SM	3.53	70	68	5Y 6/1
	2	8.0'-8.5'	SW-SM	3.54	40	41	5Y 5/1
	3	12.0'-12.5'	SW	1.51	60	58	5Y 4/2
VB-MC12-58	1	1.0'-1.2'	SP	1.56	10	18	5Y 4/2
	2	6.0'-6.2'	SM	16.51	40	18	5Y 5/1

Boring Designation	Sample Designation	Sample Depth	USCS	% Passing #230	Visual Shell %	CO_3 %	Munsell Color (Dry)
VB-MC12-59	1	0.0'-0.3'	SM	6.48	10	30	5Y 5/1
	2	4.5'-4.7'	SM	7.54	20	38	5Y 6/1
	3	7.1'-7.3'	SM	5.15	30	44	5Y 7/1
	4	9.4'-9.6'	SW-SM	4.78	30	57	5Y 6/1
VB-MC12-60	1	1.0'-1.2'	SM	21.5	70	84	5Y 6/1
	2	6.0'-6.2'	SM	23.59	70	87	5Y 6/1
	3	12.0'-12.2'	SM	31.34	40	37	5Y 6/1
VB-MC12-61	1	2.0'-2.2'	SW	1.83	1	10	5Y 4/1
	2	8.8'-9.0'	SW-SM	3.3	5	12	5Y 5/1
	3	12.0'-12.2'	SW-SM	5.77	30	31	5Y 5/1
	4	17.7'-17.9'	SW	2	50	54	5Y 4/2
VB-MC12-62	1	2.0'-2.2'	SW	1.84	90	84	5Y 4/1
	2	7.0'-7.2'	SM	8.12	5	13	5Y 6/1
	3	11.5'-11.7'	SW-SM	5.42	30	26	5Y 6/1
VB-MC12-63	1	1.0'-1.2'	SM	7.58	30	31	5Y 6/1
	2	2.3'-2.5	SM	19.68	20	30	5Y 5/1
	3	11.0'-11.2	SM	5.4	30	35	5Y 6/1
VB-MC12-64	1	0.0'-0.3'	SP-SM	3.77	10	41	5Y 6/1
	2	5.3'-5.5'	SM	7.12	10	36	5Y 6/1
	3	9.0'-9.2'	SM	5.64	5	25	5Y 6/1
	4	13.2'-13.4'	SM	9.61	10	36	5Y 6/1
	5	15.9'-16.1'	SM	11.32	20	65	5Y 6/1
VB-MC12-65	1	3.0'-3.5'	SW	1.49	60	54	5Y 5/2
	2	8.5'-8.9'	SW	1.91	90	88	5Y 5/2
	3	12.0'-12.5'	SW-SM	6.37	60	70	5Y 6/1
VB-MC12-66	1	0.8'-1.0	SM	9.3	90	86	5Y 6/1
	2	5.0'-5.2'	SM	10.28	90	88	5Y 6/1
	3	9.7'-10.0'	SM	23.5	40	46	5Y 6/1
	4	14.0'-14.2'	SW	1.39	5	18	2.5Y 5/1
	5	16.8'-17.0'	SM	10.56	20	33	5Y 6/1
VB-MC12-67	1	0.0'-0.3'	SW	2.62	15	22	5Y 6/1
	2	4.0'-4.2'	SM	15.9	15	24	5Y 6/1
	3	8.9'-9.1'	SM	21.33	5	32	5Y 6/1
	4	12.1'-12.4'	SM	23.82	40	63	5Y 6/1
	5	14.0'-14.3'	SM	6.17	40	74	5Y 7/1
VB-MC12-68	1	3.5'-4.0'	SP-SM	3.53	80	75	5Y 7/1
	2	7.5'-8.0'	SM	15.41	40	31	5Y 6/1
	3	12.5'-13.0'	SM	5.62	40	44	5Y 7/1
VB-MC12-69	1	1.0'-1.2'	SM	18.8	85	88	5Y 6/1
	2	5.0'-5.2'	SM	15.49	80	90	5Y 5/1
	3	11.0'-11.2'	SM	10.85	10	25	5Y 7/1
VB-MC12-70	1	3.0'-4.0'	SM	16.59	5	23	5Y 7/1
	2	8.0'-9.0'	SM	18.14	10	33	5Y 7/1
	3	11.0'-12.0'	SM	7.63	30	61	5Y 7/1
VB-MC12-71	1	0.0'-0.3'	SM	10.98	3	16	5Y 7/1
	2	4.8'-5.0'	SM	11.75	3	18	5Y 5/1
	3	8.0'-8.4'	SW	2.08	5	23	2.5Y 5/1
	4	11.8'-12.0'	SW-SM	5.03	5	24	5Y 5/1
	5	12.8'-13.0'	SM	8.36	40	46	5Y 7/1
	6	15.4'-15.6'	SM	5.32	80	69	5Y 7/1
VB-MC12-72	1	3.0'-3.5'	SP-SM	4.09	90	90	5Y 7/1
	2	7.5'-8.0'	SM	9.44	90	93	5Y 7/1
	3	10.5'-11.0'	SW-SM	3.56	20	31	5Y 7/1
VB-MC12-73	1	2.0'-3.0'	SM	18.79	20	38	5Y 6/1
	2	6.0'-7.0'	SP-SM	4.57	30	35	5Y 7/1
	3	10.0'-11.0'	SM	9.19	30	51	5Y 6/1
VB-MC12-74	1	3.2'-3.4'	SP-SM	5.66	95	92	5Y 7/1

Boring Designation	Sample Designation	Sample Depth	USCS	% Passing #230	Visual Shell %	CO_3 %	Munsell Color (Dry)
VB-MC12-74	2	13.9'-14.1'	SM	8.06	15	23	5Y 7/1
VB-MC12-75	1	0.0'-0.3'	SM	23.54	40	59	5Y 6/2
	2	6.1'-6.3'	SM	10.24	30	40	5Y 6/2
	3	12.1'-12.3'	SM	10	40	55	5Y 5/1
	4	14.3'-14.5'	SM	7.65	20	52	5Y 7/1
VB-MC12-77	1	2.0'-3.0'	SM	8.09	3	16	5Y 7/1
	2	8.0'-9.0'	SM	12.3	10	28	5Y 6/1
	3	13.0'-14.0'	SM	8.05	40	52	5Y 6/2
VB-MC12-78	1	3.0'-4.0'	SM	11.76	10	23	5Y 6/1
	2	9.0'-10.0'	SM	13.87	20	43	5Y 5/1
	3	11.5'-12.0'	SP-SM	5.85	50	75	5Y 7/1
VB-MC12-79	1	1.0'-2.0'	SM	12.76	10	42	5Y 7/1
	2	7.0'-8.0'	SM	6.54	10	37	5Y 7/1
	3	10.0'-11.0'	SM	22.86	30	51	5Y 6/1
VB-MC12-80	1	3.0'-4.0'	SM	9.09	5	20	5Y 7/1
	2	8.0'-8.5'	SM	11.89	10	35	5Y 7/1
	3	10.5'-11.0'	SM	8.56	70	67	5Y 7/1
VB-MC12-81	1	3.0'-3.2'	SM	11.41	90	88	5Y 7/1
	2	9.5'-9.7'	SM	11.25	70	70	5Y 5/1
	3	16.0'-16.2'	SW	1.79	5	32	5Y 4/1
VB-MC12-82	1	0.0'-0.3'	SM	9.04	5	22	5Y 7/1
	2	4.0'-4.3'	SM	9.1	5	18	5Y 7/1
	3	6.7'-6.9'	SM	9.66	3	20	5Y 6/1
	4	8.5'-8.7'	SW	1.63	20	37	2.5Y 5/1
	5	10.4'-10.6'	SW-SM	6	20	49	5Y 4/1
VB-MC12-83	1	0.0'-0.3'	SW-SM	3.68	10	29	5Y 5/1
	2	4.0'-4.2'	SM	46.23	10	30	10Y 6/1
VB-MC12-84	1	0.0'-0.3'	SW-SM	5.93	5	23	5Y 6/1
	2	5.0'-5.2'	SM	10.05	5	19	5Y 7/1
	3	10.8'-11.0'	SM	9.88	30	45	10Y 6/1
VB-MC12-85	1	2.0'-3.0'	SW	1.24	20	31	2.5Y 4/1
	2	5.0'-5.5'	SM	9.27	80	79	5Y 6/1
VB-MC12-86	1	0.6'-0.8'	SM	13.16	5	23	5Y 6/1
	2	4.0'-4.2'	SM	11.25	5	21	5Y 6/1
	3	7.6'-7.8'	SM	12.25	20	34	5Y 6/1
VB-MC12-87	1	3.0'-4.0'	SM	34.07	3	23	5Y 6/1
	2	9.0'-10.0'	SM	10.51	5	35	5Y 6/1
	3	13.0'-14.0'	SM	11.81	80	82	5Y 7/1
VB-MC12-88	1	0.0'-1.2'	SM	12.29	10	40	5Y 6/1
	2	3.0'-3.2'	SM	16.91	3	27	5Y 6/1
	3	7.0'-7.2'	SM	14.5	5	28	N 6/0
	4	11.5'-11.7'	SW	1.54	40	65	2.5Y 4/1
VB-MC12-89	1	2.0'-3.0'	SM	11.51	5	24	5Y 7/1
	2	10.0'-11.0'	SW-SM	4.99	30	38	5Y 6/1
VB-MC12-90	1	3.5'-4.5'	SW-SM	4.49	90	91	5Y 7/1
	2	7.0'-8.0'	SW-SM	7.94	5	37	5Y 6/1
	3	11.0'-12.0'	SM	22.47	40	67	5Y 6/1
VB-MC12-91	1	2.0'-3.0'	SM	21.88	90	86	5Y 7/1
	2	6.0'-7.0'	SM	17.31	5	40	5Y 5/1
	3	11.0'-12.0'	SW	2.31	10	42	5Y 6/1
	4	14.0'-15.0'	SM	30.86	50	63	5Y 7/1
VB-MC12-92	1	0.5'-1.0'	SW-SM	5.46	5	32	5Y 6/1
	2	4.5'-5.5'	SP	1	90	86	N 6/0
VB-MC12-93	1	0.6'-0.8'	SW	2.18	80	64	N 6/0
	2	2.7'-2.9'	SP	1.71	40	62	N 6/0
	3	5.7'-6.0'	SW	1.85	40	54	5Y 6/1
VB-MC12-94	1	3.4'-4.0'	SW-SM	4.46	5	30	5Y 6/1

Boring Designation	Sample Designation	Sample Depth	USCS	% Passing #230	Visual Shell %	CO_3 %	Munsell Color (Dry)
VB-MC12-94	2	11.0'-12.0'	SW	4.05	90	77	5Y 6/1
VB-MC12-95	1	0.0'-0.3'	SW	2.66	90	89	5Y 6/1
	2	3.7'-3.9'			20	53	/
	3	7.0'-7.2'	SW	1.53	10	42	5Y 6/1
	4	8.4'-8.6'	SW	1.43	30	54	5Y 7/2
	5	12.2'-12.4'	SP	2.89	10	51	5Y 6/1
	6	18.0'-18.2'	SW	2.83	10	55	5Y 5/1
VB-MC12-97	1	0.0'-0.2'	SP	1.44	5	33	5Y 6/1
	2	4.0'-4.2'	SW	2.19	10	35	5Y 5/1
	3	6.0'-6.2'	SM	15.33	10	40	2.5Y 4/1
	4	10.7'-11.0'	SW	3.63	40	62	2.5Y 7/1
	5	14.7'-15.0'	SP	1.54	70	85	5Y 6/1
VB-MC12-98	1	0.0'-0.3'	SP	1.5	80	84	5Y 5/1
	2	5.8'-6.0'	SP	1.76	5	26	5Y 5/1
	3	9.0'-9.3'	SW	3	5	28	5Y 5/1
VB-MC12-99	1	0.0'-0.3'	SP	2.73	20	43	5Y 6/1
	2	3.5'-3.7'	SP	3.2	40	49	5Y 6/1
	3	10.9'-11.1'	SP	2.28	10	39	5Y 5/1
	4	12.7'-12.9'	SP	3.68	50	79	5Y 6/1
	5	14.7'-14.9'	SM	25.58	40	52	5Y 7/2
VB-MC12-100	1	0.8'-1.0'	SP	1.47	70	83	N 6/0
	2	5.0'-5.2'	SW	2.1	60	63	N 6/0
	3	8.7'-9.0'	SW	1.67	70	80	N 6/0
	4	12.6'-12.8'	SP	1.74	70	79	2.5Y 5/1
	5	14.0'-14.3'	SP	1.76	50	64	5Y 6/1
VB-MC12-102	1	0.0'-0.3'	SP	2.24	70	77	5Y 5/1
	2	7.2'-7.4'	SP	1.79	30	30	5Y 5/1
VB-MC12-103	1	2.0'-3.0'	SM	13.49	50	80	2.5Y 7/1
	2	8.0'-9.0'	SP	2.06	30	37	5Y 5/1
VB-MC12-104	1	0.0'-0.3'	SP	2.59	90	89	5Y 5/1
	2	4.0'-4.2'	SW-SM	6.81	80	83	2.5Y 7/1
	3	6.0'-6.2'	SP	1.57	30	55	2.5Y 6/1
	4	7.7'-8.0'	SP	2.66	5	36	5Y 6/1
VB-MC12-105	1	0.0'-0.3'	SP	1.9	90	89	5Y 6/1
	2	7.0'-7.3'	SP	2.96	20	49	5Y 6/1
	3	10.7'-10.9'	SW	2.17	40	55	5Y 6/1
	4	14.5'-14.7'	SW-SM	8.34	40	72	2.5Y 5/2
VB-MC12-106	1	2.0'-3.0'	SP	1.73	20	45	5Y 7/1
	2	5.5'-6.5'	SP	1.7	80	67	5Y 7/1
	3	8.5'-9.0'	SP	4.02	85	76	5Y 7/1
VB-MC12-108	1	0.0'-0.3'	SW	2.11	90	91	5Y 6/1
	2	3.5'-3.7'	SP	2.51	50	65	5Y 7/1
	3	4.8'-5.0'	SP	2.32	40	44	5Y 7/1
	4	8.0'-8.2'	SP	2.64	60	63	5Y 6/1
VB-MC12-109	1	0.0'-0.3'	SP	2.98	50	72	5Y 6/1
	2	6.4'-6.7'	SW	2.47	60	71	2.5Y 5/1
	3	11.2'-11.5'	SP-SM	4.59	40	41	2.5Y 5/2
	4	15.0'-15.2'	SP	1.76	70	62	5Y 7/1
VB-MC12-110	1	0.0'-0.2'	SP	2.34	90	80	5Y 7/1
	2	2.5'-2.8'	SP	2.71	30	55	5Y 7/1
	3	5.2'-5.5'	SW	2.9	90	85	5Y 7/1
VB-MC12-111	1	0.0'-0.4'	SP	2.42	20	48	5Y 7/1
	2	3.0'-3.2'	SW-SM	4.18	80	87	5Y 7/1
	3	4.4'-4.6'	SW	3.07	70	82	5Y 6/1
	4	7.5'-7.7'	SW	1.36	30	79	5Y 5/1
	5	10.7'-11.0'	SP	1.55	70	79	5Y 5/1
VB-MC12-112	1	0.0'-0.3'	SP	2.22	20	39	5Y 5/1

Boring Designation	Sample Designation	Sample Depth	USCS	% Passing #230	Visual Shell %	CO_3 %	Munsell Color (Dry)
VB-MC12-112	2	2.4'-2.6'	SP	2.5	45	57	5Y 7/1
	3	4.4'-4.6'	SP	2.53	35	57	5Y 7/1
	4	7.0'-7.3'	SW	1.94	50	75	5Y 6/1
VB-MC12-115	1	0.0'-0.2'	SP	2.23	90	84	5Y 7/1
	2	4.0'-4.2'	SW	1.52	10	47	5Y 5/1
	3	7.3'-7.5'	SP	1.45	40	57	5Y 5/1
	4	9.7'-9.9'	SW	2.01	20	53	5Y 5/1
	5	11.5'-11.7'	SW	1.19	60	67	5Y 6/1
	6	13.2'-13.4'	SM	18.46	80	76	5Y 6/2
VB-MC12-117	1	0.0'-0.3'	SW	1.42	10	56	N 5/0
	2	3.3'-3.5'	SP	1.72	60	67	N 5/0
	3	6.0'-6.2'	SP	1.26	70	76	N 6/0
	4	9.5'-9.7'	SP	1.28	70	85	N 5/0
VB-MC12-118	1	0.0'-0.2'	SP	0.94	70	79	N 6/0
	2	4.0'-4.2'	SP	1.25	80	87	N 6/0
	3	9.0'-9.2'	SP	0.99	80	82	N 6/0
	4	11.8'-12.1'	SW	1.94	80	85	5Y 6/1
VB-MC12-121	1	2.5'-3.0'	SP	0.93	40	64	5Y 6/1
VB-MC12-122	1	0.0'-0.2'	SW	1.14	80	87	5Y 6/1
	2	0.8'-1.0'	SW	1.21	30	64	5Y 5/1
	3	2.2'-2.4'	SW	0.84	90	87	5Y 5/1
VB-MC12-123	1	0.0'-0.3'	SP	0.88	40	64	5Y 6/1
	2	3.0'-3.2'	SP	0.94	20	58	N 5/0
VB-SLC12-124	1	2.0'-2.3'	SP	0.99	60	78	N 5/0
VB-SLC12-125	1	0.0'-0.3'	SM	19.98	50	76	5Y 6/1
	2	4.0'-4.2'	SM	11.94	70	81	5Y 8/1
	3	7.0'-7.2'	SP-SM	4.82	90	90	5Y 8/1
VB-SLC12-126	1	1.0'-2.0'	SW	3.84	20	70	5Y 7/1
	2	4.0'-5.0'	SW-SM	5.77	60	79	5Y 5/1
	3	8.0'-9.0'	SM	8.36	40	80	5Y 5/1
VB-SLC12-127	1	0.0'-1.0'	SM	10.56	90	87	5Y 5/1
	2	3.9'-4.1'	SW	2.22	40	76	2.5Y 5/1
	3	5.9'-6.1'	SM	10.18	50	63	5Y 6/1
	4	8.8'-9.0'	SM	17.42	70	71	5Y 6/1
VB-SLC12-128	1	0.2'-0.4'	SM	13.71	40	74	5Y 6/1
	2	5.0'-5.3'	SP-SM	4.47	40	58	5Y 5/1
VB-SLC12-129	1	0.0'-0.2'	SM	24.53	80	87	5Y 6/1
	2	6..0'-6.2'	SW	1.57	70	79	2.5Y 5/2
	3	10.1'-10.4'	SW-SM	4.95	30	60	5Y 5/1
VB-SLC12-130	1	0.0'-0.3'	SM	21.97	70	88	5Y 6/1
	2	4.0'-4.2'	SW	1.38	60	75	2.5Y 4/1
	3	8.0'-8.2'	SM	11.02	50	76	5Y 5/1
	4	9.2'-9.4'	SW	4.01	40	75	5Y 5/1
VB-SLC12-131	1	0.0'-0.3'	SM	14.55	80	90	5Y 6/1
	2	5.0'-5.3'	SW	2.75	40	84	2.5Y 5/2
	3	9.0'-9.3'	SW-SM	4.88	50	70	2.5Y 5/2
	4	14.0'-14.2'	SM	15.46	60	87	5Y 6/1
	5	17.3'-17.5'	SW-SM	10.1	50	89	10Y 5/1
VB-SLC12-132	1	3.0'-4.0'	SW-SM	5.21	90	86	5Y 5/1
	2	7.0'-8.0'	SW	2.8	20	72	2.5Y 5/1
	3	11.0'-12.0'	SW-SM	4.31	20	62	5Y 5/1
VB-SLC12-133	1	2.0'-2.3	SM	13.64	80	89	5Y 6/1
	2	4.7'-4.9'	SW	1.85	30	82	2.5Y 5/2
	3	7.0'-7.3'	SW-SM	5.23	40	75	5Y 5/1
	4	9.2'-9.4'	SM	13.96	40	72	5Y 6/1
VB-SLC12-134	1	0.0'-0.3'	SM	20.29	30	92	10Y 6/1
	2	3.0'-3.2'	SW	2.03	20	77	2.5Y 5/2

Boring Designation	Sample Designation	Sample Depth	USCS	% Passing #230	Visual Shell %	CO_3 %	Munsell Color (Dry)
VB-SLC12-134	3	7.6'-7.9'	SW-SM	7.51	20	73	5Y 6/1
	4	9.8'-10.0'	SM	12.76	60	86	5Y 6/1
VB-SLC12-135	1	0.0'-0.3'	SM	11.4	20	79	10Y 5/1
	2	3.0'-3.3'	SW	2.47	30	71	5Y 4/1
	3	6.0'-6.2'	SW	3.13	20	70	5Y 5/1
	4	8.8'-9.0'	SW-SM	6.7	5	55	5Y 5/1
	5	13.5'-13.7'	SM	12.97	90	92	5Y 7/1
VB-SLC12-136	1	0.7'-1.0'	SW-SM	8.19	80	85	10Y 6/1
	2	5.7'-6.0'	SW	1.02	80	85	2.5Y 5/2
	3	10.5'-10.7'	SW	1.84	80	85	2.5Y 5/2
	4	15.2'-15.4'	SW	2.61	70	82	2.5Y 5/2
VB-SLC12-137	1	0.0'-0.3'	SW	3.41	90	89	5Y 5/2
	2	5.0'-5.2'	SW	2.4	80	87	5Y 5/2
	3	11.0'-11.2'	SW	2.61	30	69	5Y 5/2
	4	14.5'-14.7'	SW-SM	8.7	10	62	5Y 5/1
	5	17.7'-18.0'	SM	11.01	10	54	5Y 5/1
VB-SLC12-138	1	0.0'-0.4'	SM	20.53	90	91	5Y 5/1
	2	3.9'-4.1'	SW	1.93	30	78	2.5Y 5/3
	3	7.9'-8.0'	SM	14.49	40	77	5Y 6/1
VB-SLC12-139	1	2.8'-3.0'	SM	21.93	30	79	10Y 6/1
	2	6.2'-6.4'	SW-SM	6.09	30	68	10Y 4/1
	3	8.3'-8.5'	SM	12.8	80	87	10Y 5/1
VB-SLC12-140	1	2.3'-2.5'	SW-SM	10.63	90	89	10Y 5/1
	2	8.0'-8.2'	SW	1.61	90	88	2.5Y 5/2
	3	13.5'-13.7'	SP	2.13	40	83	2.5Y 5/2
VB-SLC12-141	1	2.0'-2.3'	SW-SM	4.47	90	89	2.5Y 6/1
	2	6.2'-6.5'	SW	1.4	90	90	5Y 5/2
	3	12.6'-13.0'	SW	2.07	80	92	5Y 5/2
	4	16.7'-17.1'	SW-SM	7.86	80	87	10Y 5/1
VB-SLC12-142	1	0.0'-0.3'	SM	11.07	80	89	10Y 4/1
	2	8.3'-8.6'	SW	1.66	70	87	5Y 5/2
	3	10.8'-11.1'	SM	9.69	90	91	5Y 5/1
VB-SLC12-143	1	0.0'-0.3'	SW-SM	4.49	90	83	10Y 4/1
	2	6.7'-7.0'	SW	1.77	90	94	2.5Y 5/2
	3	11.7'-12.0'	SW	3.35	80	96	2.5Y 6/2
VB-SLC12-144	1	0.0'-0.3'	SW-SM	7.44	90	86	10Y 6/1
	2	7.1'-7.4'	SW	1.86	95	95	2.5Y 6/2
	3	11.2'-11.4'	SW	1.75	90	79	2.5Y 6/2
	4	18.0'-18.3'	SM	12.8	30	60	10Y 6/1
VB-SLC12-146	1	0.0'-0.3'	SM	15.08	95	92	10Y 6/1
	2	2.0'-2.3'	SW-SM	5.78	70	68	2.5Y 5/1
	3	8.8'-9.0'	SM	12.28	80	86	10Y 5/1
	4	12.0'-12.2'	SW-SM	9.56	70	93	5Y 6/1
	5	16.0'-16.2'	SW	3.67	30	64	5Y 7/1
VB-SLC12-147	1	0.0'-0.3'	SW-SM	9.55	95	94	5Y 7/1
	2	4.0'-4.2'	SW	1.97	60	77	5Y 4/1
	3	6.0'-6.2'	SM	15.07	60	78	5Y 5/1
VB-SLC12-148	1	3.5'-4.0'	SM	12.39	80	93	5Y 5/1
	2	4.0'-4.5'	SW-SM	5.7	30	84	5Y 5/1
	3	6.5'-7.0'	SW-SM	5.6	20	81	5Y 5/1
VB-SLC12-149	1	0.0'-0.2'	SW-SM	4.86	90	89	5Y 5/1
	2	8.8'-9.2'	SW	1.71	80	95	2.5Y 5/2
VB-SLC12-150	1	10.0'-10.2'	SW	3.22	10	73	5Y 5/1
VB-SLC12-151	1	2.0'-3.0'	SM	13.38	90	96	5Y 5/1
	2	8.0'-9.0'	SW	2.99	80	96	2.5Y 7/1
VB-SLC12-153	1	1.7'-1.9'	SW-SM	7.78	80	89	10Y 6/1
	2	7.0'-7.2'	SW-SM	7.06	90	80	N 5/0

Boring Designation	Sample Designation	Sample Depth	USCS	% Passing #230	Visual Shell %	CO_3 %	Munsell Color (Dry)
VB-SLC12-153	3	10.1'-10.2'	SW-SM	5.47	80	69	5Y 6/1
	4	15.6'-15.8'	SM	14.32	90	62	5Y 6/1
VB-SLC12-154	1	1.0'-1.2'	SM	12.21	90	92	5Y 7/1
	2	6.0'-6.3'	SW	1.3	30	83	2.5Y 5/2
	3	10.0'-10.2'	SW	3.96	30	79	5Y 5/1
VB-SLC12-155	1	0.0'-0.3'	SM	11.72	80	85	5Y 5/1
	2	6.0'-6.2'	SW	1.69	70	80	5Y 5/1
	3	10.0'-10.2'	SW	1.67	70	79	5Y 4/1
	4	13.0'-13.2'	SW	2.93	70	82	5Y 4/1
VB-SLC12-156	1	0.0'-0.3'	SW	2.87	80	88	5Y 4/1
	2	6.3'-6.5'	SW	3.98	90	88	10Y 5/1
	3	11.3'-11.5'	SW	3.51	80	87	N 5/0
	4	14.8'-15.0'	SW-SM	5.29	80	81	10Y 5/1
VB-SLC12-157	1	2.0'-3.0'	SM	12.14	90	80	5Y 6/1
	2	8.0'-9.0'	SW	1.88	70	79	2.5Y 5/1
VB-SLC12-158	1	0.0'-0.3'	SW	4.23	90	85	5Y 5/1
	2	6.0'-6.2'	SW	1.49	50	44	2.5Y 5/2
	3	12.0'-12.2'	SW	1.29	60	80	2.5Y 5/2
	4	15.1'-15.3'	SW	1.64	70	79	5Y 5/1
	5	17.4'-17.6'	SP	4.05	80	87	5Y 5/1
VB-SLC12-159	1	0.4'-0.6'	SW	2.91	90	78	5Y 5/1
	2	5.1'-5.3'	SW	1.67	90	86	2.5Y 6/2
	3	7.3'-7.5'	SM	8.76	30	37	5Y 6/1
	4	11.0'-11.2'	SM	11.96	30	51	5Y 6/1
	5	16.0'-16.2'	SW-SM	5.42	20	47	5Y 7/1
VB-SLC12-160	1	2.0'-2.2'	SW-SM	4.94	90	83	5Y 7/1
	2	8.5'-8.7'	SM	24.85	80	85	5Y 7/1
VB-SLC12-161	1	0.0'-0.3'	SM	16.2	80	83	5Y 7/2
	2	5.2'-5.4'	SW	2.32	90	81	2.5Y 5/1
	3	6.5'-6.7'	SW	2.97	95	92	2.5Y 5/1
VB-SLC12-162	1	4.0'-4.2'	SM	24.94	70	78	5Y 5/1
VB-SLC12-163	1	0.0'-0.3'	SM	18.97	90	86	5Y 7/4
	2	6.7'-6.9'	SW	1.4	90	86	2.5Y 5/1
	3	9.2'-9.4'	SW	3.34	80	88	5Y 5/1
	4	16.0'-16.2'	SW-SM	5.5	90	96	5Y 6/1
VB-SLC12-164	1	0.0'-0.3'	SW	4.4	40	56	5Y 6/1
	2	6.0'-6.2'	SW-SM	5.26	70	79	2.5Y 6/1
	3	7.6'-7.8'	SW-SM	4.12	90	90	5Y 5/1
	4	10.1-10.3'	SW-SM	7.59	10	51	5Y 6/1
	5	14.6'-14.8'	SW-SM	5.79	30	58	5Y 7/1
	6	17.7'-17.9'	SM	7.65	90	86	5Y 6/1
VB-SLC12-165	1	0.0'-0.3'	SW-SM	4.76	70	89	5Y 6/1
	2	4.0'-4.2'	SW-SM	5.78	50	84	2.5Y 6/1
	3	7.0'-7.2'	SW-SM	7.38	70	84	5Y 6/1
	4	11.8'-12.0'	SM	13.71	80	90	5Y 6/1
	5	13.8'-14.0'	SW-SM	6.3	30	61	N 4/0
VB-SLC12-166	1	0.0'-0.3'	SM	14.26	80	88	5Y 5/1
VB-SLC12-167	1	1.0'-2.0'	SM	11.76	70	86	5Y 6/1
	2	10.0'-11.0'	SW	3.35	65	87	2.5Y 5/1
VB-SLC12-168	1	0.0'-0.3'	SW-SM	5.61	80	83	2.5Y 5/1
	2	6.0'-6.2'	SW	1.58	70	81	2.5Y 5/1
	3	13.2'-13.4'	SW	1.5	80	88	2.5Y 5/1
VB-SLC12-169	1	0.3'-0.5'	SW	3.32	50	81	N 5/0
	2	4.7'-4.9'	SW	2.18	40	79	2.5Y 5/1
	3	8.0'-8.2'	SW	2.7	50	85	5Y 5/1
VB-SLC12-170	1	0.0'-0.3'	SP	2.97	40	81	5Y 6/1
	2	6.8'-7.0'	SW	2.1	40	78	2.5Y 5/1

Boring Designation	Sample Designation	Sample Depth	USCS	% Passing #230	Visual Shell %	CO_3 %	Munsell Color (Dry)
VB-SLC12-170	3	10.7'-10.9'	SW	1.95	60	83	2.5Y 5/1
	4	13.6'-13.8'	SW	4.05	70	80	N 5/0
VB-SLC12-171	1	1.0'-1.2'	SW-SM	6.8	40	72	5Y 7/1
VB-SLC12-172	1	0.0'-0.3'	SM	19.9	80	86	10Y 7/1
	2	7.2'-7.4'	SW-SM	5.98	90	93	2.5Y 6/1
	3	12.2'-12.4'	SW-SM	6.78	50	81	5Y 7/1
VB-SLC12-173	1	0.0'-0.3'	SW	3.28	90	85	10Y 5/1
	2	5.8'-6.0'	SW	2.06	70	79	2.5Y 5/2
	3	10.3'-10.5'	SW	2.15	70	81	2.5Y 4/1
	4	15.8'-16.0'	SW	2.12	50	83	2.5Y 4/1
	5	17.0'-17.2'	SW-SM	6.11	70	86	10Y 4/0
VB-SLC12-174	1	0.0'-0.2'	SW-SM	9.01	80	77	10Y 4/0
	2	1.0'-1.4'	SW-SM	4.16	50	60	2.5Y 5/1
	3	3.8'-4.0'	SW-SM	7.98	90	87	10Y 4/1
	4	6.4'-6.6'	SW-SM	8.1	10	49	10Y 5/1
	5	9.0'-9.2'	SM	18.72	40	64	10Y 6/1
VB-SLC12-175A	1	2.0'-2.5'	SM	16.06	70	79	10Y 6/1
VB-SLC12-175B	1	1.0'-1.2'	SW	3.21	50	80	2.5Y 4/1
	2	4.8'-5.0'	SW	3.34	80	86	2.5Y 5/1
VB-SLC12-176	1	0.0'-0.3'	SM	13.71	80	70	10Y 4/0
	2	5.1'-5.3'	SW	1.15	60	67	5Y 4/1
	3	9.7'-10.0'	SP	1.7	50	73	5Y 4/1
VB-SLC12-177	1	0.0'-0.2'	SP	0.97	80	75	5Y 4/1
VB-SLC12-178	1	0.0'-0.3'	SM	17.36	80	80	5Y 7/2
	2	4.0'-4.2'	SW	1.97	80	75	5Y 4/1
	3	9.5'-9.7	SW	1.71	90	91	N 3/0
	4	13.5'-13.7'	SW-SM	8.44	80	93	10Y 4/0
	5	16.8'-17.0'	SW	3.18	80	69	5Y 6/1
VB-SLC12-179	1	0.5'-0.7'	SW-SM	7.09	70	80	5Y 7/1
	2	4.0'-4.2'	SW	2.07	50	77	2.5Y 4/1
	3	7.0'-7.2'	SW	3.46	90	88	5Y 5/1
VB-SLC12-180	1	1.0-1.2'	SW	3.16	70	86	10Y 5/0
	2	6.0'-6.2'	SW	2.77	50	85	2.5Y 5/2
	3	11.0'-11.2'	SW	2.55	90	89	2.5Y 5/2
	4	13.6'-13.8'	SW-SM	5.46	80	84	2.5Y 6/4
VB-SLC12-181	1	0.0'-0.3'	SW-SM	6.58	80	89	10Y 4/0
	2	7.0'-7.2'	SW	1.7	50	83	2.5Y 5/2
	3	8.0'-8.2'	SW	3.81	60	83	10Y 4/0
	4	9.0'-9.2'	SW-SM	7.42	50	84	10Y 5/0
VB-SLC12-182	1	0.0'-0.2'	SW-SM	8.3	40	80	10Y 5/0
	2	5.2'-5.4'	SM	14.37	70	85	5Y 7/1
VB-SLC12-183	1	0.3'-0.6'	SW-SM	6.3	40	75	5Y 7/1
	2	5.7'-6.0'	SW	1.2	60	82	2.5Y 5/1
	3	7.4'-7.6'	SW	1.43	30	77	2.5Y 4/1
	4	9.0'-9.2'	SW-SM	8.81	30	77	5Y 5/1
	5	11.5'-11.7'	SW	3.99	90	89	10Y 4/0
	6	16.0'-16.2'	SW	2.1	90	88	N 5/0
VB-SLC12-184	1	0.0'-0.3'	SW	1.55	40	75	2.5Y 5/2
	2	4.8'-4.6'	SW	3.56	30	83	5Y 6/1
	3	8.8'-9.0'	SW	4.27	30	83	5Y 5/1
	4	12.0'-12.2'	SW	3.58	90	88	10Y 6/1
	5	14.4'-14.6'	SW-SM	8.64	90	87	10Y 6/1
VB-SLC12-185	1	0.2'-0.4'	SW-SM	6.54	50	83	5Y 8/1
	2	4.0'-4.2'	SW-SM	6.24	60	80	5Y 5/1
	3	7.8'-8.0'	SM	13.02	60	81	10Y 5/1
	4	12.0'-12.2'	SW	3.24	40	60	5Y 7/1
	5	15.5-15.7'	SW-SM	6.34	40	73	5Y 8/1

Boring Designation	Sample Designation	Sample Depth	USCS	% Passing #230	Visual Shell %	CO_3 %	Munsell Color (Dry)
VB-SLC12-186	1	0.0'-0.3'	SM	30.55	80	85	5Y 8/1
	2	3.2'-3.4'	SW	1.31	60	74	2.5Y 6/2
VB-SLC12-187	1	0.7'-1.0'	SM	12.97	90	75	5Y 6/1
	2	5.0'-5.3'	SW	1.21	70	78	2.5Y 5/2
	3	8.6'-9.0'	SW	2.14	90	93	2.5Y 5/1
VB-SLC12-188	1	4.0'-4.5'	SW-SM	6.7	50	80	10Y 6/1
	2	6.5'-7.0'	SW-SM	4.77	50	84	5Y 5/1
VB-SLC12-189	1	0.5'-0.7'	SW-SM	5.44	60	71	5Y 5/1
	2	5.6'-5.8'	SW	2.08	50	75	2.5Y 5/1
VB-SLC12-190	1	0.0'-0.3'	SW-SM	9.13	60	76	5Y 5/1
	2	6.0'-6.2'	SW	1.54	40	74	2.5Y 5/1
VB-SLC12-191	1	2.5'-3.0'	SW	2.53	50	71	2.5Y 5/1
	2	7.5'-8.0'	SW	1.3	70	82	2.5Y 5/1
VB-SLC12-192	1	1.0'-1.2'	SW-SM	9.58	50	71	10Y 5/1
	2	6.0'-6.2'	SW	1.26	50	67	2.5Y 5/1
	3	11.0'-11.2'	SW	1.17	60	76	2.5Y 5/1
	4	15.0'-15.2'	SW	2	60	75	2.5Y 5/1
VB-SLC12-193	1	1.5'-2.5'	SW	4.21	80	82	2.5Y 5/1
	2	9.0'-10.0'	SW	1.41	70	81	2.5Y 5/1
	3	11.0'-12.0'	SW-SM	4.42	85	94	2.5Y 5/1
	4	12.5'-13.0'	SW	4.13	60	83	N 5/0
	5	16.0'-17.0'	SW-SM	8.25	70	96	10Y 5/1
VB-SLC12-194	1	0.0'-0.3'	SW-SM	8.07	50	73	10Y 6/1
	2	5.0'-5.3'	SW	1.22	40	63	2.5Y 6/1
	3	9.6'-9.9'	SP	1.33	40	79	2.5Y 6/1
VB-SLC12-196	1	0.6'-0.8'	SW	3.81	50	65	2.5Y 6/1
	2	5.0'-5.2'	SP	1.21	50	68	2.5Y 6/1
	3	9.0'-9.2'	SW	1.35	50	79	2.5Y 6/1
VB-SLC12-197	1	2.0'-3.0'	SW	1.8	90	92	2.5Y 5/1
	2	8.0'-8.5'	SW	1.73	80	86	2.5Y 6/2
VB-SLC12-198	1	0.0'-0.3'	SW-SM	8.33	90	86	10Y 5/1
VB-SLC12-199	1	0.8'-1.0'	SW	4.63	60	65	2.5Y 6/1
	2	6.0'-6.2'	SW	1.26	50	71	2.5Y 5/1
	3	11.0'-11.2'	SW	2.45	50	70	2.5Y 5/1
	4	13.7'-14.0'	SW	3.1	60	81	2.5Y 6/1
VB-SLC12-200	1	0.0'-0.2'	SW	4.52	70	72	N 5/0
	2	2.6'-2.8'	SW	3.15	70	80	2.5Y 6/1
	3	4.0'-4.2'	SW-SM	8.33	40	71	N 6/0
VB-SLC12-201	1	0.5'-0.7'	SW	4.33	90	73	5Y 6/1
	2	6.0'-6.2'	SW	1.29	50	70	2.5Y 5/1
	3	12.5'-12.7'	SW	1.86	60	71	5Y 5/1
	4	15.2'-15.4'	SW	4.37	50	76	5Y 5/1
	5	18.8'-19.0'	SW-SM	7.72	20	63	5Y 5/1
VB-SLC12-202	1	1.0'-1.2'	SP	2.79	40	72	5Y 7/1
	2	6.5'-6.7'	SW	1.87	20	70	5Y 5/1
VB-SLC12-203	1	2.5'-3.0'	SW-SM	6.44	90	83	5Y 5/1
	2	8.0'-8.5'	SW	2.33	40	72	5Y 5/1
	3	10.5'-11.0'	SM	10.53	40	80	5Y 6/1
	4	14.0'-15.0'	SW-SM	4.86	10	55	5Y 7/1

8.4 Tide Station Data

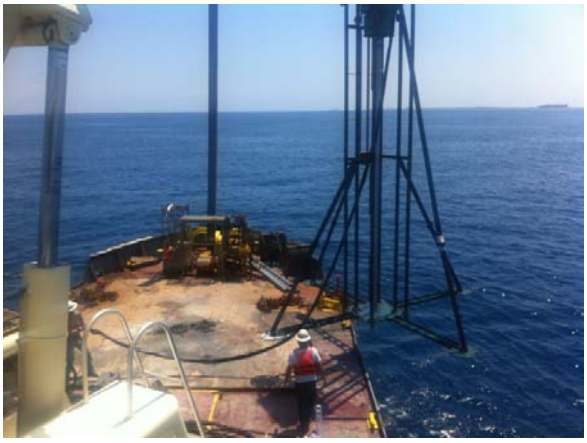
Water depths encountered during drilling ranged from -24.6 feet to -86.0 feet. Water depths were measured using a Furuno FCV-620 echo sounder, with dual frequency 50/200 kHz.

Tides were found using the most applicable tidal station and predicted tide from NOAA in MLLW using Tides and Currents Pro. Tides were selected with accuracy to the minute in time and tenth of a foot in elevation. Only one coastal tidal station, Lake Worth Pier, recorded actual tides in the study area. Observed tides deviated from the predicted tides at Lake Worth Pier by no greater than 0.4 foot with a mean of 0.2 foot. Elevations of borings were converted from MLLW (tide station units) to NAVD88 by USACE Jacksonville. The tide reading, time of boring, relevant tidal station and conversion factor used to get from MLLW to NAVD88 are recorded in Table 3 using the following station notation:

Station 1: 8722212 Ft. Pierce Inlet, South Jetty
Station 2: 8722366 Seminole Shores
Station 3: 8722495 Jupiter Inlet, South Jetty
Station 4: 8722588 Port of West Palm Beach
Station 5: 8722670 Lake Worth Pier
Station 6: 8722862 Hillsboro Inlet (Ocean)

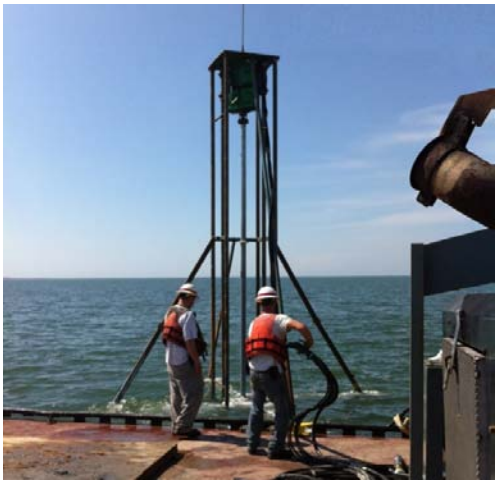
Where two tidal stations are indicated in Table 3, the recorded mean tidal elevation is the average of the two stations.

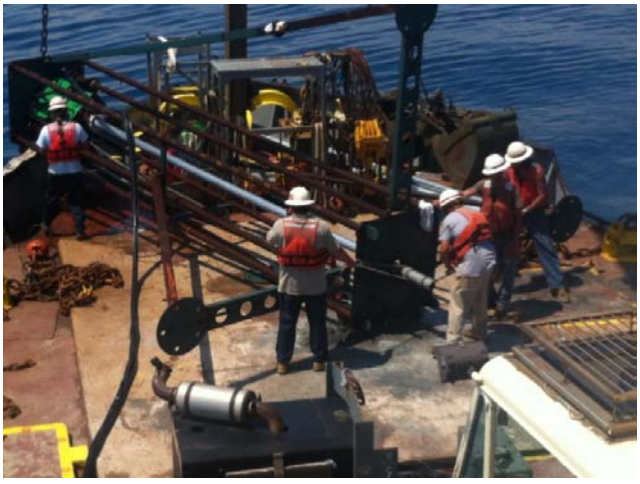
Above: USACE Wilmington District's D/B Vessel “SNELL” is a 104'x 32' vessel drawing 6' of water, equipped with a 35 ton crane capable of multiple functions from drilling to dredging and dock/snag removal.



Above Left: The nose cone treads onto the vibracore liner preventing material from entering the annulus between the liner and pipe.

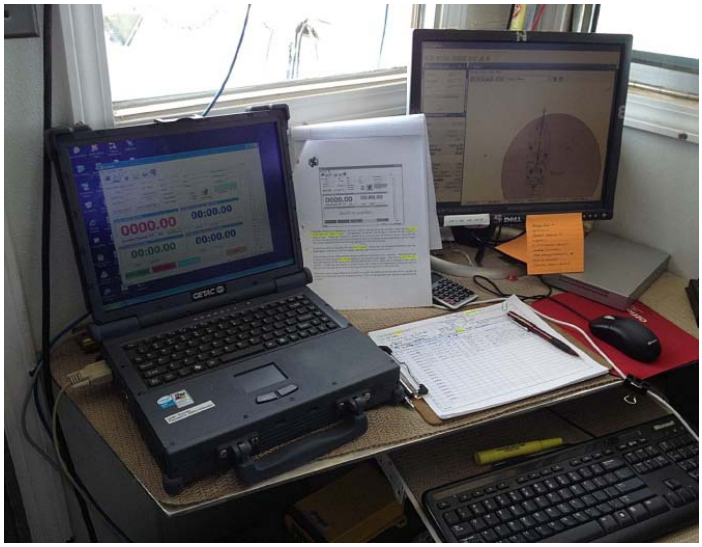
Above Right: Deployment of the drilling apparatus.

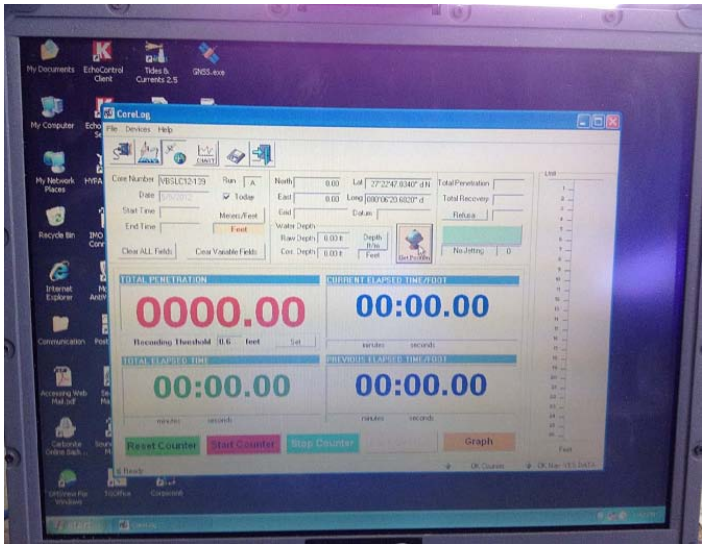




Above Left: Deckhands aboard the SNELL pull hydraulic line onto the deck as the vibracore sample is retrieved. Using hydraulic fluid for the vibrating head prevented collapse of drill lines and retained power while sampling on the edge of the outer continental shelf.

Above Right: One leg of the drilling apparatus folded allowing for easier removal of the vibracore tube.





Above: Alpine Corelog penetrometer system records and plots the rate of penetration of the vibratory unit. This provides an indication of the relative strengths of the materials penetrated.

Below: Vibracore tubes being offloaded for transport to the USACE Jacksonville District warehouse for processing.

Above: Vibracore tubes being cut into five foot sections and split longitudinally to expose the collected sediments.

Below Left: Vibracore samples were classified, logged, and sampled for laboratory analysis.

Bottom Center: photographs of each whole core and each 5’ section of core were taken.

Bottom Right: After processing, half of the vibracore sample was sleeved, labelled and placed in core boxes for storage.

Above Left: representative vibracore sample collected in Martin County containing nearly 17' of potential beach quality sand.

Above Right: A few samples of calcarenite, consolidated carbonate sand. Calcarenite was encountered in many borings, and represents the first continuous seismic reflector in the project area. When encountered, the calcarenite ranged in colors from white, yellow to gray.

Below Left and Right: Core showing penetration through rock; 12.5 feet of moderately hard limestone was recovered. The material was moderately weathered, clayey and broken by drill action.