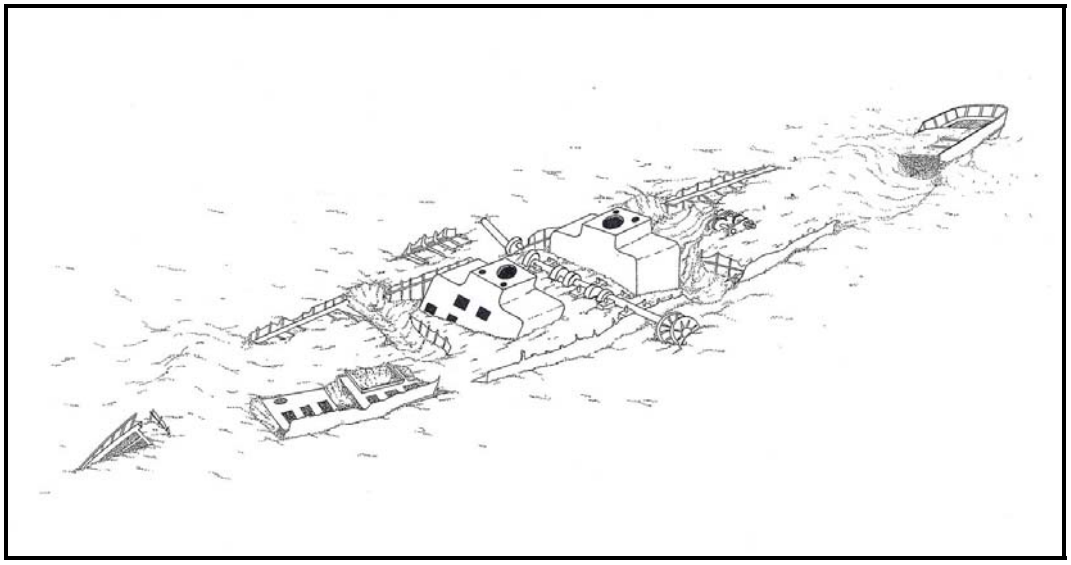
APPENDIX C

CULTURAL RESOURCE INVESTIGATION: LOCATION OF THE REMAINS OF THE *WILD DAYRELL* IN RICH INLET

Location of the Remains of the Wild Dayrell in Rich Inlet Pender County, North Carolina



Submitted to:

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Introduction

Coastal Planning and Engineering, Inc. (CPE) is currently working with the Figure Eight Beach Homeowners Association on a beach nourishment project for Figure Eight Island. The source material for this nourishment will be a borrow area in Rich Inlet (Figure 1). In order to avoid impacts to the Civil War blockade-runner *Wild Dayrell*, CPE contracted with Tidewater Atlantic Research, Inc., (TAR) of Washington, North Carolina to carry out a remote sensing survey to determine the exact position of the wreck site. The remote sensing investigation was carried out by TAR personnel Gordon Watts and Ray Tubby on 3 September 2006.

Wreck of the *Wild Dayrell*

The remains of the Anglo-Confederate Trading Company's steamer *Wild Dayrell,* lie in Rich Inlet approximately twenty miles north of Fort Fisher. That vessel was built by the firm of Jones, Quiggin and Company in Liverpool along with an identical sistership, the *Lucy*. *Lucy* and *Wild Dayrell* were constructed of iron, each measuring 215 feet in length, 20 feet in beam and 10 foot 3 inch depth of hold. The vessels' oscillating steam cylinder engines were built by Fawcett, Preston and Company in Liverpool and measured 52 inches in diameter with a 48-inch stroke. The *Wild Dayrell* was also equipped with feathering paddle wheel floats and a forecastle hood. Two raked pole masts and two raked retractable funnels were all that protruded above the level of the steamer's paddle boxes.

Figure 1. Rich Inlet beach renourishment project location.

The *Wild Dayrell* was launched on 17 September 1863. Although the steam trials of the *Wild Dayrell* were not reported in the press, its sistership *Lucy* proved to be capable of 15 ½ knots against a strong wind and tide during her trials in October 1863. On 12 November the vessel's registered owners, Edward Lawrence and Company, entered the vessel at Liverpool Customs for loading for Nassau. The fully loaded *Wild Dayrell* cleared for sea two days later. In December, the steamer made Nassau and, after being painted a lead color, took on a cargo for Wilmington. After two successful round trips the *Wild Dayrell* was run ashore on 1 February 1864.

The wreck of the *Wild Dayrell* was never lost. It lies in the shallow water of Rich Inlet south of Figure Eight Island and has been a popular site for fishing. However, because of strong currents in the inlet, the *Wild Dayrell* has never been a popular dive site though sport divers have recovered portholes from the hull during the early 1980s. In spite of the environment, the wreck was mapped by the staff and students of the Program in Maritime History and Underwater Archaeology in 1985. Although the dimensions of the hull was impossible to precisely establish because of deterioration of the structure, the overall length of the wreck corresponds closely with the 215-foot length of the *Wild Dayrell* recorded on that vessel's CBR. The 20-foot beam and 50-foot length of the engine room recorded at the wreck site also correspond precisely with those recorded on the CBR (Figure 2). The *Wild Dayrell*'s CBR and historical data associated with the vessel confirm that the ship was powered by two oscillating engines, or steam cylinders and that number of oscillating cylinders were identified at the wreck site.

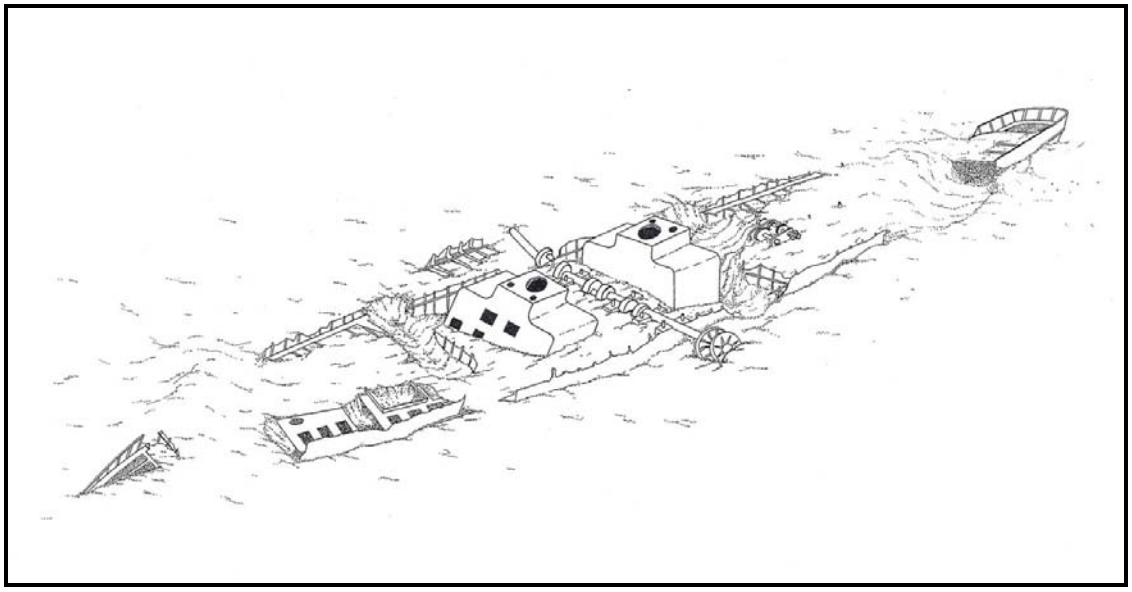

Figure 2. Perspective drawing of the remains of the *Wild Dayrell*.

Field Research Methodology and Equipment

To locate the remains of *Wild Dayrell*, TAR personnel used a 24-foot shallow-draft vessel for conducting the remote sensing survey (Figure 3). The wreck site was identified using an EG&G GEOMETRICS 881 cesium vapor magnetometer (Figure 4). Once the position of the wreck was established, a series of survey lanes were created in HYPACK®MAX to refine the magnetic signature. Because the wreck is now completely buried in the shoal on the south side of the Rich Inlet channel, breaking surf and shallow water made sonar imaging impossible. Data collection during the survey was controlled using a TRIMBLE differential global positioning system assuring reliable geographical location of the remains of *Wild Dayrell*.

An EG&G Geometrics G-881 marine cesium magnetometer capable of plus or minus 0.001 gamma resolution was employed to collect magnetic data in the survey area (Figure 4). To produce the most comprehensive magnetic record, data was collected at 10 samples per second. Due to shoal water and the possibility of snags in the project area, the magnetometer sensor was towed just below the water surface at a speed of approximately 3 knots. Magnetic data were recorded as a data file associated with the computer navigation system. Data from the survey were

contour plotted using QUICKSURF® computer software to facilitate anomaly location and definition of target signature characteristics. A 600 kHz MARINE SONICS high-resolution side scan sonar was to be employed to collect acoustic data in the survey area. However, due to shoal water and breaking surf in the inlet the side scan sonar could not be effectively utilized.

A TRIMBLE AgGPS was used to control navigation and data collection in the survey area. That system has an accuracy of plus or minus three feet, and can be used to generate highly accurate coordinates for the computer navigation system. The DGPS was employed in conjunction with an on-board Compaq 2.4 GHz laptop computer loaded with a Coastal Oceanographics HYPACK®MAX navigation and data collection software program. Positioning data generated by the navigation system were tied to magnetometer records by regular annotations to facilitate target location and anomaly analysis. All data is related to the North Carolina State Plane Coordinate System, NAD 83.

Data Analysis

Using QUICKSURF® contouring software, magnetic data generated during the survey were contour plotted at 10-gamma intervals (Figure 5). The contoured data was used to accurately identify the geographical location and distribution of the structural remains of the *Wild Dayrell*. Due to the fact that the wreck is entirely covered by a shoal, side scan sonar contributed nothing to analysis of the wreck site.

Figure 3. **Photograph of the 25-foot survey vessel *Atlantic Surveyor* employed during the Rich Inlet survey.**

Figure 4. **Photograph of magnet ometer sensor being low ered into the ocean.**

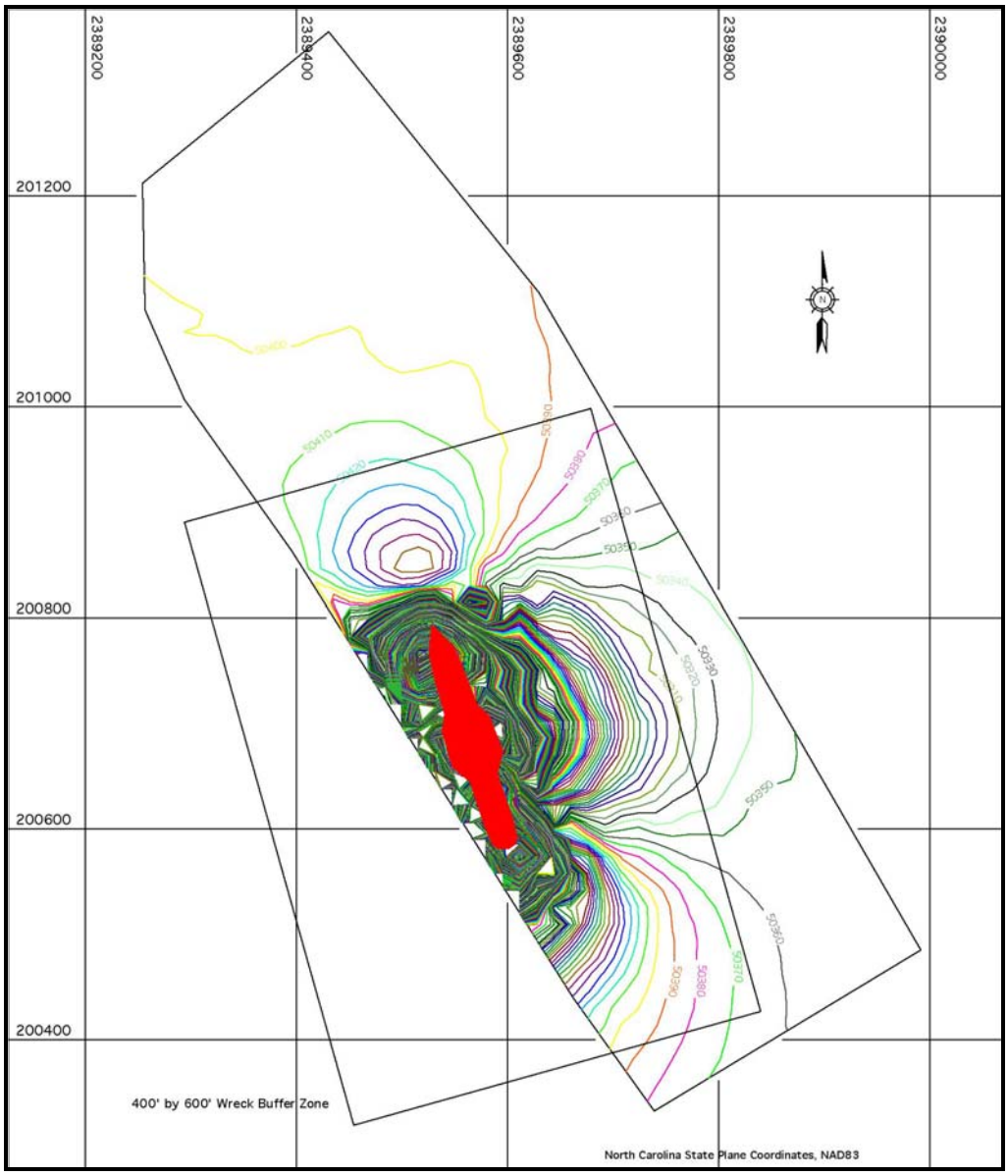

Figure 5. Magnetic contour map of the *Wild Dayrell* wreck site with proposed buffer zone.

Conclusions and Recommendations

The remote sensing survey conducted by TAR was successful in identifying the remains of the *Wild Dayrell* and generating an accurate geographical position for the wreck site. The bow lies to the northwest and the stern lies to the southeast. Coordinates for the longitudinal axis of the hull structure are:

NW 2389528.56, 200793.67
SE 2389600.84, 200581.71

On the recommendation of Richard Lawrence, head of the Underwater Archaeology Branch of the Department of Cultural Resources, a 400-foot by 600-foot buffer zone was established around the wreck site (Figure 5). Coordinates for the buffer zone are:

NW	2389293,85, 200890.38
NE	2389678.94, 200998.57
SE	2389839.48, 200427.20
SW	2389454.39, 200391.00

Proposed plans for dredging in Rich Inlet should be designed to avoid that buffer zone.

APPENDIX 5

Cultural Resource Investigation: Terrestrial and Submerged Cultural Resource Survey Rich Inlet, Figure Eight Island, North Carolina

DRAFT

Terrestrial and Submerged Cultural Resource Survey Rich Inlet, Figure Eight Island, North Carolina

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Abstract

Coastal Planning & Engineering of North Carolina, Inc. (CPE-NC) is the project engineer representing the Figure Eight Island Beach Homeowners Association in its efforts to obtain permits for the Figure Eight Island Inlet and Shoreline Management Project. In order to determine the proposed dredging effects on potentially significant submerged cultural resources, CPE-NC contracted with Tidewater Atlantic Research, Inc. of Washington, North Carolina to conduct a magnetometer and sidescan sonar survey of the proposed channel alternatives being considered. In addition the corridor in which a terminal groin is being proposed under Alternative 5a was also surveyed using terrestrial and marine survey protocol. Field research for the project was carried out on 10 December 2009, 8 and 9 March 2010, and 1 April 2010. Analysis of the remote-sensing data generated during the Rich Inlet survey identified a total of 116 magnetic targets and 6 sonar targets. Five anomalies, composed of 13 individual magnetic targets and 3 associated sonar targets, contain signature characteristics suggestive of potentially significant cultural material. Those five anomaly clusters are recommended for avoidance or additional investigation in the event that avoidance is not possible. The remaining 103 magnetic targets and three associated sonar targets are indicative of modern debris such as traps, anchors, pipe, rebar, and small cable and dredging related debris. No avoidance or additional investigation of the 103 individual magnetic targets is recommended in conjunction with the proposed project.

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Introduction

Coastal Planning and Engineering of North Carolina, Inc. (CPE-NC) of Wilmington, North Carolina is currently working with the Figure Eight Island Beach Homeowners Association to obtain permits for the Figure Eight Island Inlet and Shoreline Management Project. As part of the permitting process CPE-NC has been tasked with evaluating several channel alternatives in and around Rich Inlet. In order to determine the project's impact on potentially significant submerged cultural resources, CPE-NC contracted with Tidewater Atlantic Research, Inc. (TAR) of Washington, North Carolina to conduct a systematic magnetometer and side-scan sonar survey of an area that encompasses the proposed channel alternatives as well as the corridor in which a terminal groin is proposed for Alternative 5a.

The remote-sensing investigation conducted by TAR archaeologists was designed to provide accurate and reliable identification, assessment and documentation of submerged cultural resources in the study area. Survey methodology was developed to comply with guidelines for submerged cultural resource surveys in North Carolina created by the North Carolina Department of Cultural Resources. Those guidelines follow the criteria established by the National Historic Preservation Act of 1966 (Public Law 89-665), the National Environmental Policy Act of 1969 (Public Law 11-190), Executive Order 11593, the Advisory Council on Historic Preservation Procedures for the protection of historic and cultural properties (36 CFR Part 800) and the updated guidelines described in 36 CFR 64 and 36 CFR 66. The results of the investigation will furnish CPE-NC with the archaeological data required for complying with both state and federal submerged cultural resource legislation and regulations.

The terrestrial portion of the survey was conducted on 10 December 2009, 9 March and 1 April 2010, and the submerged portion on 8 March and 1 April 2010. Analysis of the remote-sensing data generated during the Rich Inlet survey identified a total of 116 magnetic anomalies and 6 sonar targets. Five anomaly clusters, composed of 13 individual magnetic anomalies and 3 associated sonar targets, contain signature characteristics suggestive of potentially significant cultural material. These five anomaly clusters are recommended for avoidance or additional investigation. The remaining 103 and three associated sonar targets are indicative of modern debris such as traps, anchors, pipe, rebar, and small cable. No avoidance or additional investigation of these 103 individual magnetic targets is recommended in conjunction with the proposed project.

Project survey personnel consisted of Gordon P. Watts, Jr., principal investigator and Joshua A. Daniel, remote-sensing operator. Dr. Watts and Mr. Daniel conducted both the terrestrial and marine portions of the survey. Robin Arnold and Dr. Watts carried out the historical and literature research. Dr. Watts and Mr. Daniel analyzed the remote-sensing data. Ms. Arnold, Mr. Daniel and Dr. Watts prepared this report document.

Project Location

The remote-sensing project area is situated at Rich Inlet which is located off the north end of Figure Eight Island at the confluence of Nixon Channel to the west and Green Channel to the north. The area surveyed is polygonal in shape, measuring approximately 5,000 feet long and 4,400 feet wide at its extreme points and covers an area of 193.8 acres (Figure 1). To ensure sufficient data would be available to locate any potentially significant targets in the project area, underwater remote-sensing data were collected along lanes spaced on 50-foot intervals; the terrestrial portion along transects spaced on 100-foot intervals.

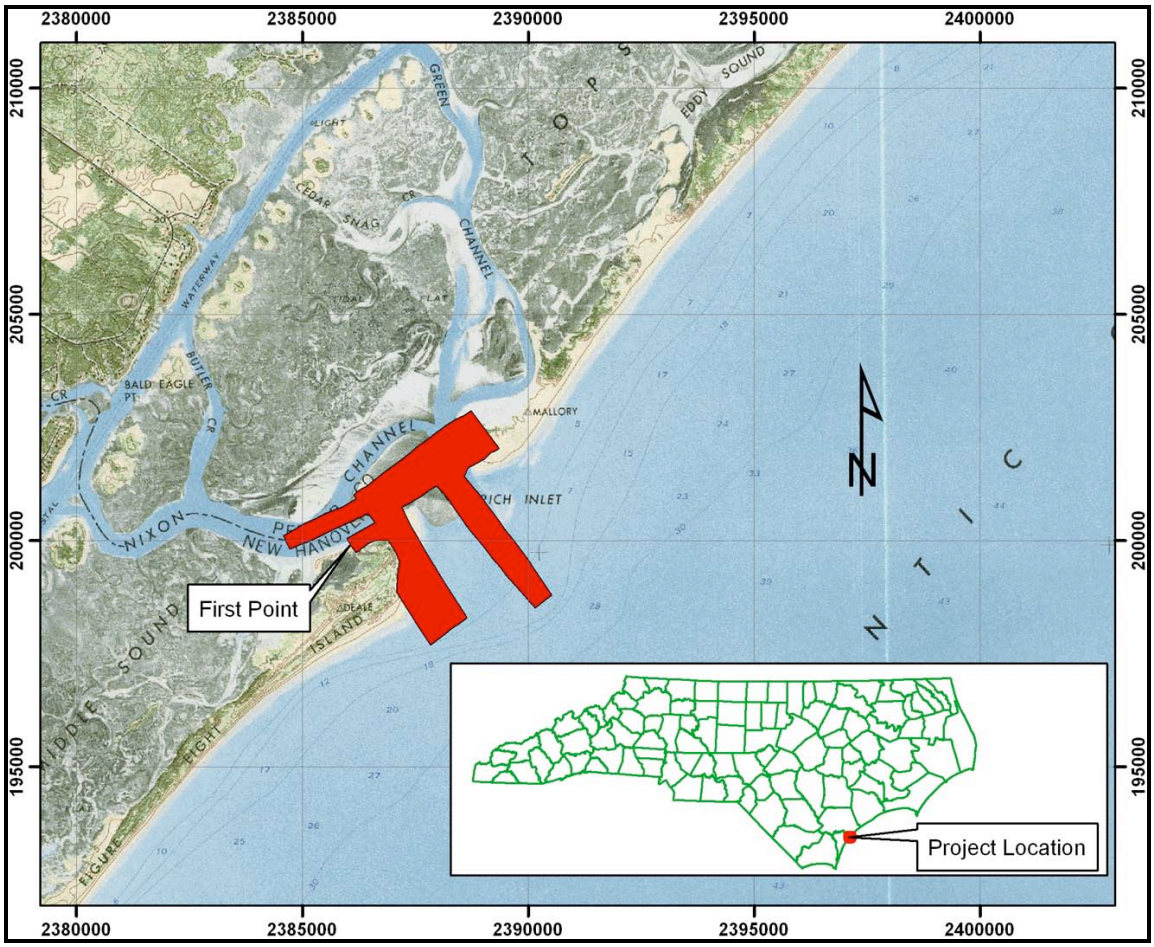

Figure 1. Project area location (USGS. "Hampstead quadrangle, North Carolina" 1:24,000).

The survey boundaries defined in North Carolina State Plane Coordinates, NAD 83, U.S. Survey Foot, beginning at "First Point" in Figure 1 and continuing clockwise are as follows:

Easting	Northing
2386077.7	199887.4
2385988.1	200055.7
2386606.4	200407.5
2386454.7	200599.2
2386124.7	200451.5
2385765.9	200289.7
2385540.6	200177.2
2385401.4	200108.3
2385234.4	200025.7
2385065.7	199963.0
2384990.3	199938.7
2384720.0	199815.6
2384575.6	200114.1
2384887.7	200287.6
2385007.4	200364.7
2385300.6	200501.8
2385475.2	200586.6
2385676.9	200667.9
2385868.6	200747.0
2385931.8	200776.7
2386109.5	200878.8
2386188.6	200932.7
2386132.0	201006.9
2386250.6	201118.7
2386425.5	201213.4
2386745.8	201468.5
2387045.1	201694.7
2387267.5	201859.5
2387482.9	202034.4
2387580.3	202112.4
2387735.9	202220.3
2387917.5	202356.9
2388001.8	202418.0
2388216.5	202575.6
2388417.1	202691.6
2388573.7	202762.3
2388737.1	202877.3
2389351.0	202039.1
2389262.1	201985.6
2389168.6	201944.7
2389021.7	201806.6
2388666.7	201612.5
2388586.9	201417.2
2388657.8	201330.0
2388715.0	201270.7

Easting	Northing
2388757.4	201214.4
2388806.9	201150.4
2388833.0	201119.6
2388908.9	201032.2
2388967.7	200953.0
2389104.0	200761.5
2389348.8	200434.1
2389511.1	200211.8
2389629.1	200060.8
2389891.2	199727.8
2390018.1	199551.5
2390094.9	199426.9
2390307.9	199108.3
2390509.2	198807.5
2390508.9	198800.1
2390147.8	198516.9
2390036.5	198647.8
2389813.5	198902.3
2389554.6	199190.5
2389497.6	199252.4
2389401.0	199380.3
2389356.5	199446.5
2389242.3	199570.2
2389192.6	199629.2
2389058.3	199805.8
2388907.0	199992.9
2388760.4	200172.4
2388687.1	200262.2
2388621.0	200346.7
2388531.7	200471.8
2388416.9	200640.1
2388358.3	200724.3
2388329.9	200760.2
2388259.7	200864.7
2388189.2	200964.3
2388163.4	201000.0
2388072.9	201095.4
2387968.2	201206.3
2387821.2	201127.8
2387777.8	201097.3
2387714.0	201052.7
2387632.3	200994.0
2387294.2	200789.2
2387198.2	200745.9
2387406.5	200310.9

Easting	Northing
2387499.4	200153.4
2387720.5	199787.3
2387974.0	199365.4
2388136.8	199095.9
2388365.5	198734.5
2388603.9	198367.8
2388640.6	198294.4
2388495.0	198188.6
2388306.1	198057.2
2388147.5	197937.0
2387835.6	197703.9
2387601.6	198055.6
2387424.2	198335.6
2387344.9	198460.3
2387181.4	198714.9
2387083.3	198867.7
2387086.9	198956.8
2387089.4	199080.8
2387091.9	199204.7
2387102.4	199281.2
2387118.2	199367.4
2387149.4	199527.4
2387122.5	199597.9
2387082.4	199713.6
2387029.1	199805.1
2386996.3	199853.5
2386898.2	200006.3
2386781.8	200010.9
2386662.5	200005.8
2386597.8	200000.9
2386514.9	199974.5
2386423.3	199918.6
2386356.8	199866.7
2386292.9	199819.6
2386259.4	199788.7
2386185.8	199747.0
2386077.7	199887.4
2385949.6	200602.4

Research Methodology

Literature and Historical Research

Due to the number of previous investigations conducted in the project vicinity, TAR personnel have carried out extensive literature searches in both primary and secondary source material. To assess the potential for finding significant historic and/or cultural resources within the proposed borrow areas TAR personnel reviewed previously collected literature, examined historical maps and charts and examined inventories of shipwrecks in the Rich Inlet area. The historical background in this document is built upon and refined from previous historical background assessments of the region developed by TAR.

Preliminary wreck-specific information was collected from primary and secondary sources that include: *A Guide to Sunken Ships in American Waters* (Lonsdale and Kaplan 1964); *Encyclopedia of American Shipwrecks* (Berman 1972); *Shipwrecks of the Civil War: The Encyclopedia of Union and Confederate Naval Losses* (Shomette 1973); *Merchant Steam Vessels of the United States 1790-1868* (Lytle and Holdcamper 1975); *Shipwrecks in the Americas* (Marx 1983); *Shipwreck Encyclopedia of The Civil War: North Carolina, 1861-1865* (Spence 1991); *Shipwrecks of North Carolina* (Gentile 1992); *Naval Documents of the American Revolution* (U.S. Navy [10 vols. published between 1964-1996]); *The Naval War of 1812: A Documentary History* (Dudley [two vols.] 1985); *Graveyard of the Atlantic* (Stick 1952); *Official Records of the Union and Confederate Navies in the War of the Rebellion* (The National Historical Society [31 vols.] 1987), *North Carolina Shipwreck Accounts: 1709 to 1950* (Charles 2004), and other published materials. A survey of select newspapers generated additional information.

Personnel at the North Carolina Office of Archives and History's Underwater Archaeology Branch (UAB) at Kure Beach, North Carolina were also contacted for shipwreck data associated with the Rich Inlet area (Richard W. Lawrence 2010, pers. comm.).

Remote-Sensing Survey

In order to reliably identify submerged cultural resources, TAR archaeologists conducted a systematic remote-sensing survey of the proposed borrow site. Underwater survey activities were conducted on 8 March 2010 from the 24-foot survey vessel *Atlantic Surveyor*. On 1 April 2010, they were conducted from a 20-foot Privateer. A pedestrian survey collected data on the beach and shoals. In order to fulfill the requirements for survey activities in North Carolina, magnetic and acoustic remote-sensing equipment were employed. This combination of remote-sensing represents the state of the art in submerged cultural resource location technology and it offers the most reliable and cost effective method to locate and identify potentially significant targets. Data collection was controlled using a differential global positioning system (DGPS). DGPS produces the highly accurate coordinates necessary to support a sophisticated navigation program and assures reliable target location.

An EG&G GEOMETRICS G-881 marine cesium magnetometer, capable of plus or minus 0.01 gamma resolution, was employed to collect magnetic data for the submerged portion of the survey area (Figure 2). To produce the most comprehensive magnetic record, data was collected at 10 samples per second. On 8 March 2010, the magnetometer sensor was towed just below the water surface at a speed of approximately three to four knots due to shoal water within the project area. On 1 April 2010, the magnetometer sensor was mounted to the bow of the vessel. Magnetic data were recorded as a data file associated with the computer navigation system. Data from the survey were contour plotted using QUICKSURF® computer software to facilitate anomaly location and definition of target signature characteristics. All magnetic data were correlated with the acoustic remote-sensing records.

A 445/900 kHz KLEIN SYSTEM 3900 digital sidescan sonar (interfaced with SONARPRO SONAR PROCESSING SYSTEM) was employed to collect acoustic data in the submerged portions of the survey area (Figure 3). Due to shoal water within the project area, the sidescan sonar transducer was deployed and maintained between 3 and 5 feet below the water surface. Acoustic data were collected using a range scale of 30 and 50 meters to provide a minimum of 200% coverage and high target signature definition. Acoustic data were recorded as a digital file with SONARPRO and tied to the magnetic and positioning data by the computer navigation system.

Figure 2. Launching the EG&G GEOMETRICS G-881 cesium vapor magnetometer.

Figure 3. Launching the KLEIN SYSTEM 3900 digital sidescan sonar.

A TRIMBLE AgGPS was used to control navigation and data collection in the survey area. That system has an accuracy of plus or minus three feet, and can be used to generate highly accurate coordinates for the computer navigation system on the survey vessel. The DGPS was employed in conjunction with an onboard COMPAQ 2.4 GHz laptop loaded with HYPACK navigation and data collection software (Figure 4). Positioning data generated by the navigation system were tied to magnetometer records by regular annotations to facilitate target location and anomaly analysis. All data is related to the North Carolina State Plane Coordinate System, NAD 83.

The terrestrial portion of the survey area was investigated on foot. Magnetic data was collected using a LITTLEMORE 7702 proton precession (Figure 5). Positioning and data recording was accomplished by a handheld TRIMBLE GEOEXPLORER SERIES GPS interfaced with HYPACK. A visual survey of the area exposed at low tide also took place during this portion of the survey.

Data Analysis

To ensure reliable target identification and assessment, analysis of the magnetic and acoustic data was carried out as it was generated. Using QUICKSURF® contouring software, magnetic data generated during the survey were contour plotted at 5-gamma intervals for analysis and accurate location of magnetic anomalies. The

magnetic data was examined for anomalies, which were then isolated and analyzed in accordance with intensity, duration, areal extent and signature characteristics. Sonar records were analyzed to identify targets on the basis of configuration, areal extent, target intensity and contrast with background, elevation and shadow image, and were also reviewed for possible association with identified magnetic anomalies.

Figure 4. Computer navigation system located at the research vessel helm.

Data generated by the remote-sensing equipment were developed to support an assessment of each magnetic and acoustic signature. Analysis of each target signature included consideration of magnetic and sonar signature characteristics previously demonstrated to be reliable indicators of historically significant submerged cultural resources. Assessment of each target includes avoidance options and possible adjustments to avoid potential cultural resources. Where avoidance is not possible the assessment includes recommendations for additional investigation to determine the exact nature of the cultural material generating the signature and its potential National Register of Historic Places (NRHP) significance. Historical evidence was developed into a background context and an inventory of shipwreck sites that identified possible correlations with magnetic targets (Appendix A). A magnetic contour map of the survey area was produced to aid in the analysis of each target.

Figure 5. Terrestrial survey using the LITTLEMORE magnetometer.

Historical Background for Rich Inlet Vicinity

The North Carolina coast exceeds 300 miles in extent, and "for the greater part of this distance barrier-reefs, or a cordon of long, low, narrow sandy islands, varying from one-fourth of a mile to nearly 4 miles in width, resist the assaults of the Atlantic, and appear for centuries to have maintained the same position in which we now find them" (U.S. War Department 1876:378).

Europeans surveyed the barrier reefs and coastline of contemporary Pender and New Hanover counties during the first quarter of the sixteenth century as reported by Giovanni da Verrazano and other explorers. Some 60 years later, according to Ralph Lane's chronicles of Sir Richard Grenville's expedition and John White's map [1585], Englishmen with the support of an unpopular Portuguese pilot fished in the region on their way to establish a colony on Roanoke Island. The Grenville party tolerated Simon Ferdinando as the former pirate was recognized as the "only skilled navigator alive with previous experience in negotiating the treacherous Carolina coastline" (Glasgow 1966:120-121).

Before John White arrived at Roanoke Island in 1587 to search for what today is known as the Lost Colony, his vessels presumably anchored in the vicinity of contemporary Figure Eight and Topsail islands. White's maps indicate that he was "aware of Cape Fear", and this fact would suggest that his vessel sailed closely up the coast to Roanoke Island. The White expeditions also contributed to the Molyneaux globe produced circa 1592, which clearly identified the "Cape of Feare" (Schoenbaum 1992:223).

Samuel Mace's 1602/1603 expedition, sponsored by Sir Walter Ralegh, enjoyed a month long sojourn in the vicinity of Rich Inlet where the English collected sassafras from aborigines (Noël Hume 1994:101,103). From the date of Mace's visit to the North Carolina coast to ostensibly search for the Raleigh colony to the beginning of the eighteenth century Europeans may have settled on the mainland although they left no physical evidence. In the interim, explorers continued to conduct superficial shoreline surveys and to ascend briefly into local waterways.

During mid-October 1663, Captain William Hilton reconnoitered Cape Fear Roads for a second time and on this occasion navigated up the North-East Cape Fear River. Aboard the *Adventure* the Massachusetts Bay mariner observed landmarks that he named "Turkey Quarter, Rocky Point and Stag Park." Of those, the latter two place names survive (Bloodworth 1947:30; Pender County 2008). Despite Hilton's positive reports on the beautiful terrain, the region remained in a "dormant state" due to a temporary moratorium enacted by the Lords Proprietors to prohibit colonization (Bloodworth 1947:30).

John Brickell surveyed North Carolina's barrier islands in 1729 and commented on the nature of inlets subsequently identified by the 1738 James Wimble chart. Brickell mentioned *Rich* Inlet, which is shown as "Reach" on Wimble's chart. In *The Natural History of North Carolina*, the Irish physician wrote: "Between these Islands and Sand Banks, are Inlets of several depths of Water, some admitting only of Sloops, Schooners, Brigantines, and Vessels of small Burthen … many of these being only Navigable for Periaugers and small Crofts, by reason of their many Shoals which are continually shifting by the violence of Storms" (Brickell 1968:2).

Brickell noted that early-eighteenth-century Carolina planters:

> [F]or the most part live by the Water side, few or none living in the In-land parts of the country at present, though the lands are as good and fertile as any that are yet inhabited, but not so commodious for Carriage as by the Water, for most part of the Plantations run but a Mile backward into the Woods, so that betwixt every River you shall see vast Tracts of Land lying waste, or inhabited only by wild beasts: What is worthy of Observation is, That almost every Planter may have a convenient Dock upon his plantation, and a sufficient Quantity of good Timber to build Ships and Boats withal" (Brickell 1968:14).

James Moore acquired the five-mile long, 1,300-acre sandbank south of Rich Inlet circa 1762. The island was later sold to Cornelius Harnett. After Harnett's death, planter James Foy purchased the tract [1795] that became part of his large Poplar Grove estate. The prosperous Foy family would retain ownership of "Woods Beach" [or Foy Island] until the 1950s, with the exception of a small tract [southern extremity] sold to the Hutaff family (Nadeau 1998:15; Barefoot 2005:170-171).

Maritime activities conducted near Rich Inlet were not greatly impacted by the American Revolution. However, some local residents exhibited ardent patriotism during the conflict and many prominent landowners and merchants were involved in the political events leading to the war and subsequent military actions. One such event occurred when American forces led by Colonel James Moore succeeded to repulse British soldiers and North Carolina Loyalists at the decisive battle at Moore's Creek Bridge in February 1776. In retribution for their owners' defiance, some Colonial plantations and salt works were plundered and destroyed in New Hanover County [and future Pender County] (Rankin 1975:15-20).

Despite the region's promising economic opportunities that were presented after American Independence, an out migration occurred during the early nineteenth century. This "Great Exodus" resulted in the loss of some of the largest and wealthiest landowners in southeastern North Carolina. This trend was driven by five factors: land grants for military service in the Revolution and War of 1812, availability of cheap land in the west, better cotton land in the west and south, higher prices elsewhere for hiring slaves and a decline in the productivity of the area's heavily farmed sandy soils (Louis Berger Group 2002:9).

During the antebellum period, international and packet maritime commerce did increase along the North Carolina coast. In September 1857, several vessels were lost off southeastern North Carolina in the midst of a severe hurricane. One casualty was reported in the vicinity of modern Figure Eight Island. On 17 September, *The New York Times* reported that the "Schooner *Abdel Kader*, Captain CORNELIUS, hence for New-York, with a cargo of naval stores, went ashore about Rich Inlet, 25 or 30 miles north [of] New Inlet, and will prove a total loss" (*The New York Times* 1857). Prior marine intelligence from the newspaper indicated that Captain Cornelius was familiar with the coast. On 6 June 1856, Cornelius cleared the port of New York aboard the *Abdel Kader* prior to his voyage to Savannah (*The New York Times* 1856).

The American Civil War disrupted commercial development and maritime trade near Rich Inlet. After Confederate forces in South Carolina attacked the U.S. garrison at Fort Sumter, President Abraham Lincoln declared a state of open rebellion and called for volunteers to preserve the Union. On 19 April 1861, Lincoln issued a proclamation to establish a blockade of Confederate ports in South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana and Texas. Eight days later, the blockade was extended to include ports in Virginia and North Carolina. Until the fall of Fort Fisher in January 1865 and the Union occupation of the Cape Fear, Wilmington remained as the Confederacy's major port for vessels running the blockade. As a consequence, the remains of numerous blockade runners lie along the coastline north and west of Cape Fear.

The remains of the Anglo-Confederate Trading Company's steamer *Wild Dayrell,* lie in Rich Inlet approximately 20 miles north of Fort Fisher. That vessel was built by the firm of Jones, Quiggin and Company in Liverpool along with an identical sistership, *Lucy*. *Lucy* and *Wild Dayrell* were constructed of iron, each measuring 215 feet in length, 20 feet in beam and 10 foot 3 inch depth of hold. The vessels' oscillating steam cylinder engines were built by Fawcett, Preston and Company in Liverpool and measured 52 inches in diameter with a 48-inch stroke. The *Wild Dayrell* was also equipped with feathering paddle wheel floats and a forecastle hood. Two raked pole masts and two raked retractable funnels were all that protruded above the level of the steamer's paddle boxes.

The *Wild Dayrell* was launched on 17 September 1863. Although the steam trials of the *Wild Dayrell* were not reported in the press, its sistership *Lucy* proved to be capable of 15 ½ knots against a strong wind and tide during her trials in October 1863. On 12 November the vessel's registered owners, Edward Lawrence and Company, entered the vessel at Liverpool Customs for loading for Nassau. The fully loaded *Wild Dayrell* cleared for sea two days later. In December, the steamer made Nassau and, after being painted a lead color, took on a cargo for Wilmington. After two successful round trips the *Wild Dayrell* was run ashore on 1 February 1864.

The wreck of the *Wild Dayrell* was never lost. It lies in the shallow water of Rich Inlet south of Figure Eight Island and has been a popular site for fishing (Figure 6). However, because of strong currents in the inlet, the *Wild Dayrell* has never been a popular dive site though sport divers have recovered portholes from the hull during the early 1980s. In spite of the environment, the wreck was mapped by the staff and students of the East Carolina University (ECU) Program in Maritime History and Underwater Archaeology in 1985 (Figure 7).

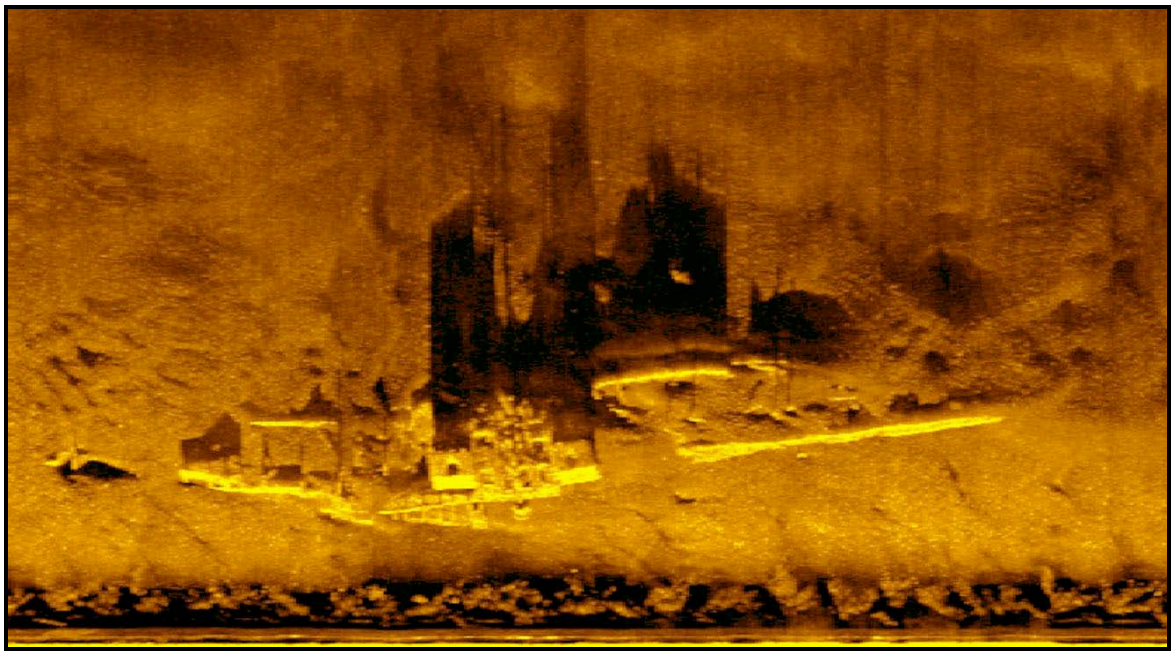

Figure 6. Sonar image of the *Wild Dayrell*.

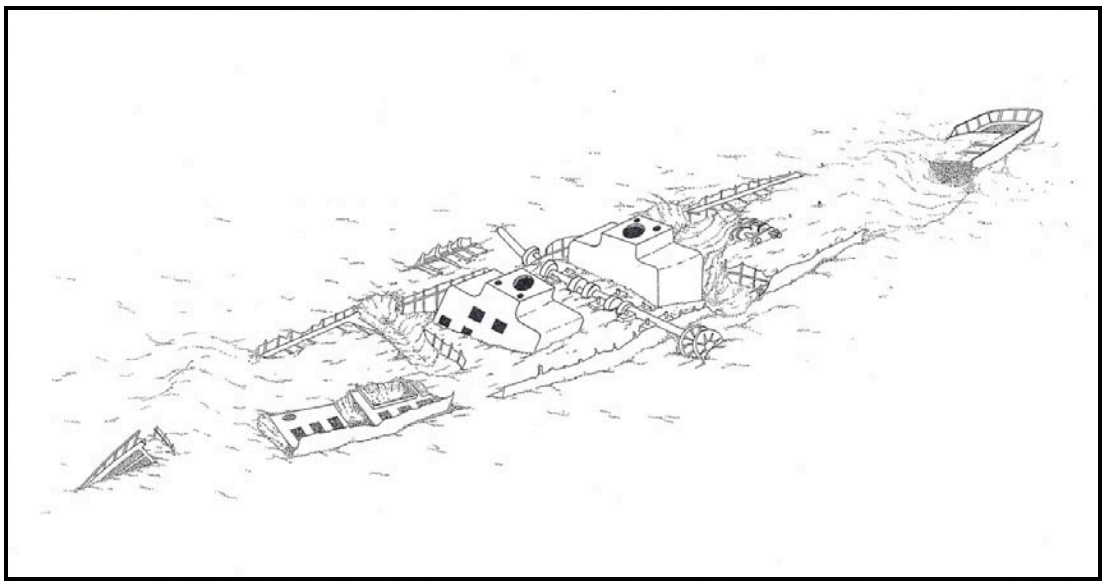

Figure 7. Perspective drawing of the remains of the *Wild Dayrell*.

Although the dimensions of the hull was impossible to precisely establish because of deterioration of the structure, the overall length of the wreck corresponds closely with the 215-foot length of the *Wild Dayrell* recorded on that vessel's *Certificate of British Registry* (CBR). The 20-foot beam and 50-foot length of the engine room recorded at the wreck site also correspond precisely with those recorded on the CBR. The *Wild Dayrell*'s CBR and historical data associated with the vessel confirm that the ship was powered by two oscillating engines, or steam cylinders and that number of oscillating cylinders were identified at the wreck site.

According to postwar records, the region's once prosperous plantation system disappeared during the Reconstruction Era. Some 4,000 native males had served the Confederacy and survivors faced a dismal future upon their return. The war's aftermath of economic and social upheaval also created a climate for political change. Historians related that carpetbaggers had seized control of nearby Wilmington and their stranglehold resulted in corruption at all levels of government. In 1873, landowners organized at Long Creek Village (former Lillington) to discuss plans to separate from New Hanover County's control. During February 1875, the future constituents of Pender County voted to form their own county and succeeded by popular vote. The name Pender was selected to honor native son General William D. Pender. The City of South Washington (now Watha) was designated as the first government center but was replaced by the present county seat of Burgaw in 1879 (Bloodworth 1947:1,3).

The lack of navigable channels also hindered postwar recovery. In 1875/1876, a Federal civil engineer reported about impediments to navigation in southeastern North Carolina that included Rich Inlet. S. T. Albert noted that the depth of Rich Inlet was only 2.5 feet (U.S. War Department 1876:384). He also remarked that:

> Between Bogue Sound and Wilmington are five shallow sounds, with an occasional inlet, where coasters may find a haven. These sounds … are for the most part occupied by an intricate network of channels through which a canoe cannot pass. The storms sweep into the sounds a large amount of sand which the feeble backwater is unable to remove, and large deltas have been formed by the ocean inside the inlets (U.S. War Department 1876:388).

Rich Inlet's shallow, meandering channel possibly contributed to a mid-April 1877 shipwreck. According to *The Deseret News*, a "schooner, loaded with lumber, is ashore near Rich Inlet. The vessel is broken in two, and with her cargo is a total loss. It is feared that the crew are all lost" (*Deseret News* 1877). A contemporary Connecticut paper published a similar story (*Hartford Daily Courant* 1877). Within two years, a coastwise vessel bound for Charleston stranded in Rich Inlet, according to *The New York Times.* Following its departure from New York, the steam yacht *Elizabeth* "took fire" in the inlet during March 1879 and "was totally destroyed". The newspaper related that the yacht's crew was safely ashore (*The New York Times* 1879). In 1898, the U.S. Life-Saving Service compiled its annual report and advised Congress that over the course of a ten-year-period (1888-1897) there was one confirmed vessel stranding at Rich Inlet (U.S. Life-Saving Service 1898:453).

Navigational improvements made during the twentieth century prompted some changes along Pender and New Hanover counties. During the 1920s, construction began on the Intracoastal Waterway (ICW), a protected waterway traversing the entire eastern seaboard of the United States. It was hoped that the waterway would facilitate coastal trade and open areas of the coast that had little access to transportation outlets. Prior to 1930, Beaufort remained the southern terminus of the ICW. To the south of that North Carolina port, the waterway resumed at Winyah Bay, South Carolina. Federal legislation enacted during the late 1920s approved construction of a 93-mile long waterway between the port cities of Beaufort and Wilmington. The projected waterway was expected to increase shipments of "large quantities of lumber, seafood, fertilizer, petroleum products, and general merchandise through the intervening sounds" (Angley 1984:8).

Those changes, however, had no impact on vessel traffic navigating through Rich Inlet. In 1922, the U.S. Coast and Geodetic Survey reported on the status of all North Carolina inlets remarking that: "Rich and Queens Inlets are 5 miles and 8½ miles, respectively, westward of New Topsail Inlet, and have channel depths over their bars of 2 to 4 feet at low tide. They are used to some extent as anchorages by small local craft but are not recommended to strangers" (U.S. Department of Commerce 1922:58-59).

The lack of vessel traffic in Rich Inlet did not deter local fishing craft, and apparently encouraged bootleg whisky enterprises on the northern end of Figure Eight Island. According to some accounts "there were quite a few illegal stills" producing illicit liquors during Prohibition (1919-1933). In particular, a still operated by "Rod Rogers" located at Big Oak Landing produced some five gallons of whiskey per

week. Situated at the base of a high bank along the creek, and backed by heavy foliage and large oaks, Roger's distillery was only accessible by high tide (Nadeau 1998:18-19; Zepke 2004:187).

During World War II, at least 12 American tankers and freighters were sunk in Onslow Bay after being torpedoed by German U-boats. The majority of those commercial vessels were lost during March and April 1942. Conversely, the 218-foot *U-352* was destroyed in the bay after being depth-charged by the USCG cutter *Icarus* (Gentile 1992:193-209; Survivor Topsail 2005).

In response to U-boat activity north of Figure Eight Island, coast guard auxiliary vessels were stationed at Rich and Mason inlets to watch for enemy submarines. A Porter's Neck resident who served in the inlet patrol later reported that two U.S. Army airplanes crashed at Figure Eight Island. J. Knight Davis recalled that one crashed into the ocean, and a possible Thunderbolt "cracked up on the dunes". In respect to the latter incident, the pilot survived and walked away. Davis maintained that the plane wreckage was visible for several years. The former coast guard observer also suggested that a "wrecked dredge" washed up on the island's south end (Nadeau 1998:20).

A Rich Inlet fisherman named Eugene Casteen provided information that P-47 and P-39 pilots used the beaches of Figure Eight as a strafing range in World War II. Flying out of their training base at Bluethenthal Field (ILM Airport), the five to six planes would fire at beach targets laid out by Casteen and others. Primitive barracks were constructed on the island to accommodate U.S. Army soldiers and USCG personnel, who served in mounted beach patrol units. A small pier was also constructed on the shoreline of the sound. After the global conflict ended, the federal government apparently abandoned the barracks. In the postwar period, fishermen and squatters occupied the shacks (Nadeau 1998:20-21; Zepke 2004:187-188).

Modern Development on Figure Eight Island

In 1955, two New Hanover County businessmen sought to purchase the 1,300-acre barrier island from descendents of the Foy and Hutaff families. After protracted negotiations, brothers Dan and Bruce Cameron purchased the island for approximately $100,000. Due to the extensive damage caused by Hurricane Hazel in 1954, the oceanfront property was probably seen as a liability to the previous owners (Nadeau 1998:15-16).

In April 1967, the U.S. Department of Defense released details regarding "Exercise Kitty Hawk", in which 70,000 air and ground troops would train during late summer along the North Carolina coast. Rich Inlet was designated as the southernmost staging area for "the biggest U.S. war games since the Vietnam buildup". According to the U.S. Strike Command, one phase of the military exercise

would include an amphibious Marine landing to coordinate with U.S. Army, U.S. Air Force, and U.S. Navy training maneuvers. The joint operation was scheduled to commence in late August 1967 (*The Dispatch* 1967).

During October 1977, New Hanover County filed a Superior Court petition to resolve a longstanding dispute between the county and Pender County. The legal action involved a 147-acre tract at the north end of Figure Eight Island, "over which both counties claim[ed] jurisdiction". Specifically, the disputed tract was "bounded on the west by Nixon Channel, on the north by Rich Inlet, and on the east by the Atlantic Ocean" (*Morning Star* 1977; Meyer 1978:7-C). Jurisdiction of Figure Eight Island was eventually awarded to New Hanover County, and the official county boundaries are located within Rich Inlet (Fennell 1982:2B).

By early 1982, Figure Eight Island was still largely undeveloped and its natural character was preserved to a great degree. Access to the island was prohibited by "invitation only" and was facilitated by a private bridge (Schoenbaum 1992:234). Fishing enthusiasts continued to enjoy superb catches near the island, and benefited from the state's artificial reef program. Beginning in 1973, the N.C Division of Marine Fisheries (NCDMF) also deposited discarded tires on fishing reefs including sites off Rich's Inlet, and nearby Topsail Beach to enhance commercial and recreational fishing (*Morning Star* 1975).

Seventy mph winds created by Hurricane Diana in September 1984 prompted a brief, voluntary evacuation of Figure Eight Island. A modern houseboat sank at the yacht club marina during the storm, and some residents later reported seeing "the shell of a wooden ship washed up on the beach" [near Dan Cameron home]. Witnesses observed "creosoted heart of pine wood" and "solid copper, hand cast nail spikes." Islanders noted that the wreck disappeared into the surf within days of the initial sighting (Nadeau 1991:89; 1998:90-92).

On 4 December 1984, N.C. underwater archaeologists Richard Lawrence and Leslie Bright visited Figure Eight Island to examine a wreck reported by Mr. Bob Maready. Mr. Lawrence and Mr. Bright conducted a visual inspection "from the point where the mainland access road intersects the beach, south to Rich Inlet" but were unable to relocate any vessel remains. In his previous telephone report, Mr. Maready described "cypress or oak" wooden remains with brass spikes and pins, and suggested that the overall dimensions of the wreck measured some 36 feet by 10 feet (Lawrence 1985:1).

During the 4 December visit, Mr. Lawrence and Mr. Bright also conducted a brief survey of the remains (Site 0001-FEB) of another wooden vessel that was situated "across the street and just south of the house at 524 Beach Drive in a wooded thicket" (Lawrence 1985:1). According to Nadeau (1998:54), the remains were near the north end of the island on a lot at 521 Beach Road North and were discovered by Robert Pollock in the early 1980s. Mr. Lawrence reported that Site 0001-FEB was "at the base of a dune system and was apparently deposited at a time when the inlet was situated south of its present location or during a time of extreme overwash". (Lawrence 1985:1-2). Historical records indicate that at least two inlets now closed

once existed on the northern end of Figure Eight Island. By 1991, "the fragmented spine of the ship" was still visible with its attached "rusted spikes and bolts" (Nadeau 1998:54-56).

In March 1985, the NCDMF cautioned mariners approaching Rich Inlet to avoid the sunken hulk of the *Wild Dayrell* as strong currents had swept away markers placed at the site in 1983. A local marina operator reported that at least six boats struck the wreck during 1984, and sustained damage. At this time, numerous vessels were navigating through Rich Inlet on "a typical summer day" (Headrick 1985).

A Wilmington newspaper published in 1986 informed readers about local fishing tournaments, and specifically advised king mackerel anglers to motor some six miles off Rich Inlet to Dallas Rock where large, sharp ledges attracted the popular finfish. In addition to the presence of king mackerel, sportsmen were able to catch abundant bluefish, dolphin, grouper, marlin, and wahoo aboard charter or private vessels off Rich Inlet (Cooney 1986).

During the 1990s, several hurricanes caused significant damage to coastal Pender and New Hanover counties, and resulted in the evacuation of thousands of residents and tourists. In November 1994, the area was subjected to the prolonged and erratic path of tropical storm Gordon, which whipped up 11-foot waves in some locations to cause serious beach erosion. Although Hurricane Bertha made landfall near Surf City in mid-July 1996 with sustained winds of 110 mph, the storm's greatest impact was the loss of revenue when tourists and residents were forced to leave barrier island accommodations. In early September 1996, Hurricane Fran came ashore within miles of Bertha's landfall site with maximum winds of 115 mph (122 mph per NOAA). Both 1996 tropical systems generated severe gales, floodwaters, and near-record storm surges (*The Charlotte Observer* 1994; Geroux 1996; Sack 1996; Torriero 1996).

A Figure Eight Island homeowner commented that every structure on the barrier island was damaged during Hurricane Fran, and that all docks and beach steps were lost. Sand was re-deposited to a depth of three feet on all roads (Nadeau 1998:9). In late August 1998, Hurricane Bonnie struck the same coastline with maximum winds of 115 knots and near-record rainfall totals. Hurricane Dennis skirted the coastline in late August 1999, which prompted officials to issue mandatory evacuation of low lying areas and some barrier island communities. In September 1999, epic flooding caused by Hurricane Floyd devastated Pender and New Hanover in addition to numerous other North Carolina counties (*Atlanta Journal-Constitution* 1998; Pressley 1999; *The Charlotte Observer* 1999).

Hurricane Isabel struck the North Carolina coast in mid-September 2003, and the effects of the storm may have dislodged a wreck that appeared in the vicinity of Rich Inlet several weeks later. On 14 November 2003, wreckage was found on the southern bank of the newly aligned Mason Inlet [between Figure Eight Island and Wrightsville Beach]. A local fisherman observed the vessel frame that was located "several hundred feet inland from the mouth of the inlet", and reported the site to

the N.C. UAB at Fort Fisher. Archaeologists were not able to view the wreckage but suggested that the remains might be related to those described in the 6 March 1985 *Memorandum*, which were identified as the Maready Site (Henry 2003:1).

Currently, Figure Eight Island is advertised as one of the most pristine privately owned beach properties in North Carolina. Development on the island is strictly managed to maintain its picturesque and tranquil character. Amenities include a luxurious yacht club that features a restaurant, marina, and tennis courts. Due to its exclusivity and seclusion, celebrities and politicians favor the island. Over 400 "aesthetically pleasing" homes are situated amid the island's maritime forests and high, rolling dunes (Barefoot 2005:170).

Previous Investigations

In 1984, the wreck of the *Wild Dayrell* (0001RII) was examined by the UAB staff and subsequently mapped in 1989 by students of the ECU Program in Maritime History and Underwater Archaeology. Although the dimensions of the hull were impossible to precisely establish because of deterioration of the structure, the overall length of the wreck corresponded closely with the 215-foot length of the *Wild Dayrell* recorded on that vessel's CBR. The 20-foot beam and 50-foot length of the engine room recorded at the wreck site also correspond precisely with those recorded on the CBR. The *Wild Dayrell*'s CBR and historical data associated with the vessel confirm that the ship was powered by two oscillating engines, or steam cylinders; the same number of oscillating cylinders were identified at the wreck site. With these data, it was determined that this wreck represents the probable remains of the *Wild Dayrell*.

On 31 May 2002, the UAB conducted an inspection dive on the *Wild Dayrell*, prompted by reports that the wreck had been exposed. A secondary goal of this inspection was to record accurate coordinates for the wreck site with the UAB's DGPS. Diving took place at high tide with the upper portions of the boilers four feet from the water surface. Along with obtaining coordinates, it was determined that the shipwreck appeared to be in the same condition as when it was examined by the UAB and ECU field school (Lawrence 2002).

On 3 September 2006, Tidewater Atlantic Research, Inc. (TAR) of Washington, North Carolina carried out a remote-sensing survey to determine the exact position of the wreck site of the Civil War blockade-runner *Wild Dayrell*. That remote-sensing survey was conducted for CPE-NC, working with the Figure Eight Island Beach Homeowners Association on the inlet and shoreline management project. As one of the project alternatives involved the repositioning of the Rich Inlet channel, the investigation carried out by TAR personnel relocated the *Wild Dayrell* and accurately established the location of the wreck using differential global positioning. On the recommendation of Richard Lawrence, head of the North Carolina UAB, a 400-foot by 600-foot protective buffer zone was established around the wreck site.

Description of Findings

An analysis of the remote-sensing data identified a total of 116 individual magnetic anomalies and 6 sonar targets within the area surveyed (Figure 8, Appendix B and Figure 9). Five clusters, composed of 13 individual anomalies, contained signature characteristics suggestive of potentially significant cultural material. Cluster RI-1 is composed of two associated magnetic signatures and a sonar image suggestive of possible ballast (Figure 8, Appendix B and Appendix C). As these signatures are suggestive of potentially significant cultural material, avoidance of these targets is recommended by the creation of a 150-foot radius buffer. Cluster RI-2 is composed of three magnetic anomalies (Figure 8 and Appendix B). Their proximity to each other along with their signature characteristics are suggestive of potentially significant cultural material. Avoidance of cluster RI-2 is recommended by the creation of a 100-foot radius buffer. Cluster RI-3 is composed of five magnetic anomalies (Figure 8 and Appendix B). Their proximity to each other along with their signature characteristics are suggestive of potentially significant cultural material. Avoidance of cluster RI-3 is recommended by the creation of a 150-foot radius buffer. Anomaly RI-4 is composed of a single magnetic anomaly (Figure 8 and Appendix B). Sonar identified possible structural debris at the site (Appendix C). Due to this anomaly's proximity to the *Wild Dayrell*, it could be disarticulated structure associated with that wreck. Avoidance of RI-4 is recommended by the creation of a 100-foot radius buffer. Cluster RI-5 is composed of two magnetic anomalies and a sonar image suggestive of possible structural debris (Figure 8, Appendix B and Appendix C). As these signatures are suggestive of potentially significant cultural material avoidance is recommended by the creation of a 100-foot radius buffer. Should avoidance prove impossible, additional investigation designed to fully assess each anomaly's historical and archaeological significance in terms of NRHP eligibility is recommended.

The remaining 103 magnetic targets in the survey area contained signature characteristics suggestive of modern material such as traps, anchors, pipe, rebar, small cable, moorings, and moored vessels (Figure 8 and Appendix B). Three targets, 81, 94, and 95, had associated sonar images illustrating a crab trap, scattered modern debris, and a tire, respectively (Appendix C). As the sensor was within several feet of the bottom, even small ferrous objects will generate a significant magnetic target. The cesium vapor magnetometer will also identify targets well in advance of their position and continue to record the associated magnetic disturbance well after crossing material generating the signature. This assessment is verified by modern material recorded by the sonar (Figure 9 and Appendix C). As their signature characteristics are suggestive of modern material, those 103 individual magnetic anomalies are not recommended for avoidance or additional investigation in conjunction with the proposed project.

Within the proposed survey area two locations proved to be inaccessible. One area was located in the surf zone off the north end of Figure Eight. The second was on a shoal west of the location of the *Wild Dayrell*. Breaking water in both areas proved to be too rough and shallow for safe vessel operations and too rough and deep for terrestrial survey means.

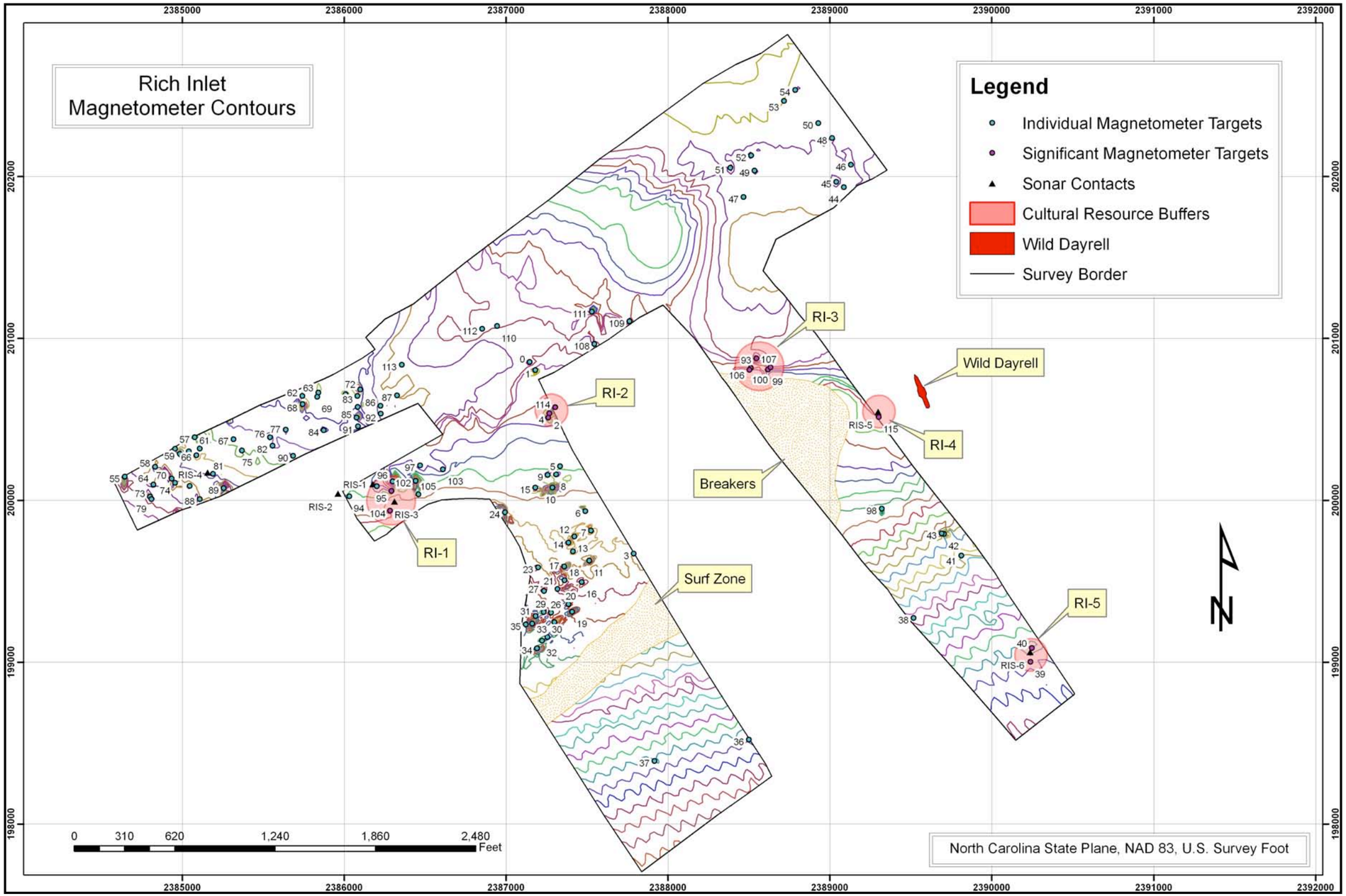

Figure 8. Magnetic contour map.

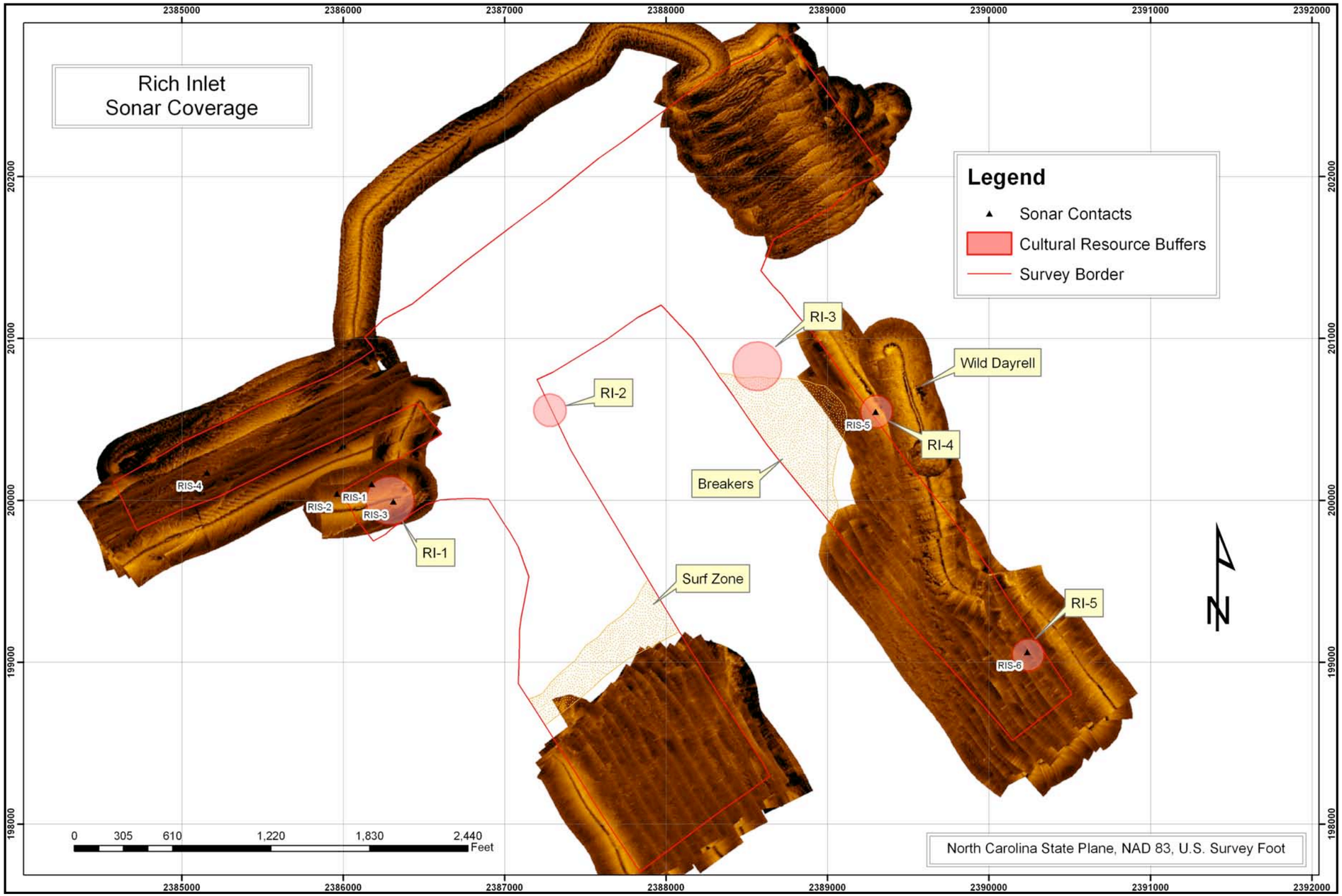

Figure 9. Sonar coverage map.

Conclusions and Recommendations

Development in the immediate vicinity of Rich Inlet is relatively modern and closely associated with Figure Eight Island. Because channels associated with Rich Inlet were limited in terms of both depth and access to habitable areas on the adjacent coast, navigation in the inlet has historically been limited. With the exception of very small craft, larger vessel traffic has been almost entirely associated with the consequences of mechanical disaster, war and weather. Documented wrecks in Rich Inlet or in the immediate vicinity have all been a result of one or more of those factors. While there are at least 5 documented wrecks in the vicinity of the proposed borrow area only one, *Wild Dayrell*, has been identified to date. The anomaly concentrations identified for avoidance or additional investigation could be associated with other documented wrecks.

The remote-sensing survey identified a total of 116 individual magnetic targets and 6 sonar targets (Appendix B and C). Five anomalies, composed of 13 individual magnetic targets and 3 associated sonar targets, contain signature characteristics suggestive of potentially significant cultural material. These five anomalies are recommended for avoidance. Should avoidance prove impossible, additional investigation designed to fully assess each anomaly's historical and archaeological significance in terms of NRHP eligibility is recommended. The remaining 103 and three associated sonar targets are indicative of modern debris such as traps, anchors, pipe, rebar, and small cable. No avoidance or additional investigation of these 103 individual magnetic targets is recommended in conjunction with the proposed project.

As there are no data for the two inaccessible areas, dredging operations in both locations should be carefully monitored for contact with submerged cultural resources. In the event that historic vessel material is identified, dredging should be shifted away from the material until an assessment of its NRHP eligibility can be made by archaeologists under contract to CPE-NC and personnel from the UAB at Fort Fisher.

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Appendix A

Known wrecks in the vicinity of Rich Inlet, North Carolina

Vessel	Type	Use	Date of Loss	Location	Disposition
Abdel Kader	schooner	coast trade-naval stores	September 1857	25/30 miles N of New Inlet	
Wild Dayrell	paddle steamer	blockade runner	February 1864	South of Figure Eight Island	
Unknown	schooner	lumber	April 1877	Near Rich Inlet	total loss
Elizabeth	steam yacht		March 1879	Rich Inlet	caught fire/total loss
Unknown	aircraft	U.S. Army	WWII	Ocean off Figure Eight Island	crashed & sunk
Unknown	Thunderbolt ? aircraft	U.S. Army	WWII	Dunes on Figure Eight Island	wreckage visible for several years
Unknown	dredge			South end of Figure Eight Island	
Unknown	wooden			South of Rich Inlet-521 Beach Rd N	remains of keel
Unknown	wooden			Near Don Cameron home	washed ashore during 1984 hurricane
Unknown	houseboat	pleasure	September 1984	Figure Eight Island marina	sank during hurricane
Unknown	Wooden			southern bank of Mason Inlet	appeared after hurricane

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Appendix B

Magnetic Target List
(All coordinates North Carolina State Plane, NAD 83, U.S. Survey Foot)

Anomaly	Map Designation	Characteristics	X	Y	Sonar	Recommendations
RI-1	101	3-1-mc12g167f	2386290.7	200057.5	RIS-3	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Sonar image suggestive of possible ballast. Avoidance by the creation of a 150-foot radius buffer is recommended.
	104	4-1-mc39g123f	2386282.2	199935.2	RIS-3	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Sonar image suggestive of possible ballast. Avoidance by the creation of a 150-foot radius buffer is recommended.
RI-2	2	27-1-nm51g149f	2387266.3	200536.7	No	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Avoidance by the creation of a 100-foot radius buffer is recommended.
	4	26-1-mc67g114f	2387260.5	200510.0	No	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Avoidance by the creation of a 100-foot radius buffer is recommended.
	114	28-3-nm98g147f	2387302.6	200575.0	No	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Avoidance by the creation of a 100-foot radius buffer is recommended.
RI-3	93	1-1-pm24g67f	2388545.7	200876.5	No	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Avoidance by the creation of a 150-foot radius buffer is recommended.

RI-3, cont'd	99	2-2-nm5g33f	2388617.3	200807.1	No	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Avoidance by the creation of a 150-foot radius buffer is recommended.
	100	2-3-nm8g68f	2388512.3	200817.0	No	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Avoidance by the creation of a 150-foot radius buffer is recommended.
	106	9-1-mc5g134f	2388502.2	200805.3	No	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Avoidance by the creation of a 150-foot radius buffer is recommended.
	107	9-2-nm5g40f	2388633.0	200821.1	No	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Avoidance by the creation of a 150-foot radius buffer is recommended.
RI-4	115	14-1-pm4g24f	2389302.0	200513.9	RIS-5	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Sonar image suggestive of possible disarticulated structure from the *Wild Dayrell*. Avoidance by the creation of a 100-foot radius buffer is recommended.
RI-5	39	11-1-dp4g89f	2390239.3	199000.4	RIS-6	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Sonar image suggestive of possible disarticulated structure. Avoidance by the creation of a 100-foot radius buffer is recommended.
	40	12-1-dp10g75f	2390248.4	199086.1	RIS-6	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Sonar image suggestive of possible disarticulated structure. Avoidance by the creation of a 100-foot radius buffer is recommended.

Individual Magnetic Targets

Map Designation	Name	X	Y	Sonar	Recommendations
0	28-1-nm24g62f	2387145.7	200853.4	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
1	28-2-nm16g58f	2387179.8	200803.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
3	27-2-dp9g34f	2387787.4	199670.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
5	25-1-mc28g52f	2387332.4	200208.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
6	25-2-mc124g127f	2387488.9	199931.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
7	24-1-mc26g72f	2387523.1	199811.6	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
8	24-2-pm18g55f	2387307.7	200158.6	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
9	23-1-dp51g26f	2387256.1	200155.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
10	23-2-dp425g22f	2387286.4	200076.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
11	22-1-mc101g61f	2387513.8	199626.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
12	22-2-dp38g27f	2387421.0	199775.4	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
13	21-1-mc111g30f	2387413.2	199684.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
14	21-2-mc122g44f	2387384.3	199737.5	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
15	21-3-mc52g62f	2387179.4	200076.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
16	20-1-mc85g49f	2387467.0	199494.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
17	19-1-nm67g67f	2387359.4	199589.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
18	18-1-mc31g203f	2387360.5	199504.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.

19	17-1-pm69g23f	2387408.1	199310.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
20	17-2-dp41g41f	2387384.8	199357.5	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
21	17-3-nm23g19f	2387317.8	199451.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
22	16-1-pm23g36f	2387331.1	199368.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
23	16-2-dp23g32f	2387197.7	199584.5	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
24	16-3-mc101g288f	2386991.5	199924.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
25	15-1-mc72g50f	2387297.1	199245.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
26	15-2-mc24g23f	2387277.7	199305.3	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
27	15-3-mc19g41f	2387233.0	199438.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
28	14-1-mc84g28f	2387301.9	199179.3	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
29	14-2-mc60g98f	2387231.6	199308.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
30	13-3-mc56g53f	2387254.2	199153.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
31	13-2-mc35g99f	2387182.3	199283.8	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
32	12-1-mc78g30f	2387222.0	199131.4	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
33	12-2-dp177g36f	2387160.0	199237.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
34	11-1-mc178g40f	2387190.2	199084.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
35	11-2-pm75g17f	2387120.6	199232.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
36	28-1-mc4g67f	2388499.6	198520.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
37	16-1-dp3g45f	2387916.5	198388.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.

38	3-1-dp3g41f	2389517.0	199272.3	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
41	12-2-pm5g26f	2389812.6	199656.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
42	12-3-dp61g109f	2389703.7	199790.8	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
43	16-1-pm8g66f	2389689.9	199795.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
44	29-1-pm4g138f	2389085.5	201933.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
45	28-1-nm8g83f	2389040.1	201966.3	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
46	27-1-pm3g74f	2389129.1	202072.5	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
47	24-1-pm5g29f	2388466.2	201872.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
48	23-1-pm4g41f	2389013.9	202237.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
49	22-1-nm8g31f	2388534.0	202035.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
50	21-1-nm4g59f	2388927.5	202329.6	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
51	20-1-nm14g50f	2388385.6	202053.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
52	20-2-mc8g64f	2388514.1	202129.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
53	16-1-dp4g111f	2388717.0	202466.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
54	15-1-dp6g107f	2388785.2	202534.8	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
55	2-1-pm22g45f	2384643.0	200144.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
56	2-3-pm3g58f	2384954.3	200316.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
57	2-4-pm9g26f	2385076.3	200387.8	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
58	3-1-mc14g55+f	2384830.5	200205.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.

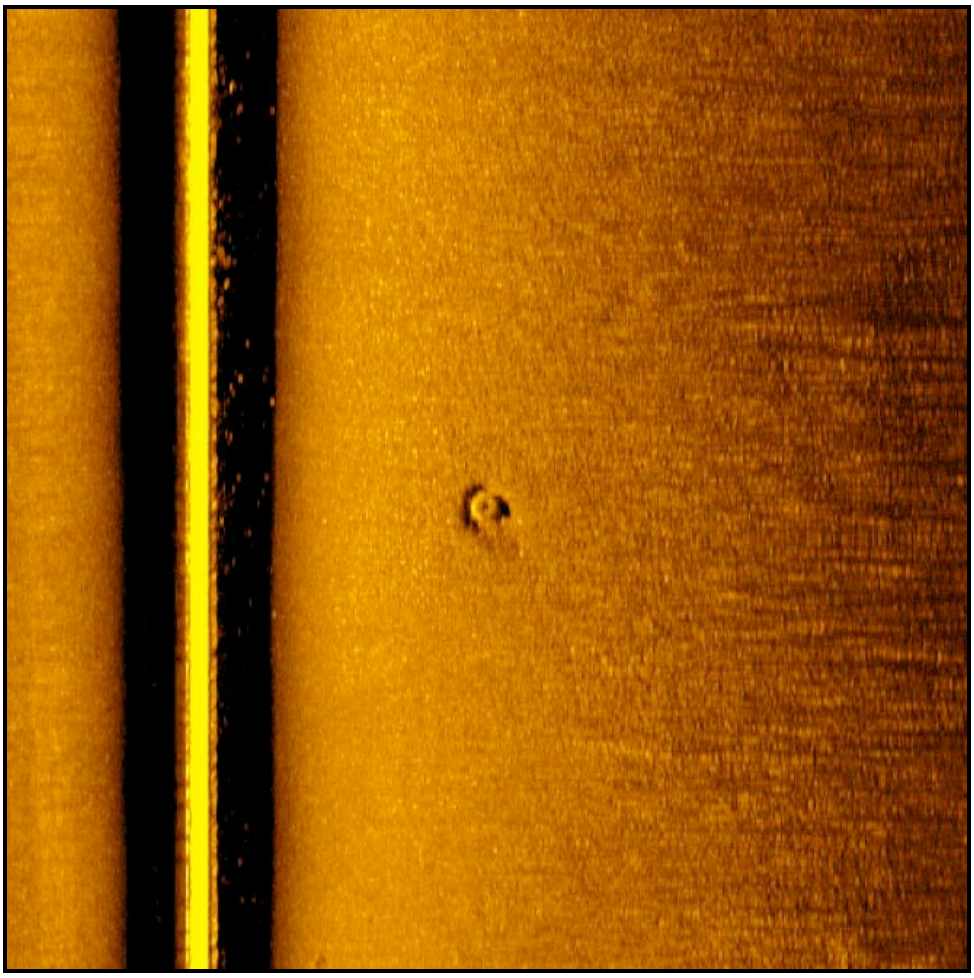
59	3-2-dp47g97f	2384982.9	200286.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
60	3-3-pm3g21f	2385039.9	200301.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
61	3-4-pm3g41f	2385106.8	200319.4	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
62	3-5-pm7g34f	2385741.0	200644.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
63	3-6-dp13g79f	2385839.1	200664.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
64	4-1-pm5g25f	2384820.4	200096.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
65	4-2-dp49g79f	2384892.6	200167.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
66	4-3-pm4g31f	2385086.1	200277.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
67	4-4-pm4g78f	2385315.4	200377.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
68	4-5-dp92g134f	2385741.7	200592.8	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
69	4-6-nm4g45f	2385832.7	200638.3	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
70	5-1-dp11g72f	2384932.4	200134.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
71	5-2-pm6g47f	2386007.3	200653.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
72	5-3-dp20g107f	2386098.8	200684.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
73	6-1-pm14g68f	2384799.1	200021.6	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
74	6-2-mc12g100f	2384954.1	200107.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
75	6-3-mc3g138f	2385366.5	200306.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
76	6-4-dp8g81f	2385540.2	200388.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
77	6-5-nm3g74f	2385637.5	200435.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.

78	6-6-mc2g113f	2386080.6	200642.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
79	7-1-pm6g78f	2384808.6	200005.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
80	7-2-dp5g58f	2385044.6	200087.5	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
81	7-3-pm4g60f	2385187.9	200162.7	RIS-4	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. Sonar confirms the presence of a crab trap. No additional investigation is recommended.
82	7-4-dp9g119f	2385555.9	200336.5	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
83	7-5-mc6g173f	2386082.7	200575.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
84	8-2-pm5g45f	2385873.0	200432.4	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
85	8-3-dp48g88f	2386075.9	200509.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
86	8-4-pm4g52f	2386223.7	200583.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
87	8-5-dp8g67f	2386326.2	200646.5	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
88	9-1-dp23g70f	2385107.5	200007.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
89	9-2-dp125g148f	2385254.7	200074.4	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
90	9-3-dp5g43f	2385683.3	200273.4	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
91	9-4-dp4g60f	2386084.8	200456.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
92	9-5-pm3g30f	2386225.3	200534.6	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
94	2-1-nm5g61f	2386029.6	200023.4	RIS-2	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. Sonar confirms the presence of modern debris. No additional investigation is recommended.
95	2-2-pm5g65f	2386200.1	200085.5	RIS-1	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. Sonar confirms the presence of a tire. No additional investigation is recommended.
96	2-3-dp70g159f	2386297.9	200116.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.

97	2-4-pm8g68f	2386468.3	200215.3	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
98	2-1-pm13g34f	2389320.5	199946.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
102	3-2-dp251g127f	2386440.6	200119.6	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
103	3-3-pm9g166f	2386609.1	200190.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
105	4-2-pm5g42f	2386458.3	200036.8	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
108	11-1-dp13g68f	2387544.5	200964.4	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
109	13-1-nm23g110f	2387761.4	201106.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
110	16-1-pm4g58f	2386943.8	201075.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
111	16-1-nm25g43f	2387529.4	201164.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
112	17-1-pm4g73f	2386852.5	201058.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
113	18-1-dp3g87f	2386354.5	200835.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.

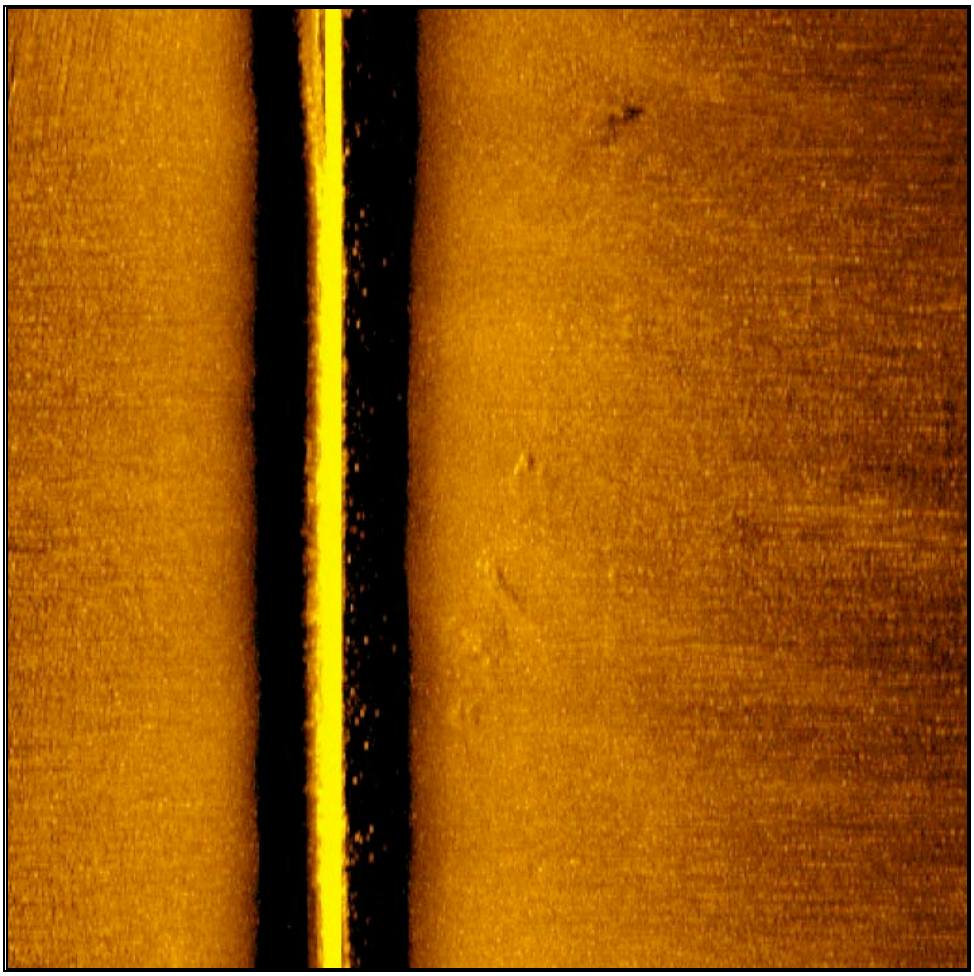
Appendix C
Sonar Targets

RIS-1



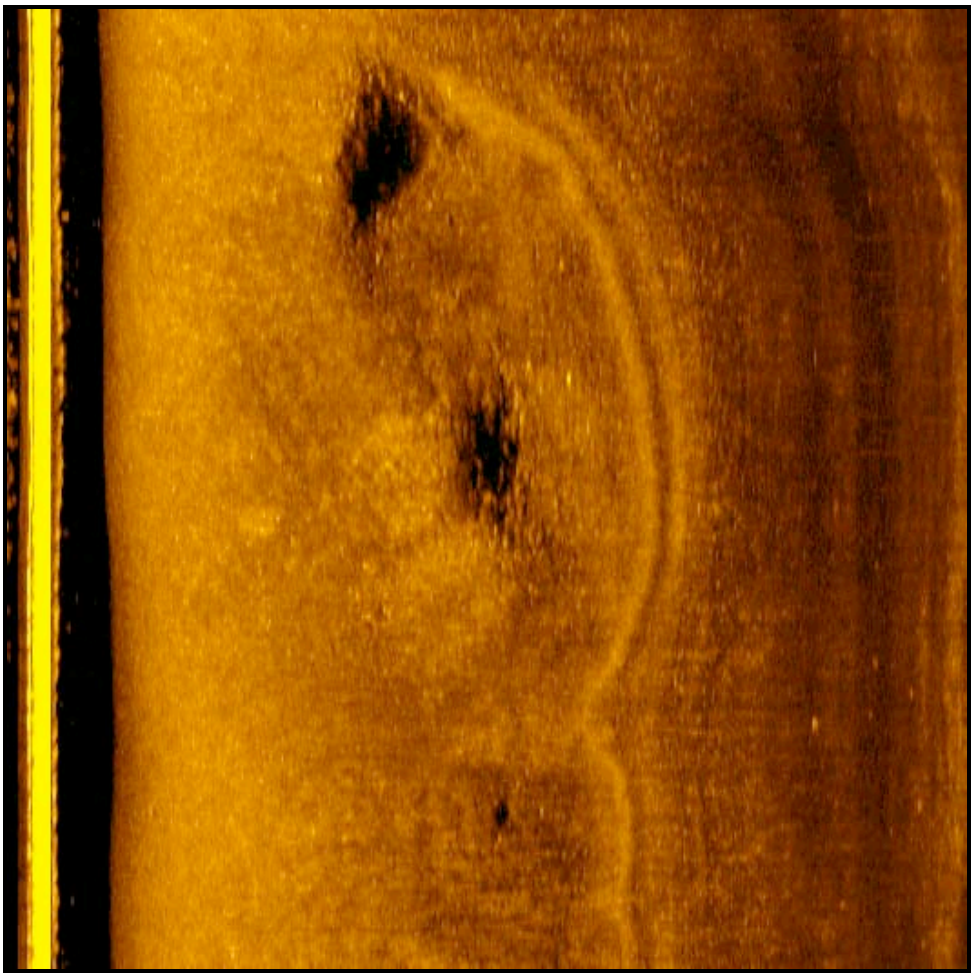
Contact Info: RIS-1	User Entered Info
• Sonar Time at Target: 03/08/2010 21:08:19 • Click Position (Projected Coordinates) (X) 2386175.50 (Y) 200099.91 • Map Proj: NAD83 North Carolina State Planes, US Foot • Acoustic Source File: RI10_L12-4_100308160900.xtf • Ping Number: 238760 • Range to Target: 14.84 US Feet • Fish Height: 3.71 US Feet • Line Name: RI10_L12-4_100308160900	Target Height: 0.5 US Feet Target Length: 5.0 US Feet Target Shadow: 2.0 US Feet Target Width: 5.0 US Feet Mag Anomaly: 95 Avoidance: No Description: Tire

RIS-2



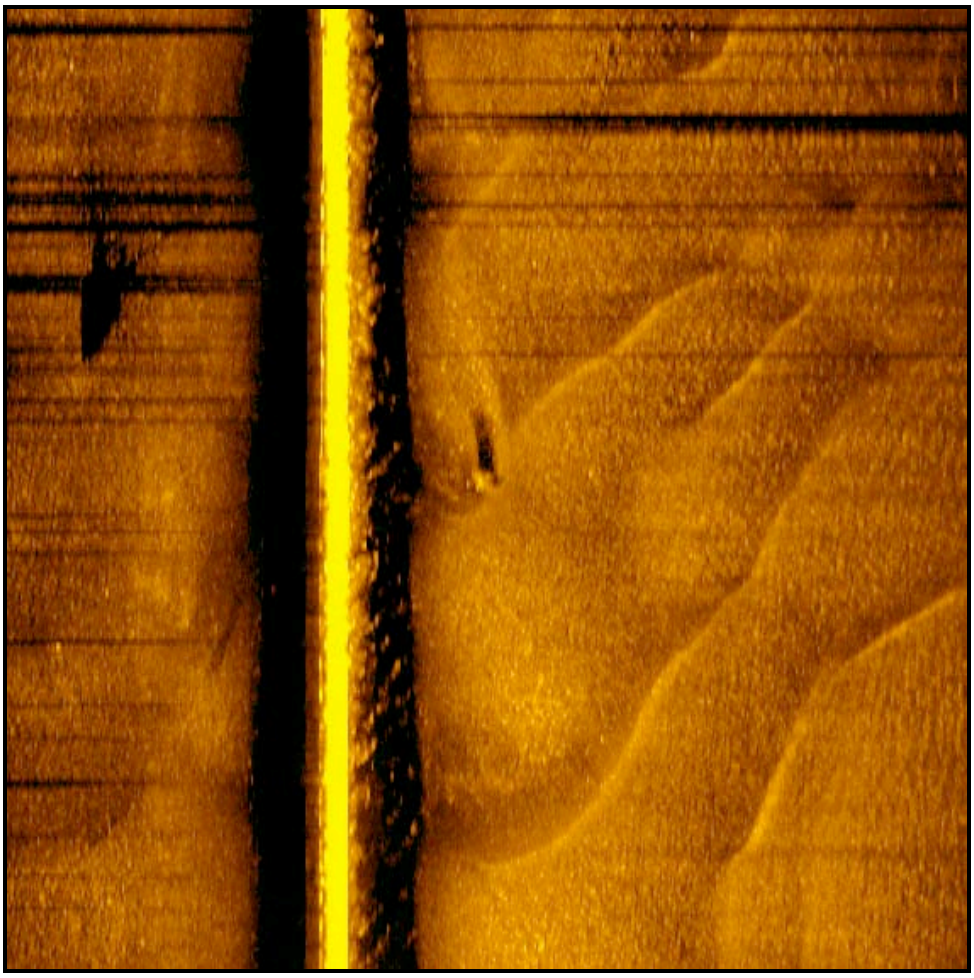
Contact Info: RIS-2	User Entered Info
• Sonar Time at Target: 03/08/2010 21:08:48 • Click Position (Projected Coordinates) (X) 2385961.25 (Y) 200041.34 • Map Proj: NAD83 North Carolina State Planes, US Foot • Acoustic Source File: RI10_L12-4_100308160900.xtf • Ping Number: 239185 • Range to Target: 7.91 US Feet • Fish Height: 3.81 US Feet • Line Name: RI10_L12-4_100308160900	Target Height: N/A Target Length: N/A Target Shadow: N/At Target Width: N/A Mag Anomaly: 94 Avoidance: No Description: Modern Debris

RIS-3



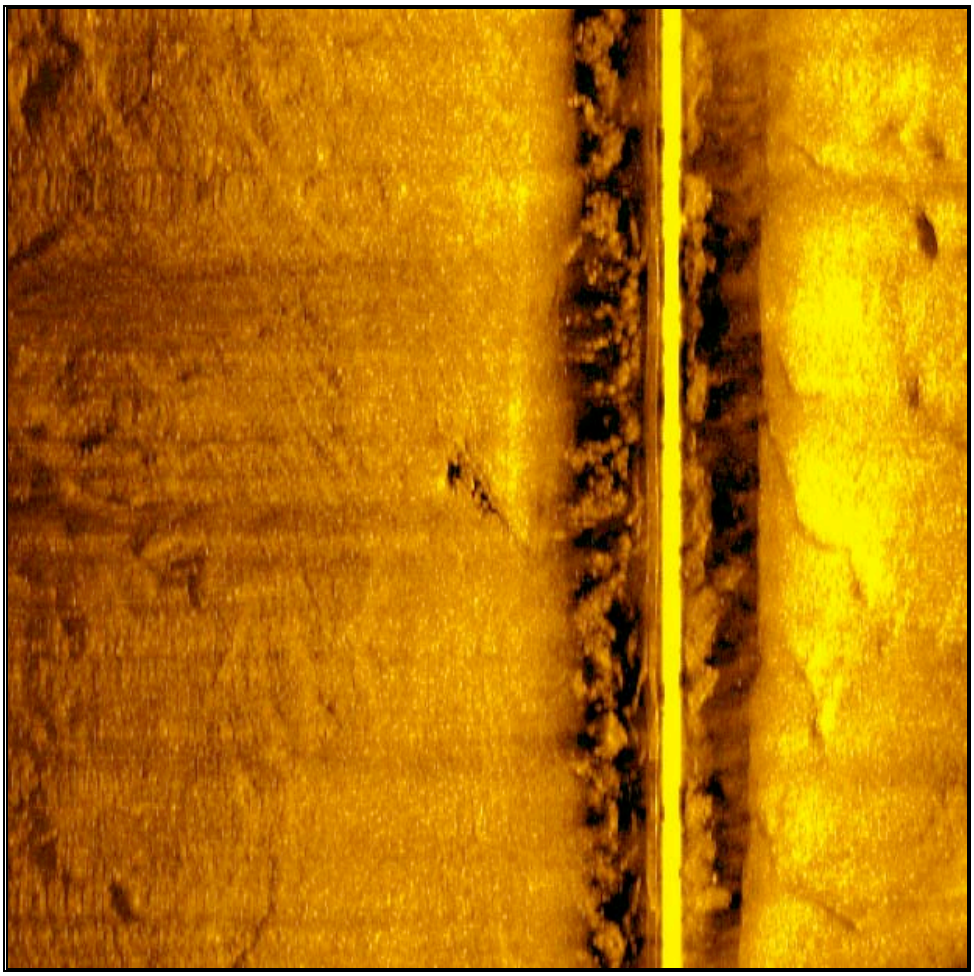
Contact Info: RIS-3	User Entered Info
• Sonar Time at Target: 03/08/2010 21:09:53 • Click Position (Projected Coordinates) (X) 2386309.75 (Y) 199992.81 • Map Proj: NAD83 North Carolina State Planes, US Foot • Acoustic Source File: RI10_L12-4_100308160900.xtf • Ping Number: 240148 • Range to Target: 23.05 US Feet • Fish Height: 3.32 US Feet • Line Name: RI10_L12-4_100308160900	Target Height: 1.9 US Feet Target Length: 69.7 US Feet Target Shadow: 16.2 US Feet Target Width: 23.5 US Feet Mag Anomaly: 101, 104, RI-1 Avoidance: Yes Description: Depression with possible ballast

RIS-4



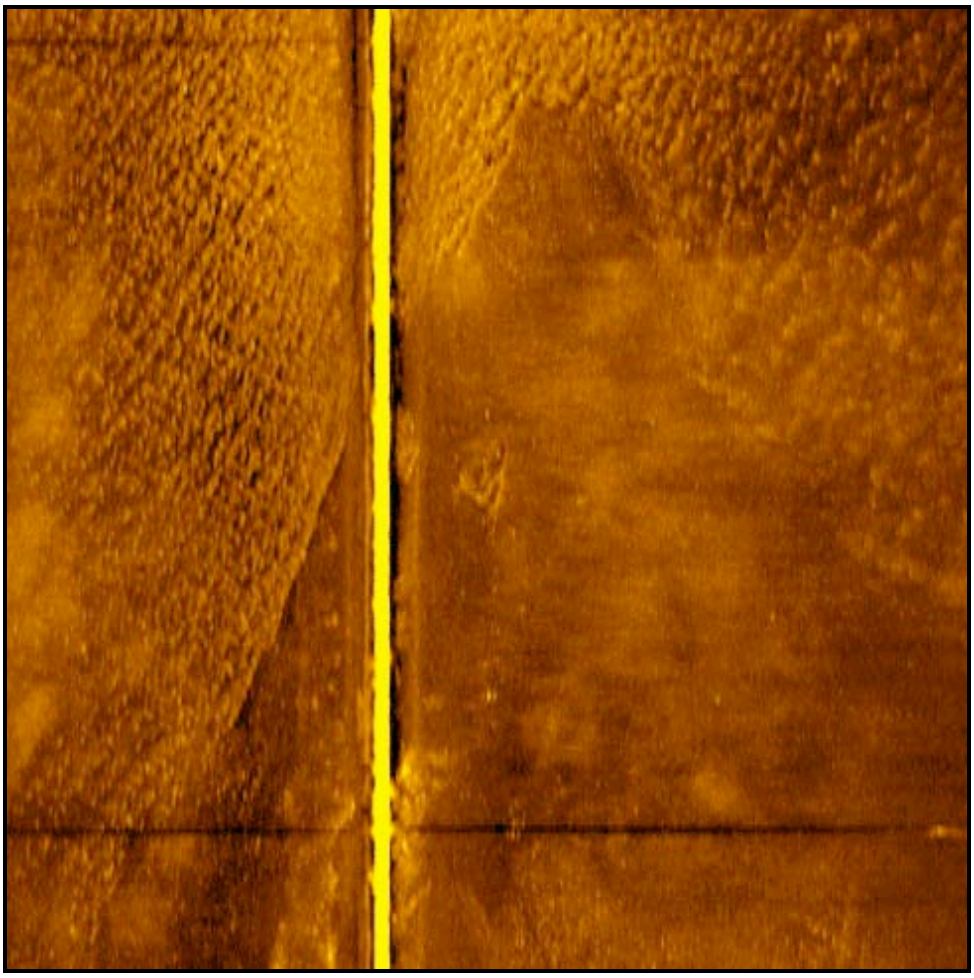
Contact Info: RIS-4	User Entered Info
• Sonar Time at Target: 03/08/2010 20:40:24 • Click Position (Projected Coordinates) (X) 2385155.75 (Y) 200171.19 • Map Proj: NAD83 North Carolina State Planes, US Foot • Acoustic Source File: RI10_L7-4_100308154000.xtf • Ping Number: 213590 • Range to Target: 6.17 US Feet • Fish Height: 3.52 US Feet • Line Name: RI10_L7-4_100308154000	Target Height: 0.0 US Feet Target Length: 1.9 US Feet Target Shadow: 0.0 US Feet Target Width: 1.9 US Feet Mag Anomaly: 81 Avoidance: No Description: Trap

RIS-5



Contact Info: RIS-5	User Entered Info
• Sonar Time at Target: 03/08/2010 18:57:07 • Click Position (Projected Coordinates) (X) 2389298.50 (Y) 200546.31 • Map Proj: NAD83 North Carolina State Planes, US Foot • Acoustic Source File: RI10_L01-2_100308135800.xtf • Ping Number: 104449 • Range to Target: 9.67 US Feet • Fish Height: 4.39 US Feet • Line Name: RI10_L01-2_100308135800	Target Height: 1.3 US Feet Target Length: 22.0 US Feet Target Shadow: 3.2 US Feet Target Width: 6.0 US Feet Mag Anomaly: 115, RI-4 Avoidance: Yes Description: Possible structure associated with the *Wild Dayrell*

RIS-6



Contact Info: RIS-6	User Entered Info
• Sonar Time at Target: 03/08/2010 18:44:35 • Click Position (Projected Coordinates) (X) 2390237.25 (Y) 199061.88 • Map Proj: NAD83 North Carolina State Planes, US Foot • Acoustic Source File: RI10_L01-2_100308134600.xtf • Ping Number: 93346 • Range to Target: 5.47 US Feet • Fish Height: 1.46 US Feet • Line Name: RI10_L01-2_100308134600	Target Height: 0.0 US Feet Target Length: 17.4 US Feet Target Shadow: 0.0 US Feet Target Width: 8.9 US Feet Mag Anomaly: 39, 40, RI-6 Avoidance: Yes Description: Possible structure

APPENDIX D
GEOTECHNICAL REPORT

FIGURE EIGHT ISLAND, NORTH CAROLINA
INLET AND SHORELINE MANAGEMENT PROJECT

APPENDIX OVERVIEW

Introduction: An investigation of Rich Inlet and the associated ebb and flood tidal deltas was conducted in an effort to qualitatively and quantitatively evaluate sand resources for Figure Eight Island. These appendices contain the results from geotechnical field investigations and analysis of the resulting sand samples. The results of these investigations are provided in vibracore logs, jet probe logs, photographs, composite summary tables, grain size distribution curves/ histograms, and granularmetric reports. Thirty (30) vibracores were collected and sixteen (16) jet probes were advanced during the investigations. In addition the contract scope of services and two reports from cultural resource investigations conducted in support of the geotech investigation are included.

1) Scope of Services
The final scope of services for sand search investigations of Rich Inlet included, which were included in the original contract between CPENC and the Figure Eight Island Homeowners Association dated 18 July 2006 is provided in this appendix.

2) Scope of Services (Vibracore Addendum)
The final scope of services for the addendum to the 18 July 2006 contract, which included the collection and analysis of ten (10) additional vibracores is provided in this appendix.

3) Scope of Services (Cultural Resource Survey)
The final scope of services for a cultural resource survey of the Alternative 3 and 5 channel corridors and the corridor in which a terminal groin is propose under Alternative 5, is provided in this appendix.

4) Cultural Resource Investigation: Location of the Remains of the *Wild Dayrell* in Rich Inlet
This appendix includes the final report prepared by TAR detailing the results and conclusions of a survey to determine the location of the remains of the *Wild Dayrell*.

5) Cultural Resource Investigation: Terrestrial and Submerged Cultural Resource Survey Rich Inlet, Figure Eight Island, North Carolina
This appendix includes the final report prepared by TAR detailing the results and conclusions of a survey to determine the presence of any cultural resources within the proposed channel corridors associated with Alternative 3 and 5.

6) 2007 Hutaff Island Native Beach Composite Summary Tables
A series of summary tables are presented in this appendix. These tables are used to calculate and summarize composite data. Composite calculations are based on native beach samples collected along the southwestern half of Hutaff Island by CPENC in March and September 2007. Samples were collected along three (3) shore-perpendicular transects from the dune to approximately -20 ft. NAVD 88 along the Island. These samples were collected according to beach fill

compatibility standards implemented by the North Carolina Division of Coastal Management (15A NCAC 07H .0312). Sample locations along each transect are referenced to NAVD 88 and include: dune, dune toe, mid-berm, area between +3.0' and +2.0', MHW, MTL, MLW, -6', -8.8', -11.6', -14.4', -17.2', and -20'. An average of samples collected along each transect was calculated, producing the transect composite. An average of samples collected at each sample elevation was calculated producing elevation composites. The transect composites were then averaged to calculate the total native beach composite.

Five table types were produced to display this data. The *Transect Composite Summary* table is a summary of key grain size data for all of the composites. The *Transect Composite Data* table shows the composite data for the composite beach and the supporting composite profile line data used to calculate the composite beach. The *Transect Cumulative Percents and Computed Composite Distribution* table shows the percent retained on all sieves for the individual samples used to create transect composites. The *Elevation Cumulative Percents and Computed Composite Distribution* table shows the percent retained on all sieves for the individual samples used to create elevation composites. The *Percentage of Material by Sediment Grain Size Category* table shows the percent of material in each of the four grain size categories (fine, sand, granular and gravel) as defined by the North Carolina State Technical Standards outlined in 15A NCAC 07H .0312.

7) 2007 Hutaff Island Native Beach Individual Grab Sample Granularmetric Reports

This appendix contains individual granularmetric reports for each of the 39 grab samples collected along Hutaff Island during the 2007 Native Beach Characterization completed by CPENC.

8) 2007 Hutaff Island Native Beach Individual Grab Sample Grain Size Distribution Curves/Histograms (Digital Copy Only)

This appendix contains individual gradation grain size distribution curves/histograms for each of the 39 grab samples collected along Hutaff Island during the 2007 Native Beach Characterization completed by CPENC.

9) 2007 Hutaff Island Native Beach Composite Grab Sample Granularmetric Reports

Composite granularmetric reports, corresponding to data presented in the tables in Appendix 6, are included here. Granularmetric reports are presented for each transect and the total native beach.

10) 2007 Hutaff Island Native Beach Composite Grab Sample Grain Size Distribution Curves/Histograms

Composite grain size distribution curves and histograms of the data presented in the Appendix 6 tables are included here. Curves and histograms are presented for each transect and the total native beach.

11) 2007 Figure Eight Island Native Beach Composite Summary Tables

A series of summary tables are presented in this appendix. These tables are used to calculate and summarize composite data. Composite calculations are based on native beach samples collected along Figure Eight Island by CPENC in March and September 2007. Samples were collected

along four (4) shore-perpendicular transects from the dune to approximately -20 ft. NAVD 88 along Figure Eight Island. These samples were collected according to beach fill compatibility standards implemented by the North Carolina Division of Coastal Management (15A NCAC 07H .0312). Sample locations along each transect are referenced to NAVD 88 and include: dune, dune toe, mid-berm, area between +3.0' and +2.0', MHW, MTL, MLW, -6', -8.8', -11.6', -14.4', -17.2', and -20'. An average of samples collected along each transect was calculated, producing the transect composite. An average of samples collected at each sample elevation was calculated producing elevation composites. The transect composites were then averaged to calculate the total native beach composite.

Five table types were produced to display this data. The *Transect Composite Summary* table is a summary of key grain size data for all of the composites. The *Transect Composite Data* table shows the composite data for the composite beach and the supporting composite profile line data used to calculate the composite beach. The *Transect Cumulative Percents and Computed Composite Distribution* table shows the percent retained on all sieves for the individual samples used to create transect composites. The *Elevation Cumulative Percents and Computed Composite Distribution* table shows the percent retained on all sieves for the individual samples used to create elevation composites. The *Percentage of Material by Sediment Grain Size Category* table shows the percent of material in each of the four grain size categories (fine, sand, granular and gravel) as defined by the North Carolina State Technical Standards outlined in 15A NCAC 07H .0312.

12) 2007 Figure Eight Island Native Beach Individual Grab Sample Granularmetric Reports

This appendix contains individual granularmetric reports for each of the 52 grab samples collected along Figure Eight Island during the 2007 Native Beach Characterization completed by CPENC.

13) 2007 Figure Eight Island Native Beach Individual Grab Sample Grain Size Distribution Curves/Histograms

This appendix contains individual gradation grain size distribution curves/histograms for each of the 52 grab samples collected along Figure Eight Island during the 2007 Native Beach Characterization completed by CPENC.

14) 2007 Figure Eight Island Native Beach Composite Grab Sample Granularmetric Reports

Composite granularmetric reports, corresponding to data presented in the tables in Appendix 11, are included here. Granularmetric reports are presented for each transect and the total native beach.

15) 2007 Figure Eight Island Native Beach Composite Grab Sample Grain Size Distribution Curves/Histograms

Composite grain size distribution curves and histograms of the data presented in the Appendix 11 tables are included here. Curves and histograms are presented for each transect and the total native beach.

16) 2007 CPENC Jet Probe Logs

Sixteen (16) jet probes were advanced by CPENC in February 2007 within the project area. Geologists who are proficient in SCUBA diving, operate the jet probe by penetrating a graduated 7 m water pressure pipe into the ocean bottom and making observations as it passes through the sediment layers. The geologist is on the bottom and the support diver stays at the upper end of the probe to hold it upright against the current. The geologist on the bottom observes the graduated scale on the probe and by the "feel" of the objects it encounters, makes mental notes of the depths of each change in texture, which are afterwards incorporated into the field logs presented in this appendix.

17) 2007 CPENC Vibracore Logs

A total of 20 vibracores were collected by CPENC in March 2007 during geotechnical investigations within the project area. Laboratory and descriptive information for each vibracore is presented on the log sheets. Unified Soils Classification terminology is used in the core layer descriptions and key grain size information (mean grain size, fines content and sorting) for each vibracore sample is presented under the *Remarks* column. Multiple layer intervals are sometimes represented by a single sample. The *Sample Number* column is used to identify the specific sample that represents a specific layer.

18) 2007 CPENC Vibracore Photographs

Vibracores collected in 2007 were photographed in 2.0 ft. intervals. The photographs are included in this appendix.

19) 2007 CPENC Individual Vibracore Granularmetric Reports

This appendix contains individual granularmetric reports for each of the 78 vibracore samples collected during the 2007 sand search investigation within Rich Inlet and the associated ebb and flood tidal deltas.

20) 2007 CPENC Individual Vibracore Grain Size Distribution Curves/Histograms

This appendix contains individual gradation grain size distribution curves/histograms for each of the 78 vibracore samples collected during the 2007 sand search investigation within Rich Inlet and the associated ebb and flood tidal deltas.

21) 2008 CPENC Vibracore Logs

A total of 10 vibracores were collected by CPENC between 6 October and 7 November 2008 during additional geotechnical investigations within the project area. Laboratory and descriptive information for each vibracore is presented on the log sheets. Unified Soils Classification terminology is used in the core layer descriptions and key grain size information (mean grain size, fines content and sorting) for each vibracore sample is presented under the *Remarks* column. Multiple layer intervals are sometimes represented by a single sample. The *Sample Number* column is used to identify the specific sample that represents a specific layer.

22) 2008 CPENC Vibracore Photographs

Vibracores collected in 2008 were photographed in 2.0 ft. intervals. The photographs are included in this appendix.

23) 2008 CPENC Individual Vibracore Granularmetric Reports

This appendix contains individual granularmetric reports for each of the 50 vibracore samples collected during the 2008 vibracore investigation within Rich Inlet and the associated ebb and flood tidal deltas.

24) 2008 CPENC Individual Vibracore Grain Size Distribution Curves/Histograms

This appendix contains individual gradation grain size distribution curves/histograms for each of the 50 vibracore samples collected during the 2008 vibracore investigation within Rich Inlet and the associated ebb and flood tidal deltas.

25) Native Beach Table of Results for Survey to Quantify Clasts Greater Than Three (3) Inches

The North Carolina Technical Standards for Beach Fill Material outlined in 15A NCAC 07H.0312 state "the total number of sediments and shell material greater than three (3) inches in diameter, observable on the surface of the beach between mean low water (MLW) and the dune toe shall be calculated for an area of 50,000 square feet within the beach fill project boundaries." On 10 July 2008, CPENC conducted a survey to quantify clasts greater than three (3) inches within an area in the vicinity of 402 N. Beach Rd. The dimensions of the survey area were approximately 200 ft. along the beach and 250 ft. across the beach from the toe of dune to the MLW Line. The survey area was divided into 500 boxes measuring approximately ten (10) ft. by ten (10) ft., and clasts greater than three (3) in. were counted within each of the boxes. The table in this appendix contains the results of the survey as well as the coordinates defining the surveyed area.

26) Alternative 3 Channel Corridor Composite Summary Tables

A series of summary tables are presented in this appendix. These tables are used to calculate and summarize composite data for the proposed channel corridor for Alternative 3. Composite calculations are based on select beach quality samples from the 2007 and 2008 CPENC vibracores, presented in appendices 17, 19, 20, 21, 23, and 24. An average of beach quality layers, weighted by effective length, was calculated for each vibracore, producing the vibracore composite. The vibracore composites were averaged and weighted by effective length to calculate the borrow area composite.

Four table types were produced to display this data. The *Composite Summary* table is a summary of key grain size data for all of the composites. The *Composite Data* table shows the composite data for the borrow area and the supporting composite vibracore data used to calculate the borrow area composite. The *Cumulative Percents and Computed Composite Distribution* table shows the weighted average percent retained on all sieves for the individual samples used to create vibracore composites. The *Percentage of Material by Sediment Grain Size Category* table shows the percent of material in each of the four grain size categories (fine, sand, granular and gravel) as defined by the North Carolina State Technical Standards outlined in 15A NCAC 07H .0312.

27) Alternative 3 Channel Corridor Composite Vibracore Granularmetric Reports

Composite granularmetric reports, corresponding to data presented in the tables in Appendix 26, are included here. Granularmetric reports are presented for the Channel Corridor and each vibracore.

28) Alternative 3 Channel Corridor Composite Vibracore Grain Size Distribution Curves/Histograms

Composite grain size distribution curves and histograms of the data presented in the Appendix 26 tables are included here. Curves and histograms are presented for the Channel Corridor and each vibracore.

29) Alternative 5 Channel Corridor Composite Summary Tables

A series of summary tables are presented in this appendix. These tables are used to calculate and summarize composite data for the proposed channel corridor for Alternative 5. Composite calculations are based on select beach quality samples from the 2007 and 2008 CPENC vibracores, presented in appendices 17, 19, 20, 21, 23, and 24. An average of beach quality layers, weighted by effective length, was calculated for each vibracore, producing the vibracore composite. The vibracore composites were averaged and weighted by effective length to calculate the borrow area composite.

Four table types were produced to display this data. The *Composite Summary* table is a summary of key grain size data for all of the composites. The *Composite Data* table shows the composite data for the borrow area and the supporting composite vibracore data used to calculate the borrow area composite. The *Cumulative Percents and Computed Composite Distribution* table shows the weighted average percent retained on all sieves for the individual samples used to create vibracore composites. The *Percentage of Material by Sediment Grain Size Category* table shows the percent of material in each of the four grain size categories (fine, sand, granular and gravel) as defined by the North Carolina State Technical Standards outlined in 15A NCAC 07H .0312.

30) Alternative 5 Channel Corridor Composite Vibracore Granularmetric Reports

Composite granularmetric reports, corresponding to data presented in the tables in Appendix 29, are included here. Granularmetric reports are presented for the Channel Corridor and each vibracore.

31) Alternative 5 Channel Corridor Composite Vibracore Grain Size Distribution Curves/Histograms

Composite grain size distribution curves and histograms of the data presented in the Appendix 29 tables are included here. Curves and histograms are presented for the Channel Corridor and each vibracore.

APPENDIX 1
Scope of Services

TASK 2 - GEOTECHNICAL INVESTIGATIONS

CPE will utilize the following methodology to conduct reconnaissance and comprehensive geotechnical investigations of the Rich Inlet complex including the inlet throat, flood tidal delta, ebb tidal delta, and feeder channels (Nixon Channel and Green Channel), to identify and map the quality and quantity of sand to be placed on the northern end of Figure Eight Island, North Carolina. The proposed sand search, to be performed by the CPE coastal geology team, will be completed in two phases, which will include:

- Phase I – Research and Planning
- Phase II - Jet Probes and Vibracores
  - (1) Jetprobe Collection and Analysis
  - (2) Vibracore Planning/Meeting with ASSOCIATION
  - (3) Vibracore Collection and Analysis
  - (4) Sediment compatibility evaluation
  - (5) Cultural resources study and borrow area design refinement

A. Phase I – Research and Planning

This phase includes an analysis of existing geotechnical literature, geophysical data, and hydrographic survey data obtained by previous consultants, surveyors, universities and governmental agencies. Historical photographs of the inlet will be analyzed to determine the historic, preferred channel alignment (see Task 1.B). The GIS will be used in planning the geotechnical investigation, in the execution of the investigation, and in the mapping of the sand resources.

B. Phase II – Jet Probes and Vibracores

1. Jet probes: Jet probes are used as a cost efficient way to perform broad reconnaissance level ground truthing in order to limit the number of more costly vibracores. CPE proposes to use jet probes to provide preliminary qualitative information of the sediment contained in the feeder channels (Nixon Channel and Green Channel) and the ebb tide delta of Rich Inlet. Jet probes utilize a water pump to jet a graduated PVC pipe into the sediment. During the course of the probe, a CPE diver/geologist observes the material that is flowing out of the hole in the seafloor. Samples of the material will be obtained for grain size analysis and logs of the material will be prepared. CPE proposes to spend three (3) days taking reconnaissance jet probes.

2. Vibracore Planning: A meeting will be held with ASSOCIATION staff to review results and recommendations from Phase I work. Areas suspected of containing good quality and sufficient quantity of sand resources within the preferred channel realignment corridor will be targeted for vibracoring. Nevertheless, CPE does not warrant that beach compatible sand, acceptable to State and Federal regulators, will be obtained from the

planned vibracores. Proposed vibracores will be located on the GIS to refine core placement in relation to legacy data.

3. Vibracore Collection and Analysis: A vibracore is a continuous undisturbed sample of material taken in a vibrating tube that is inserted into the bottom of the channel. It is estimated that approximately 20 cores (up to 20 ft. long) will be required to define the quality and quantity of material in the final channel re-location corridor and sand source area. Throughout the collection of the vibracores in the field, the team of CPE Geologists will closely monitor the material collected in the cores. When possible, cores will be split aboard the vessel to assure the most efficient placement of the vibracores as required.

The vibracores will be returned to CPE for additional logging and mechanical sieve analysis of sand samples taken from the cores. A core log will be prepared for each core describing the sediments by layers. Grain size analyses will be performed on approximately three to five sediment samples per core. Sub-samples will be obtained from distinct layers in the sediment record, or periodically through the core record. Grain size analysis will be conducted in accordance with the American Society for Testing and Materials (ASTM), Standard Material Designation D422-63 for partial size analysis of soils. Grain-size frequency distribution curves and textural statistical parameters will be developed for each vibracore sample.

4. Sediment Compatibility Evaluation: Sand resources in the Rich Inlet complex will be evaluated for compatibility with the native beach sand. The compatibility analysis will focus on the comparison of the mean grain sizes and provide the basis for determining how the dredged material will perform as beach fill. The sand will also be evaluated based on State and Federal guidelines for allowable quantities of silt, shell and rock. The inlet excavation area will also be evaluated for dredging feasibility and costs.

At the conclusion of the geotechnical and geophysical evaluations, a geotechnical report will be prepared that identifies the local geological framework, the quantity and quality of the available sand, and additional information which could be required for the permitting and construction processes. Report appendices will include the grain size analyses of discrete samples taken from the vibracores, core logs, and jet probe logs. Additionally, the report will provide isopach (sand thickness) maps, GIS plan-views displaying inlet sand resource area, vibracores and other datasets in relation to the project area, general data analyses, and final recommendations. Up to 5 copies of the report will be provided.

5. Cultural Resources Study of Wreck Site Wild Dayrell: Cartographic and historical research will be conducted to collect available historical data regarding the wreck. Location and mapping of the Wild Dayrell wreck site will start with plotting of existing surveys taken of the wreck. A magnetometer survey controlled by differential global positioning covering the inlet, shoals, and beach in the vicinity of the wreck will be performed to identify the apparent wreck boundaries. The remote sensing survey will utilize a hand held proton precession magnetometer and or a cesium vapor magnetometer. Offshore operations will be carried out from a small, shallow draft, boat equipped with DGPS and computer controlled Hypack navigation. Beach based operations will also be

located with DGPS. The results of the research and the exact location of the Wild Dayrell will be provided on a georeferenced aerial photograph of Rich Inlet.

A cultural resource investigation of the final dredge design cut which will not be determined until the engineering design and environmental studies are near completion will be performed. The cost for the cultural resource investigation of the final dredge areas will be provided under an additional proposal when the area to be surveyed is determined.

APPENDIX 2
Scope of Services (Vibracore Addendum)

TASK 1 – VIBRACORE COLLECTION AND ANALYSIS

Item I – Vibracore Collection

Nine (9) vibracores will be collected within the current channel design for the Rich Inlet Complex to supplement existing data and obtain the 500 ft spacing between vibracores required in the amended (Feb, 2008) North Carolina Technical Standards for Beach Fill Projects. The vibracores will be collected by Catlin Engineers and Scientists of Wilmington, North Carolina under the direction of a CPE-NC geologist. Vibracores shall be obtained by mechanical, electric, pneumatic or hydraulically activated boring having a minimum diameter of 3.0 inches.

The coring device shall recover a minimum of 85 percent of the unconsolidated strata through which it has penetrated, which does not include the overlap portion recovered after jetting. The total length of recovery will be measured by excluding the overlap portion recovered after each jet attempt. This value will be compared to the measured depth of penetration to calculate percent recovery. The desired depth of penetration is 20 unless otherwise stipulated by CPE-NC representatives. It is recognized, however, that maximum penetration may not be achieved at all sample locations. Penetration refusal shall be completed when less than 1 foot of advance is accomplished after 5 minutes of vibration with vibrating-type coring tool. When refusal is met at less than 90 percent of the desired depth of penetration, the Sub-Contractor will remove the sampled portion and a new core pipe will be set up. A jet pump hose shall be attached to the tip of the core pipe just below the vibrator. The rig shall be lowered to the bottom and jetted down to a depth 2 feet above where the first part met refusal. The jet will then be turned off and the vibrator turned on, taking the additional part of the core and 2 foot of overlap. Retries will be accomplished until penetration has reached refusal or until (3) three attempts have been made, whichever occurs first. The core tube or liner shall be split longitudinally to allow for inspection of the material obtained. Each half will be enclosed in transparent plastic for safe storage and transportation.

Item II – Vibracore Analysis

The vibracores will be transported to CPE-NC's office in Wilmington, North Carolina to be logged, sampled, and photographed. The vibracores will be logged in detail by describing sedimentary properties by layer in terms of layer thickness, color, texture (grain size), composition and presence of clay, silt, gravel, or shell and any other identifying features. The vibracores will be digitally photographed against an 18% gray background in 2 ft intervals. Sediment samples will be obtained from irregular intervals based on distinct layers in the sediment sequence. The cores will then be re-wrapped in plastic for archiving.

Sieve analyses will be conducted on all sediment samples obtained from the vibracores in accordance with American Society for Testing and Materials Standard Materials Designation D422-63 for particle size analysis of soils (ASTM, 2007). This method

covers the quantitative determination of the distribution of sand size particles. For sediment finer than the No. 230 sieve (4.0 phi) the ASTM Standard Test Method, Designation D1140-00 was followed (ASTM, 2006). Mechanical sieving was accomplished using calibrated sieves.

Grain size data will be entered into the gINT® software program, which computes the mean and median grain size, sorting, and silt/clay percentages for each sample using the moment method (FOLK, 1974). Grain size distribution curves and gradation analysis reports will be compiled for each sample.

Carbonate analysis of vibracore samples will be conducted to determine the % Calcium Carbonate in each layer. Composite values for each core will be calculated based on weighted averages of layers. The percent by weigh of carbonate is calculated using the following equation:

$$C = \frac{(W - R)}{W} \times 100$$

Where: C = Percent by weight carbonates
W = Mass of sample
R = Insoluble residue

Item III – Incorporation of Data in Final Report

Currently composite mean grain size, percent silt, percent granular, percent gravel, percent carbonate, and sorting were computed for each vibracore by calculating the weighted average (average of each sample weighted by representative core length). Composite values for mean grain size, percent silt, percent granular, percent gravel, percent carbonate, and sorting were then computed for the entire borrow area within the channel design. Once the additional nine (9) vibracores are collected and analyzed, data must be incorporated into the geotech report by generating new borrow area composite values for mean grain size, percent silt, percent granular, percent gravel, percent carbonate, and sorting that reflect the inclusion of the additional data. Subsequently the appendices portion of the geotech report will be updated.

APPENDIX 3

Scope of Services (Cultural Resource Survey)

The original scope of work associated with the contract dated 18 July 2006 between the Figure Eight Island Beach Homeowners Association and Coastal Planning & Engineering of North Carolina, Inc stated that:

> *A cultural resource investigation of the final dredge design cut which will not be determined until the engineering design and environmental studies are near completion will be performed. The cost for the cultural resource investigation of the final dredge areas will be provided under an additional proposal when the area to be surveyed is determined.*

At this time it is prudent to conduct such a cultural resource survey. CPE-NC is pleased to provide you with this proposal to conduct the necessary cultural resource survey associated with the Figure Eight Island Inlet and Shoreline Management Project. CPE-NC has coordinated with Mr. Richard Lawrence and Mr. Nathan Henry of the North Carolina Department of Cultural Resources' Underwater Archeology Branch, with regards to the methodology and areal coverage required for approval. Figure 1 shows the areas to be surveyed including both channels being considered (Alternative 3 and Alternative 5) as well as a corridor in which a terminal groin is proposed under Alternative 5.

CPE-NC has negotiated with Tidewater Atlantic Research, Inc. (TAR) of Washington, North Carolina to conduct the cultural resources investigation. TAR is the marine archeology firm that conducted the initial cultural resource survey to determine the location of the *Wild Dayrell* wreck in Rich Inlet. CPE-NC has worked with TAR on many sand searches throughout North Carolina and is highly confident in their capabilities.

CPE-NC will provide planning support for TAR in preparation of the investigation. CPE-NC will provide TAR with the areas to be surveyed as well as any additional project information necessary to conduct the investigation. TAR will provide all personnel and equipment to conduct a historical background review as well as the cultural resource survey. TAR will provide a draft report documenting the findings of the investigation to CPE-NC for technical review and comments. Upon review, TAR will prepare a final report to be submitted to the North Carolina Department of Cultural Resources for final approval.

The total, not to exceed, cost estimate for the submerged cultural resource investigation is $17,320. This task order will be charged as time and materials using the same rate schedule as is currently being used for all other tasks being conducted by CPE-NC.

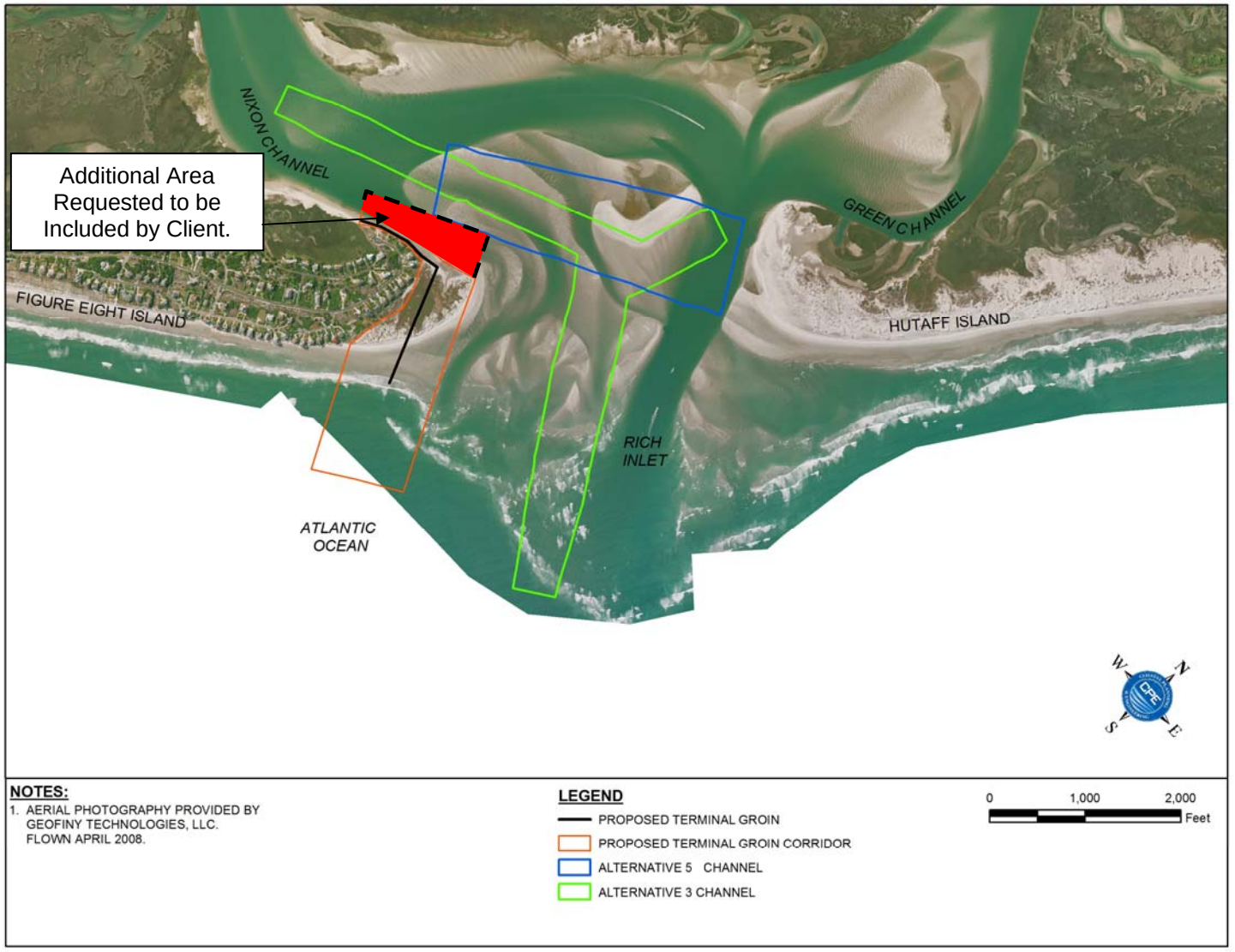
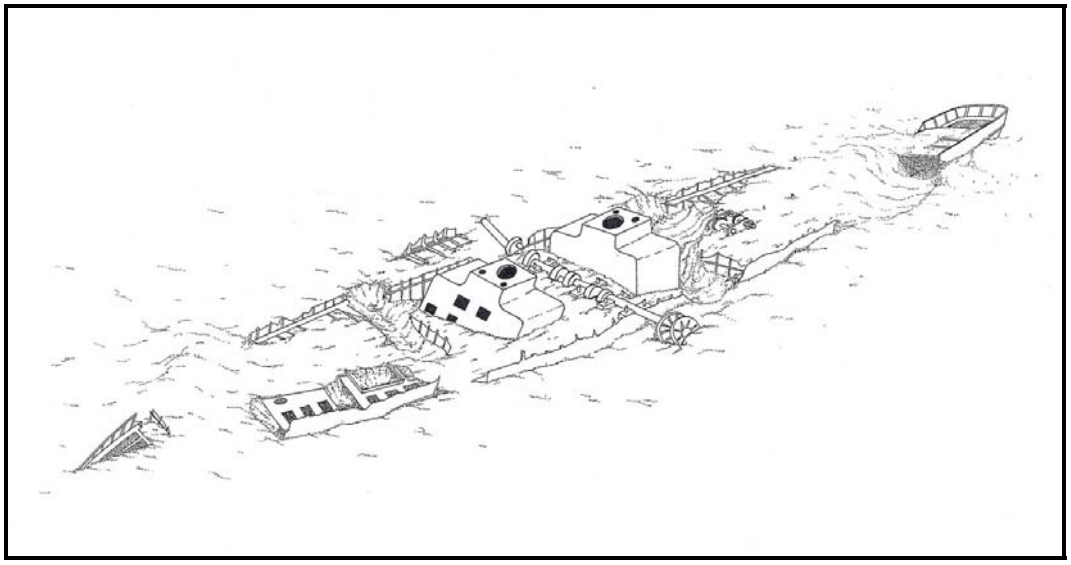


Figure 1. Map depicting the areas for which cultural resource investigations will be conducted including the two proposed channel corridors (Alternative 3 and 5) as well as the corridor in which a terminal groin is proposed under Alternative 5.

APPENDIX 4

Cultural Resource Invetigation: Location of the Remains of the *Wild Dayrell* in Rich Inlet

Location of the Remains of the Wild Dayrell in Rich Inlet Pender County, North Carolina



Submitted to:

Mr. Jeffrey L. Andrews, P.S.M., C.I.

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Submitted by:

Tidewater Atlantic Research, Inc.
P. O. Box 2494

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29 September 2006

Introduction

Coastal Planning and Engineering, Inc. (CPE) is currently working with the Figure Eight Beach Homeowners Association on a beach nourishment project for Figure Eight Island. The source material for this nourishment will be a borrow area in Rich Inlet (Figure 1). In order to avoid impacts to the Civil War blockade-runner *Wild Dayrell*, CPE contracted with Tidewater Atlantic Research, Inc., (TAR) of Washington, North Carolina to carry out a remote sensing survey to determine the exact position of the wreck site. The remote sensing investigation was carried out by TAR personnel Gordon Watts and Ray Tubby on 3 September 2006.

Wreck of the *Wild Dayrell*

The remains of the Anglo-Confederate Trading Company's steamer *Wild Dayrell,* lie in Rich Inlet approximately twenty miles north of Fort Fisher. That vessel was built by the firm of Jones, Quiggin and Company in Liverpool along with an identical sistership, the *Lucy*. *Lucy* and *Wild Dayrell* were constructed of iron, each measuring 215 feet in length, 20 feet in beam and 10 foot 3 inch depth of hold. The vessels' oscillating steam cylinder engines were built by Fawcett, Preston and Company in Liverpool and measured 52 inches in diameter with a 48-inch stroke. The *Wild Dayrell* was also equipped with feathering paddle wheel floats and a forecastle hood. Two raked pole masts and two raked retractable funnels were all that protruded above the level of the steamer's paddle boxes.

Figure 1. Rich Inlet beach renourishment project location.

The *Wild Dayrell* was launched on 17 September 1863. Although the steam trials of the *Wild Dayrell* were not reported in the press, its sistership *Lucy* proved to be capable of 15 ½ knots against a strong wind and tide during her trials in October 1863. On 12 November the vessel's registered owners, Edward Lawrence and Company, entered the vessel at Liverpool Customs for loading for Nassau. The fully loaded *Wild Dayrell* cleared for sea two days later. In December, the steamer made Nassau and, after being painted a lead color, took on a cargo for Wilmington. After two successful round trips the *Wild Dayrell* was run ashore on 1 February 1864.

The wreck of the *Wild Dayrell* was never lost. It lies in the shallow water of Rich Inlet south of Figure Eight Island and has been a popular site for fishing. However, because of strong currents in the inlet, the *Wild Dayrell* has never been a popular dive site though sport divers have recovered portholes from the hull during the early 1980s. In spite of the environment, the wreck was mapped by the staff and students of the Program in Maritime History and Underwater Archaeology in 1985. Although the dimensions of the hull was impossible to precisely establish because of deterioration of the structure, the overall length of the wreck corresponds closely with the 215-foot length of the *Wild Dayrell* recorded on that vessel's CBR. The 20-foot beam and 50-foot length of the engine room recorded at the wreck site also correspond precisely with those recorded on the CBR (Figure 2). The *Wild Dayrell*'s CBR and historical data associated with the vessel confirm that the ship was powered by two oscillating engines, or steam cylinders and that number of oscillating cylinders were identified at the wreck site.

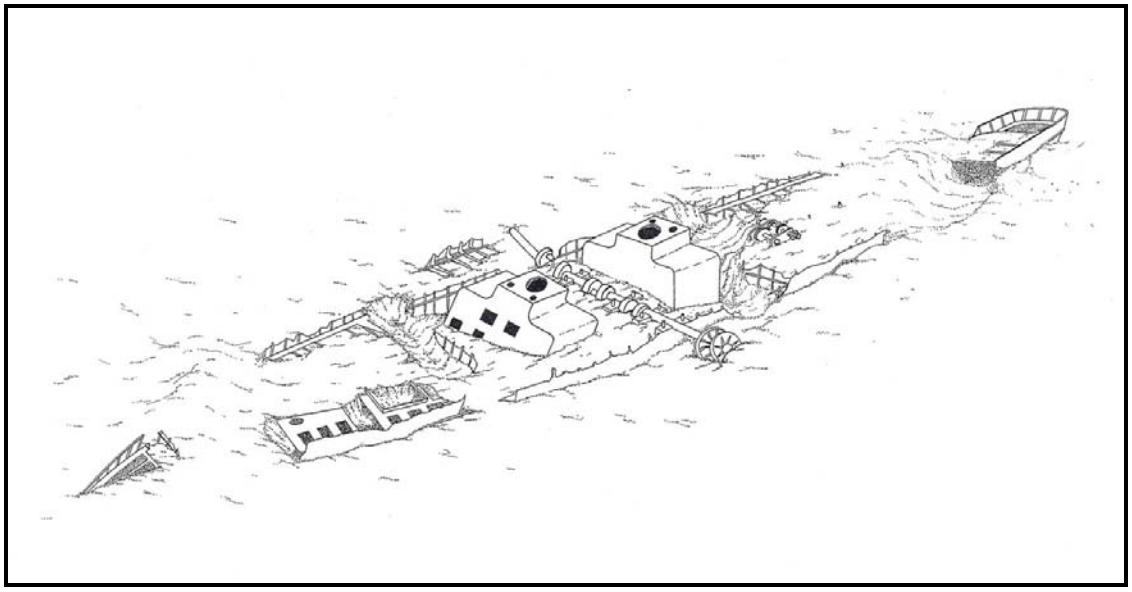

Figure 2. Perspective drawing of the remains of the *Wild Dayrell*.

Field Research Methodology and Equipment

To locate the remains of *Wild Dayrell*, TAR personnel used a 24-foot shallow-draft vessel for conducting the remote sensing survey (Figure 3). The wreck site was identified using an EG&G GEOMETRICS 881 cesium vapor magnetometer (Figure 4). Once the position of the wreck was established, a series of survey lanes were created in HYPACK®MAX to refine the magnetic signature. Because the wreck is now completely buried in the shoal on the south side of the Rich Inlet channel, breaking surf and shallow water made sonar imaging impossible. Data collection during the survey was controlled using a TRIMBLE differential global positioning system assuring reliable geographical location of the remains of *Wild Dayrell*.

An EG&G Geometrics G-881 marine cesium magnetometer capable of plus or minus 0.001 gamma resolution was employed to collect magnetic data in the survey area (Figure 4). To produce the most comprehensive magnetic record, data was collected at 10 samples per second. Due to shoal water and the possibility of snags in the project area, the magnetometer sensor was towed just below the water surface at a speed of approximately 3 knots. Magnetic data were recorded as a data file associated with the computer navigation system. Data from the survey were

contour plotted using QUICKSURF® computer software to facilitate anomaly location and definition of target signature characteristics. A 600 kHz MARINE SONICS high-resolution side scan sonar was to be employed to collect acoustic data in the survey area. However, due to shoal water and breaking surf in the inlet the side scan sonar could not be effectively utilized.

A TRIMBLE AgGPS was used to control navigation and data collection in the survey area. That system has an accuracy of plus or minus three feet, and can be used to generate highly accurate coordinates for the computer navigation system. The DGPS was employed in conjunction with an on-board Compaq 2.4 GHz laptop computer loaded with a Coastal Oceanographics HYPACK®MAX navigation and data collection software program. Positioning data generated by the navigation system were tied to magnetometer records by regular annotations to facilitate target location and anomaly analysis. All data is related to the North Carolina State Plane Coordinate System, NAD 83.

Data Analysis

Using QUICKSURF® contouring software, magnetic data generated during the survey were contour plotted at 10-gamma intervals (Figure 5). The contoured data was used to accurately identify the geographical location and distribution of the structural remains of the *Wild Dayrell*. Due to the fact that the wreck is entirely covered by a shoal, side scan sonar contributed nothing to analysis of the wreck site.

Figure 3. **Photograph of the 25-foot survey vessel *Atlantic Surveyor* employed during the Rich Inlet survey.**

Figure 4. **Photograph of magnetometer sensor being lowered into the ocean.**

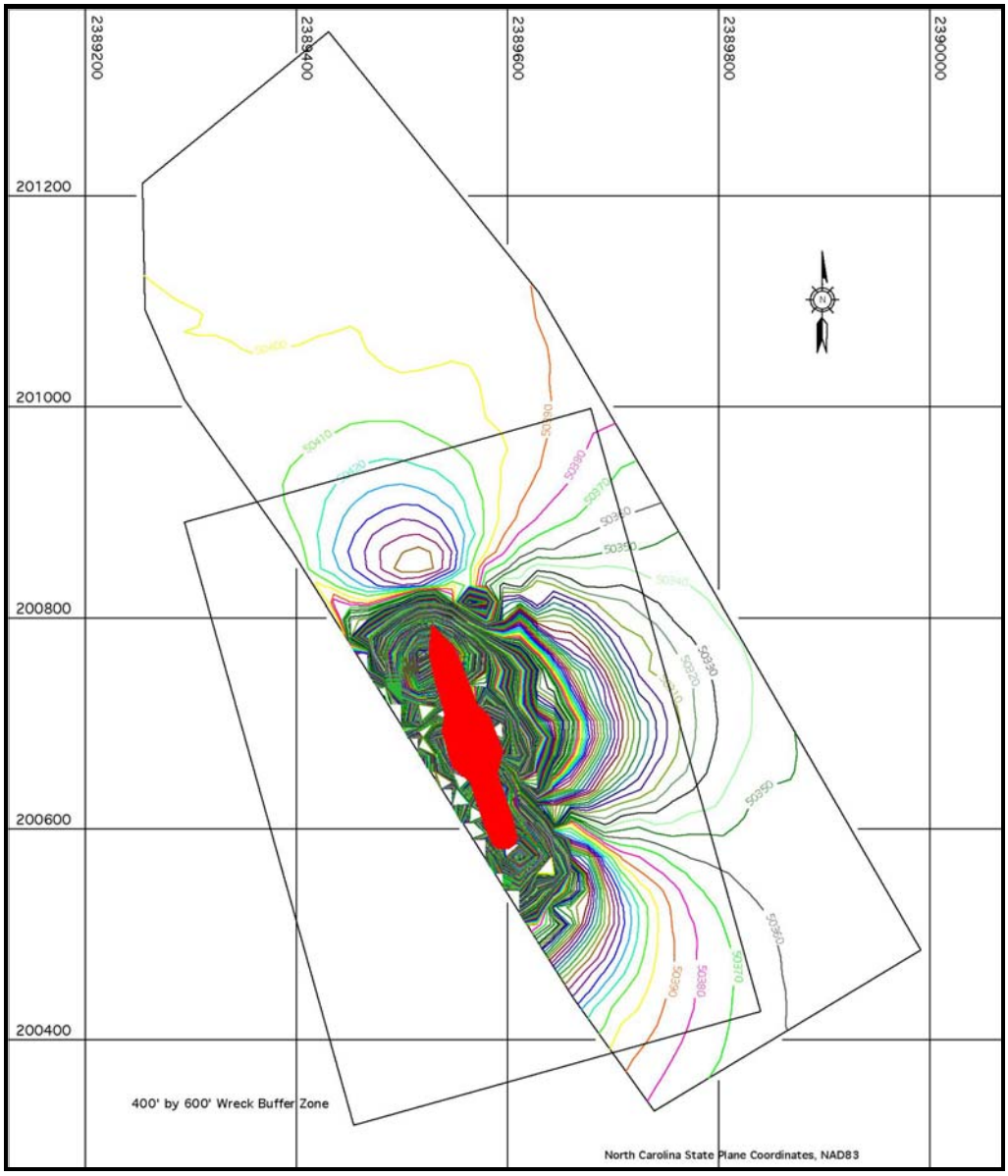

Figure 5. Magnetic contour map of the *Wild Dayrell* wreck site with proposed buffer zone.

Conclusions and Recommendations

The remote sensing survey conducted by TAR was successful in identifying the remains of the *Wild Dayrell* and generating an accurate geographical position for the wreck site. The bow lies to the northwest and the stern lies to the southeast. Coordinates for the longitudinal axis of the hull structure are:

NW 2389528.56, 200793.67
SE 2389600.84, 200581.71

On the recommendation of Richard Lawrence, head of the Underwater Archaeology Branch of the Department of Cultural Resources, a 400-foot by 600-foot buffer zone was established around the wreck site (Figure 5). Coordinates for the buffer zone are:

NW	2389293,85, 200890.38
NE	2389678.94, 200998.57
SE	2389839.48, 200427.20
SW	2389454.39, 200391.00

Proposed plans for dredging in Rich Inlet should be designed to avoid that buffer zone.

APPENDIX 5

Cultural Resource Investigation: Terrestrial and Submerged Cultural Resource Survey Rich Inlet, Figure Eight Island, North Carolina

DRAFT

Terrestrial and Submerged Cultural Resource Survey Rich Inlet, Figure Eight Island, North Carolina

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6 May 2010

Abstract

Coastal Planning & Engineering of North Carolina, Inc. (CPE-NC) is the project engineer representing the Figure Eight Island Beach Homeowners Association in its efforts to obtain permits for the Figure Eight Island Inlet and Shoreline Management Project. In order to determine the proposed dredging effects on potentially significant submerged cultural resources, CPE-NC contracted with Tidewater Atlantic Research, Inc. of Washington, North Carolina to conduct a magnetometer and sidescan sonar survey of the proposed channel alternatives being considered. In addition the corridor in which a terminal groin is being proposed under Alternative 5a was also surveyed using terrestrial and marine survey protocol. Field research for the project was carried out on 10 December 2009, 8 and 9 March 2010, and 1 April 2010. Analysis of the remote-sensing data generated during the Rich Inlet survey identified a total of 116 magnetic targets and 6 sonar targets. Five anomalies, composed of 13 individual magnetic targets and 3 associated sonar targets, contain signature characteristics suggestive of potentially significant cultural material. Those five anomaly clusters are recommended for avoidance or additional investigation in the event that avoidance is not possible. The remaining 103 magnetic targets and three associated sonar targets are indicative of modern debris such as traps, anchors, pipe, rebar, and small cable and dredging related debris. No avoidance or additional investigation of the 103 individual magnetic targets is recommended in conjunction with the proposed project.

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Introduction

Coastal Planning and Engineering of North Carolina, Inc. (CPE-NC) of Wilmington, North Carolina is currently working with the Figure Eight Island Beach Homeowners Association to obtain permits for the Figure Eight Island Inlet and Shoreline Management Project. As part of the permitting process CPE-NC has been tasked with evaluating several channel alternatives in and around Rich Inlet. In order to determine the project's impact on potentially significant submerged cultural resources, CPE-NC contracted with Tidewater Atlantic Research, Inc. (TAR) of Washington, North Carolina to conduct a systematic magnetometer and side-scan sonar survey of an area that encompasses the proposed channel alternatives as well as the corridor in which a terminal groin is proposed for Alternative 5a.

The remote-sensing investigation conducted by TAR archaeologists was designed to provide accurate and reliable identification, assessment and documentation of submerged cultural resources in the study area. Survey methodology was developed to comply with guidelines for submerged cultural resource surveys in North Carolina created by the North Carolina Department of Cultural Resources. Those guidelines follow the criteria established by the National Historic Preservation Act of 1966 (Public Law 89-665), the National Environmental Policy Act of 1969 (Public Law 11-190), Executive Order 11593, the Advisory Council on Historic Preservation Procedures for the protection of historic and cultural properties (36 CFR Part 800) and the updated guidelines described in 36 CFR 64 and 36 CFR 66. The results of the investigation will furnish CPE-NC with the archaeological data required for complying with both state and federal submerged cultural resource legislation and regulations.

The terrestrial portion of the survey was conducted on 10 December 2009, 9 March and 1 April 2010, and the submerged portion on 8 March and 1 April 2010. Analysis of the remote-sensing data generated during the Rich Inlet survey identified a total of 116 magnetic anomalies and 6 sonar targets. Five anomaly clusters, composed of 13 individual magnetic anomalies and 3 associated sonar targets, contain signature characteristics suggestive of potentially significant cultural material. These five anomaly clusters are recommended for avoidance or additional investigation. The remaining 103 and three associated sonar targets are indicative of modern debris such as traps, anchors, pipe, rebar, and small cable. No avoidance or additional investigation of these 103 individual magnetic targets is recommended in conjunction with the proposed project.

Project survey personnel consisted of Gordon P. Watts, Jr., principal investigator and Joshua A. Daniel, remote-sensing operator. Dr. Watts and Mr. Daniel conducted both the terrestrial and marine portions of the survey. Robin Arnold and Dr. Watts carried out the historical and literature research. Dr. Watts and Mr. Daniel analyzed the remote-sensing data. Ms. Arnold, Mr. Daniel and Dr. Watts prepared this report document.

Project Location

The remote-sensing project area is situated at Rich Inlet which is located off the north end of Figure Eight Island at the confluence of Nixon Channel to the west and Green Channel to the north. The area surveyed is polygonal in shape, measuring approximately 5,000 feet long and 4,400 feet wide at its extreme points and covers an area of 193.8 acres (Figure 1). To ensure sufficient data would be available to locate any potentially significant targets in the project area, underwater remote-sensing data were collected along lanes spaced on 50-foot intervals; the terrestrial portion along transects spaced on 100-foot intervals.

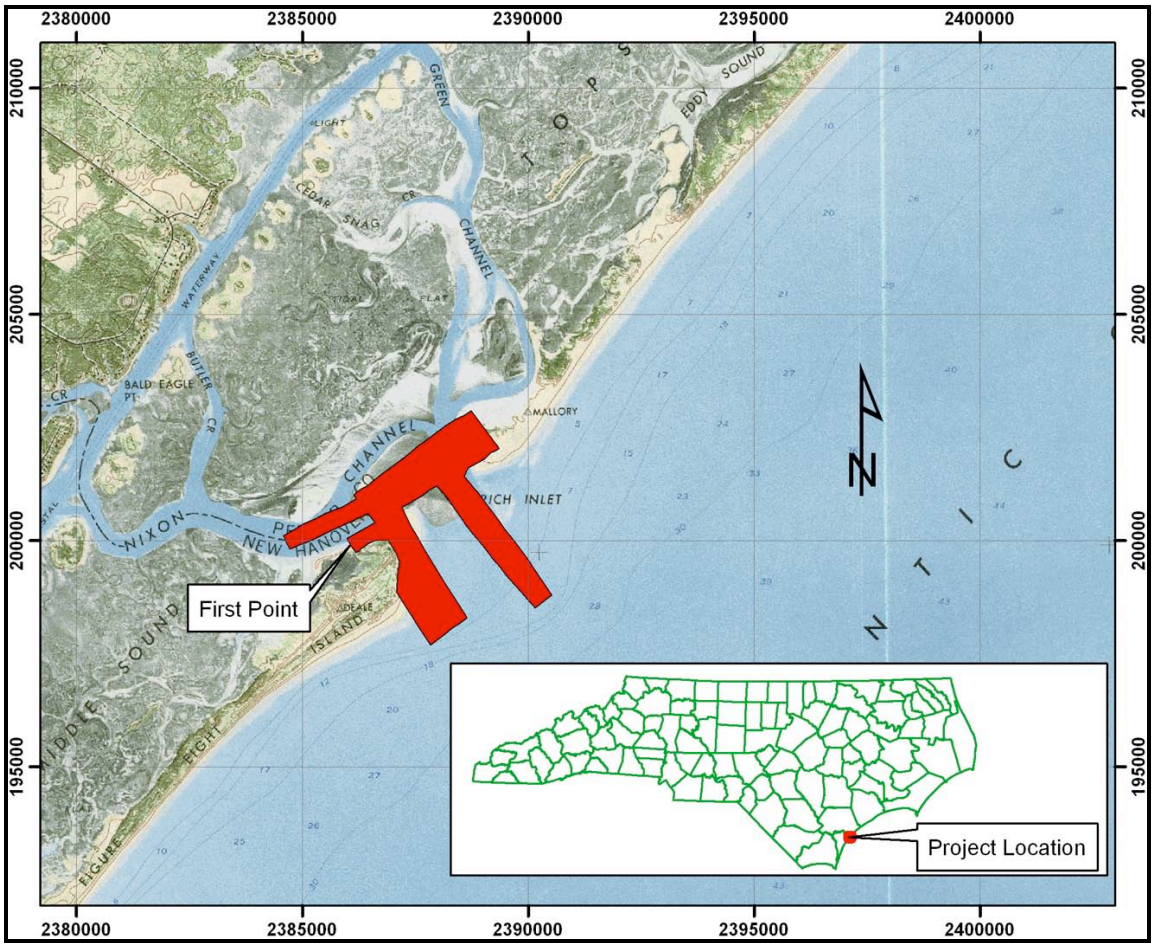

Figure 1. Project area location (USGS. "Hampstead quadrangle, North Carolina" 1:24,000).

The survey boundaries defined in North Carolina State Plane Coordinates, NAD 83, U.S. Survey Foot, beginning at "First Point" in Figure 1 and continuing clockwise are as follows:

Easting	Northing
2386077.7	199887.4
2385988.1	200055.7
2386606.4	200407.5
2386454.7	200599.2
2386124.7	200451.5
2385765.9	200289.7
2385540.6	200177.2
2385401.4	200108.3
2385234.4	200025.7
2385065.7	199963.0
2384990.3	199938.7
2384720.0	199815.6
2384575.6	200114.1
2384887.7	200287.6
2385007.4	200364.7
2385300.6	200501.8
2385475.2	200586.6
2385676.9	200667.9
2385868.6	200747.0
2385931.8	200776.7
2386109.5	200878.8
2386188.6	200932.7
2386132.0	201006.9
2386250.6	201118.7
2386425.5	201213.4
2386745.8	201468.5
2387045.1	201694.7
2387267.5	201859.5
2387482.9	202034.4
2387580.3	202112.4
2387735.9	202220.3
2387917.5	202356.9
2388001.8	202418.0
2388216.5	202575.6
2388417.1	202691.6
2388573.7	202762.3
2388737.1	202877.3
2389351.0	202039.1
2389262.1	201985.6
2389168.6	201944.7
2389021.7	201806.6
2388666.7	201612.5
2388586.9	201417.2
2388657.8	201330.0
2388715.0	201270.7

Easting	Northing
2388757.4	201214.4
2388806.9	201150.4
2388833.0	201119.6
2388908.9	201032.2
2388967.7	200953.0
2389104.0	200761.5
2389348.8	200434.1
2389511.1	200211.8
2389629.1	200060.8
2389891.2	199727.8
2390018.1	199551.5
2390094.9	199426.9
2390307.9	199108.3
2390509.2	198807.5
2390508.9	198800.1
2390147.8	198516.9
2390036.5	198647.8
2389813.5	198902.3
2389554.6	199190.5
2389497.6	199252.4
2389401.0	199380.3
2389356.5	199446.5
2389242.3	199570.2
2389192.6	199629.2
2389058.3	199805.8
2388907.0	199992.9
2388760.4	200172.4
2388687.1	200262.2
2388621.0	200346.7
2388531.7	200471.8
2388416.9	200640.1
2388358.3	200724.3
2388329.9	200760.2
2388259.7	200864.7
2388189.2	200964.3
2388163.4	201000.0
2388072.9	201095.4
2387968.2	201206.3
2387821.2	201127.8
2387777.8	201097.3
2387714.0	201052.7
2387632.3	200994.0
2387294.2	200789.2
2387198.2	200745.9
2387406.5	200310.9

Easting	Northing
2387499.4	200153.4
2387720.5	199787.3
2387974.0	199365.4
2388136.8	199095.9
2388365.5	198734.5
2388603.9	198367.8
2388640.6	198294.4
2388495.0	198188.6
2388306.1	198057.2
2388147.5	197937.0
2387835.6	197703.9
2387601.6	198055.6
2387424.2	198335.6
2387344.9	198460.3
2387181.4	198714.9
2387083.3	198867.7
2387086.9	198956.8
2387089.4	199080.8
2387091.9	199204.7
2387102.4	199281.2
2387118.2	199367.4
2387149.4	199527.4
2387122.5	199597.9
2387082.4	199713.6
2387029.1	199805.1
2386996.3	199853.5
2386898.2	200006.3
2386781.8	200010.9
2386662.5	200005.8
2386597.8	200000.9
2386514.9	199974.5
2386423.3	199918.6
2386356.8	199866.7
2386292.9	199819.6
2386259.4	199788.7
2386185.8	199747.0
2386077.7	199887.4
2385949.6	200602.4

Research Methodology

Literature and Historical Research

Due to the number of previous investigations conducted in the project vicinity, TAR personnel have carried out extensive literature searches in both primary and secondary source material. To assess the potential for finding significant historic and/or cultural resources within the proposed borrow areas TAR personnel reviewed previously collected literature, examined historical maps and charts and examined inventories of shipwrecks in the Rich Inlet area. The historical background in this document is built upon and refined from previous historical background assessments of the region developed by TAR.

Preliminary wreck-specific information was collected from primary and secondary sources that include: *A Guide to Sunken Ships in American Waters* (Lonsdale and Kaplan 1964); *Encyclopedia of American Shipwrecks* (Berman 1972); *Shipwrecks of the Civil War: The Encyclopedia of Union and Confederate Naval Losses* (Shomette 1973); *Merchant Steam Vessels of the United States 1790-1868* (Lytle and Holdcamper 1975); *Shipwrecks in the Americas* (Marx 1983); *Shipwreck Encyclopedia of The Civil War: North Carolina, 1861-1865* (Spence 1991); *Shipwrecks of North Carolina* (Gentile 1992); *Naval Documents of the American Revolution* (U.S. Navy [10 vols. published between 1964-1996]); *The Naval War of 1812: A Documentary History* (Dudley [two vols.] 1985); *Graveyard of the Atlantic* (Stick 1952); *Official Records of the Union and Confederate Navies in the War of the Rebellion* (The National Historical Society [31 vols.] 1987), *North Carolina Shipwreck Accounts: 1709 to 1950* (Charles 2004), and other published materials. A survey of select newspapers generated additional information.

Personnel at the North Carolina Office of Archives and History's Underwater Archaeology Branch (UAB) at Kure Beach, North Carolina were also contacted for shipwreck data associated with the Rich Inlet area (Richard W. Lawrence 2010, pers. comm.).

Remote-Sensing Survey

In order to reliably identify submerged cultural resources, TAR archaeologists conducted a systematic remote-sensing survey of the proposed borrow site. Underwater survey activities were conducted on 8 March 2010 from the 24-foot survey vessel *Atlantic Surveyor*. On 1 April 2010, they were conducted from a 20-foot Privateer. A pedestrian survey collected data on the beach and shoals. In order to fulfill the requirements for survey activities in North Carolina, magnetic and acoustic remote-sensing equipment were employed. This combination of remote-sensing represents the state of the art in submerged cultural resource location technology and it offers the most reliable and cost effective method to locate and identify potentially significant targets. Data collection was controlled using a differential global positioning system (DGPS). DGPS produces the highly accurate coordinates necessary to support a sophisticated navigation program and assures reliable target location.

An EG&G GEOMETRICS G-881 marine cesium magnetometer, capable of plus or minus 0.01 gamma resolution, was employed to collect magnetic data for the submerged portion of the survey area (Figure 2). To produce the most comprehensive magnetic record, data was collected at 10 samples per second. On 8 March 2010, the magnetometer sensor was towed just below the water surface at a speed of approximately three to four knots due to shoal water within the project area. On 1 April 2010, the magnetometer sensor was mounted to the bow of the vessel. Magnetic data were recorded as a data file associated with the computer navigation system. Data from the survey were contour plotted using QUICKSURF® computer software to facilitate anomaly location and definition of target signature characteristics. All magnetic data were correlated with the acoustic remote-sensing records.

A 445/900 kHz KLEIN SYSTEM 3900 digital sidescan sonar (interfaced with SONARPRO SONAR PROCESSING SYSTEM) was employed to collect acoustic data in the submerged portions of the survey area (Figure 3). Due to shoal water within the project area, the sidescan sonar transducer was deployed and maintained between 3 and 5 feet below the water surface. Acoustic data were collected using a range scale of 30 and 50 meters to provide a minimum of 200% coverage and high target signature definition. Acoustic data were recorded as a digital file with SONARPRO and tied to the magnetic and positioning data by the computer navigation system.

Figure 2. Launching the EG&G GEOMETRICS G-881 cesium vapor magnetometer.

Figure 3. Launching the KLEIN SYSTEM 3900 digital sidescan sonar.

A TRIMBLE AgGPS was used to control navigation and data collection in the survey area. That system has an accuracy of plus or minus three feet, and can be used to generate highly accurate coordinates for the computer navigation system on the survey vessel. The DGPS was employed in conjunction with an onboard COMPAQ 2.4 GHz laptop loaded with HYPACK navigation and data collection software (Figure 4). Positioning data generated by the navigation system were tied to magnetometer records by regular annotations to facilitate target location and anomaly analysis. All data is related to the North Carolina State Plane Coordinate System, NAD 83.

The terrestrial portion of the survey area was investigated on foot. Magnetic data was collected using a LITTLEMORE 7702 proton precession (Figure 5). Positioning and data recording was accomplished by a handheld TRIMBLE GEOEXPLORER SERIES GPS interfaced with HYPACK. A visual survey of the area exposed at low tide also took place during this portion of the survey.

Data Analysis

To ensure reliable target identification and assessment, analysis of the magnetic and acoustic data was carried out as it was generated. Using QUICKSURF® contouring software, magnetic data generated during the survey were contour plotted at 5-gamma intervals for analysis and accurate location of magnetic anomalies. The

magnetic data was examined for anomalies, which were then isolated and analyzed in accordance with intensity, duration, areal extent and signature characteristics. Sonar records were analyzed to identify targets on the basis of configuration, areal extent, target intensity and contrast with background, elevation and shadow image, and were also reviewed for possible association with identified magnetic anomalies.

Figure 4. Computer navigation system located at the research vessel helm.

Data generated by the remote-sensing equipment were developed to support an assessment of each magnetic and acoustic signature. Analysis of each target signature included consideration of magnetic and sonar signature characteristics previously demonstrated to be reliable indicators of historically significant submerged cultural resources. Assessment of each target includes avoidance options and possible adjustments to avoid potential cultural resources. Where avoidance is not possible the assessment includes recommendations for additional investigation to determine the exact nature of the cultural material generating the signature and its potential National Register of Historic Places (NRHP) significance. Historical evidence was developed into a background context and an inventory of shipwreck sites that identified possible correlations with magnetic targets (Appendix A). A magnetic contour map of the survey area was produced to aid in the analysis of each target.

Figure 5. Terrestrial survey using the LITTLEMORE magnetometer.

Historical Background for Rich Inlet Vicinity

The North Carolina coast exceeds 300 miles in extent, and "for the greater part of this distance barrier-reefs, or a cordon of long, low, narrow sandy islands, varying from one-fourth of a mile to nearly 4 miles in width, resist the assaults of the Atlantic, and appear for centuries to have maintained the same position in which we now find them" (U.S. War Department 1876:378).

Europeans surveyed the barrier reefs and coastline of contemporary Pender and New Hanover counties during the first quarter of the sixteenth century as reported by Giovanni da Verrazano and other explorers. Some 60 years later, according to Ralph Lane's chronicles of Sir Richard Grenville's expedition and John White's map [1585], Englishmen with the support of an unpopular Portuguese pilot fished in the region on their way to establish a colony on Roanoke Island. The Grenville party tolerated Simon Ferdinando as the former pirate was recognized as the "only skilled navigator alive with previous experience in negotiating the treacherous Carolina coastline" (Glasgow 1966:120-121).

Before John White arrived at Roanoke Island in 1587 to search for what today is known as the Lost Colony, his vessels presumably anchored in the vicinity of contemporary Figure Eight and Topsail islands. White's maps indicate that he was "aware of Cape Fear", and this fact would suggest that his vessel sailed closely up the coast to Roanoke Island. The White expeditions also contributed to the Molyneaux globe produced circa 1592, which clearly identified the "Cape of Feare" (Schoenbaum 1992:223).

Samuel Mace's 1602/1603 expedition, sponsored by Sir Walter Ralegh, enjoyed a month long sojourn in the vicinity of Rich Inlet where the English collected sassafras from aborigines (Noël Hume 1994:101,103). From the date of Mace's visit to the North Carolina coast to ostensibly search for the Raleigh colony to the beginning of the eighteenth century Europeans may have settled on the mainland although they left no physical evidence. In the interim, explorers continued to conduct superficial shoreline surveys and to ascend briefly into local waterways.

During mid-October 1663, Captain William Hilton reconnoitered Cape Fear Roads for a second time and on this occasion navigated up the North-East Cape Fear River. Aboard the *Adventure* the Massachusetts Bay mariner observed landmarks that he named "Turkey Quarter, Rocky Point and Stag Park." Of those, the latter two place names survive (Bloodworth 1947:30; Pender County 2008). Despite Hilton's positive reports on the beautiful terrain, the region remained in a "dormant state" due to a temporary moratorium enacted by the Lords Proprietors to prohibit colonization (Bloodworth 1947:30).

John Brickell surveyed North Carolina's barrier islands in 1729 and commented on the nature of inlets subsequently identified by the 1738 James Wimble chart. Brickell mentioned *Rich* Inlet, which is shown as "Reach" on Wimble's chart. In *The Natural History of North Carolina*, the Irish physician wrote: "Between these Islands and Sand Banks, are Inlets of several depths of Water, some admitting only of Sloops, Schooners, Brigantines, and Vessels of small Burthen … many of these being only Navigable for Periaugers and small Crofts, by reason of their many Shoals which are continually shifting by the violence of Storms" (Brickell 1968:2).

Brickell noted that early-eighteenth-century Carolina planters:

> [F]or the most part live by the Water side, few or none living in the In-land parts of the country at present, though the lands are as good and fertile as any that are yet inhabited, but not so commodious for Carriage as by the Water, for most part of the Plantations run but a Mile backward into the Woods, so that betwixt every River you shall see vast Tracts of Land lying waste, or inhabited only by wild beasts: What is worthy of Observation is, That almost every Planter may have a convenient Dock upon his plantation, and a sufficient Quantity of good Timber to build Ships and Boats withal" (Brickell 1968:14).

James Moore acquired the five-mile long, 1,300-acre sandbank south of Rich Inlet circa 1762. The island was later sold to Cornelius Harnett. After Harnett's death, planter James Foy purchased the tract [1795] that became part of his large Poplar Grove estate. The prosperous Foy family would retain ownership of "Woods Beach" [or Foy Island] until the 1950s, with the exception of a small tract [southern extremity] sold to the Hutaff family (Nadeau 1998:15; Barefoot 2005:170-171).

Maritime activities conducted near Rich Inlet were not greatly impacted by the American Revolution. However, some local residents exhibited ardent patriotism during the conflict and many prominent landowners and merchants were involved in the political events leading to the war and subsequent military actions. One such event occurred when American forces led by Colonel James Moore succeeded to repulse British soldiers and North Carolina Loyalists at the decisive battle at Moore's Creek Bridge in February 1776. In retribution for their owners' defiance, some Colonial plantations and salt works were plundered and destroyed in New Hanover County [and future Pender County] (Rankin 1975:15-20).

Despite the region's promising economic opportunities that were presented after American Independence, an out migration occurred during the early nineteenth century. This "Great Exodus" resulted in the loss of some of the largest and wealthiest landowners in southeastern North Carolina. This trend was driven by five factors: land grants for military service in the Revolution and War of 1812, availability of cheap land in the west, better cotton land in the west and south, higher prices elsewhere for hiring slaves and a decline in the productivity of the area's heavily farmed sandy soils (Louis Berger Group 2002:9).

During the antebellum period, international and packet maritime commerce did increase along the North Carolina coast. In September 1857, several vessels were lost off southeastern North Carolina in the midst of a severe hurricane. One casualty was reported in the vicinity of modern Figure Eight Island. On 17 September, *The New York Times* reported that the "Schooner *Abdel Kader*, Captain CORNELIUS, hence for New-York, with a cargo of naval stores, went ashore about Rich Inlet, 25 or 30 miles north [of] New Inlet, and will prove a total loss" (*The New York Times* 1857). Prior marine intelligence from the newspaper indicated that Captain Cornelius was familiar with the coast. On 6 June 1856, Cornelius cleared the port of New York aboard the *Abdel Kader* prior to his voyage to Savannah (*The New York Times* 1856).

The American Civil War disrupted commercial development and maritime trade near Rich Inlet. After Confederate forces in South Carolina attacked the U.S. garrison at Fort Sumter, President Abraham Lincoln declared a state of open rebellion and called for volunteers to preserve the Union. On 19 April 1861, Lincoln issued a proclamation to establish a blockade of Confederate ports in South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana and Texas. Eight days later, the blockade was extended to include ports in Virginia and North Carolina. Until the fall of Fort Fisher in January 1865 and the Union occupation of the Cape Fear, Wilmington remained as the Confederacy's major port for vessels running the blockade. As a consequence, the remains of numerous blockade runners lie along the coastline north and west of Cape Fear.

The remains of the Anglo-Confederate Trading Company's steamer *Wild Dayrell,* lie in Rich Inlet approximately 20 miles north of Fort Fisher. That vessel was built by the firm of Jones, Quiggin and Company in Liverpool along with an identical sistership, *Lucy*. *Lucy* and *Wild Dayrell* were constructed of iron, each measuring 215 feet in length, 20 feet in beam and 10 foot 3 inch depth of hold. The vessels' oscillating steam cylinder engines were built by Fawcett, Preston and Company in Liverpool and measured 52 inches in diameter with a 48-inch stroke. The *Wild Dayrell* was also equipped with feathering paddle wheel floats and a forecastle hood. Two raked pole masts and two raked retractable funnels were all that protruded above the level of the steamer's paddle boxes.

The *Wild Dayrell* was launched on 17 September 1863. Although the steam trials of the *Wild Dayrell* were not reported in the press, its sistership *Lucy* proved to be capable of 15 ½ knots against a strong wind and tide during her trials in October 1863. On 12 November the vessel's registered owners, Edward Lawrence and Company, entered the vessel at Liverpool Customs for loading for Nassau. The fully loaded *Wild Dayrell* cleared for sea two days later. In December, the steamer made Nassau and, after being painted a lead color, took on a cargo for Wilmington. After two successful round trips the *Wild Dayrell* was run ashore on 1 February 1864.

The wreck of the *Wild Dayrell* was never lost. It lies in the shallow water of Rich Inlet south of Figure Eight Island and has been a popular site for fishing (Figure 6). However, because of strong currents in the inlet, the *Wild Dayrell* has never been a popular dive site though sport divers have recovered portholes from the hull during the early 1980s. In spite of the environment, the wreck was mapped by the staff and students of the East Carolina University (ECU) Program in Maritime History and Underwater Archaeology in 1985 (Figure 7).

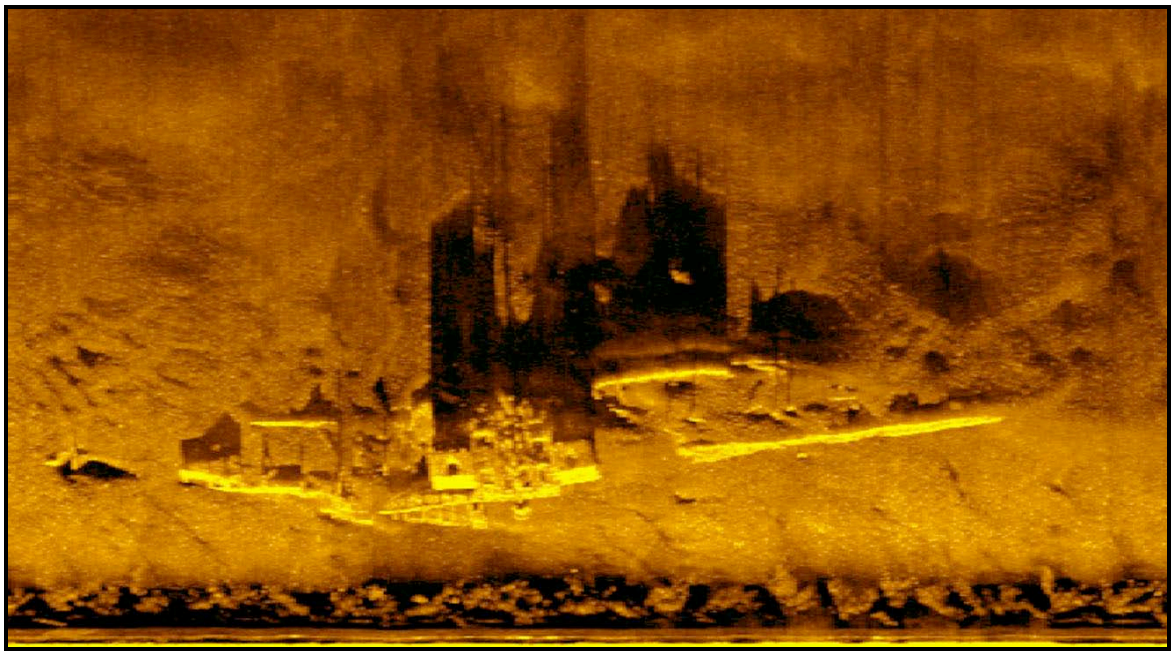

Figure 6. Sonar image of the *Wild Dayrell*.

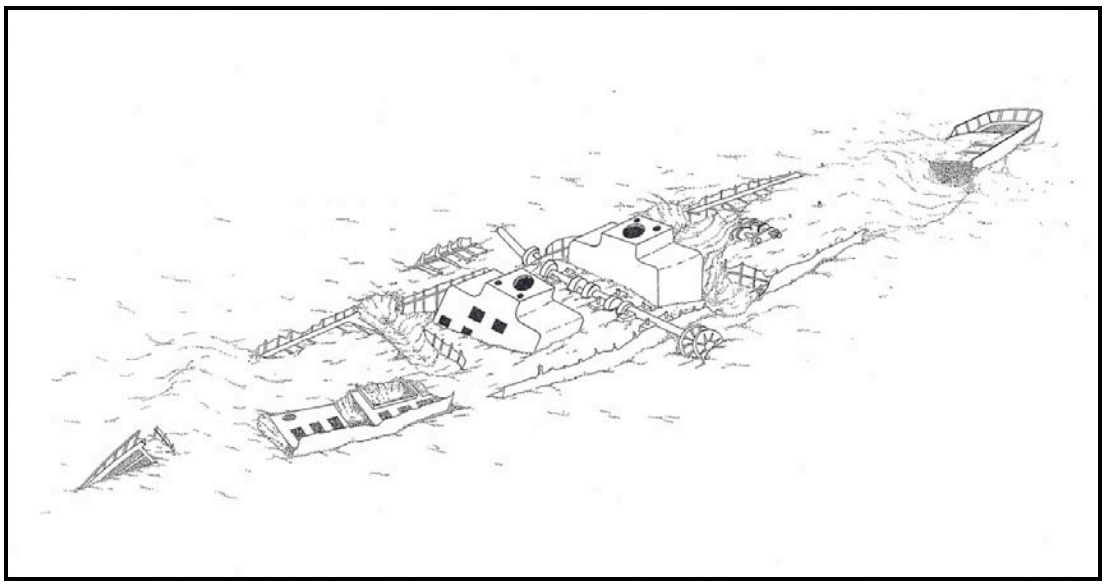

Figure 7. Perspective drawing of the remains of the *Wild Dayrell*.

Although the dimensions of the hull was impossible to precisely establish because of deterioration of the structure, the overall length of the wreck corresponds closely with the 215-foot length of the *Wild Dayrell* recorded on that vessel's *Certificate of British Registry* (CBR). The 20-foot beam and 50-foot length of the engine room recorded at the wreck site also correspond precisely with those recorded on the CBR. The *Wild Dayrell*'s CBR and historical data associated with the vessel confirm that the ship was powered by two oscillating engines, or steam cylinders and that number of oscillating cylinders were identified at the wreck site.

According to postwar records, the region's once prosperous plantation system disappeared during the Reconstruction Era. Some 4,000 native males had served the Confederacy and survivors faced a dismal future upon their return. The war's aftermath of economic and social upheaval also created a climate for political change. Historians related that carpetbaggers had seized control of nearby Wilmington and their stranglehold resulted in corruption at all levels of government. In 1873, landowners organized at Long Creek Village (former Lillington) to discuss plans to separate from New Hanover County's control. During February 1875, the future constituents of Pender County voted to form their own county and succeeded by popular vote. The name Pender was selected to honor native son General William D. Pender. The City of South Washington (now Watha) was designated as the first government center but was replaced by the present county seat of Burgaw in 1879 (Bloodworth 1947:1,3).

The lack of navigable channels also hindered postwar recovery. In 1875/1876, a Federal civil engineer reported about impediments to navigation in southeastern North Carolina that included Rich Inlet. S. T. Albert noted that the depth of Rich Inlet was only 2.5 feet (U.S. War Department 1876:384). He also remarked that:

> Between Bogue Sound and Wilmington are five shallow sounds, with an occasional inlet, where coasters may find a haven. These sounds … are for the most part occupied by an intricate network of channels through which a canoe cannot pass. The storms sweep into the sounds a large amount of sand which the feeble backwater is unable to remove, and large deltas have been formed by the ocean inside the inlets (U.S. War Department 1876:388).

Rich Inlet's shallow, meandering channel possibly contributed to a mid-April 1877 shipwreck. According to *The Deseret News*, a "schooner, loaded with lumber, is ashore near Rich Inlet. The vessel is broken in two, and with her cargo is a total loss. It is feared that the crew are all lost" (*Deseret News* 1877). A contemporary Connecticut paper published a similar story (*Hartford Daily Courant* 1877). Within two years, a coastwise vessel bound for Charleston stranded in Rich Inlet, according to *The New York Times.* Following its departure from New York, the steam yacht *Elizabeth* "took fire" in the inlet during March 1879 and "was totally destroyed". The newspaper related that the yacht's crew was safely ashore (*The New York Times* 1879). In 1898, the U.S. Life-Saving Service compiled its annual report and advised Congress that over the course of a ten-year-period (1888-1897) there was one confirmed vessel stranding at Rich Inlet (U.S. Life-Saving Service 1898:453).

Navigational improvements made during the twentieth century prompted some changes along Pender and New Hanover counties. During the 1920s, construction began on the Intracoastal Waterway (ICW), a protected waterway traversing the entire eastern seaboard of the United States. It was hoped that the waterway would facilitate coastal trade and open areas of the coast that had little access to transportation outlets. Prior to 1930, Beaufort remained the southern terminus of the ICW. To the south of that North Carolina port, the waterway resumed at Winyah Bay, South Carolina. Federal legislation enacted during the late 1920s approved construction of a 93-mile long waterway between the port cities of Beaufort and Wilmington. The projected waterway was expected to increase shipments of "large quantities of lumber, seafood, fertilizer, petroleum products, and general merchandise through the intervening sounds" (Angley 1984:8).

Those changes, however, had no impact on vessel traffic navigating through Rich Inlet. In 1922, the U.S. Coast and Geodetic Survey reported on the status of all North Carolina inlets remarking that: "Rich and Queens Inlets are 5 miles and 8½ miles, respectively, westward of New Topsail Inlet, and have channel depths over their bars of 2 to 4 feet at low tide. They are used to some extent as anchorages by small local craft but are not recommended to strangers" (U.S. Department of Commerce 1922:58-59).

The lack of vessel traffic in Rich Inlet did not deter local fishing craft, and apparently encouraged bootleg whisky enterprises on the northern end of Figure Eight Island. According to some accounts "there were quite a few illegal stills" producing illicit liquors during Prohibition (1919-1933). In particular, a still operated by "Rod Rogers" located at Big Oak Landing produced some five gallons of whiskey per

week. Situated at the base of a high bank along the creek, and backed by heavy foliage and large oaks, Roger's distillery was only accessible by high tide (Nadeau 1998:18-19; Zepke 2004:187).

During World War II, at least 12 American tankers and freighters were sunk in Onslow Bay after being torpedoed by German U-boats. The majority of those commercial vessels were lost during March and April 1942. Conversely, the 218-foot *U-352* was destroyed in the bay after being depth-charged by the USCG cutter *Icarus* (Gentile 1992:193-209; Survivor Topsail 2005).

In response to U-boat activity north of Figure Eight Island, coast guard auxiliary vessels were stationed at Rich and Mason inlets to watch for enemy submarines. A Porter's Neck resident who served in the inlet patrol later reported that two U.S. Army airplanes crashed at Figure Eight Island. J. Knight Davis recalled that one crashed into the ocean, and a possible Thunderbolt "cracked up on the dunes". In respect to the latter incident, the pilot survived and walked away. Davis maintained that the plane wreckage was visible for several years. The former coast guard observer also suggested that a "wrecked dredge" washed up on the island's south end (Nadeau 1998:20).

A Rich Inlet fisherman named Eugene Casteen provided information that P-47 and P-39 pilots used the beaches of Figure Eight as a strafing range in World War II. Flying out of their training base at Bluethenthal Field (ILM Airport), the five to six planes would fire at beach targets laid out by Casteen and others. Primitive barracks were constructed on the island to accommodate U.S. Army soldiers and USCG personnel, who served in mounted beach patrol units. A small pier was also constructed on the shoreline of the sound. After the global conflict ended, the federal government apparently abandoned the barracks. In the postwar period, fishermen and squatters occupied the shacks (Nadeau 1998:20-21; Zepke 2004:187-188).

Modern Development on Figure Eight Island

In 1955, two New Hanover County businessmen sought to purchase the 1,300-acre barrier island from descendents of the Foy and Hutaff families. After protracted negotiations, brothers Dan and Bruce Cameron purchased the island for approximately $100,000. Due to the extensive damage caused by Hurricane Hazel in 1954, the oceanfront property was probably seen as a liability to the previous owners (Nadeau 1998:15-16).

In April 1967, the U.S. Department of Defense released details regarding "Exercise Kitty Hawk", in which 70,000 air and ground troops would train during late summer along the North Carolina coast. Rich Inlet was designated as the southernmost staging area for "the biggest U.S. war games since the Vietnam buildup". According to the U.S. Strike Command, one phase of the military exercise

would include an amphibious Marine landing to coordinate with U.S. Army, U.S. Air Force, and U.S. Navy training maneuvers. The joint operation was scheduled to commence in late August 1967 (*The Dispatch* 1967).

During October 1977, New Hanover County filed a Superior Court petition to resolve a longstanding dispute between the county and Pender County. The legal action involved a 147-acre tract at the north end of Figure Eight Island, "over which both counties claim[ed] jurisdiction". Specifically, the disputed tract was "bounded on the west by Nixon Channel, on the north by Rich Inlet, and on the east by the Atlantic Ocean" (*Morning Star* 1977; Meyer 1978:7-C). Jurisdiction of Figure Eight Island was eventually awarded to New Hanover County, and the official county boundaries are located within Rich Inlet (Fennell 1982:2B).

By early 1982, Figure Eight Island was still largely undeveloped and its natural character was preserved to a great degree. Access to the island was prohibited by "invitation only" and was facilitated by a private bridge (Schoenbaum 1992:234). Fishing enthusiasts continued to enjoy superb catches near the island, and benefited from the state's artificial reef program. Beginning in 1973, the N.C Division of Marine Fisheries (NCDMF) also deposited discarded tires on fishing reefs including sites off Rich's Inlet, and nearby Topsail Beach to enhance commercial and recreational fishing (*Morning Star* 1975).

Seventy mph winds created by Hurricane Diana in September 1984 prompted a brief, voluntary evacuation of Figure Eight Island. A modern houseboat sank at the yacht club marina during the storm, and some residents later reported seeing "the shell of a wooden ship washed up on the beach" [near Dan Cameron home]. Witnesses observed "creosoted heart of pine wood" and "solid copper, hand cast nail spikes." Islanders noted that the wreck disappeared into the surf within days of the initial sighting (Nadeau 1991:89; 1998:90-92).

On 4 December 1984, N.C. underwater archaeologists Richard Lawrence and Leslie Bright visited Figure Eight Island to examine a wreck reported by Mr. Bob Maready. Mr. Lawrence and Mr. Bright conducted a visual inspection "from the point where the mainland access road intersects the beach, south to Rich Inlet" but were unable to relocate any vessel remains. In his previous telephone report, Mr. Maready described "cypress or oak" wooden remains with brass spikes and pins, and suggested that the overall dimensions of the wreck measured some 36 feet by 10 feet (Lawrence 1985:1).

During the 4 December visit, Mr. Lawrence and Mr. Bright also conducted a brief survey of the remains (Site 0001-FEB) of another wooden vessel that was situated "across the street and just south of the house at 524 Beach Drive in a wooded thicket" (Lawrence 1985:1). According to Nadeau (1998:54), the remains were near the north end of the island on a lot at 521 Beach Road North and were discovered by Robert Pollock in the early 1980s. Mr. Lawrence reported that Site 0001-FEB was "at the base of a dune system and was apparently deposited at a time when the inlet was situated south of its present location or during a time of extreme overwash". (Lawrence 1985:1-2). Historical records indicate that at least two inlets now closed

once existed on the northern end of Figure Eight Island. By 1991, "the fragmented spine of the ship" was still visible with its attached "rusted spikes and bolts" (Nadeau 1998:54-56).

In March 1985, the NCDMF cautioned mariners approaching Rich Inlet to avoid the sunken hulk of the *Wild Dayrell* as strong currents had swept away markers placed at the site in 1983. A local marina operator reported that at least six boats struck the wreck during 1984, and sustained damage. At this time, numerous vessels were navigating through Rich Inlet on "a typical summer day" (Headrick 1985).

A Wilmington newspaper published in 1986 informed readers about local fishing tournaments, and specifically advised king mackerel anglers to motor some six miles off Rich Inlet to Dallas Rock where large, sharp ledges attracted the popular finfish. In addition to the presence of king mackerel, sportsmen were able to catch abundant bluefish, dolphin, grouper, marlin, and wahoo aboard charter or private vessels off Rich Inlet (Cooney 1986).

During the 1990s, several hurricanes caused significant damage to coastal Pender and New Hanover counties, and resulted in the evacuation of thousands of residents and tourists. In November 1994, the area was subjected to the prolonged and erratic path of tropical storm Gordon, which whipped up 11-foot waves in some locations to cause serious beach erosion. Although Hurricane Bertha made landfall near Surf City in mid-July 1996 with sustained winds of 110 mph, the storm's greatest impact was the loss of revenue when tourists and residents were forced to leave barrier island accommodations. In early September 1996, Hurricane Fran came ashore within miles of Bertha's landfall site with maximum winds of 115 mph (122 mph per NOAA). Both 1996 tropical systems generated severe gales, floodwaters, and near-record storm surges (*The Charlotte Observer* 1994; Geroux 1996; Sack 1996; Torriero 1996).

A Figure Eight Island homeowner commented that every structure on the barrier island was damaged during Hurricane Fran, and that all docks and beach steps were lost. Sand was re-deposited to a depth of three feet on all roads (Nadeau 1998:9). In late August 1998, Hurricane Bonnie struck the same coastline with maximum winds of 115 knots and near-record rainfall totals. Hurricane Dennis skirted the coastline in late August 1999, which prompted officials to issue mandatory evacuation of low lying areas and some barrier island communities. In September 1999, epic flooding caused by Hurricane Floyd devastated Pender and New Hanover in addition to numerous other North Carolina counties (*Atlanta Journal-Constitution* 1998; Pressley 1999; *The Charlotte Observer* 1999).

Hurricane Isabel struck the North Carolina coast in mid-September 2003, and the effects of the storm may have dislodged a wreck that appeared in the vicinity of Rich Inlet several weeks later. On 14 November 2003, wreckage was found on the southern bank of the newly aligned Mason Inlet [between Figure Eight Island and Wrightsville Beach]. A local fisherman observed the vessel frame that was located "several hundred feet inland from the mouth of the inlet", and reported the site to

the N.C. UAB at Fort Fisher. Archaeologists were not able to view the wreckage but suggested that the remains might be related to those described in the 6 March 1985 *Memorandum*, which were identified as the Maready Site (Henry 2003:1).

Currently, Figure Eight Island is advertised as one of the most pristine privately owned beach properties in North Carolina. Development on the island is strictly managed to maintain its picturesque and tranquil character. Amenities include a luxurious yacht club that features a restaurant, marina, and tennis courts. Due to its exclusivity and seclusion, celebrities and politicians favor the island. Over 400 "aesthetically pleasing" homes are situated amid the island's maritime forests and high, rolling dunes (Barefoot 2005:170).

Previous Investigations

In 1984, the wreck of the *Wild Dayrell* (0001RII) was examined by the UAB staff and subsequently mapped in 1989 by students of the ECU Program in Maritime History and Underwater Archaeology. Although the dimensions of the hull were impossible to precisely establish because of deterioration of the structure, the overall length of the wreck corresponded closely with the 215-foot length of the *Wild Dayrell* recorded on that vessel's CBR. The 20-foot beam and 50-foot length of the engine room recorded at the wreck site also correspond precisely with those recorded on the CBR. The *Wild Dayrell*'s CBR and historical data associated with the vessel confirm that the ship was powered by two oscillating engines, or steam cylinders; the same number of oscillating cylinders were identified at the wreck site. With these data, it was determined that this wreck represents the probable remains of the *Wild Dayrell*.

On 31 May 2002, the UAB conducted an inspection dive on the *Wild Dayrell*, prompted by reports that the wreck had been exposed. A secondary goal of this inspection was to record accurate coordinates for the wreck site with the UAB's DGPS. Diving took place at high tide with the upper portions of the boilers four feet from the water surface. Along with obtaining coordinates, it was determined that the shipwreck appeared to be in the same condition as when it was examined by the UAB and ECU field school (Lawrence 2002).

On 3 September 2006, Tidewater Atlantic Research, Inc. (TAR) of Washington, North Carolina carried out a remote-sensing survey to determine the exact position of the wreck site of the Civil War blockade-runner *Wild Dayrell*. That remote-sensing survey was conducted for CPE-NC, working with the Figure Eight Island Beach Homeowners Association on the inlet and shoreline management project. As one of the project alternatives involved the repositioning of the Rich Inlet channel, the investigation carried out by TAR personnel relocated the *Wild Dayrell* and accurately established the location of the wreck using differential global positioning. On the recommendation of Richard Lawrence, head of the North Carolina UAB, a 400-foot by 600-foot protective buffer zone was established around the wreck site.

Description of Findings

An analysis of the remote-sensing data identified a total of 116 individual magnetic anomalies and 6 sonar targets within the area surveyed (Figure 8, Appendix B and Figure 9). Five clusters, composed of 13 individual anomalies, contained signature characteristics suggestive of potentially significant cultural material. Cluster RI-1 is composed of two associated magnetic signatures and a sonar image suggestive of possible ballast (Figure 8, Appendix B and Appendix C). As these signatures are suggestive of potentially significant cultural material, avoidance of these targets is recommended by the creation of a 150-foot radius buffer. Cluster RI-2 is composed of three magnetic anomalies (Figure 8 and Appendix B). Their proximity to each other along with their signature characteristics are suggestive of potentially significant cultural material. Avoidance of cluster RI-2 is recommended by the creation of a 100-foot radius buffer. Cluster RI-3 is composed of five magnetic anomalies (Figure 8 and Appendix B). Their proximity to each other along with their signature characteristics are suggestive of potentially significant cultural material. Avoidance of cluster RI-3 is recommended by the creation of a 150-foot radius buffer. Anomaly RI-4 is composed of a single magnetic anomaly (Figure 8 and Appendix B). Sonar identified possible structural debris at the site (Appendix C). Due to this anomaly's proximity to the *Wild Dayrell*, it could be disarticulated structure associated with that wreck. Avoidance of RI-4 is recommended by the creation of a 100-foot radius buffer. Cluster RI-5 is composed of two magnetic anomalies and a sonar image suggestive of possible structural debris (Figure 8, Appendix B and Appendix C). As these signatures are suggestive of potentially significant cultural material avoidance is recommended by the creation of a 100-foot radius buffer. Should avoidance prove impossible, additional investigation designed to fully assess each anomaly's historical and archaeological significance in terms of NRHP eligibility is recommended.

The remaining 103 magnetic targets in the survey area contained signature characteristics suggestive of modern material such as traps, anchors, pipe, rebar, small cable, moorings, and moored vessels (Figure 8 and Appendix B). Three targets, 81, 94, and 95, had associated sonar images illustrating a crab trap, scattered modern debris, and a tire, respectively (Appendix C). As the sensor was within several feet of the bottom, even small ferrous objects will generate a significant magnetic target. The cesium vapor magnetometer will also identify targets well in advance of their position and continue to record the associated magnetic disturbance well after crossing material generating the signature. This assessment is verified by modern material recorded by the sonar (Figure 9 and Appendix C). As their signature characteristics are suggestive of modern material, those 103 individual magnetic anomalies are not recommended for avoidance or additional investigation in conjunction with the proposed project.

Within the proposed survey area two locations proved to be inaccessible. One area was located in the surf zone off the north end of Figure Eight. The second was on a shoal west of the location of the *Wild Dayrell*. Breaking water in both areas proved to be too rough and shallow for safe vessel operations and too rough and deep for terrestrial survey means.

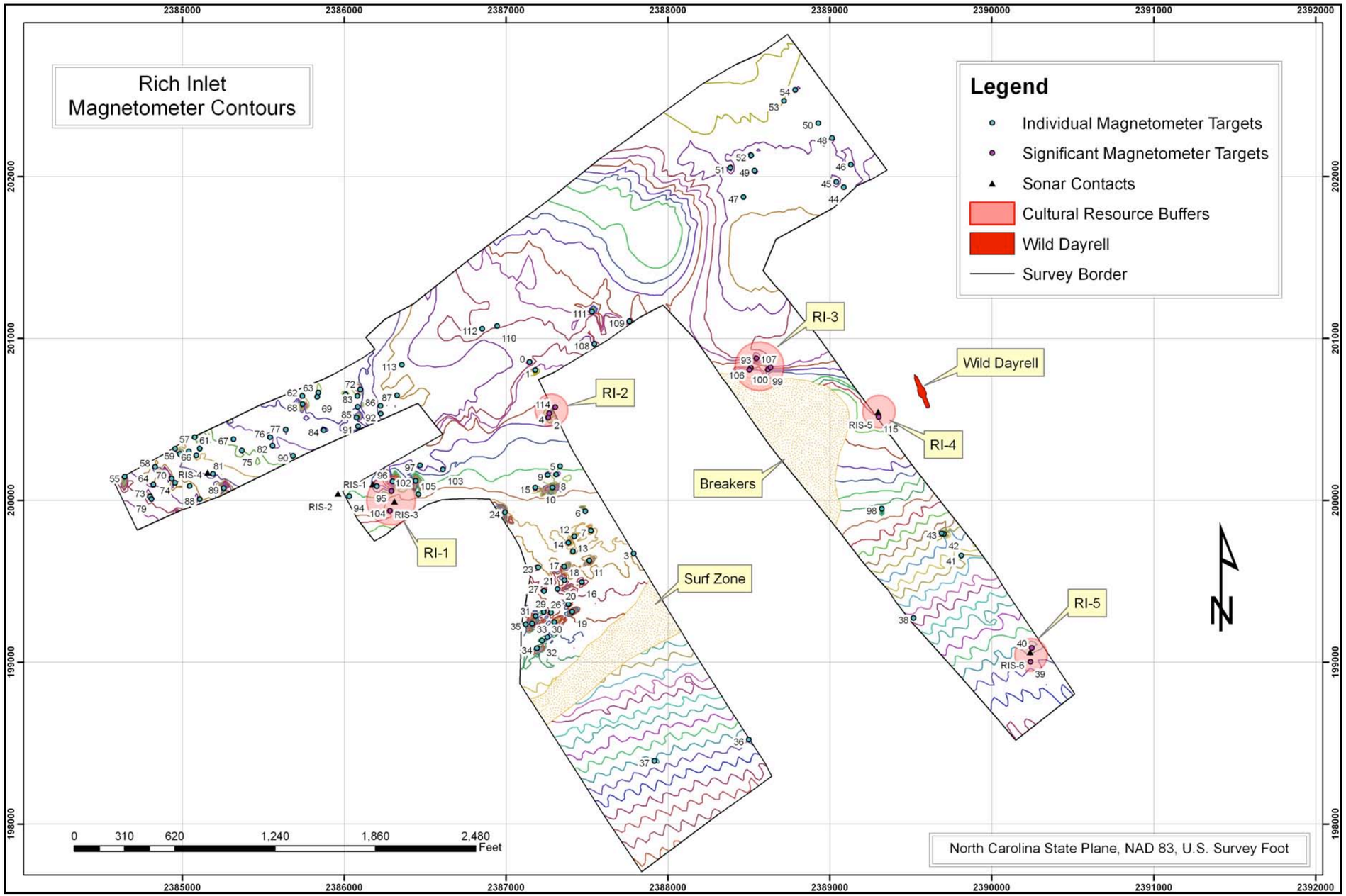

Figure 8. Magnetic contour map.

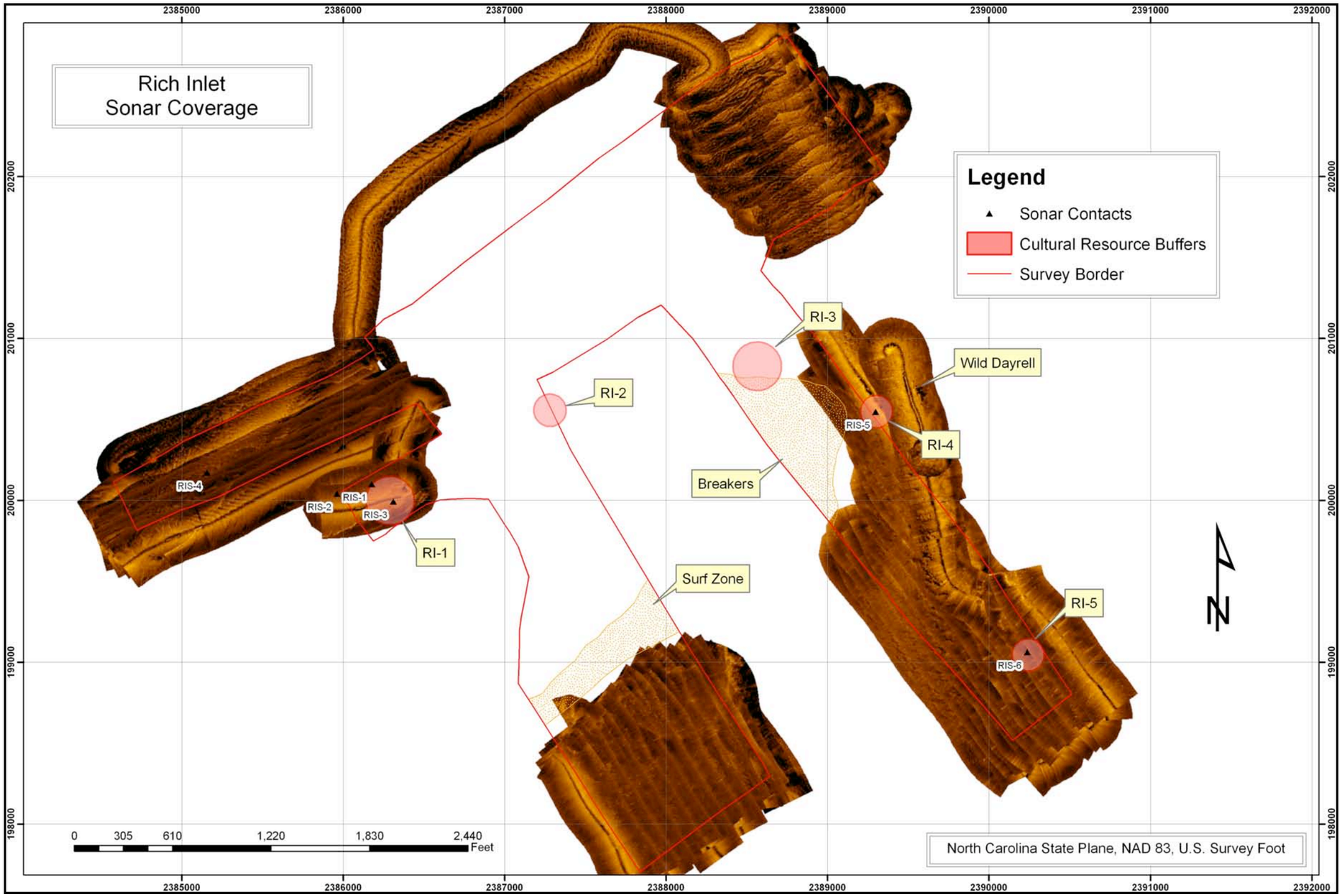

Figure 9. Sonar coverage map.

Conclusions and Recommendations

Development in the immediate vicinity of Rich Inlet is relatively modern and closely associated with Figure Eight Island. Because channels associated with Rich Inlet were limited in terms of both depth and access to habitable areas on the adjacent coast, navigation in the inlet has historically been limited. With the exception of very small craft, larger vessel traffic has been almost entirely associated with the consequences of mechanical disaster, war and weather. Documented wrecks in Rich Inlet or in the immediate vicinity have all been a result of one or more of those factors. While there are at least 5 documented wrecks in the vicinity of the proposed borrow area only one, *Wild Dayrell*, has been identified to date. The anomaly concentrations identified for avoidance or additional investigation could be associated with other documented wrecks.

The remote-sensing survey identified a total of 116 individual magnetic targets and 6 sonar targets (Appendix B and C). Five anomalies, composed of 13 individual magnetic targets and 3 associated sonar targets, contain signature characteristics suggestive of potentially significant cultural material. These five anomalies are recommended for avoidance. Should avoidance prove impossible, additional investigation designed to fully assess each anomaly's historical and archaeological significance in terms of NRHP eligibility is recommended. The remaining 103 and three associated sonar targets are indicative of modern debris such as traps, anchors, pipe, rebar, and small cable. No avoidance or additional investigation of these 103 individual magnetic targets is recommended in conjunction with the proposed project.

As there are no data for the two inaccessible areas, dredging operations in both locations should be carefully monitored for contact with submerged cultural resources. In the event that historic vessel material is identified, dredging should be shifted away from the material until an assessment of its NRHP eligibility can be made by archaeologists under contract to CPE-NC and personnel from the UAB at Fort Fisher.

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Appendix A

Known wrecks in the vicinity of Rich Inlet, North Carolina

Vessel	Type	Use	Date of Loss	Location	Disposition
Abdel Kader	schooner	coast trade-naval stores	September 1857	25/30 miles N of New Inlet	
Wild Dayrell	paddle steamer	blockade runner	February 1864	South of Figure Eight Island	
Unknown	schooner	lumber	April 1877	Near Rich Inlet	total loss
Elizabeth	steam yacht		March 1879	Rich Inlet	caught fire/total loss
Unknown	aircraft	U.S. Army	WWII	Ocean off Figure Eight Island	crashed & sunk
Unknown	Thunderbolt ? aircraft	U.S. Army	WWII	Dunes on Figure Eight Island	wreckage visible for several years
Unknown	dredge			South end of Figure Eight Island	
Unknown	wooden			South of Rich Inlet-521 Beach Rd N	remains of keel
Unknown	wooden			Near Don Cameron home	washed ashore during 1984 hurricane
Unknown	houseboat	pleasure	September 1984	Figure Eight Island marina	sank during hurricane
Unknown	Wooden			southern bank of Mason Inlet	appeared after hurricane

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Appendix B

Magnetic Target List
(All coordinates North Carolina State Plane, NAD 83, U.S. Survey Foot)

Anomaly	Map Designation	Characteristics	X	Y	Sonar	Recommendations
RI-1	101	3-1-mc12g167f	2386290.7	200057.5	RIS-3	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Sonar image suggestive of possible ballast. Avoidance by the creation of a 150-foot radius buffer is recommended.
	104	4-1-mc39g123f	2386282.2	199935.2	RIS-3	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Sonar image suggestive of possible ballast. Avoidance by the creation of a 150-foot radius buffer is recommended.
RI-2	2	27-1-nm51g149f	2387266.3	200536.7	No	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Avoidance by the creation of a 100-foot radius buffer is recommended.
	4	26-1-mc67g114f	2387260.5	200510.0	No	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Avoidance by the creation of a 100-foot radius buffer is recommended.
	114	28-3-nm98g147f	2387302.6	200575.0	No	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Avoidance by the creation of a 100-foot radius buffer is recommended.
RI-3	93	1-1-pm24g67f	2388545.7	200876.5	No	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Avoidance by the creation of a 150-foot radius buffer is recommended.

RI-3, cont'd	99	2-2-nm5g33f	2388617.3	200807.1	No	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Avoidance by the creation of a 150-foot radius buffer is recommended.
	100	2-3-nm8g68f	2388512.3	200817.0	No	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Avoidance by the creation of a 150-foot radius buffer is recommended.
	106	9-1-mc5g134f	2388502.2	200805.3	No	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Avoidance by the creation of a 150-foot radius buffer is recommended.
	107	9-2-nm5g40f	2388633.0	200821.1	No	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Avoidance by the creation of a 150-foot radius buffer is recommended.
RI-4	115	14-1-pm4g24f	2389302.0	200513.9	RIS-5	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Sonar image suggestive of possible disarticulated structure from the *Wild Dayrell*. Avoidance by the creation of a 100-foot radius buffer is recommended.
RI-5	39	11-1-dp4g89f	2390239.3	199000.4	RIS-6	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Sonar image suggestive of possible disarticulated structure. Avoidance by the creation of a 100-foot radius buffer is recommended.
	40	12-1-dp10g75f	2390248.4	199086.1	RIS-6	Magnetic signature characteristics, intensity, and duration suggest that material generating the anomaly could be associated with the remains of a vessel or potentially significant cultural resource. Sonar image suggestive of possible disarticulated structure. Avoidance by the creation of a 100-foot radius buffer is recommended.

Individual Magnetic Targets

Map Designation	Name	X	Y	Sonar	Recommendations
0	28-1-nm24g62f	2387145.7	200853.4	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
1	28-2-nm16g58f	2387179.8	200803.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
3	27-2-dp9g34f	2387787.4	199670.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
5	25-1-mc28g52f	2387332.4	200208.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
6	25-2-mc124g127f	2387488.9	199931.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
7	24-1-mc26g72f	2387523.1	199811.6	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
8	24-2-pm18g55f	2387307.7	200158.6	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
9	23-1-dp51g26f	2387256.1	200155.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
10	23-2-dp425g22f	2387286.4	200076.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
11	22-1-mc101g61f	2387513.8	199626.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
12	22-2-dp38g27f	2387421.0	199775.4	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
13	21-1-mc111g30f	2387413.2	199684.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
14	21-2-mc122g44f	2387384.3	199737.5	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
15	21-3-mc52g62f	2387179.4	200076.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
16	20-1-mc85g49f	2387467.0	199494.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
17	19-1-nm67g67f	2387359.4	199589.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
18	18-1-mc31g203f	2387360.5	199504.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.

19	17-1-pm69g23f	2387408.1	199310.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
20	17-2-dp41g41f	2387384.8	199357.5	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
21	17-3-nm23g19f	2387317.8	199451.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
22	16-1-pm23g36f	2387331.1	199368.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
23	16-2-dp23g32f	2387197.7	199584.5	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
24	16-3-mc101g288f	2386991.5	199924.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
25	15-1-mc72g50f	2387297.1	199245.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
26	15-2-mc24g23f	2387277.7	199305.3	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
27	15-3-mc19g41f	2387233.0	199438.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
28	14-1-mc84g28f	2387301.9	199179.3	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
29	14-2-mc60g98f	2387231.6	199308.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
30	13-3-mc56g53f	2387254.2	199153.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
31	13-2-mc35g99f	2387182.3	199283.8	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
32	12-1-mc78g30f	2387222.0	199131.4	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
33	12-2-dp177g36f	2387160.0	199237.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
34	11-1-mc178g40f	2387190.2	199084.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
35	11-2-pm75g17f	2387120.6	199232.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
36	28-1-mc4g67f	2388499.6	198520.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
37	16-1-dp3g45f	2387916.5	198388.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.

38	3-1-dp3g41f	2389517.0	199272.3	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
41	12-2-pm5g26f	2389812.6	199656.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
42	12-3-dp61g109f	2389703.7	199790.8	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
43	16-1-pm8g66f	2389689.9	199795.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
44	29-1-pm4g138f	2389085.5	201933.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
45	28-1-nm8g83f	2389040.1	201966.3	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
46	27-1-pm3g74f	2389129.1	202072.5	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
47	24-1-pm5g29f	2388466.2	201872.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
48	23-1-pm4g41f	2389013.9	202237.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
49	22-1-nm8g31f	2388534.0	202035.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
50	21-1-nm4g59f	2388927.5	202329.6	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
51	20-1-nm14g50f	2388385.6	202053.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
52	20-2-mc8g64f	2388514.1	202129.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
53	16-1-dp4g111f	2388717.0	202466.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
54	15-1-dp6g107f	2388785.2	202534.8	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
55	2-1-pm22g45f	2384643.0	200144.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
56	2-3-pm3g58f	2384954.3	200316.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
57	2-4-pm9g26f	2385076.3	200387.8	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
58	3-1-mc14g55+f	2384830.5	200205.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.

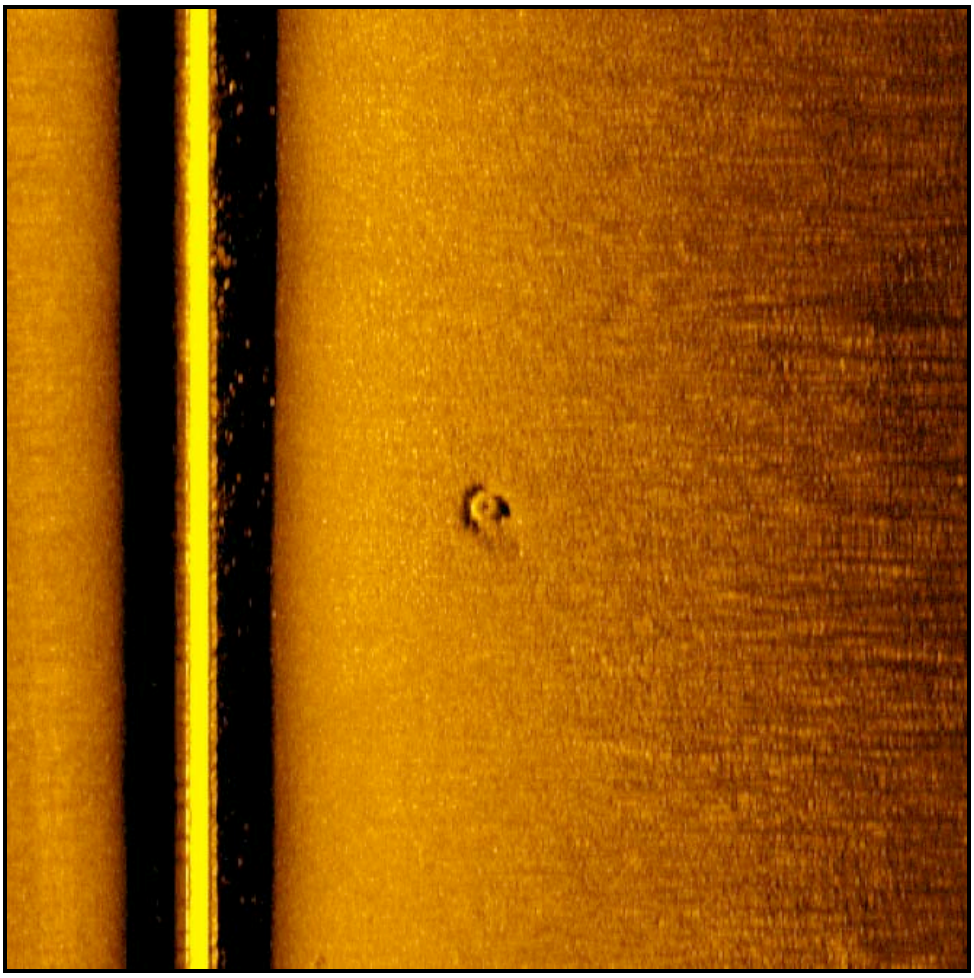
59	3-2-dp47g97f	2384982.9	200286.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
60	3-3-pm3g21f	2385039.9	200301.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
61	3-4-pm3g41f	2385106.8	200319.4	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
62	3-5-pm7g34f	2385741.0	200644.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
63	3-6-dp13g79f	2385839.1	200664.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
64	4-1-pm5g25f	2384820.4	200096.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
65	4-2-dp49g79f	2384892.6	200167.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
66	4-3-pm4g31f	2385086.1	200277.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
67	4-4-pm4g78f	2385315.4	200377.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
68	4-5-dp92g134f	2385741.7	200592.8	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
69	4-6-nm4g45f	2385832.7	200638.3	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
70	5-1-dp11g72f	2384932.4	200134.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
71	5-2-pm6g47f	2386007.3	200653.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
72	5-3-dp20g107f	2386098.8	200684.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
73	6-1-pm14g68f	2384799.1	200021.6	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
74	6-2-mc12g100f	2384954.1	200107.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
75	6-3-mc3g138f	2385366.5	200306.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
76	6-4-dp8g81f	2385540.2	200388.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
77	6-5-nm3g74f	2385637.5	200435.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.

78	6-6-mc2g113f	2386080.6	200642.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
79	7-1-pm6g78f	2384808.6	200005.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
80	7-2-dp5g58f	2385044.6	200087.5	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
81	7-3-pm4g60f	2385187.9	200162.7	RIS-4	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. Sonar confirms the presence of a crab trap. No additional investigation is recommended.
82	7-4-dp9g119f	2385555.9	200336.5	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
83	7-5-mc6g173f	2386082.7	200575.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
84	8-2-pm5g45f	2385873.0	200432.4	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
85	8-3-dp48g88f	2386075.9	200509.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
86	8-4-pm4g52f	2386223.7	200583.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
87	8-5-dp8g67f	2386326.2	200646.5	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
88	9-1-dp23g70f	2385107.5	200007.0	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
89	9-2-dp125g148f	2385254.7	200074.4	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
90	9-3-dp5g43f	2385683.3	200273.4	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
91	9-4-dp4g60f	2386084.8	200456.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
92	9-5-pm3g30f	2386225.3	200534.6	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
94	2-1-nm5g61f	2386029.6	200023.4	RIS-2	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. Sonar confirms the presence of modern debris. No additional investigation is recommended.
95	2-2-pm5g65f	2386200.1	200085.5	RIS-1	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. Sonar confirms the presence of a tire. No additional investigation is recommended.
96	2-3-dp70g159f	2386297.9	200116.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.

97	2-4-pm8g68f	2386468.3	200215.3	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
98	2-1-pm13g34f	2389320.5	199946.7	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
102	3-2-dp251g127f	2386440.6	200119.6	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
103	3-3-pm9g166f	2386609.1	200190.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
105	4-2-pm5g42f	2386458.3	200036.8	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
108	11-1-dp13g68f	2387544.5	200964.4	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
109	13-1-nm23g110f	2387761.4	201106.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
110	16-1-pm4g58f	2386943.8	201075.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
111	16-1-nm25g43f	2387529.4	201164.2	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
112	17-1-pm4g73f	2386852.5	201058.1	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.
113	18-1-dp3g87f	2386354.5	200835.9	No	Signature suggestive of small diameter pipe, trap, anchor or other small modern debris. No additional investigation is recommended.

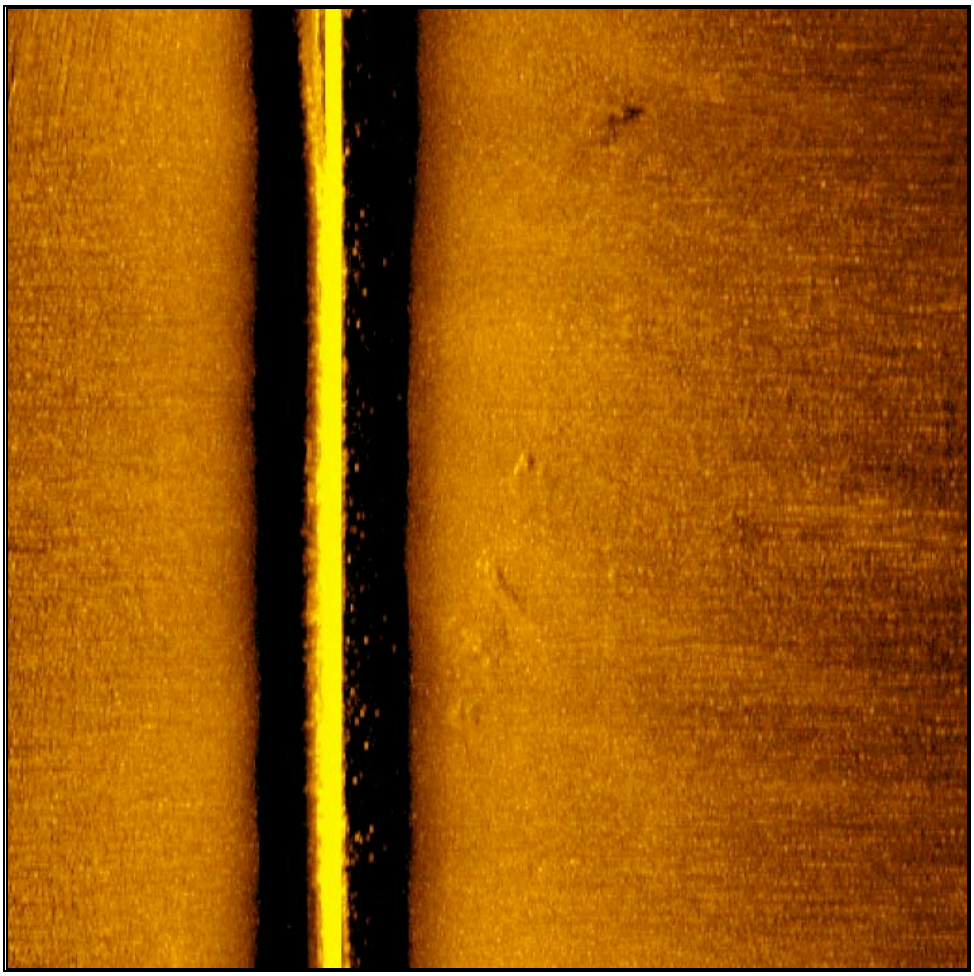
Appendix C
Sonar Targets

RIS-1



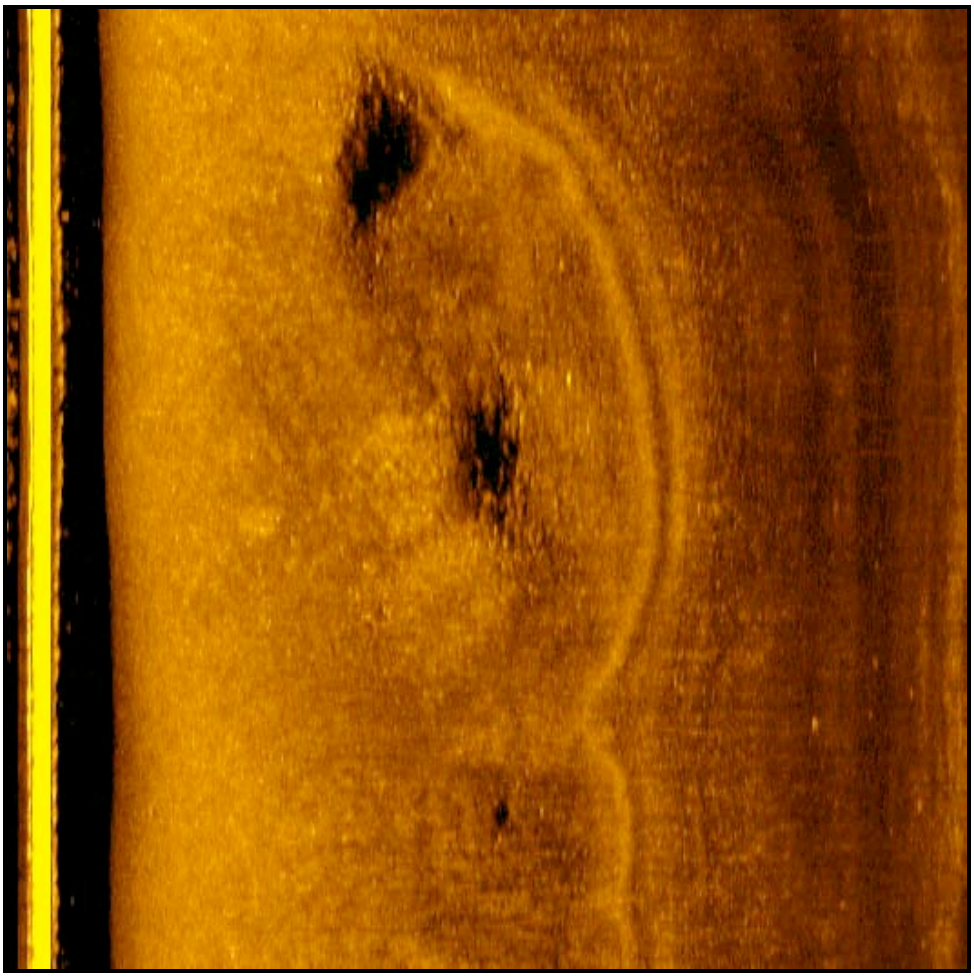
Contact Info: RIS-1	User Entered Info
• Sonar Time at Target: 03/08/2010 21:08:19 • Click Position (Projected Coordinates) (X) 2386175.50 (Y) 200099.91 • Map Proj: NAD83 North Carolina State Planes, US Foot • Acoustic Source File: RI10_L12-4_100308160900.xtf • Ping Number: 238760 • Range to Target: 14.84 US Feet • Fish Height: 3.71 US Feet • Line Name: RI10_L12-4_100308160900	Target Height: 0.5 US Feet Target Length: 5.0 US Feet Target Shadow: 2.0 US Feet Target Width: 5.0 US Feet Mag Anomaly: 95 Avoidance: No Description: Tire

RIS-2



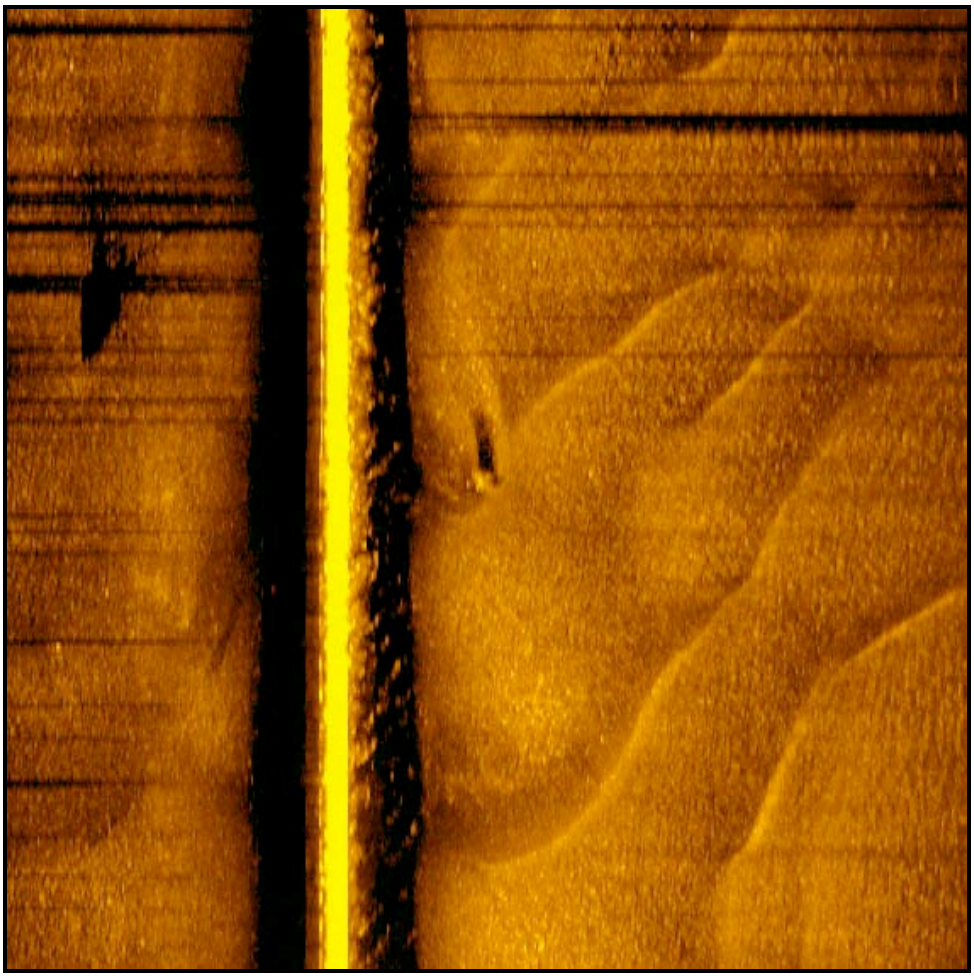
Contact Info: RIS-2	User Entered Info
• Sonar Time at Target: 03/08/2010 21:08:48 • Click Position (Projected Coordinates) (X) 2385961.25 (Y) 200041.34 • Map Proj: NAD83 North Carolina State Planes, US Foot • Acoustic Source File: RI10_L12-4_100308160900.xtf • Ping Number: 239185 • Range to Target: 7.91 US Feet • Fish Height: 3.81 US Feet • Line Name: RI10_L12-4_100308160900	Target Height: N/A Target Length: N/A Target Shadow: N/At Target Width: N/A Mag Anomaly: 94 Avoidance: No Description: Modern Debris

RIS-3



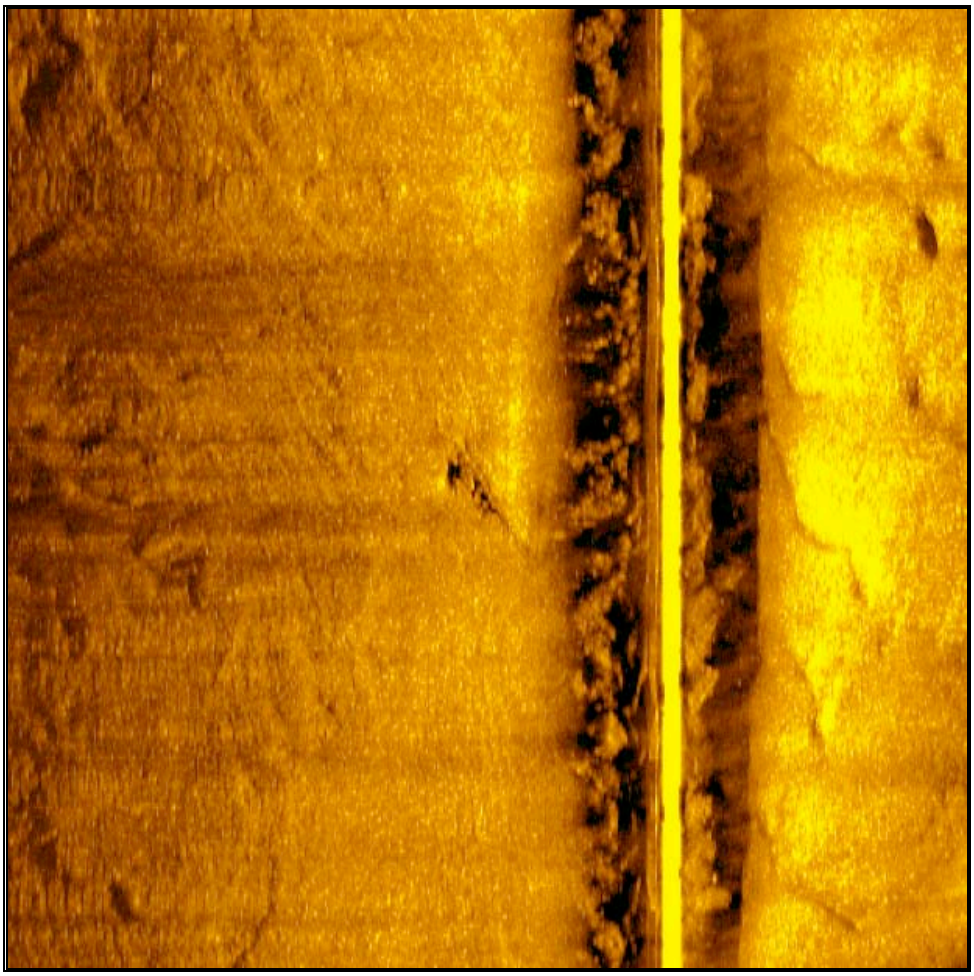
Contact Info: RIS-3	User Entered Info
• Sonar Time at Target: 03/08/2010 21:09:53 • Click Position (Projected Coordinates) (X) 2386309.75 (Y) 199992.81 • Map Proj: NAD83 North Carolina State Planes, US Foot • Acoustic Source File: RI10_L12-4_100308160900.xtf • Ping Number: 240148 • Range to Target: 23.05 US Feet • Fish Height: 3.32 US Feet • Line Name: RI10_L12-4_100308160900	Target Height: 1.9 US Feet Target Length: 69.7 US Feet Target Shadow: 16.2 US Feet Target Width: 23.5 US Feet Mag Anomaly: 101, 104, RI-1 Avoidance: Yes Description: Depression with possible ballast

RIS-4



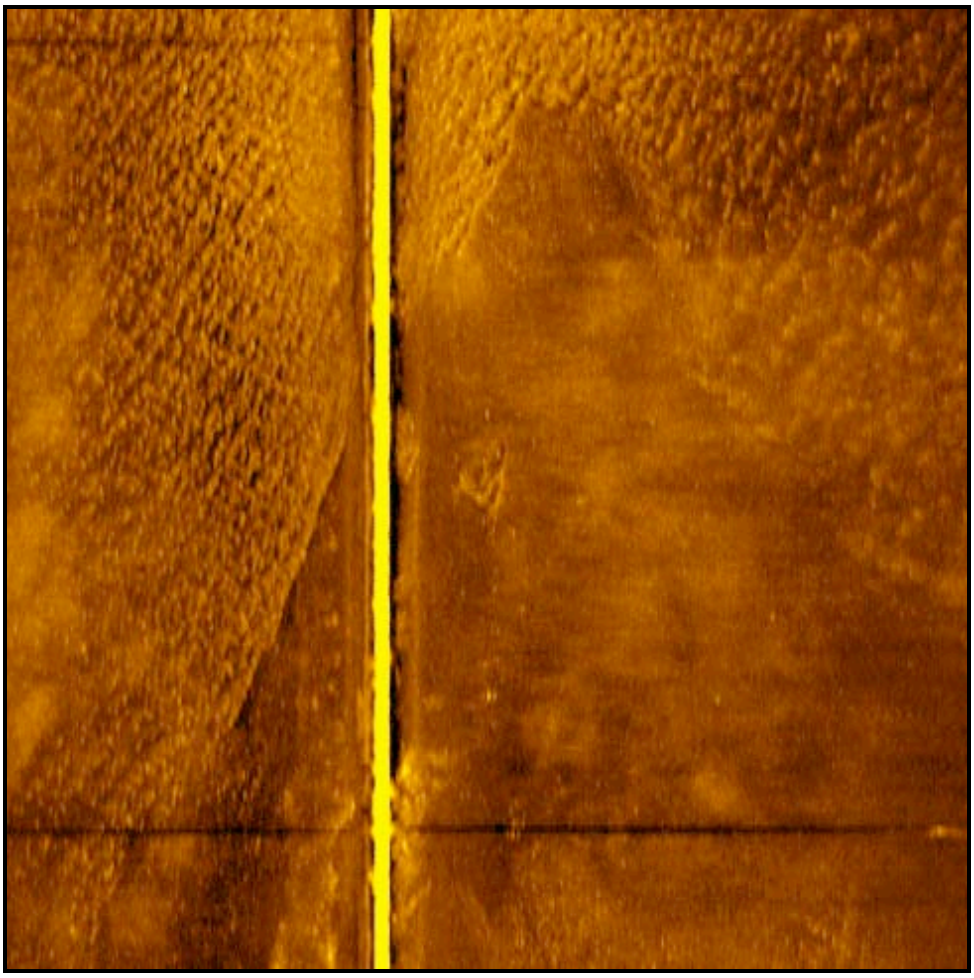
Contact Info: RIS-4	User Entered Info
• Sonar Time at Target: 03/08/2010 20:40:24 • Click Position (Projected Coordinates) (X) 2385155.75 (Y) 200171.19 • Map Proj: NAD83 North Carolina State Planes, US Foot • Acoustic Source File: RI10_L7-4_100308154000.xtf • Ping Number: 213590 • Range to Target: 6.17 US Feet • Fish Height: 3.52 US Feet • Line Name: RI10_L7-4_100308154000	Target Height: 0.0 US Feet Target Length: 1.9 US Feet Target Shadow: 0.0 US Feet Target Width: 1.9 US Feet Mag Anomaly: 81 Avoidance: No Description: Trap

RIS-5



Contact Info: RIS-5	User Entered Info
• Sonar Time at Target: 03/08/2010 18:57:07 • Click Position (Projected Coordinates) (X) 2389298.50 (Y) 200546.31 • Map Proj: NAD83 North Carolina State Planes, US Foot • Acoustic Source File: RI10_L01-2_100308135800.xtf • Ping Number: 104449 • Range to Target: 9.67 US Feet • Fish Height: 4.39 US Feet • Line Name: RI10_L01-2_100308135800	Target Height: 1.3 US Feet Target Length: 22.0 US Feet Target Shadow: 3.2 US Feet Target Width: 6.0 US Feet Mag Anomaly: 115, RI-4 Avoidance: Yes Description: Possible structure associated with the *Wild Dayrell*

RIS-6



Contact Info: RIS-6	User Entered Info
• Sonar Time at Target: 03/08/2010 18:44:35 • Click Position (Projected Coordinates) (X) 2390237.25 (Y) 199061.88 • Map Proj: NAD83 North Carolina State Planes, US Foot • Acoustic Source File: RI10_L01-2_100308134600.xtf • Ping Number: 93346 • Range to Target: 5.47 US Feet • Fish Height: 1.46 US Feet • Line Name: RI10_L01-2_100308134600	Target Height: 0.0 US Feet Target Length: 17.4 US Feet Target Shadow: 0.0 US Feet Target Width: 8.9 US Feet Mag Anomaly: 39, 40, RI-6 Avoidance: Yes Description: Possible structure

APPENDIX 6

2007 Hutaff Island Native Beach Composite Summary Tables

PROFILE LINE SUMMARY TABLE
HUTAFF ISLAND SAMPLES

PROFILE	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	% Carbonate
H1 COMPOSITE	0.20	2.33	0.64	0.89	5	6	6.9
H2 COMPOSITE	0.19	2.41	0.59	0.97	5	6	5.9
H3 COMPOSITE	0.24	2.03	1.16	1.14	5	6	17.0
BEACH COMPOSITE	**0.21**	**2.26**	**0.85**	**1.00**	**5**	**6**	**9.9**

PROFILE LINE DATA TABLE
HUTAFF ISLAND SAMPLES

SAMPLE I. D.	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	CUMULATIVE PERCENT RETAINED (SIEVES EXPRESSED IN PHI)																			
							GRAVEL						GRANULAR			SAND										FINE
							-4.25	-4.00	-3.50	-3.00	-2.50	-2.25	-2.00	-1.50	-1.00	-0.50	0.00	0.50	1.00	1.50	2.00	2.50	3.00	3.5	3.75	4	PAN
H1 COMPOSITE	0.20	2.33	0.64	0.89	5	6	0.00	0.00	0.00	0.00	0.01	0.03	0.06	0.19	0.42	0.89	1.47	2.24	3.51	6.31	17.25	56.32	93.70	98.68	99.04	99.11	99.98
H2 COMPOSITE	0.19	2.41	0.59	0.97	5	6	0.00	0.00	0.00	0.00	0.04	0.10	0.15	0.23	0.35	0.57	0.86	1.36	2.37	5.13	14.46	50.20	91.80	98.46	98.91	99.03	99.99
H3 COMPOSITE	0.24	2.03	1.16	1.14	5	6	0.00	0.00	0.09	0.18	0.55	0.86	1.21	2.18	3.67	5.96	8.29	10.93	14.29	18.82	28.29	55.63	92.19	98.41	98.77	98.86	99.99
BEACH COMPOSITE	**0.21**	**2.26**	**0.85**	**1.00**	**5**	**6**	**0.00**	**0.00**	**0.03**	**0.06**	**0.20**	**0.33**	**0.47**	**0.87**	**1.48**	**2.47**	**3.54**	**4.84**	**6.72**	**10.09**	**20.00**	**54.05**	**92.56**	**98.52**	**98.91**	**99.00**	**99.99**

PERCENTAGE OF MATERIAL BY SEDIMENT GRAIN SIZE CATEGORY
HUTAFF ISLAND (1 of 1)

SAMPLE I. D.	FINE % (<0.0625mm)	SAND % (0.0625mm-2.00mm)	GRANULAR % (2mm-4.76mm)	GRAVEL % (4.76mm-76mm)
H1 Dune	0.08	99.92	0.00	0.00
H1 Toe of Dune	0.11	99.89	0.00	0.00
H1 Mid-Berm	0.19	99.75	0.06	0.00
H1 (+3.0)	0.32	99.68	0.00	0.00
H1 MHW	0.16	99.84	0.00	0.00
H1 MTL	0.82	99.14	0.04	0.00
H1 MLW	0.58	94.60	4.48	0.34
H1 (-6.0)	1.31	98.43	0.26	0.00
H1 (-8.8)	1.54	98.38	0.08	0.00
H1 (-11.6)	1.41	98.56	0.03	0.00
H1 (-14.4)	1.71	98.23	0.06	0.00
H1 (-17.2)	1.59	98.41	0.00	0.00
H1 (-20.0)	1.73	98.12	0.15	0.00
H1 COMPOSITE	**0.89**	**98.69**	**0.40**	**0.03**
H2 Dune	0.34	99.66	0.00	0.00
H2 Toe of Dune	0.24	99.71	0.05	0.00
H2 Mid-Berm	0.33	99.60	0.07	0.00
H2 (+3.0)	0.56	99.44	0.00	0.00
H2 MHW	0.28	99.72	0.00	0.00
H2 MTL	0.98	99.02	0.00	0.00
H2 MLW	0.66	98.02	0.73	0.59
H2 (-6.0)	1.18	97.75	1.07	0.00
H2 (-8.8)	1.69	98.22	0.09	0.00
H2 (-11.6)	1.22	98.57	0.21	0.00
H2 (-14.4)	1.64	96.76	0.87	0.73
H2 (-17.2)	1.64	98.26	0.06	0.04
H2 (-20.0)	1.81	98.13	0.06	0.00
H2 COMPOSITE	**0.97**	**98.68**	**0.25**	**0.10**
H3 Dune	0.20	99.80	0.00	0.00
H3 Toe of Dune	0.64	99.36	0.00	0.00
H3 Mid-Berm	0.53	99.43	0.04	0.00
H3 (+2.0)	0.83	94.84	4.22	0.11
H3 MHW	0.84	91.53	7.08	0.55
H3 MTL	1.11	85.39	10.20	3.30
H3 MLW	1.10	82.35	9.86	6.69
H3 (-6.0)	1.19	95.61	3.07	0.13
H3 (-8.8)	1.76	98.21	0.03	0.00
H3 (-11.6)	1.59	97.37	0.81	0.23
H3 (-14.4)	1.56	97.75	0.57	0.12
H3 (-17.2)	1.78	97.82	0.40	0.00
H3 (-20.0)	1.71	98.02	0.27	0.00
H3 COMPOSITE	**1.14**	**95.19**	**2.81**	**0.86**
TOTAL BEACH COMPOSITE	**1.00**	**97.52**	**1.15**	**0.33**

PROFILE LINE COMPOSITES - HUTAFF ISLAND SAMPLES (1 of 1)

SAMPLE I. D.	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	CUMULATIVE PERCENT RETAINED (SIEVES EXPRESSED IN PHI)																				FINE
							GRAVEL						GRANULAR			SAND											PAN
							-4.25	-4.00	-3.50	-3.00	-2.50	-2.25	-2.00	-1.50	-1.00	-0.50	0.00	0.50	1.00	1.50	2.00	2.50	3.00	3.50	3.75	4.00	
H1 Dune	0.19	2.43	0.35	0.08	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.07	6.99	61.87	94.77	99.55	99.87	99.92	99.99
H1 Toe of Dune	0.19	2.40	0.35	0.11	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.06	0.37	8.96	63.55	96.34	99.64	99.85	99.89	100.00
H1 Mid-Berm	0.18	2.47	0.47	0.19	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.09	0.16	0.28	0.61	2.53	18.42	36.34	96.75	99.53	99.77	99.81	100.00
H1 (+3.0)	0.19	2.37	0.36	0.32	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.22	10.86	69.84	95.38	99.20	99.61	99.68	100.00
H1 MHW	0.20	2.30	0.32	0.16	7	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.27	14.09	77.29	98.74	99.66	99.82	99.84	100.00
H1 MTL	0.26	1.93	0.65	0.82	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.14	0.66	3.12	9.81	21.81	46.46	81.39	98.67	99.14	99.17	99.18	99.91
H1 MLW	0.36	1.47	1.23	0.58	6	7	0.00	0.00	0.00	0.00	0.13	0.34	0.75	2.32	4.82	10.20	16.14	21.63	26.95	37.24	53.34	81.98	98.32	99.27	99.40	99.42	100.00
H1 (-6.0)	0.19	2.41	0.56	1.31	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.26	0.47	0.85	1.40	2.57	4.88	12.67	47.83	94.06	98.50	98.66	98.69	99.99
H1 (-8.8)	0.15	2.73	0.41	1.54	3	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.08	0.15	0.20	0.29	0.43	0.84	2.54	19.33	80.23	96.17	98.10	98.46	99.98
H1 (-11.6)	0.20	2.30	0.55	1.41	5	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.17	0.47	1.12	2.64	7.13	20.89	58.93	95.33	98.50	98.57	98.59	99.99
H1 (-14.4)	0.19	2.42	0.47	1.71	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.10	0.20	0.45	1.02	3.11	14.27	51.93	92.84	98.17	98.25	98.29	99.95
H1 (-17.2)	0.17	2.55	0.43	1.59	4	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.12	0.26	0.59	1.80	7.75	39.67	88.77	98.01	98.33	98.41	99.98
H1 (-20.0)	0.17	2.54	0.47	1.73	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.15	0.20	0.29	0.48	0.85	1.78	7.03	42.23	87.87	97.55	98.15	98.27	100.00
H1 COMPOSITE	**0.20**	**2.33**	**0.64**	**0.89**	**5**	**6**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.03**	**0.06**	**0.19**	**0.42**	**0.89**	**1.47**	**2.24**	**3.51**	**6.31**	**17.25**	**56.32**	**93.70**	**98.68**	**99.04**	**99.11**	**99.98**
H2 Dune	0.19	2.43	0.36	0.34	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.44	9.91	56.30	96.60	99.41	99.61	99.66	100.00
H2 Toe of Dune	0.17	2.54	0.35	0.24	6	6	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.06	0.09	0.36	2.74	43.69	93.97	99.24	99.68	99.76	100.00
H2 Mid-Berm	0.22	2.21	0.45	0.33	7	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.07	0.09	0.13	0.31	1.01	4.87	26.78	76.15	98.28	99.46	99.63	99.67	99.97
H2 (+3.0)	0.20	2.29	0.34	0.56	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.09	1.00	15.80	74.73	98.50	99.31	99.43	99.44	99.98
H2 MHW	0.18	2.44	0.30	0.28	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	5.34	58.38	98.56	99.65	99.72	99.72	99.97
H2 MTL	0.20	2.34	0.36	0.98	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.39	16.36	66.31	97.97	99.00	99.01	99.02	99.97
H2 MLW	0.31	1.67	0.80	0.66	6	7	0.00	0.00	0.00	0.00	0.33	0.59	0.92	1.03	1.32	2.01	3.07	5.73	13.36	34.65	63.06	89.06	99.00	99.31	99.33	99.34	99.99
H2 (-6.0)	0.20	2.30	0.81	1.18	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	1.07	1.92	3.18	4.75	6.64	10.46	19.54	48.67	91.87	98.48	98.76	98.82	99.98
H2 (-8.8)	0.16	2.60	0.53	1.69	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.47	0.84	1.30	2.00	3.10	5.96	30.42	85.15	97.40	98.21	98.31	99.99
H2 (-11.6)	0.18	2.47	0.59	1.22	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.14	0.21	0.63	1.16	1.96	3.04	4.57	8.56	42.35	91.17	98.15	98.63	98.78	99.99
H2 (-14.4)	0.17	2.58	0.77	1.64	4	6	0.00	0.00	0.00	0.00	0.18	0.73	0.81	1.17	1.60	1.96	2.31	2.70	3.06	4.00	6.79	25.32	83.28	97.26	98.10	98.36	100.00
H2 (-17.2)	0.16	2.66	0.44	1.64	4	6	0.00	0.00	0.00	0.00	0.00	0.04	0.06	0.06	0.10	0.16	0.27	0.46	0.74	1.52	4.17	24.99	84.37	97.17	98.07	98.36	99.99
H2 (-20.0)	0.15	2.77	0.44	1.81	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.06	0.13	0.22	0.40	0.70	1.32	2.97	16.19	74.73	96.15	97.59	98.19	99.98
H2 COMPOSITE	**0.19**	**2.41**	**0.59**	**0.97**	**5**	**6**	**0.00**	**0.00**	**0.00**	**0.00**	**0.04**	**0.10**	**0.15**	**0.23**	**0.35**	**0.57**	**0.86**	**1.36**	**2.37**	**5.13**	**14.46**	**50.20**	**91.80**	**98.46**	**98.91**	**99.03**	**99.99**
H3 Dune	0.20	2.30	0.38	0.20	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.14	1.79	17.45	72.17	98.04	99.63	99.78	99.80	100.00
H3 Toe of Dune	0.21	2.28	0.44	0.64	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.41	3.93	22.94	70.38	96.20	98.96	99.29	99.36	99.89
H3 Mid-Berm	0.21	2.22	0.45	0.53	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.05	0.11	0.37	0.97	5.15	26.23	72.45	98.65	99.43	99.46	99.47	100.00
H3 (+2.0)	0.47	1.08	1.16	0.83	5	6	0.00	0.00	0.00	0.00	0.00	0.11	0.78	1.79	4.33	10.59	19.18	30.41	44.15	58.96	72.15	89.99	98.85	99.15	99.16	99.17	100.00
H3 MHW	0.57	0.82	1.24	0.84	5	6	0.00	0.00	0.00	0.00	0.09	0.55	1.01	3.44	7.63	17.18	27.27	38.17	52.41	67.31	78.12	91.08	98.85	99.14	99.15	99.16	100.00
H3 MTL	0.39	1.36	1.60	1.11	5	6	0.00	0.00	0.00	0.57	1.66	3.30	4.48	8.02	13.50	18.68	22.26	25.51	29.63	34.41	43.73	73.61	97.78	98.87	98.89	98.89	100.00
H3 MLW	0.36	1.46	1.84	1.10	5	6	0.00	0.00	1.14	1.83	4.91	6.69	8.11	11.92	16.55	20.45	22.44	23.99	25.38	27.51	35.81	59.37	95.10	98.86	98.89	98.90	100.00
H3 (-6.0)	0.27	1.90	1.17	1.19	5	6	0.00	0.00	0.00	0.00	0.13	0.13	0.69	1.60	3.20	6.28	10.09	14.28	19.13	24.24	32.59	60.20	94.47	98.66	98.80	98.81	100.00
H3 (-8.8)	0.16	2.68	0.40	1.76	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.12	0.22	0.35	0.54	1.11	3.84	21.67	84.05	97.47	98.07	98.24	99.99
H3 (-11.6)	0.18	2.49	0.82	1.59	4	6	0.00	0.00	0.00	0.00	0.23	0.23	0.23	0.47	1.04	1.89	2.86	4.18	5.66	8.08	12.35	29.65	83.60	97.53	98.23	98.41	99.98
H3 (-14.4)	0.17	2.55	0.67	1.56	5	6	0.00	0.00	0.00	0.00	0.12	0.12	0.28	0.57	0.69	1.11	1.68	2.30	3.11	4.73	7.94	29.29	86.22	97.73	98.28	98.44	100.00
H3 (-17.2)	0.16	2.62	0.55	1.78	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.30	0.40	0.57	0.79	1.12	1.73	2.89	6.07	26.45	84.25	96.91	97.93	98.22	100.00
H3 (-20.0)	0.16	2.60	0.59	1.71	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.18	0.27	0.55	0.84	1.39	2.46	4.52	8.53	26.83	82.45	97.05	98.07	98.29	99.99
H3 COMPOSITE	**0.24**	**2.03**	**1.16**	**1.14**	**5**	**6**	**0.00**	**0.00**	**0.09**	**0.18**	**0.55**	**0.86**	**1.21**	**2.18**	**3.67**	**5.96**	**8.29**	**10.93**	**14.29**	**18.82**	**28.29**	**55.63**	**92.19**	**98.41**	**98.77**	**98.86**	**99.99**

ELEVATION COMPOSITES - HUTAFF ISLAND SAMPLES (1 of 2)

SAMPLE I. D.	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	CUMULATIVE PERCENT RETAINED (SIEVES EXPRESSED IN PHI)																			FINE
							GRAVEL						GRANULAR			SAND										PAN
							-4.25	-4.00	-3.50	-3.00	-2.50	-2.25	-2.00	-1.50	-1.00	-0.50	0.00	0.50	1.00	1.50	2.00	2.50	3.00	3.5	3.75	4.00	
H1 Dune	0.19	2.43	0.35	0.08	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.07	6.99	61.87	94.77	99.55	99.87	99.92	99.99
H2 Dune	0.19	2.43	0.36	0.34	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.44	9.91	56.30	96.60	99.41	99.61	99.66	100.00
H3 Dune	0.20	2.30	0.38	0.20	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.14	1.79	17.45	72.17	98.04	99.63	99.78	99.80	100.00
DUNE COMPOSITE	**0.19**	**2.39**	**0.37**	**0.21**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.05**	**0.77**	**11.45**	**63.45**	**96.47**	**99.53**	**99.75**	**99.79**	**100.00**
H1 Toe of Dune	0.19	2.40	0.35	0.11	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.06	0.37	8.96	63.55	96.34	99.64	99.85	99.89	100.00
H2 Toe of Dune	0.17	2.54	0.35	0.24	6	6	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.06	0.09	0.36	2.74	43.69	93.97	99.24	99.68	99.76	100.00
H3 Toe of Dune	0.21	2.28	0.44	0.64	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.41	3.93	22.94	70.38	96.20	98.96	99.29	99.36	99.89
TOE OF DUNE COMPOSITE	**0.19**	**2.41**	**0.40**	**0.33**	**5**	**6**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.04**	**0.19**	**1.55**	**11.55**	**59.21**	**95.50**	**99.28**	**99.61**	**99.67**	**99.96**
H1 Mid-Berm	0.18	2.47	0.47	0.19	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.09	0.16	0.28	0.61	2.53	18.42	36.34	96.75	99.53	99.77	99.81	100.00
H2 Mid-Berm	0.22	2.21	0.45	0.33	7	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.07	0.09	0.13	0.31	1.01	4.87	26.78	76.15	98.28	99.46	99.63	99.67	99.97
H3 Mid-Berm	0.21	2.22	0.45	0.53	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.05	0.11	0.37	0.97	5.15	26.23	72.45	98.65	99.43	99.46	99.47	100.00
MID-BERM COMPOSITE	**0.20**	**2.30**	**0.47**	**0.35**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.06**	**0.08**	**0.13**	**0.32**	**0.86**	**4.18**	**23.81**	**61.65**	**97.89**	**99.47**	**99.62**	**99.65**	**99.99**
H1 (+3.0)	0.19	2.37	0.36	0.32	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.22	10.86	69.84	95.38	99.20	99.61	99.68	100.00
H2 (+3.0)	0.20	2.29	0.34	0.56	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.09	1.00	15.80	74.73	98.50	99.31	99.43	99.44	99.98
H3 (+2.0)	0.47	1.08	1.16	0.83	5	6	0.00	0.00	0.00	0.00	0.00	0.11	0.78	1.79	4.33	10.59	19.18	30.41	44.15	58.96	72.15	89.99	98.85	99.15	99.16	99.17	100.00
+2.0/ +3.0 COMPOSITE	**0.27**	**1.91**	**0.94**	**0.57**	**5**	**6**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.04**	**0.26**	**0.60**	**1.44**	**3.53**	**6.39**	**10.15**	**14.75**	**20.06**	**32.94**	**78.19**	**97.58**	**99.22**	**99.40**	**99.43**	**99.99**
H1 MHW	0.20	2.30	0.32	0.16	7	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.27	14.09	77.29	98.74	99.66	99.82	99.84	100.00
H2 MHW	0.18	2.44	0.30	0.28	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	5.34	58.38	98.56	99.65	99.72	99.72	99.97
H3 MHW	0.57	0.82	1.24	0.84	5	6	0.00	0.00	0.00	0.00	0.09	0.55	1.01	3.44	7.63	17.18	27.27	38.17	52.41	67.31	78.12	91.08	98.85	99.14	99.15	99.16	100.00
MHW COMPOSITE	**0.28**	**1.85**	**1.05**	**0.43**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.00**	**0.03**	**0.18**	**0.34**	**1.15**	**2.54**	**5.73**	**9.09**	**12.72**	**17.48**	**22.54**	**32.52**	**75.58**	**98.72**	**99.48**	**99.56**	**99.57**	**99.99**
H1 MTL	0.26	1.93	0.65	0.82	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.14	0.66	3.12	9.81	21.81	46.46	81.39	98.67	99.14	99.17	99.18	99.91
H2 MTL	0.20	2.34	0.36	0.98	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.39	16.36	66.31	97.97	99.00	99.01	99.02	99.97
H3 MTL	0.39	1.36	1.60	1.11	5	6	0.00	0.00	0.00	0.57	1.66	3.30	4.48	8.02	13.50	18.68	22.26	25.51	29.63	34.41	43.73	73.61	97.78	98.87	98.89	98.89	100.00
MTL COMPOSITE	**0.27**	**1.88**	**1.09**	**0.97**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.19**	**0.55**	**1.10**	**1.49**	**2.67**	**4.51**	**6.27**	**7.64**	**9.54**	**13.15**	**18.87**	**35.52**	**73.77**	**98.14**	**99.00**	**99.02**	**99.03**	**99.96**

ELEVATION COMPOSITES - HUTAFF ISLAND SAMPLES (2 of 2)

SAMPLE I. D.	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	CUMULATIVE PERCENT RETAINED (SIEVES EXPRESSED IN PHI)																				
							GRAVEL						GRANULAR			SAND											FINE
							-4.25	-4.00	-3.50	-3.00	-2.50	-2.25	-2.00	-1.50	-1.00	-0.50	0.00	0.50	1.00	1.50	2.00	2.50	3.00	3.5	3.75	4.00	PAN
H1 MLW	0.36	1.47	1.23	0.58	6	7	0.00	0.00	0.00	0.00	0.13	0.34	0.75	2.32	4.82	10.20	16.14	21.63	26.95	37.24	53.34	81.98	98.32	99.27	99.40	99.42	100.00
H2 MLW	0.31	1.67	0.80	0.66	6	7	0.00	0.00	0.00	0.00	0.33	0.59	0.92	1.03	1.32	2.01	3.07	5.73	13.36	34.65	63.06	89.06	99.00	99.31	99.33	99.34	99.99
H3 MLW	0.36	1.46	1.84	1.10	5	6	0.00	0.00	1.14	1.83	4.91	6.69	8.11	11.92	16.55	20.45	22.44	23.99	25.38	27.51	35.81	59.37	95.10	98.86	98.89	98.90	100.00
MLW COMPOSITE	**0.35**	**1.53**	**1.36**	**0.78**	**6**	**7**	**0.00**	**0.00**	**0.38**	**0.61**	**1.79**	**2.54**	**3.26**	**5.09**	**7.56**	**10.89**	**13.88**	**17.12**	**21.90**	**33.13**	**50.74**	**76.80**	**97.47**	**99.15**	**99.21**	**99.22**	**100.00**
H1 (-6.0)	0.19	2.41	0.56	1.31	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.26	0.47	0.85	1.40	2.57	4.88	12.67	47.83	94.06	98.50	98.66	98.69	99.99
H2 (-6.0)	0.20	2.30	0.81	1.18	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	1.07	1.92	3.18	4.75	6.64	10.46	19.54	48.67	91.87	98.48	98.76	98.82	99.98
H3 (-6.0)	0.27	1.90	1.17	1.19	5	6	0.00	0.00	0.00	0.00	0.13	0.13	0.69	1.60	3.20	6.28	10.09	14.28	19.13	24.24	32.59	60.20	94.47	98.66	98.80	98.81	100.00
(-6.0) COMPOSITE	**0.22**	**2.20**	**0.91**	**1.23**	**5**	**6**	**0.00**	**0.00**	**0.00**	**0.00**	**0.04**	**0.04**	**0.23**	**0.71**	**1.51**	**2.89**	**4.71**	**6.81**	**9.45**	**13.19**	**21.60**	**52.23**	**93.47**	**98.55**	**98.74**	**98.77**	**99.99**
H1 (-8.8)	0.15	2.73	0.41	1.54	3	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.08	0.15	0.20	0.29	0.43	0.84	2.54	19.33	80.23	96.17	98.10	98.46	99.98
H2 (-8.8)	0.16	2.60	0.53	1.69	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.47	0.84	1.30	2.00	3.10	5.96	30.42	85.15	97.40	98.21	98.31	99.99
H3 (-8.8)	0.16	2.68	0.40	1.76	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.12	0.22	0.35	0.54	1.11	3.84	21.67	84.05	97.47	98.07	98.24	99.99
(-8.8) COMPOSITE	**0.16**	**2.67**	**0.46**	**1.66**	**4**	**6**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.07**	**0.25**	**0.42**	**0.65**	**0.99**	**1.68**	**4.11**	**23.81**	**83.14**	**97.01**	**98.13**	**98.34**	**99.99**
H1 (-11.6)	0.20	2.30	0.55	1.41	5	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.17	0.47	1.12	2.64	7.13	20.89	58.93	95.33	98.50	98.57	98.59	99.99
H2 (-11.6)	0.18	2.47	0.59	1.22	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.14	0.21	0.63	1.16	1.96	3.04	4.57	8.56	42.35	91.17	98.15	98.63	98.78	99.99
H3 (-11.6)	0.18	2.49	0.82	1.59	4	6	0.00	0.00	0.00	0.00	0.23	0.23	0.23	0.47	1.04	1.89	2.86	4.18	5.66	8.08	12.35	29.65	83.60	97.53	98.23	98.41	99.98
(-11.6) COMPOSITE	**0.19**	**2.42**	**0.67**	**1.41**	**5**	**6**	**0.00**	**0.00**	**0.00**	**0.00**	**0.08**	**0.08**	**0.11**	**0.20**	**0.43**	**0.90**	**1.50**	**2.42**	**3.78**	**6.59**	**13.93**	**43.64**	**90.03**	**98.06**	**98.48**	**98.59**	**99.99**
H1 (-14.4)	0.19	2.42	0.47	1.71	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.10	0.20	0.45	1.02	3.11	14.27	51.93	92.84	98.17	98.25	98.29	99.95
H2 (-14.4)	0.17	2.58	0.77	1.64	4	6	0.00	0.00	0.00	0.00	0.18	0.73	0.81	1.17	1.60	1.96	2.31	2.70	3.06	4.00	6.79	25.32	83.28	97.26	98.10	98.36	100.00
H3 (-14.4)	0.17	2.55	0.67	1.56	5	6	0.00	0.00	0.00	0.00	0.12	0.12	0.28	0.57	0.69	1.11	1.68	2.30	3.11	4.73	7.94	29.29	86.22	97.73	98.28	98.44	100.00
(-14.4) COMPOSITE	**0.17**	**2.52**	**0.65**	**1.64**	**4**	**6**	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.28**	**0.36**	**0.58**	**0.78**	**1.06**	**1.40**	**1.82**	**2.40**	**3.95**	**9.67**	**35.51**	**87.45**	**97.72**	**98.21**	**98.36**	**99.98**
H1 (-17.2)	0.17	2.55	0.43	1.59	4	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.12	0.26	0.59	1.80	7.75	39.67	88.77	98.01	98.33	98.41	99.98
H2 (-17.2)	0.16	2.66	0.44	1.64	4	6	0.00	0.00	0.00	0.00	0.00	0.04	0.06	0.06	0.10	0.16	0.27	0.46	0.74	1.52	4.17	24.99	84.37	97.17	98.07	98.36	99.99
H3 (-17.2)	0.16	2.62	0.55	1.78	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.30	0.40	0.57	0.79	1.12	1.73	2.89	6.07	26.45	84.25	96.91	97.93	98.22	100.00
(-17.2) COMPOSITE	**0.16**	**2.61**	**0.48**	**1.67**	**4**	**6**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.05**	**0.12**	**0.17**	**0.26**	**0.39**	**0.61**	**1.02**	**2.07**	**6.00**	**30.37**	**85.80**	**97.36**	**98.11**	**98.33**	**99.99**
H1 (-20.0)	0.17	2.54	0.47	1.73	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.15	0.20	0.29	0.48	0.85	1.78	7.03	42.23	87.87	97.55	98.15	98.27	100.00
H2 (-20.0)	0.15	2.77	0.44	1.81	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.06	0.13	0.22	0.40	0.70	1.32	2.97	16.19	74.73	96.15	97.59	98.19	99.98
H3 (-20.0)	0.16	2.60	0.59	1.71	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.18	0.27	0.55	0.84	1.39	2.46	4.52	8.53	26.83	82.45	97.05	98.07	98.29	99.99
(-20.0) COMPOSITE	**0.16**	**2.64**	**0.51**	**1.75**	**4**	**6**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.08**	**0.16**	**0.29**	**0.45**	**0.76**	**1.34**	**2.54**	**6.18**	**28.42**	**81.68**	**96.92**	**97.94**	**98.25**	**99.99**

APPENDIX 7

2007 Hutaff Island Native Beach Individual Grab Sample Granularmetric Reports

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H1 (+3)

Analysis Date: 11-14-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,391,200	203,913	North Carolina State Plane	3.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-5/1 Dry - 2/5Y-6/1 Washed - 2/5Y-6/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
104.34	104.02	0.01	0.00	#200 - 0.39 #230 - 0.32			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.00	0.00	0.00	0.00
25	0.50	0.71	0.01	0.01	0.01	0.01
35	1.00	0.50	0.01	0.01	0.02	0.02
45	1.50	0.35	0.21	0.20	0.23	0.22
60	2.00	0.25	11.10	10.64	11.33	10.86
80	2.50	0.18	61.54	58.98	72.87	69.84
120	3.00	0.13	26.65	25.54	99.52	95.38
170	3.50	0.09	3.99	3.82	103.51	99.20
200	3.75	0.07	0.43	0.41	103.94	99.61
230	4.00	0.06	0.07	0.07	104.01	99.68

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.99	2.78	2.60	2.33	2.12	2.04	1.72

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	2.37	0.19	0.36	0.46	3.93

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H1 (-11.6)

Analysis Date: 11-09-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,391,811	203,616	North Carolina State Plane	-11.6 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 5Y-7/1 Washed - 5Y-7/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
87.33	86.12	0.00	0.01	#200 - 1.43 #230 - 1.41			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.03	0.03	0.03	0.03
14	-0.50	1.41	0.12	0.14	0.15	0.17
18	0.00	1.00	0.26	0.30	0.41	0.47
25	0.50	0.71	0.57	0.65	0.98	1.12
35	1.00	0.50	1.33	1.52	2.31	2.64
45	1.50	0.35	3.92	4.49	6.23	7.13
60	2.00	0.25	12.02	13.76	18.25	20.89
80	2.50	0.18	33.22	38.04	51.47	58.93
120	3.00	0.13	31.79	36.40	83.26	95.33
170	3.50	0.09	2.77	3.17	86.03	98.50
200	3.75	0.07	0.06	0.07	86.09	98.57
230	4.00	0.06	0.02	0.02	86.11	98.59

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.00	2.84	2.72	2.38	2.05	1.82	1.26

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	2.3	0.20	0.55	-1.42	6.91

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H1 (-14.4)

Analysis Date: 10-26-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,392,044	203,286	North Carolina State Plane	-14.4 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/1 Dry - 5Y-6/1 Washed - 5Y-6/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
92.75	91.21	0.00	0.05	#200 - 1.75 #230 - 1.71			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.01	0.01	0.01	0.01
10	-1.00	2.00	0.05	0.05	0.06	0.06
14	-0.50	1.41	0.04	0.04	0.10	0.10
18	0.00	1.00	0.09	0.10	0.19	0.20
25	0.50	0.71	0.23	0.25	0.42	0.45
35	1.00	0.50	0.53	0.57	0.95	1.02
45	1.50	0.35	1.94	2.09	2.89	3.11
60	2.00	0.25	10.35	11.16	13.24	14.27
80	2.50	0.18	34.93	37.66	48.17	51.93
120	3.00	0.13	37.94	40.91	86.11	92.84
170	3.50	0.09	4.94	5.33	91.05	98.17
200	3.75	0.07	0.07	0.08	91.12	98.25
230	4.00	0.06	0.04	0.04	91.16	98.29

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.20	2.89	2.78	2.47	2.14	2.02	1.58

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.42	0.19	0.47	-1.31	8.39

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H1 (-17.2)

Analysis Date: 10-24-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,392,564	203,025	North Carolina State Plane	-17.2 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/1 Dry - 5Y-7/1 Washed - 5Y-7/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
88.50	87.10	0.00	0.02	#200 - 1.67 #230 - 1.59			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.05	0.06	0.05	0.06
18	0.00	1.00	0.05	0.06	0.10	0.12
25	0.50	0.71	0.12	0.14	0.22	0.26
35	1.00	0.50	0.29	0.33	0.51	0.59
45	1.50	0.35	1.07	1.21	1.58	1.80
60	2.00	0.25	5.27	5.95	6.85	7.75
80	2.50	0.18	28.25	31.92	35.10	39.67
120	3.00	0.13	43.45	49.10	78.55	88.77
170	3.50	0.09	8.18	9.24	86.73	98.01
200	3.75	0.07	0.28	0.32	87.01	98.33
230	4.00	0.06	0.07	0.08	87.08	98.41

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.34	2.95	2.86	2.61	2.27	2.13	1.77

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.55	0.17	0.43	-1.12	7.53

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H1 (-20)

Analysis Date: 10-24-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,392,882	202,822	North Carolina State Plane	-20.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/1 Dry - 5Y-6/1 Washed - 5Y-6/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
96.75	95.12	0.02	0.00	#200 - 1.85 #230 - 1.73			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.02	0.02	0.02	0.02
10	-1.00	2.00	0.13	0.13	0.15	0.15
14	-0.50	1.41	0.05	0.05	0.20	0.20
18	0.00	1.00	0.09	0.09	0.29	0.29
25	0.50	0.71	0.18	0.19	0.47	0.48
35	1.00	0.50	0.36	0.37	0.83	0.85
45	1.50	0.35	0.90	0.93	1.73	1.78
60	2.00	0.25	5.08	5.25	6.81	7.03
80	2.50	0.18	34.06	35.20	40.87	42.23
120	3.00	0.13	44.16	45.64	85.03	87.87
170	3.50	0.09	9.37	9.68	94.40	97.55
200	3.75	0.07	0.58	0.60	94.98	98.15
230	4.00	0.06	0.12	0.12	95.10	98.27

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.37	2.96	2.86	2.59	2.26	2.13	1.81

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.54	0.17	0.47	-1.75	13.72

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H1 (-6)

Analysis Date: 11-09-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,391,449	203,768	North Carolina State Plane	-6.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 5Y-6/1 Washed - 5Y-7/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
92.16	90.98	0.01	0.01	#200 - 1.34 #230 - 1.31			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.04	0.04	0.04	0.04
10	-1.00	2.00	0.20	0.22	0.24	0.26
14	-0.50	1.41	0.19	0.21	0.43	0.47
18	0.00	1.00	0.35	0.38	0.78	0.85
25	0.50	0.71	0.51	0.55	1.29	1.40
35	1.00	0.50	1.08	1.17	2.37	2.57
45	1.50	0.35	2.13	2.31	4.50	4.88
60	2.00	0.25	7.18	7.79	11.68	12.67
80	2.50	0.18	32.40	35.16	44.08	47.83
120	3.00	0.13	42.61	46.23	86.69	94.06
170	3.50	0.09	4.09	4.44	90.78	98.50
200	3.75	0.07	0.15	0.16	90.93	98.66
230	4.00	0.06	0.03	0.03	90.96	98.69

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.11	2.89	2.79	2.52	2.18	2.05	1.51

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.41	0.19	0.56	-2.37	13.05

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H1 (-8.8)

Analysis Date: 11-09-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,391,603	203,599	North Carolina State Plane	-8.8 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-3/1 Dry - 5Y-6/1 Washed - 5Y-6/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
93.59	92.21	0.03	0.02	#200 - 1.90 #230 - 1.54			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.06	0.06	0.06	0.06
10	-1.00	2.00	0.02	0.02	0.08	0.08
14	-0.50	1.41	0.07	0.07	0.15	0.15
18	0.00	1.00	0.05	0.05	0.20	0.20
25	0.50	0.71	0.08	0.09	0.28	0.29
35	1.00	0.50	0.13	0.14	0.41	0.43
45	1.50	0.35	0.38	0.41	0.79	0.84
60	2.00	0.25	1.59	1.70	2.38	2.54
80	2.50	0.18	15.71	16.79	18.09	19.33
120	3.00	0.13	57.00	60.90	75.09	80.23
170	3.50	0.09	14.92	15.94	90.01	96.17
200	3.75	0.07	1.81	1.93	91.82	98.10
230	4.00	0.06	0.34	0.36	92.16	98.46

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.46	3.12	2.96	2.75	2.55	2.40	2.07

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.73	0.15	0.41	-2.11	20.6

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H1 Dune

Analysis Date: 11-14-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,391,135	203,952	North Carolina State Plane	7.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-5/1 Dry - 2.5Y-6/1 Washed - 2.5Y-6/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
108.04	107.98	0.02	0.01	#200 - 0.13 #230 - 0.08			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.00	0.00	0.00	0.00
25	0.50	0.71	0.00	0.00	0.00	0.00
35	1.00	0.50	0.01	0.01	0.01	0.01
45	1.50	0.35	0.06	0.06	0.07	0.07
60	2.00	0.25	7.48	6.92	7.55	6.99
80	2.50	0.18	59.29	54.88	66.84	61.87
120	3.00	0.13	35.55	32.90	102.39	94.77
170	3.50	0.09	5.16	4.78	107.55	99.55
200	3.75	0.07	0.35	0.32	107.90	99.87
230	4.00	0.06	0.05	0.05	107.95	99.92

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.02	2.84	2.70	2.39	2.16	2.08	1.86

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.43	0.19	0.35	0.39	3.39

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H1 MHW

Analysis Date: 11-14-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
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ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,391,223	203,899	North Carolina State Plane	1.4 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-7/1 Dry - 2.5Y-7/1 Washed - 2.5Y-7/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
102.84	102.68	0.01	0.00	#200 - 0.18 #230 - 0.16			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.00	0.00	0.00	0.00
25	0.50	0.71	0.00	0.00	0.00	0.00
35	1.00	0.50	0.01	0.01	0.01	0.01
45	1.50	0.35	0.27	0.26	0.28	0.27
60	2.00	0.25	14.21	13.82	14.49	14.09
80	2.50	0.18	64.99	63.20	79.48	77.29
120	3.00	0.13	22.06	21.45	101.54	98.74
170	3.50	0.09	0.95	0.92	102.49	99.66
200	3.75	0.07	0.16	0.16	102.65	99.82
230	4.00	0.06	0.02	0.02	102.67	99.84

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.91	2.66	2.48	2.28	2.09	2.02	1.67

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	2.3	0.20	0.32	0.19	3.76

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H1 Mid Berm

Analysis Date: 11-14-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,391,180	203,924	North Carolina State Plane	4.2 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-6/1 Dry - 2.5Y-7/1 Washed - 2.5Y-7/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
102.16	101.96	0.00	0.00	#200 - 0.23 #230 - 0.19			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.06	0.06	0.06	0.06
14	-0.50	1.41	0.03	0.03	0.09	0.09
18	0.00	1.00	0.07	0.07	0.16	0.16
25	0.50	0.71	0.12	0.12	0.28	0.28
35	1.00	0.50	0.34	0.33	0.62	0.61
45	1.50	0.35	1.96	1.92	2.58	2.53
60	2.00	0.25	16.23	15.89	18.81	18.42
80	2.50	0.18	18.31	17.92	37.12	36.34
120	3.00	0.13	61.71	60.41	98.83	96.75
170	3.50	0.09	2.84	2.78	101.67	99.53
200	3.75	0.07	0.25	0.24	101.92	99.77
230	4.00	0.06	0.04	0.04	101.96	99.81

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.99	2.89	2.82	2.61	2.18	1.92	1.58

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.47	0.18	0.47	-1.46	7.17

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H1 MLW

Analysis Date: 11-14-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,391,320	203,835	North Carolina State Plane	-3.1 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
104.46	103.89	0.02	0.00	#200 - 0.60 #230 - 0.58			2

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.14	0.13	0.14	0.13
4	-2.25	4.76	0.22	0.21	0.36	0.34
5	-2.00	4.00	0.43	0.41	0.79	0.75
7	-1.50	2.83	1.64	1.57	2.43	2.32
10	-1.00	2.00	2.61	2.50	5.04	4.82
14	-0.50	1.41	5.62	5.38	10.66	10.20
18	0.00	1.00	6.20	5.94	16.86	16.14
25	0.50	0.71	5.74	5.49	22.60	21.63
35	1.00	0.50	5.56	5.32	28.16	26.95
45	1.50	0.35	10.75	10.29	38.91	37.24
60	2.00	0.25	16.82	16.10	55.73	53.34
80	2.50	0.18	29.92	28.64	85.65	81.98
120	3.00	0.13	17.07	16.34	102.72	98.32
170	3.50	0.09	0.99	0.95	103.71	99.27
200	3.75	0.07	0.14	0.13	103.85	99.40
230	4.00	0.06	0.02	0.02	103.87	99.42

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.90	2.56	2.38	1.90	0.82	-0.01	-0.98

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.47	0.36	1.23	-1.03	3.2

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H1 MTL

Analysis Date: 11-14-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,391,260	203,877	North Carolina State Plane	-0.7 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
93.11	92.42	0.00	0.09	#200 - 0.83 #230 - 0.82			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.04	0.04	0.04	0.04
14	-0.50	1.41	0.09	0.10	0.13	0.14
18	0.00	1.00	0.48	0.52	0.61	0.66
25	0.50	0.71	2.29	2.46	2.90	3.12
35	1.00	0.50	6.23	6.69	9.13	9.81
45	1.50	0.35	11.17	12.00	20.30	21.81
60	2.00	0.25	22.95	24.65	43.25	46.46
80	2.50	0.18	32.52	34.93	75.77	81.39
120	3.00	0.13	16.09	17.28	91.86	98.67
170	3.50	0.09	0.44	0.47	92.30	99.14
200	3.75	0.07	0.03	0.03	92.33	99.17
230	4.00	0.06	0.01	0.01	92.34	99.18

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.89	2.58	2.41	2.05	1.56	1.26	0.64

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.93	0.26	0.65	-0.83	3.66

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H1 Toe of Dune

Analysis Date: 11-13-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,391,155	203,939	North Carolina State Plane	5.2 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-5/1 Dry - 2.5Y-6/1 Washed - 2.5Y-7/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
96.64	96.55	0.01	0.00	#200 - 0.15 #230 - 0.11			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.01	0.01	0.01	0.01
25	0.50	0.71	0.02	0.02	0.03	0.03
35	1.00	0.50	0.03	0.03	0.06	0.06
45	1.50	0.35	0.30	0.31	0.36	0.37
60	2.00	0.25	8.30	8.59	8.66	8.96
80	2.50	0.18	52.76	54.59	61.42	63.55
120	3.00	0.13	31.69	32.79	93.11	96.34
170	3.50	0.09	3.19	3.30	96.30	99.64
200	3.75	0.07	0.20	0.21	96.50	99.85
230	4.00	0.06	0.04	0.04	96.54	99.89

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.98	2.81	2.67	2.38	2.15	2.06	1.77

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.4	0.19	0.35	0.06	4.05

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H2 (+3)

Analysis Date: 11-14-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,392,748	206,415	North Carolina State Plane	3.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
102.64	102.09	0.01	0.02	#200 - 0.57 #230 - 0.56			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.00	0.00	0.00	0.00
25	0.50	0.71	0.02	0.02	0.02	0.02
35	1.00	0.50	0.07	0.07	0.09	0.09
45	1.50	0.35	0.93	0.91	1.02	1.00
60	2.00	0.25	15.19	14.80	16.21	15.80
80	2.50	0.18	60.49	58.93	76.70	74.73
120	3.00	0.13	24.40	23.77	101.10	98.50
170	3.50	0.09	0.83	0.81	101.93	99.31
200	3.75	0.07	0.12	0.12	102.05	99.43
230	4.00	0.06	0.01	0.01	102.06	99.44

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.93	2.69	2.51	2.29	2.08	2.00	1.64

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.29	0.20	0.34	-0.15	3.84

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H2 (-11.6)

Analysis Date: 10-19-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,393,188	205,924	North Carolina State Plane	-11.6 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 5Y-6/1 Washed - 5Y-6/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
81.14	80.17	0.01	0.01	#200 - 1.37 #230 - 1.22			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.07	0.09	0.07	0.09
7	-1.50	2.83	0.04	0.05	0.11	0.14
10	-1.00	2.00	0.06	0.07	0.17	0.21
14	-0.50	1.41	0.34	0.42	0.51	0.63
18	0.00	1.00	0.43	0.53	0.94	1.16
25	0.50	0.71	0.65	0.80	1.59	1.96
35	1.00	0.50	0.88	1.08	2.47	3.04
45	1.50	0.35	1.24	1.53	3.71	4.57
60	2.00	0.25	3.24	3.99	6.95	8.56
80	2.50	0.18	27.42	33.79	34.37	42.35
120	3.00	0.13	39.61	48.82	73.98	91.17
170	3.50	0.09	5.66	6.98	79.64	98.15
200	3.75	0.07	0.39	0.48	80.03	98.63
230	4.00	0.06	0.12	0.15	80.15	98.78

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.27	2.93	2.83	2.58	2.24	2.11	1.55

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.47	0.18	0.59	-2.71	15.35

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H2 (-14.4)

Analysis Date: 10-19-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,393,324	205,997	North Carolina State Plane	-14.4 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/1 Dry - 5Y-6/1 Washed - 5Y-6/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
79.83	78.55	0.03	0.00	#200 - 1.90 #230 - 1.64			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.14	0.18	0.14	0.18
4	-2.25	4.76	0.44	0.55	0.58	0.73
5	-2.00	4.00	0.06	0.08	0.64	0.81
7	-1.50	2.83	0.29	0.36	0.93	1.17
10	-1.00	2.00	0.34	0.43	1.27	1.60
14	-0.50	1.41	0.29	0.36	1.56	1.96
18	0.00	1.00	0.28	0.35	1.84	2.31
25	0.50	0.71	0.31	0.39	2.15	2.70
35	1.00	0.50	0.29	0.36	2.44	3.06
45	1.50	0.35	0.75	0.94	3.19	4.00
60	2.00	0.25	2.23	2.79	5.42	6.79
80	2.50	0.18	14.79	18.53	20.21	25.32
120	3.00	0.13	46.27	57.96	66.48	83.28
170	3.50	0.09	11.16	13.98	77.64	97.26
200	3.75	0.07	0.67	0.84	78.31	98.10
230	4.00	0.06	0.21	0.26	78.52	98.36

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.42	3.03	2.93	2.71	2.49	2.25	1.68

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.58	0.17	0.77	-4.04	23.72

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H2 (-17.2)

Analysis Date: 10-19-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,393,486	205,855	North Carolina State Plane	-17.2 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/1 Dry - 5Y-6/1 Washed - 5Y-6/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
83.53	82.19	0.04	0.01	#200 - 1.93 #230 - 1.64			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.03	0.04	0.03	0.04
5	-2.00	4.00	0.02	0.02	0.05	0.06
7	-1.50	2.83	0.00	0.00	0.05	0.06
10	-1.00	2.00	0.03	0.04	0.08	0.10
14	-0.50	1.41	0.05	0.06	0.13	0.16
18	0.00	1.00	0.09	0.11	0.22	0.27
25	0.50	0.71	0.16	0.19	0.38	0.46
35	1.00	0.50	0.23	0.28	0.61	0.74
45	1.50	0.35	0.65	0.78	1.26	1.52
60	2.00	0.25	2.21	2.65	3.47	4.17
80	2.50	0.18	17.39	20.82	20.86	24.99
120	3.00	0.13	49.60	59.38	70.46	84.37
170	3.50	0.09	10.69	12.80	81.15	97.17
200	3.75	0.07	0.75	0.90	81.90	98.07
230	4.00	0.06	0.24	0.29	82.14	98.36

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.42	3.00	2.92	2.71	2.50	2.28	2.02

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.66	0.16	0.44	-2.44	21.02

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H2 (-20)

Analysis Date: 10-19-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,393,623	205,771	North Carolina State Plane	-20.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-4/1 Dry - 2.5Y-6/2 Washed - 2.5Y-6/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
81.19	79.81	0.07	0.02	#200 - 2.41 #230 - 1.81			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.03	0.04	0.03	0.04
10	-1.00	2.00	0.02	0.02	0.05	0.06
14	-0.50	1.41	0.06	0.07	0.11	0.13
18	0.00	1.00	0.07	0.09	0.18	0.22
25	0.50	0.71	0.15	0.18	0.33	0.40
35	1.00	0.50	0.24	0.30	0.57	0.70
45	1.50	0.35	0.50	0.62	1.07	1.32
60	2.00	0.25	1.34	1.65	2.41	2.97
80	2.50	0.18	10.73	13.22	13.14	16.19
120	3.00	0.13	47.53	58.54	60.67	74.73
170	3.50	0.09	17.39	21.42	78.06	96.15
200	3.75	0.07	1.17	1.44	79.23	97.59
230	4.00	0.06	0.49	0.60	79.72	98.19

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.47	3.22	3.01	2.79	2.58	2.49	2.08

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.77	0.15	0.44	-2.15	17.24

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H2 (-6)

Analysis Date: 10-18-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,393,045	206,230	North Carolina State Plane	-6.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-5/1 Dry - 2.5Y-6/1 Washed - 2.5Y-6/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
84.25	83.29	0.01	0.02	#200 - 1.24 #230 - 1.18			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.41	0.49	0.41	0.49
10	-1.00	2.00	0.49	0.58	0.90	1.07
14	-0.50	1.41	0.72	0.85	1.62	1.92
18	0.00	1.00	1.06	1.26	2.68	3.18
25	0.50	0.71	1.32	1.57	4.00	4.75
35	1.00	0.50	1.59	1.89	5.59	6.64
45	1.50	0.35	3.22	3.82	8.81	10.46
60	2.00	0.25	7.65	9.08	16.46	19.54
80	2.50	0.18	24.54	29.13	41.00	48.67
120	3.00	0.13	36.40	43.20	77.40	91.87
170	3.50	0.09	5.57	6.61	82.97	98.48
200	3.75	0.07	0.24	0.28	83.21	98.76
230	4.00	0.06	0.05	0.06	83.26	98.82

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.24	2.91	2.80	2.52	2.09	1.81	0.57

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.3	0.20	0.81	-2.26	9.41

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H2 (-8.8)

Analysis Date: 10-22-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,393,088	206,095	North Carolina State Plane	-8.8 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/1 Dry - 5Y-6/2 Washed - 5Y-7/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
79.02	77.73	0.04	0.01	#200 - 1.79 #230 - 1.69			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.07	0.09	0.07	0.09
14	-0.50	1.41	0.30	0.38	0.37	0.47
18	0.00	1.00	0.29	0.37	0.66	0.84
25	0.50	0.71	0.36	0.46	1.02	1.30
35	1.00	0.50	0.55	0.70	1.57	2.00
45	1.50	0.35	0.87	1.10	2.44	3.10
60	2.00	0.25	2.26	2.86	4.70	5.96
80	2.50	0.18	19.33	24.46	24.03	30.42
120	3.00	0.13	43.25	54.73	67.28	85.15
170	3.50	0.09	9.68	12.25	76.96	97.40
200	3.75	0.07	0.64	0.81	77.60	98.21
230	4.00	0.06	0.08	0.10	77.68	98.31

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.40	2.99	2.91	2.68	2.39	2.21	1.83

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.6	0.16	0.53	-2.6	15.34

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H2 Dune

Analysis Date: 11-14-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,392,702	206,504	North Carolina State Plane	9.5 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
103.19	102.86	0.02	0.00	#200 - 0.39 #230 - 0.34			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.00	0.00	0.00	0.00
25	0.50	0.71	0.00	0.00	0.00	0.00
35	1.00	0.50	0.01	0.01	0.01	0.01
45	1.50	0.35	0.44	0.43	0.45	0.44
60	2.00	0.25	9.77	9.47	10.22	9.91
80	2.50	0.18	47.87	46.39	58.09	56.30
120	3.00	0.13	41.59	40.30	99.68	96.60
170	3.50	0.09	2.90	2.81	102.58	99.41
200	3.75	0.07	0.21	0.20	102.79	99.61
230	4.00	0.06	0.05	0.05	102.84	99.66

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.98	2.84	2.73	2.43	2.16	2.07	1.74

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.43	0.19	0.36	-0.15	3.17

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H2 MHW

Analysis Date: 11-14-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,392,783	206,389	North Carolina State Plane	1.4 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-6/1 Dry - 2.5Y-7/1 Washed - 2.5Y-7/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
101.83	101.58	0.00	0.03	#200 - 0.28 #230 - 0.28			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.00	0.00	0.00	0.00
25	0.50	0.71	0.00	0.00	0.00	0.00
35	1.00	0.50	0.01	0.01	0.01	0.01
45	1.50	0.35	0.02	0.02	0.03	0.03
60	2.00	0.25	5.41	5.31	5.44	5.34
80	2.50	0.18	54.01	53.04	59.45	58.38
120	3.00	0.13	40.92	40.18	100.37	98.56
170	3.50	0.09	1.11	1.09	101.48	99.65
200	3.75	0.07	0.07	0.07	101.55	99.72
230	4.00	0.06	0.00	0.00	101.55	99.72

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.96	2.82	2.71	2.42	2.19	2.10	1.97

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.44	0.18	0.3	-0.07	2.8

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H2 Mid Berm

Analysis Date: 11-14-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,392,726	206,433	North Carolina State Plane	3.7 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-7/1 Dry - 2.5Y-7/1 Washed - 2.5Y-7/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
113.16	112.81	0.00	0.03	#200 - 0.37 #230 - 0.33			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.05	0.04	0.05	0.04
10	-1.00	2.00	0.03	0.03	0.08	0.07
14	-0.50	1.41	0.02	0.02	0.10	0.09
18	0.00	1.00	0.05	0.04	0.15	0.13
25	0.50	0.71	0.20	0.18	0.35	0.31
35	1.00	0.50	0.79	0.70	1.14	1.01
45	1.50	0.35	4.37	3.86	5.51	4.87
60	2.00	0.25	24.79	21.91	30.30	26.78
80	2.50	0.18	55.87	49.37	86.17	76.15
120	3.00	0.13	25.04	22.13	111.21	98.28
170	3.50	0.09	1.33	1.18	112.54	99.46
200	3.75	0.07	0.19	0.17	112.73	99.63
230	4.00	0.06	0.05	0.04	112.78	99.67

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.93	2.68	2.49	2.24	1.96	1.75	1.50

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.21	0.22	0.45	-0.94	7.91

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H2 MLW

Analysis Date: 11-14-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,392,894	206,301	North Carolina State Plane	-3.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
97.40	96.75	0.00	0.01	#200 - 0.67 #230 - 0.66			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.32	0.33	0.32	0.33
4	-2.25	4.76	0.25	0.26	0.57	0.59
5	-2.00	4.00	0.32	0.33	0.89	0.92
7	-1.50	2.83	0.11	0.11	1.00	1.03
10	-1.00	2.00	0.28	0.29	1.28	1.32
14	-0.50	1.41	0.67	0.69	1.95	2.01
18	0.00	1.00	1.03	1.06	2.98	3.07
25	0.50	0.71	2.59	2.66	5.57	5.73
35	1.00	0.50	7.43	7.63	13.00	13.36
45	1.50	0.35	20.74	21.29	33.74	34.65
60	2.00	0.25	27.67	28.41	61.41	63.06
80	2.50	0.18	25.32	26.00	86.73	89.06
120	3.00	0.13	9.68	9.94	96.41	99.00
170	3.50	0.09	0.30	0.31	96.71	99.31
200	3.75	0.07	0.02	0.02	96.73	99.33
230	4.00	0.06	0.01	0.01	96.74	99.34

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.80	2.40	2.23	1.77	1.27	1.06	0.36

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.67	0.31	0.8	-1.73	9.04

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H2 MTL

Analysis Date: 11-14-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,392,812	206,366	North Carolina State Plane	-0.7 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
95.42	94.51	0.00	0.03	#200 - 0.99 #230 - 0.98			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.00	0.00	0.00	0.00
25	0.50	0.71	0.00	0.00	0.00	0.00
35	1.00	0.50	0.01	0.01	0.01	0.01
45	1.50	0.35	0.36	0.38	0.37	0.39
60	2.00	0.25	15.24	15.97	15.61	16.36
80	2.50	0.18	47.66	49.95	63.27	66.31
120	3.00	0.13	30.21	31.66	93.48	97.97
170	3.50	0.09	0.98	1.03	94.46	99.00
200	3.75	0.07	0.01	0.01	94.47	99.01
230	4.00	0.06	0.01	0.01	94.48	99.02

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.95	2.78	2.64	2.34	2.09	1.99	1.64

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.34	0.20	0.36	-0.15	2.61

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H2 Toe of Dune

Analysis Date: 11-14-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,392,716	206,492	North Carolina State Plane	5.7 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-6/1 Dry - 2.5Y-6/1 Washed - 2.5Y-7/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
105.43	105.18	0.02	0.00	#200 - 0.32 #230 - 0.24			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.05	0.05	0.05	0.05
7	-1.50	2.83	0.00	0.00	0.05	0.05
10	-1.00	2.00	0.00	0.00	0.05	0.05
14	-0.50	1.41	0.00	0.00	0.05	0.05
18	0.00	1.00	0.00	0.00	0.05	0.05
25	0.50	0.71	0.01	0.01	0.06	0.06
35	1.00	0.50	0.03	0.03	0.09	0.09
45	1.50	0.35	0.28	0.27	0.37	0.36
60	2.00	0.25	2.51	2.38	2.88	2.74
80	2.50	0.18	43.17	40.95	46.05	43.69
120	3.00	0.13	53.01	50.28	99.06	93.97
170	3.50	0.09	5.56	5.27	104.62	99.24
200	3.75	0.07	0.46	0.44	105.08	99.68
230	4.00	0.06	0.08	0.08	105.16	99.76

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.10	2.90	2.81	2.56	2.27	2.16	2.03

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	2.54	0.17	0.35	-1.17	18.73

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H3 (+2)

Analysis Date: 10-22-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,394,579	208,673	North Carolina State Plane	2.0 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 2.5Y-5/2 Dry - 2.5Y-6/1 Washed - 2.5Y-6/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
89.01	88.29	0.00	0.00	#200 - 0.84 #230 - 0.83			2

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.10	0.11	0.10	0.11
5	-2.00	4.00	0.60	0.67	0.70	0.78
7	-1.50	2.83	0.90	1.01	1.60	1.79
10	-1.00	2.00	2.26	2.54	3.86	4.33
14	-0.50	1.41	5.57	6.26	9.43	10.59
18	0.00	1.00	7.65	8.59	17.08	19.18
25	0.50	0.71	10.00	11.23	27.08	30.41
35	1.00	0.50	12.23	13.74	39.31	44.15
45	1.50	0.35	13.18	14.81	52.49	58.96
60	2.00	0.25	11.74	13.19	64.23	72.15
80	2.50	0.18	15.88	17.84	80.11	89.99
120	3.00	0.13	7.89	8.86	88.00	98.85
170	3.50	0.09	0.27	0.30	88.27	99.15
200	3.75	0.07	0.01	0.01	88.28	99.16
230	4.00	0.06	0.01	0.01	88.29	99.17

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.78	2.33	2.08	1.20	0.26	-0.19	-0.95

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.08	0.47	1.16	-0.45	2.49

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H3 (-11.6)

Analysis Date: 10-22-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,394,994	208,257	North Carolina State Plane	-11.6 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/1 Dry - 5Y-6/2 Washed - 5Y-6/2	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
88.44	87.07	0.02	0.02	#200 - 1.77 #230 - 1.59			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.20	0.23	0.20	0.23
4	-2.25	4.76	0.00	0.00	0.20	0.23
5	-2.00	4.00	0.00	0.00	0.20	0.23
7	-1.50	2.83	0.21	0.24	0.41	0.47
10	-1.00	2.00	0.50	0.57	0.91	1.04
14	-0.50	1.41	0.75	0.85	1.66	1.89
18	0.00	1.00	0.86	0.97	2.52	2.86
25	0.50	0.71	1.17	1.32	3.69	4.18
35	1.00	0.50	1.31	1.48	5.00	5.66
45	1.50	0.35	2.14	2.42	7.14	8.08
60	2.00	0.25	3.78	4.27	10.92	12.35
80	2.50	0.18	15.30	17.30	26.22	29.65
120	3.00	0.13	47.71	53.95	73.93	83.60
170	3.50	0.09	12.32	13.93	86.25	97.53
200	3.75	0.07	0.62	0.70	86.87	98.23
230	4.00	0.06	0.16	0.18	87.03	98.41

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.41	3.01	2.92	2.69	2.37	2.11	0.78

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.49	0.18	0.82	-2.79	12.93

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H3 (-14.4)

Analysis Date: 10-23-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,395,105	208,187	North Carolina State Plane	-14.4 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-5/1 Dry - 2.5Y-6/1 Washed - 2.5Y-6/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
80.31	79.09	0.02	0.00	#200 - 1.72 #230 - 1.56			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.10	0.12	0.10	0.12
4	-2.25	4.76	0.00	0.00	0.10	0.12
5	-2.00	4.00	0.13	0.16	0.23	0.28
7	-1.50	2.83	0.23	0.29	0.46	0.57
10	-1.00	2.00	0.10	0.12	0.56	0.69
14	-0.50	1.41	0.34	0.42	0.90	1.11
18	0.00	1.00	0.46	0.57	1.36	1.68
25	0.50	0.71	0.50	0.62	1.86	2.30
35	1.00	0.50	0.65	0.81	2.51	3.11
45	1.50	0.35	1.30	1.62	3.81	4.73
60	2.00	0.25	2.58	3.21	6.39	7.94
80	2.50	0.18	17.15	21.35	23.54	29.29
120	3.00	0.13	45.72	56.93	69.26	86.22
170	3.50	0.09	9.24	11.51	78.50	97.73
200	3.75	0.07	0.44	0.55	78.94	98.28
230	4.00	0.06	0.13	0.16	79.07	98.44

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.38	2.98	2.90	2.68	2.40	2.19	1.54

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	2.55	0.17	0.67	-3.5	20.78

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H3 (-17.2)

Analysis Date: 10-23-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,395,225	208,141	North Carolina State Plane	-17.2 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-4/2 Dry - 2.5Y-6/2 Washed - 2.5Y-6/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
81.76	80.33	0.03	0.00	#200 - 2.07 #230 - 1.78			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.07	0.09	0.07	0.09
7	-1.50	2.83	0.17	0.21	0.24	0.30
10	-1.00	2.00	0.08	0.10	0.32	0.40
14	-0.50	1.41	0.14	0.17	0.46	0.57
18	0.00	1.00	0.18	0.22	0.64	0.79
25	0.50	0.71	0.27	0.33	0.91	1.12
35	1.00	0.50	0.50	0.61	1.41	1.73
45	1.50	0.35	0.95	1.16	2.36	2.89
60	2.00	0.25	2.60	3.18	4.96	6.07
80	2.50	0.18	16.66	20.38	21.62	26.45
120	3.00	0.13	47.26	57.80	68.88	84.25
170	3.50	0.09	10.35	12.66	79.23	96.91
200	3.75	0.07	0.83	1.02	80.06	97.93
230	4.00	0.06	0.24	0.29	80.30	98.22

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.42	3.00	2.92	2.70	2.46	2.24	1.83

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.62	0.16	0.55	-3.24	22.56

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H3 (-20)

Analysis Date: 10-23-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,395,366	208,000	North Carolina State Plane	-20.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/1 Dry - 5Y-6/2 Washed - 5Y-6/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
78.76	77.42	0.01	0.01	#200 - 1.93 #230 - 1.71			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.03	0.04	0.03	0.04
7	-1.50	2.83	0.11	0.14	0.14	0.18
10	-1.00	2.00	0.07	0.09	0.21	0.27
14	-0.50	1.41	0.22	0.28	0.43	0.55
18	0.00	1.00	0.23	0.29	0.66	0.84
25	0.50	0.71	0.43	0.55	1.09	1.39
35	1.00	0.50	0.84	1.07	1.93	2.46
45	1.50	0.35	1.62	2.06	3.55	4.52
60	2.00	0.25	3.16	4.01	6.71	8.53
80	2.50	0.18	14.41	18.30	21.12	26.83
120	3.00	0.13	43.81	55.62	64.93	82.45
170	3.50	0.09	11.50	14.60	76.43	97.05
200	3.75	0.07	0.80	1.02	77.23	98.07
230	4.00	0.06	0.17	0.22	77.40	98.29

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.43	3.05	2.93	2.71	2.45	2.20	1.56

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.6	0.16	0.59	-2.65	15.22

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H3 (-6)

Analysis Date: 10-22-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,394,761	208,510	North Carolina State Plane	-6.3 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 2.5Y-5/1 Dry - 2.5Y-6/1 Washed - 2.5Y-7/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
84.53	83.53	0.01	0.00	#200 - 1.20 #230 - 1.19			1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.11	0.13	0.11	0.13
4	-2.25	4.76	0.00	0.00	0.11	0.13
5	-2.00	4.00	0.47	0.56	0.58	0.69
7	-1.50	2.83	0.77	0.91	1.35	1.60
10	-1.00	2.00	1.35	1.60	2.70	3.20
14	-0.50	1.41	2.60	3.08	5.30	6.28
18	0.00	1.00	3.22	3.81	8.52	10.09
25	0.50	0.71	3.54	4.19	12.06	14.28
35	1.00	0.50	4.10	4.85	16.16	19.13
45	1.50	0.35	4.32	5.11	20.48	24.24
60	2.00	0.25	7.06	8.35	27.54	32.59
80	2.50	0.18	23.34	27.61	50.88	60.20
120	3.00	0.13	28.97	34.27	79.85	94.47
170	3.50	0.09	3.54	4.19	83.39	98.66
200	3.75	0.07	0.12	0.14	83.51	98.80
230	4.00	0.06	0.01	0.01	83.52	98.81

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.06	2.85	2.72	2.32	1.55	0.68	-0.71

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.9	0.27	1.17	-1.47	4.49

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H3 (-8.8)

Analysis Date: 10-22-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,394,792	208,480	North Carolina State Plane	-8.8 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/1 Dry - 5Y-6/1 Washed - 5Y-6/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
78.39	77.04	0.02	0.01	#200 - 1.93 #230 - 1.76			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.02	0.03	0.02	0.03
14	-0.50	1.41	0.07	0.09	0.09	0.12
18	0.00	1.00	0.08	0.10	0.17	0.22
25	0.50	0.71	0.10	0.13	0.27	0.35
35	1.00	0.50	0.15	0.19	0.42	0.54
45	1.50	0.35	0.45	0.57	0.87	1.11
60	2.00	0.25	2.14	2.73	3.01	3.84
80	2.50	0.18	13.98	17.83	16.99	21.67
120	3.00	0.13	48.90	62.38	65.89	84.05
170	3.50	0.09	10.52	13.42	76.41	97.47
200	3.75	0.07	0.47	0.60	76.88	98.07
230	4.00	0.06	0.13	0.17	77.01	98.24

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.41	3.00	2.93	2.73	2.53	2.34	2.03

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.68	0.16	0.4	-2.02	15.45

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H3 Dune

Analysis Date: 10-19-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,394,433	208,800	North Carolina State Plane	7.5 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
96.42	96.22	0.00	0.00	#200 - 0.22 #230 - 0.20			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.00	0.00	0.00	0.00
25	0.50	0.71	0.01	0.01	0.01	0.01
35	1.00	0.50	0.13	0.13	0.14	0.14
45	1.50	0.35	1.59	1.65	1.73	1.79
60	2.00	0.25	15.10	15.66	16.83	17.45
80	2.50	0.18	52.76	54.72	69.59	72.17
120	3.00	0.13	24.94	25.87	94.53	98.04
170	3.50	0.09	1.53	1.59	96.06	99.63
200	3.75	0.07	0.14	0.15	96.20	99.78
230	4.00	0.06	0.02	0.02	96.22	99.80

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.94	2.73	2.55	2.30	2.07	1.95	1.60

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.3	0.20	0.38	-0.19	3.71

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H3 MHW

Analysis Date: 10-22-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,394,585	208,669	North Carolina State Plane	1.4 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 2.5Y-5/2 Dry - 2.5Y-6/1 Washed - 2.5Y-6/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
89.72	88.97	0.00	0.00	#200 - 0.85 #230 - 0.84			3

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.08	0.09	0.08	0.09
4	-2.25	4.76	0.41	0.46	0.49	0.55
5	-2.00	4.00	0.41	0.46	0.90	1.01
7	-1.50	2.83	2.18	2.43	3.08	3.44
10	-1.00	2.00	3.76	4.19	6.84	7.63
14	-0.50	1.41	8.57	9.55	15.41	17.18
18	0.00	1.00	9.05	10.09	24.46	27.27
25	0.50	0.71	9.78	10.90	34.24	38.17
35	1.00	0.50	12.78	14.24	47.02	52.41
45	1.50	0.35	13.37	14.90	60.39	67.31
60	2.00	0.25	9.70	10.81	70.09	78.12
80	2.50	0.18	11.63	12.96	81.72	91.08
120	3.00	0.13	6.97	7.77	88.69	98.85
170	3.50	0.09	0.26	0.29	88.95	99.14
200	3.75	0.07	0.01	0.01	88.96	99.15
230	4.00	0.06	0.01	0.01	88.97	99.16

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.75	2.23	1.86	0.92	-0.11	-0.56	-1.31

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.82	0.57	1.24	-0.27	2.29

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H3 Mid Berm

Analysis Date: 10-22-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,394,544	208,706	North Carolina State Plane	3.8 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/2 Dry - 5Y-7/1 Washed - 5Y-7/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
94.88	94.39	0.00	0.00	#200 - 0.54 #230 - 0.53			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.03	0.03	0.03	0.03
10	-1.00	2.00	0.01	0.01	0.04	0.04
14	-0.50	1.41	0.01	0.01	0.05	0.05
18	0.00	1.00	0.06	0.06	0.11	0.11
25	0.50	0.71	0.25	0.26	0.36	0.37
35	1.00	0.50	0.57	0.60	0.93	0.97
45	1.50	0.35	3.97	4.18	4.90	5.15
60	2.00	0.25	20.00	21.08	24.90	26.23
80	2.50	0.18	43.85	46.22	68.75	72.45
120	3.00	0.13	24.86	26.20	93.61	98.65
170	3.50	0.09	0.74	0.78	94.35	99.43
200	3.75	0.07	0.03	0.03	94.38	99.46
230	4.00	0.06	0.01	0.01	94.39	99.47

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.93	2.72	2.55	2.26	1.97	1.76	1.48

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.22	0.21	0.45	-0.97	6.58

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H3 MLW

Analysis Date: 10-22-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,394,651	208,612	North Carolina State Plane	-2.9 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-5/2 Dry - 5Y-6/2 Washed - 5Y-6/2	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
87.47	86.54	0.03	0.00	#200 - 1.11 #230 - 1.10			5

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	1.00	1.14	1.00	1.14
5/16	-3.00	8.00	0.60	0.69	1.60	1.83
3.5	-2.50	5.66	2.69	3.08	4.29	4.91
4	-2.25	4.76	1.56	1.78	5.85	6.69
5	-2.00	4.00	1.24	1.42	7.09	8.11
7	-1.50	2.83	3.33	3.81	10.42	11.92
10	-1.00	2.00	4.05	4.63	14.47	16.55
14	-0.50	1.41	3.41	3.90	17.88	20.45
18	0.00	1.00	1.74	1.99	19.62	22.44
25	0.50	0.71	1.36	1.55	20.98	23.99
35	1.00	0.50	1.22	1.39	22.20	25.38
45	1.50	0.35	1.86	2.13	24.06	27.51
60	2.00	0.25	7.26	8.30	31.32	35.81
80	2.50	0.18	20.61	23.56	51.93	59.37
120	3.00	0.13	31.25	35.73	83.18	95.10
170	3.50	0.09	3.29	3.76	86.47	98.86
200	3.75	0.07	0.03	0.03	86.50	98.89
230	4.00	0.06	0.01	0.01	86.51	98.90

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.00	2.84	2.72	2.30	0.86	-1.06	-2.49

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.46	0.36	1.84	-1.29	3.27

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H3 MTL

Analysis Date: 10-22-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,394,617	208,641	North Carolina State Plane	-0.8 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 2.5Y-5/2 Dry - 2.5Y-6/2 Washed - 2.5Y-6/2	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
86.14	85.20	0.01	0.00	#200 - 1.11 #230 - 1.11			5

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.49	0.57	0.49	0.57
3.5	-2.50	5.66	0.94	1.09	1.43	1.66
4	-2.25	4.76	1.41	1.64	2.84	3.30
5	-2.00	4.00	1.02	1.18	3.86	4.48
7	-1.50	2.83	3.05	3.54	6.91	8.02
10	-1.00	2.00	4.72	5.48	11.63	13.50
14	-0.50	1.41	4.46	5.18	16.09	18.68
18	0.00	1.00	3.08	3.58	19.17	22.26
25	0.50	0.71	2.80	3.25	21.97	25.51
35	1.00	0.50	3.55	4.12	25.52	29.63
45	1.50	0.35	4.12	4.78	29.64	34.41
60	2.00	0.25	8.03	9.32	37.67	43.73
80	2.50	0.18	25.74	29.88	63.41	73.61
120	3.00	0.13	20.82	24.17	84.23	97.78
170	3.50	0.09	0.94	1.09	85.17	98.87
200	3.75	0.07	0.02	0.02	85.19	98.89
230	4.00	0.06	0.00	0.00	85.19	98.89

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.94	2.71	2.53	2.10	0.42	-0.76	-1.93

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.36	0.39	1.6	-1.1	2.94

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: H3 Toe of Dune

Analysis Date: 10-19-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,394,441	208,791	North Carolina State Plane	5.7 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 5Y-6/1 Washed - 5Y-7/1	Hutaff Island Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
91.96	91.47	0.00	0.11	#200 - 0.71 #230 - 0.64			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.00	0.00	0.00	0.00
25	0.50	0.71	0.02	0.02	0.02	0.02
35	1.00	0.50	0.36	0.39	0.38	0.41
45	1.50	0.35	3.24	3.52	3.62	3.93
60	2.00	0.25	17.48	19.01	21.10	22.94
80	2.50	0.18	43.63	47.44	64.73	70.38
120	3.00	0.13	23.74	25.82	88.47	96.20
170	3.50	0.09	2.54	2.76	91.01	98.96
200	3.75	0.07	0.30	0.33	91.31	99.29
230	4.00	0.06	0.06	0.07	91.37	99.36

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

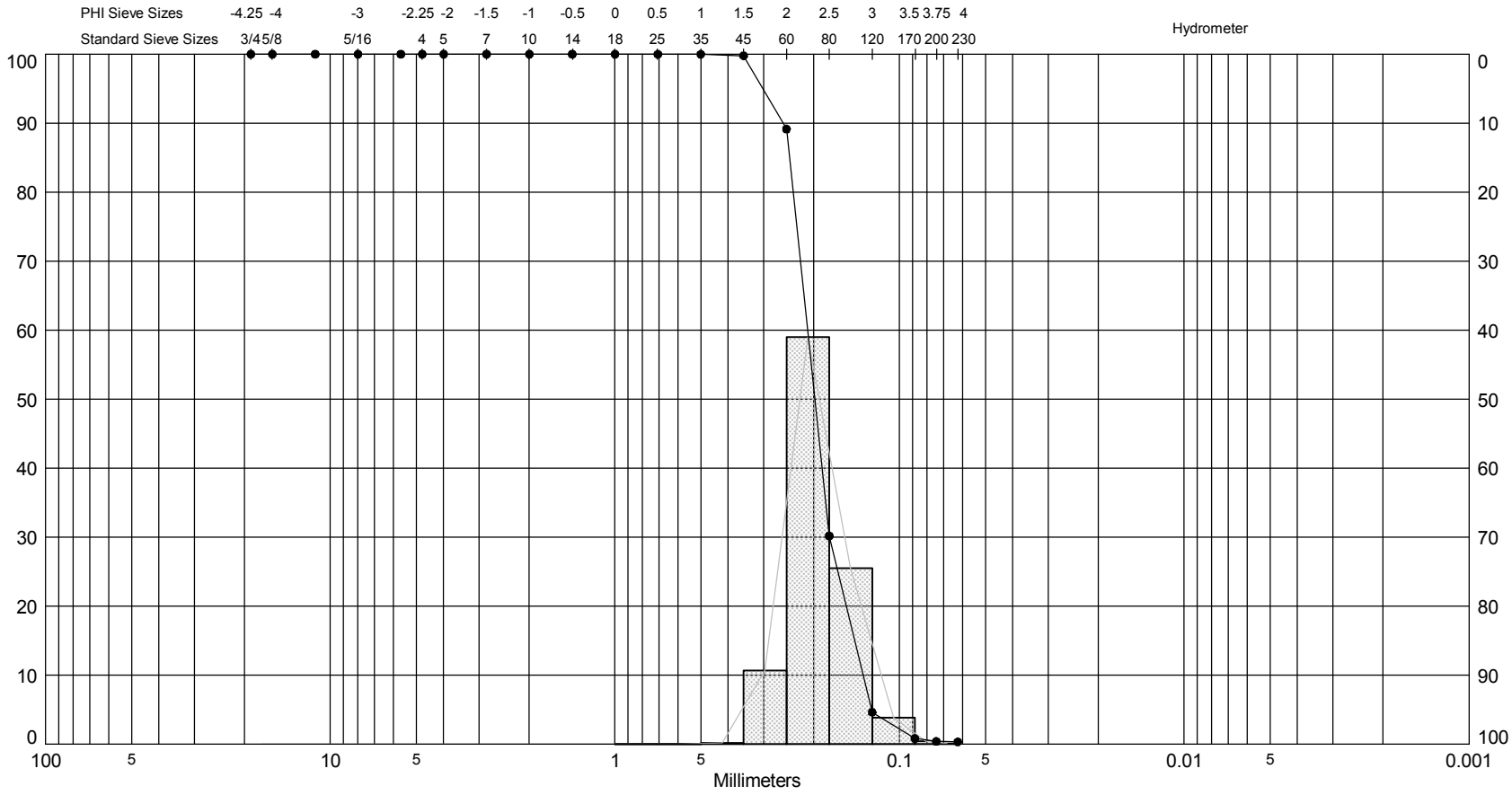
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.98	2.76	2.59	2.29	2.02	1.82	1.53

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.28	0.21	0.44	-0.21	3.55

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

APPENDIX 8

2007 Hutaff Island Native Beach Individual Grab Sample Grain Size Distribution Curves/Histograms



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H1 (+3)	—●—	3.0	SP	#200 - 0.39 #230 - 0.32			2.33	2.37	0.46	3.93	0.36

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-14-07
Analyzed By:	PB
Easting (X, ft):	2,391,200
Northing (Y, ft):	203,913
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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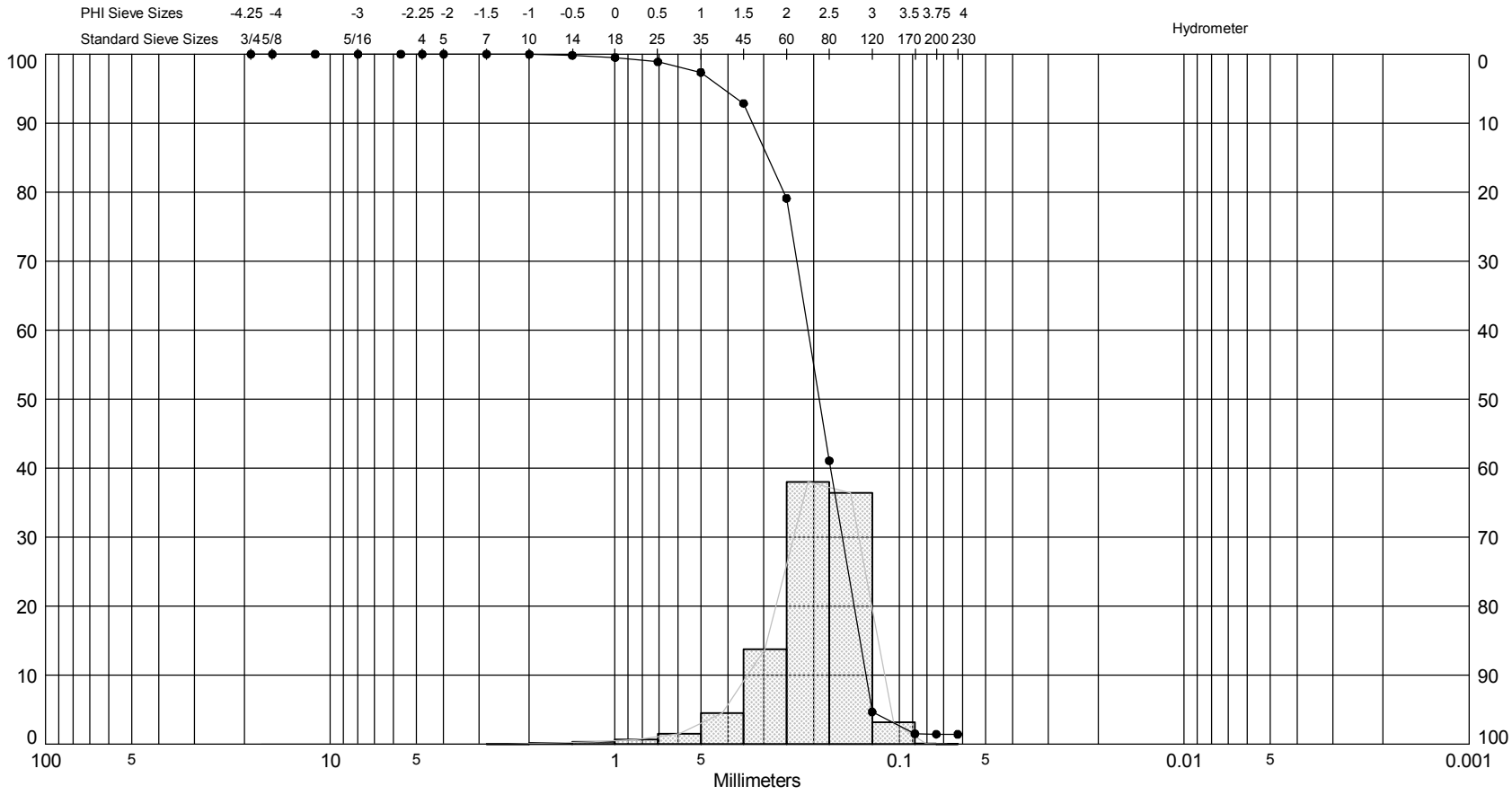

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H1 (-11.6)	—●—	-11.6	SP	#200 - 1.43 #230 - 1.41			2.38	2.3	-1.42	6.91	0.55

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-09-07
Analyzed By:	PB
Easting (X, ft):	2,391,811
Northing (Y, ft):	203,616
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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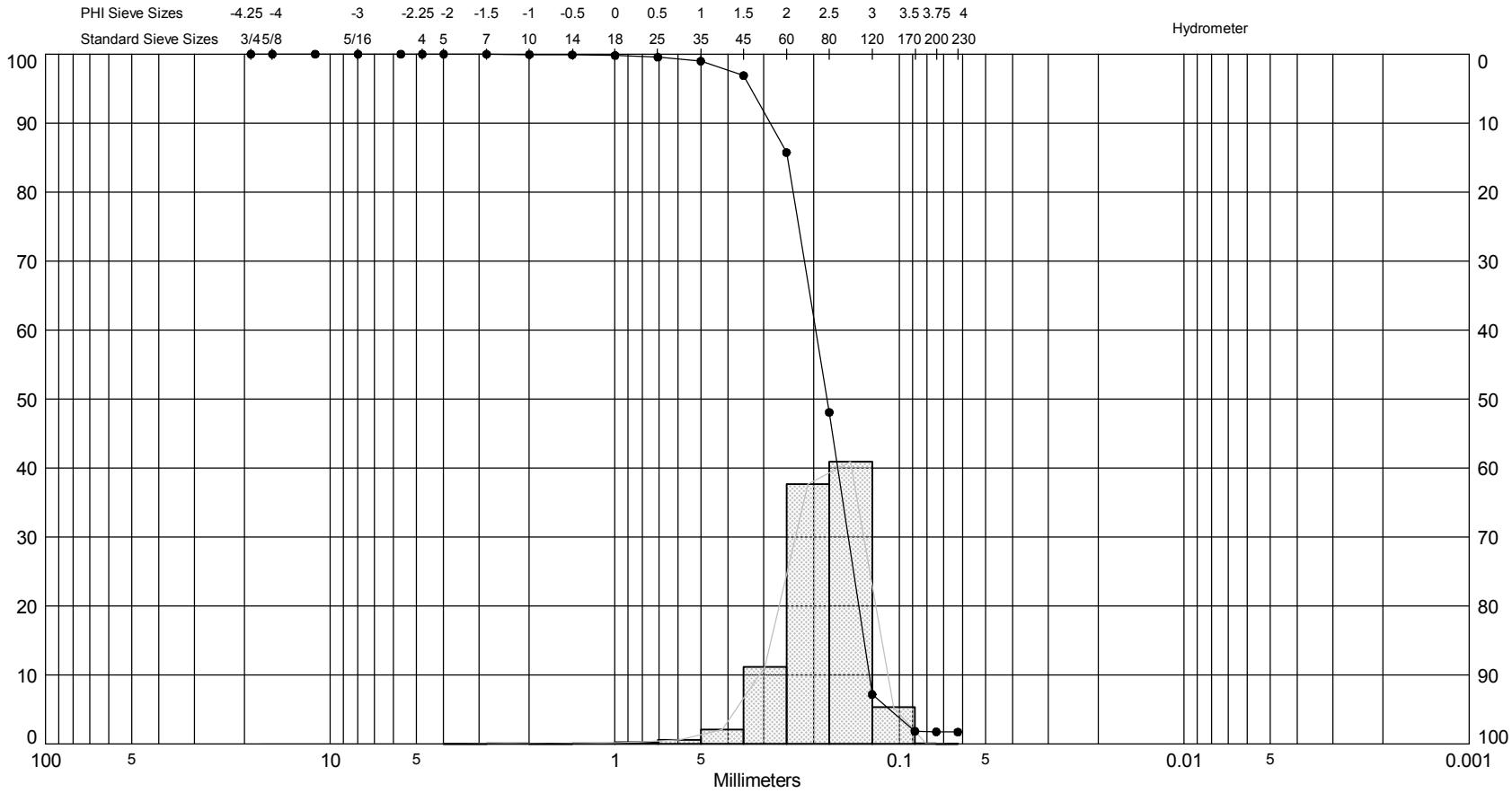

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H1 (-14.4)	—●—	-14.4	SP	#200 - 1.75 #230 - 1.71			2.47	2.42	-1.31	8.39	0.47

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-26-07
Analyzed By:	TD
Easting (X, ft):	2,392,044
Northing (Y, ft):	203,286
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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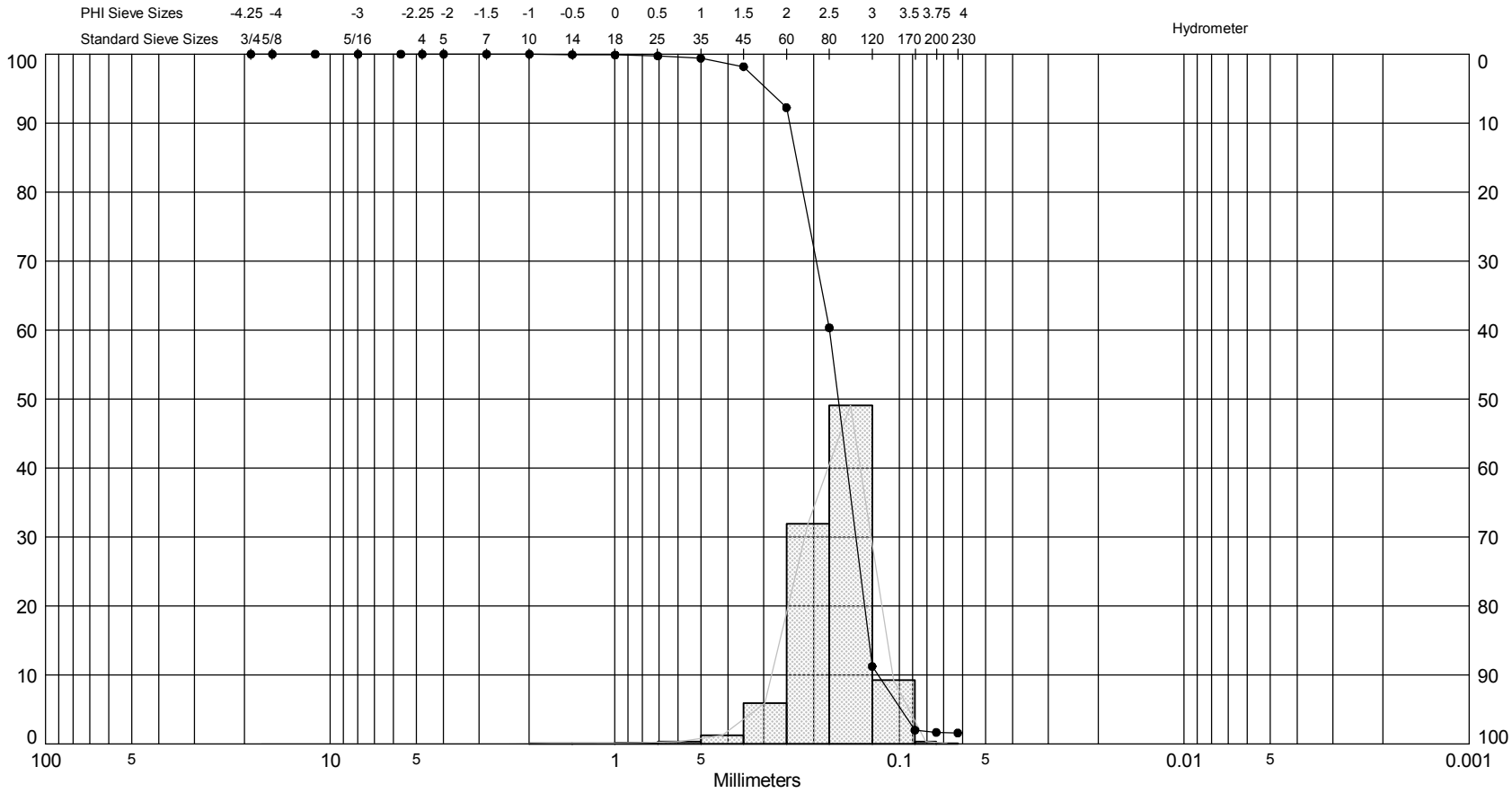

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H1 (-17.2)	—●—	-17.2	SP	#200 - 1.67 #230 - 1.59			2.61	2.55	-1.12	7.53	0.43

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

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Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-24-07
Analyzed By:	TD
Easting (X, ft):	2,392,564
Northing (Y, ft):	203,025
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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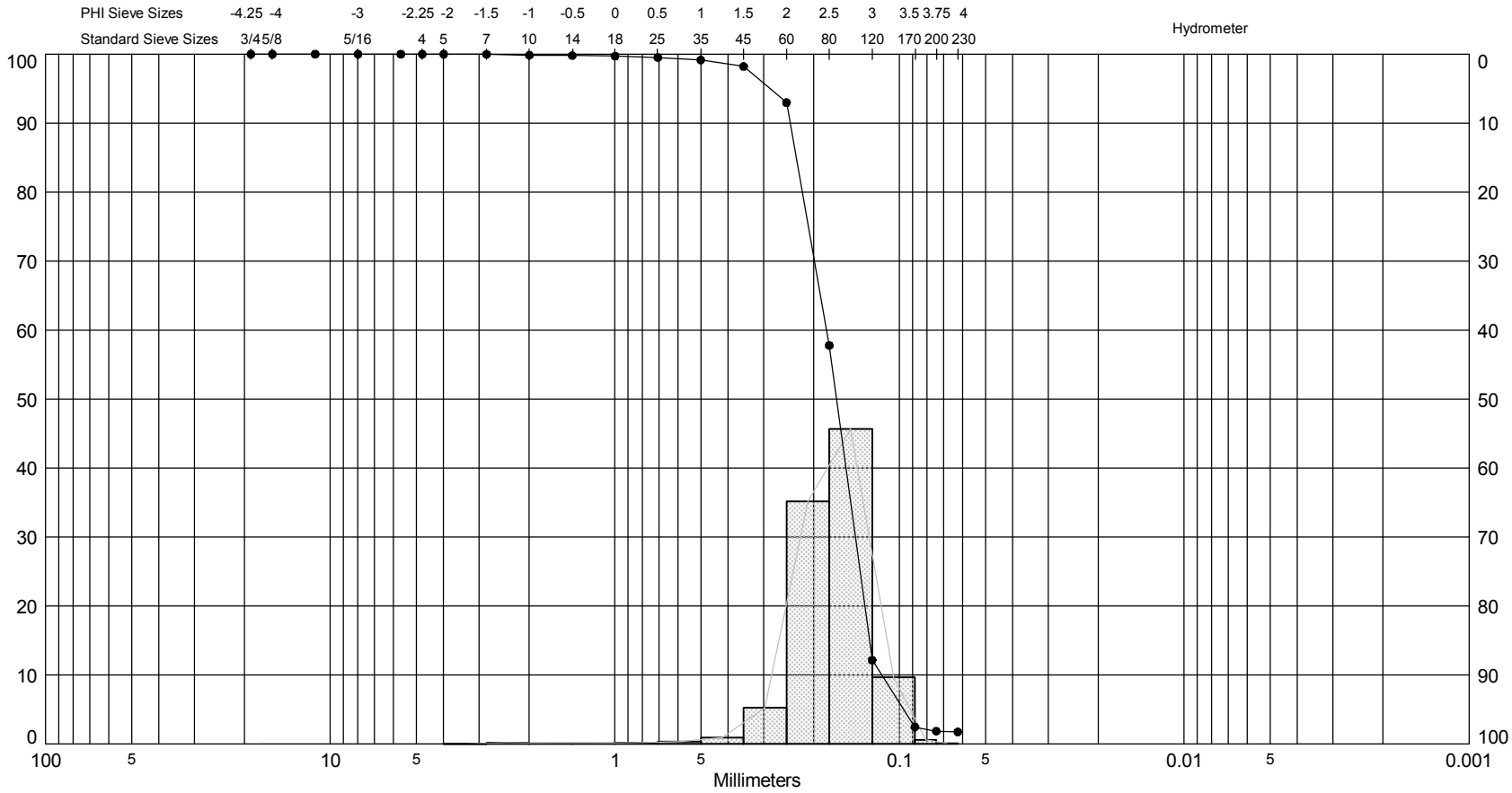

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H1 (-20)	—●—	-20.0	SP	#200 - 1.85 #230 - 1.73			2.59	2.54	-1.75	13.72	0.47

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-24-07
Analyzed By:	TD
Easting (X, ft):	2,392,882
Northing (Y, ft):	202,822
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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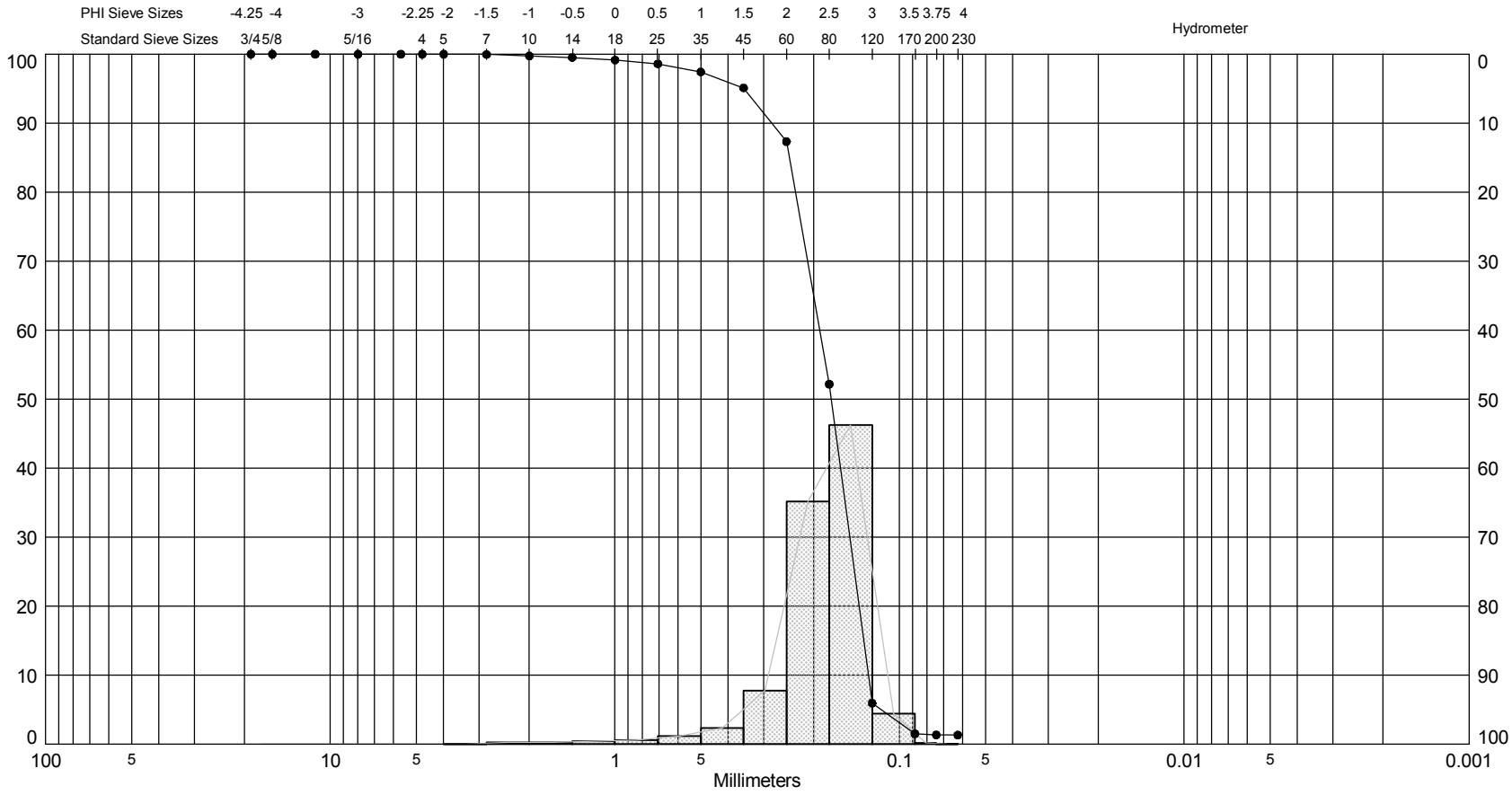

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H1 (-6)	—●—	-6.0	SP	#200 - 1.34 #230 - 1.31			2.52	2.41	-2.37	13.05	0.56

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-09-07
Analyzed By:	PB
Easting (X, ft):	2,391,449
Northing (Y, ft):	203,768
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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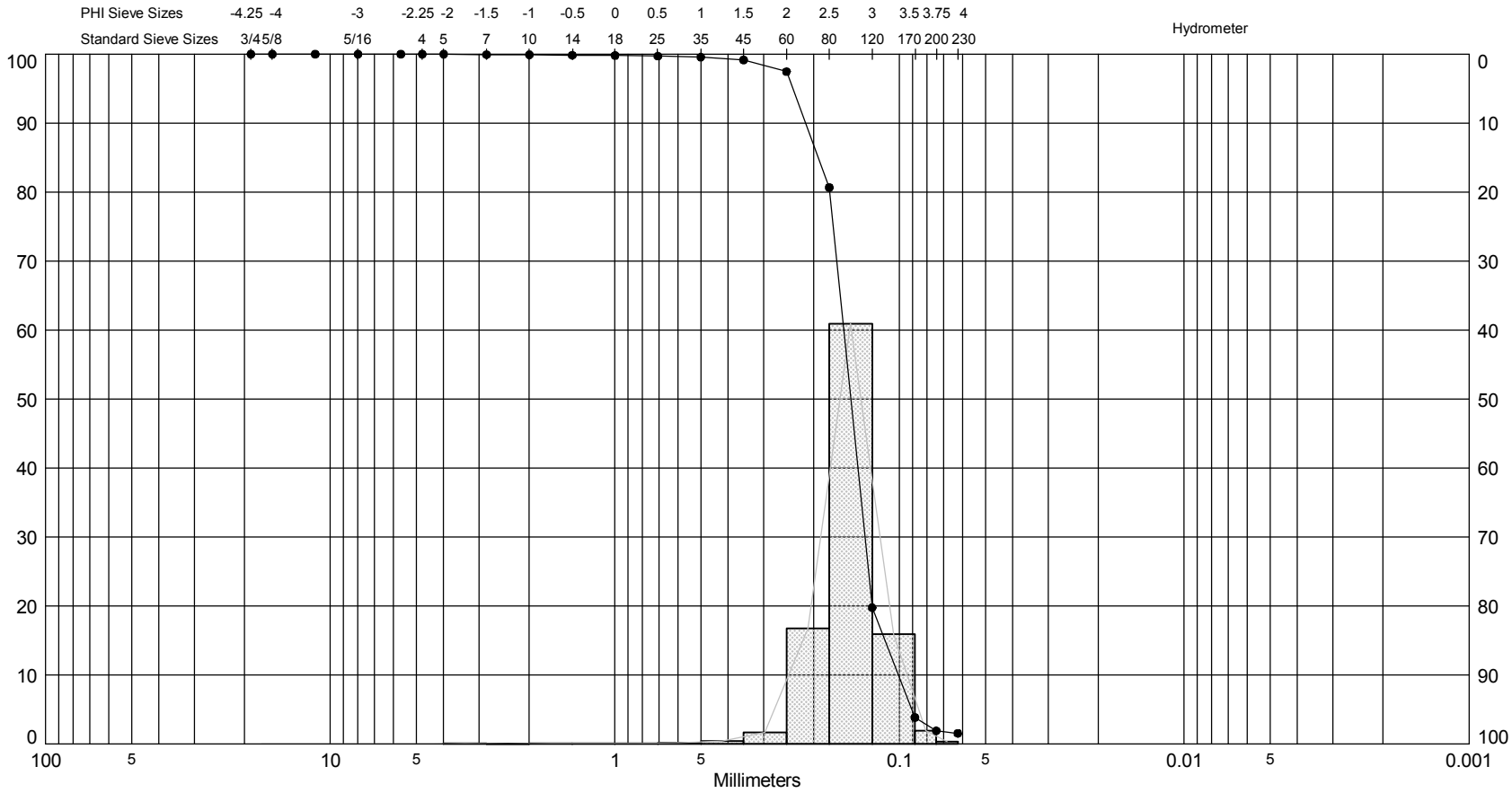

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H1 (-8.8)	—●—	-8.8	SP	#200 - 1.90 #230 - 1.54			2.75	2.73	-2.11	20.6	0.41

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-09-07
Analyzed By:	PB
Easting (X, ft):	2,391,603
Northing (Y, ft):	203,599
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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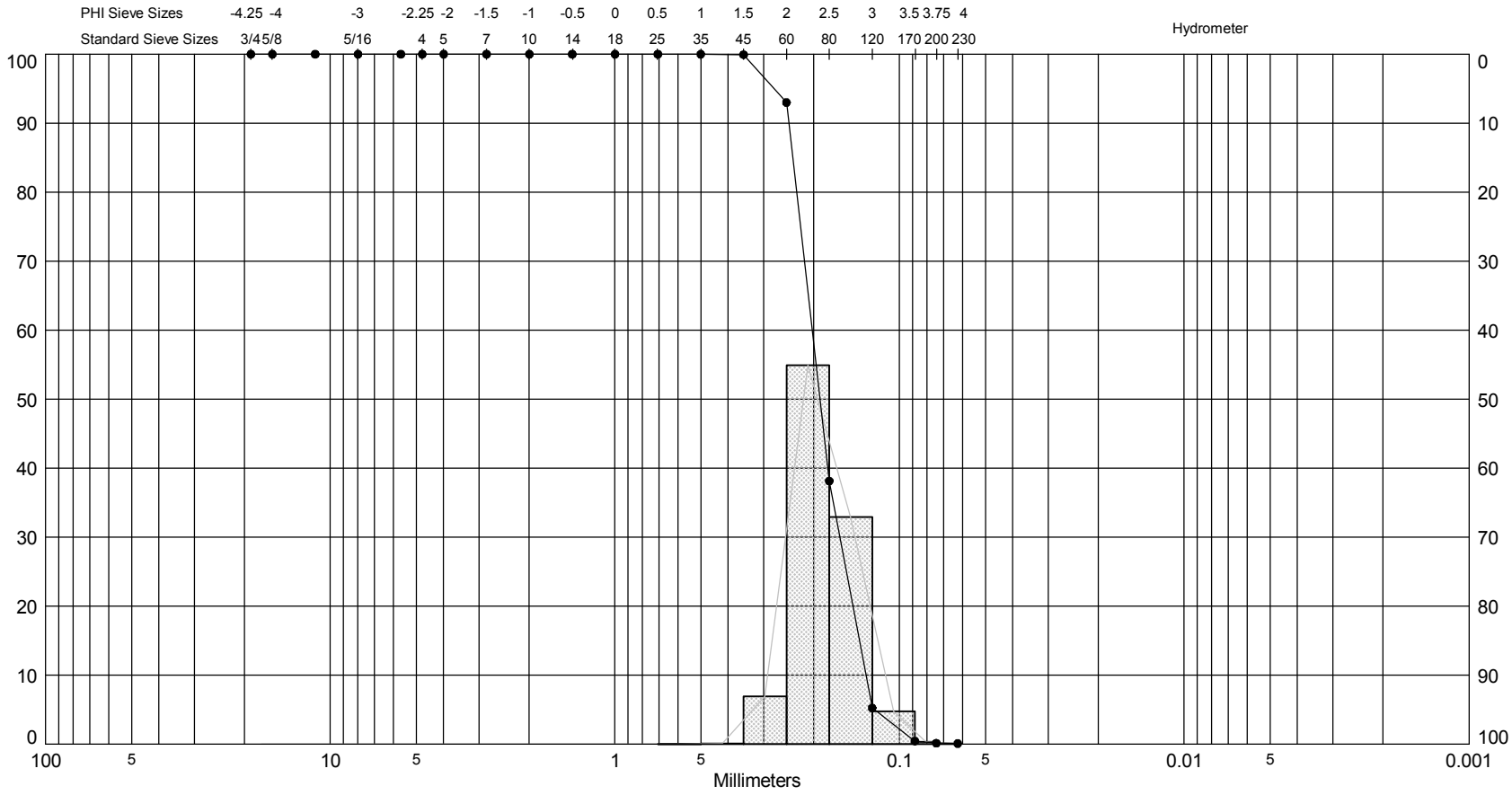

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H1 Dune	—●—	7.0	SP	#200 - 0.13 #230 - 0.08			2.39	2.43	0.39	3.39	0.35

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-14-07
Analyzed By:	PB
Easting (X, ft):	2,391,135
Northing (Y, ft):	203,952
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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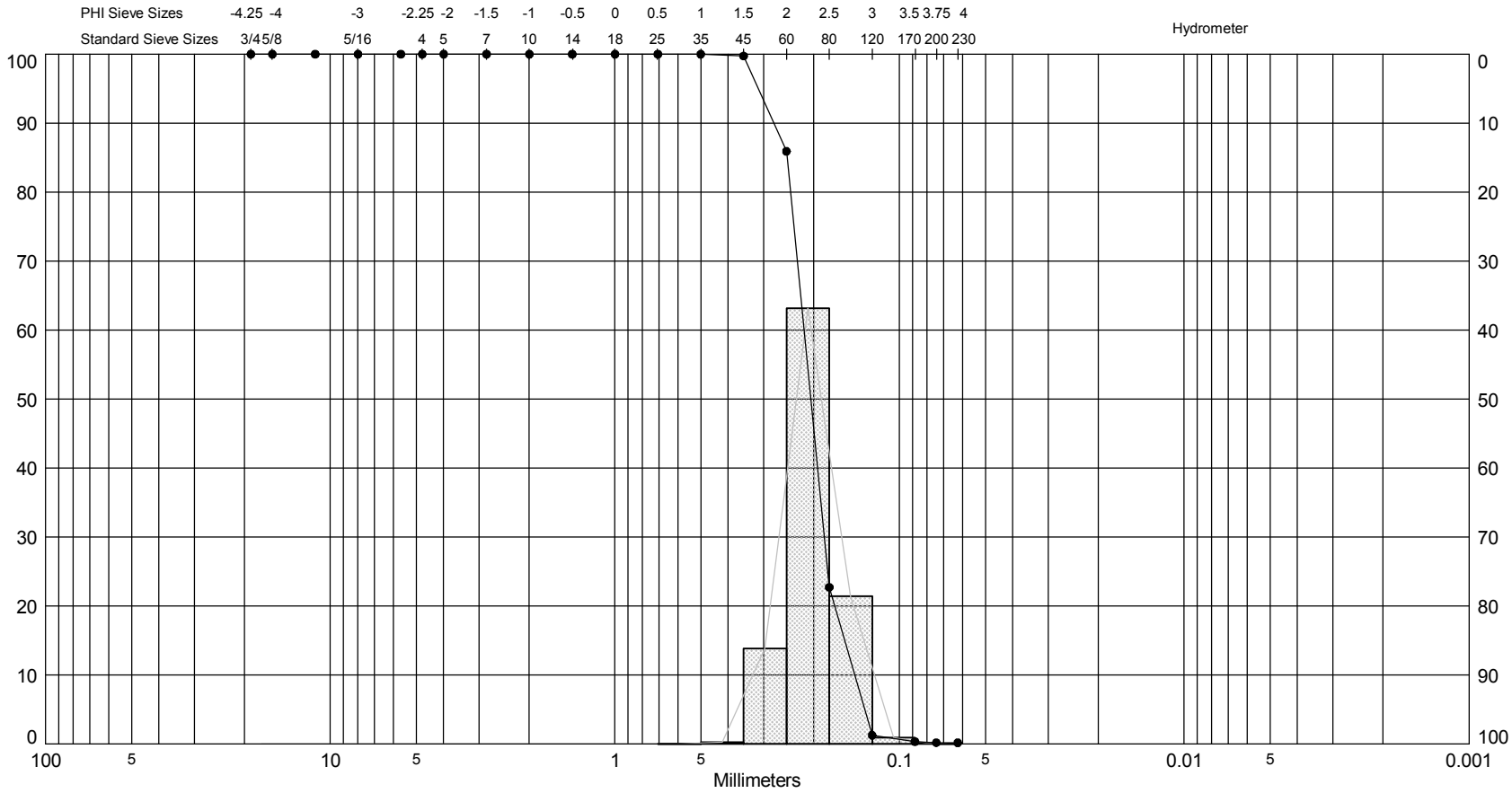

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H1 MHW	—●—	1.4	SP	#200 - 0.18 #230 - 0.16			2.28	2.3	0.19	3.76	0.32

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-14-07
Analyzed By:	TD
Easting (X, ft):	2,391,223
Northing (Y, ft):	203,899
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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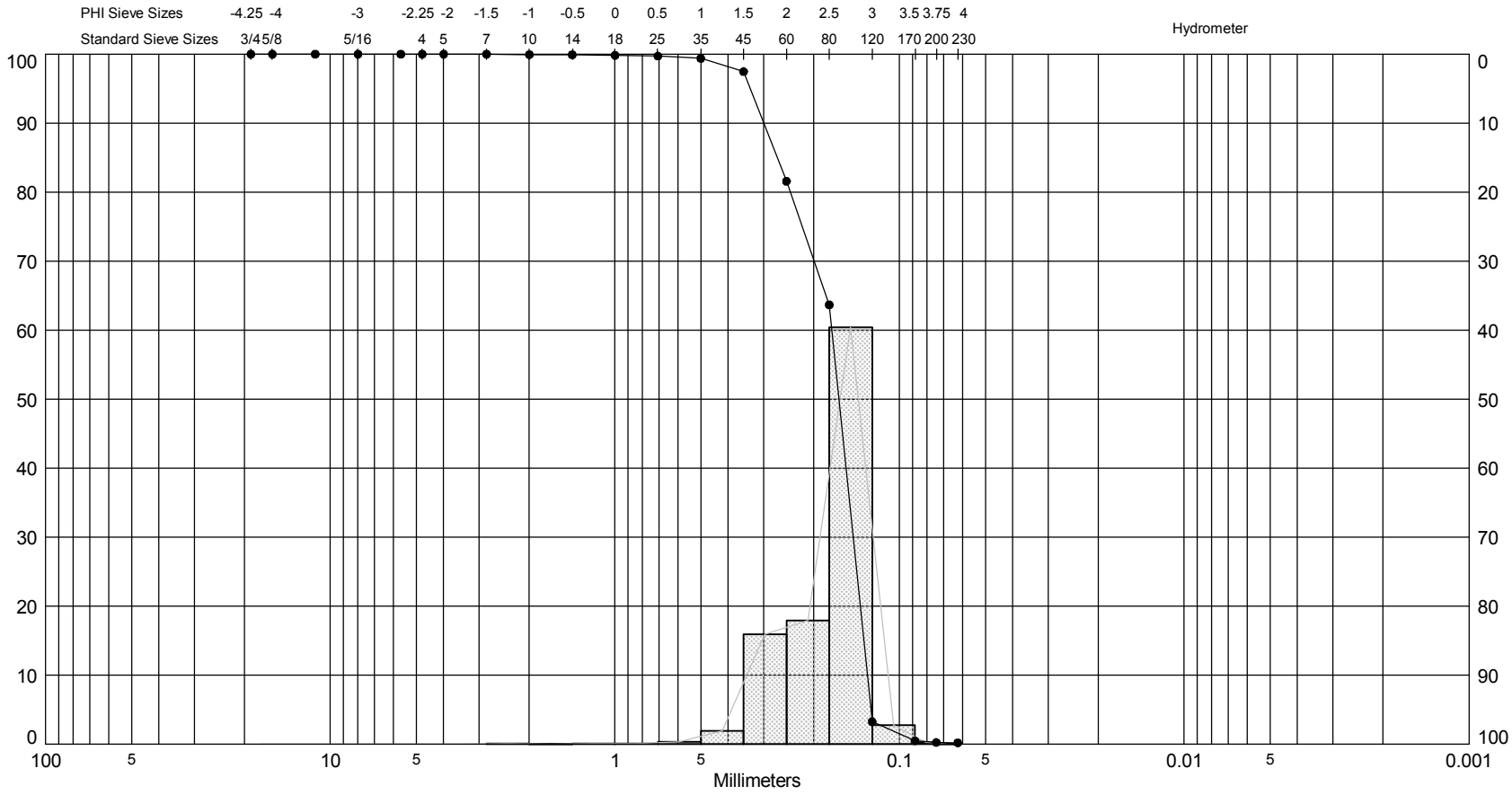

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H1 Mid Berm	—●—	4.2	SP	#200 - 0.23 #230 - 0.19			2.61	2.47	-1.46	7.17	0.47

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-14-07
Analyzed By:	PB
Easting (X, ft):	2,391,180
Northing (Y, ft):	203,924
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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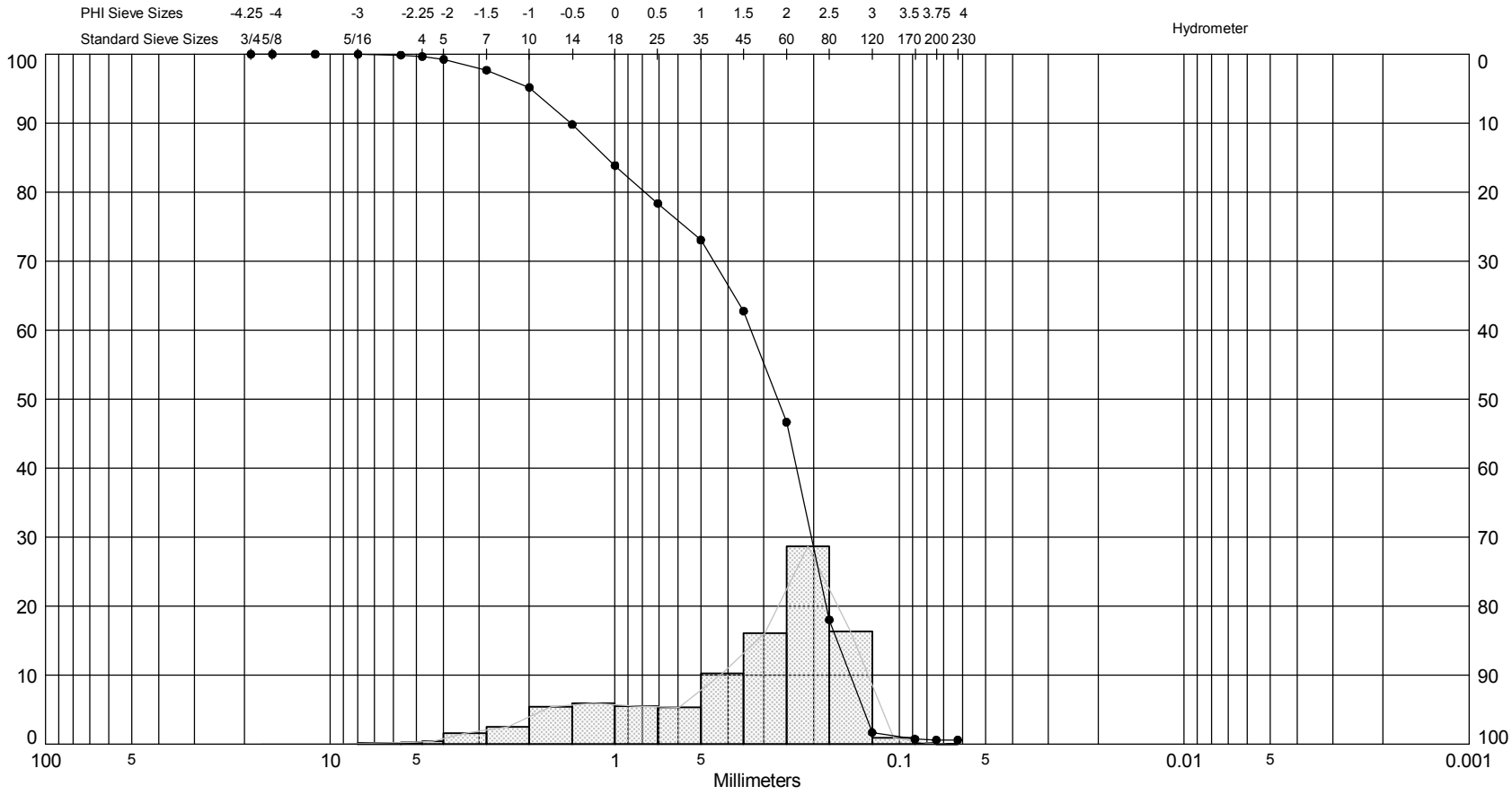

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H1 MLW	—●—	-3.1	SW	#200 - 0.60 #230 - 0.58			1.9	1.47	-1.03	3.2	1.23

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-14-07
Analyzed By:	PB
Easting (X, ft):	2,391,320
Northing (Y, ft):	203,835
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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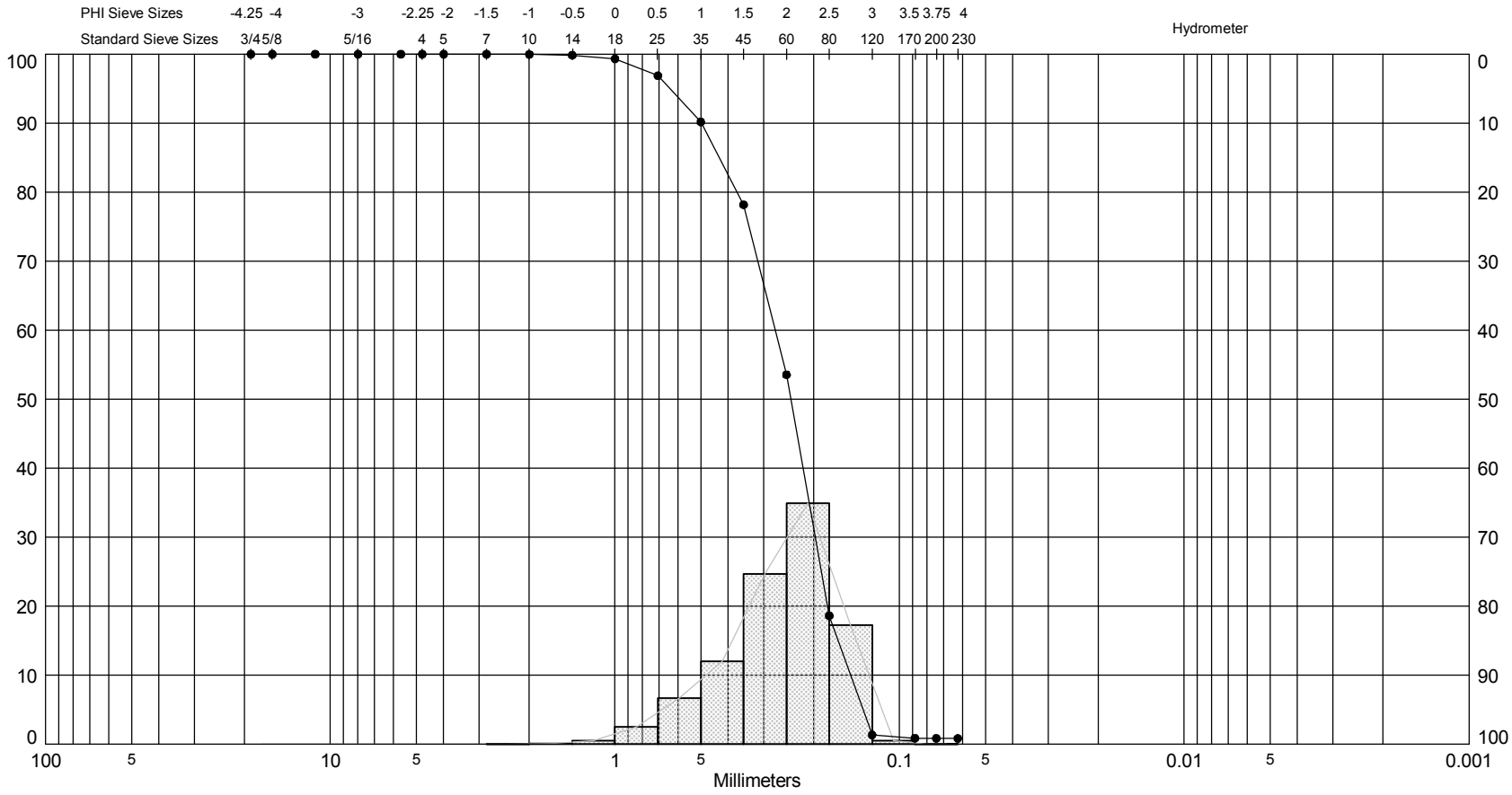

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H1 MTL	—●—	-0.7	SP	#200 - 0.83 #230 - 0.82			2.05	1.93	-0.83	3.66	0.65

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-14-07
Analyzed By:	TD
Easting (X, ft):	2,391,260
Northing (Y, ft):	203,877
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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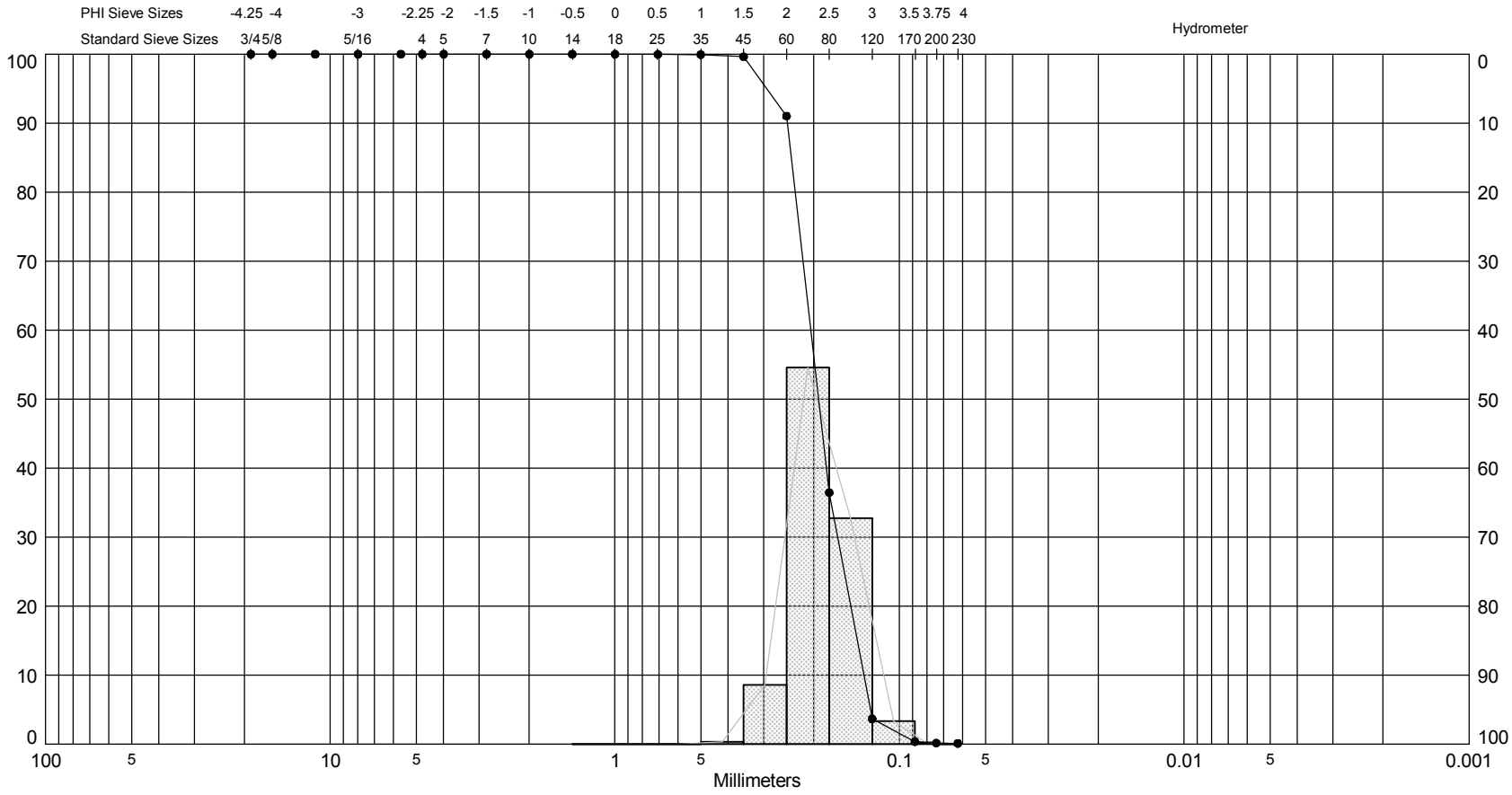

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H1 Toe of Dune	—●—	5.2	SP	#200 - 0.15 #230 - 0.11			2.38	2.4	0.06	4.05	0.35

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-13-07
Analyzed By:	PB
Easting (X, ft):	2,391,155
Northing (Y, ft):	203,939
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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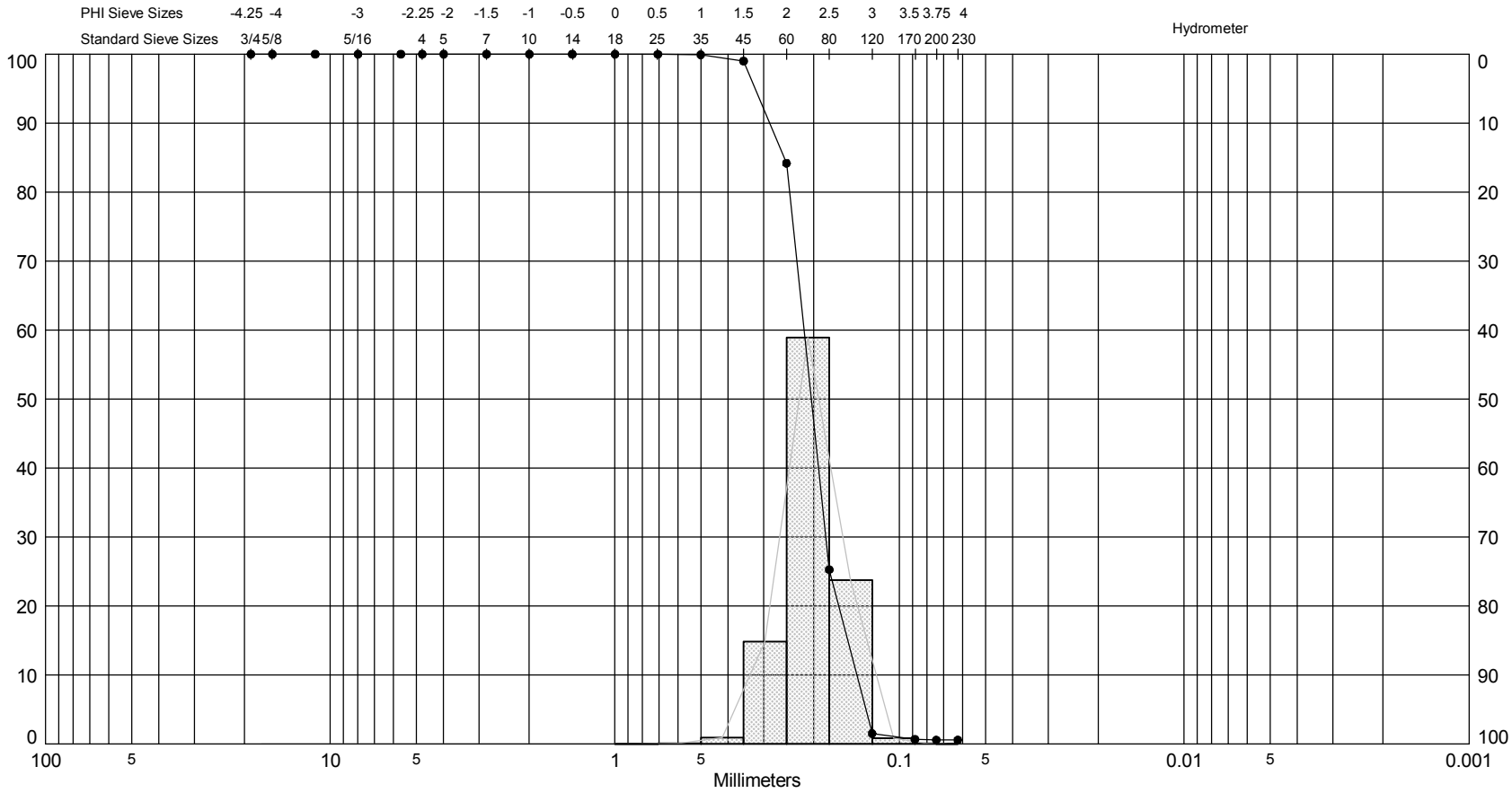

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H2 (+3)	—●—	3.0	SP	#200 - 0.57 #230 - 0.56			2.29	2.29	-0.15	3.84	0.34

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-14-07
Analyzed By:	TD
Easting (X, ft):	2,392,748
Northing (Y, ft):	206,415
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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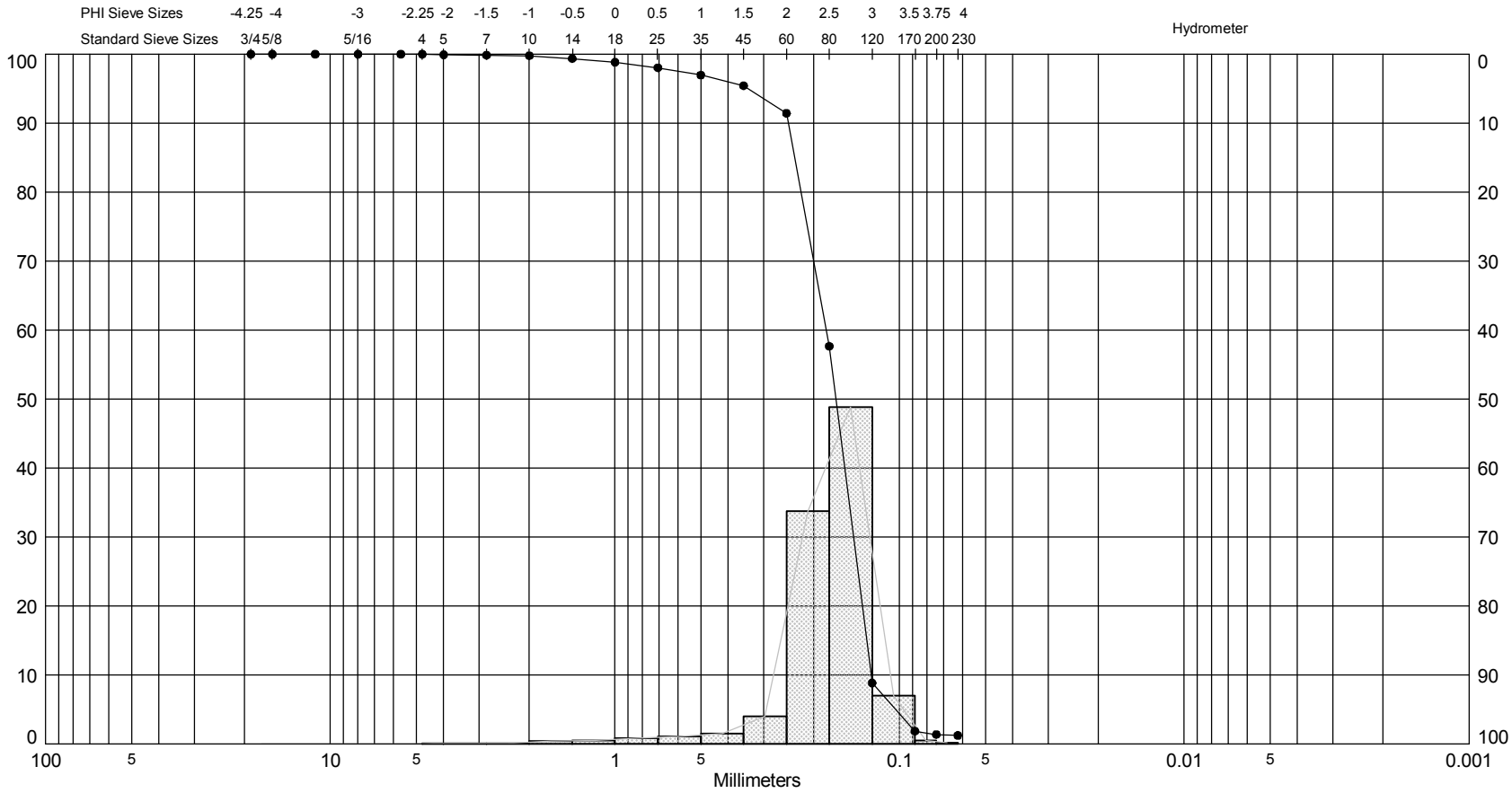

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H2 (-11.6)	—●—	-11.6	SP	#200 - 1.37 #230 - 1.22			2.58	2.47	-2.71	15.35	0.59

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-19-07
Analyzed By:	TD
Easting (X, ft):	2,393,188
Northing (Y, ft):	205,924
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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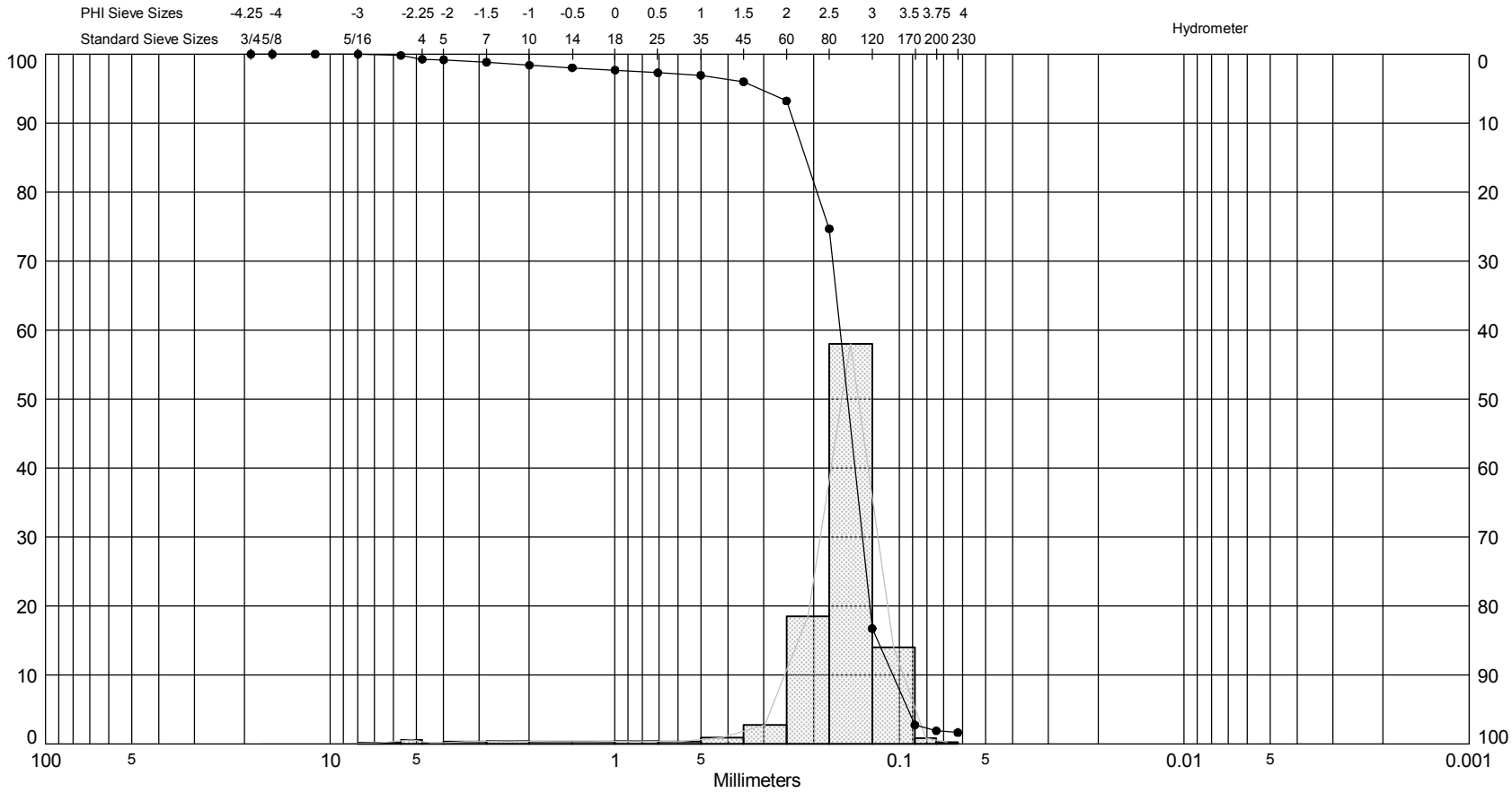

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H2 (-14.4)	—●—	-14.4	SP	#200 - 1.90 #230 - 1.64			2.71	2.58	-4.04	23.72	0.77

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-19-07
Analyzed By:	TD
Easting (X, ft):	2,393,324
Northing (Y, ft):	205,997
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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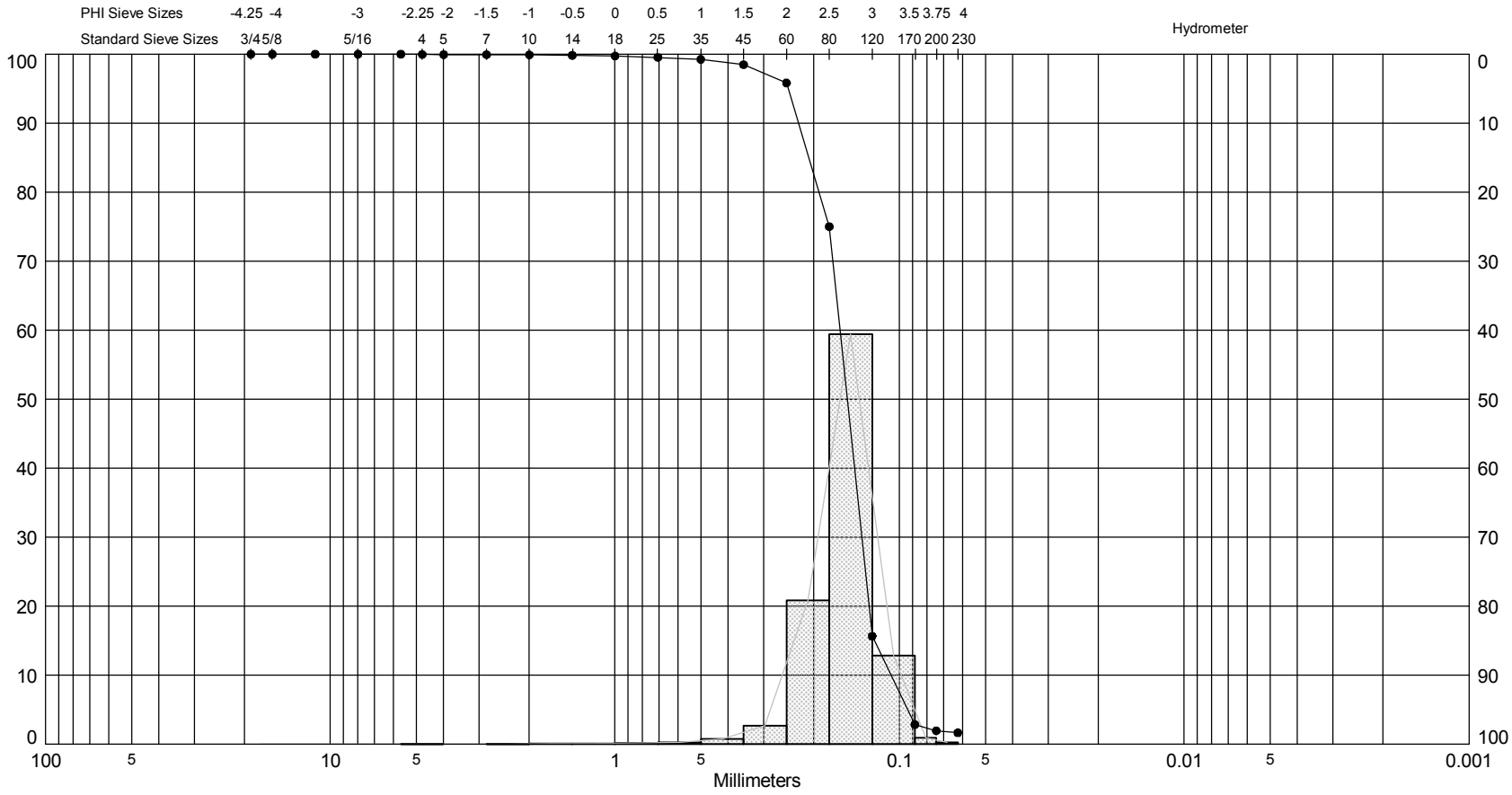

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H2 (-17.2)	—●—	-17.2	SP	#200 - 1.93 #230 - 1.64			2.71	2.66	-2.44	21.02	0.44

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-19-07
Analyzed By:	TD
Easting (X, ft):	2,393,486
Northing (Y, ft):	205,855
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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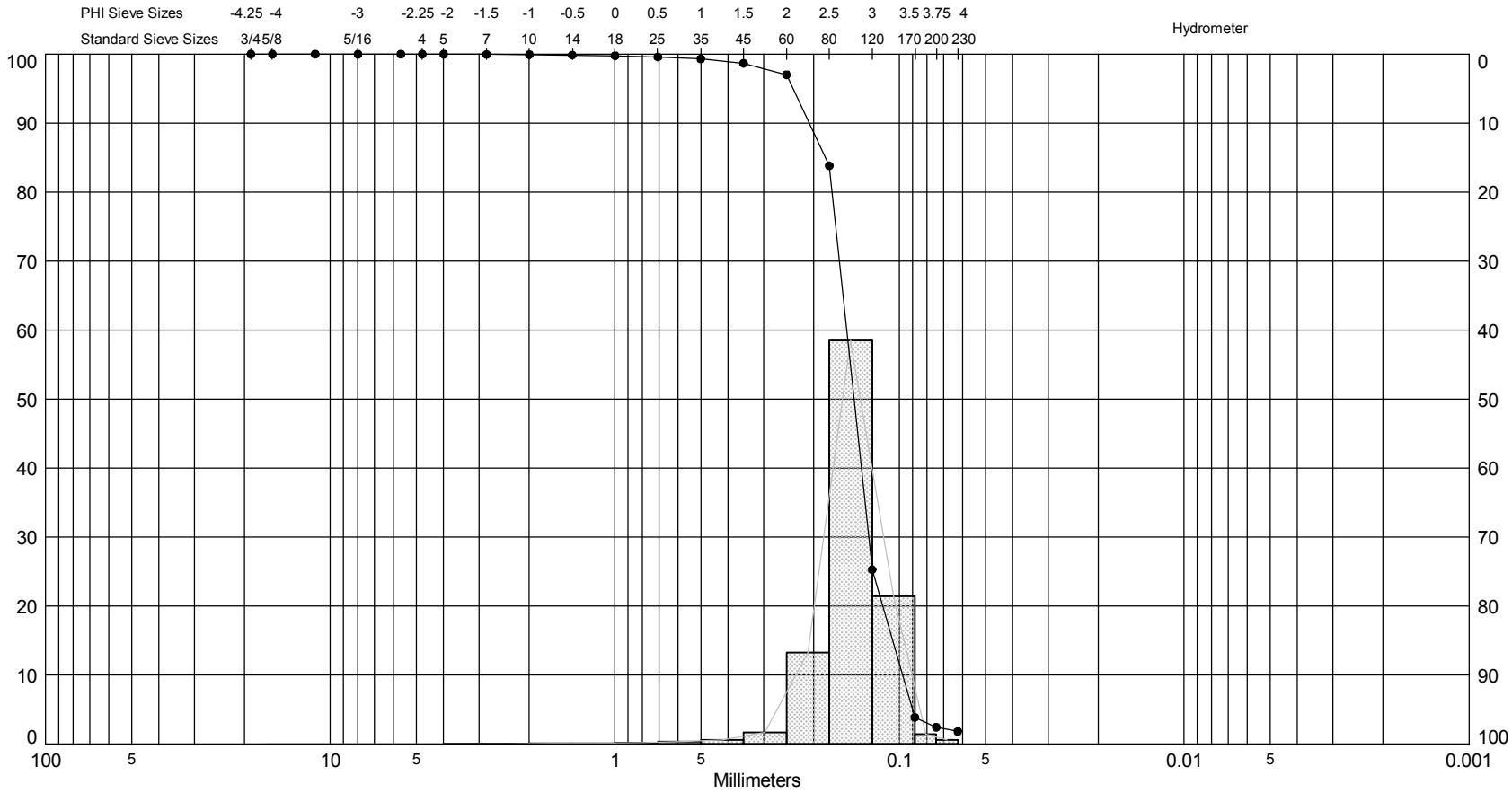

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H2 (-20)	—●—	-20.0	SP	#200 - 2.41 #230 - 1.81			2.79	2.77	-2.15	17.24	0.44

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-19-07
Analyzed By:	TD
Easting (X, ft):	2,393,623
Northing (Y, ft):	205,771
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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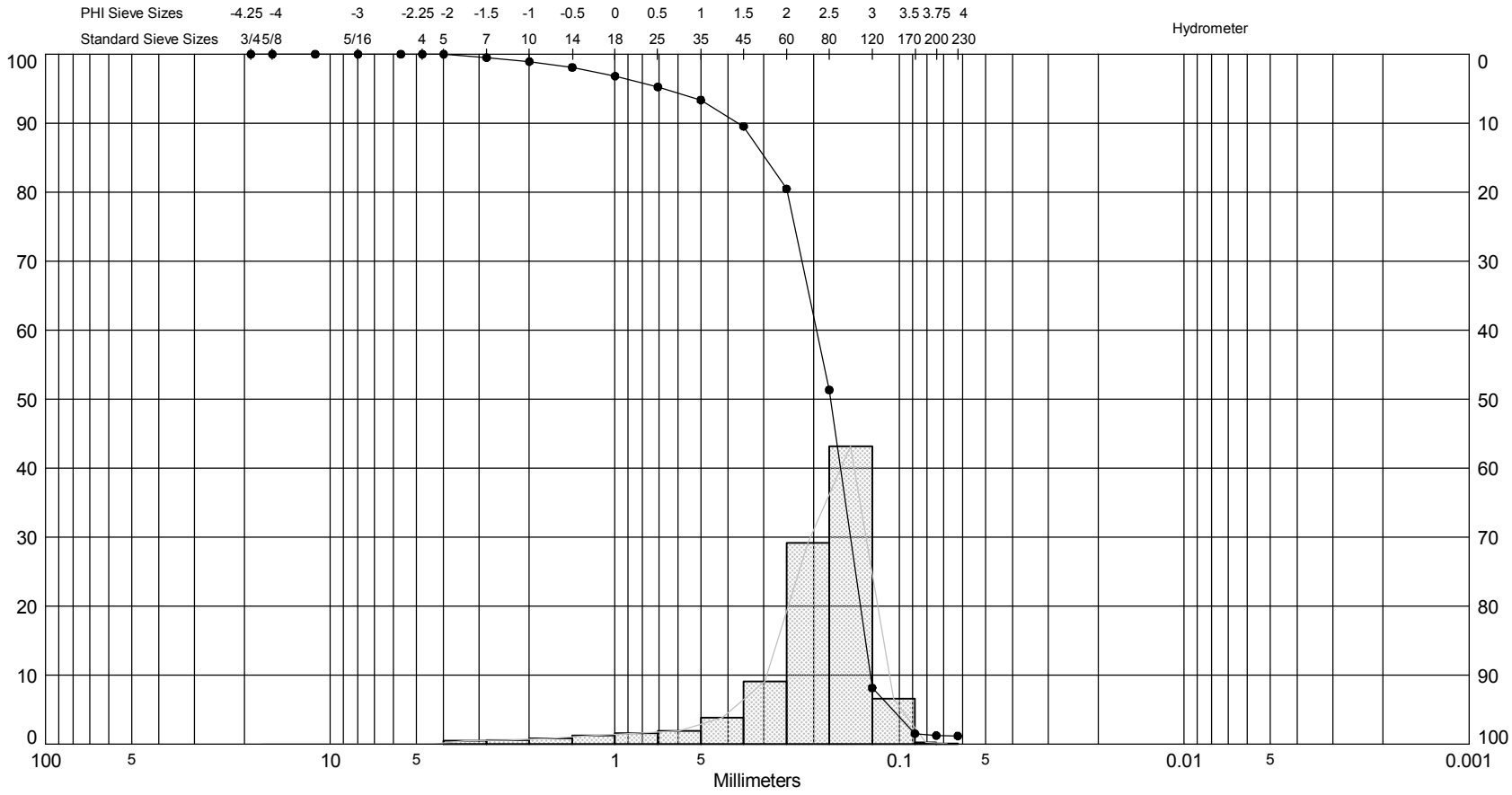

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H2 (-6)	—●—	-6.0	SP	#200 - 1.24 #230 - 1.18			2.52	2.3	-2.26	9.41	0.81

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-18-07
Analyzed By:	TD
Easting (X, ft):	2,393,045
Northing (Y, ft):	206,230
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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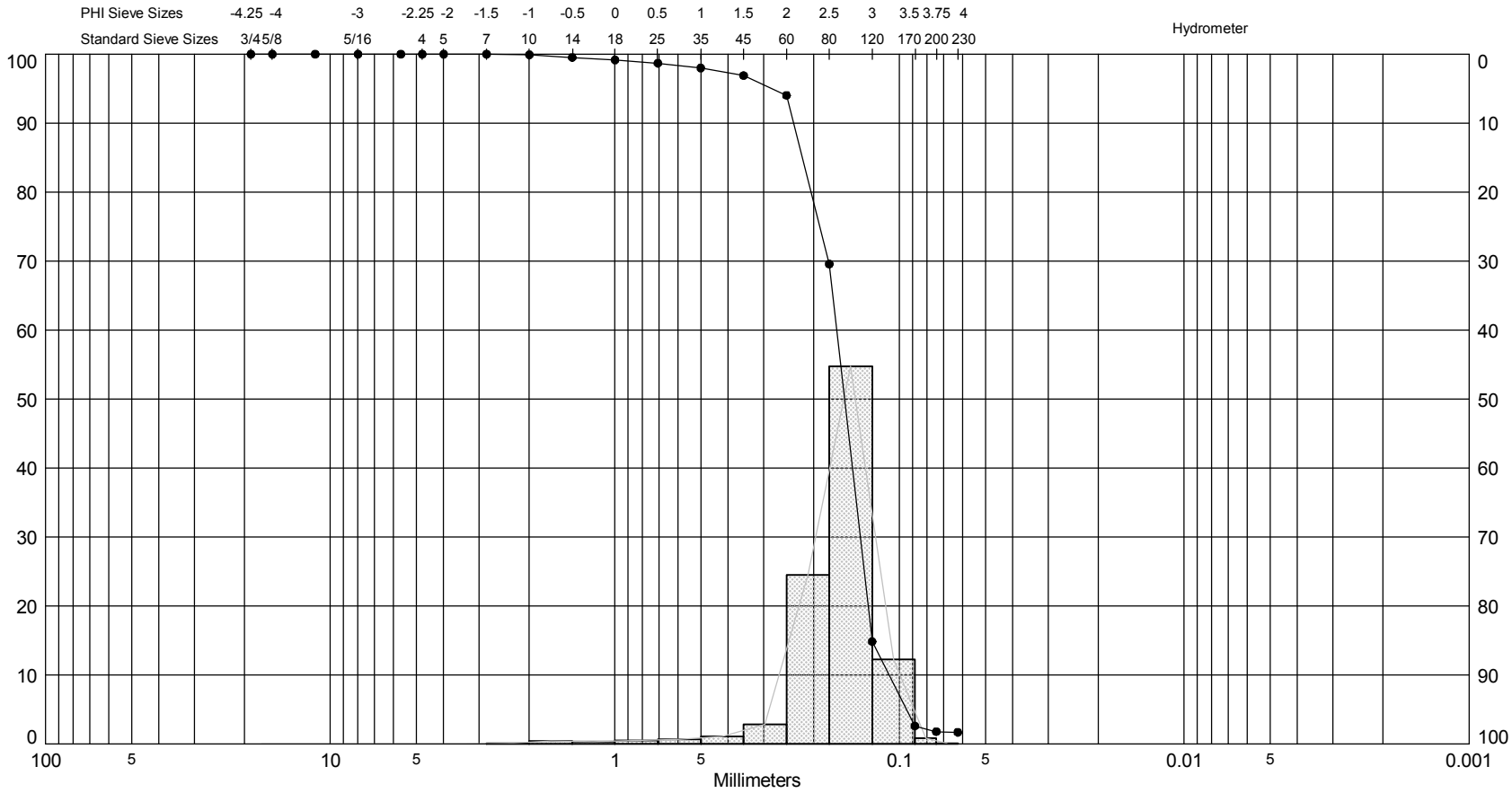

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H2 (-8.8)	—●—	-8.8	SP	#200 - 1.79 #230 - 1.69			2.68	2.6	-2.6	15.34	0.53

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-22-07
Analyzed By:	TD
Easting (X, ft):	2,393,088
Northing (Y, ft):	206,095
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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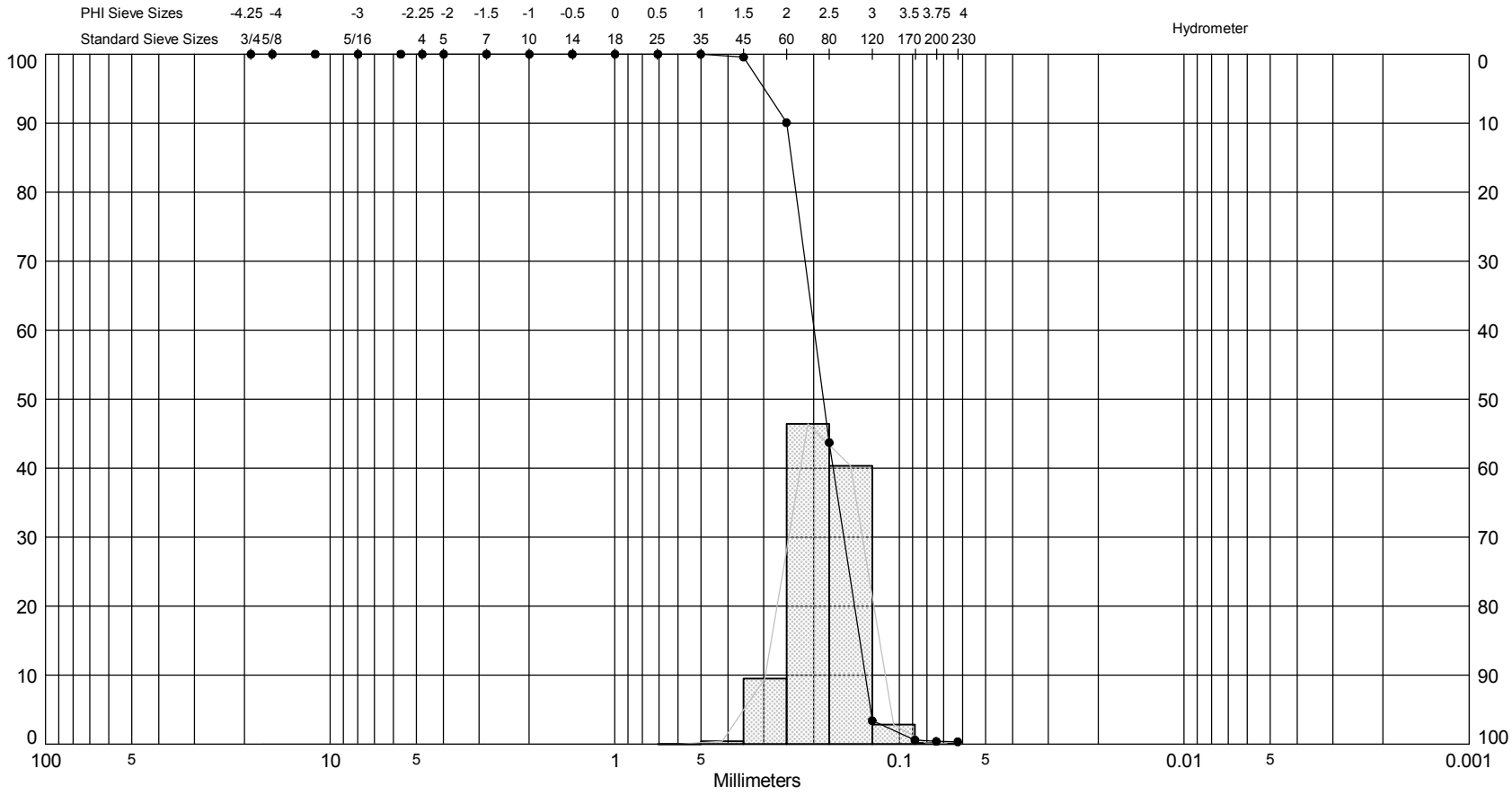

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H2 Dune	—●—	9.5	SP	#200 - 0.39 #230 - 0.34			2.43	2.43	-0.15	3.17	0.36

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-14-07
Analyzed By:	PB
Easting (X, ft):	2,392,702
Northing (Y, ft):	206,504
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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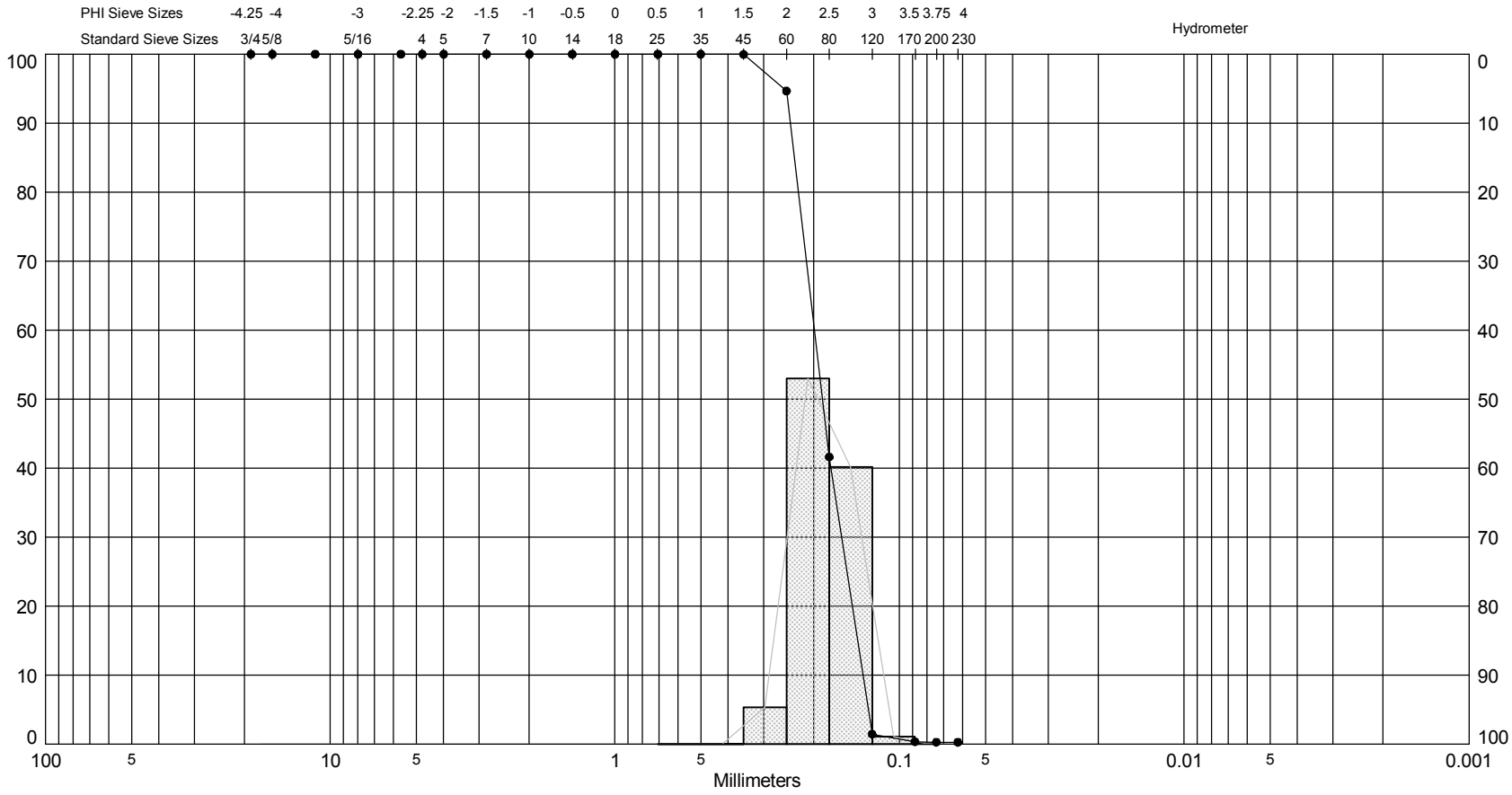

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H2 MHW	—●—	1.4	SP	#200 - 0.28 #230 - 0.28			2.42	2.44	-0.07	2.8	0.3

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-14-07
Analyzed By:	TD
Easting (X, ft):	2,392,783
Northing (Y, ft):	206,389
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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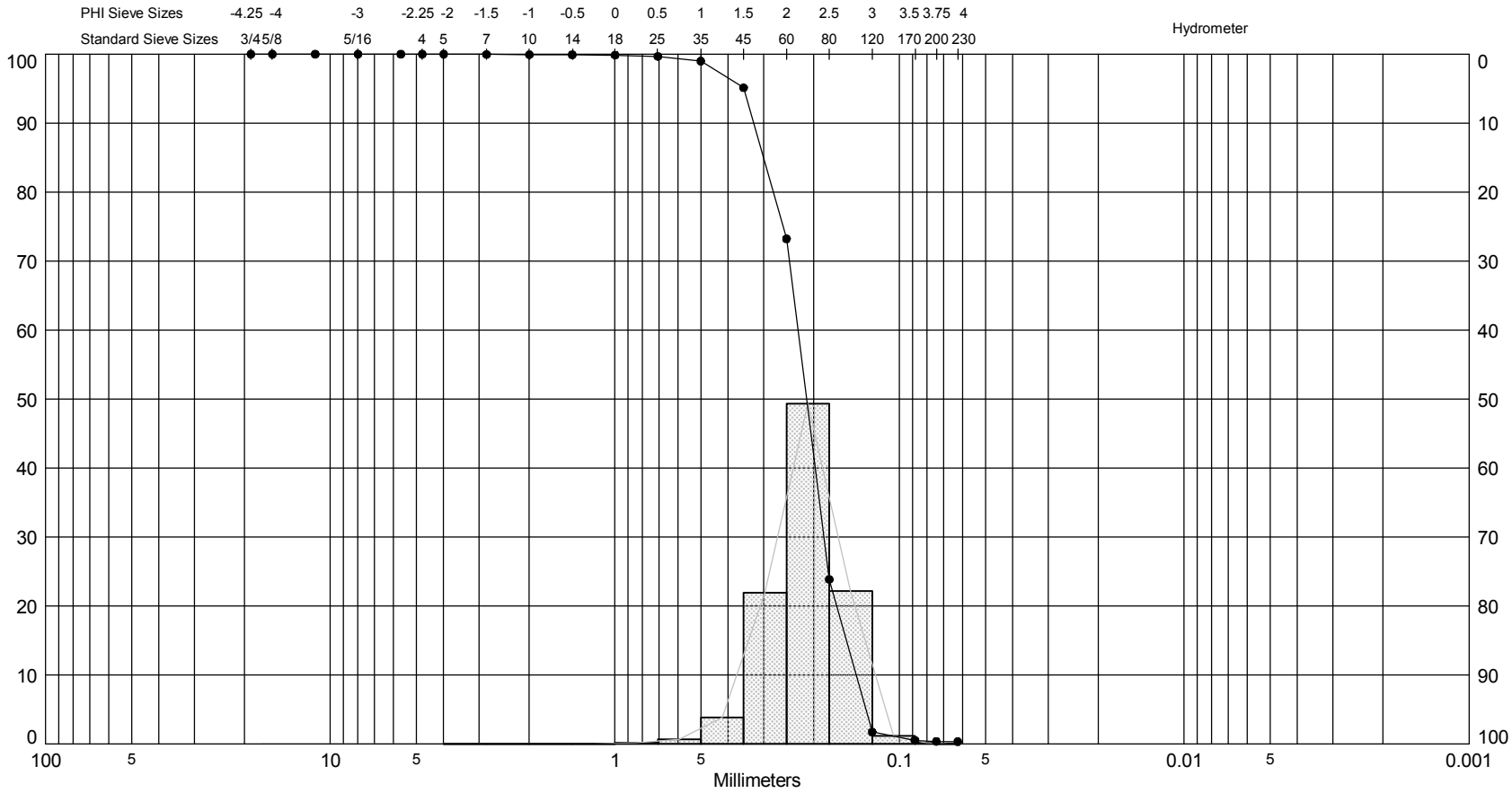

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H2 Mid Berm	—●—	3.7	SP	#200 - 0.37 #230 - 0.33			2.24	2.21	-0.94	7.91	0.45

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-14-07
Analyzed By:	TD
Easting (X, ft):	2,392,726
Northing (Y, ft):	206,433
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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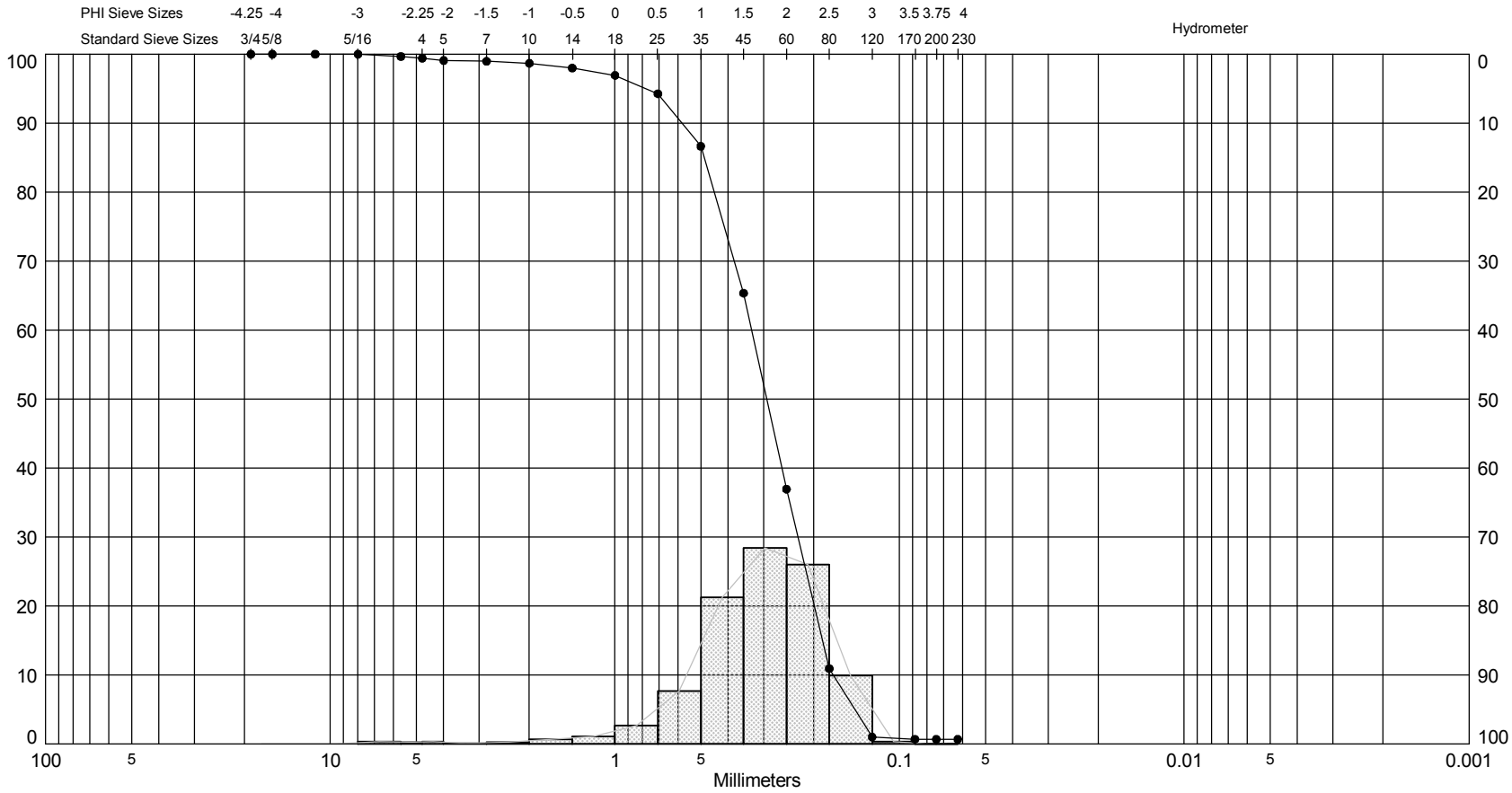

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H2 MLW	—●—	-3.0	SP	#200 - 0.67 #230 - 0.66			1.77	1.67	-1.73	9.04	0.8

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-14-07
Analyzed By:	PB
Easting (X, ft):	2,392,894
Northing (Y, ft):	206,301
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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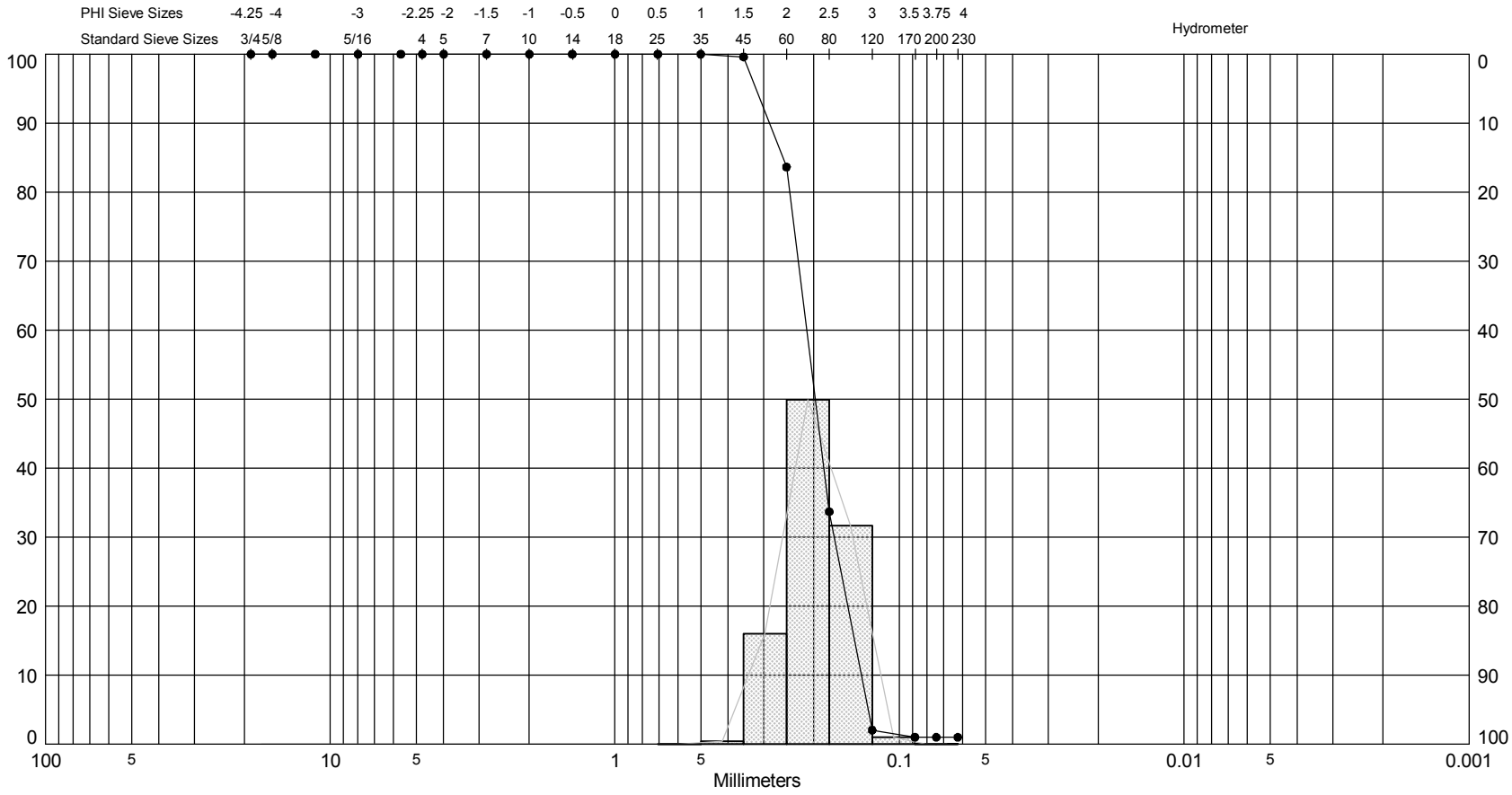

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H2 MTL	—●—	-0.7	SP	#200 - 0.99 #230 - 0.98			2.34	2.34	-0.15	2.61	0.36

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-14-07
Analyzed By:	TD
Easting (X, ft):	2,392,812
Northing (Y, ft):	206,366
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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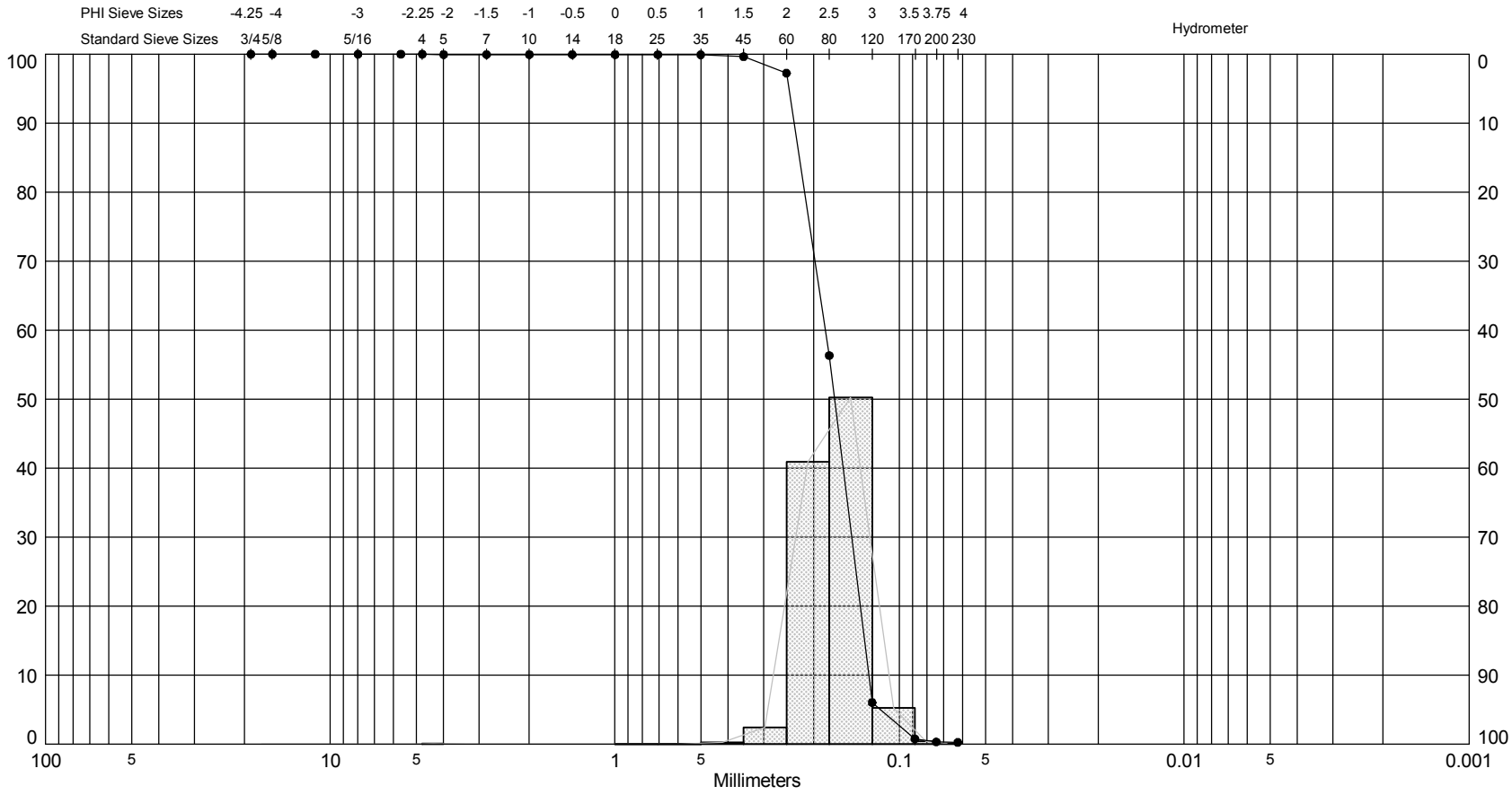

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H2 Toe of Dune	—●—	5.7	SP	#200 - 0.32 #230 - 0.24			2.56	2.54	-1.17	18.73	0.35

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-14-07
Analyzed By:	PB
Easting (X, ft):	2,392,716
Northing (Y, ft):	206,492
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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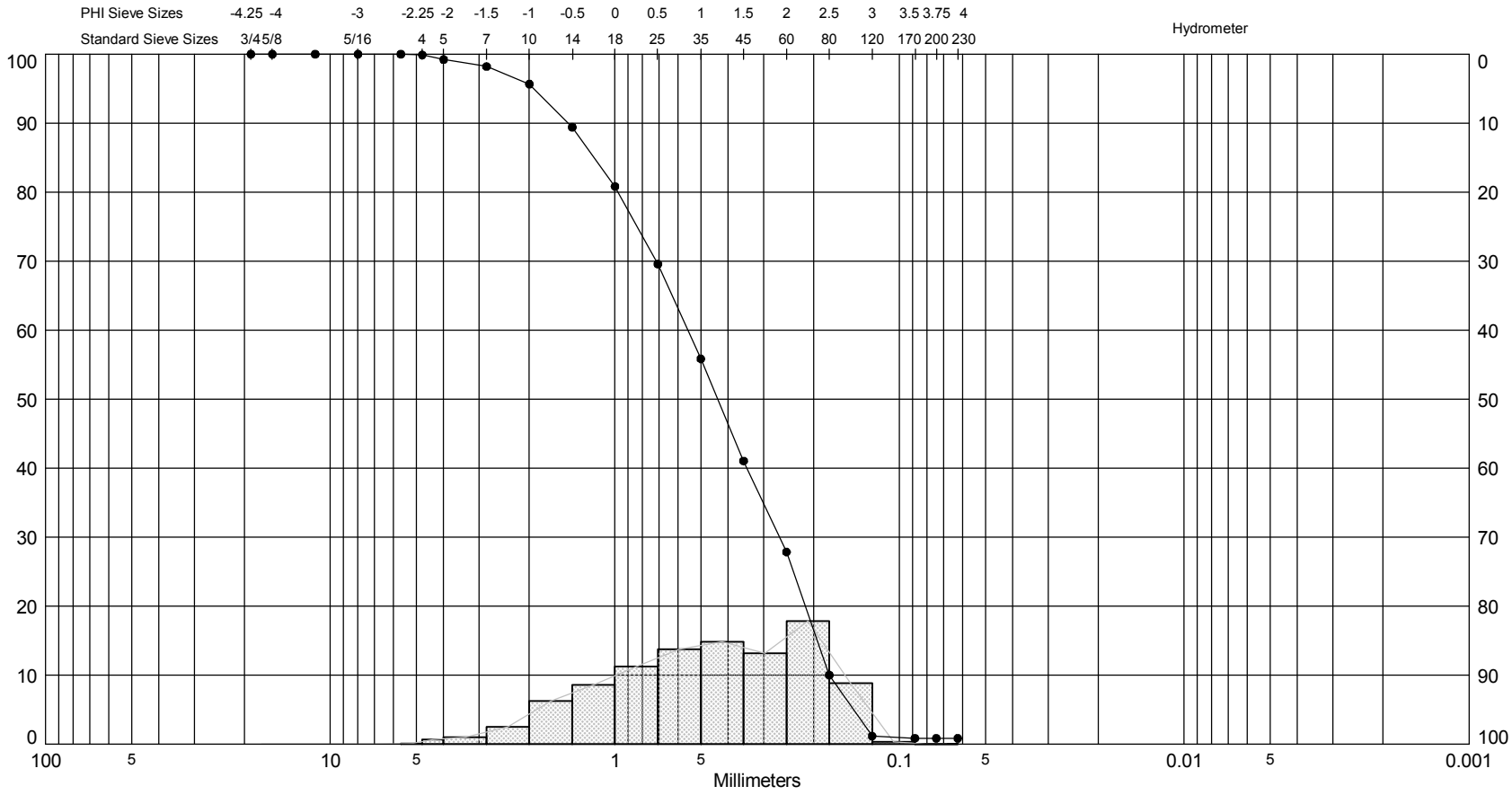

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H3 (+2)	—●—	2.0	SW	#200 - 0.84 #230 - 0.83			1.2	1.08	-0.45	2.49	1.16

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-22-07
Analyzed By:	PB
Easting (X, ft):	2,394,579
Northing (Y, ft):	208,673
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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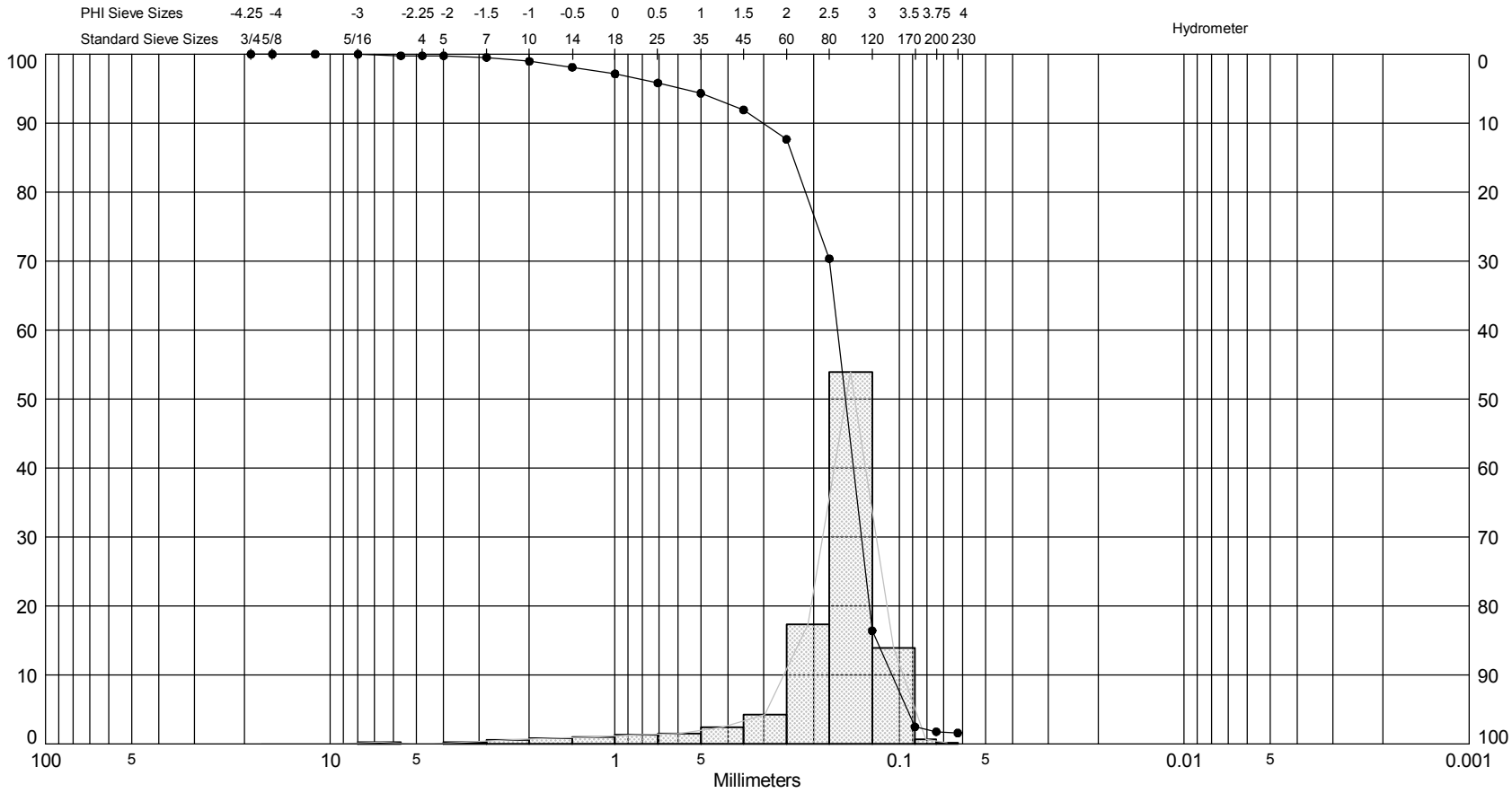

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H3 (-11.6)	—●—	-11.6	SP	#200 - 1.77 #230 - 1.59			2.69	2.49	-2.79	12.93	0.82

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-22-07
Analyzed By:	PB
Easting (X, ft):	2,394,994
Northing (Y, ft):	208,257
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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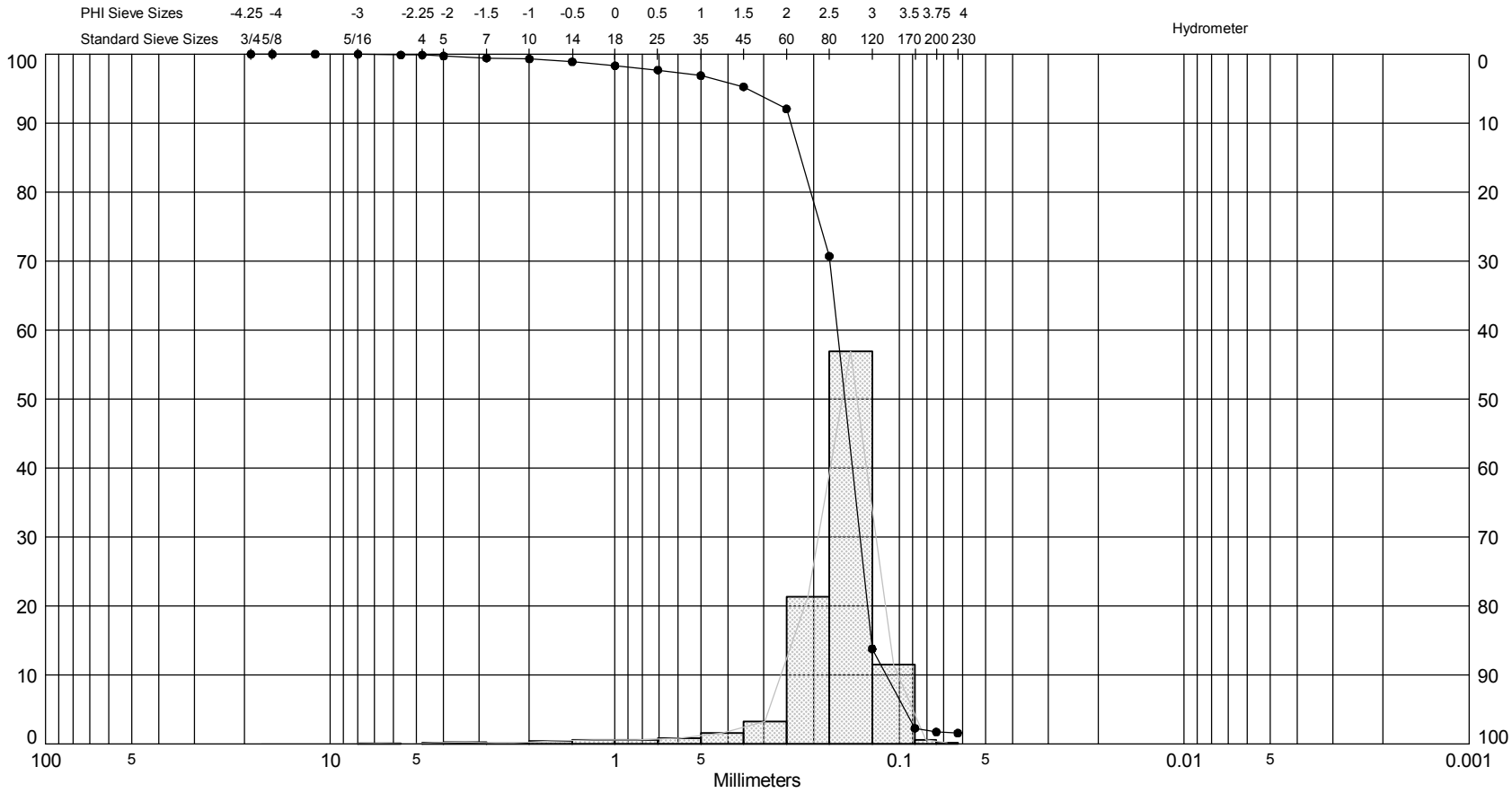

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H3 (-14.4)	—●—	-14.4	SP	#200 - 1.72 #230 - 1.56			2.68	2.55	-3.5	20.78	0.67

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-23-07
Analyzed By:	PB
Easting (X, ft):	2,395,105
Northing (Y, ft):	208,187
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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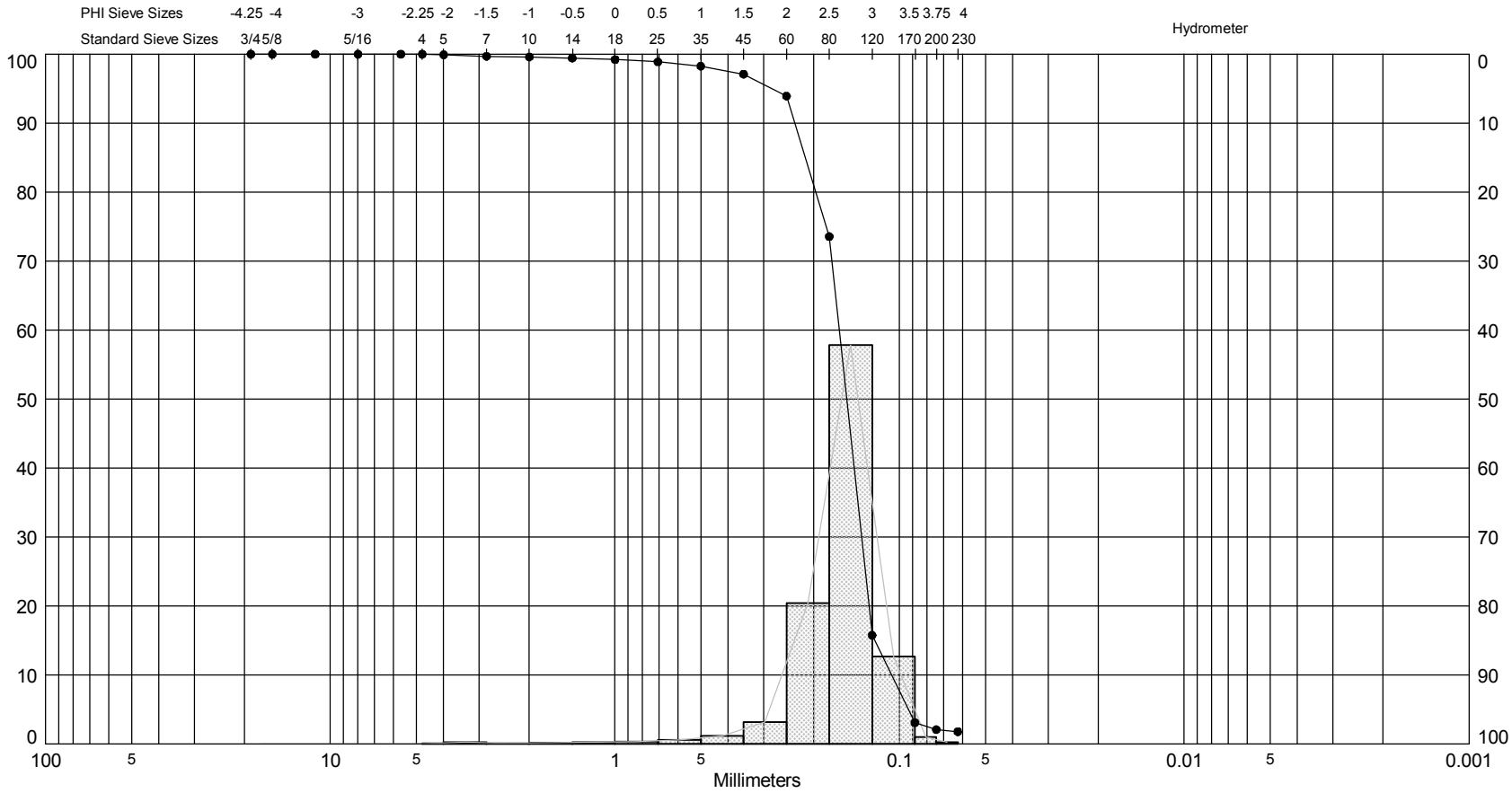

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H3 (-17.2)	—●—	-17.2	SP	#200 - 2.07 #230 - 1.78			2.7	2.62	-3.24	22.56	0.55

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-23-07
Analyzed By:	TD
Easting (X, ft):	2,395,225
Northing (Y, ft):	208,141
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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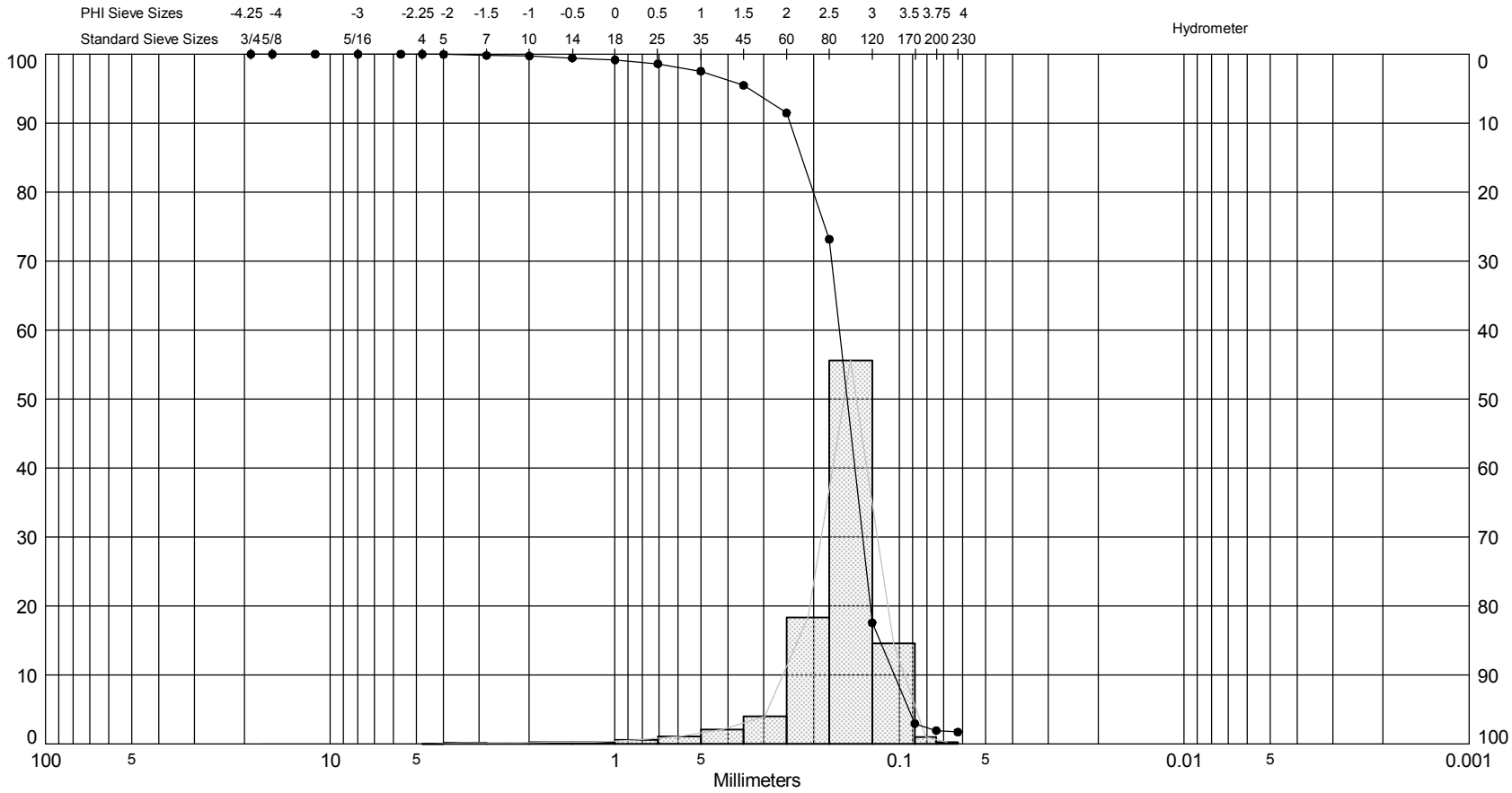

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H3 (-20)	—●—	-20.0	SP	#200 - 1.93 #230 - 1.71			2.71	2.6	-2.65	15.22	0.59

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-23-07
Analyzed By:	TD
Easting (X, ft):	2,395,366
Northing (Y, ft):	208,000
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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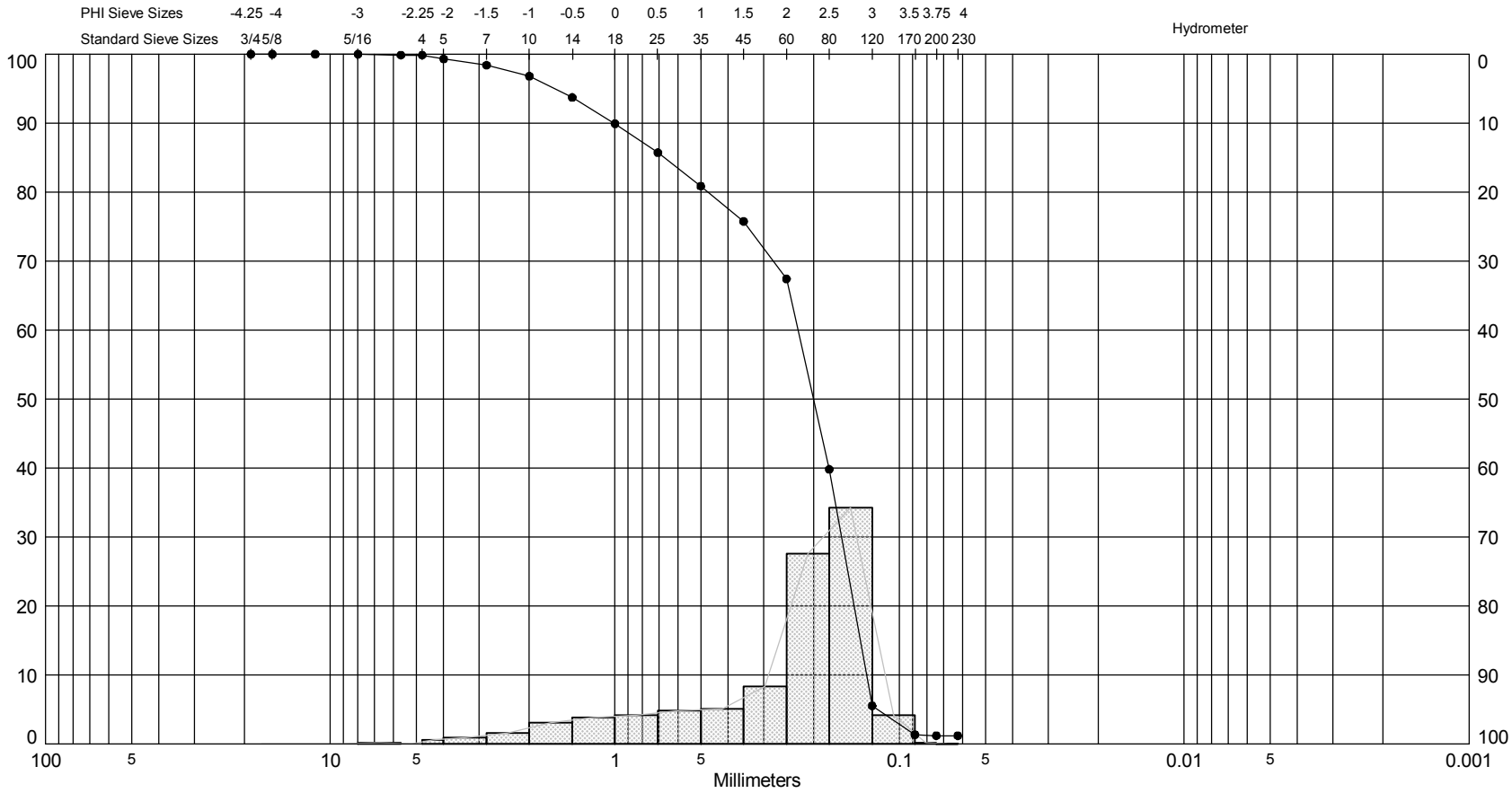

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H3 (-6)	—●—	-6.3	SW	#200 - 1.20 #230 - 1.19			2.32	1.9	-1.47	4.49	1.17

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-22-07
Analyzed By:	TD
Easting (X, ft):	2,394,761
Northing (Y, ft):	208,510
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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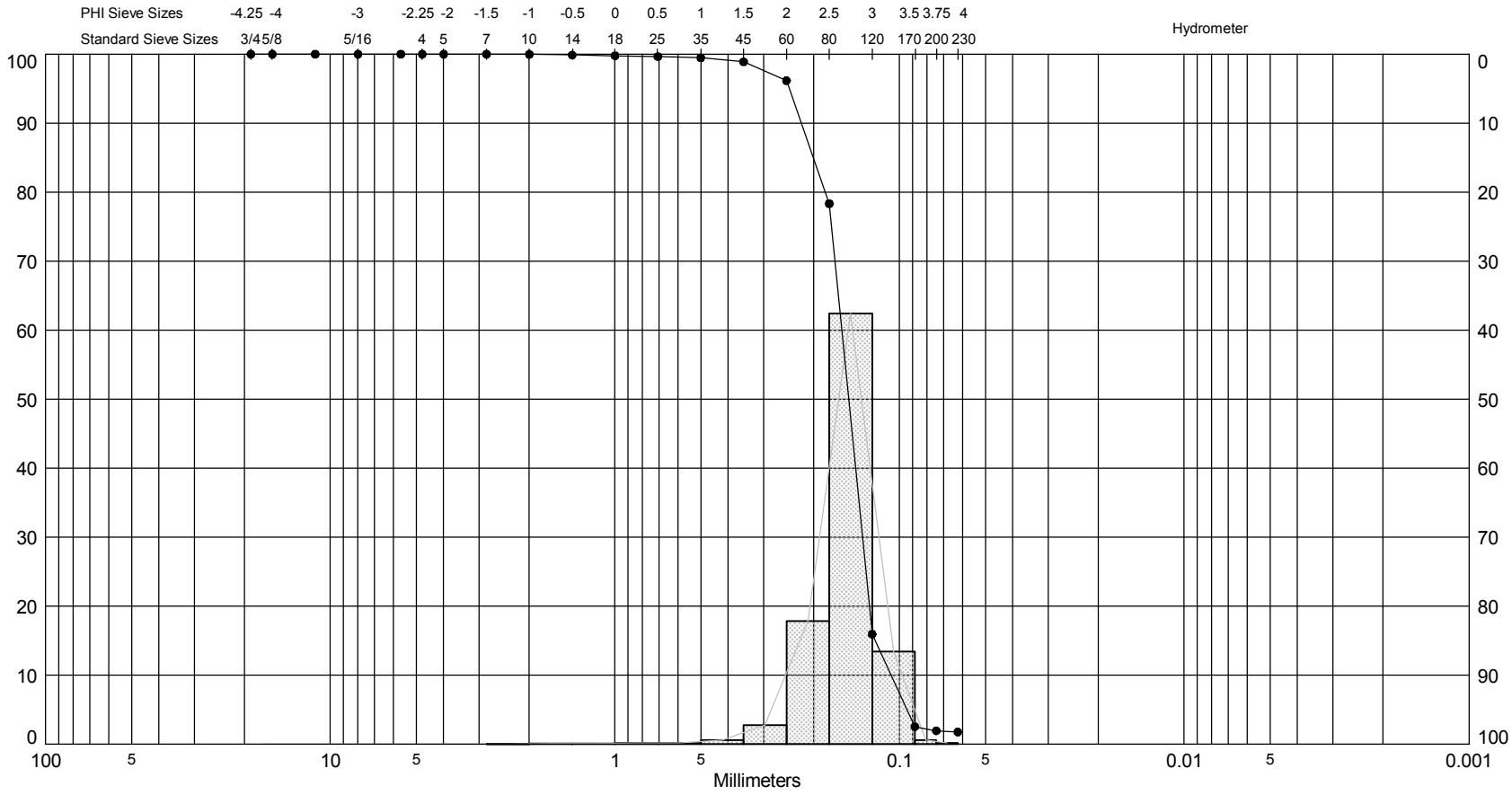

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H3 (-8.8)	—●—	-8.8	SP	#200 - 1.93 #230 - 1.76			2.73	2.68	-2.02	15.45	0.4

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-22-07
Analyzed By:	PB
Easting (X, ft):	2,394,792
Northing (Y, ft):	208,480
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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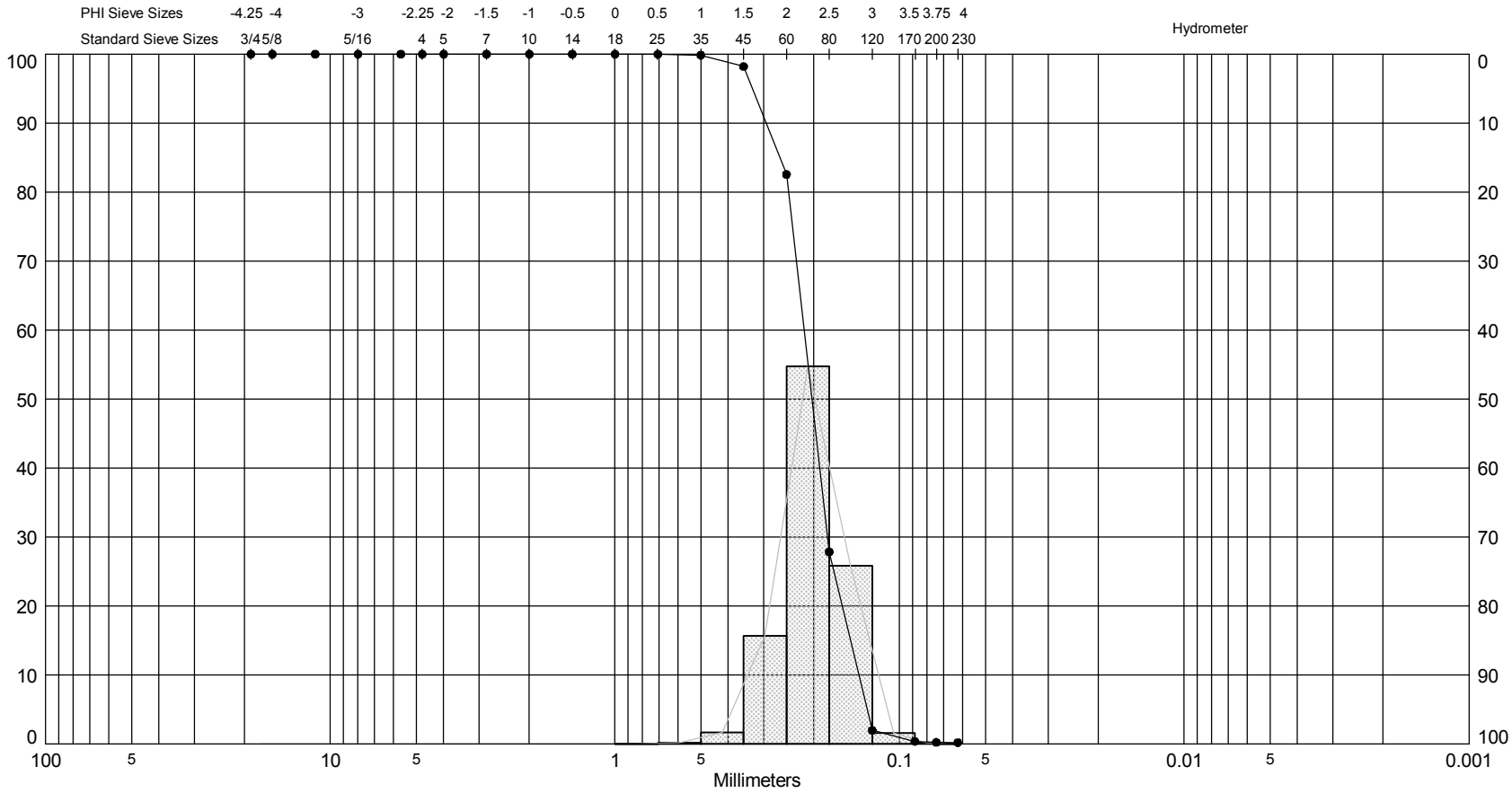

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H3 Dune	—●—	7.5	SP	#200 - 0.22 #230 - 0.20			2.3	2.3	-0.19	3.71	0.38

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-19-07
Analyzed By:	TD
Easting (X, ft):	2,394,433
Northing (Y, ft):	208,800
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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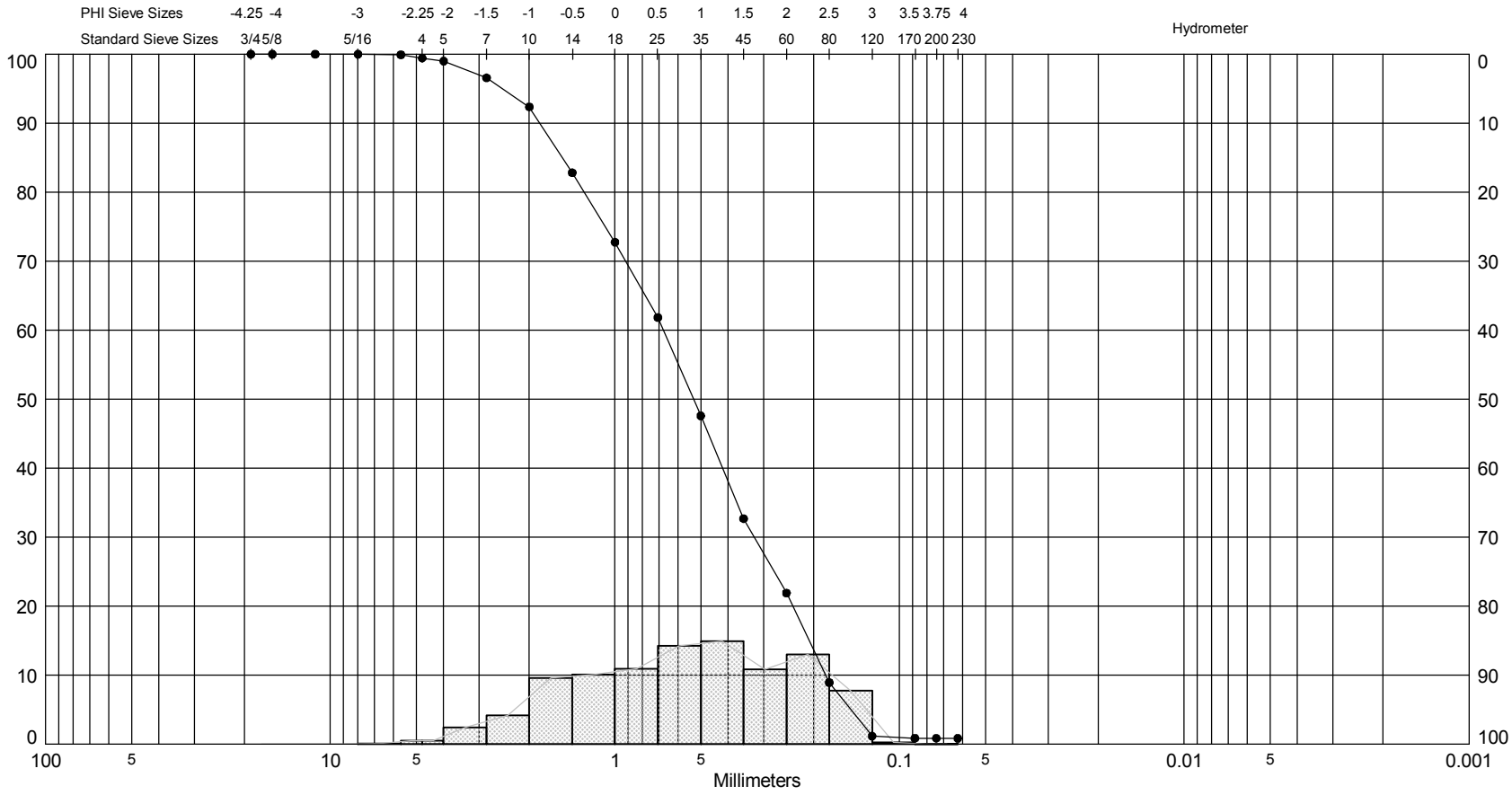

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H3 MHW	—●—	1.4	SW	#200 - 0.85 #230 - 0.84			0.92	0.82	-0.27	2.29	1.24

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-22-07
Analyzed By:	PB
Easting (X, ft):	2,394,585
Northing (Y, ft):	208,669
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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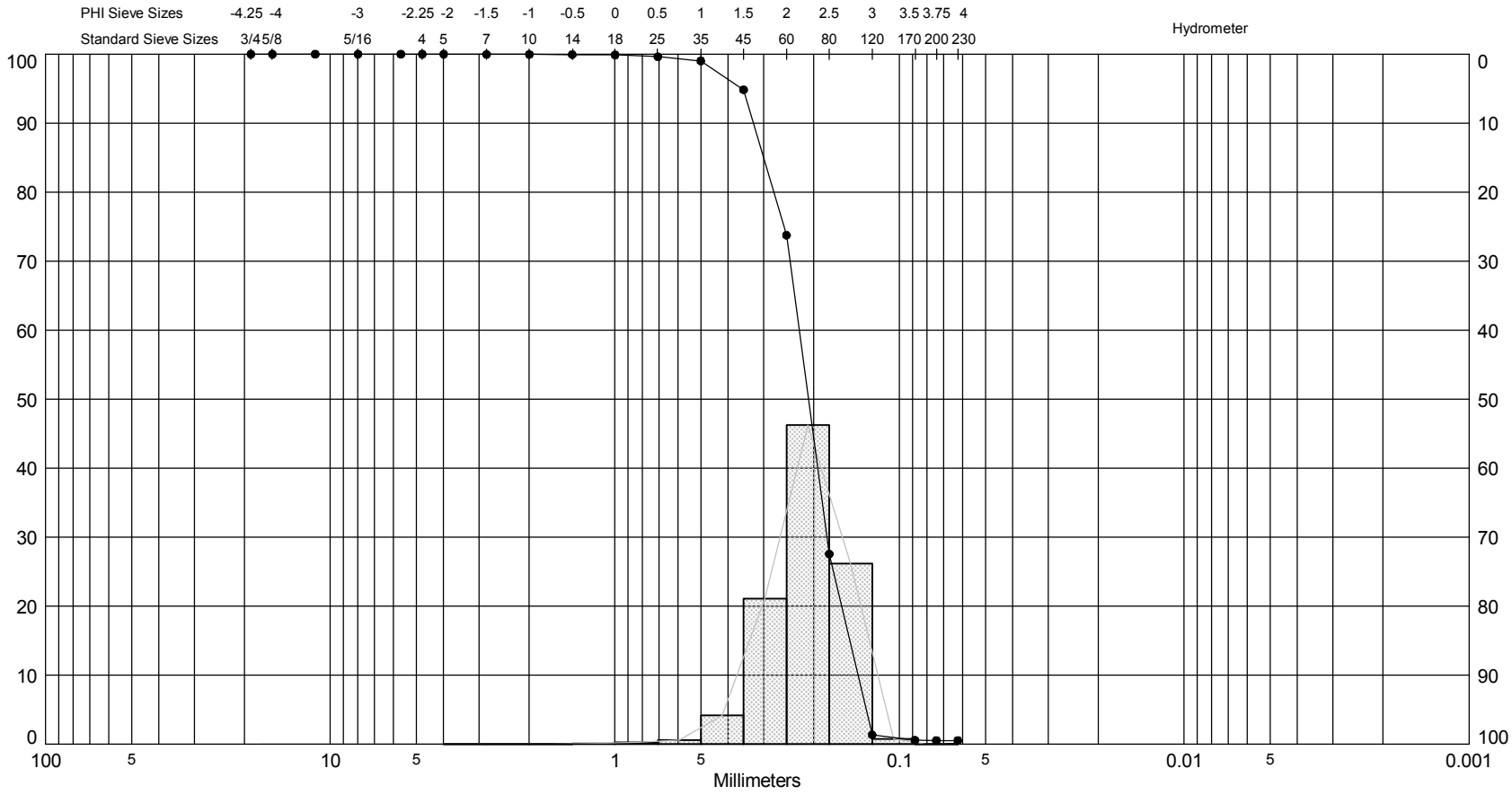

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H3 Mid Berm	—●—	3.8	SP	#200 - 0.54 #230 - 0.53			2.26	2.22	-0.97	6.58	0.45

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-22-07
Analyzed By:	PB
Easting (X, ft):	2,394,544
Northing (Y, ft):	208,706
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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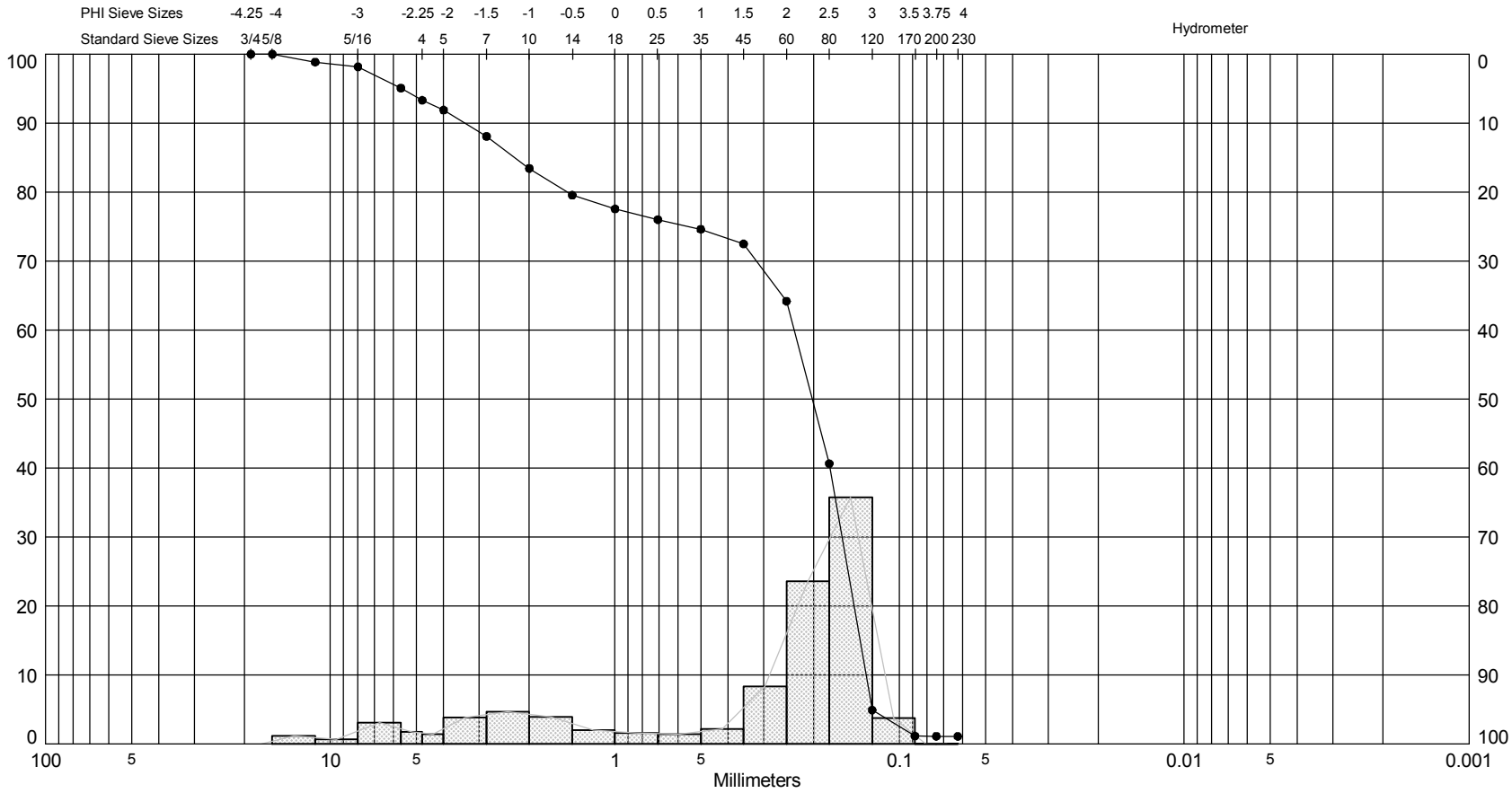

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H3 MLW	—●—	-2.9	SW	#200 - 1.11 #230 - 1.10			2.3	1.46	-1.29	3.27	1.84

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-22-07
Analyzed By:	TD
Easting (X, ft):	2,394,651
Northing (Y, ft):	208,612
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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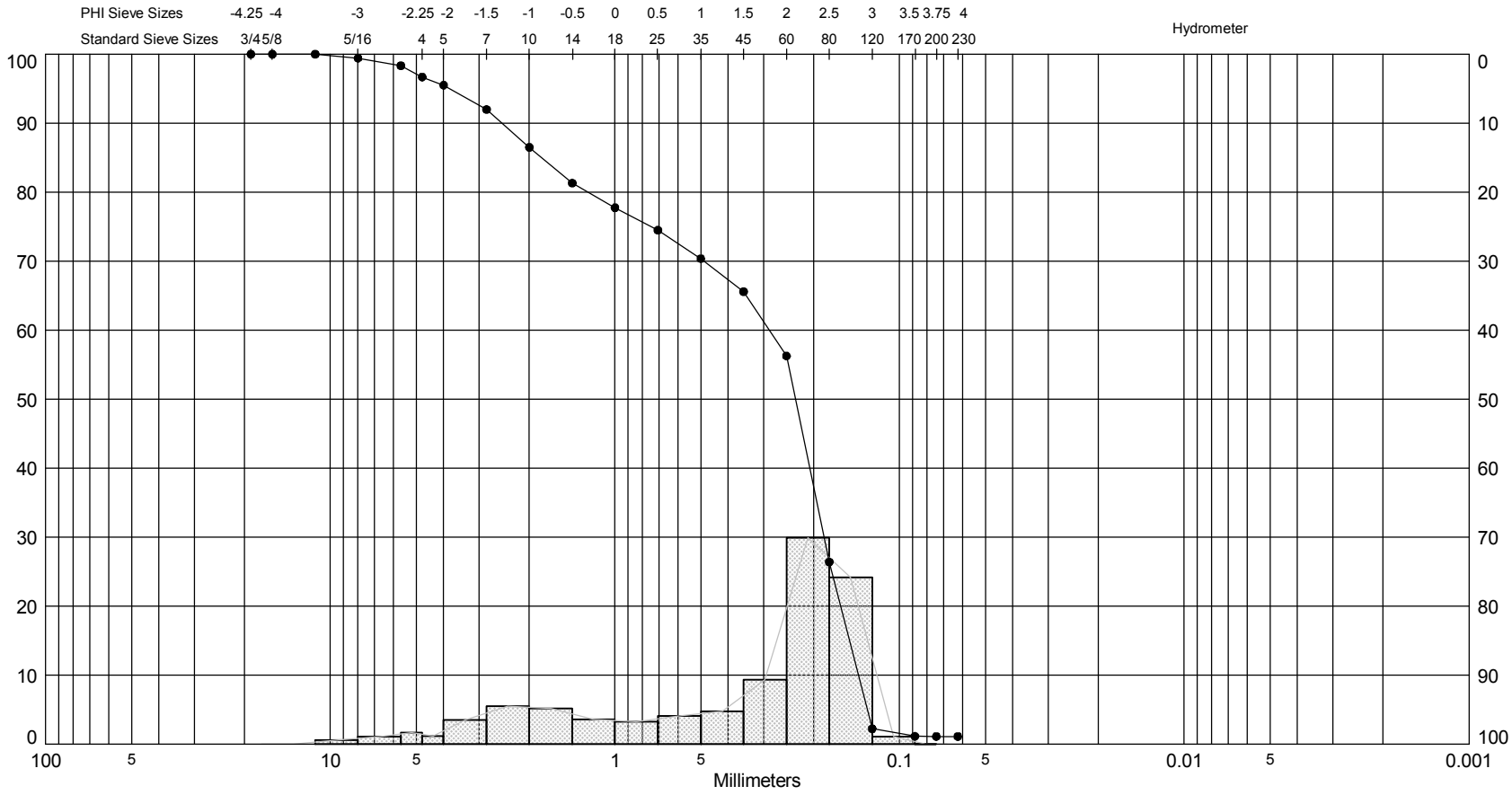

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H3 MTL	—●—	-0.8	SW	#200 - 1.11 #230 - 1.11			2.1	1.36	-1.1	2.94	1.6

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-22-07
Analyzed By:	TD
Easting (X, ft):	2,394,617
Northing (Y, ft):	208,641
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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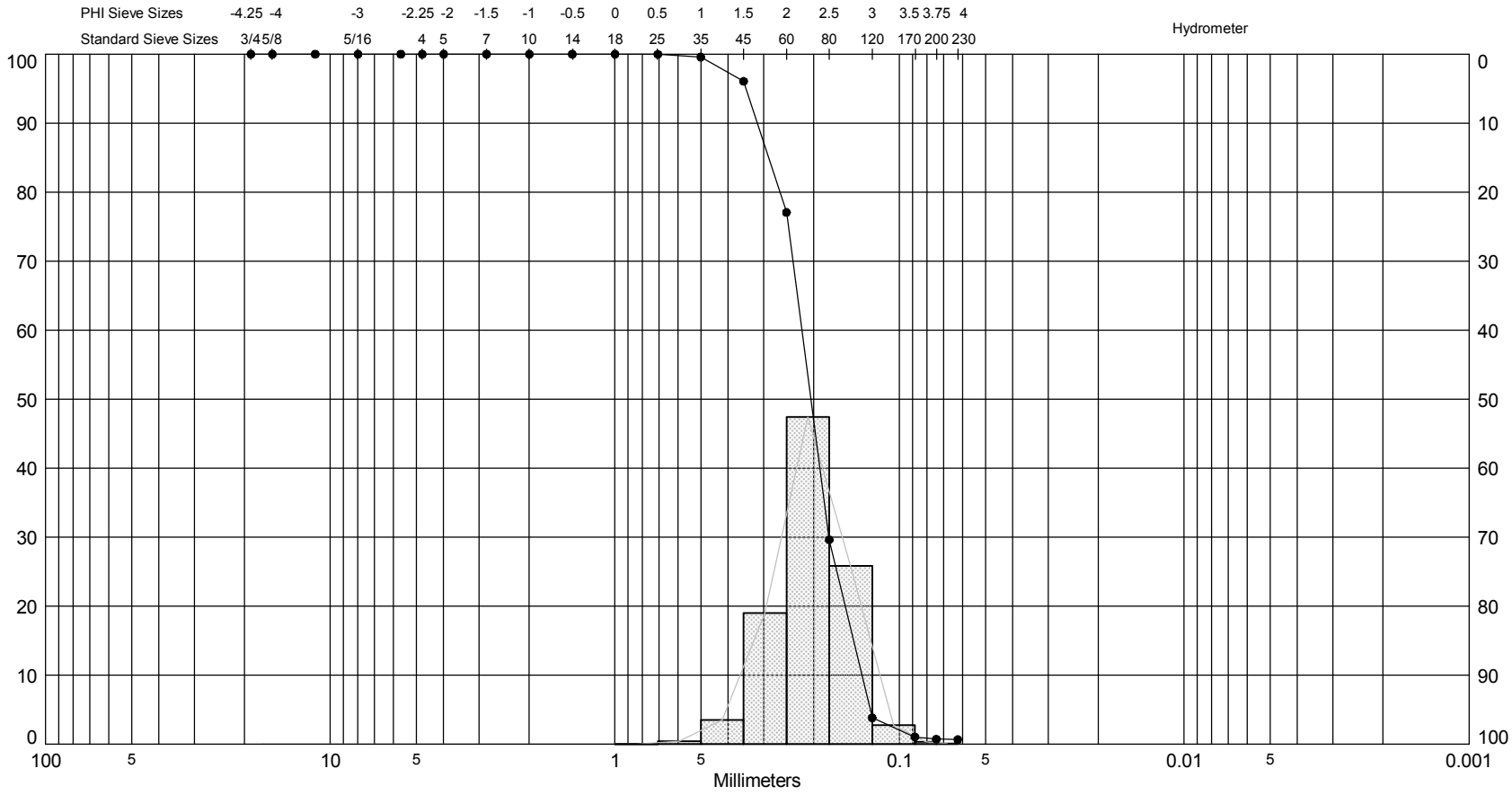

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H3 Toe of Dune	—●—	5.7	SP	#200 - 0.71 #230 - 0.64			2.29	2.28	-0.21	3.55	0.44

Comments: Hutaff Island Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-19-07
Analyzed By:	TD
Easting (X, ft):	2,394,441
Northing (Y, ft):	208,791
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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APPENDIX 9

2007 Hutaff Island Native Beach Composite Grab Sample Granularmetric Reports

Granularmetric Report

Depths and elevations based on measured values

Project Name: Hutaff Island

Sample Name: Beach Comp.

Analysis Date:

Analyzed By:

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Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.99	0.01	#200 - 1.09 #230 - 1.00			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.03	0.03	0.03	0.03
5/16"	-3.00	8.00	0.03	0.03	0.06	0.06
3.5	-2.50	5.66	0.14	0.14	0.20	0.20
4	-2.25	4.76	0.13	0.13	0.33	0.33
5	-2.00	4.00	0.14	0.14	0.47	0.47
7	-1.50	2.83	0.40	0.40	0.87	0.87
10	-1.00	2.00	0.61	0.61	1.48	1.48
14	-0.50	1.41	0.99	0.99	2.47	2.47
18	0.00	1.00	1.07	1.07	3.54	3.54
25	0.50	0.71	1.30	1.30	4.84	4.84
35	1.00	0.50	1.88	1.88	6.72	6.72
45	1.50	0.35	3.37	3.37	10.09	10.09
60	2.00	0.25	9.91	9.91	20.00	20.00
80	2.50	0.18	34.05	34.05	54.05	54.05
120	3.00	0.13	38.51	38.51	92.56	92.56
170	3.50	0.09	5.96	5.96	98.52	98.52
200	3.75	0.07	0.39	0.39	98.91	98.91
230	4.00	0.06	0.09	0.09	99.00	99.00

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.20	2.89	2.77	2.44	2.07	1.80	0.54

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.26	0.21	0.85	-2.58	11.92

GRANULARMETRIC REPORT HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Hutaff Island

Sample Name: H1 Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.87	0.02	#200 - 0.96 #230 - 0.89		7	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.01	0.01	0.01	0.01
4	-2.25	4.76	0.02	0.02	0.03	0.03
5	-2.00	4.00	0.03	0.03	0.06	0.06
7	-1.50	2.83	0.13	0.13	0.19	0.19
10	-1.00	2.00	0.23	0.23	0.42	0.42
14	-0.50	1.41	0.47	0.47	0.89	0.89
18	0.00	1.00	0.58	0.58	1.47	1.47
25	0.50	0.71	0.77	0.77	2.24	2.24
35	1.00	0.50	1.27	1.27	3.51	3.51
45	1.50	0.35	2.80	2.80	6.31	6.31
60	2.00	0.25	10.94	10.94	17.25	17.25
80	2.50	0.18	39.07	39.07	56.32	56.32
120	3.00	0.13	37.38	37.38	93.70	93.70
170	3.50	0.09	4.98	4.98	98.68	98.68
200	3.75	0.07	0.36	0.36	99.04	99.04
230	4.00	0.06	0.07	0.07	99.11	99.11

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.13	2.87	2.75	2.42	2.10	1.94	1.27

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.33	0.20	0.64	-2.33	12.63

GRANULARMETRIC REPORT HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Hutaff Island

Sample Name: H2 Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.96	0.01	#200 - 1.09 #230 - 0.97		6	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.04	0.04	0.04	0.04
4	-2.25	4.76	0.06	0.06	0.10	0.10
5	-2.00	4.00	0.05	0.05	0.15	0.15
7	-1.50	2.83	0.08	0.08	0.23	0.23
10	-1.00	2.00	0.12	0.12	0.35	0.35
14	-0.50	1.41	0.22	0.22	0.57	0.57
18	0.00	1.00	0.29	0.29	0.86	0.86
25	0.50	0.71	0.50	0.50	1.36	1.36
35	1.00	0.50	1.01	1.01	2.37	2.37
45	1.50	0.35	2.76	2.76	5.13	5.13
60	2.00	0.25	9.33	9.33	14.46	14.46
80	2.50	0.18	35.74	35.74	50.20	50.20
120	3.00	0.13	41.60	41.60	91.80	91.80
170	3.50	0.09	6.66	6.66	98.46	98.46
200	3.75	0.07	0.45	0.45	98.91	98.91
230	4.00	0.06	0.12	0.12	99.03	99.03

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.24	2.91	2.80	2.50	2.15	2.02	1.48

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.41	0.19	0.59	-2.43	15.65

GRANULARMETRIC REPORT HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Hutaff Island

Sample Name: H3 Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SW		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.13	0.01	#200 - 1.23 #230 - 1.14		17	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.09	0.09	0.09	0.09
5/16"	-3.00	8.00	0.09	0.09	0.18	0.18
3.5	-2.50	5.66	0.37	0.37	0.55	0.55
4	-2.25	4.76	0.31	0.31	0.86	0.86
5	-2.00	4.00	0.35	0.35	1.21	1.21
7	-1.50	2.83	0.97	0.97	2.18	2.18
10	-1.00	2.00	1.49	1.49	3.67	3.67
14	-0.50	1.41	2.29	2.29	5.96	5.96
18	0.00	1.00	2.33	2.33	8.29	8.29
25	0.50	0.71	2.64	2.64	10.93	10.93
35	1.00	0.50	3.36	3.36	14.29	14.29
45	1.50	0.35	4.53	4.53	18.82	18.82
60	2.00	0.25	9.47	9.47	28.29	28.29
80	2.50	0.18	27.34	27.34	55.63	55.63
120	3.00	0.13	36.56	36.56	92.19	92.19
170	3.50	0.09	6.22	6.22	98.41	98.41
200	3.75	0.07	0.36	0.36	98.77	98.77
230	4.00	0.06	0.09	0.09	98.86	98.86

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.23	2.89	2.76	2.40	1.83	1.19	-0.71

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.03	0.24	1.16	-1.93	6.7

GRANULARMETRIC REPORT HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Hutaff Island

Sample Name: Dune Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.21	0.00	#200 - 0.25 #230 - 0.21			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.00	0.00	0.00	0.00
25	0.50	0.71	0.00	0.00	0.00	0.00
35	1.00	0.50	0.05	0.05	0.05	0.05
45	1.50	0.35	0.72	0.72	0.77	0.77
60	2.00	0.25	10.68	10.68	11.45	11.45
80	2.50	0.18	52.00	52.00	63.45	63.45
120	3.00	0.13	33.02	33.02	96.47	96.47
170	3.50	0.09	3.06	3.06	99.53	99.53
200	3.75	0.07	0.22	0.22	99.75	99.75
230	4.00	0.06	0.04	0.04	99.79	99.79

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.98	2.81	2.67	2.37	2.13	2.04	1.70

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.39	0.19	0.37	-0.03	3.5

GRANULARMETRIC REPORT HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Hutaff Island

Sample Name: Toe of Dune Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.29	0.04	#200 - 0.39 #230 - 0.33			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.02	0.02	0.02	0.02
7	-1.50	2.83	0.00	0.00	0.02	0.02
10	-1.00	2.00	0.00	0.00	0.02	0.02
14	-0.50	1.41	0.00	0.00	0.02	0.02
18	0.00	1.00	0.00	0.00	0.02	0.02
25	0.50	0.71	0.02	0.02	0.04	0.04
35	1.00	0.50	0.15	0.15	0.19	0.19
45	1.50	0.35	1.36	1.36	1.55	1.55
60	2.00	0.25	10.00	10.00	11.55	11.55
80	2.50	0.18	47.66	47.66	59.21	59.21
120	3.00	0.13	36.29	36.29	95.50	95.50
170	3.50	0.09	3.78	3.78	99.28	99.28
200	3.75	0.07	0.33	0.33	99.61	99.61
230	4.00	0.06	0.06	0.06	99.67	99.67

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.99	2.84	2.72	2.40	2.14	2.05	1.67

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.41	0.19	0.4	-0.54	7.09

GRANULARMETRIC REPORT HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Hutaff Island

Sample Name: Mid-Berm Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.34	0.01	#200 - 0.38 #230 - 0.35			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.02	0.02	0.02	0.02
10	-1.00	2.00	0.04	0.04	0.06	0.06
14	-0.50	1.41	0.02	0.02	0.08	0.08
18	0.00	1.00	0.05	0.05	0.13	0.13
25	0.50	0.71	0.19	0.19	0.32	0.32
35	1.00	0.50	0.54	0.54	0.86	0.86
45	1.50	0.35	3.32	3.32	4.18	4.18
60	2.00	0.25	19.63	19.63	23.81	23.81
80	2.50	0.18	37.84	37.84	61.65	61.65
120	3.00	0.13	36.24	36.24	97.89	97.89
170	3.50	0.09	1.58	1.58	99.47	99.47
200	3.75	0.07	0.15	0.15	99.62	99.62
230	4.00	0.06	0.03	0.03	99.65	99.65

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.96	2.81	2.68	2.35	2.02	1.80	1.52

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.3	0.20	0.47	-0.98	6.33

GRANULARMETRIC REPORT HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Hutaff Island

Sample Name: 2.0 / 3.0 Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SW		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.56	0.01	#200 - 0.60 #230 - 0.57			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.04	0.04	0.04	0.04
5	-2.00	4.00	0.22	0.22	0.26	0.26
7	-1.50	2.83	0.34	0.34	0.60	0.60
10	-1.00	2.00	0.84	0.84	1.44	1.44
14	-0.50	1.41	2.09	2.09	3.53	3.53
18	0.00	1.00	2.86	2.86	6.39	6.39
25	0.50	0.71	3.76	3.76	10.15	10.15
35	1.00	0.50	4.60	4.60	14.75	14.75
45	1.50	0.35	5.31	5.31	20.06	20.06
60	2.00	0.25	12.88	12.88	32.94	32.94
80	2.50	0.18	45.25	45.25	78.19	78.19
120	3.00	0.13	19.39	19.39	97.58	97.58
170	3.50	0.09	1.64	1.64	99.22	99.22
200	3.75	0.07	0.18	0.18	99.40	99.40
230	4.00	0.06	0.03	0.03	99.43	99.43

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.93	2.65	2.46	2.19	1.69	1.12	-0.24

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.91	0.27	0.94	-1.69	5.78

GRANULARMETRIC REPORT HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Hutaff Island

Sample Name: MHW Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SW		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.42	0.01	#200 - 0.44 #230 - 0.43			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.03	0.03	0.03	0.03
4	-2.25	4.76	0.15	0.15	0.18	0.18
5	-2.00	4.00	0.16	0.16	0.34	0.34
7	-1.50	2.83	0.81	0.81	1.15	1.15
10	-1.00	2.00	1.39	1.39	2.54	2.54
14	-0.50	1.41	3.19	3.19	5.73	5.73
18	0.00	1.00	3.36	3.36	9.09	9.09
25	0.50	0.71	3.63	3.63	12.72	12.72
35	1.00	0.50	4.76	4.76	17.48	17.48
45	1.50	0.35	5.06	5.06	22.54	22.54
60	2.00	0.25	9.98	9.98	32.52	32.52
80	2.50	0.18	43.06	43.06	75.58	75.58
120	3.00	0.13	23.14	23.14	98.72	98.72
170	3.50	0.09	0.76	0.76	99.48	99.48
200	3.75	0.07	0.08	0.08	99.56	99.56
230	4.00	0.06	0.01	0.01	99.57	99.57

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.92	2.68	2.49	2.20	1.62	0.84	-0.61

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.85	0.28	1.05	-1.65	5.14

GRANULARMETRIC REPORT HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Hutaff Island

Sample Name: MTL Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SW		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.93	0.04	#200 - 0.98 #230 - 0.97			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.19	0.19	0.19	0.19
3.5	-2.50	5.66	0.36	0.36	0.55	0.55
4	-2.25	4.76	0.55	0.55	1.10	1.10
5	-2.00	4.00	0.39	0.39	1.49	1.49
7	-1.50	2.83	1.18	1.18	2.67	2.67
10	-1.00	2.00	1.84	1.84	4.51	4.51
14	-0.50	1.41	1.76	1.76	6.27	6.27
18	0.00	1.00	1.37	1.37	7.64	7.64
25	0.50	0.71	1.90	1.90	9.54	9.54
35	1.00	0.50	3.61	3.61	13.15	13.15
45	1.50	0.35	5.72	5.72	18.87	18.87
60	2.00	0.25	16.65	16.65	35.52	35.52
80	2.50	0.18	38.25	38.25	73.77	73.77
120	3.00	0.13	24.37	24.37	98.14	98.14
170	3.50	0.09	0.86	0.86	99.00	99.00
200	3.75	0.07	0.02	0.02	99.02	99.02
230	4.00	0.06	0.01	0.01	99.03	99.03

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.94	2.71	2.53	2.19	1.68	1.25	-0.86

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.88	0.27	1.09	-2.16	7.79

GRANULARMETRIC REPORT HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Hutaff Island

Sample Name: MLW Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SW		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.78	0.00	#200 - 0.79 #230 - 0.78			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.38	0.38	0.38	0.38
5/16"	-3.00	8.00	0.23	0.23	0.61	0.61
3.5	-2.50	5.66	1.18	1.18	1.79	1.79
4	-2.25	4.76	0.75	0.75	2.54	2.54
5	-2.00	4.00	0.72	0.72	3.26	3.26
7	-1.50	2.83	1.83	1.83	5.09	5.09
10	-1.00	2.00	2.47	2.47	7.56	7.56
14	-0.50	1.41	3.33	3.33	10.89	10.89
18	0.00	1.00	2.99	2.99	13.88	13.88
25	0.50	0.71	3.24	3.24	17.12	17.12
35	1.00	0.50	4.78	4.78	21.90	21.90
45	1.50	0.35	11.23	11.23	33.13	33.13
60	2.00	0.25	17.61	17.61	50.74	50.74
80	2.50	0.18	26.06	26.06	76.80	76.80
120	3.00	0.13	20.67	20.67	97.47	97.47
170	3.50	0.09	1.68	1.68	99.15	99.15
200	3.75	0.07	0.06	0.06	99.21	99.21
230	4.00	0.06	0.01	0.01	99.22	99.22

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.94	2.67	2.47	1.98	1.14	0.33	-1.52

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.53	0.35	1.36	-1.53	4.94

GRANULARMETRIC REPORT HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Hutaff Island

Sample Name: -6.0 Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SW		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.22	0.01	#200 - 1.26 #230 - 1.23			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.04	0.04	0.04	0.04
4	-2.25	4.76	0.00	0.00	0.04	0.04
5	-2.00	4.00	0.19	0.19	0.23	0.23
7	-1.50	2.83	0.48	0.48	0.71	0.71
10	-1.00	2.00	0.80	0.80	1.51	1.51
14	-0.50	1.41	1.38	1.38	2.89	2.89
18	0.00	1.00	1.82	1.82	4.71	4.71
25	0.50	0.71	2.10	2.10	6.81	6.81
35	1.00	0.50	2.64	2.64	9.45	9.45
45	1.50	0.35	3.74	3.74	13.19	13.19
60	2.00	0.25	8.41	8.41	21.60	21.60
80	2.50	0.18	30.63	30.63	52.23	52.23
120	3.00	0.13	41.24	41.24	93.47	93.47
170	3.50	0.09	5.08	5.08	98.55	98.55
200	3.75	0.07	0.19	0.19	98.74	98.74
230	4.00	0.06	0.03	0.03	98.77	98.77

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.15	2.89	2.78	2.46	2.06	1.67	0.07

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.2	0.22	0.91	-2.15	8.13

GRANULARMETRIC REPORT HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Hutaff Island

Sample Name: -8.8 Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.65	0.01	#200 - 1.87 #230 - 1.66			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.02	0.02	0.02	0.02
10	-1.00	2.00	0.05	0.05	0.07	0.07
14	-0.50	1.41	0.18	0.18	0.25	0.25
18	0.00	1.00	0.17	0.17	0.42	0.42
25	0.50	0.71	0.23	0.23	0.65	0.65
35	1.00	0.50	0.34	0.34	0.99	0.99
45	1.50	0.35	0.69	0.69	1.68	1.68
60	2.00	0.25	2.43	2.43	4.11	4.11
80	2.50	0.18	19.70	19.70	23.81	23.81
120	3.00	0.13	59.33	59.33	83.14	83.14
170	3.50	0.09	13.87	13.87	97.01	97.01
200	3.75	0.07	1.12	1.12	98.13	98.13
230	4.00	0.06	0.21	0.21	98.34	98.34

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.43	3.03	2.93	2.72	2.51	2.30	2.02

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.67	0.16	0.46	-2.45	17.84

GRANULARMETRIC REPORT HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Hutaff Island

Sample Name: -11.6 Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.40	0.01	#200 - 1.52 #230 - 1.41			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.08	0.08	0.08	0.08
4	-2.25	4.76	0.00	0.00	0.08	0.08
5	-2.00	4.00	0.03	0.03	0.11	0.11
7	-1.50	2.83	0.09	0.09	0.20	0.20
10	-1.00	2.00	0.23	0.23	0.43	0.43
14	-0.50	1.41	0.47	0.47	0.90	0.90
18	0.00	1.00	0.60	0.60	1.50	1.50
25	0.50	0.71	0.92	0.92	2.42	2.42
35	1.00	0.50	1.36	1.36	3.78	3.78
45	1.50	0.35	2.81	2.81	6.59	6.59
60	2.00	0.25	7.34	7.34	13.93	13.93
80	2.50	0.18	29.71	29.71	43.64	43.64
120	3.00	0.13	46.39	46.39	90.03	90.03
170	3.50	0.09	8.03	8.03	98.06	98.06
200	3.75	0.07	0.42	0.42	98.48	98.48
230	4.00	0.06	0.11	0.11	98.59	98.59

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.31	2.94	2.84	2.57	2.19	2.03	1.22

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.42	0.19	0.67	-2.51	13.31

GRANULARMETRIC REPORT HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Hutaff Island

Sample Name: -14.4 Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.62	0.02	#200 - 1.79 #230 - 1.64			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.10	0.10	0.10	0.10
4	-2.25	4.76	0.18	0.18	0.28	0.28
5	-2.00	4.00	0.08	0.08	0.36	0.36
7	-1.50	2.83	0.22	0.22	0.58	0.58
10	-1.00	2.00	0.20	0.20	0.78	0.78
14	-0.50	1.41	0.28	0.28	1.06	1.06
18	0.00	1.00	0.34	0.34	1.40	1.40
25	0.50	0.71	0.42	0.42	1.82	1.82
35	1.00	0.50	0.58	0.58	2.40	2.40
45	1.50	0.35	1.55	1.55	3.95	3.95
60	2.00	0.25	5.72	5.72	9.67	9.67
80	2.50	0.18	25.84	25.84	35.51	35.51
120	3.00	0.13	51.94	51.94	87.45	87.45
170	3.50	0.09	10.27	10.27	97.72	97.72
200	3.75	0.07	0.49	0.49	98.21	98.21
230	4.00	0.06	0.15	0.15	98.36	98.36

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.37	2.97	2.88	2.64	2.30	2.12	1.59

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.52	0.17	0.65	-3.51	22.66

GRANULARMETRIC REPORT HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Hutaff Island

Sample Name: -17.2 Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.66	0.01	#200 - 1.89 #230 - 1.67			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.01	0.01	0.01	0.01
5	-2.00	4.00	0.04	0.04	0.05	0.05
7	-1.50	2.83	0.07	0.07	0.12	0.12
10	-1.00	2.00	0.05	0.05	0.17	0.17
14	-0.50	1.41	0.09	0.09	0.26	0.26
18	0.00	1.00	0.13	0.13	0.39	0.39
25	0.50	0.71	0.22	0.22	0.61	0.61
35	1.00	0.50	0.41	0.41	1.02	1.02
45	1.50	0.35	1.05	1.05	2.07	2.07
60	2.00	0.25	3.93	3.93	6.00	6.00
80	2.50	0.18	24.37	24.37	30.37	30.37
120	3.00	0.13	55.43	55.43	85.80	85.80
170	3.50	0.09	11.56	11.56	97.36	97.36
200	3.75	0.07	0.75	0.75	98.11	98.11
230	4.00	0.06	0.22	0.22	98.33	98.33

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.40	2.98	2.90	2.68	2.39	2.21	1.87

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.61	0.16	0.48	-2.53	19.5

GRANULARMETRIC REPORT HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Hutaff Island

Sample Name: -20.0 Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.74	0.01	#200 - 2.06 #230 - 1.75			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.01	0.01	0.01	0.01
7	-1.50	2.83	0.07	0.07	0.08	0.08
10	-1.00	2.00	0.08	0.08	0.16	0.16
14	-0.50	1.41	0.13	0.13	0.29	0.29
18	0.00	1.00	0.16	0.16	0.45	0.45
25	0.50	0.71	0.31	0.31	0.76	0.76
35	1.00	0.50	0.58	0.58	1.34	1.34
45	1.50	0.35	1.20	1.20	2.54	2.54
60	2.00	0.25	3.64	3.64	6.18	6.18
80	2.50	0.18	22.24	22.24	28.42	28.42
120	3.00	0.13	53.26	53.26	81.68	81.68
170	3.50	0.09	15.24	15.24	96.92	96.92
200	3.75	0.07	1.02	1.02	97.94	97.94
230	4.00	0.06	0.31	0.31	98.25	98.25

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

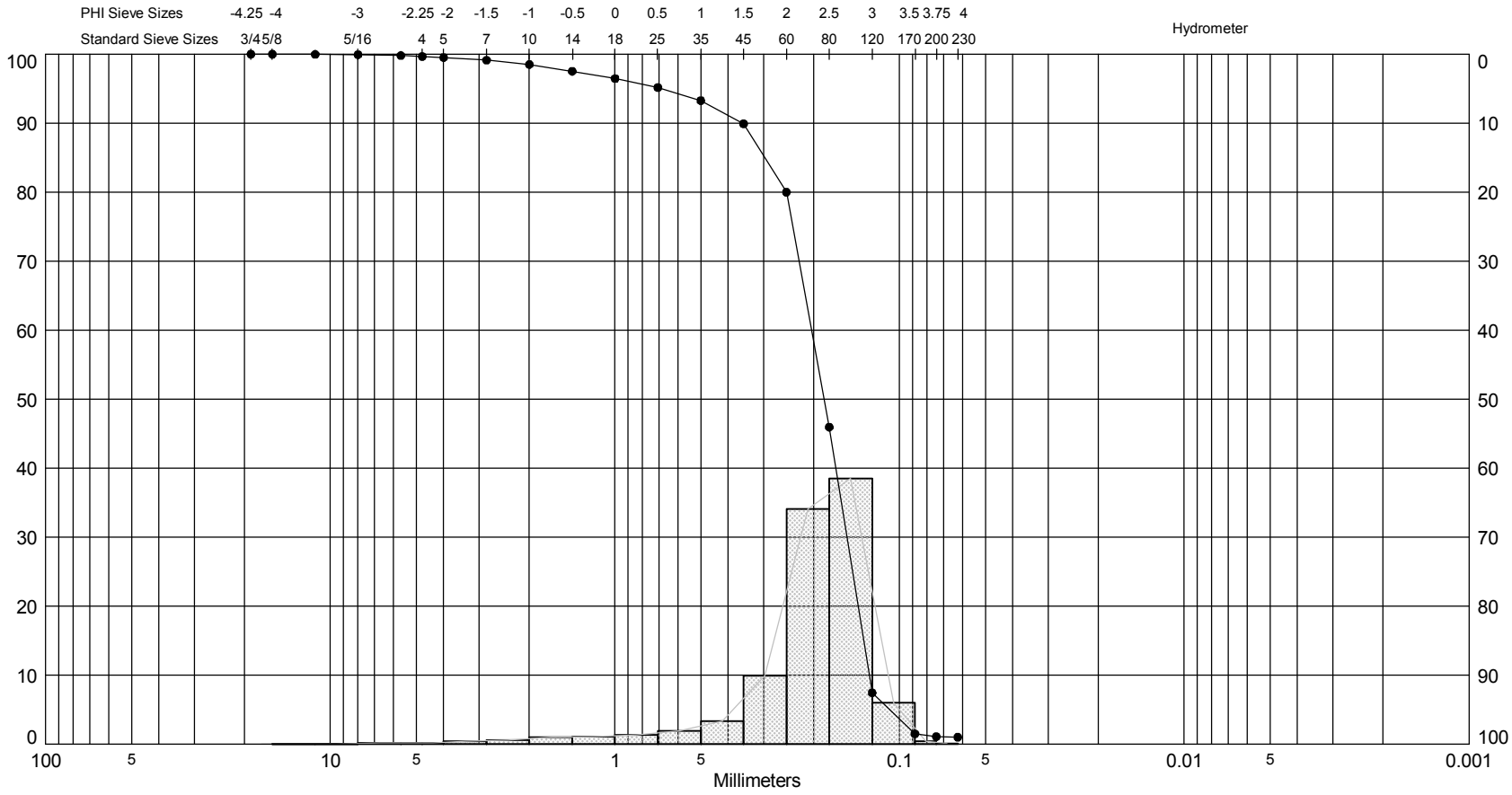
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.44	3.08	2.94	2.70	2.42	2.22	1.84

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.64	0.16	0.51	-2.3	15.6

GRANULARMETRIC REPORT HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

APPENDIX 10

2007 Hutaff Island Native Beach Composite Grab Sample Grain Size Distribution Curves/Histograms



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
Beach Comp.	—●—		SP	#200 - 1.09 #230 - 1.00			2.44	2.26	-2.58	11.92	0.85

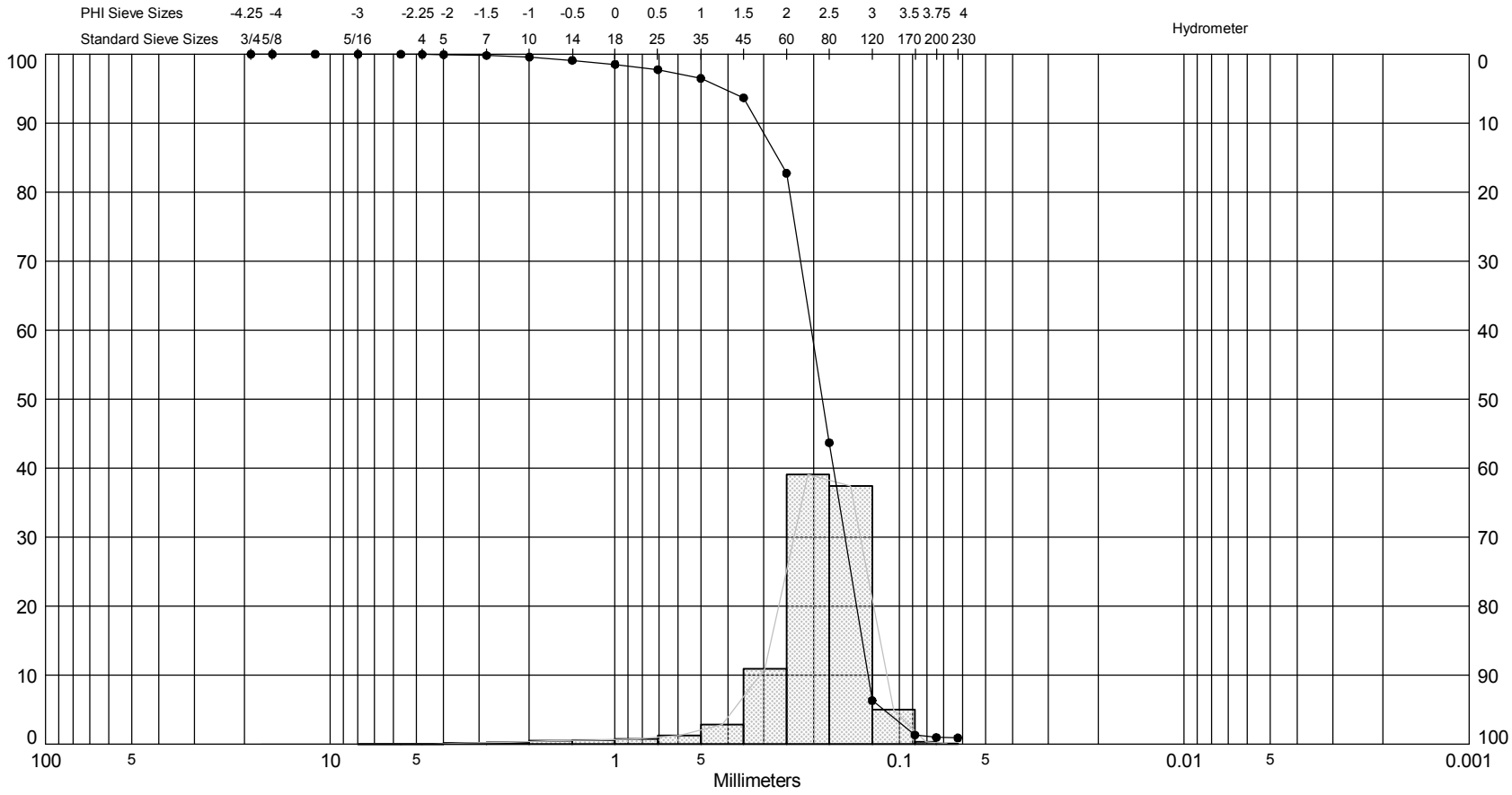
Comments: COMPOSITE

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Sample Information	
Project Name:	Hutaff Island
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

SIEVE ANALYSIS HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H1 Comp.	—●—		SP	#200 - 0.96 #230 - 0.89		7	2.42	2.33	-2.33	12.63	0.64

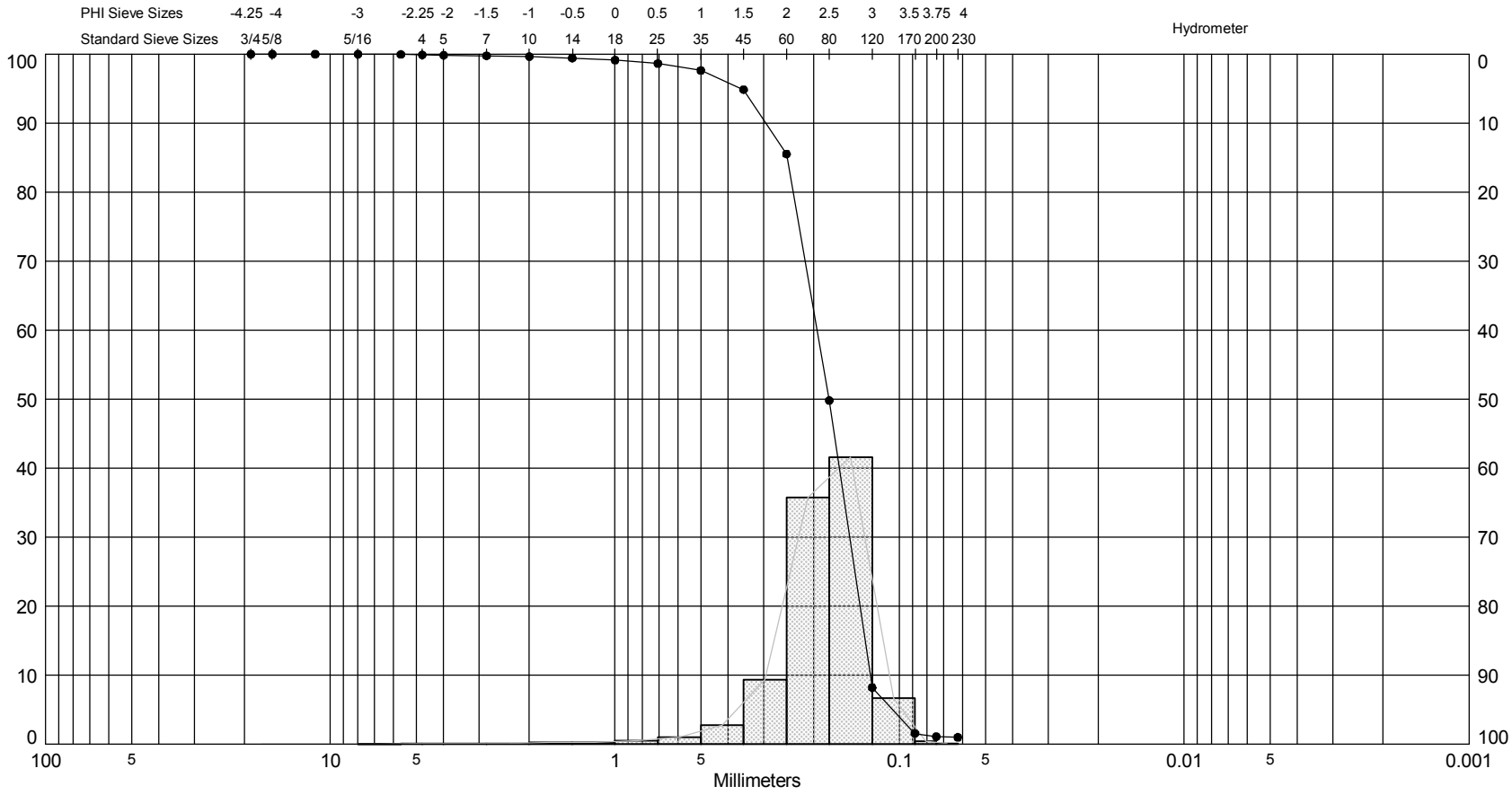
Comments: COMPOSITE

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Sample Information	
Project Name:	Hutaff Island
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

SIEVE ANALYSIS HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H2 Comp.	—●—		SP	#200 - 1.09 #230 - 0.97		6	2.5	2.41	-2.43	15.65	0.59

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Hutaff Island
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

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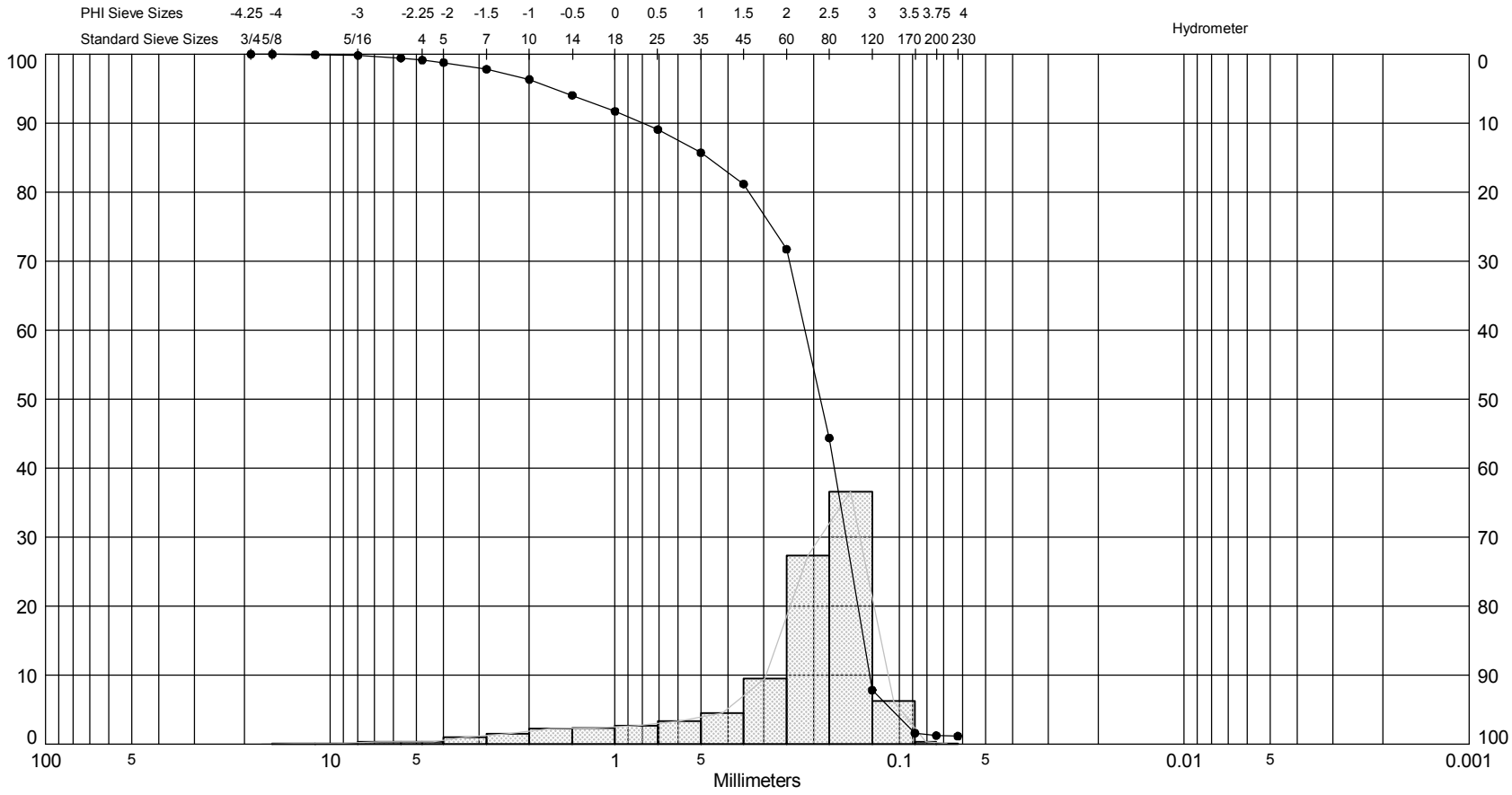
SIEVE ANALYSIS HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
H3 Comp.	—●—		SW	#200 - 1.23 #230 - 1.14		17	2.4	2.03	-1.93	6.7	1.16

Comments: COMPOSITE

Depths and elevations based on measured values

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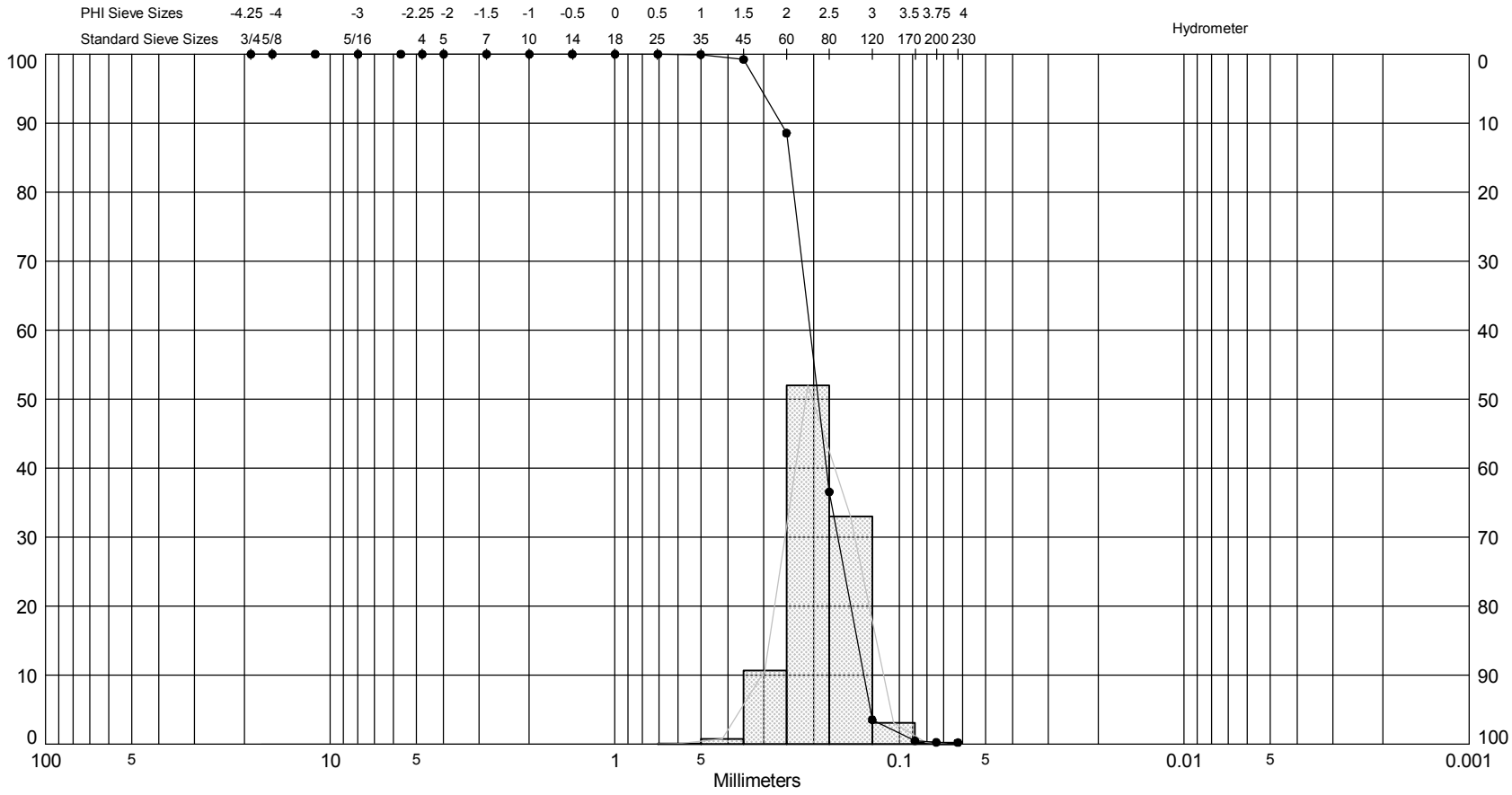
Sample Information	
Project Name:	Hutaff Island
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

SIEVE ANALYSIS HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
Dune Comp.	—●—		SP	#200 - 0.25 #230 - 0.21			2.37	2.39	-0.03	3.5	0.37

Comments: COMPOSITE

Depths and elevations based on measured values

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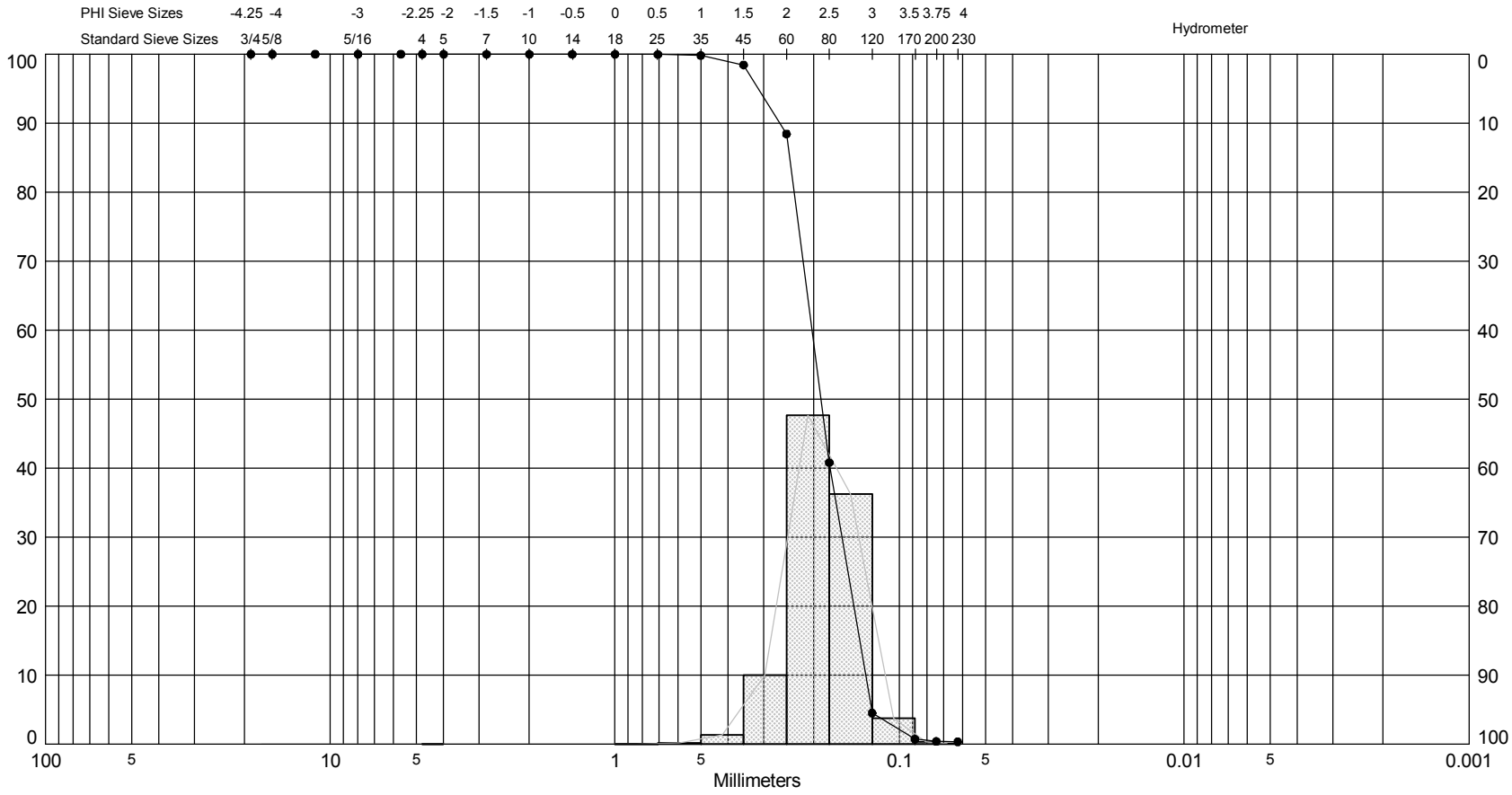
Sample Information	
Project Name:	Hutaff Island
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

SIEVE ANALYSIS HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
Toe of Dune Comp.	—●—		SP	#200 - 0.39 #230 - 0.33			2.4	2.41	-0.54	7.09	0.4

Comments: COMPOSITE

Depths and elevations based on measured values

Coastal Planning & Engineering
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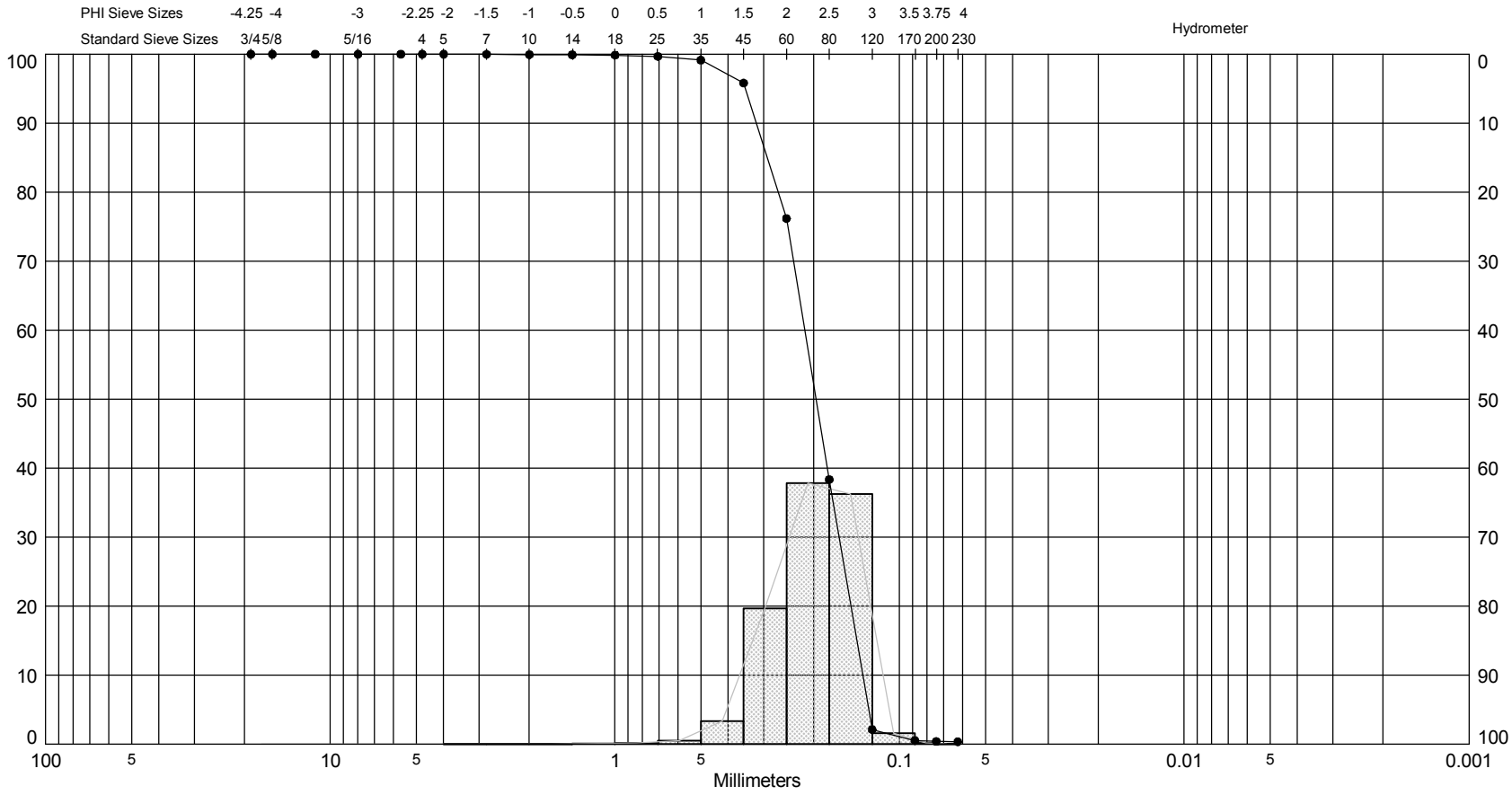
Sample Information	
Project Name:	Hutaff Island
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

SIEVE ANALYSIS HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
Mid-Berm Comp.	—●—		SP	#200 - 0.38 #230 - 0.35			2.35	2.3	-0.98	6.33	0.47

Comments: COMPOSITE

Depths and elevations based on measured values

Coastal Planning & Engineering
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FL 33431
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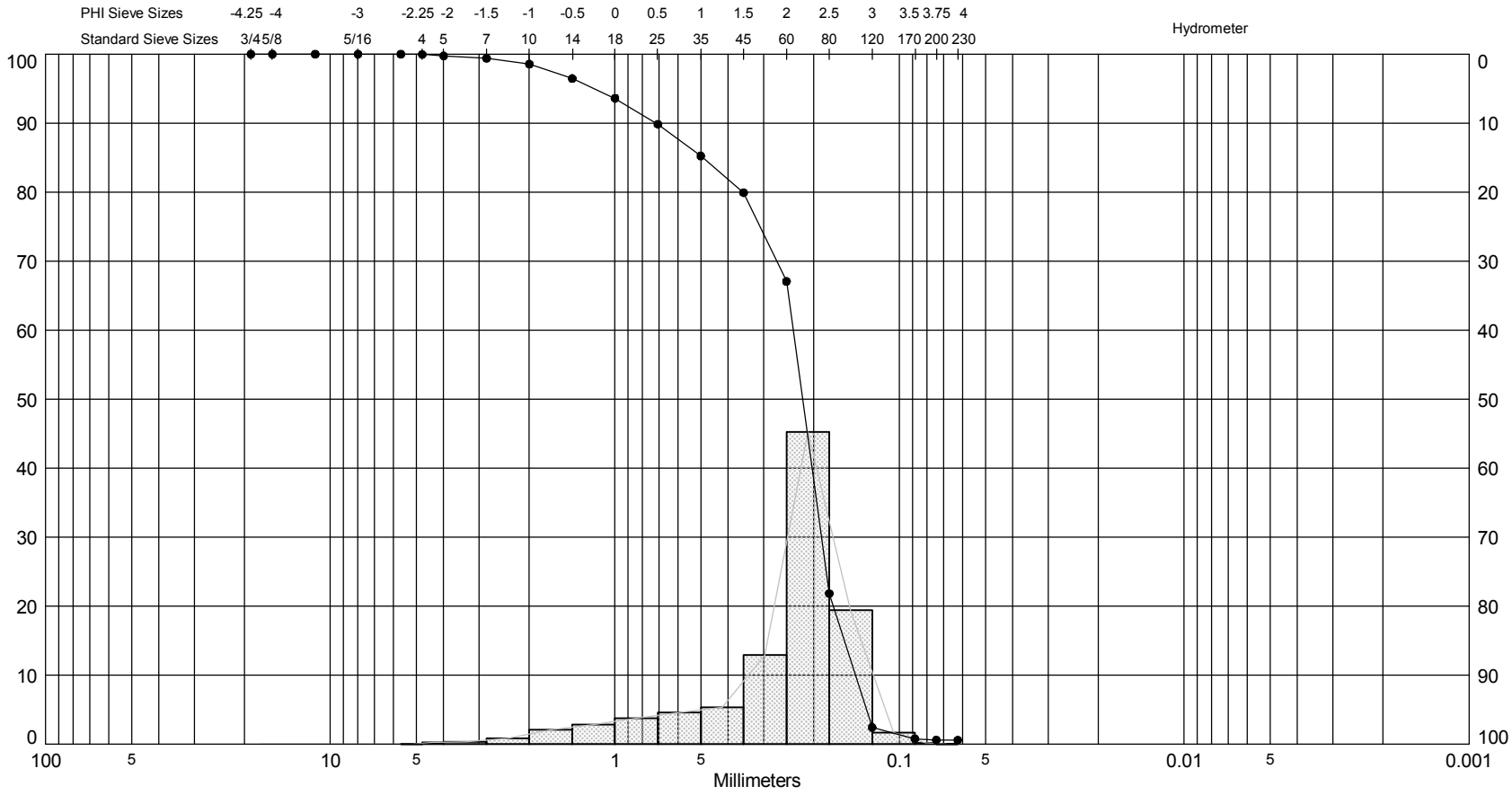
fax (561) 391-9116

Sample Information	
Project Name:	Hutaff Island
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

SIEVE ANALYSIS HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
2.0 / 3.0 Comp.	—●—		SW	#200 - 0.60 #230 - 0.57			2.19	1.91	-1.69	5.78	0.94

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Hutaff Island
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

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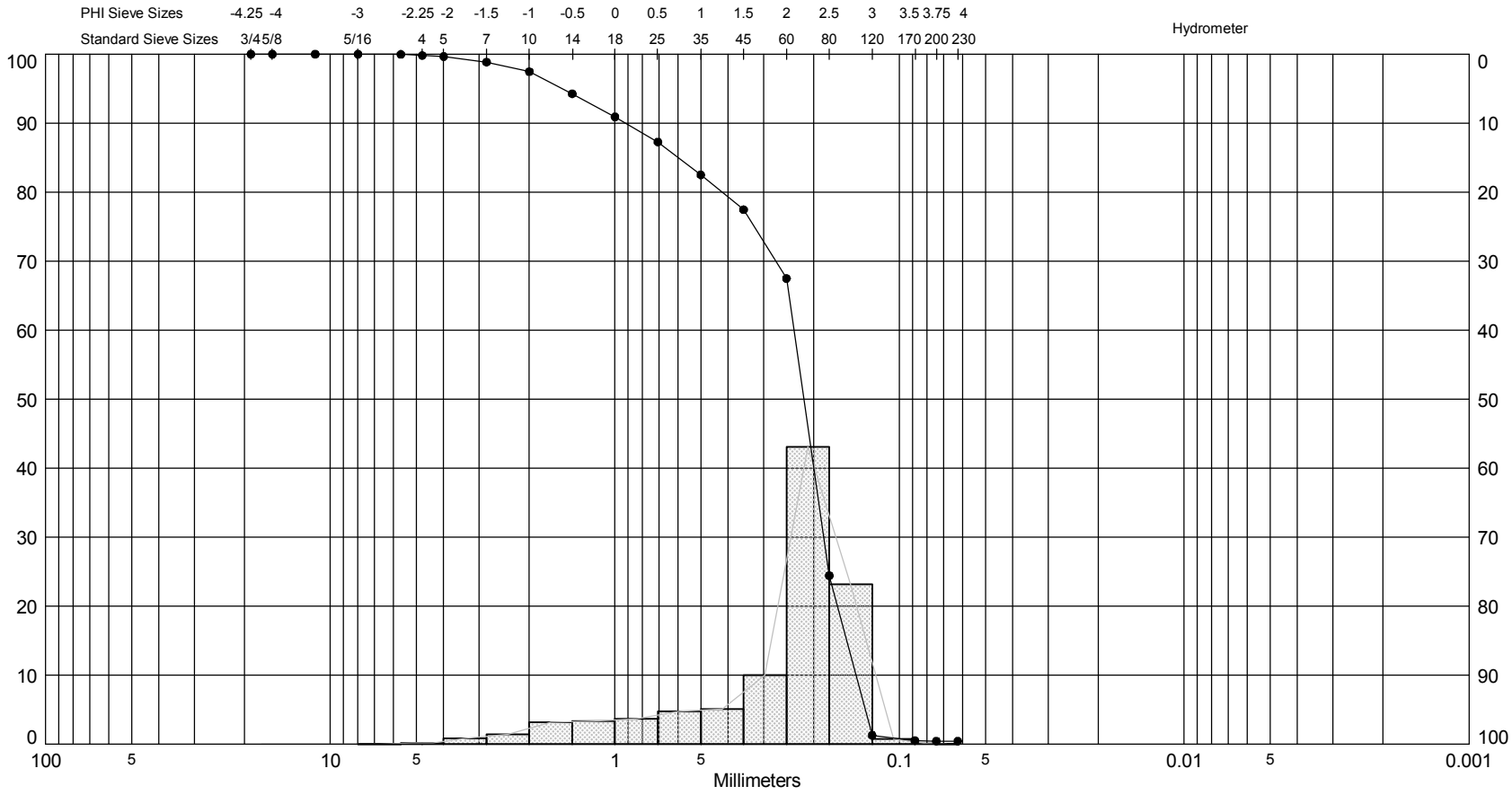
SIEVE ANALYSIS HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
MHW Comp.	—●—		SW	#200 - 0.44 #230 - 0.43			2.2	1.85	-1.65	5.14	1.05

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Hutaff Island
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

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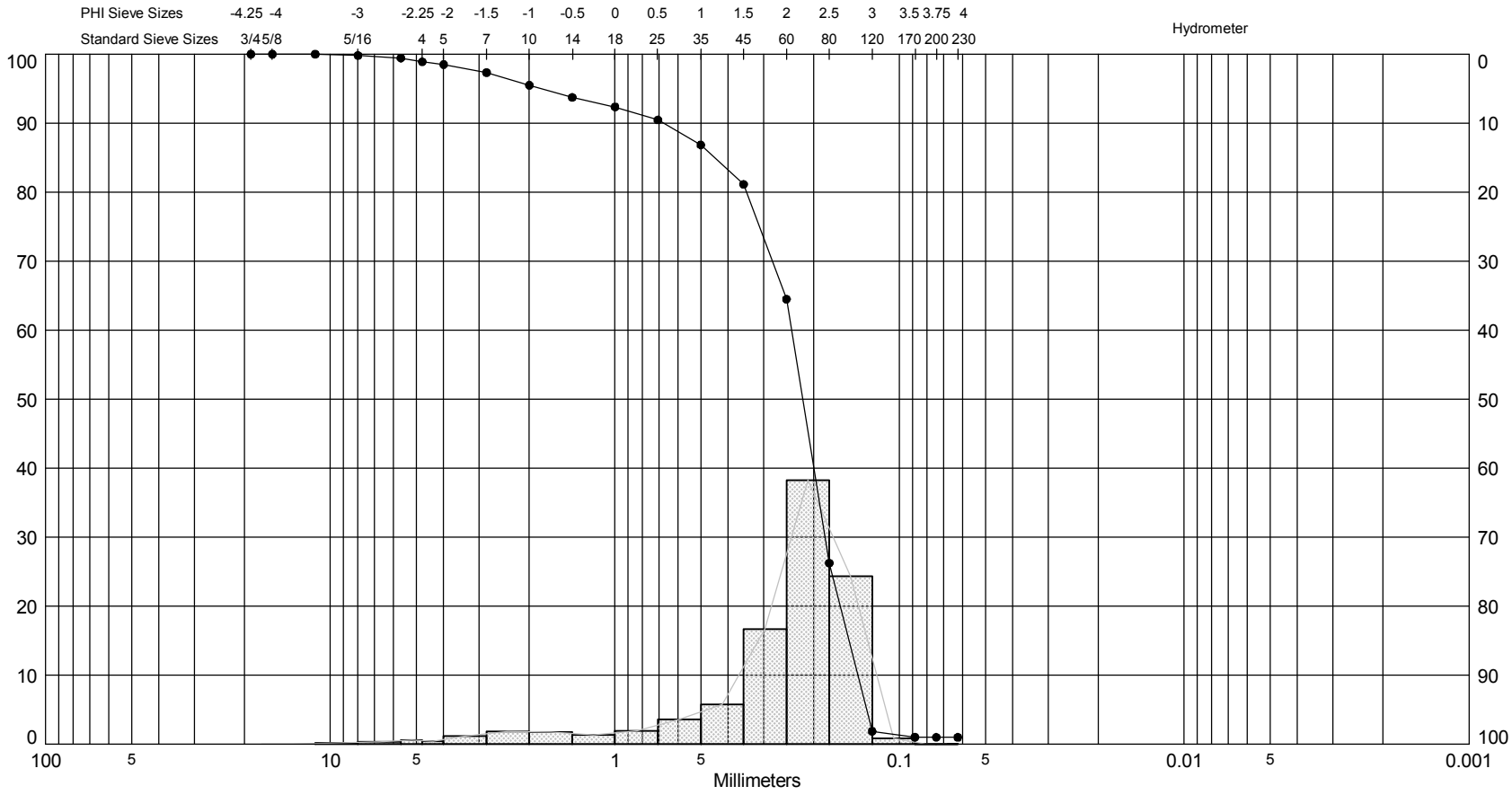
SIEVE ANALYSIS HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
MTL Comp.	—●—		SW	#200 - 0.98 #230 - 0.97			2.19	1.88	-2.16	7.79	1.09

Comments: COMPOSITE

Depths and elevations based on measured values

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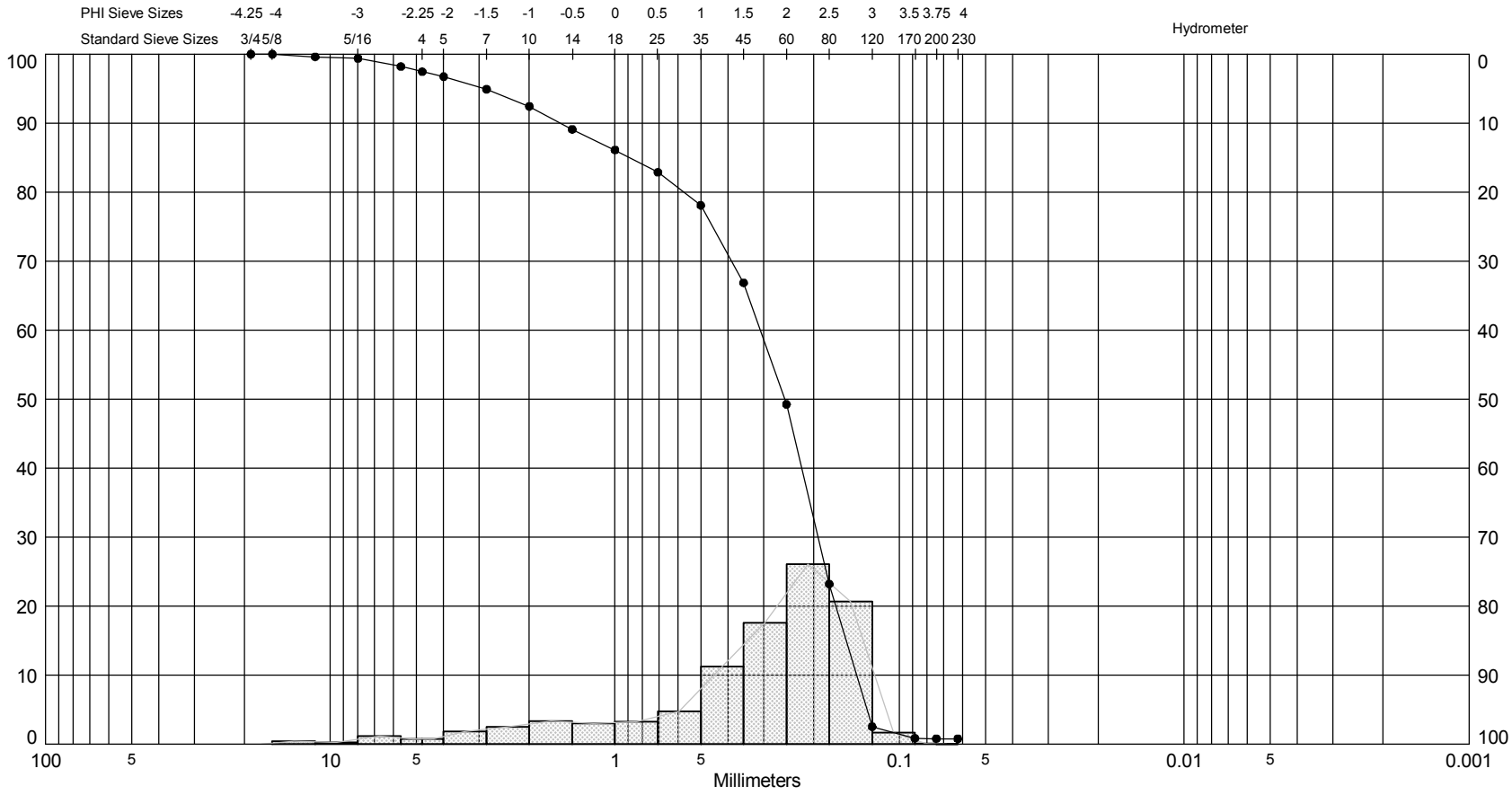
fax (561) 391-9116

Sample Information	
Project Name:	Hutaff Island
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

SIEVE ANALYSIS HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
MLW Comp.	—●—		SW	#200 - 0.79 #230 - 0.78			1.98	1.53	-1.53	4.94	1.36

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Hutaff Island
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

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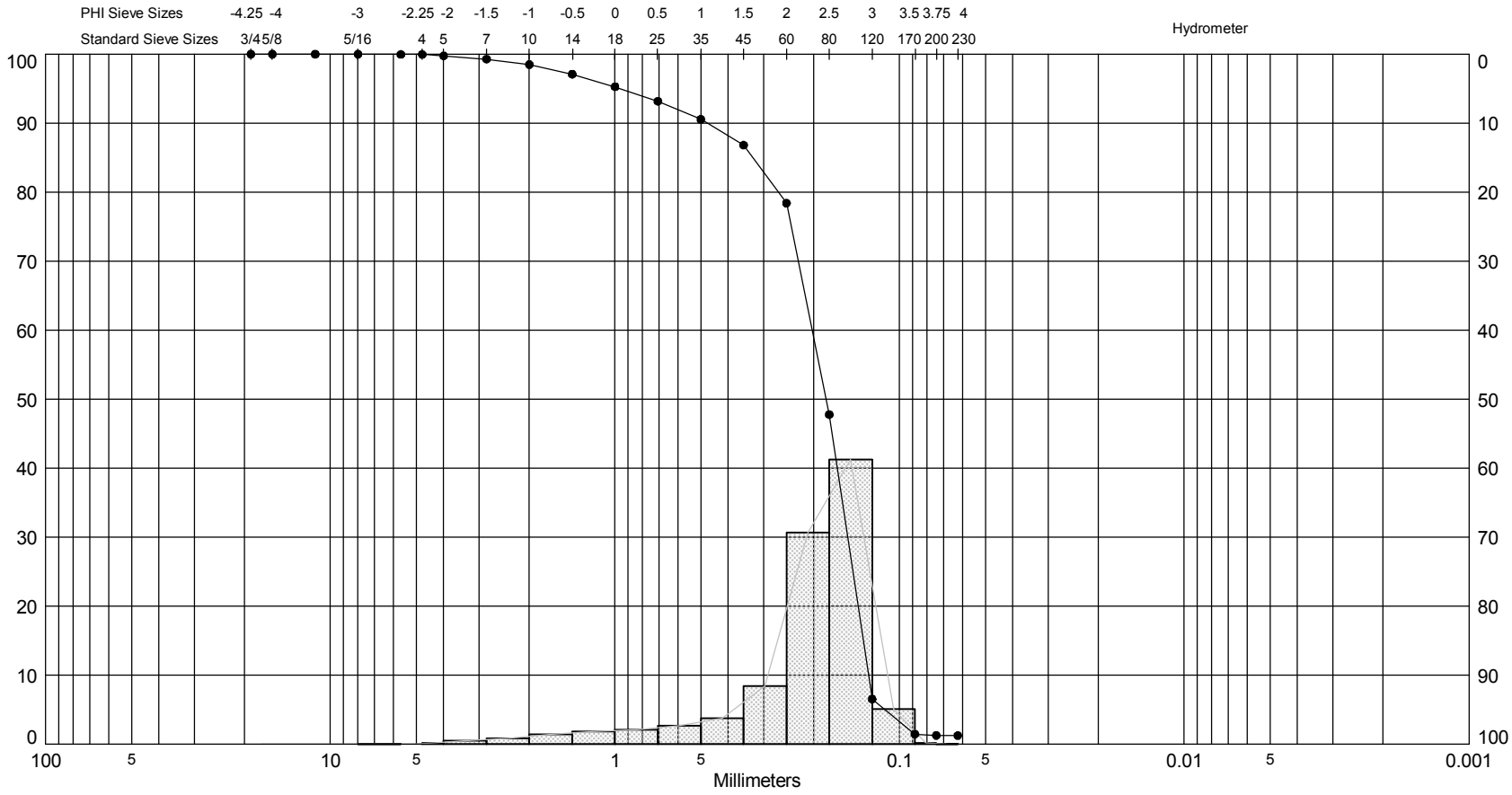
SIEVE ANALYSIS HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
-6.0 Comp.	—●—		SW	#200 - 1.26 #230 - 1.23			2.46	2.2	-2.15	8.13	0.91

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Hutaff Island
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

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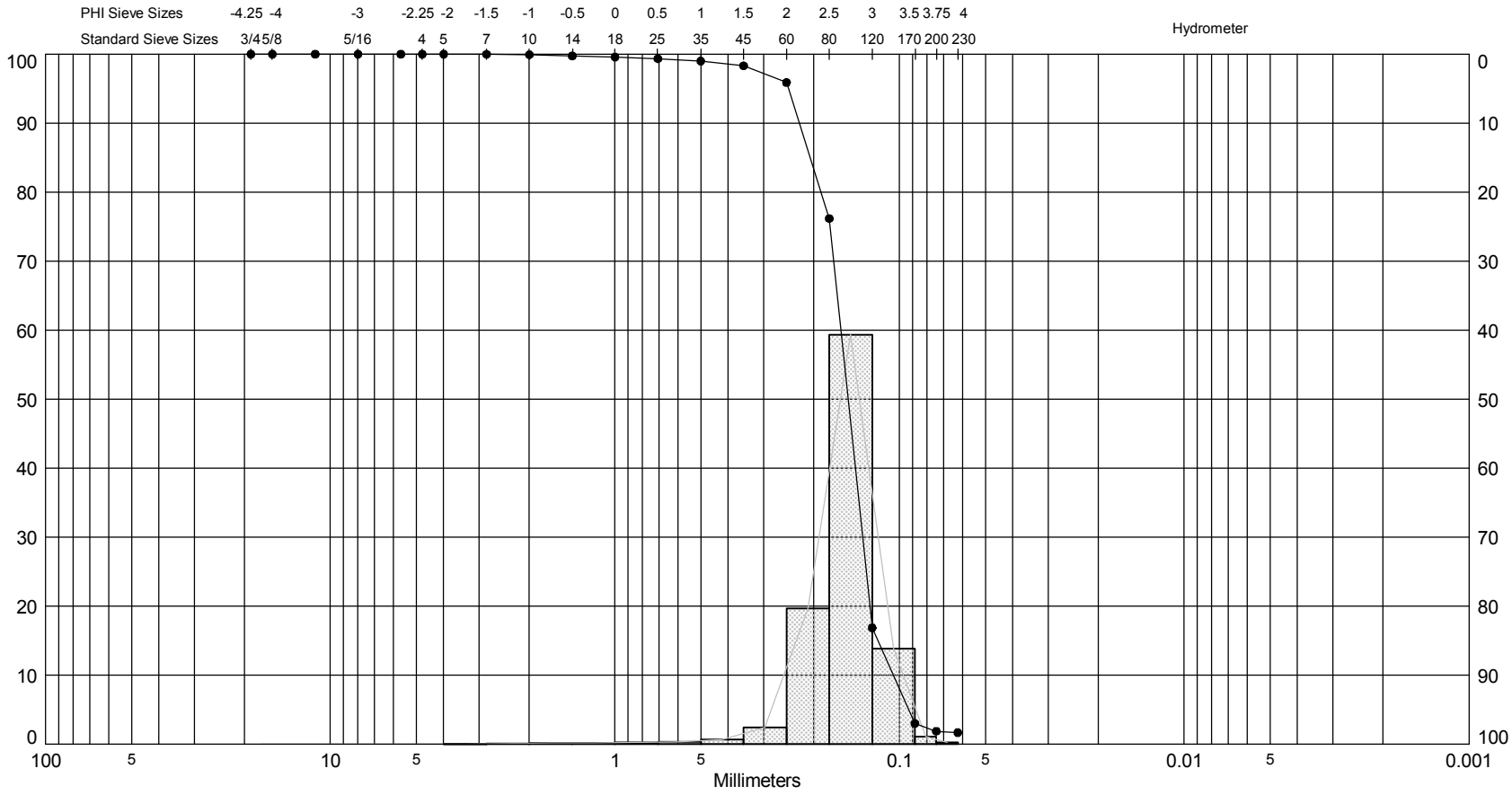
SIEVE ANALYSIS HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
-8.8 Comp.	—●—		SP	#200 - 1.87 #230 - 1.66			2.72	2.67	-2.45	17.84	0.46

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Hutaff Island
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

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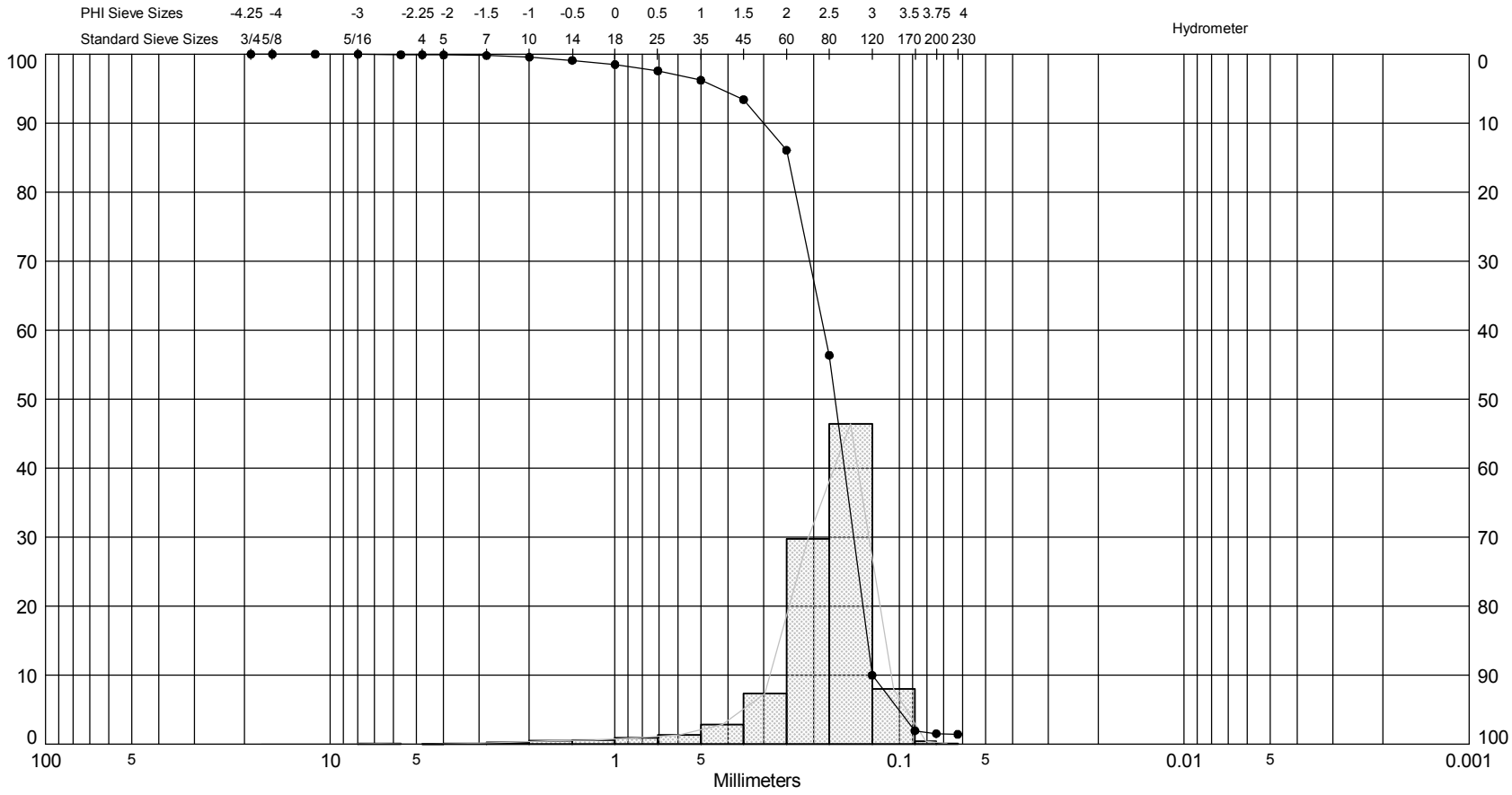
SIEVE ANALYSIS HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
-11.6 Comp.	—●—		SP	#200 - 1.52 #230 - 1.41			2.57	2.42	-2.51	13.31	0.67

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Hutaff Island
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

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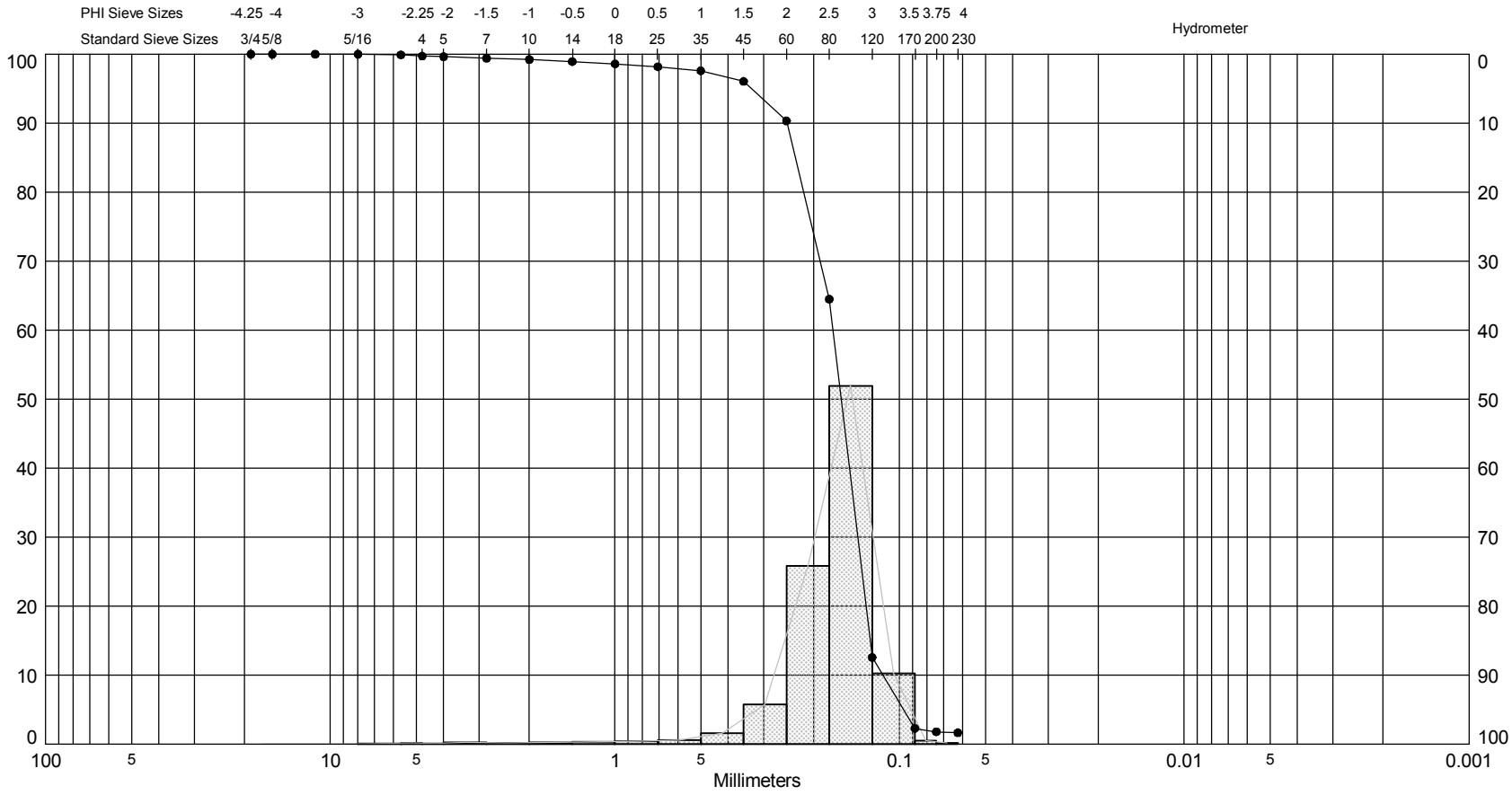
SIEVE ANALYSIS HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
-14.4 Comp.	—●—		SP	#200 - 1.79 #230 - 1.64			2.64	2.52	-3.51	22.66	0.65

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Hutaff Island
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

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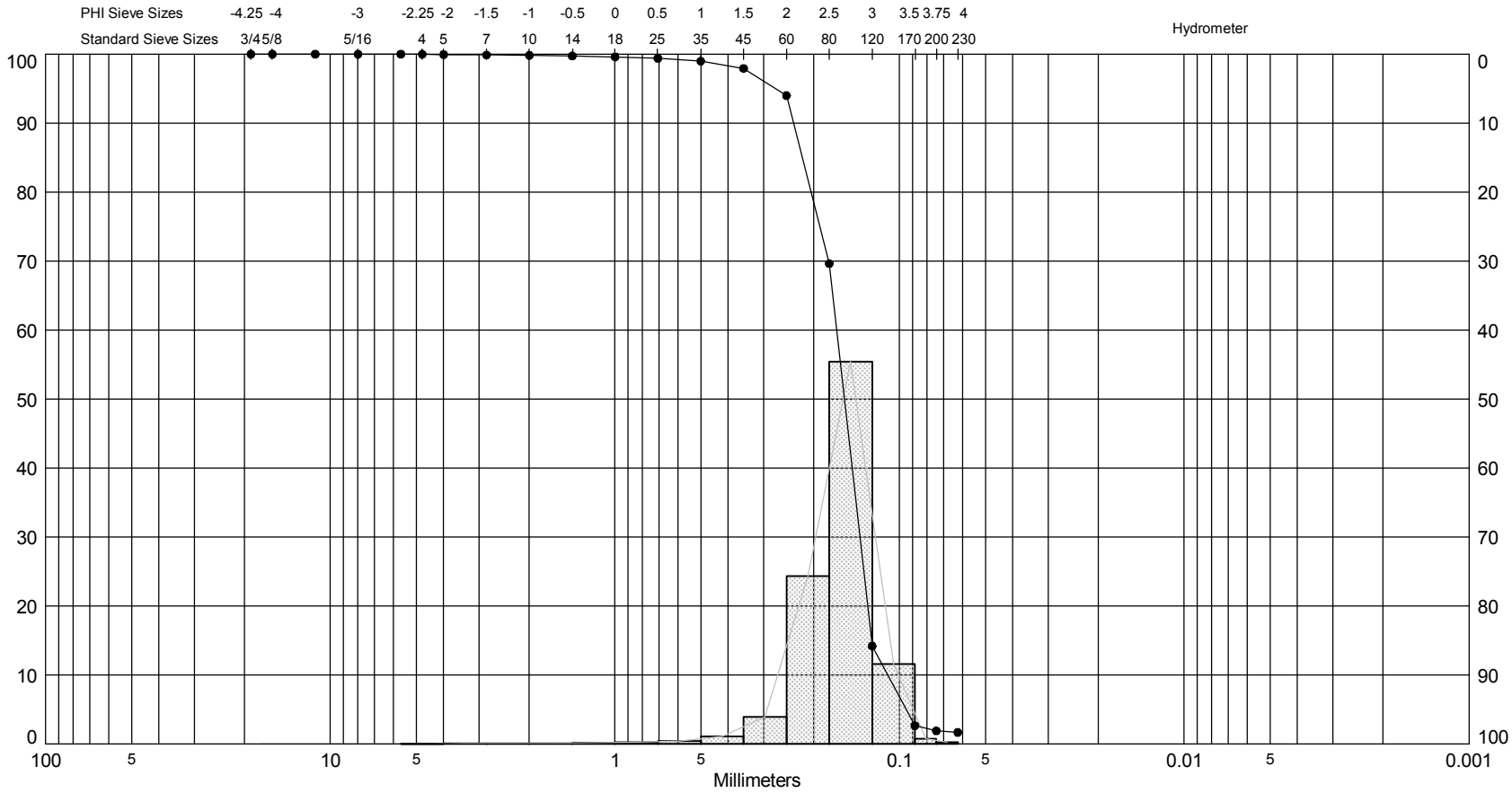
SIEVE ANALYSIS HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
-17.2 Comp.	—●—		SP	#200 - 1.89 #230 - 1.67			2.68	2.61	-2.53	19.5	0.48

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Hutaff Island
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

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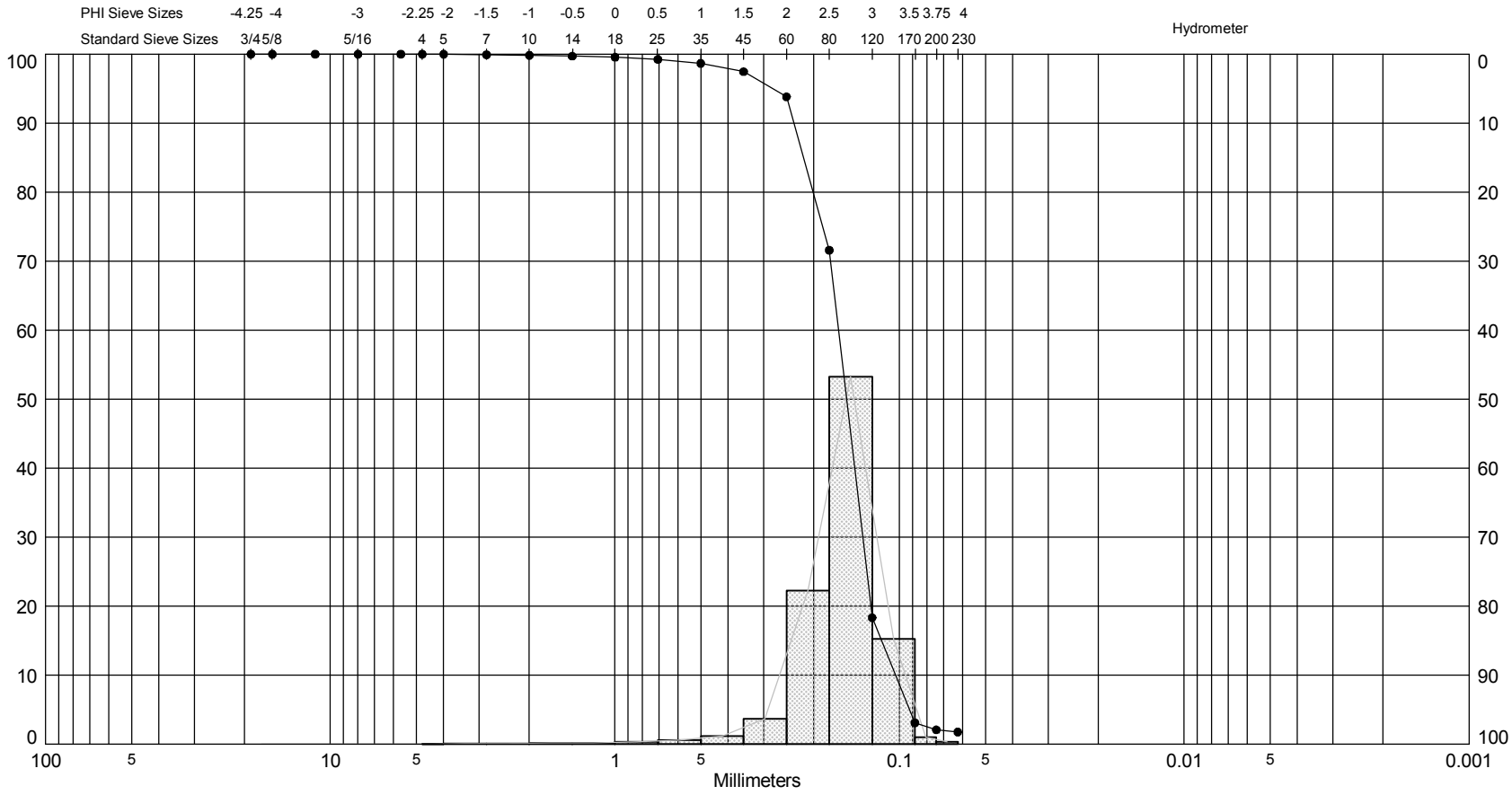
SIEVE ANALYSIS HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
-20.0 Comp.	—●—		SP	#200 - 2.06 #230 - 1.75			2.7	2.64	-2.3	15.6	0.51

Comments: COMPOSITE

Depths and elevations based on measured values

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Sample Information	
Project Name:	Hutaff Island
Analysis Date:	
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Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

SIEVE ANALYSIS HUTAFF COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

APPENDIX 11

2007 Figure Eight Island Native Beach Composite Summary Tables

PROFILE LINE SUMMARY TABLE
FIGURE EIGHT BEACH SAMPLES

PROFILE	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	% Carbonate
80+00 COMPOSITE	0.19	2.40	0.66	0.96	5	7	7.9
120+00 COMPOSITE	0.18	2.45	0.55	1.03	5	6	5.4
160+00 COMPOSITE	0.18	2.45	0.50	1.13	5	6	4.8
200+00 COMPOSITE	0.18	2.47	0.46	1.04	5	6	5.9
BEACH COMPOSITE	**0.18**	**2.44**	**0.55**	**1.04**	**5**	**6**	**6.0**

PROFILE LINE DATA TABLE
FIGURE EIGHT BEACH SAMPLES

SAMPLE I. D.	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	CUMULATIVE PERCENT RETAINED (SIEVES EXPRESSED IN PHI)																		
							GRAVEL						GRANULAR			SAND									FINE
							-4.25	-4.00	-3.50	-3.00	-2.50	-2.25	-2.00	-1.50	-1.00	-0.50	0.00	0.50	1.00	1.50	2.00	2.50	3.00	3.5	3.75	4	PAN
80+00 COMPOSITE	0.19	2.40	0.66	0.96	5	7	0.00	0.00	0.00	0.12	0.13	0.15	0.17	0.35	0.59	1.12	1.77	2.53	3.26	4.46	10.54	51.21	91.66	98.42	98.91	99.04	99.99
120+00 COMPOSITE	0.18	2.45	0.55	1.03	5	6	0.00	0.00	0.00	0.00	0.01	0.02	0.07	0.16	0.32	0.58	0.90	1.35	1.91	3.11	9.87	48.45	91.44	98.50	98.89	98.97	99.98
160+00 COMPOSITE	0.18	2.45	0.50	1.13	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.10	0.20	0.43	0.66	0.95	1.36	2.53	9.93	50.87	92.39	98.48	98.80	98.87	99.98
200+00 COMPOSITE	0.18	2.47	0.46	1.04	5	6	0.00	0.00	0.00	0.00	0.02	0.03	0.03	0.06	0.12	0.23	0.39	0.63	1.02	1.98	7.91	49.19	92.93	98.61	98.90	98.96	99.98
BEACH COMPOSITE	**0.18**	**2.44**	**0.55**	**1.04**	**5**	**6**	**0.00**	**0.00**	**0.00**	**0.03**	**0.04**	**0.05**	**0.07**	**0.17**	**0.31**	**0.59**	**0.93**	**1.36**	**1.89**	**3.02**	**9.56**	**49.93**	**92.11**	**98.50**	**98.87**	**98.96**	**99.98**

PERCENTAGE OF MATERIAL BY SEDIMENT GRAIN SIZE CATEGORY
FIGURE EIGHT BEACH (1 of 2)

SAMPLE I. D.	FINE % (<0.0625mm)	SAND % (0.0625mm-2.00mm)	GRANULAR % (2mm-4.76mm)	GRAVEL % (4.76mm-76mm)
80+00 Dune	0.28	99.71	0.01	0.00
80+00 Toe of Dune	0.24	97.96	0.52	1.28
80+00 Mid-Berm	0.38	99.62	0.00	0.00
80+00 (+2.0)	0.44	99.53	0.03	0.00
80+00 MHW	0.35	99.65	0.00	0.00
80+00 MTL	1.03	98.96	0.01	0.00
80+00 MLW	0.85	99.02	0.13	0.00
80+00 (-6.0)	1.07	96.79	1.90	0.24
80+00 (-8.8)	1.38	97.63	0.99	0.00
80+00 (-11.6)	1.37	98.12	0.51	0.00
80+00 (-14.4)	1.48	97.95	0.18	0.39
80+00 (-17.2)	1.85	97.44	0.71	0.00
80+00 (-20.0)	1.74	97.54	0.72	0.00
80+00 COMPOSITE	**0.96**	**98.46**	**0.44**	**0.15**
120+00 Dune	0.19	99.80	0.01	0.00
120+00 Toe of Dune	0.32	99.48	0.20	0.00
120+00 Mid-Berm	0.43	99.04	0.53	0.00
120+00 (+3.0)	0.39	99.61	0.00	0.00
120+00 MHW	0.53	99.47	0.00	0.00
120+00 MTL	1.36	98.51	0.07	0.06
120+00 MLW	1.16	98.30	0.47	0.07
120+00 (-6.0)	1.35	97.56	1.09	0.00
120+00 (-8.8)	1.44	98.48	0.08	0.00
120+00 (-11.6)	1.38	98.02	0.60	0.00
120+00 (-14.4)	1.43	98.12	0.45	0.00
120+00 (-17.2)	1.63	98.10	0.27	0.00
120+00 (-20.0)	1.79	98.00	0.11	0.10
120+00 COMPOSITE	**1.03**	**98.65**	**0.30**	**0.02**

PERCENTAGE OF MATERIAL BY SEDIMENT GRAIN SIZE CATEGORY
FIGURE EIGHT BEACH (2 of 2)

SAMPLE I. D.	FINE % (<0.0625mm)	SAND % (0.0625mm-2.00mm)	GRANULAR % (2mm-4.76mm)	GRAVEL % (4.76mm-76mm)
160+00 Dune	0.32	99.68	0.00	0.00
160+00 Toe of Dune	0.33	99.67	0.00	0.00
160+00 Mid-Berm	0.59	99.37	0.04	0.00
160+00 (+3.0)	0.36	99.64	0.00	0.00
160+00 MHW	0.36	99.64	0.00	0.00
160+00 MTL	1.28	98.72	0.00	0.00
160+00 MLW	1.18	98.23	0.59	0.00
160+00 (-6.0)	1.40	97.96	0.64	0.00
160+00 (-8.8)	1.65	97.56	0.79	0.00
160+00 (-11.6)	1.57	98.16	0.17	0.00
160+00 (-14.4)	1.63	98.07	0.30	0.00
160+00 (-17.2)	2.00	97.97	0.03	0.00
160+00 (-20.0)	1.98	97.95	0.07	0.00
160+00 COMPOSITE	**1.13**	**98.66**	**0.20**	**0.00**
200+00 Dune	0.49	99.50	0.01	0.00
200+00 Toe of Dune	0.15	99.81	0.04	0.00
200+00 Mid-Berm	0.63	99.37	0.00	0.00
200+00 (+2.0)	0.57	99.42	0.01	0.00
200+00 MHW	0.54	99.46	0.00	0.00
200+00 MTL	1.20	98.80	0.00	0.00
200+00 MLW	1.15	98.81	0.04	0.00
200+00 (-6.0)	1.38	97.63	0.65	0.34
200+00 (-8.8)	1.14	98.75	0.11	0.00
200+00 (-11.6)	1.35	98.61	0.04	0.00
200+00 (-14.4)	1.57	98.39	0.04	0.00
200+00 (-17.2)	1.37	98.50	0.13	0.00
200+00 (-20.0)	1.92	97.94	0.14	0.00
200+00 COMPOSITE	**1.04**	**98.85**	**0.09**	**0.03**
TOTAL BEACH COMPOSITE	**1.04**	**98.65**	**0.26**	**0.05**

PROFILE LINE COMPOSITES - FIGURE EIGHT BEACH SAMPLES (1 of 2)

SAMPLE I. D.	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	CUMULATIVE PERCENT RETAINED (SIEVES EXPRESSED IN PHI)																				FINE
							GRAVEL						GRANULAR			SAND											
							-4.25	-4.00	-3.50	-3.00	-2.50	-2.25	-2.00	-1.50	-1.00	-0.50	0.00	0.50	1.00	1.50	2.00	2.50	3.00	3.50	3.75	4.00	PAN
80+00 Dune	0.19	2.43	0.35	0.28	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.06	0.12	0.26	0.63	6.11	59.83	96.48	99.40	99.67	99.72	99.95
80+00 Toe of Dune	0.19	2.38	0.89	0.24	5	6	0.00	0.00	0.00	1.17	1.28	1.28	1.37	1.52	1.80	2.65	3.32	3.98	4.18	4.40	6.93	48.62	92.73	98.83	99.59	99.76	99.95
80+00 Mid-Berm	0.18	2.46	0.31	0.38	6	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0.09	2.74	59.47	96.03	99.20	99.57	99.62	99.98
80+00 (+2.0)	0.18	2.48	0.31	0.44	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.03	0.03	0.04	0.04	0.11	3.39	51.97	97.24	99.44	99.54	99.56	99.98
80+00 MHW	0.19	2.40	0.30	0.35	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.07	0.09	0.18	5.37	64.52	98.51	99.56	99.62	99.65	99.99
80+00 MTL	0.19	2.36	0.39	1.03	5	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.07	0.18	0.40	1.79	13.93	63.31	97.35	98.89	98.96	98.97	100.00
80+00 MLW	0.20	2.35	0.41	0.85	5	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.13	0.26	0.41	0.59	0.80	1.35	10.65	66.91	97.65	99.03	99.14	99.15	99.98
80+00 (-6.0)	0.31	1.67	1.01	1.07	5	6	0.00	0.00	0.00	0.00	0.00	0.24	0.34	1.09	2.14	4.93	9.39	14.58	19.75	27.77	49.45	85.41	98.38	98.91	98.92	98.93	100.00
80+00 (-8.8)	0.19	2.43	0.74	1.38	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.55	0.99	1.99	2.77	3.47	4.15	5.37	10.84	43.48	88.11	97.90	98.48	98.62	99.99
80+00 (-11.6)	0.18	2.47	0.61	1.37	5	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.51	0.95	1.50	2.26	2.85	4.08	9.29	41.92	90.96	98.24	98.53	98.63	99.99
80+00 (-14.4)	0.17	2.57	0.63	1.48	5	7	0.00	0.00	0.00	0.39	0.39	0.39	0.43	0.44	0.57	0.97	1.34	1.74	2.05	2.50	4.58	32.97	86.68	97.76	98.34	98.52	100.00
80+00 (-17.2)	0.15	2.71	0.69	1.85	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.32	0.71	1.18	1.71	2.49	3.38	4.21	5.74	17.39	70.06	95.88	97.66	98.15	100.00
80+00 (-20.0)	0.17	2.56	0.73	1.74	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.72	1.59	2.32	3.34	4.42	5.44	7.95	29.93	81.46	96.45	97.87	98.26	100.00
80+00 COMPOSITE	**0.19**	**2.40**	**0.66**	**0.96**	**5**	**7**	**0.00**	**0.00**	**0.00**	**0.12**	**0.13**	**0.15**	**0.17**	**0.35**	**0.59**	**1.12**	**1.77**	**2.53**	**3.26**	**4.46**	**10.54**	**51.21**	**91.66**	**98.42**	**98.91**	**99.04**	**99.99**
120+00 Dune	0.18	2.50	0.35	0.19	6	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.04	0.09	0.35	4.38	49.99	94.64	99.42	99.73	99.81	99.97
120+00 Toe of Dune	0.19	2.43	0.45	0.32	6	6	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.12	0.20	0.26	0.38	0.70	1.02	1.84	7.46	57.22	94.96	99.07	99.62	99.68	99.95
120+00 Mid-Berm	0.19	2.40	0.54	0.43	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.35	0.53	0.72	0.87	1.13	1.54	3.02	11.26	55.58	95.17	99.18	99.51	99.57	99.98
120+00 (+3.0)	0.19	2.38	0.31	0.39	6	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.17	6.42	68.59	97.69	99.36	99.58	99.61	100.00
120+00 MHW	0.18	2.47	0.30	0.53	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	3.73	52.99	97.73	99.41	99.46	99.47	99.99
120+00 MTL	0.20	2.30	0.42	1.36	5	6	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.09	0.13	0.19	0.25	0.41	0.70	1.65	17.63	69.47	97.65	98.60	98.63	98.64	99.98
120+00 MLW	0.22	2.21	0.61	1.16	5	6	0.00	0.00	0.00	0.00	0.00	0.07	0.15	0.30	0.54	1.03	1.54	2.28	3.33	6.45	22.18	69.70	97.76	98.81	98.83	98.84	99.98
120+00 (-6.0)	0.22	2.19	0.78	1.35	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	1.09	2.17	3.34	4.85	6.37	10.41	24.51	60.77	94.65	98.56	98.64	98.65	100.00
120+00 (-8.8)	0.15	2.73	0.42	1.44	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.08	0.22	0.39	0.58	0.70	0.96	2.36	18.22	79.03	97.85	98.46	98.56	99.99
120+00 (-11.6)	0.18	2.44	0.68	1.38	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.36	0.60	1.28	2.06	2.97	3.71	5.16	11.12	42.73	90.30	98.12	98.50	98.62	99.99
120+00 (-14.4)	0.16	2.61	0.55	1.43	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.34	0.45	0.76	1.05	1.36	1.64	1.98	3.42	30.19	85.59	97.75	98.42	98.57	100.00
120+00 (-17.2)	0.15	2.69	0.48	1.63	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.27	0.41	0.65	0.87	1.16	1.52	2.66	22.69	81.57	97.26	98.18	98.37	99.93
120+00 (-20.0)	0.17	2.54	0.68	1.79	4	6	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.11	0.21	0.54	1.13	2.33	4.49	6.87	11.16	31.68	81.95	97.11	97.98	98.21	99.99
120+00 COMPOSITE	**0.18**	**2.45**	**0.55**	**1.03**	**5**	**6**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.02**	**0.07**	**0.16**	**0.32**	**0.58**	**0.90**	**1.35**	**1.91**	**3.11**	**9.87**	**48.45**	**91.44**	**98.50**	**98.89**	**98.97**	**99.98**

PROFILE LINE COMPOSITES - FIGURE EIGHT BEACH SAMPLES (2 of 2)

SAMPLE I. D.	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	CUMULATIVE PERCENT RETAINED (SIEVES EXPRESSED IN PHI)																				FINE
							GRAVEL						GRANULAR			SAND											
							-4.25	-4.00	-3.50	-3.00	-2.50	-2.25	-2.00	-1.50	-1.00	-0.50	0.00	0.50	1.00	1.50	2.00	2.50	3.00	3.50	3.75	4.00	PAN
160+00 Dune	0.17	2.58	0.29	0.32	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.52	38.00	94.97	99.39	99.61	99.68	99.98
160+00 Toe of Dune	0.20	2.34	0.40	0.33	6	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.17	1.02	15.07	70.63	94.53	99.20	99.59	99.67	100.00
160+00 Mid-Berm	0.20	2.35	0.42	0.59	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.10	0.15	0.31	0.68	1.90	12.55	68.42	94.83	98.94	99.36	99.41	99.91
160+00 (+3.0)	0.19	2.43	0.30	0.36	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.09	4.10	61.16	97.77	99.51	99.61	99.64	99.99
160+00 MHW	0.19	2.38	0.30	0.36	6	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.05	7.09	67.37	98.68	99.59	99.63	99.64	99.98
160+00 MTL	0.19	2.36	0.41	1.28	5	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.15	0.26	0.50	2.00	14.82	60.28	97.09	98.66	98.71	98.72	100.00
160+00 MLW	0.21	2.27	0.56	1.18	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.59	0.89	1.20	1.62	2.38	5.06	18.41	66.02	97.44	98.80	98.81	98.82	100.00
160+00 (-6.0)	0.21	2.23	0.64	1.40	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.38	0.64	1.14	1.64	2.29	3.53	7.49	22.21	64.38	96.57	98.55	98.59	98.60	99.98
160+00 (-8.8)	0.20	2.33	0.73	1.65	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.40	0.79	1.74	2.69	3.73	4.92	7.23	15.95	51.47	92.63	98.11	98.34	98.35	99.96
160+00 (-11.6)	0.18	2.45	0.56	1.57	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.17	0.66	1.14	1.78	2.51	3.84	9.68	44.88	92.06	98.10	98.32	98.33	100.00
160+00 (-14.4)	0.17	2.56	0.56	1.63	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.20	0.30	0.82	1.22	1.68	2.14	2.89	5.43	33.63	87.83	98.01	98.30	98.37	100.00
160+00 (-17.2)	0.15	2.73	0.37	2.00	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.09	0.16	0.25	0.35	0.59	1.46	18.66	80.15	97.00	97.85	98.00	100.00
160+00 (-20.0)	0.15	2.76	0.40	1.98	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.07	0.16	0.23	0.36	0.51	0.73	1.74	16.41	76.52	96.37	97.70	98.02	99.95
160+00 COMPOSITE	**0.18**	**2.45**	**0.50**	**1.13**	**5**	**6**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.10**	**0.20**	**0.43**	**0.66**	**0.95**	**1.36**	**2.53**	**9.93**	**50.87**	**92.39**	**98.48**	**98.80**	**98.87**	**99.98**
200+00 Dune	0.18	2.45	0.36	0.49	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.06	0.12	0.24	1.06	6.91	54.47	96.83	99.28	99.46	99.51	99.98
200+00 Toe of Dune	0.18	2.46	0.36	0.15	7	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.05	0.09	0.15	0.30	0.83	5.70	53.42	96.88	99.67	99.84	99.85	100.00
200+00 Mid-Berm	0.18	2.44	0.30	0.63	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.23	4.04	59.17	98.02	99.27	99.36	99.37	99.94
200+00 (+2.0)	0.18	2.45	0.30	0.57	6	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.05	0.14	3.08	57.54	97.73	99.29	99.42	99.43	99.99
200+00 MHW	0.19	2.40	0.32	0.54	6	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.22	8.65	61.77	98.33	99.41	99.44	99.46	99.90
200+00 MTL	0.19	2.40	0.38	1.20	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.08	0.15	0.31	1.18	11.11	59.30	96.62	98.71	98.79	98.80	99.93
200+00 MLW	0.20	2.31	0.40	1.15	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.11	0.20	0.32	0.66	2.30	15.38	69.94	97.48	98.83	98.84	98.85	100.00
200+00 (-6.0)	0.22	2.20	0.80	1.38	4	6	0.00	0.00	0.00	0.00	0.26	0.34	0.41	0.61	0.99	1.83	2.90	4.46	6.91	11.04	22.04	60.32	94.93	98.41	98.59	98.62	99.99
200+00 (-8.8)	0.17	2.53	0.48	1.14	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.11	0.27	0.51	0.88	1.37	2.43	6.73	39.16	90.29	98.40	98.77	98.86	100.00
200+00 (-11.6)	0.16	2.66	0.42	1.35	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.13	0.26	0.42	0.61	1.07	3.54	27.18	83.80	97.67	98.42	98.65	99.99
200+00 (-14.4)	0.16	2.63	0.41	1.57	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.11	0.19	0.33	0.56	1.14	3.82	30.30	86.04	97.89	98.34	98.43	99.99
200+00 (-17.2)	0.17	2.59	0.47	1.37	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.13	0.20	0.36	0.60	0.96	1.85	5.27	34.49	86.39	97.96	98.49	98.63	99.99
200+00 (-20.0)	0.16	2.60	0.49	1.92	3	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.14	0.22	0.37	0.70	1.18	2.29	6.56	32.40	84.74	97.10	97.88	98.08	100.00
200+00 COMPOSITE	**0.18**	**2.47**	**0.46**	**1.04**	**5**	**6**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.03**	**0.03**	**0.06**	**0.12**	**0.23**	**0.39**	**0.63**	**1.02**	**1.98**	**7.91**	**49.19**	**92.93**	**98.61**	**98.90**	**98.96**	**99.98**

ELEVATION COMPOSITES - FIGURE EIGHT BEACH SAMPLES (1 of 3)

SAMPLE I. D.	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	CUMULATIVE PERCENT RETAINED (SIEVES EXPRESSED IN PHI)																			FINE
							GRAVEL						GRANULAR			SAND										PAN
							-4.25	-4.00	-3.50	-3.00	-2.50	-2.25	-2.00	-1.50	-1.00	-0.50	0.00	0.50	1.00	1.50	2.00	2.50	3.00	3.5	3.75	4.00	
80+00 Dune	0.19	2.43	0.35	0.28	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.06	0.12	0.26	0.63	6.11	59.83	96.48	99.40	99.67	99.72	99.95
120+00 Dune	0.18	2.50	0.35	0.19	6	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.04	0.09	0.35	4.38	49.99	94.64	99.42	99.73	99.81	99.97
160+00 Dune	0.17	2.58	0.29	0.32	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.52	38.00	94.97	99.39	99.61	99.68	99.98
200+00 Dune	0.18	2.45	0.36	0.49	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.06	0.12	0.24	1.06	6.91	54.47	96.83	99.28	99.46	99.51	99.98
DUNE COMPOSITE	**0.18**	**2.49**	**0.34**	**0.32**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.02**	**0.04**	**0.07**	**0.15**	**0.52**	**4.48**	**50.57**	**95.73**	**99.37**	**99.62**	**99.68**	**99.97**
80+00 Toe of Dune	0.19	2.38	0.89	0.24	5	6	0.00	0.00	0.00	1.17	1.28	1.28	1.37	1.52	1.80	2.65	3.32	3.98	4.18	4.40	6.93	48.62	92.73	98.83	99.59	99.76	99.95
120+00 Toe of Dune	0.19	2.43	0.45	0.32	6	6	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.12	0.20	0.26	0.38	0.70	1.02	1.84	7.46	57.22	94.96	99.07	99.62	99.68	99.95
160+00 Toe of Dune	0.20	2.34	0.40	0.33	6	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.17	1.02	15.07	70.63	94.53	99.20	99.59	99.67	100.00
200+00 Toe of Dune	0.18	2.46	0.36	0.15	7	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.05	0.09	0.15	0.30	0.83	5.70	53.42	96.88	99.67	99.84	99.85	100.00
TOE OF DUNE COMPOSITE	**0.19**	**2.40**	**0.57**	**0.26**	**6**	**6**	**0.00**	**0.00**	**0.00**	**0.29**	**0.32**	**0.32**	**0.36**	**0.41**	**0.51**	**0.74**	**0.95**	**1.22**	**1.42**	**2.02**	**8.79**	**57.47**	**94.78**	**99.19**	**99.66**	**99.74**	**99.98**
80+00 Mid-Berm	0.18	2.46	0.31	0.38	6	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0.09	2.74	59.47	96.03	99.20	99.57	99.62	99.98
120+00 Mid-Berm	0.19	2.40	0.54	0.43	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.35	0.53	0.72	0.87	1.13	1.54	3.02	11.26	55.58	95.17	99.18	99.51	99.57	99.98
160+00 Mid-Berm	0.20	2.35	0.42	0.59	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.10	0.15	0.31	0.68	1.90	12.55	68.42	94.83	98.94	99.36	99.41	99.91
200+00 Mid-Berm	0.18	2.44	0.30	0.63	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.23	4.04	59.17	98.02	99.27	99.36	99.37	99.94
MID-BERM COMPOSITE	**0.19**	**2.41**	**0.41**	**0.51**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.04**	**0.09**	**0.14**	**0.21**	**0.26**	**0.37**	**0.57**	**1.31**	**7.65**	**60.66**	**96.01**	**99.15**	**99.45**	**99.49**	**99.95**
80+00 (+2.0)	0.18	2.48	0.31	0.44	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.03	0.03	0.04	0.04	0.11	3.39	51.97	97.24	99.44	99.54	99.56	99.98
120+00 (+3.0)	0.19	2.38	0.31	0.39	6	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.17	6.42	68.59	97.69	99.36	99.58	99.61	100.00
160+00 (+3.0)	0.19	2.43	0.30	0.36	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.09	4.10	61.16	97.77	99.51	99.61	99.64	99.99
200+00 (+2.0)	0.18	2.45	0.30	0.57	6	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.05	0.14	3.08	57.54	97.73	99.29	99.42	99.43	99.99
+2.0/ +3.0 COMPOSITE	**0.18**	**2.44**	**0.31**	**0.44**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**	**0.01**	**0.01**	**0.02**	**0.03**	**0.13**	**4.25**	**59.82**	**97.61**	**99.40**	**99.54**	**99.56**	**99.99**
80+00 MHW	0.19	2.40	0.30	0.35	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.07	0.09	0.18	5.37	64.52	98.51	99.56	99.62	99.65	99.99
120+00 MHW	0.18	2.47	0.30	0.53	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	3.73	52.99	97.73	99.41	99.46	99.47	99.99
160+00 MHW	0.19	2.38	0.30	0.36	6	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.05	7.09	67.37	98.68	99.59	99.63	99.64	99.98
200+00 MHW	0.19	2.40	0.32	0.54	6	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.22	8.65	61.77	98.33	99.41	99.44	99.46	99.90
MHW COMPOSITE	**0.19**	**2.41**	**0.31**	**0.44**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.02**	**0.04**	**0.12**	**6.21**	**61.66**	**98.31**	**99.49**	**99.54**	**99.56**	**99.97**

ELEVATION COMPOSITES - FIGURE EIGHT BEACH SAMPLES (2 of 3)

SAMPLE I. D.	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	CUMULATIVE PERCENT RETAINED (SIEVES EXPRESSED IN PHI)																				FINE
							GRAVEL						GRANULAR			SAND											
							-4.25	-4.00	-3.50	-3.00	-2.50	-2.25	-2.00	-1.50	-1.00	-0.50	0.00	0.50	1.00	1.50	2.00	2.50	3.00	3.5	3.75	4.00	PAN
80+00 MTL	0.19	2.36	0.39	1.03	5	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.07	0.18	0.40	1.79	13.93	63.31	97.35	98.89	98.96	98.97	100.00
120+00 MTL	0.20	2.30	0.42	1.36	5	6	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.09	0.13	0.19	0.25	0.41	0.70	1.65	17.63	69.47	97.65	98.60	98.63	98.64	99.98
160+00 MTL	0.19	2.36	0.41	1.28	5	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.15	0.26	0.50	2.00	14.82	60.28	97.09	98.66	98.71	98.72	100.00
200+00 MTL	0.19	2.40	0.38	1.20	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.08	0.15	0.31	1.18	11.11	59.30	96.62	98.71	98.79	98.80	99.93
MTL COMPOSITE	**0.20**	**2.35**	**0.40**	**1.22**	**5**	**7**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.02**	**0.02**	**0.04**	**0.08**	**0.14**	**0.25**	**0.48**	**1.66**	**14.37**	**63.09**	**97.18**	**98.72**	**98.77**	**98.78**	**99.98**
80+00 MLW	0.20	2.35	0.41	0.85	5	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.13	0.26	0.41	0.59	0.80	1.35	10.65	66.91	97.65	99.03	99.14	99.15	99.98
120+00 MLW	0.22	2.21	0.61	1.16	5	6	0.00	0.00	0.00	0.00	0.00	0.07	0.15	0.30	0.54	1.03	1.54	2.28	3.33	6.45	22.18	69.70	97.76	98.81	98.83	98.84	99.98
160+00 MLW	0.21	2.27	0.56	1.18	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.59	0.89	1.20	1.62	2.38	5.06	18.41	66.02	97.44	98.80	98.81	98.82	100.00
200+00 MLW	0.20	2.31	0.40	1.15	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.11	0.20	0.32	0.66	2.30	15.38	69.94	97.48	98.83	98.84	98.85	100.00
MLW COMPOSITE	**0.21**	**2.28**	**0.51**	**1.08**	**5**	**6**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.04**	**0.17**	**0.33**	**0.57**	**0.84**	**1.20**	**1.79**	**3.79**	**16.66**	**68.14**	**97.58**	**98.87**	**98.91**	**98.92**	**99.99**
80+00 (-6.0)	0.31	1.67	1.01	1.07	5	6	0.00	0.00	0.00	0.00	0.00	0.24	0.34	1.09	2.14	4.93	9.39	14.58	19.75	27.77	49.45	85.41	98.38	98.91	98.92	98.93	100.00
120+00 (-6.0)	0.22	2.19	0.78	1.35	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	1.09	2.17	3.34	4.85	6.37	10.41	24.51	60.77	94.65	98.56	98.64	98.65	100.00
160+00 (-6.0)	0.21	2.23	0.64	1.40	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.38	0.64	1.14	1.64	2.29	3.53	7.49	22.21	64.38	96.57	98.55	98.59	98.60	99.98
200+00 (-6.0)	0.22	2.20	0.80	1.38	4	6	0.00	0.00	0.00	0.00	0.26	0.34	0.41	0.61	0.99	1.83	2.90	4.46	6.91	11.04	22.04	60.32	94.93	98.41	98.59	98.62	99.99
(-6.0) COMPOSITE	**0.24**	**2.07**	**0.85**	**1.30**	**5**	**6**	**0.00**	**0.00**	**0.00**	**0.00**	**0.07**	**0.15**	**0.22**	**0.60**	**1.22**	**2.52**	**4.32**	**6.55**	**9.14**	**14.18**	**29.55**	**67.72**	**96.13**	**98.61**	**98.69**	**98.70**	**99.99**
80+00 (-8.8)	0.19	2.43	0.74	1.38	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.55	0.99	1.99	2.77	3.47	4.15	5.37	10.84	43.48	88.11	97.90	98.48	98.62	99.99
120+00 (-8.8)	0.15	2.73	0.42	1.44	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.08	0.22	0.39	0.58	0.70	0.96	2.36	18.22	79.03	97.85	98.46	98.56	99.99
160+00 (-8.8)	0.20	2.33	0.73	1.65	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.40	0.79	1.74	2.69	3.73	4.92	7.23	15.95	51.47	92.63	98.11	98.34	98.35	99.96
200+00 (-8.8)	0.17	2.53	0.48	1.14	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.11	0.27	0.51	0.88	1.37	2.43	6.73	39.16	90.29	98.40	98.77	98.86	100.00
(-8.8) COMPOSITE	**0.18**	**2.51**	**0.63**	**1.40**	**5**	**6**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.03**	**0.25**	**0.49**	**1.06**	**1.59**	**2.17**	**2.79**	**4.00**	**8.97**	**38.08**	**87.52**	**98.07**	**98.51**	**98.60**	**99.99**
80+00 (-11.6)	0.18	2.47	0.61	1.37	5	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.51	0.95	1.50	2.26	2.85	4.08	9.29	41.92	90.96	98.24	98.53	98.63	99.99
120+00 (-11.6)	0.18	2.44	0.68	1.38	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.36	0.60	1.28	2.06	2.97	3.71	5.16	11.12	42.73	90.30	98.12	98.50	98.62	99.99
160+00 (-11.6)	0.18	2.45	0.56	1.57	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.17	0.66	1.14	1.78	2.51	3.84	9.68	44.88	92.06	98.10	98.32	98.33	100.00
200+00 (-11.6)	0.16	2.66	0.42	1.35	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.13	0.26	0.42	0.61	1.07	3.54	27.18	83.80	97.67	98.42	98.65	99.99
(-11.6) COMPOSITE	**0.18**	**2.51**	**0.58**	**1.44**	**4**	**6**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.05**	**0.13**	**0.33**	**0.76**	**1.24**	**1.86**	**2.42**	**3.54**	**8.41**	**39.18**	**89.28**	**98.03**	**98.44**	**98.56**	**99.99**

ELEVATION COMPOSITES - FIGURE EIGHT BEACH SAMPLES (3 of 3)

SAMPLE I. D.	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	CUMULATIVE PERCENT RETAINED (SIEVES EXPRESSED IN PHI)																				
							GRAVEL						GRANULAR			SAND											FINE
							-4.25	-4.00	-3.50	-3.00	-2.50	-2.25	-2.00	-1.50	-1.00	-0.50	0.00	0.50	1.00	1.50	2.00	2.50	3.00	3.5	3.75	4.00	PAN
80+00 (-14.4)	0.17	2.57	0.63	1.48	5	7	0.00	0.00	0.00	0.39	0.39	0.39	0.43	0.44	0.57	0.97	1.34	1.74	2.05	2.50	4.58	32.97	86.68	97.76	98.34	98.52	100.00
120+00 (-14.4)	0.16	2.61	0.55	1.43	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.34	0.45	0.76	1.05	1.36	1.64	1.98	3.42	30.19	85.59	97.75	98.42	98.57	100.00
160+00 (-14.4)	0.17	2.56	0.56	1.63	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.20	0.30	0.82	1.22	1.68	2.14	2.89	5.43	33.63	87.83	98.01	98.30	98.37	100.00
200+00 (-14.4)	0.16	2.63	0.41	1.57	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.11	0.19	0.33	0.56	1.14	3.82	30.30	86.04	97.89	98.34	98.43	99.99
(-14.4) COMPOSITE	**0.17**	**2.59**	**0.55**	**1.53**	**4**	**6**	**0.00**	**0.00**	**0.00**	**0.10**	**0.10**	**0.10**	**0.19**	**0.25**	**0.34**	**0.67**	**0.95**	**1.28**	**1.60**	**2.13**	**4.31**	**31.77**	**86.54**	**97.85**	**98.35**	**98.47**	**100.00**
80+00 (-17.2)	0.15	2.71	0.69	1.85	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.32	0.71	1.18	1.71	2.49	3.38	4.21	5.74	17.39	70.06	95.88	97.66	98.15	100.00
120+00 (-17.2)	0.15	2.69	0.48	1.63	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.27	0.41	0.65	0.87	1.16	1.52	2.66	22.69	81.57	97.26	98.18	98.37	99.93
160+00 (-17.2)	0.15	2.73	0.37	2.00	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.09	0.16	0.25	0.35	0.59	1.46	18.66	80.15	97.00	97.85	98.00	100.00
200+00 (-17.2)	0.17	2.59	0.47	1.37	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.13	0.20	0.36	0.60	0.96	1.85	5.27	34.49	86.39	97.96	98.49	98.63	99.99
(-17.2) COMPOSITE	**0.16**	**2.68**	**0.52**	**1.71**	**4**	**6**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.13**	**0.29**	**0.47**	**0.72**	**1.05**	**1.46**	**2.04**	**3.78**	**23.31**	**79.54**	**97.03**	**98.05**	**98.29**	**99.98**
80+00 (-20.0)	0.17	2.56	0.73	1.74	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.72	1.59	2.32	3.34	4.42	5.44	7.95	29.93	81.46	96.45	97.87	98.26	100.00
120+00 (-20.0)	0.17	2.54	0.68	1.79	4	6	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.11	0.21	0.54	1.13	2.33	4.49	6.87	11.16	31.68	81.95	97.11	97.98	98.21	99.99
160+00 (-20.0)	0.15	2.76	0.40	1.98	4	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.07	0.16	0.23	0.36	0.51	0.73	1.74	16.41	76.52	96.37	97.70	98.02	99.95
200+00 (-20.0)	0.16	2.60	0.49	1.92	3	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.14	0.22	0.37	0.70	1.18	2.29	6.56	32.40	84.74	97.10	97.88	98.08	100.00
(-20.0) COMPOSITE	**0.16**	**2.61**	**0.60**	**1.86**	**4**	**6**	**0.00**	**0.00**	**0.00**	**0.00**	**0.03**	**0.03**	**0.03**	**0.13**	**0.29**	**0.63**	**1.01**	**1.68**	**2.65**	**3.83**	**6.85**	**27.61**	**81.17**	**96.76**	**97.86**	**98.14**	**99.99**

APPENDIX 12

2007 Figure Eight Island Native Beach Individual Grab Sample Granularmetric Reports

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 80+00 (+2)

Analysis Date: 10-18-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,378,351	189,640	North Carolina State Plane	2.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/2 Dry - 5Y-7/1 Washed - 5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
101.11	100.69	0.01	0.02	#200 - 0.46 #230 - 0.44			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.03	0.03	0.03	0.03
10	-1.00	2.00	0.00	0.00	0.03	0.03
14	-0.50	1.41	0.00	0.00	0.03	0.03
18	0.00	1.00	0.00	0.00	0.03	0.03
25	0.50	0.71	0.01	0.01	0.04	0.04
35	1.00	0.50	0.00	0.00	0.04	0.04
45	1.50	0.35	0.07	0.07	0.11	0.11
60	2.00	0.25	3.32	3.28	3.43	3.39
80	2.50	0.18	49.12	48.58	52.55	51.97
120	3.00	0.13	45.77	45.27	98.32	97.24
170	3.50	0.09	2.22	2.20	100.54	99.44
200	3.75	0.07	0.10	0.10	100.64	99.54
230	4.00	0.06	0.02	0.02	100.66	99.56

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.98	2.85	2.75	2.48	2.22	2.13	2.02

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	2.48	0.18	0.31	-0.76	12.77

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 80+00 (-11.6)

Analysis Date: 10-29-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,378,816	189,210	North Carolina State Plane	-11.6 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 5Y-7/2 Washed - 5Y-7/2	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
89.44	88.22	0.01	0.01	#200 - 1.47 #230 - 1.37			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.13	0.15	0.13	0.15
10	-1.00	2.00	0.32	0.36	0.45	0.51
14	-0.50	1.41	0.39	0.44	0.84	0.95
18	0.00	1.00	0.49	0.55	1.33	1.50
25	0.50	0.71	0.68	0.76	2.01	2.26
35	1.00	0.50	0.53	0.59	2.54	2.85
45	1.50	0.35	1.10	1.23	3.64	4.08
60	2.00	0.25	4.66	5.21	8.30	9.29
80	2.50	0.18	29.18	32.63	37.48	41.92
120	3.00	0.13	43.86	49.04	81.34	90.96
170	3.50	0.09	6.51	7.28	87.85	98.24
200	3.75	0.07	0.26	0.29	88.11	98.53
230	4.00	0.06	0.09	0.10	88.20	98.63

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.28	2.93	2.84	2.58	2.24	2.10	1.59

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.47	0.18	0.61	-2.94	16.43

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 80+00 (-14.4)

Analysis Date: 10-29-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,378,915	189,086	North Carolina State Plane	-14.4 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/2 Dry - 5Y-7/1 Washed - 5Y-7/2	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
84.51	83.26	0.01	0.00	#200 - 1.66 #230 - 1.48			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.33	0.39	0.33	0.39
3.5	-2.50	5.66	0.00	0.00	0.33	0.39
4	-2.25	4.76	0.00	0.00	0.33	0.39
5	-2.00	4.00	0.03	0.04	0.36	0.43
7	-1.50	2.83	0.01	0.01	0.37	0.44
10	-1.00	2.00	0.11	0.13	0.48	0.57
14	-0.50	1.41	0.34	0.40	0.82	0.97
18	0.00	1.00	0.31	0.37	1.13	1.34
25	0.50	0.71	0.34	0.40	1.47	1.74
35	1.00	0.50	0.26	0.31	1.73	2.05
45	1.50	0.35	0.38	0.45	2.11	2.50
60	2.00	0.25	1.76	2.08	3.87	4.58
80	2.50	0.18	23.99	28.39	27.86	32.97
120	3.00	0.13	45.39	53.71	73.25	86.68
170	3.50	0.09	9.36	11.08	82.61	97.76
200	3.75	0.07	0.49	0.58	83.10	98.34
230	4.00	0.06	0.15	0.18	83.25	98.52

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.38	2.98	2.89	2.66	2.36	2.20	2.01

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.57	0.17	0.63	-4.65	37.1

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 80+00 (-17.2)

Analysis Date: 10-29-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,379,081	188,995	North Carolina State Plane	-17.2 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/1 Dry - 5Y-6/1 Washed - 5Y-6/2	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
91.38	89.75	0.06	0.00	#200 - 2.34 #230 - 1.85			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.06	0.07	0.06	0.07
7	-1.50	2.83	0.23	0.25	0.29	0.32
10	-1.00	2.00	0.36	0.39	0.65	0.71
14	-0.50	1.41	0.43	0.47	1.08	1.18
18	0.00	1.00	0.48	0.53	1.56	1.71
25	0.50	0.71	0.71	0.78	2.27	2.49
35	1.00	0.50	0.81	0.89	3.08	3.38
45	1.50	0.35	0.76	0.83	3.84	4.21
60	2.00	0.25	1.40	1.53	5.24	5.74
80	2.50	0.18	10.65	11.65	15.89	17.39
120	3.00	0.13	48.13	52.67	64.02	70.06
170	3.50	0.09	23.59	25.82	87.61	95.88
200	3.75	0.07	1.63	1.78	89.24	97.66
230	4.00	0.06	0.45	0.49	89.69	98.15

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.48	3.27	3.10	2.81	2.57	2.44	1.76

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.71	0.15	0.69	-3.28	17.86

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 80+00 (-20)

Analysis Date: 10-29-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,379,098	188,935	North Carolina State Plane	-20.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/2 Dry - 5Y-6/2 Washed - 5Y-6/2	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
93.37	91.76	0.03	0.00	#200 - 2.13 #230 - 1.74			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.28	0.30	0.28	0.30
10	-1.00	2.00	0.39	0.42	0.67	0.72
14	-0.50	1.41	0.81	0.87	1.48	1.59
18	0.00	1.00	0.68	0.73	2.16	2.32
25	0.50	0.71	0.95	1.02	3.11	3.34
35	1.00	0.50	1.01	1.08	4.12	4.42
45	1.50	0.35	0.95	1.02	5.07	5.44
60	2.00	0.25	2.34	2.51	7.41	7.95
80	2.50	0.18	20.52	21.98	27.93	29.93
120	3.00	0.13	48.11	51.53	76.04	81.46
170	3.50	0.09	14.00	14.99	90.04	96.45
200	3.75	0.07	1.33	1.42	91.37	97.87
230	4.00	0.06	0.36	0.39	91.73	98.26

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.45	3.08	2.94	2.69	2.39	2.18	1.28

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.56	0.17	0.73	-2.85	13.89

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 80+00 (-6)

Analysis Date: 10-19-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,378,618	189,439	North Carolina State Plane	-6.0 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 2.5Y-5/2 Dry - 2.5Y-6/1 Washed - 2.5Y-6/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
90.19	89.23	0.00	0.00	#200 - 1.08 #230 - 1.07			1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.22	0.24	0.22	0.24
5	-2.00	4.00	0.09	0.10	0.31	0.34
7	-1.50	2.83	0.68	0.75	0.99	1.09
10	-1.00	2.00	0.95	1.05	1.94	2.14
14	-0.50	1.41	2.52	2.79	4.46	4.93
18	0.00	1.00	4.02	4.46	8.48	9.39
25	0.50	0.71	4.68	5.19	13.16	14.58
35	1.00	0.50	4.66	5.17	17.82	19.75
45	1.50	0.35	7.23	8.02	25.05	27.77
60	2.00	0.25	19.55	21.68	44.60	49.45
80	2.50	0.18	32.43	35.96	77.03	85.41
120	3.00	0.13	11.70	12.97	88.73	98.38
170	3.50	0.09	0.48	0.53	89.21	98.91
200	3.75	0.07	0.01	0.01	89.22	98.92
230	4.00	0.06	0.01	0.01	89.23	98.93

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.87	2.48	2.36	2.01	1.33	0.64	-0.49

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.67	0.31	1.01	-1.39	4.56

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 80+00 (-8.8)

Analysis Date: 10-29-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,378,715	189,342	North Carolina State Plane	-8.8 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 5Y-6/1 Washed - 5Y-6/2	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
90.19	88.95	0.01	0.01	#200 - 1.52 #230 - 1.38			1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.05	0.06	0.05	0.06
7	-1.50	2.83	0.44	0.49	0.49	0.55
10	-1.00	2.00	0.40	0.44	0.89	0.99
14	-0.50	1.41	0.90	1.00	1.79	1.99
18	0.00	1.00	0.70	0.78	2.49	2.77
25	0.50	0.71	0.63	0.70	3.12	3.47
35	1.00	0.50	0.61	0.68	3.73	4.15
45	1.50	0.35	1.10	1.22	4.83	5.37
60	2.00	0.25	4.93	5.47	9.76	10.84
80	2.50	0.18	29.44	32.64	39.20	43.48
120	3.00	0.13	40.25	44.63	79.45	88.11
170	3.50	0.09	8.83	9.79	88.28	97.90
200	3.75	0.07	0.52	0.58	88.80	98.48
230	4.00	0.06	0.13	0.14	88.93	98.62

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.35	2.95	2.85	2.57	2.22	2.08	1.35

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.43	0.19	0.74	-2.91	14.44

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 80+00 Dune

Analysis Date: 10-18-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
		North Carolina State Plane	

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
101.80	101.56	0.00	0.05	#200 - 0.33 #230 - 0.28			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.01	0.01	0.01	0.01
14	-0.50	1.41	0.01	0.01	0.02	0.02
18	0.00	1.00	0.04	0.04	0.06	0.06
25	0.50	0.71	0.06	0.06	0.12	0.12
35	1.00	0.50	0.14	0.14	0.26	0.26
45	1.50	0.35	0.38	0.37	0.64	0.63
60	2.00	0.25	5.58	5.48	6.22	6.11
80	2.50	0.18	54.69	53.72	60.91	59.83
120	3.00	0.13	37.31	36.65	98.22	96.48
170	3.50	0.09	2.97	2.92	101.19	99.40
200	3.75	0.07	0.27	0.27	101.46	99.67
230	4.00	0.06	0.05	0.05	101.51	99.72

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.98	2.83	2.71	2.41	2.18	2.09	1.90

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.43	0.19	0.35	-0.5	7.86

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 80+00 MHW

Analysis Date: 10-18-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,378,368	189,625	North Carolina State Plane	1.4 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
108.07	107.70	0.01	0.01	#200 - 0.38 #230 - 0.35			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.01	0.01	0.01	0.01
18	0.00	1.00	0.04	0.04	0.05	0.05
25	0.50	0.71	0.02	0.02	0.07	0.07
35	1.00	0.50	0.02	0.02	0.09	0.09
45	1.50	0.35	0.10	0.09	0.19	0.18
60	2.00	0.25	5.61	5.19	5.80	5.37
80	2.50	0.18	63.92	59.15	69.72	64.52
120	3.00	0.13	36.73	33.99	106.45	98.51
170	3.50	0.09	1.13	1.05	107.58	99.56
200	3.75	0.07	0.07	0.06	107.65	99.62
230	4.00	0.06	0.03	0.03	107.68	99.65

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.95	2.79	2.65	2.38	2.17	2.09	1.96

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.4	0.19	0.3	-0.29	6.73

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 80+00 Mid Berm

Analysis Date: 10-18-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
		North Carolina State Plane	

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-6/1 Washed - 5Y-6/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
102.03	101.65	0.00	0.02	#200 - 0.43 #230 - 0.38			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.01	0.01	0.01	0.01
25	0.50	0.71	0.00	0.00	0.01	0.01
35	1.00	0.50	0.02	0.02	0.03	0.03
45	1.50	0.35	0.06	0.06	0.09	0.09
60	2.00	0.25	2.70	2.65	2.79	2.74
80	2.50	0.18	57.88	56.73	60.67	59.47
120	3.00	0.13	37.30	36.56	97.97	96.03
170	3.50	0.09	3.23	3.17	101.20	99.20
200	3.75	0.07	0.38	0.37	101.58	99.57
230	4.00	0.06	0.05	0.05	101.63	99.62

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.99	2.84	2.71	2.42	2.20	2.12	2.02

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.46	0.18	0.31	0.46	4.23

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 80+00 MLW

Analysis Date: 10-19-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,378,467	189,525	North Carolina State Plane	-2.8 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 5Y-7/1 Washed - 5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
91.42	90.67	0.02	0.02	#200 - 0.86 #230 - 0.85			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.09	0.10	0.09	0.10
10	-1.00	2.00	0.03	0.03	0.12	0.13
14	-0.50	1.41	0.12	0.13	0.24	0.26
18	0.00	1.00	0.14	0.15	0.38	0.41
25	0.50	0.71	0.16	0.18	0.54	0.59
35	1.00	0.50	0.19	0.21	0.73	0.80
45	1.50	0.35	0.50	0.55	1.23	1.35
60	2.00	0.25	8.50	9.30	9.73	10.65
80	2.50	0.18	51.43	56.26	61.16	66.91
120	3.00	0.13	28.10	30.74	89.26	97.65
170	3.50	0.09	1.26	1.38	90.52	99.03
200	3.75	0.07	0.10	0.11	90.62	99.14
230	4.00	0.06	0.01	0.01	90.63	99.15

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.96	2.78	2.63	2.35	2.13	2.05	1.70

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.35	0.20	0.41	-2.51	22.3

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 80+00 MTL

Analysis Date: 10-18-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,378,411	189,588	North Carolina State Plane	-1.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/2 Dry - 5Y-7/1 Washed - 5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
82.01	81.18	0.00	0.00	#200 - 1.04 #230 - 1.03			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.01	0.01	0.01	0.01
14	-0.50	1.41	0.01	0.01	0.02	0.02
18	0.00	1.00	0.04	0.05	0.06	0.07
25	0.50	0.71	0.09	0.11	0.15	0.18
35	1.00	0.50	0.18	0.22	0.33	0.40
45	1.50	0.35	1.14	1.39	1.47	1.79
60	2.00	0.25	9.96	12.14	11.43	13.93
80	2.50	0.18	40.50	49.38	51.93	63.31
120	3.00	0.13	27.92	34.04	79.85	97.35
170	3.50	0.09	1.26	1.54	81.11	98.89
200	3.75	0.07	0.06	0.07	81.17	98.96
230	4.00	0.06	0.01	0.01	81.18	98.97

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.97	2.80	2.67	2.37	2.11	2.02	1.63

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.36	0.19	0.39	-0.85	6.5

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 80+00 Toe of Dune

Analysis Date: 10-18-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
		North Carolina State Plane	

USCS:	Munsell:	Comments:
SW	Wet - 5Y-5/1 Dry - 5Y-6/1 Washed - 5Y-6/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
98.10	97.94	0.01	0.05	#200 - 0.41 #230 - 0.24			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	1.15	1.17	1.15	1.17
3.5	-2.50	5.66	0.11	0.11	1.26	1.28
4	-2.25	4.76	0.00	0.00	1.26	1.28
5	-2.00	4.00	0.09	0.09	1.35	1.37
7	-1.50	2.83	0.15	0.15	1.50	1.52
10	-1.00	2.00	0.27	0.28	1.77	1.80
14	-0.50	1.41	0.83	0.85	2.60	2.65
18	0.00	1.00	0.66	0.67	3.26	3.32
25	0.50	0.71	0.65	0.66	3.91	3.98
35	1.00	0.50	0.20	0.20	4.11	4.18
45	1.50	0.35	0.22	0.22	4.33	4.40
60	2.00	0.25	2.48	2.53	6.81	6.93
80	2.50	0.18	40.90	41.69	47.71	48.62
120	3.00	0.13	43.27	44.11	90.98	92.73
170	3.50	0.09	5.98	6.10	96.96	98.83
200	3.75	0.07	0.75	0.76	97.71	99.59
230	4.00	0.06	0.17	0.17	97.88	99.76

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.19	2.90	2.80	2.52	2.22	2.11	1.62

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.38	0.19	0.89	-4.21	24.42

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 120+00 (+3)

Analysis Date: 11-13-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,380,845	192,819	North Carolina State Plane	3.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-6/1 Washed - 5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
98.13	97.77	0.01	0.00	#200 - 0.42 #230 - 0.39			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.01	0.01	0.01	0.01
25	0.50	0.71	0.00	0.00	0.01	0.01
35	1.00	0.50	0.01	0.01	0.02	0.02
45	1.50	0.35	0.15	0.15	0.17	0.17
60	2.00	0.25	6.13	6.25	6.30	6.42
80	2.50	0.18	61.01	62.17	67.31	68.59
120	3.00	0.13	28.56	29.10	95.87	97.69
170	3.50	0.09	1.64	1.67	97.51	99.36
200	3.75	0.07	0.22	0.22	97.73	99.58
230	4.00	0.06	0.03	0.03	97.76	99.61

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.95	2.76	2.61	2.35	2.15	2.08	1.89

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.38	0.19	0.31	0.3	4.42

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 120+00 (-11.6)

Analysis Date: 10-24-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,381,366	192,333	North Carolina State Plane	-11.6 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/2 Dry - 5Y-6/2 Washed - 5Y-6/2	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
99.17	97.83	0.01	0.01	#200 - 1.50 #230 - 1.38			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.18	0.18	0.18	0.18
7	-1.50	2.83	0.18	0.18	0.36	0.36
10	-1.00	2.00	0.24	0.24	0.60	0.60
14	-0.50	1.41	0.67	0.68	1.27	1.28
18	0.00	1.00	0.77	0.78	2.04	2.06
25	0.50	0.71	0.90	0.91	2.94	2.97
35	1.00	0.50	0.73	0.74	3.67	3.71
45	1.50	0.35	1.44	1.45	5.11	5.16
60	2.00	0.25	5.91	5.96	11.02	11.12
80	2.50	0.18	31.35	31.61	42.37	42.73
120	3.00	0.13	47.18	47.57	89.55	90.30
170	3.50	0.09	7.76	7.82	97.31	98.12
200	3.75	0.07	0.38	0.38	97.69	98.50
230	4.00	0.06	0.12	0.12	97.81	98.62

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.30	2.93	2.84	2.58	2.22	2.08	1.44

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.44	0.18	0.68	-2.92	15.38

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 120+00 (-14.4)

Analysis Date: 10-24-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,381,476	192,220	North Carolina State Plane	-14.4 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/1 Dry - 5Y-6/1 Washed - 5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
89.18	87.92	0.02	0.00	#200 - 1.58 #230 - 1.43			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.24	0.27	0.24	0.27
7	-1.50	2.83	0.06	0.07	0.30	0.34
10	-1.00	2.00	0.10	0.11	0.40	0.45
14	-0.50	1.41	0.28	0.31	0.68	0.76
18	0.00	1.00	0.26	0.29	0.94	1.05
25	0.50	0.71	0.28	0.31	1.22	1.36
35	1.00	0.50	0.25	0.28	1.47	1.64
45	1.50	0.35	0.30	0.34	1.77	1.98
60	2.00	0.25	1.28	1.44	3.05	3.42
80	2.50	0.18	23.87	26.77	26.92	30.19
120	3.00	0.13	49.41	55.40	76.33	85.59
170	3.50	0.09	10.84	12.16	87.17	97.75
200	3.75	0.07	0.60	0.67	87.77	98.42
230	4.00	0.06	0.13	0.15	87.90	98.57

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.39	2.99	2.90	2.68	2.40	2.23	2.03

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.61	0.16	0.55	-3.9	29.18

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 120+00 (-17.2)

Analysis Date: 10-24-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,381,542	192,182	North Carolina State Plane	-17.2 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/2 Dry - 5Y-6/2 Washed - 5Y-7/2	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
86.29	84.95	0.02	0.07	#200 - 1.82 #230 - 1.63			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.11	0.13	0.11	0.13
10	-1.00	2.00	0.12	0.14	0.23	0.27
14	-0.50	1.41	0.12	0.14	0.35	0.41
18	0.00	1.00	0.21	0.24	0.56	0.65
25	0.50	0.71	0.19	0.22	0.75	0.87
35	1.00	0.50	0.25	0.29	1.00	1.16
45	1.50	0.35	0.31	0.36	1.31	1.52
60	2.00	0.25	0.98	1.14	2.29	2.66
80	2.50	0.18	17.28	20.03	19.57	22.69
120	3.00	0.13	50.81	58.88	70.38	81.57
170	3.50	0.09	13.54	15.69	83.92	97.26
200	3.75	0.07	0.79	0.92	84.71	98.18
230	4.00	0.06	0.16	0.19	84.87	98.37

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.43	3.08	2.94	2.73	2.52	2.33	2.06

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.69	0.15	0.48	-3.35	26.44

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 120+00 (-20)

Analysis Date: 10-24-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,381,604	192,064	North Carolina State Plane	-20.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-4/1 Dry - 2.5Y-6/1 Washed - 2.5Y-6/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
81.87	80.43	0.02	0.01	#200 - 2.02 #230 - 1.79			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.08	0.10	0.08	0.10
4	-2.25	4.76	0.00	0.00	0.08	0.10
5	-2.00	4.00	0.00	0.00	0.08	0.10
7	-1.50	2.83	0.01	0.01	0.09	0.11
10	-1.00	2.00	0.08	0.10	0.17	0.21
14	-0.50	1.41	0.27	0.33	0.44	0.54
18	0.00	1.00	0.48	0.59	0.92	1.13
25	0.50	0.71	0.98	1.20	1.90	2.33
35	1.00	0.50	1.77	2.16	3.67	4.49
45	1.50	0.35	1.95	2.38	5.62	6.87
60	2.00	0.25	3.51	4.29	9.13	11.16
80	2.50	0.18	16.80	20.52	25.93	31.68
120	3.00	0.13	41.16	50.27	67.09	81.95
170	3.50	0.09	12.41	15.16	79.50	97.11
200	3.75	0.07	0.71	0.87	80.21	97.98
230	4.00	0.06	0.19	0.23	80.40	98.21

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.43	3.07	2.93	2.68	2.34	2.12	1.11

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.54	0.17	0.68	-2.34	11.65

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 120+00 (-6)

Analysis Date: 10-24-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,381,136	192,538	North Carolina State Plane	-6.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/1 Dry - 5Y-6/1 Washed - 5Y-6/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
94.61	93.35	0.01	0.00	#200 - 1.36 #230 - 1.35			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.28	0.30	0.28	0.30
10	-1.00	2.00	0.75	0.79	1.03	1.09
14	-0.50	1.41	1.02	1.08	2.05	2.17
18	0.00	1.00	1.11	1.17	3.16	3.34
25	0.50	0.71	1.43	1.51	4.59	4.85
35	1.00	0.50	1.44	1.52	6.03	6.37
45	1.50	0.35	3.82	4.04	9.85	10.41
60	2.00	0.25	13.34	14.10	23.19	24.51
80	2.50	0.18	34.31	36.26	57.50	60.77
120	3.00	0.13	32.05	33.88	89.55	94.65
170	3.50	0.09	3.70	3.91	93.25	98.56
200	3.75	0.07	0.08	0.08	93.33	98.64
230	4.00	0.06	0.01	0.01	93.34	98.65

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.04	2.84	2.71	2.35	2.01	1.70	0.55

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.19	0.22	0.78	-2.2	9.25

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 120+00 (-8.8)

Analysis Date: 10-24-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,381,220	192,479	North Carolina State Plane	-8.8 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/1 Dry - 5Y-6/1 Washed - 5Y-6/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
85.82	84.61	0.02	0.01	#200 - 1.54 #230 - 1.44			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.01	0.01	0.01	0.01
10	-1.00	2.00	0.06	0.07	0.07	0.08
14	-0.50	1.41	0.12	0.14	0.19	0.22
18	0.00	1.00	0.15	0.17	0.34	0.39
25	0.50	0.71	0.16	0.19	0.50	0.58
35	1.00	0.50	0.10	0.12	0.60	0.70
45	1.50	0.35	0.22	0.26	0.82	0.96
60	2.00	0.25	1.20	1.40	2.02	2.36
80	2.50	0.18	13.61	15.86	15.63	18.22
120	3.00	0.13	52.19	60.81	67.82	79.03
170	3.50	0.09	16.15	18.82	83.97	97.85
200	3.75	0.07	0.52	0.61	84.49	98.46
230	4.00	0.06	0.09	0.10	84.58	98.56

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.42	3.13	2.97	2.76	2.56	2.43	2.08

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.73	0.15	0.42	-2.79	22.86

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 120+00 Dune

Analysis Date: 11-12-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,380,759	192,920	North Carolina State Plane	16.8 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-6/1 Washed - 5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.99	100.82	0.00	0.03	#200 - 0.27 #230 - 0.19			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.01	0.01	0.01	0.01
14	-0.50	1.41	0.01	0.01	0.02	0.02
18	0.00	1.00	0.01	0.01	0.03	0.03
25	0.50	0.71	0.01	0.01	0.04	0.04
35	1.00	0.50	0.05	0.05	0.09	0.09
45	1.50	0.35	0.26	0.26	0.35	0.35
60	2.00	0.25	4.07	4.03	4.42	4.38
80	2.50	0.18	46.06	45.61	50.48	49.99
120	3.00	0.13	45.09	44.65	95.57	94.64
170	3.50	0.09	4.83	4.78	100.40	99.42
200	3.75	0.07	0.31	0.31	100.71	99.73
230	4.00	0.06	0.08	0.08	100.79	99.81

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.04	2.88	2.78	2.50	2.23	2.13	2.01

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.5	0.18	0.35	-0.26	6.11

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 120+00 MHW

Analysis Date: 11-12-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,380,884	192,774	North Carolina State Plane	1.4 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
98.07	97.57	0.00	0.01	#200 - 0.54 #230 - 0.53			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.00	0.00	0.00	0.00
25	0.50	0.71	0.00	0.00	0.00	0.00
35	1.00	0.50	0.01	0.01	0.01	0.01
45	1.50	0.35	0.02	0.02	0.03	0.03
60	2.00	0.25	3.63	3.70	3.66	3.73
80	2.50	0.18	48.31	49.26	51.97	52.99
120	3.00	0.13	43.88	44.74	95.85	97.73
170	3.50	0.09	1.65	1.68	97.50	99.41
200	3.75	0.07	0.05	0.05	97.55	99.46
230	4.00	0.06	0.01	0.01	97.56	99.47

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.97	2.85	2.75	2.47	2.22	2.12	2.01

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.47	0.18	0.3	-0.08	2.81

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 120+00 Mid Berm

Analysis Date: 11-12-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,380,808	192,864	North Carolina State Plane	8.5 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/2 Dry - 5Y-7/2 Washed - 5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
102.66	102.23	0.01	0.02	#200 - 0.49 #230 - 0.43			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.16	0.16	0.16	0.16
7	-1.50	2.83	0.19	0.19	0.35	0.35
10	-1.00	2.00	0.18	0.18	0.53	0.53
14	-0.50	1.41	0.19	0.19	0.72	0.72
18	0.00	1.00	0.15	0.15	0.87	0.87
25	0.50	0.71	0.27	0.26	1.14	1.13
35	1.00	0.50	0.42	0.41	1.56	1.54
45	1.50	0.35	1.52	1.48	3.08	3.02
60	2.00	0.25	8.46	8.24	11.54	11.26
80	2.50	0.18	45.50	44.32	57.04	55.58
120	3.00	0.13	40.64	39.59	97.68	95.17
170	3.50	0.09	4.12	4.01	101.80	99.18
200	3.75	0.07	0.34	0.33	102.14	99.51
230	4.00	0.06	0.06	0.06	102.20	99.57

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.00	2.86	2.75	2.44	2.16	2.05	1.62

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.4	0.19	0.54	-3.15	23.26

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 120+00 MLW

Analysis Date: 11-12-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,380,983	192,667	North Carolina State Plane	-2.6 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 5Y-6/1 Washed - 5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
104.34	103.15	0.00	0.02	#200 - 1.17 #230 - 1.16			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.07	0.07	0.07	0.07
5	-2.00	4.00	0.08	0.08	0.15	0.15
7	-1.50	2.83	0.16	0.15	0.31	0.30
10	-1.00	2.00	0.25	0.24	0.56	0.54
14	-0.50	1.41	0.51	0.49	1.07	1.03
18	0.00	1.00	0.53	0.51	1.60	1.54
25	0.50	0.71	0.77	0.74	2.37	2.28
35	1.00	0.50	1.10	1.05	3.47	3.33
45	1.50	0.35	3.26	3.12	6.73	6.45
60	2.00	0.25	16.41	15.73	23.14	22.18
80	2.50	0.18	49.58	47.52	72.72	69.70
120	3.00	0.13	29.28	28.06	102.00	97.76
170	3.50	0.09	1.10	1.05	103.10	98.81
200	3.75	0.07	0.02	0.02	103.12	98.83
230	4.00	0.06	0.01	0.01	103.13	98.84

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.95	2.75	2.59	2.29	2.03	1.80	1.27

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	2.21	0.22	0.61	-2.74	15.67

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 120+00 MTL

Analysis Date: 11-12-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,380,910	192,741	North Carolina State Plane	-0.7 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 5Y-6/1 Washed - 5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
108.69	107.21	0.00	0.02	#200 - 1.37 #230 - 1.36			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.07	0.06	0.07	0.06
5	-2.00	4.00	0.00	0.00	0.07	0.06
7	-1.50	2.83	0.03	0.03	0.10	0.09
10	-1.00	2.00	0.04	0.04	0.14	0.13
14	-0.50	1.41	0.06	0.06	0.20	0.19
18	0.00	1.00	0.07	0.06	0.27	0.25
25	0.50	0.71	0.17	0.16	0.44	0.41
35	1.00	0.50	0.31	0.29	0.75	0.70
45	1.50	0.35	1.03	0.95	1.78	1.65
60	2.00	0.25	17.37	15.98	19.15	17.63
80	2.50	0.18	56.34	51.84	75.49	69.47
120	3.00	0.13	30.63	28.18	106.12	97.65
170	3.50	0.09	1.03	0.95	107.15	98.60
200	3.75	0.07	0.03	0.03	107.18	98.63
230	4.00	0.06	0.01	0.01	107.19	98.64

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.95	2.76	2.60	2.31	2.07	1.95	1.60

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.3	0.20	0.42	-2.11	20.04

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 120+00 Toe of Dune

Analysis Date: 11-13-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,380,801	192,911	North Carolina State Plane	11.7 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-6/1 Washed - 5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
102.87	102.59	0.01	0.05	#200 - 0.38 #230 - 0.32			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.05	0.05	0.05	0.05
7	-1.50	2.83	0.07	0.07	0.12	0.12
10	-1.00	2.00	0.08	0.08	0.20	0.20
14	-0.50	1.41	0.06	0.06	0.26	0.26
18	0.00	1.00	0.12	0.12	0.38	0.38
25	0.50	0.71	0.33	0.32	0.71	0.70
35	1.00	0.50	0.33	0.32	1.04	1.02
45	1.50	0.35	0.84	0.82	1.88	1.84
60	2.00	0.25	5.78	5.62	7.66	7.46
80	2.50	0.18	51.19	49.76	58.85	57.22
120	3.00	0.13	38.82	37.74	97.67	94.96
170	3.50	0.09	4.23	4.11	101.90	99.07
200	3.75	0.07	0.57	0.55	102.47	99.62
230	4.00	0.06	0.06	0.06	102.53	99.68

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.00	2.85	2.74	2.43	2.18	2.09	1.78

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.43	0.19	0.45	-2.36	20.97

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 160+00 (+3)

Analysis Date: 10-23-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,383,594	195,781	North Carolina State Plane	3.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
102.13	101.78	0.00	0.01	#200 - 0.39 #230 - 0.36			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.00	0.00	0.00	0.00
25	0.50	0.71	0.01	0.01	0.01	0.01
35	1.00	0.50	0.01	0.01	0.02	0.02
45	1.50	0.35	0.07	0.07	0.09	0.09
60	2.00	0.25	4.10	4.01	4.19	4.10
80	2.50	0.18	58.28	57.06	62.47	61.16
120	3.00	0.13	37.39	36.61	99.86	97.77
170	3.50	0.09	1.78	1.74	101.64	99.51
200	3.75	0.07	0.10	0.10	101.74	99.61
230	4.00	0.06	0.03	0.03	101.77	99.64

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.96	2.81	2.69	2.40	2.18	2.10	2.01

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.43	0.19	0.3	0.19	3.5

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 160+00 (-11.6)

Analysis Date: 10-23-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,384,040	195,264	North Carolina State Plane	-11.6 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/1 Dry - 5Y-6/2 Washed - 5Y-6/2	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
83.38	82.00	0.01	0.00	#200 - 1.68 #230 - 1.67			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.01	0.01	0.01	0.01
10	-1.00	2.00	0.13	0.16	0.14	0.17
14	-0.50	1.41	0.41	0.49	0.55	0.66
18	0.00	1.00	0.40	0.48	0.95	1.14
25	0.50	0.71	0.53	0.64	1.48	1.78
35	1.00	0.50	0.61	0.73	2.09	2.51
45	1.50	0.35	1.11	1.33	3.20	3.84
60	2.00	0.25	4.87	5.84	8.07	9.68
80	2.50	0.18	29.35	35.20	37.42	44.88
120	3.00	0.13	39.34	47.18	76.76	92.06
170	3.50	0.09	5.04	6.04	81.80	98.10
200	3.75	0.07	0.18	0.22	81.98	98.32
230	4.00	0.06	0.01	0.01	81.99	98.33

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.24	2.91	2.82	2.55	2.22	2.09	1.60

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.45	0.18	0.56	-2.62	14.54

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 160+00 (-14.4)

Analysis Date: 10-23-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,384,134	195,171	North Carolina State Plane	-14.4 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/1 Dry - 5Y-6/2 Washed - 5Y-6/2	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
80.32	79.02	0.01	0.00	#200 - 1.70 #230 - 1.63			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.03	0.04	0.03	0.04
7	-1.50	2.83	0.13	0.16	0.16	0.20
10	-1.00	2.00	0.08	0.10	0.24	0.30
14	-0.50	1.41	0.42	0.52	0.66	0.82
18	0.00	1.00	0.32	0.40	0.98	1.22
25	0.50	0.71	0.37	0.46	1.35	1.68
35	1.00	0.50	0.37	0.46	1.72	2.14
45	1.50	0.35	0.60	0.75	2.32	2.89
60	2.00	0.25	2.04	2.54	4.36	5.43
80	2.50	0.18	22.65	28.20	27.01	33.63
120	3.00	0.13	43.53	54.20	70.54	87.83
170	3.50	0.09	8.18	10.18	78.72	98.01
200	3.75	0.07	0.23	0.29	78.95	98.30
230	4.00	0.06	0.06	0.07	79.01	98.37

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.35	2.96	2.88	2.65	2.35	2.19	1.92

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.56	0.17	0.56	-3.33	21.14

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 160+00 (-17.2)

Analysis Date: 10-24-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,384,296	195,067	North Carolina State Plane	-17.2 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/1 Dry - 5Y-6/2 Washed - 5Y-7/2	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
86.16	84.48	0.03	0.00	#200 - 2.15 #230 - 2.00			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.03	0.03	0.03	0.03
14	-0.50	1.41	0.05	0.06	0.08	0.09
18	0.00	1.00	0.06	0.07	0.14	0.16
25	0.50	0.71	0.08	0.09	0.22	0.25
35	1.00	0.50	0.09	0.10	0.31	0.35
45	1.50	0.35	0.21	0.24	0.52	0.59
60	2.00	0.25	0.75	0.87	1.27	1.46
80	2.50	0.18	14.82	17.20	16.09	18.66
120	3.00	0.13	52.98	61.49	69.07	80.15
170	3.50	0.09	14.52	16.85	83.59	97.00
200	3.75	0.07	0.73	0.85	84.32	97.85
230	4.00	0.06	0.13	0.15	84.45	98.00

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.44	3.11	2.96	2.75	2.55	2.42	2.10

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.73	0.15	0.37	-1.81	17.36

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 160+00 (-20)

Analysis Date: 10-24-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,384,367	194,975	North Carolina State Plane	-20.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/1 Dry - 5Y-6/2 Washed - 5Y-7/2	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
82.15	80.59	0.03	0.05	#200 - 2.30 #230 - 1.98			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.02	0.02	0.02	0.02
10	-1.00	2.00	0.04	0.05	0.06	0.07
14	-0.50	1.41	0.07	0.09	0.13	0.16
18	0.00	1.00	0.06	0.07	0.19	0.23
25	0.50	0.71	0.11	0.13	0.30	0.36
35	1.00	0.50	0.12	0.15	0.42	0.51
45	1.50	0.35	0.18	0.22	0.60	0.73
60	2.00	0.25	0.83	1.01	1.43	1.74
80	2.50	0.18	12.05	14.67	13.48	16.41
120	3.00	0.13	49.38	60.11	62.86	76.52
170	3.50	0.09	16.31	19.85	79.17	96.37
200	3.75	0.07	1.09	1.33	80.26	97.70
230	4.00	0.06	0.26	0.32	80.52	98.02

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.47	3.19	2.99	2.78	2.57	2.49	2.11

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.76	0.15	0.4	-2.28	21.27

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 160+00 (-6)

Analysis Date: 10-23-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,383,820	195,535	North Carolina State Plane	-6.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-5/1 Dry - 2.5Y-6/2 Washed - 2.5Y-6/2	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
83.17	82.03	0.00	0.02	#200 - 1.41 #230 - 1.40			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.10	0.12	0.10	0.12
7	-1.50	2.83	0.22	0.26	0.32	0.38
10	-1.00	2.00	0.22	0.26	0.54	0.64
14	-0.50	1.41	0.42	0.50	0.96	1.14
18	0.00	1.00	0.42	0.50	1.38	1.64
25	0.50	0.71	0.54	0.65	1.92	2.29
35	1.00	0.50	1.03	1.24	2.95	3.53
45	1.50	0.35	3.29	3.96	6.24	7.49
60	2.00	0.25	12.24	14.72	18.48	22.21
80	2.50	0.18	35.07	42.17	53.55	64.38
120	3.00	0.13	26.77	32.19	80.32	96.57
170	3.50	0.09	1.65	1.98	81.97	98.55
200	3.75	0.07	0.03	0.04	82.00	98.59
230	4.00	0.06	0.01	0.01	82.01	98.60

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.98	2.80	2.66	2.33	2.03	1.79	1.19

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.23	0.21	0.64	-2.57	13.96

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 160+00 (-8.8)

Analysis Date: 10-24-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,383,938	195,481	North Carolina State Plane	-8.8 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/1 Dry - 5Y-6/1 Washed - 5Y-6/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
84.38	83.01	0.00	0.04	#200 - 1.66 #230 - 1.65			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.06	0.07	0.06	0.07
7	-1.50	2.83	0.28	0.33	0.34	0.40
10	-1.00	2.00	0.33	0.39	0.67	0.79
14	-0.50	1.41	0.80	0.95	1.47	1.74
18	0.00	1.00	0.80	0.95	2.27	2.69
25	0.50	0.71	0.88	1.04	3.15	3.73
35	1.00	0.50	1.00	1.19	4.15	4.92
45	1.50	0.35	1.95	2.31	6.10	7.23
60	2.00	0.25	7.36	8.72	13.46	15.95
80	2.50	0.18	29.97	35.52	43.43	51.47
120	3.00	0.13	34.73	41.16	78.16	92.63
170	3.50	0.09	4.62	5.48	82.78	98.11
200	3.75	0.07	0.19	0.23	82.97	98.34
230	4.00	0.06	0.01	0.01	82.98	98.35

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.22	2.90	2.79	2.48	2.13	2.00	1.02

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.33	0.20	0.73	-2.61	12.22

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 160+00 Dune

Analysis Date: 10-24-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,383,542	195,838	North Carolina State Plane	13.6 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-6/1 Dry - 2.5Y-7/1 Washed - 2.5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
96.53	96.25	0.01	0.02	#200 - 0.39 #230 - 0.32			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.00	0.00	0.00	0.00
25	0.50	0.71	0.01	0.01	0.01	0.01
35	1.00	0.50	0.01	0.01	0.02	0.02
45	1.50	0.35	0.02	0.02	0.04	0.04
60	2.00	0.25	0.46	0.48	0.50	0.52
80	2.50	0.18	36.18	37.48	36.68	38.00
120	3.00	0.13	54.99	56.97	91.67	94.97
170	3.50	0.09	4.27	4.42	95.94	99.39
200	3.75	0.07	0.21	0.22	96.15	99.61
230	4.00	0.06	0.07	0.07	96.22	99.68

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.00	2.90	2.82	2.61	2.33	2.21	2.06

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.58	0.17	0.29	0.05	3.51

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 160+00 MHW

Analysis Date: 10-23-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,383,614	195,756	North Carolina State Plane	1.4 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-6/1 Dry - 2.5Y-6/1 Washed - 2.5Y-6/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.20	99.85	0.00	0.02	#200 - 0.37 #230 - 0.36			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.00	0.00	0.00	0.00
25	0.50	0.71	0.00	0.00	0.00	0.00
35	1.00	0.50	0.01	0.01	0.01	0.01
45	1.50	0.35	0.04	0.04	0.05	0.05
60	2.00	0.25	7.05	7.04	7.10	7.09
80	2.50	0.18	60.40	60.28	67.50	67.37
120	3.00	0.13	31.37	31.31	98.87	98.68
170	3.50	0.09	0.91	0.91	99.78	99.59
200	3.75	0.07	0.04	0.04	99.82	99.63
230	4.00	0.06	0.01	0.01	99.83	99.64

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.94	2.77	2.62	2.36	2.15	2.07	1.85

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.38	0.19	0.3	0.1	3.13

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 160+00 Mid Berm

Analysis Date: 10-24-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,383,573	195,808	North Carolina State Plane	6.8 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-6/1 Dry - 2.5Y-7/1 Washed - 2.5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
96.50	96.06	0.02	0.09	#200 - 0.64 #230 - 0.59			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.04	0.04	0.04	0.04
14	-0.50	1.41	0.06	0.06	0.10	0.10
18	0.00	1.00	0.05	0.05	0.15	0.15
25	0.50	0.71	0.15	0.16	0.30	0.31
35	1.00	0.50	0.36	0.37	0.66	0.68
45	1.50	0.35	1.18	1.22	1.84	1.90
60	2.00	0.25	10.28	10.65	12.12	12.55
80	2.50	0.18	53.91	55.87	66.03	68.42
120	3.00	0.13	25.49	26.41	91.52	94.83
170	3.50	0.09	3.97	4.11	95.49	98.94
200	3.75	0.07	0.41	0.42	95.90	99.36
230	4.00	0.06	0.05	0.05	95.95	99.41

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.02	2.79	2.62	2.34	2.11	2.03	1.65

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.35	0.20	0.42	-0.82	9.41

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 160+00 MLW

Analysis Date:

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,383,720	195,645	North Carolina State Plane	-2.8 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-4/2 Dry - 2.5Y-6/2 Washed - 2.5Y-7/2	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
84.33	83.34	0.00	0.00	#200 - 1.19 #230 - 1.18			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.23	0.27	0.23	0.27
10	-1.00	2.00	0.27	0.32	0.50	0.59
14	-0.50	1.41	0.25	0.30	0.75	0.89
18	0.00	1.00	0.26	0.31	1.01	1.20
25	0.50	0.71	0.35	0.42	1.36	1.62
35	1.00	0.50	0.64	0.76	2.00	2.38
45	1.50	0.35	2.26	2.68	4.26	5.06
60	2.00	0.25	11.26	13.35	15.52	18.41
80	2.50	0.18	40.15	47.61	55.67	66.02
120	3.00	0.13	26.50	31.42	82.17	97.44
170	3.50	0.09	1.15	1.36	83.32	98.80
200	3.75	0.07	0.01	0.01	83.33	98.81
230	4.00	0.06	0.01	0.01	83.34	98.82

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.96	2.79	2.64	2.33	2.07	1.91	1.49

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.27	0.21	0.56	-2.85	17.45

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 160+00 MTL

Analysis Date: 10-24-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,383,640	195,726	North Carolina State Plane	-0.8 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 5Y-7/2 Washed - 5Y-7/2	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
84.19	83.09	0.00	0.00	#200 - 1.29 #230 - 1.28			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.04	0.05	0.04	0.05
18	0.00	1.00	0.08	0.10	0.12	0.15
25	0.50	0.71	0.09	0.11	0.21	0.26
35	1.00	0.50	0.20	0.24	0.41	0.50
45	1.50	0.35	1.26	1.50	1.67	2.00
60	2.00	0.25	10.79	12.82	12.46	14.82
80	2.50	0.18	38.27	45.46	50.73	60.28
120	3.00	0.13	30.99	36.81	81.72	97.09
170	3.50	0.09	1.32	1.57	83.04	98.66
200	3.75	0.07	0.04	0.05	83.08	98.71
230	4.00	0.06	0.01	0.01	83.09	98.72

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.97	2.82	2.70	2.39	2.11	2.01	1.62

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	2.36	0.19	0.41	-1.04	6.96

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 160+00 Toe of Dune

Analysis Date: 10-24-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,383,559	195,822	North Carolina State Plane	8.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-6/1 Dry - 2.5Y-6/1 Washed - 2.5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
105.03	104.69	0.01	0.00	#200 - 0.41 #230 - 0.33			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.01	0.01	0.01	0.01
25	0.50	0.71	0.04	0.04	0.05	0.05
35	1.00	0.50	0.13	0.12	0.18	0.17
45	1.50	0.35	0.89	0.85	1.07	1.02
60	2.00	0.25	14.76	14.05	15.83	15.07
80	2.50	0.18	58.35	55.56	74.18	70.63
120	3.00	0.13	25.10	23.90	99.28	94.53
170	3.50	0.09	4.91	4.67	104.19	99.20
200	3.75	0.07	0.41	0.39	104.60	99.59
230	4.00	0.06	0.08	0.08	104.68	99.67

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.05	2.78	2.59	2.31	2.09	2.01	1.64

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.34	0.20	0.4	0.19	4.18

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 200+00 (+2)

Analysis Date: 11-09-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,854	198,499	North Carolina State Plane	2.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-6/1 Washed - 5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
101.22	100.66	0.01	0.01	#200 - 0.58 #230 - 0.57			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.01	0.01	0.01	0.01
14	-0.50	1.41	0.00	0.00	0.01	0.01
18	0.00	1.00	0.00	0.00	0.01	0.01
25	0.50	0.71	0.00	0.00	0.01	0.01
35	1.00	0.50	0.04	0.04	0.05	0.05
45	1.50	0.35	0.09	0.09	0.14	0.14
60	2.00	0.25	2.98	2.94	3.12	3.08
80	2.50	0.18	55.12	54.46	58.24	57.54
120	3.00	0.13	40.68	40.19	98.92	97.73
170	3.50	0.09	1.58	1.56	100.50	99.29
200	3.75	0.07	0.13	0.13	100.63	99.42
230	4.00	0.06	0.01	0.01	100.64	99.43

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.97	2.83	2.72	2.43	2.20	2.12	2.02

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.45	0.18	0.3	-0.1	5.65

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 200+00 (-11.6)

Analysis Date: 10-25-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,178	197,908	North Carolina State Plane	-11.6 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/1 Dry - 5Y-6/1 Washed - 5Y-6/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
85.55	84.42	0.02	0.01	#200 - 1.58 #230 - 1.35			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.03	0.04	0.03	0.04
14	-0.50	1.41	0.08	0.09	0.11	0.13
18	0.00	1.00	0.11	0.13	0.22	0.26
25	0.50	0.71	0.14	0.16	0.36	0.42
35	1.00	0.50	0.16	0.19	0.52	0.61
45	1.50	0.35	0.39	0.46	0.91	1.07
60	2.00	0.25	2.11	2.47	3.02	3.54
80	2.50	0.18	20.22	23.64	23.24	27.18
120	3.00	0.13	48.44	56.62	71.68	83.80
170	3.50	0.09	11.87	13.87	83.55	97.67
200	3.75	0.07	0.64	0.75	84.19	98.42
230	4.00	0.06	0.20	0.23	84.39	98.65

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.40	3.01	2.92	2.70	2.45	2.26	2.03

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.66	0.16	0.42	-1.81	14.38

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 200+00 (-14.4)

Analysis Date: 10-25-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,403	197,618	North Carolina State Plane	-14.4 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/1 Dry - 5Y-6/1 Washed - 5Y-6/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
86.19	84.87	0.02	0.01	#200 - 1.66 #230 - 1.57			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.03	0.03	0.03	0.03
10	-1.00	2.00	0.01	0.01	0.04	0.04
14	-0.50	1.41	0.06	0.07	0.10	0.11
18	0.00	1.00	0.07	0.08	0.17	0.19
25	0.50	0.71	0.12	0.14	0.29	0.33
35	1.00	0.50	0.20	0.23	0.49	0.56
45	1.50	0.35	0.50	0.58	0.99	1.14
60	2.00	0.25	2.31	2.68	3.30	3.82
80	2.50	0.18	22.82	26.48	26.12	30.30
120	3.00	0.13	48.04	55.74	74.16	86.04
170	3.50	0.09	10.21	11.85	84.37	97.89
200	3.75	0.07	0.39	0.45	84.76	98.34
230	4.00	0.06	0.08	0.09	84.84	98.43

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.38	2.98	2.90	2.68	2.40	2.23	2.02

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	2.63	0.16	0.41	-1.84	15.26

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 200+00 (-17.2)

Analysis Date: 10-25-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,565	197,384	North Carolina State Plane	-17.2 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 5Y-6/1 Washed - 5Y-6/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
82.82	81.71	0.01	0.01	#200 - 1.51 #230 - 1.37			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.07	0.08	0.07	0.08
10	-1.00	2.00	0.04	0.05	0.11	0.13
14	-0.50	1.41	0.06	0.07	0.17	0.20
18	0.00	1.00	0.13	0.16	0.30	0.36
25	0.50	0.71	0.20	0.24	0.50	0.60
35	1.00	0.50	0.30	0.36	0.80	0.96
45	1.50	0.35	0.74	0.89	1.54	1.85
60	2.00	0.25	2.83	3.42	4.37	5.27
80	2.50	0.18	24.20	29.22	28.57	34.49
120	3.00	0.13	42.98	51.90	71.55	86.39
170	3.50	0.09	9.58	11.57	81.13	97.96
200	3.75	0.07	0.44	0.53	81.57	98.49
230	4.00	0.06	0.12	0.14	81.69	98.63

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.37	2.98	2.89	2.65	2.34	2.18	1.96

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.59	0.17	0.47	-2.22	16.97

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 200+00 (-20)

Analysis Date: 10-24-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,819	197,070	North Carolina State Plane	-20.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-3/2 Dry - 2.5Y-6/2 Washed - 2.5Y-6/2	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
75.66	74.21	0.02	0.00	#200 - 2.12 #230 - 1.92			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.05	0.07	0.05	0.07
10	-1.00	2.00	0.05	0.07	0.10	0.14
14	-0.50	1.41	0.06	0.08	0.16	0.22
18	0.00	1.00	0.11	0.15	0.27	0.37
25	0.50	0.71	0.25	0.33	0.52	0.70
35	1.00	0.50	0.36	0.48	0.88	1.18
45	1.50	0.35	0.84	1.11	1.72	2.29
60	2.00	0.25	3.23	4.27	4.95	6.56
80	2.50	0.18	19.55	25.84	24.50	32.40
120	3.00	0.13	39.60	52.34	64.10	84.74
170	3.50	0.09	9.35	12.36	73.45	97.10
200	3.75	0.07	0.59	0.78	74.04	97.88
230	4.00	0.06	0.15	0.20	74.19	98.08

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.42	2.99	2.91	2.67	2.36	2.18	1.82

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.6	0.16	0.49	-2.11	14.69

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 200+00 (-6)

Analysis Date: 10-26-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,009	198,163	North Carolina State Plane	-6.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-4/1 Dry - 5Y-6/1 Washed - 5Y-6/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
89.31	88.10	0.01	0.01	#200 - 1.41 #230 - 1.38			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.23	0.26	0.23	0.26
4	-2.25	4.76	0.07	0.08	0.30	0.34
5	-2.00	4.00	0.06	0.07	0.36	0.41
7	-1.50	2.83	0.18	0.20	0.54	0.61
10	-1.00	2.00	0.34	0.38	0.88	0.99
14	-0.50	1.41	0.75	0.84	1.63	1.83
18	0.00	1.00	0.96	1.07	2.59	2.90
25	0.50	0.71	1.39	1.56	3.98	4.46
35	1.00	0.50	2.19	2.45	6.17	6.91
45	1.50	0.35	3.69	4.13	9.86	11.04
60	2.00	0.25	9.82	11.00	19.68	22.04
80	2.50	0.18	34.19	38.28	53.87	60.32
120	3.00	0.13	30.91	34.61	84.78	94.93
170	3.50	0.09	3.11	3.48	87.89	98.41
200	3.75	0.07	0.16	0.18	88.05	98.59
230	4.00	0.06	0.03	0.03	88.08	98.62

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.01	2.84	2.71	2.37	2.04	1.73	0.61

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.2	0.22	0.8	-2.48	11.72

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 200+00 (-8.8)

Analysis Date: 10-26-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,013	198,077	North Carolina State Plane	-8.8 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 5Y-6/1 Washed - 5Y-6/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
86.53	85.57	0.02	0.00	#200 - 1.23 #230 - 1.14			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.02	0.02	0.02	0.02
10	-1.00	2.00	0.08	0.09	0.10	0.11
14	-0.50	1.41	0.14	0.16	0.24	0.27
18	0.00	1.00	0.21	0.24	0.45	0.51
25	0.50	0.71	0.32	0.37	0.77	0.88
35	1.00	0.50	0.42	0.49	1.19	1.37
45	1.50	0.35	0.92	1.06	2.11	2.43
60	2.00	0.25	3.72	4.30	5.83	6.73
80	2.50	0.18	28.06	32.43	33.89	39.16
120	3.00	0.13	44.24	51.13	78.13	90.29
170	3.50	0.09	7.02	8.11	85.15	98.40
200	3.75	0.07	0.32	0.37	85.47	98.77
230	4.00	0.06	0.08	0.09	85.55	98.86

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.29	2.94	2.85	2.61	2.28	2.14	1.80

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.53	0.17	0.48	-2.33	15.5

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 200+00 Dune

Analysis Date: 11-12-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,832	198,518	North Carolina State Plane	8.6 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-6/1 Dry - 2.5Y-7/1 Washed - 2.5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
102.70	102.20	0.00	0.02	#200 - 0.54 #230 - 0.49			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.01	0.01	0.01	0.01
14	-0.50	1.41	0.03	0.03	0.04	0.04
18	0.00	1.00	0.02	0.02	0.06	0.06
25	0.50	0.71	0.06	0.06	0.12	0.12
35	1.00	0.50	0.12	0.12	0.24	0.24
45	1.50	0.35	0.84	0.82	1.08	1.06
60	2.00	0.25	6.01	5.85	7.09	6.91
80	2.50	0.18	48.84	47.56	55.93	54.47
120	3.00	0.13	43.50	42.36	99.43	96.83
170	3.50	0.09	2.52	2.45	101.95	99.28
200	3.75	0.07	0.18	0.18	102.13	99.46
230	4.00	0.06	0.05	0.05	102.18	99.51

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.98	2.85	2.74	2.45	2.19	2.10	1.84

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	2.45	0.18	0.36	-0.85	8

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 200+00 MHW

Analysis Date: 11-12-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,863	198,487	North Carolina State Plane	1.4 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-6/1 Washed - 5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
99.19	98.75	0.00	0.10	#200 - 0.56 #230 - 0.54			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.00	0.00	0.00	0.00
25	0.50	0.71	0.01	0.01	0.01	0.01
35	1.00	0.50	0.02	0.02	0.03	0.03
45	1.50	0.35	0.19	0.19	0.22	0.22
60	2.00	0.25	8.36	8.43	8.58	8.65
80	2.50	0.18	52.69	53.12	61.27	61.77
120	3.00	0.13	36.26	36.56	97.53	98.33
170	3.50	0.09	1.07	1.08	98.60	99.41
200	3.75	0.07	0.03	0.03	98.63	99.44
230	4.00	0.06	0.02	0.02	98.65	99.46

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.95	2.80	2.68	2.39	2.15	2.07	1.78

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.4	0.19	0.32	-0.19	3.19

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 200+00 Mid Berm

Analysis Date: 11-12-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,837	198,513	North Carolina State Plane	3.3 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-6/1 Dry - 2.5Y-7/1 Washed - 2.5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
105.38	104.79	0.01	0.06	#200 - 0.64 #230 - 0.63			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.00	0.00	0.00	0.00
25	0.50	0.71	0.01	0.01	0.01	0.01
35	1.00	0.50	0.03	0.03	0.04	0.04
45	1.50	0.35	0.20	0.19	0.24	0.23
60	2.00	0.25	4.02	3.81	4.26	4.04
80	2.50	0.18	58.10	55.13	62.36	59.17
120	3.00	0.13	40.94	38.85	103.30	98.02
170	3.50	0.09	1.32	1.25	104.62	99.27
200	3.75	0.07	0.09	0.09	104.71	99.36
230	4.00	0.06	0.01	0.01	104.72	99.37

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.96	2.82	2.70	2.42	2.19	2.11	2.01

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	2.44	0.18	0.3	-0.05	3.61

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 200+00 MLW

Analysis Date: 10-29-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,954	198,390	North Carolina State Plane	-2.9 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 5Y-6/1 Washed - 5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
112.56	111.27	0.00	0.00	#200 - 1.16 #230 - 1.15			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.05	0.04	0.05	0.04
14	-0.50	1.41	0.08	0.07	0.13	0.11
18	0.00	1.00	0.10	0.09	0.23	0.20
25	0.50	0.71	0.14	0.12	0.37	0.32
35	1.00	0.50	0.38	0.34	0.75	0.66
45	1.50	0.35	1.85	1.64	2.60	2.30
60	2.00	0.25	14.72	13.08	17.32	15.38
80	2.50	0.18	61.41	54.56	78.73	69.94
120	3.00	0.13	31.00	27.54	109.73	97.48
170	3.50	0.09	1.52	1.35	111.25	98.83
200	3.75	0.07	0.01	0.01	111.26	98.84
230	4.00	0.06	0.01	0.01	111.27	98.85

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.95	2.76	2.59	2.32	2.09	2.01	1.60

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.31	0.20	0.4	-1.34	10.54

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 200+00 MTL

Analysis Date: 11-12-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,888	198,459	North Carolina State Plane	-0.7 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 5Y-6/1 Washed - 5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.20	99.06	0.00	0.07	#200 - 1.21 #230 - 1.20			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.05	0.05	0.05	0.05
18	0.00	1.00	0.03	0.03	0.08	0.08
25	0.50	0.71	0.07	0.07	0.15	0.15
35	1.00	0.50	0.16	0.16	0.31	0.31
45	1.50	0.35	0.87	0.87	1.18	1.18
60	2.00	0.25	9.95	9.93	11.13	11.11
80	2.50	0.18	48.29	48.19	59.42	59.30
120	3.00	0.13	37.39	37.32	96.81	96.62
170	3.50	0.09	2.09	2.09	98.90	98.71
200	3.75	0.07	0.08	0.08	98.98	98.79
230	4.00	0.06	0.01	0.01	98.99	98.80

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.98	2.83	2.71	2.40	2.14	2.05	1.69

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.4	0.19	0.38	-0.85	7.04

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island 2007

Sample Name: 200+00 Toe of Dune

Analysis Date: 11-12-07

Analyzed By: TD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,833	198,517	North Carolina State Plane	3.9 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-7/1 Dry - 2.5Y-7/1 Washed - 2.5Y-7/1	Native Beach

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.95	100.80	0.00	0.00	#200 - 0.16 #230 - 0.15			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4	-4.25	19.03	0.00	0.00	0.00	0.00
5/8	-4.00	16.00	0.00	0.00	0.00	0.00
7/16	-3.50	11.31	0.00	0.00	0.00	0.00
5/16	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.01	0.01	0.01	0.01
10	-1.00	2.00	0.03	0.03	0.04	0.04
14	-0.50	1.41	0.01	0.01	0.05	0.05
18	0.00	1.00	0.04	0.04	0.09	0.09
25	0.50	0.71	0.06	0.06	0.15	0.15
35	1.00	0.50	0.15	0.15	0.30	0.30
45	1.50	0.35	0.54	0.53	0.84	0.83
60	2.00	0.25	4.92	4.87	5.76	5.70
80	2.50	0.18	48.17	47.72	53.93	53.42
120	3.00	0.13	43.87	43.46	97.80	96.88
170	3.50	0.09	2.82	2.79	100.62	99.67
200	3.75	0.07	0.17	0.17	100.79	99.84
230	4.00	0.06	0.01	0.01	100.80	99.85

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

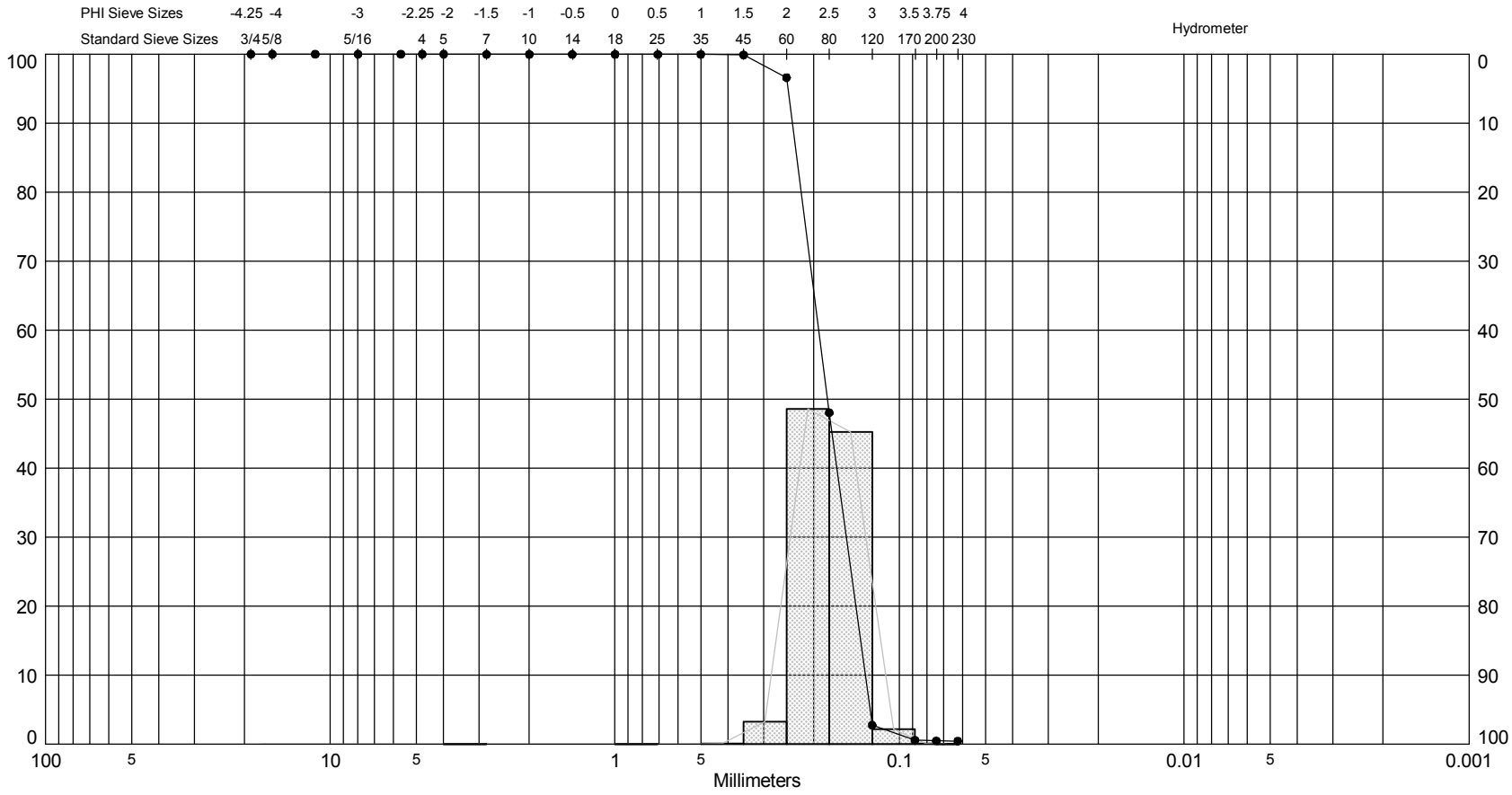
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.98	2.85	2.75	2.46	2.20	2.11	1.93

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.46	0.18	0.36	-1.16	11.71

GRANULARMETRIC REPORT FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/26/09

APPENDIX 13

2007 Figure Eight Island Native Beach Individual Grab Sample Grain Size Distribution Curves/Histograms



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
80+00 (+2)	—●—	2.0	SP	#200 - 0.46 #230 - 0.44			2.48	2.48	-0.76	12.77	0.31

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-18-07
Analyzed By:	TD
Easting (X, ft):	2,378,351
Northing (Y, ft):	189,640
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
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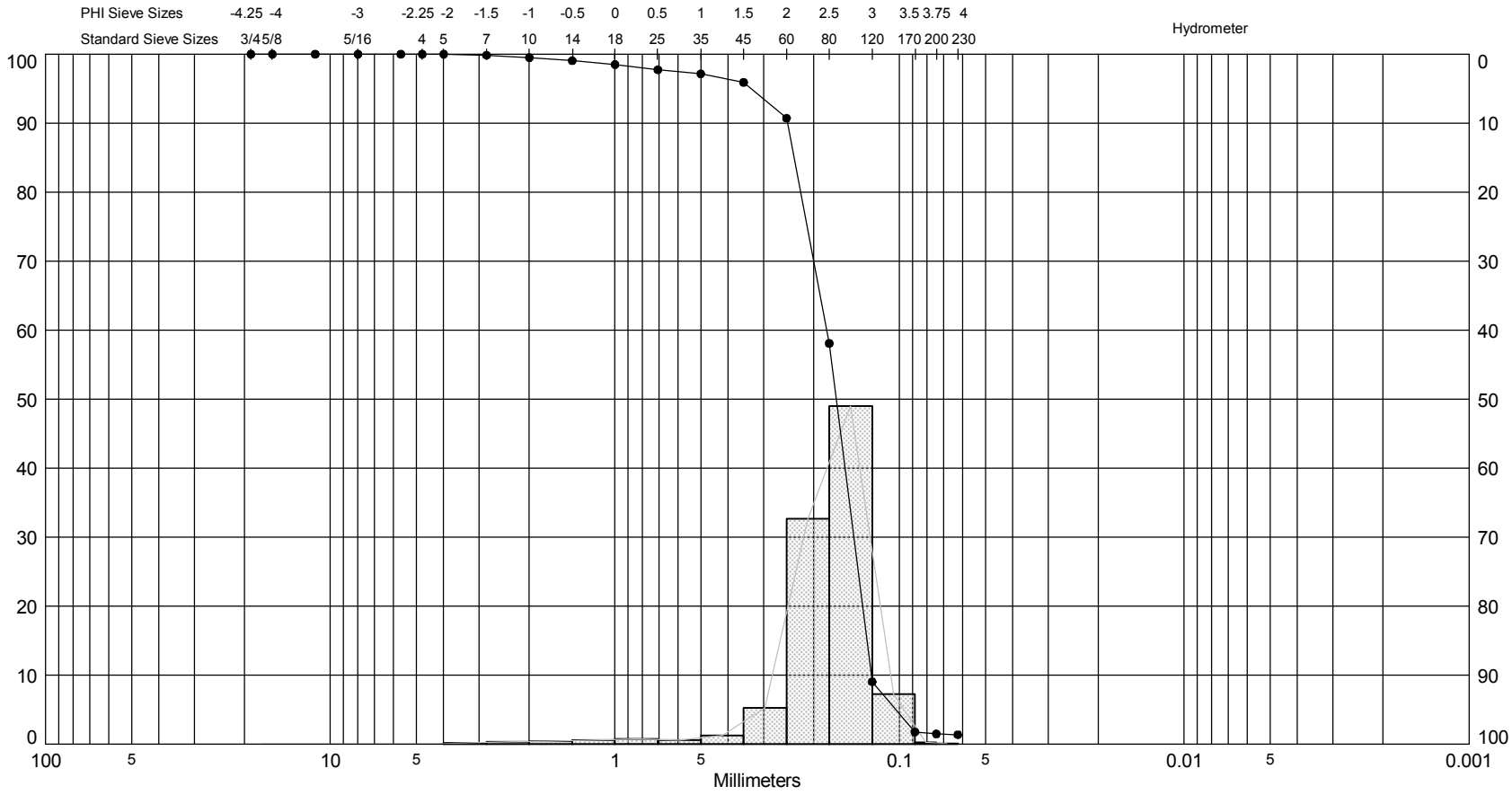
SIEVE ANALYSIS FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
80+00 (-11.6)	—●—	-11.6	SP	#200 - 1.47 #230 - 1.37			2.58	2.47	-2.94	16.43	0.61

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-29-07
Analyzed By:	PB
Easting (X, ft):	2,378,816
Northing (Y, ft):	189,210
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
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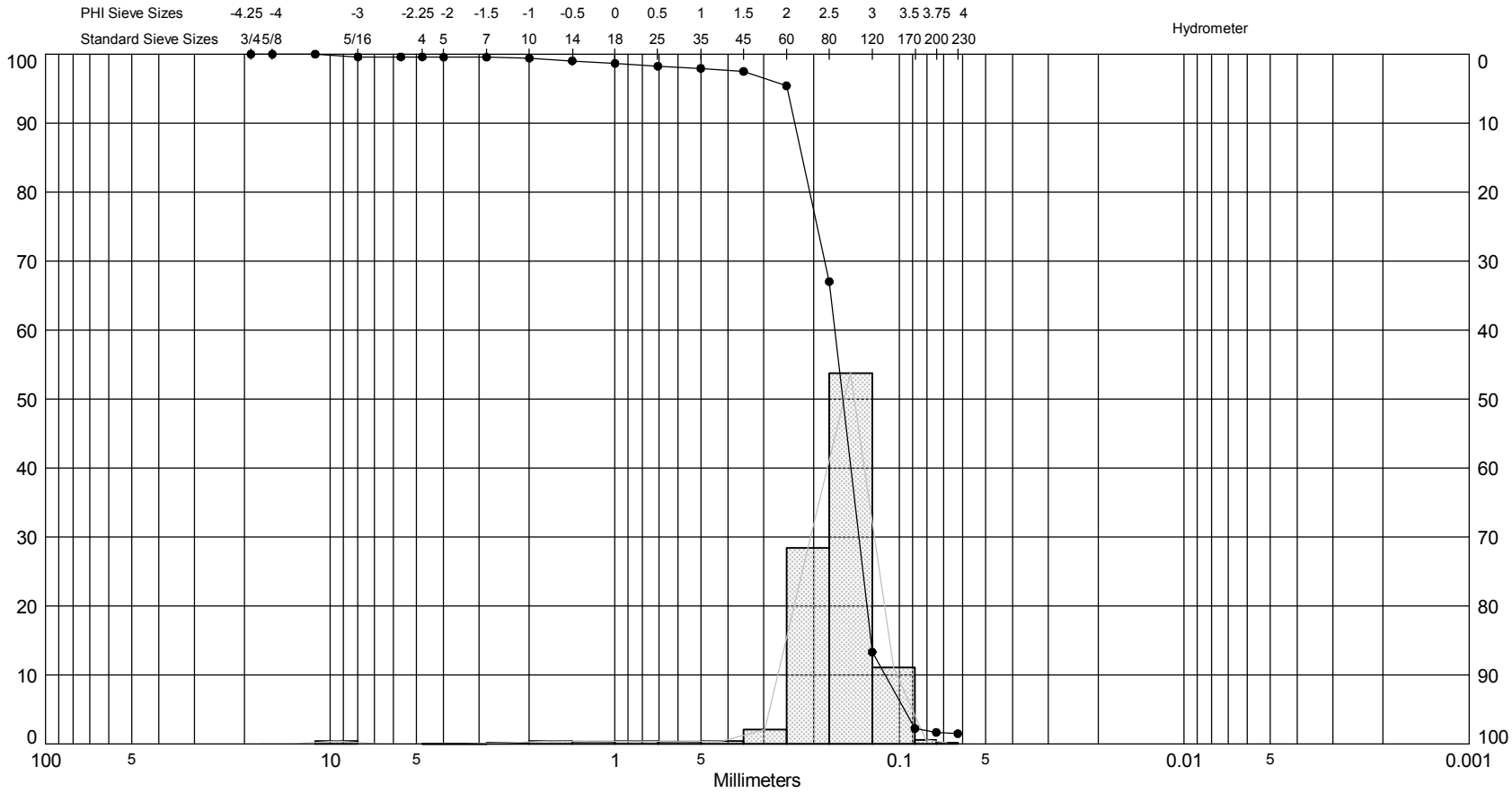
SIEVE ANALYSIS FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
80+00 (-14.4)	—●—	-14.4	SP	#200 - 1.66 #230 - 1.48			2.66	2.57	-4.65	37.1	0.63

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-29-07
Analyzed By:	PB
Easting (X, ft):	2,378,915
Northing (Y, ft):	189,086
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
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FL 33431
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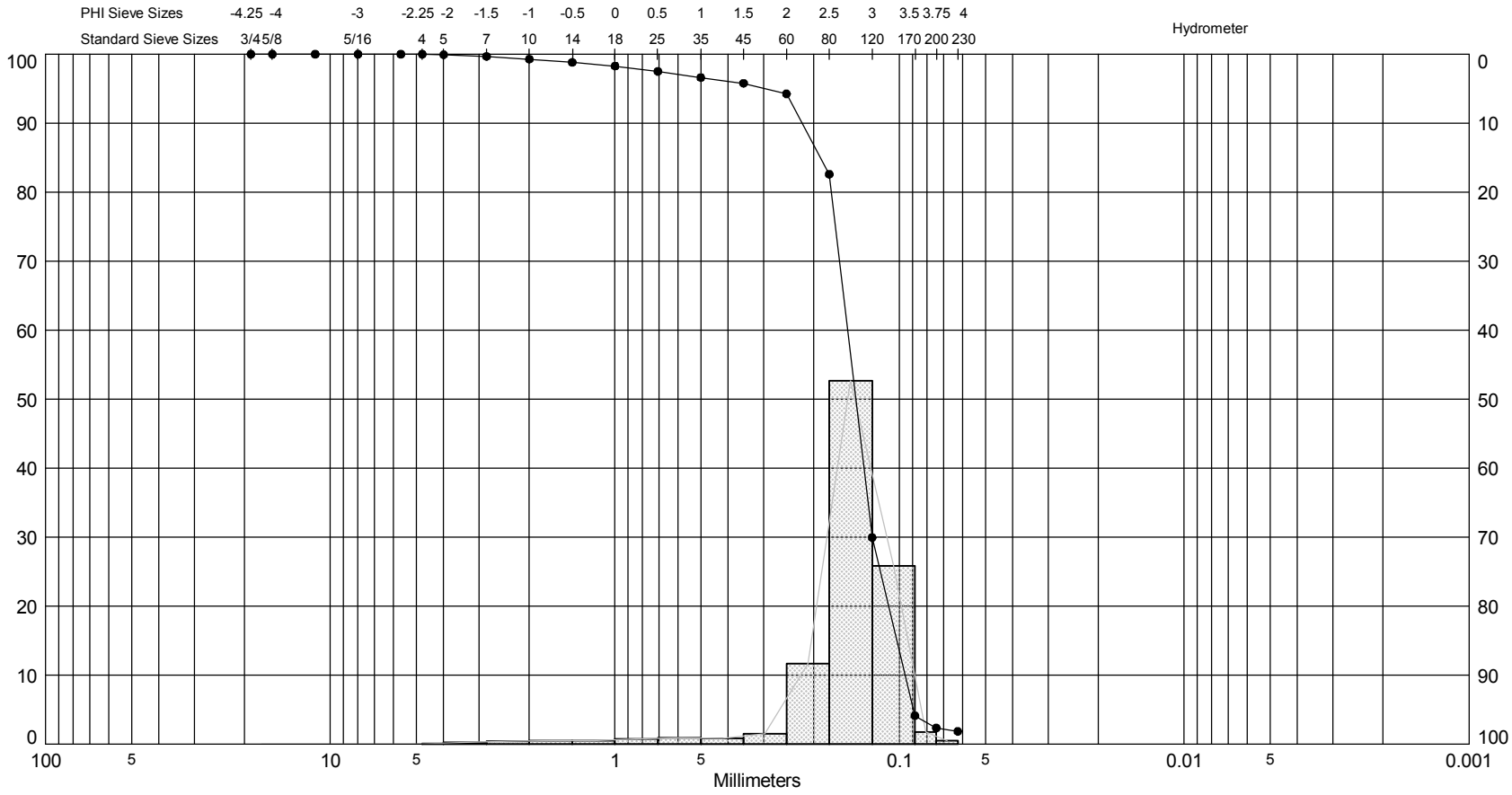
SIEVE ANALYSIS FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
80+00 (-17.2)	—●—	-17.2	SP	#200 - 2.34 #230 - 1.85			2.81	2.71	-3.28	17.86	0.69

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-29-07
Analyzed By:	PB
Easting (X, ft):	2,379,081
Northing (Y, ft):	188,995
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
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FL 33431
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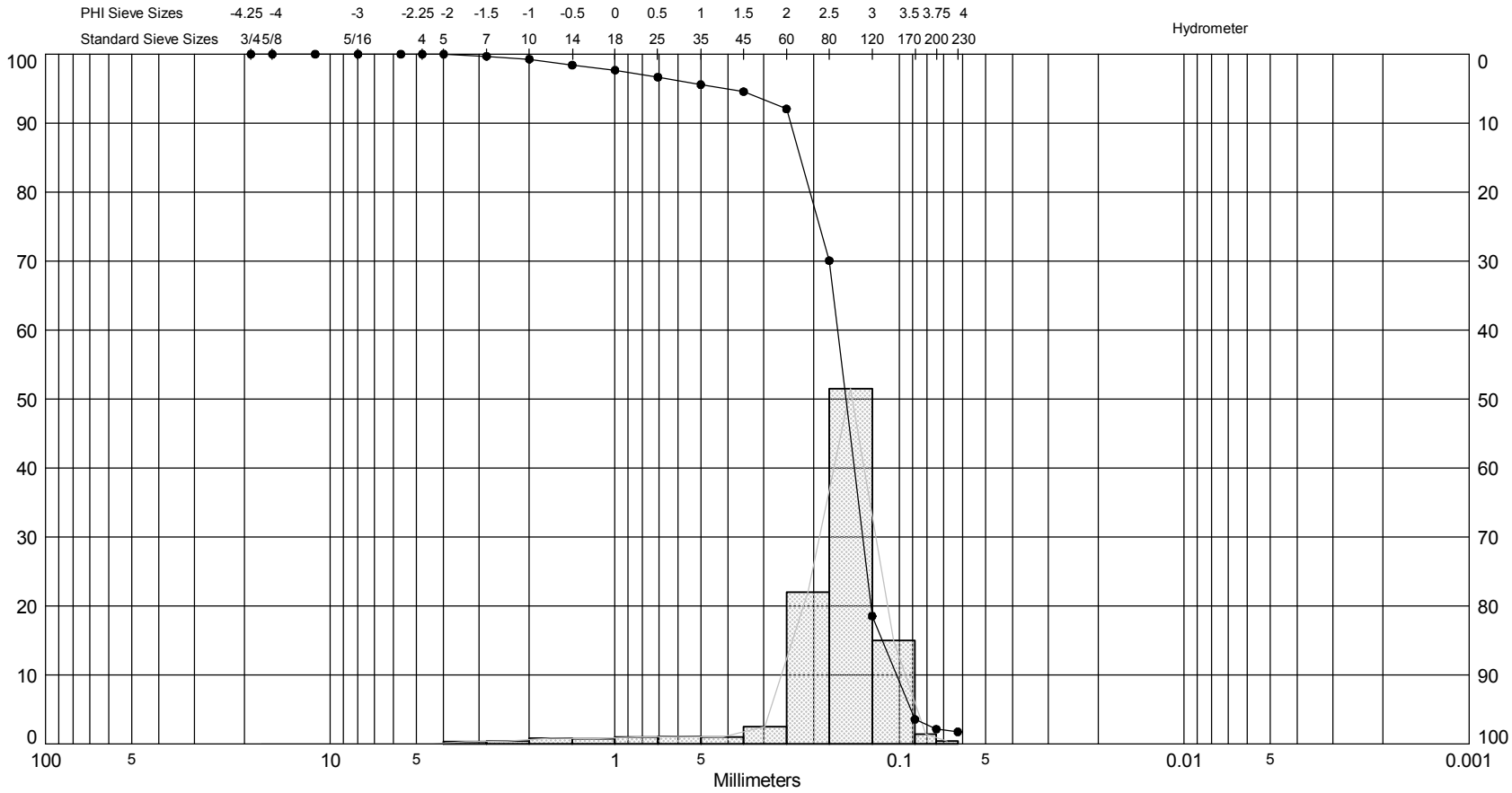
SIEVE ANALYSIS FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
80+00 (-20)	—●—	-20.0	SP	#200 - 2.13 #230 - 1.74			2.69	2.56	-2.85	13.89	0.73

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-29-07
Analyzed By:	PB
Easting (X, ft):	2,379,098
Northing (Y, ft):	188,935
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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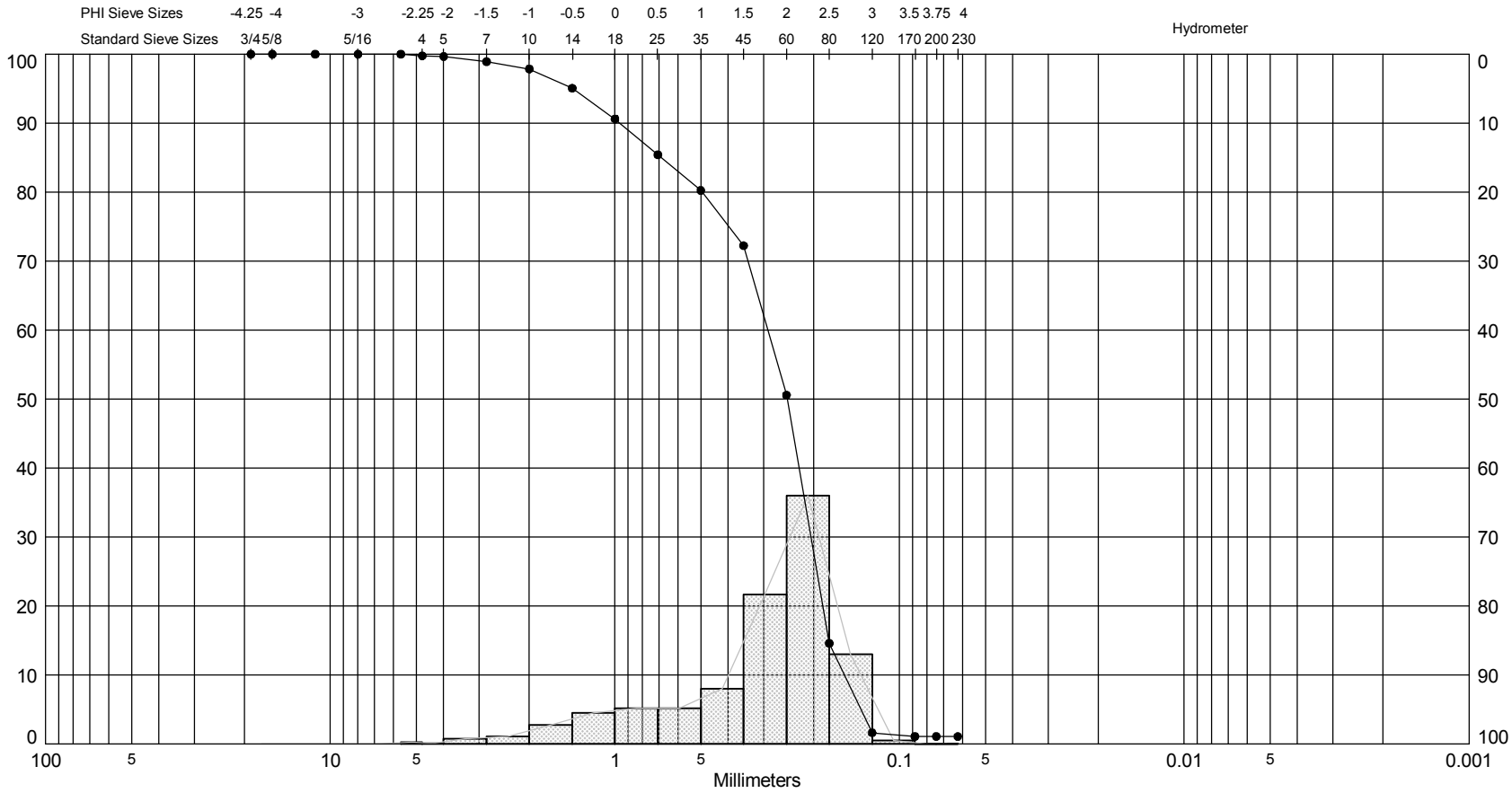
SIEVE ANALYSIS FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
80+00 (-6)	—●—	-6.0	SW	#200 - 1.08 #230 - 1.07			2.01	1.67	-1.39	4.56	1.01

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-19-07
Analyzed By:	TD
Easting (X, ft):	2,378,618
Northing (Y, ft):	189,439
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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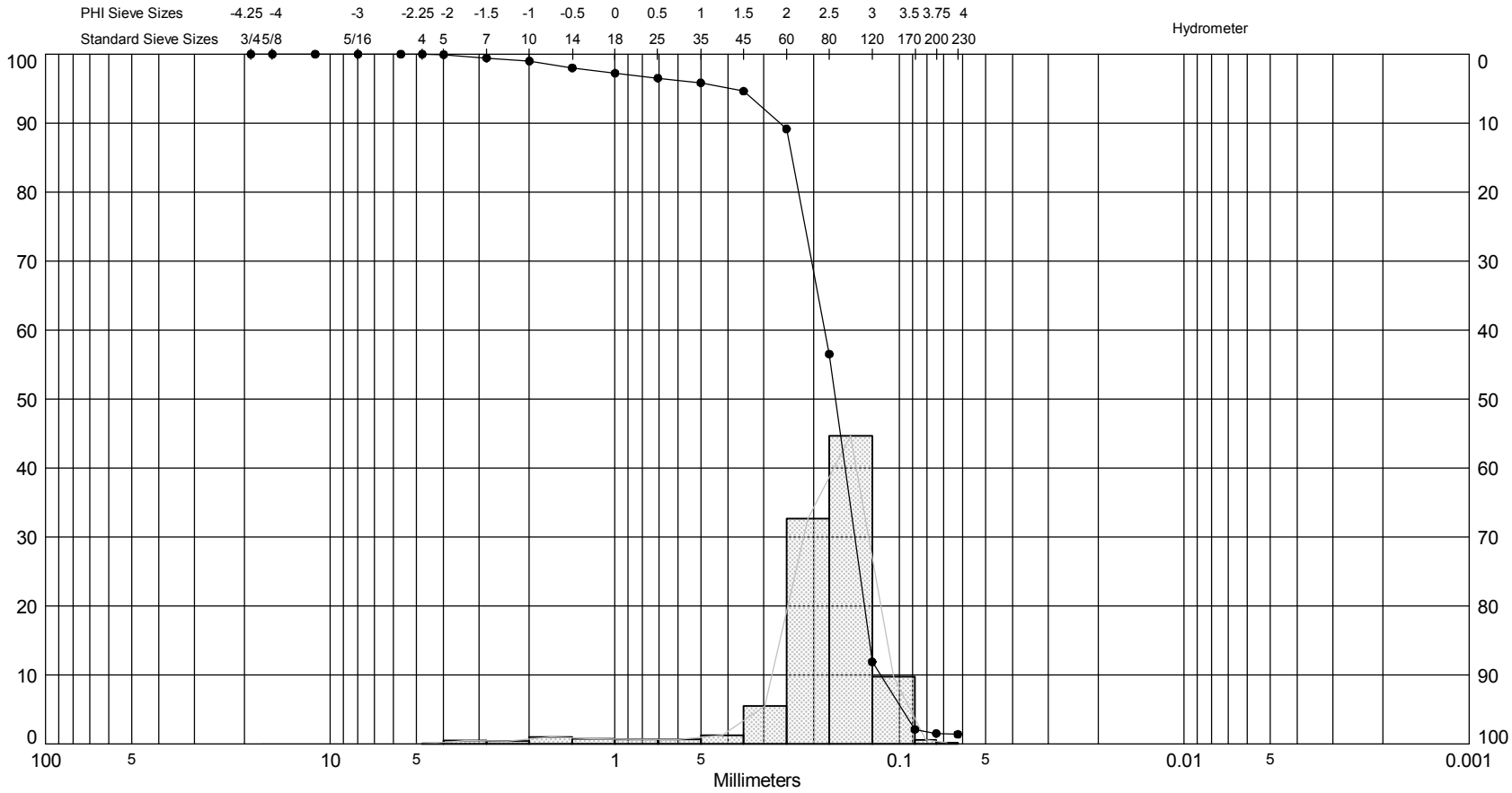

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
80+00 (-8.8)	—●—	-8.8	SP	#200 - 1.52 #230 - 1.38			2.57	2.43	-2.91	14.44	0.74

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-29-07
Analyzed By:	PB
Easting (X, ft):	2,378,715
Northing (Y, ft):	189,342
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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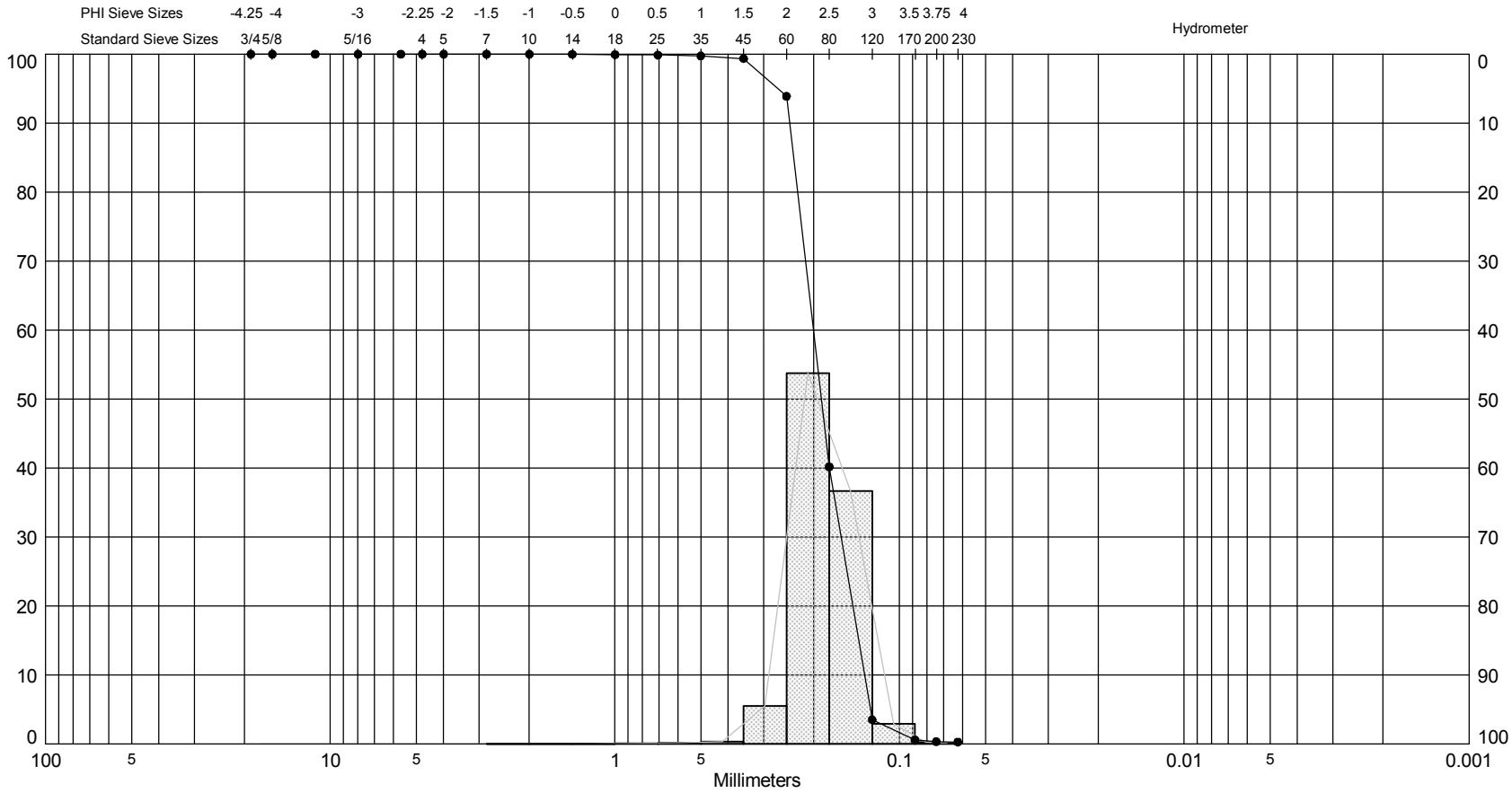

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
80+00 Dune	—●—		SP	#200 - 0.33 #230 - 0.28			2.41	2.43	-0.5	7.86	0.35

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-18-07
Analyzed By:	TD
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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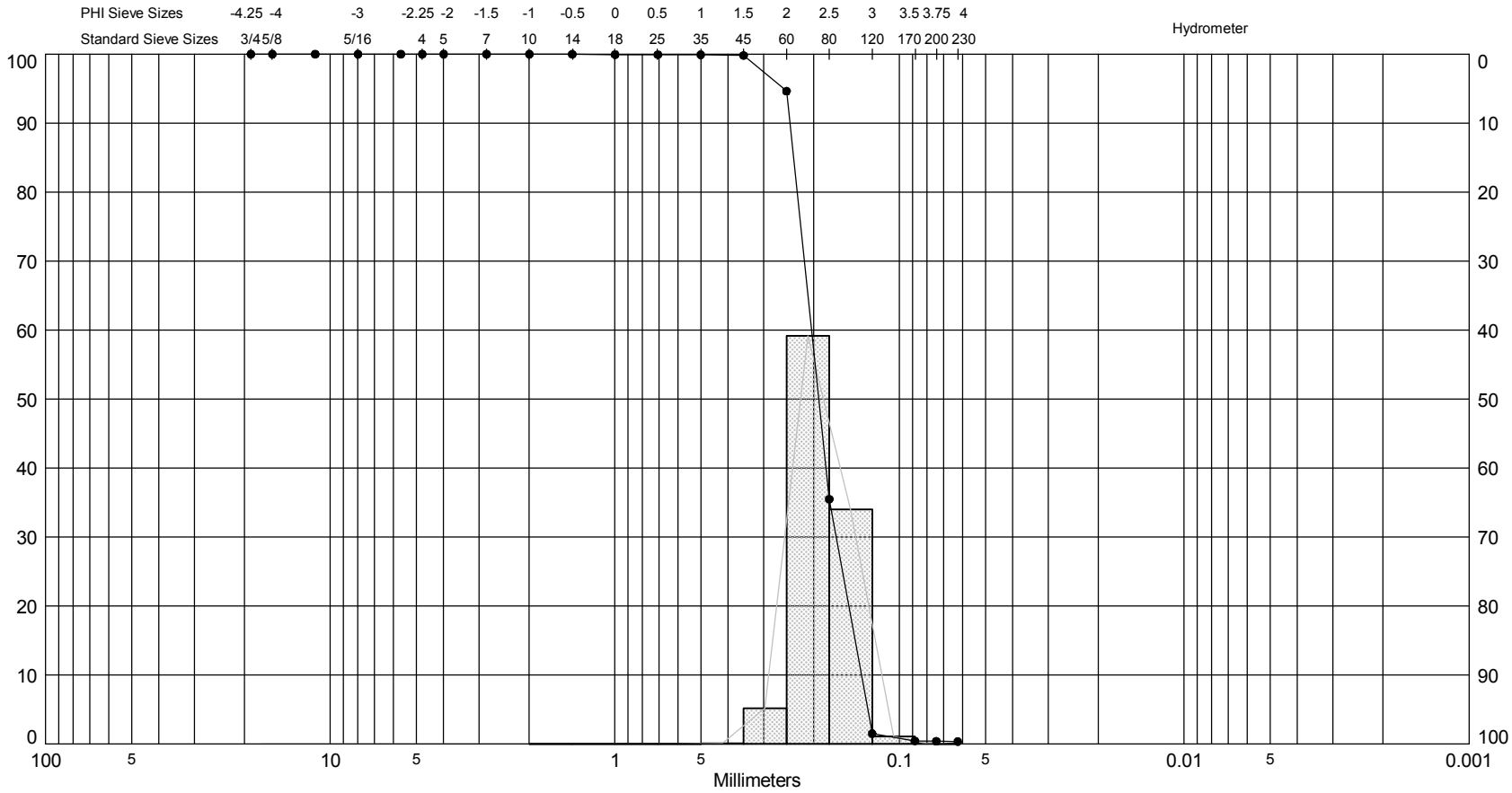

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
80+00 MHW	—●—	1.4	SP	#200 - 0.38 #230 - 0.35			2.38	2.4	-0.29	6.73	0.3

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-18-07
Analyzed By:	TD
Easting (X, ft):	2,378,368
Northing (Y, ft):	189,625
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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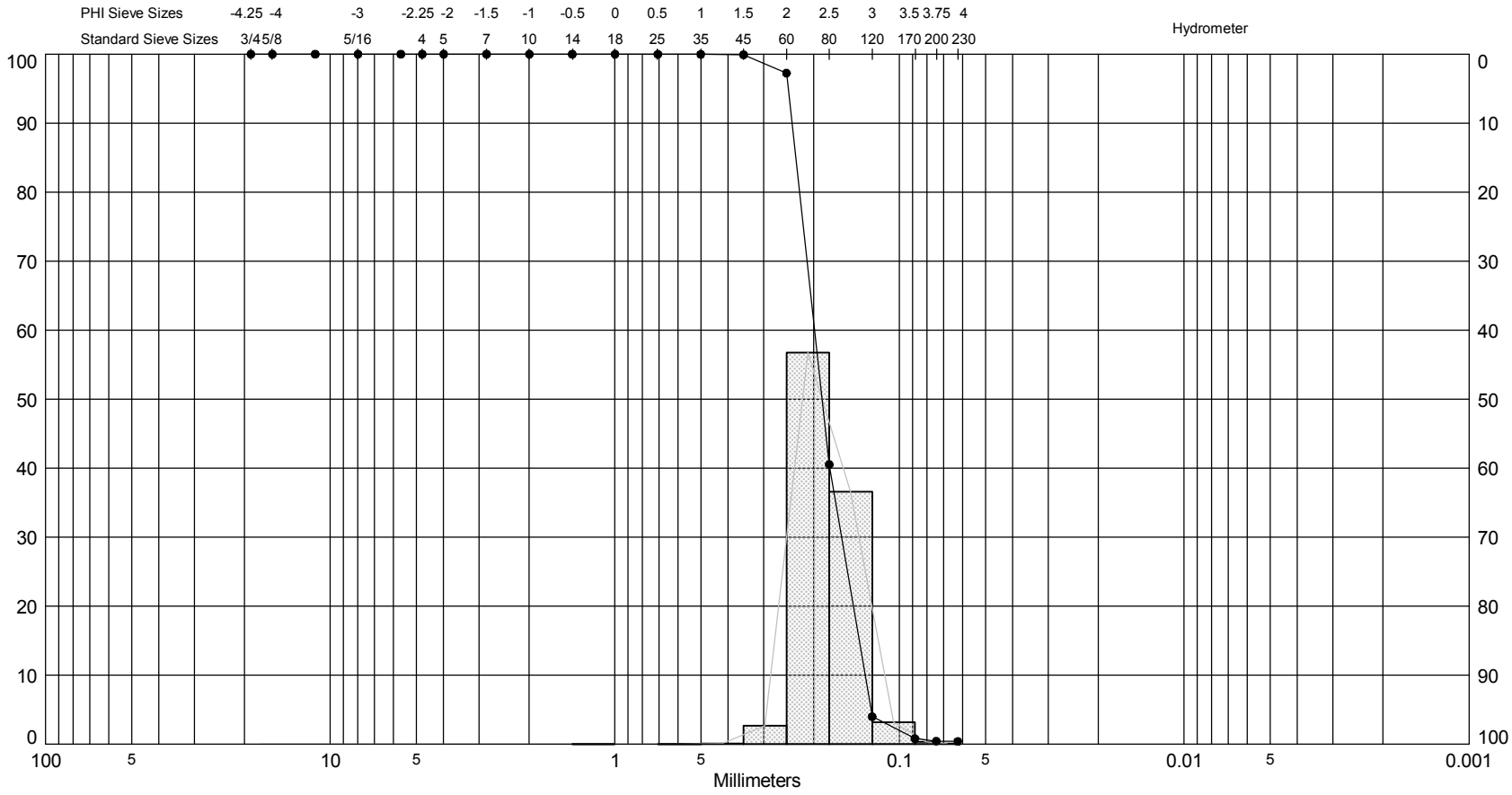

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
80+00 Mid Berm	—●—		SP	#200 - 0.43 #230 - 0.38			2.42	2.46	0.46	4.23	0.31

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-18-07
Analyzed By:	TD
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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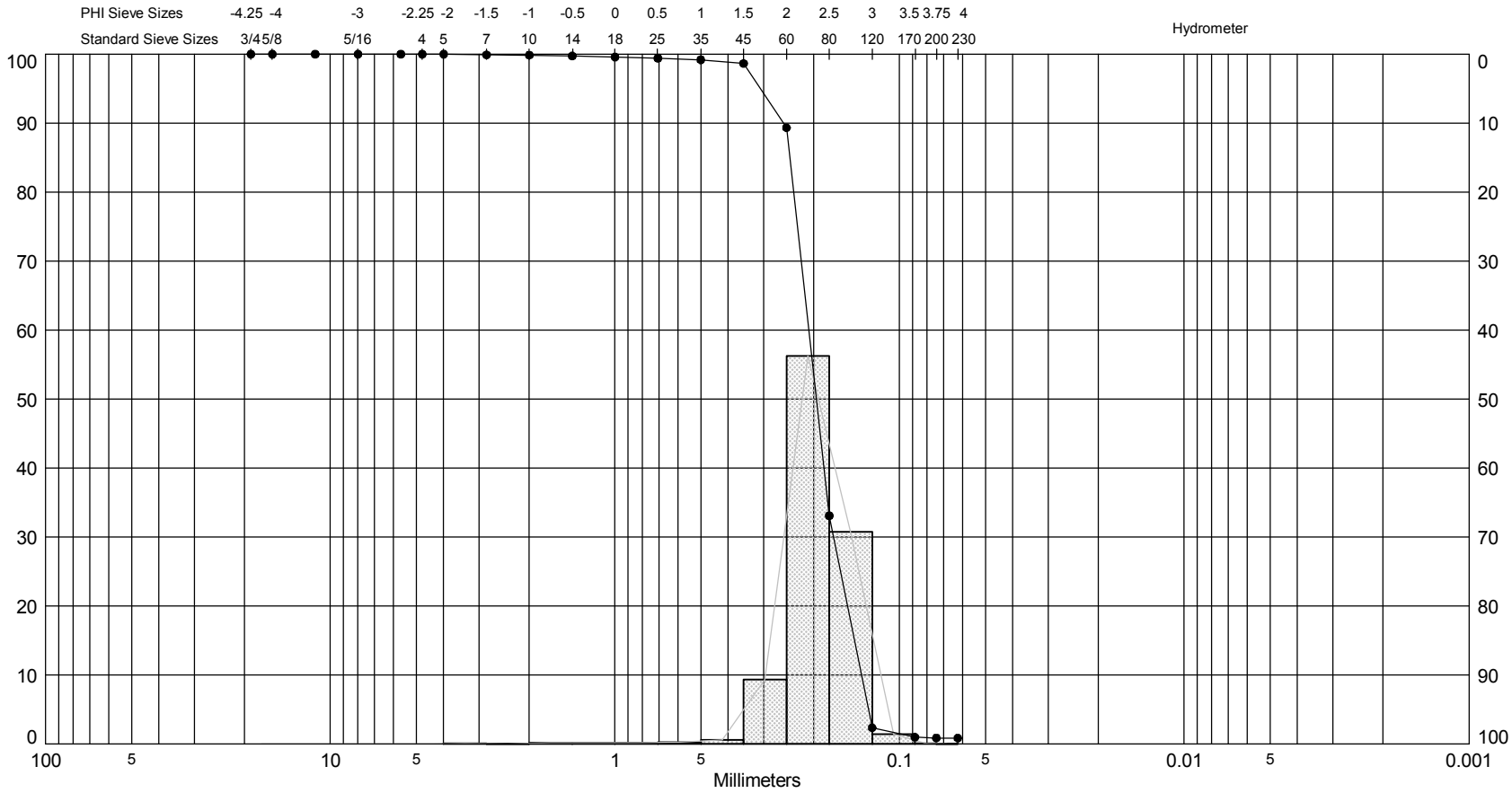

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
80+00 MLW	—●—	-2.8	SP	#200 - 0.86 #230 - 0.85			2.35	2.35	-2.51	22.3	0.41

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-19-07
Analyzed By:	TD
Easting (X, ft):	2,378,467
Northing (Y, ft):	189,525
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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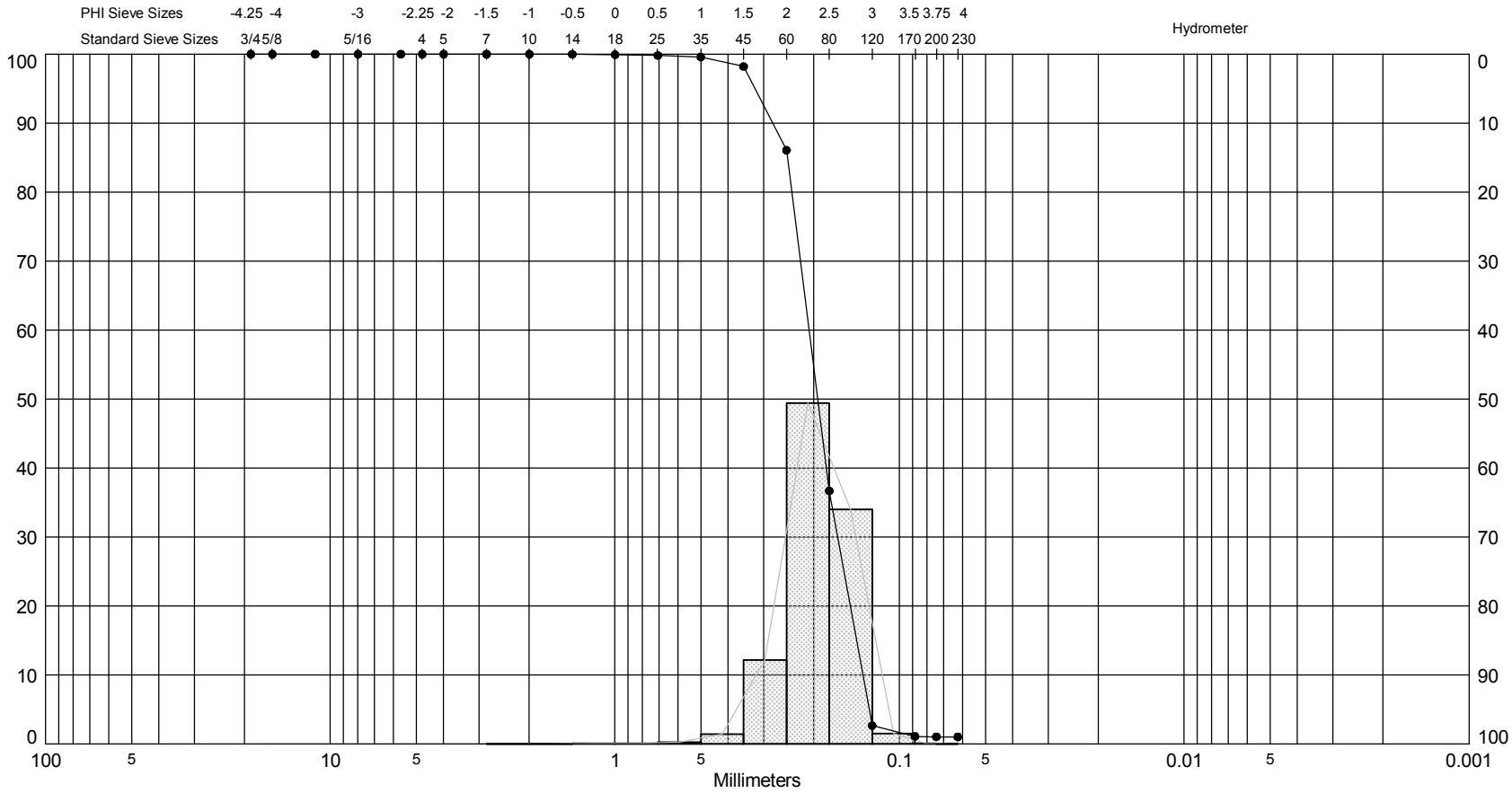

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
80+00 MTL	—●—	-1.0	SP	#200 - 1.04 #230 - 1.03			2.37	2.36	-0.85	6.5	0.39

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-18-07
Analyzed By:	TD
Easting (X, ft):	2,378,411
Northing (Y, ft):	189,588
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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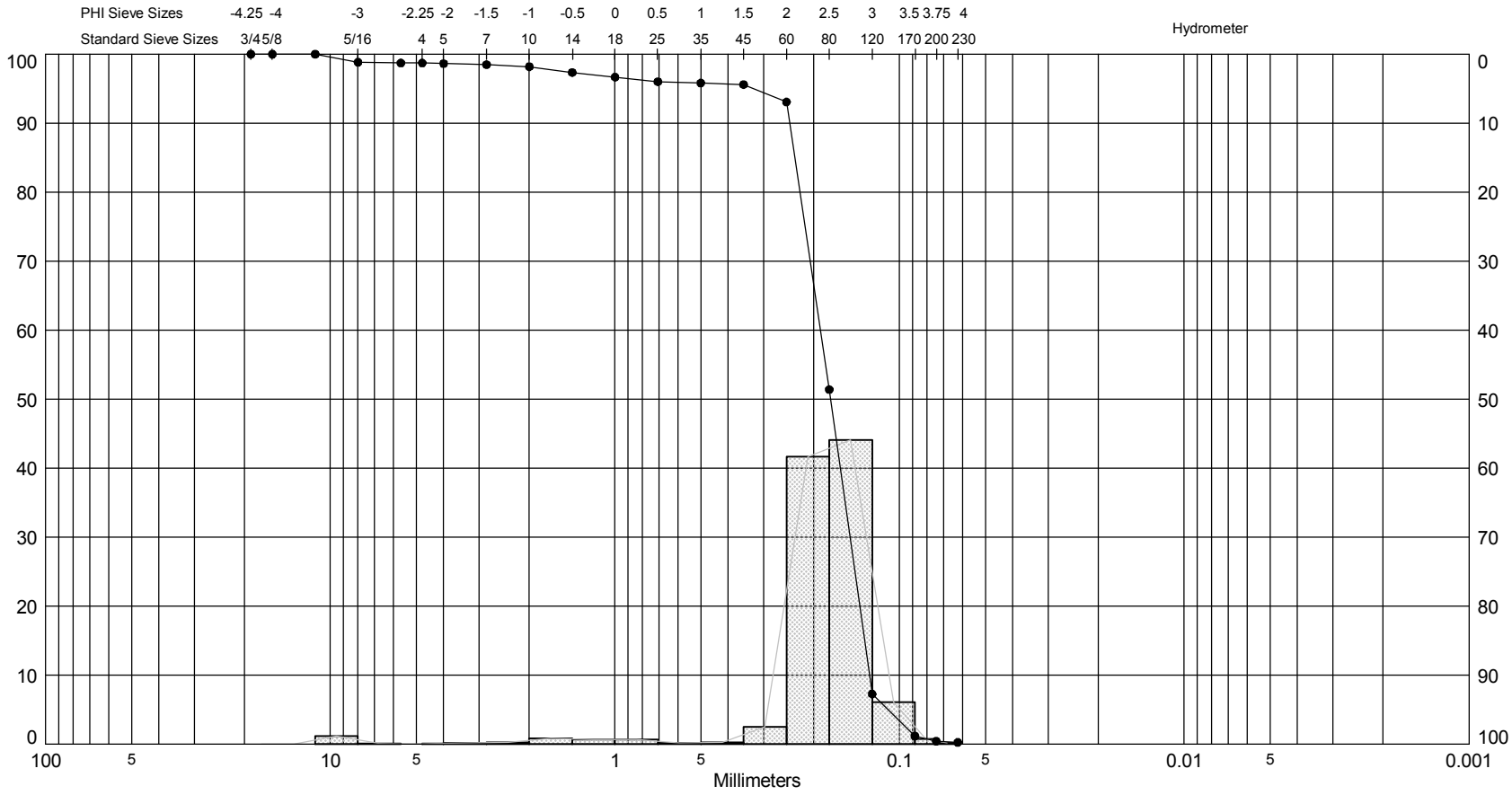

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
80+00 Toe of Dune	—●—		SW	#200 - 0.41 #230 - 0.24			2.52	2.38	-4.21	24.42	0.89

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-18-07
Analyzed By:	TD
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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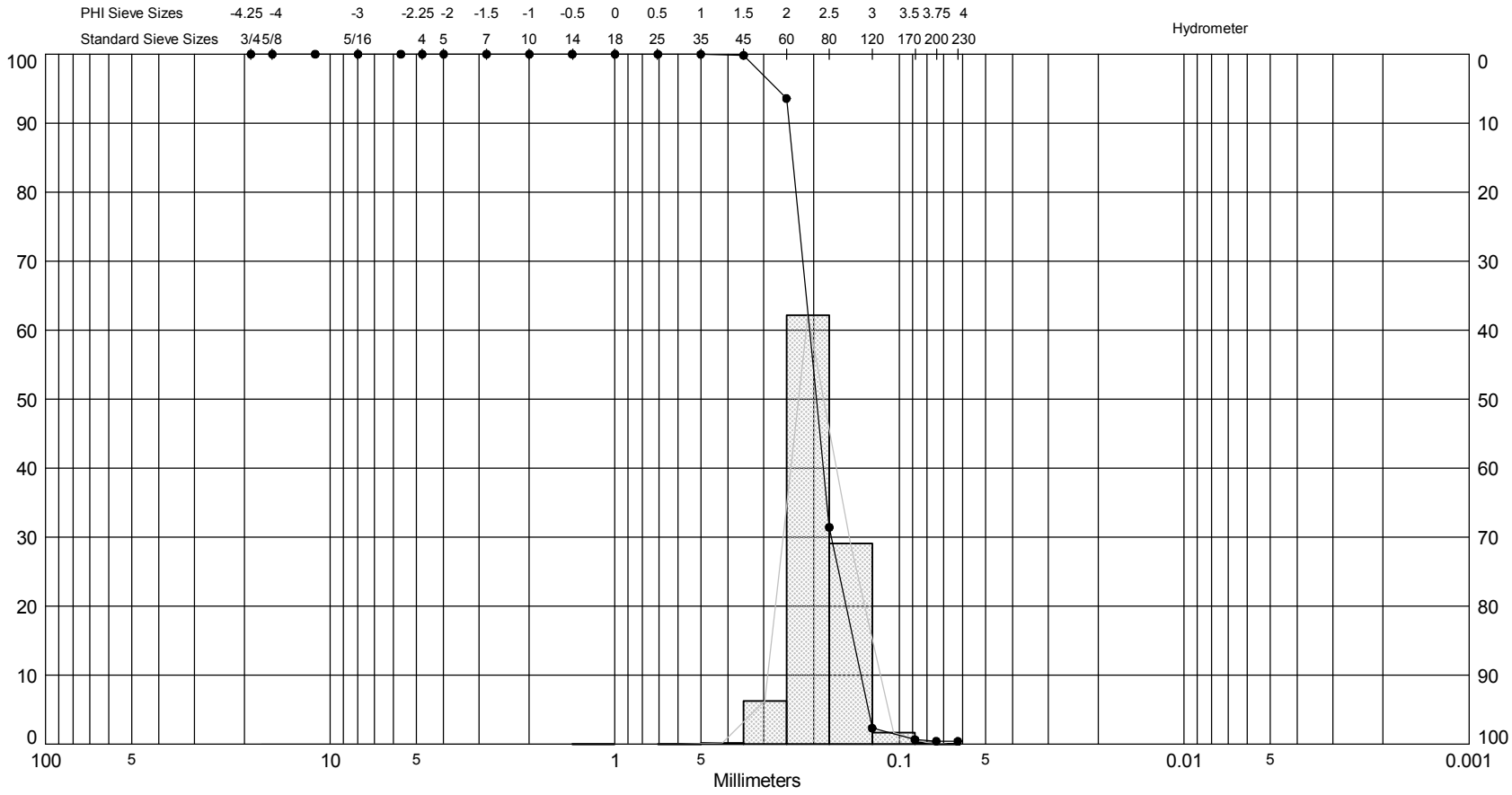

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
120+00 (+3)	—●—	3.0	SP	#200 - 0.42 #230 - 0.39			2.35	2.38	0.3	4.42	0.31

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-13-07
Analyzed By:	TD
Easting (X, ft):	2,380,845
Northing (Y, ft):	192,819
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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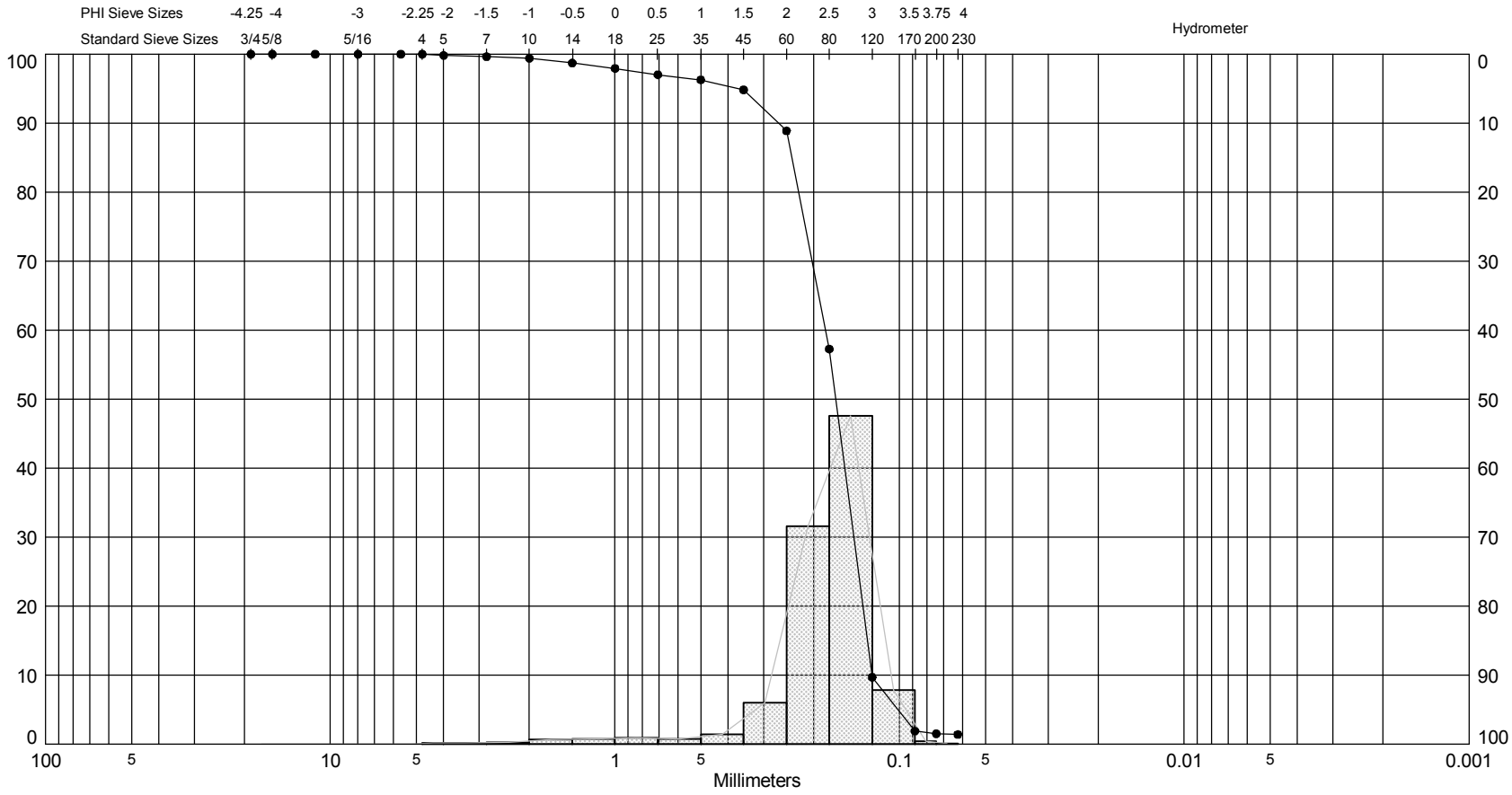

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
120+00 (-11.6)	—●—	-11.6	SP	#200 - 1.50 #230 - 1.38			2.58	2.44	-2.92	15.38	0.68

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-24-07
Analyzed By:	PB
Easting (X, ft):	2,381,366
Northing (Y, ft):	192,333
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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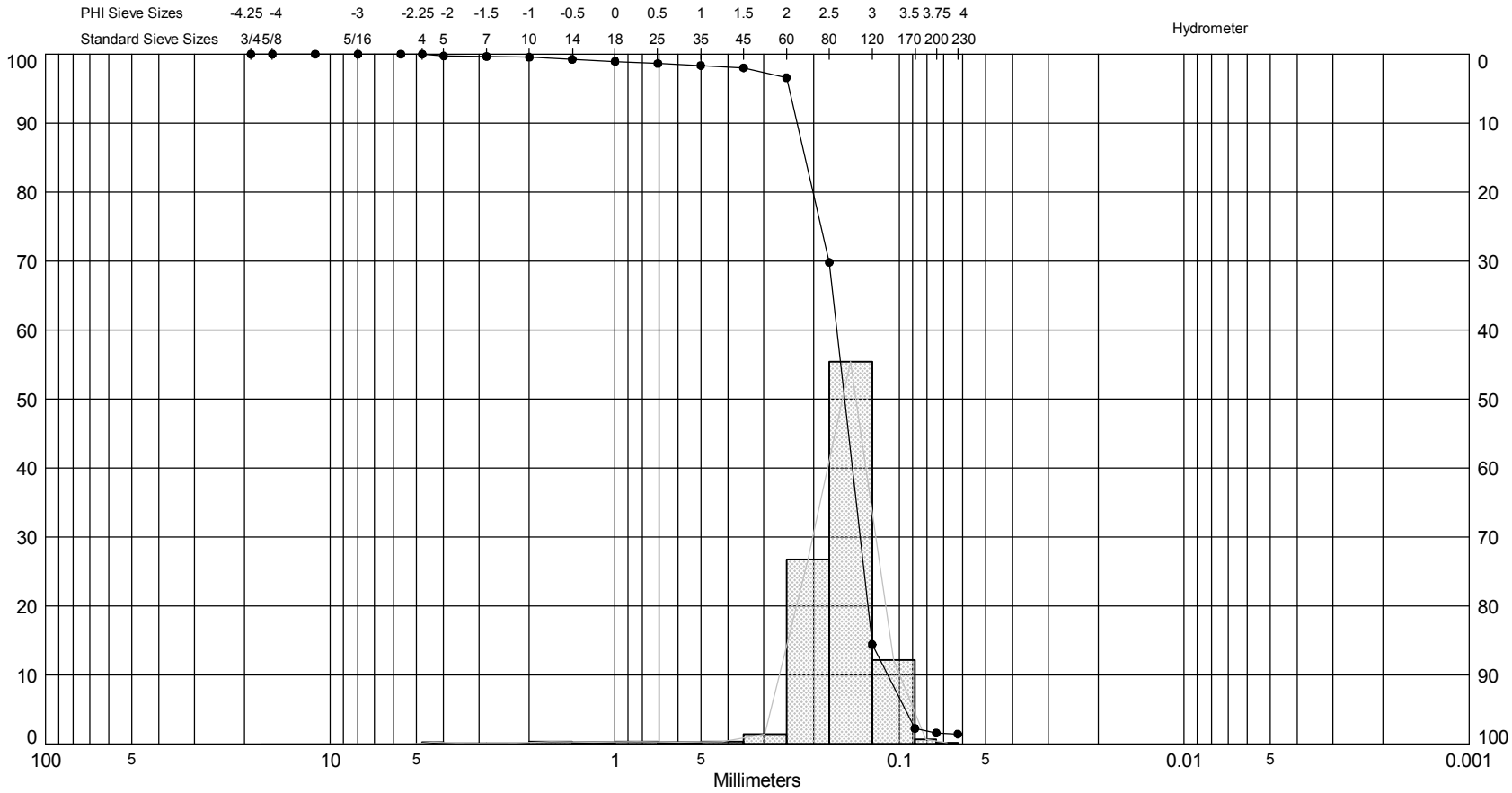

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
120+00 (-14.4)	—●—	-14.4	SP	#200 - 1.58 #230 - 1.43			2.68	2.61	-3.9	29.18	0.55

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-24-07
Analyzed By:	TD
Easting (X, ft):	2,381,476
Northing (Y, ft):	192,220
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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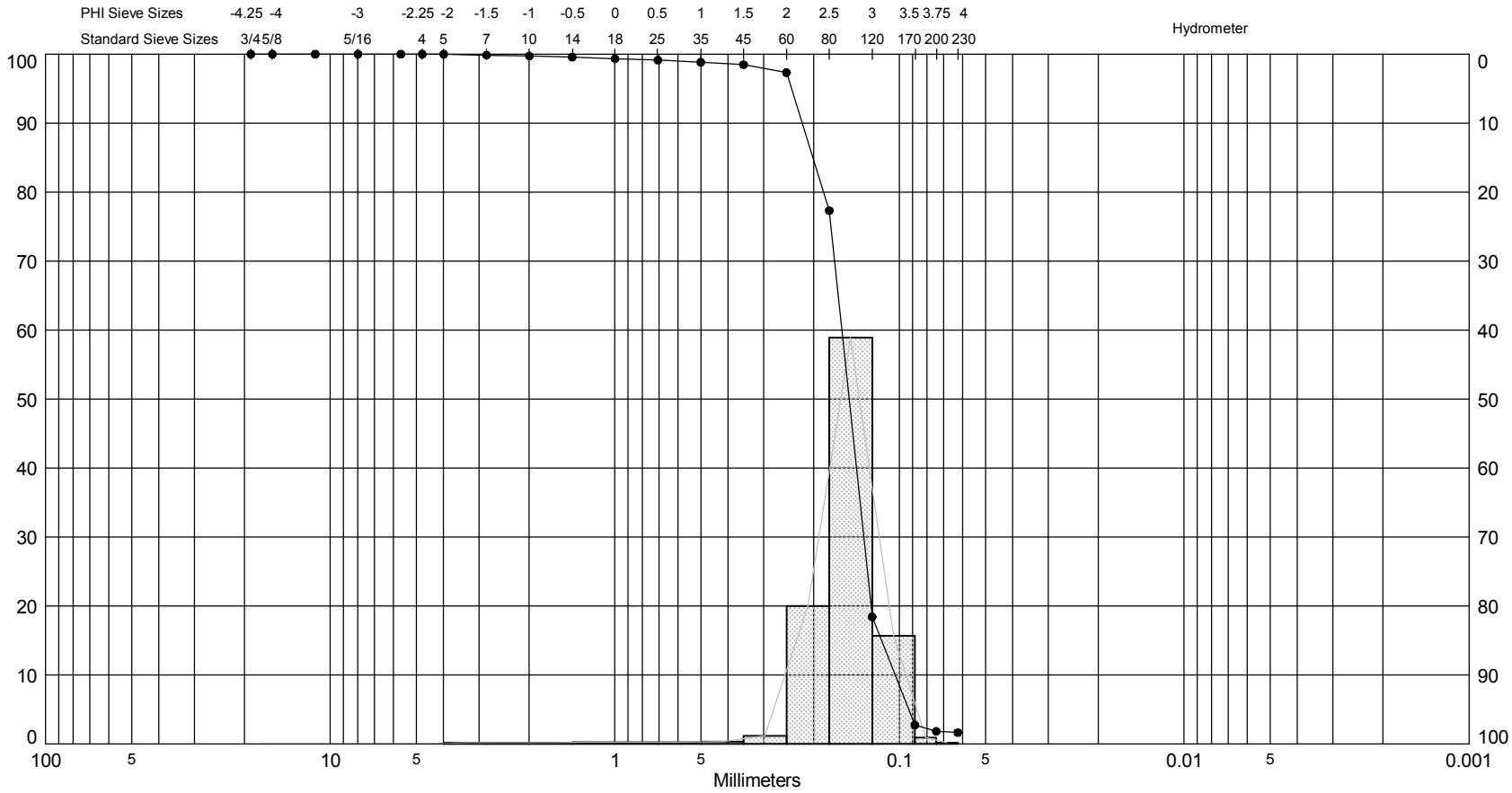

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
120+00 (-17.2)	—●—	-17.2	SP	#200 - 1.82 #230 - 1.63			2.73	2.69	-3.35	26.44	0.48

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-24-07
Analyzed By:	TD
Easting (X, ft):	2,381,542
Northing (Y, ft):	192,182
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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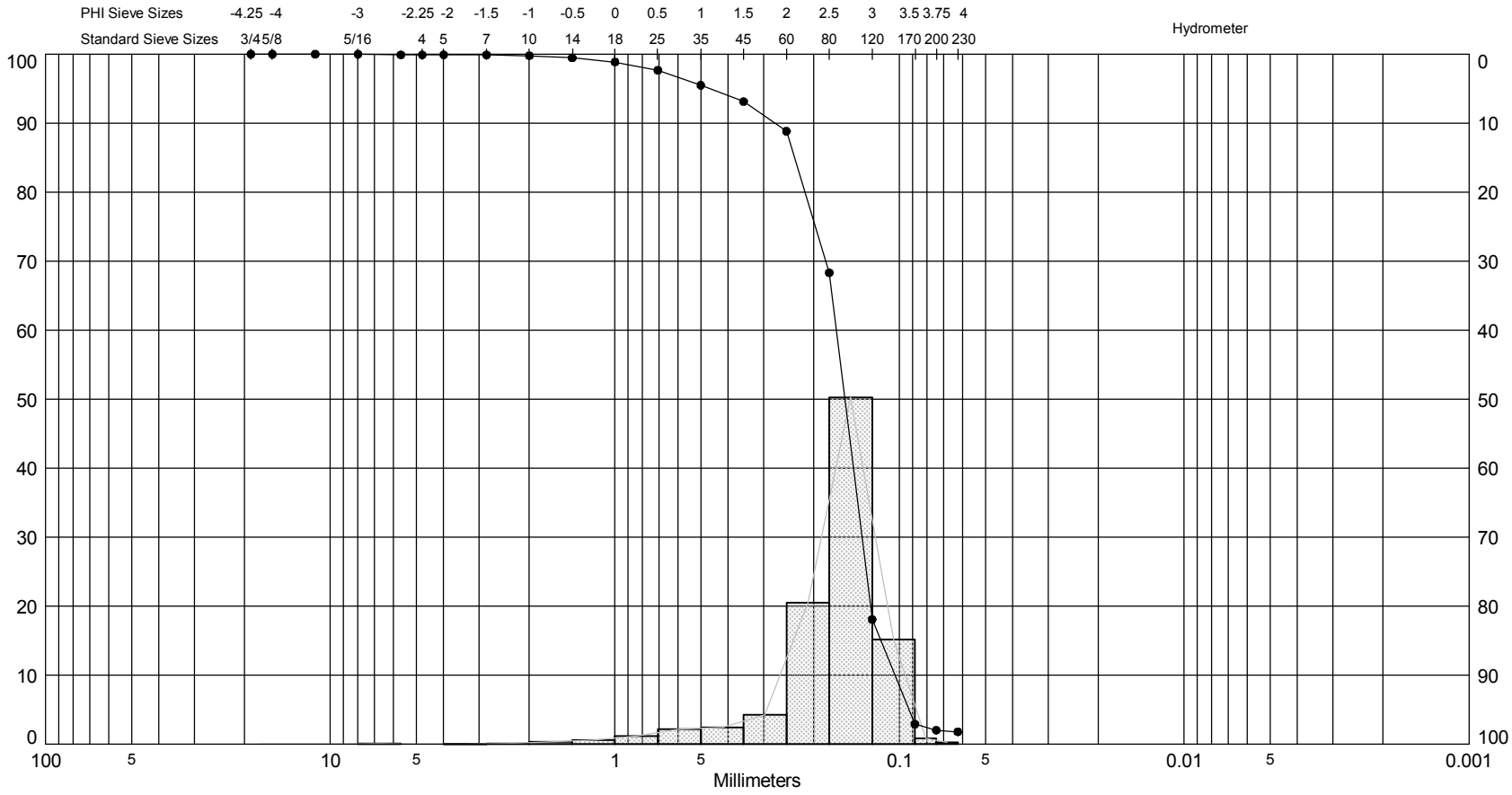

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
120+00 (-20)	—●—	-20.0	SP	#200 - 2.02 #230 - 1.79			2.68	2.54	-2.34	11.65	0.68

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-24-07
Analyzed By:	TD
Easting (X, ft):	2,381,604
Northing (Y, ft):	192,064
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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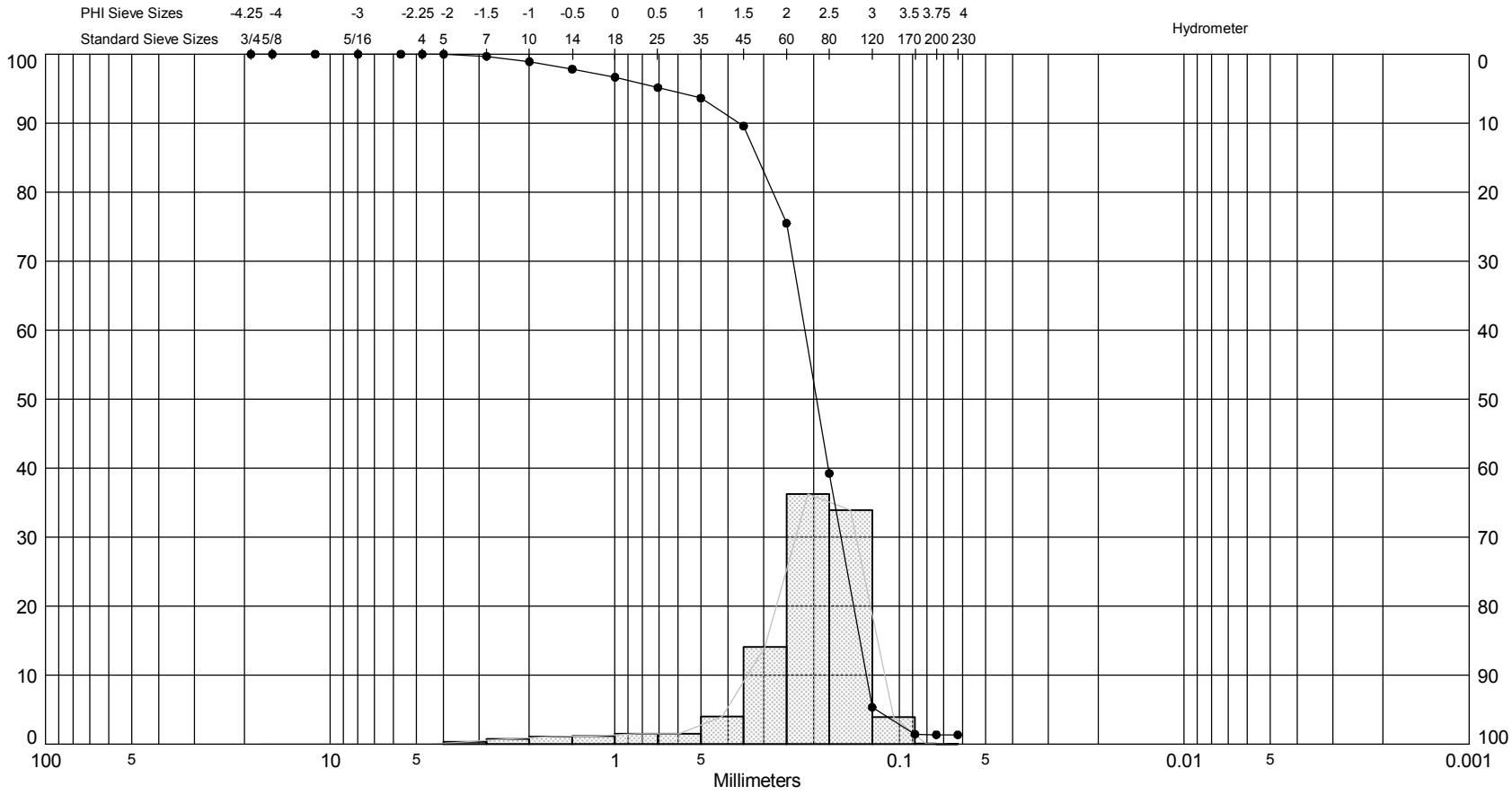

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
120+00 (-6)	—●—	-6.0	SP	#200 - 1.36 #230 - 1.35			2.35	2.19	-2.2	9.25	0.78

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-24-07
Analyzed By:	PB
Easting (X, ft):	2,381,136
Northing (Y, ft):	192,538
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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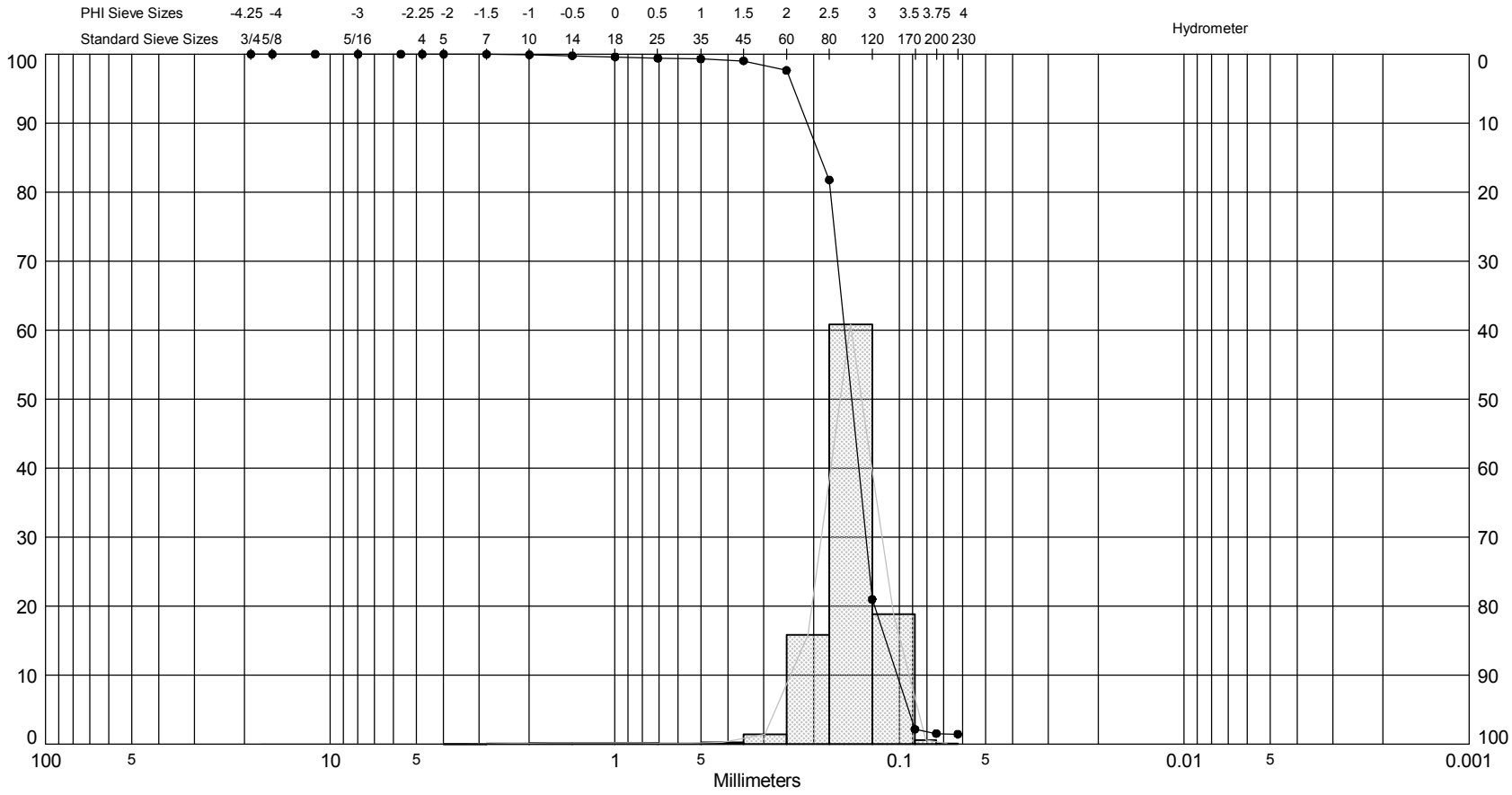

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
120+00 (-8.8)	—●—	-8.8	SP	#200 - 1.54 #230 - 1.44			2.76	2.73	-2.79	22.86	0.42

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-24-07
Analyzed By:	PB
Easting (X, ft):	2,381,220
Northing (Y, ft):	192,479
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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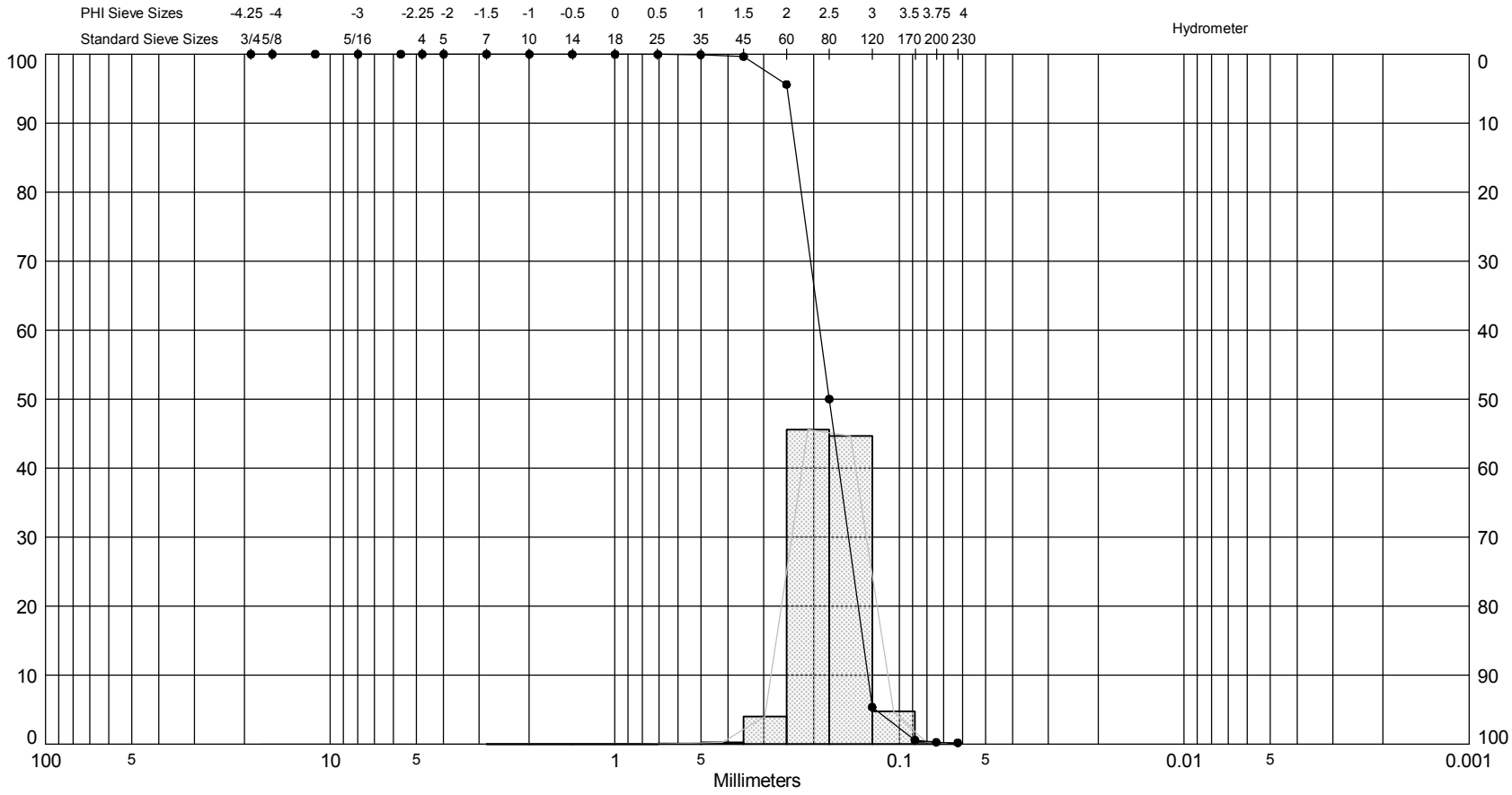

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
120+00 Dune	—●—	16.8	SP	#200 - 0.27 #230 - 0.19			2.5	2.5	-0.26	6.11	0.35

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-12-07
Analyzed By:	PB
Easting (X, ft):	2,380,759
Northing (Y, ft):	192,920
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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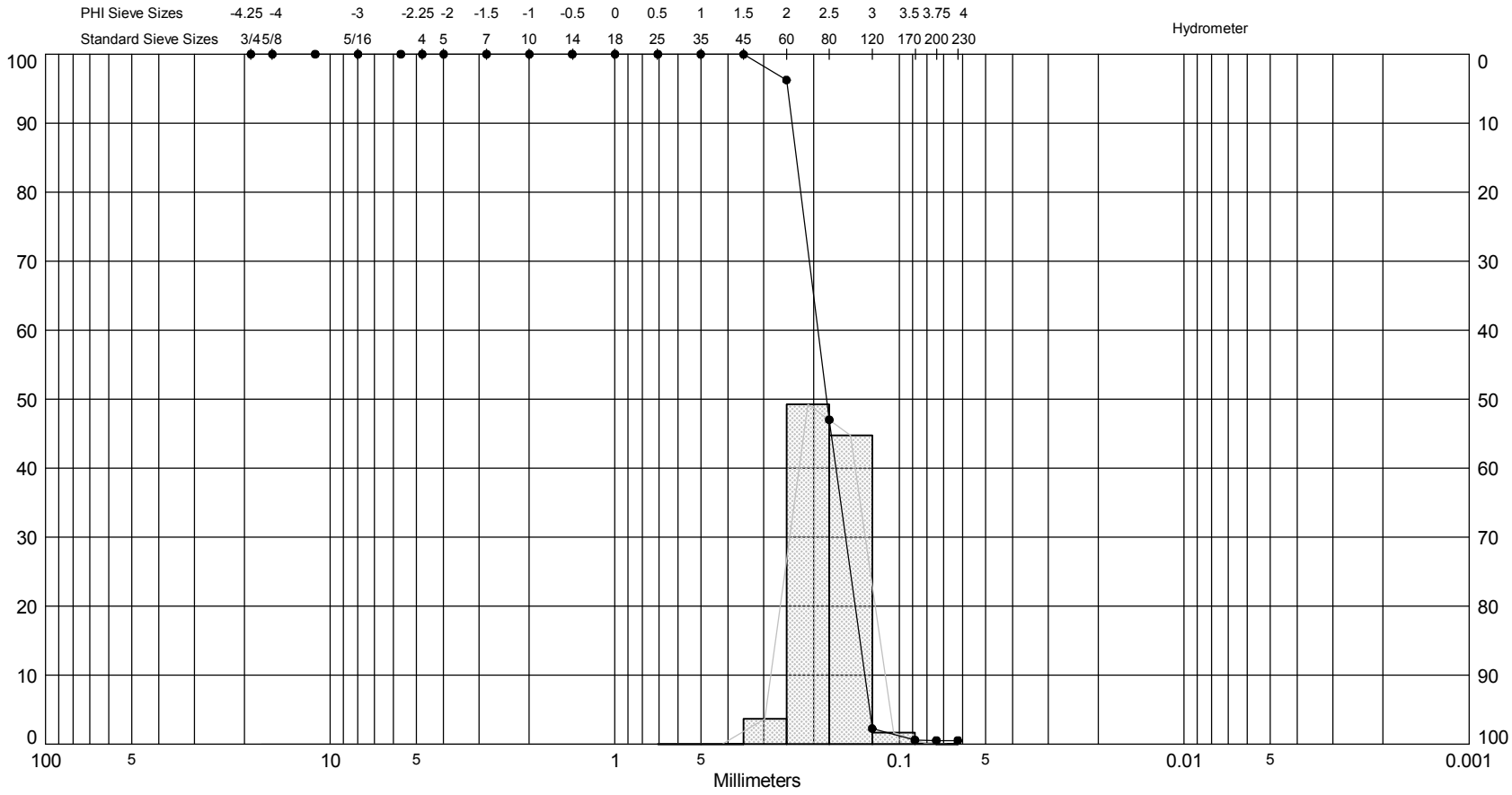

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
120+00 MHW	—●—	1.4	SP	#200 - 0.54 #230 - 0.53			2.47	2.47	-0.08	2.81	0.3

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-12-07
Analyzed By:	PB
Easting (X, ft):	2,380,884
Northing (Y, ft):	192,774
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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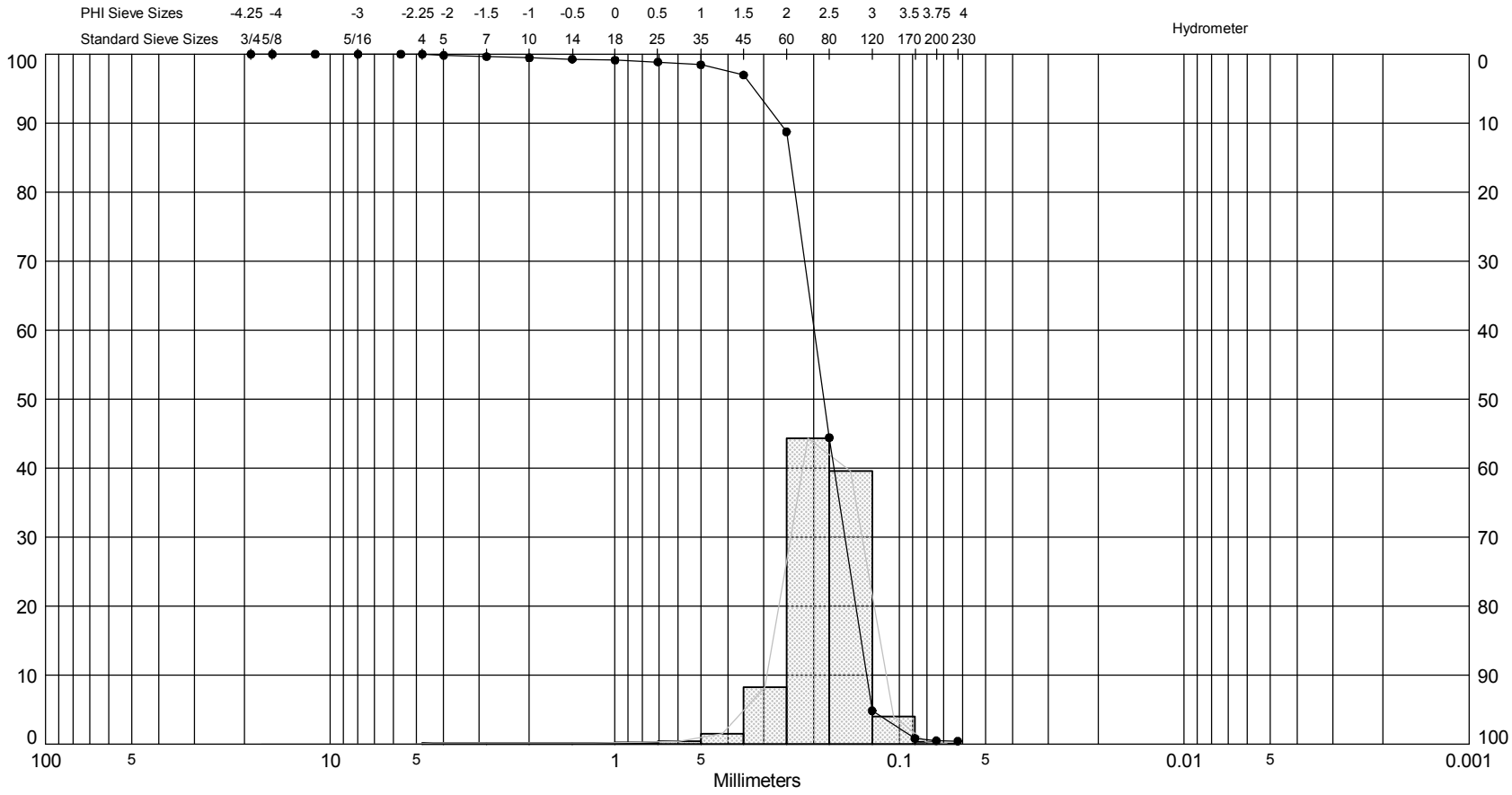

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
120+00 Mid Berm	—●—	8.5	SP	#200 - 0.49 #230 - 0.43			2.44	2.4	-3.15	23.26	0.54

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-12-07
Analyzed By:	PB
Easting (X, ft):	2,380,808
Northing (Y, ft):	192,864
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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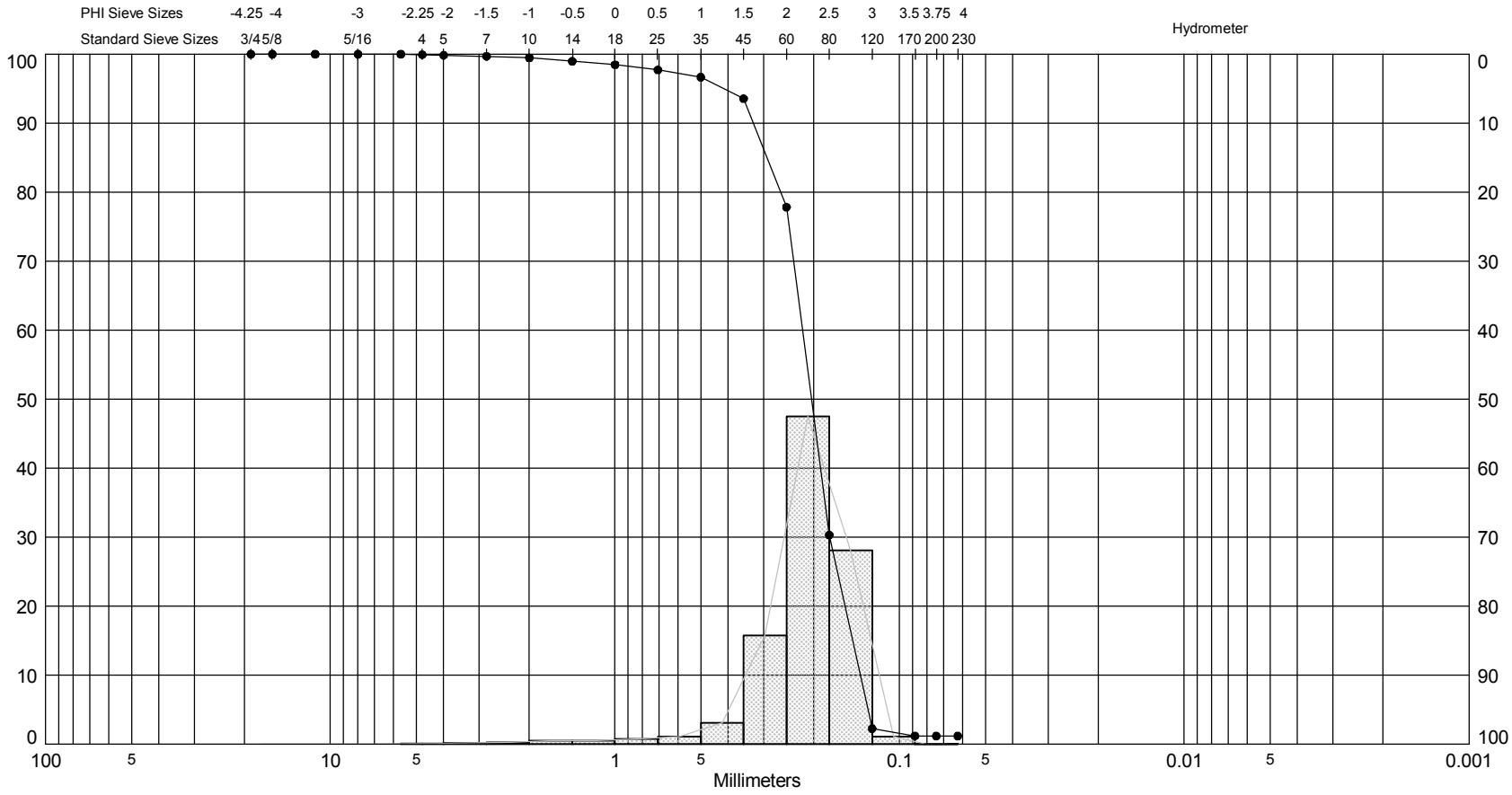

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
120+00 MLW	—●—	-2.6	SP	#200 - 1.17 #230 - 1.16			2.29	2.21	-2.74	15.67	0.61

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-12-07
Analyzed By:	PB
Easting (X, ft):	2,380,983
Northing (Y, ft):	192,667
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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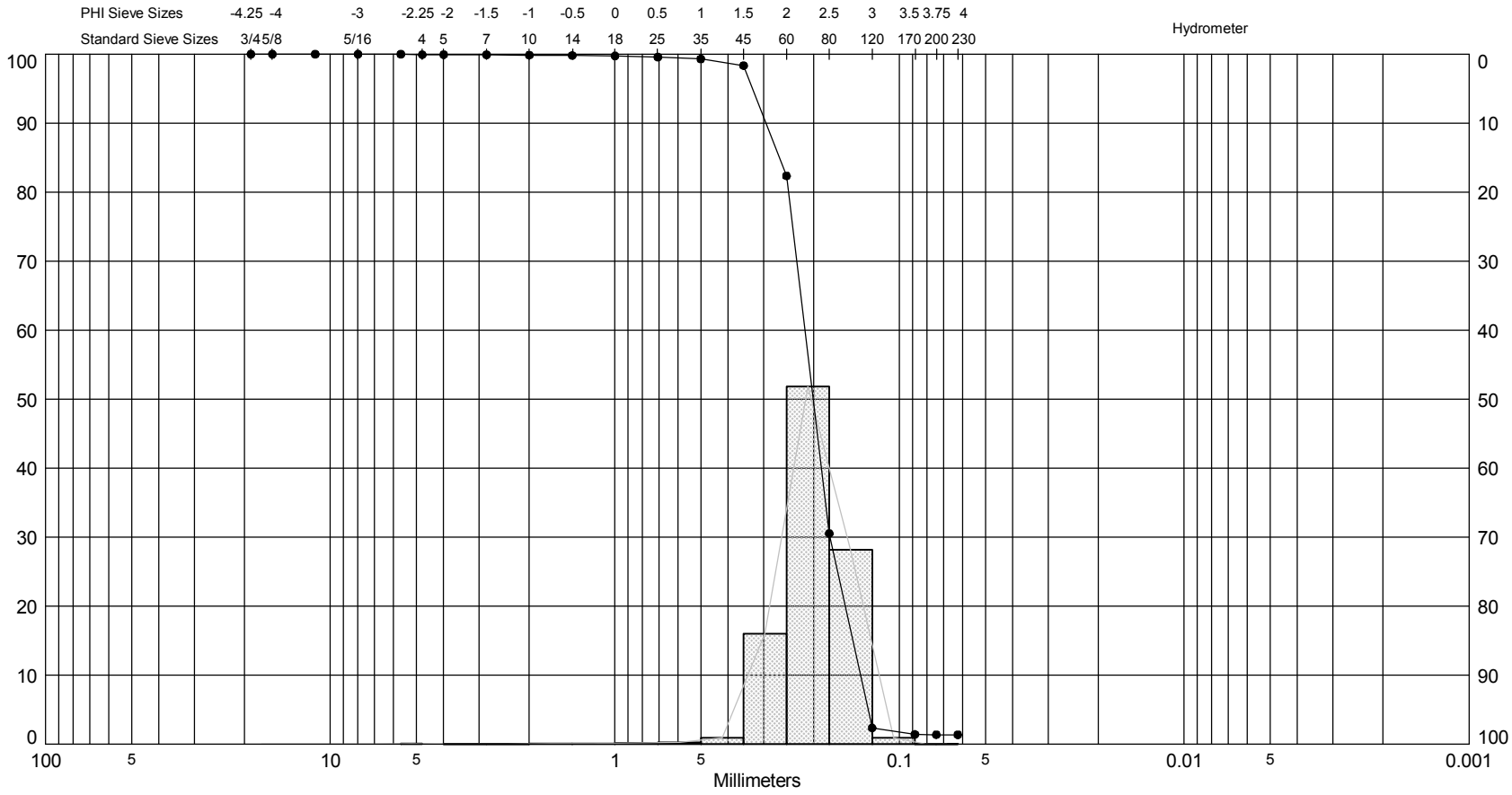

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
120+00 MTL	—●—	-0.7	SP	#200 - 1.37 #230 - 1.36			2.31	2.3	-2.11	20.04	0.42

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-12-07
Analyzed By:	PB
Easting (X, ft):	2,380,910
Northing (Y, ft):	192,741
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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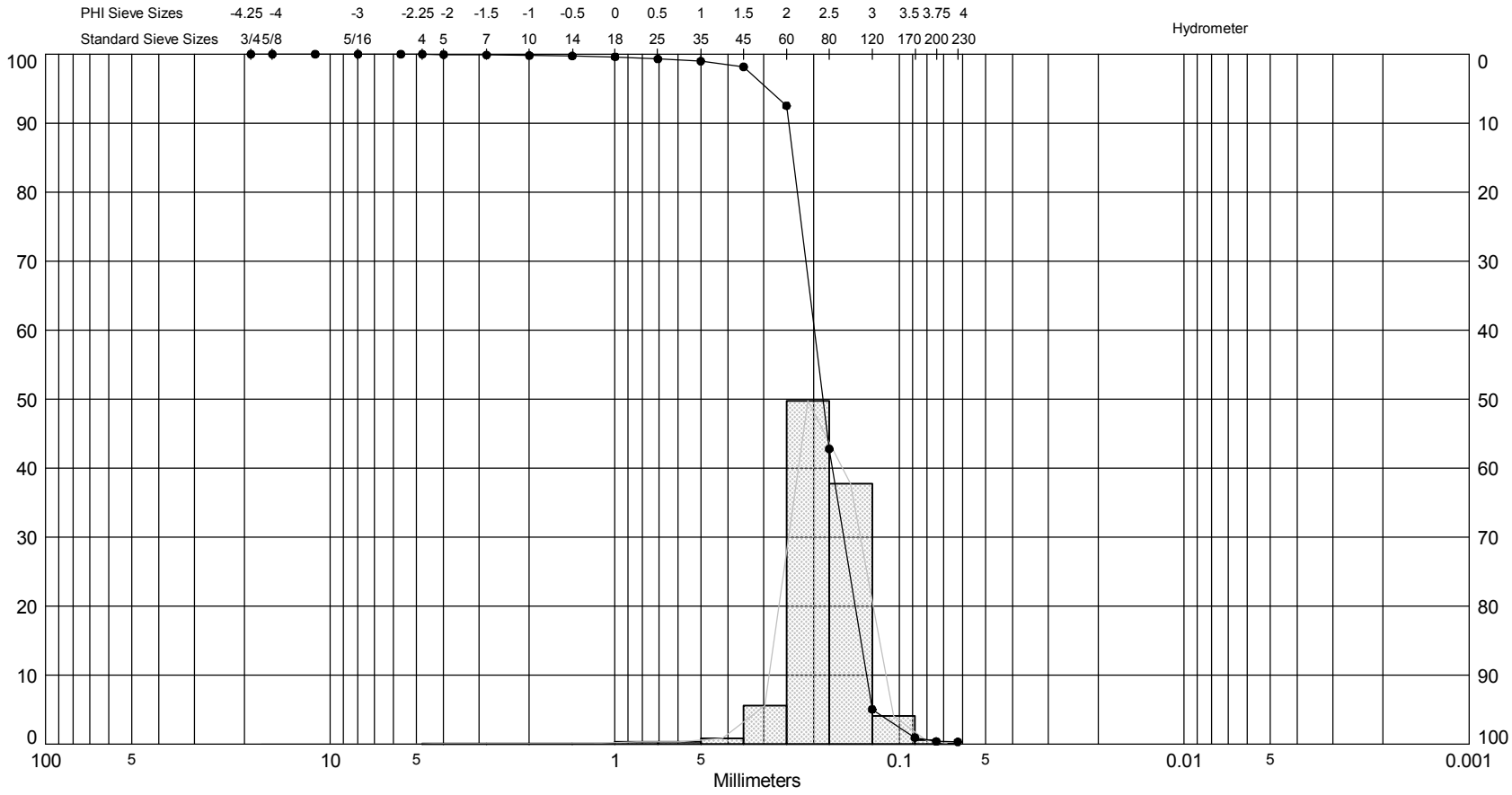

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
120+00 Toe of Dune	—●—	11.7	SP	#200 - 0.38 #230 - 0.32			2.43	2.43	-2.36	20.97	0.45

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-13-07
Analyzed By:	TD
Easting (X, ft):	2,380,801
Northing (Y, ft):	192,911
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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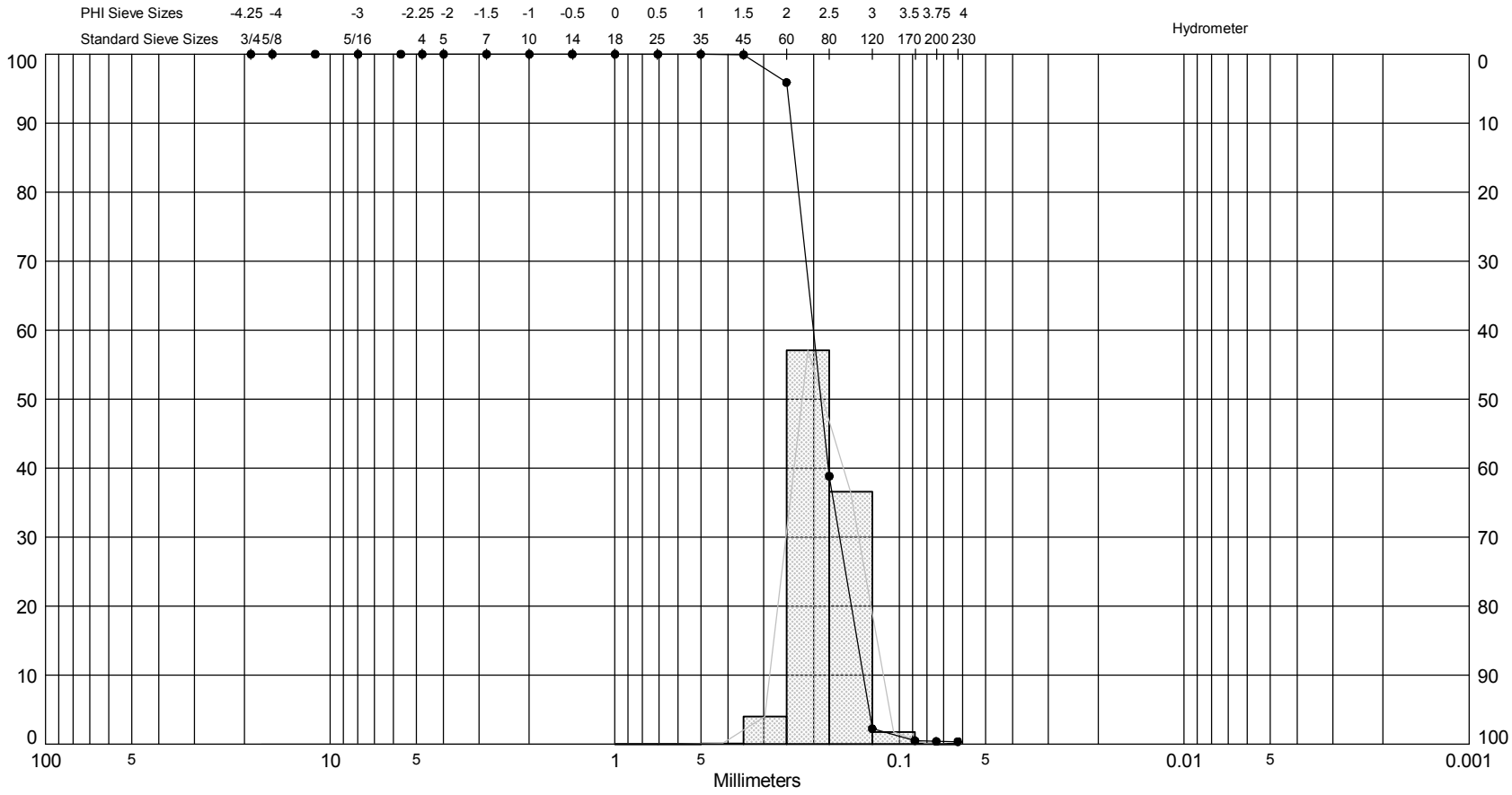

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
160+00 (+3)	—●—	3.0	SP	#200 - 0.39 #230 - 0.36			2.4	2.43	0.19	3.5	0.3

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-23-07
Analyzed By:	PB
Easting (X, ft):	2,383,594
Northing (Y, ft):	195,781
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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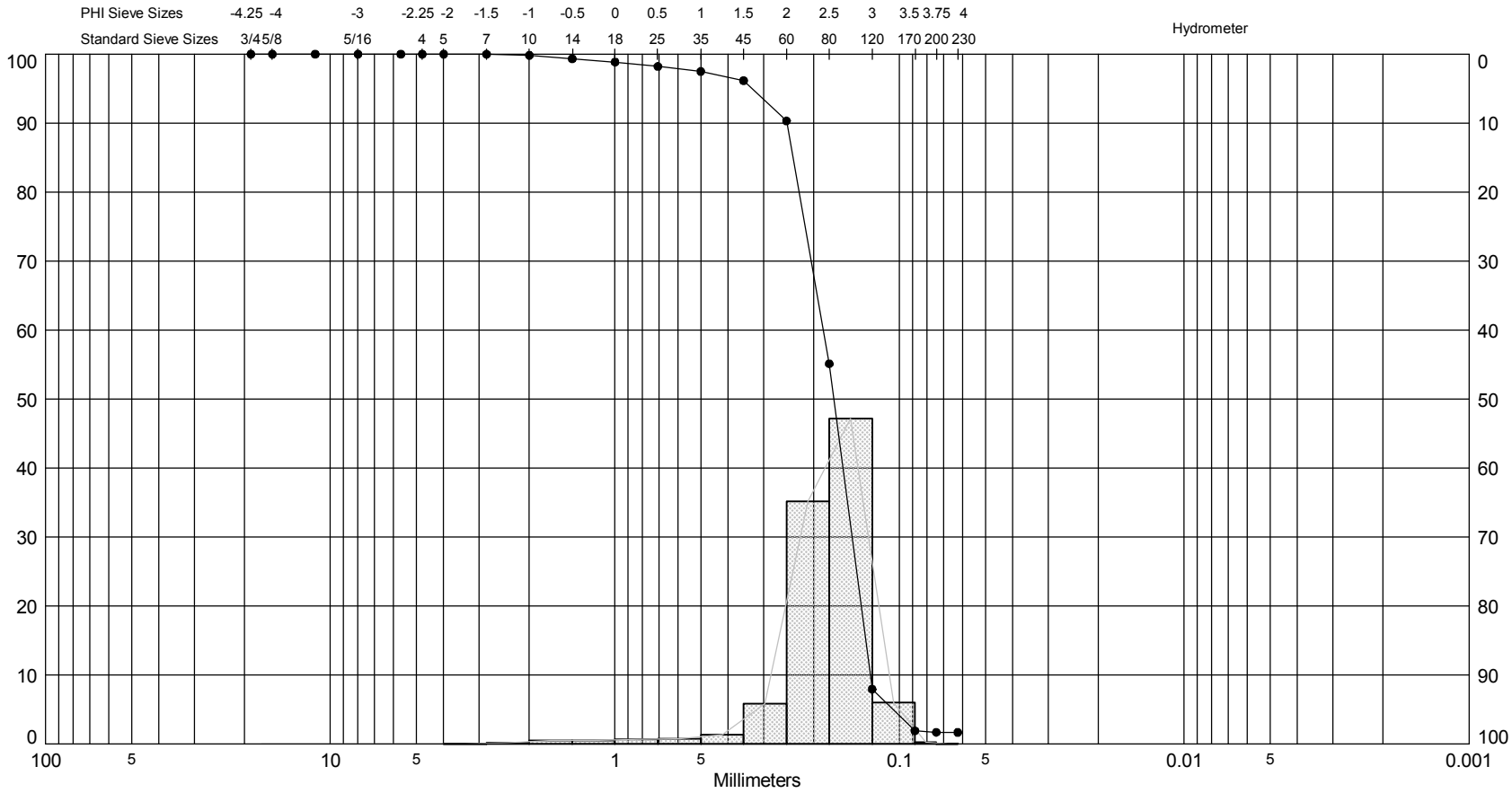

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
160+00 (-11.6)	—●—	-11.6	SP	#200 - 1.68 #230 - 1.67			2.55	2.45	-2.62	14.54	0.56

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-23-07
Analyzed By:	TD
Easting (X, ft):	2,384,040
Northing (Y, ft):	195,264
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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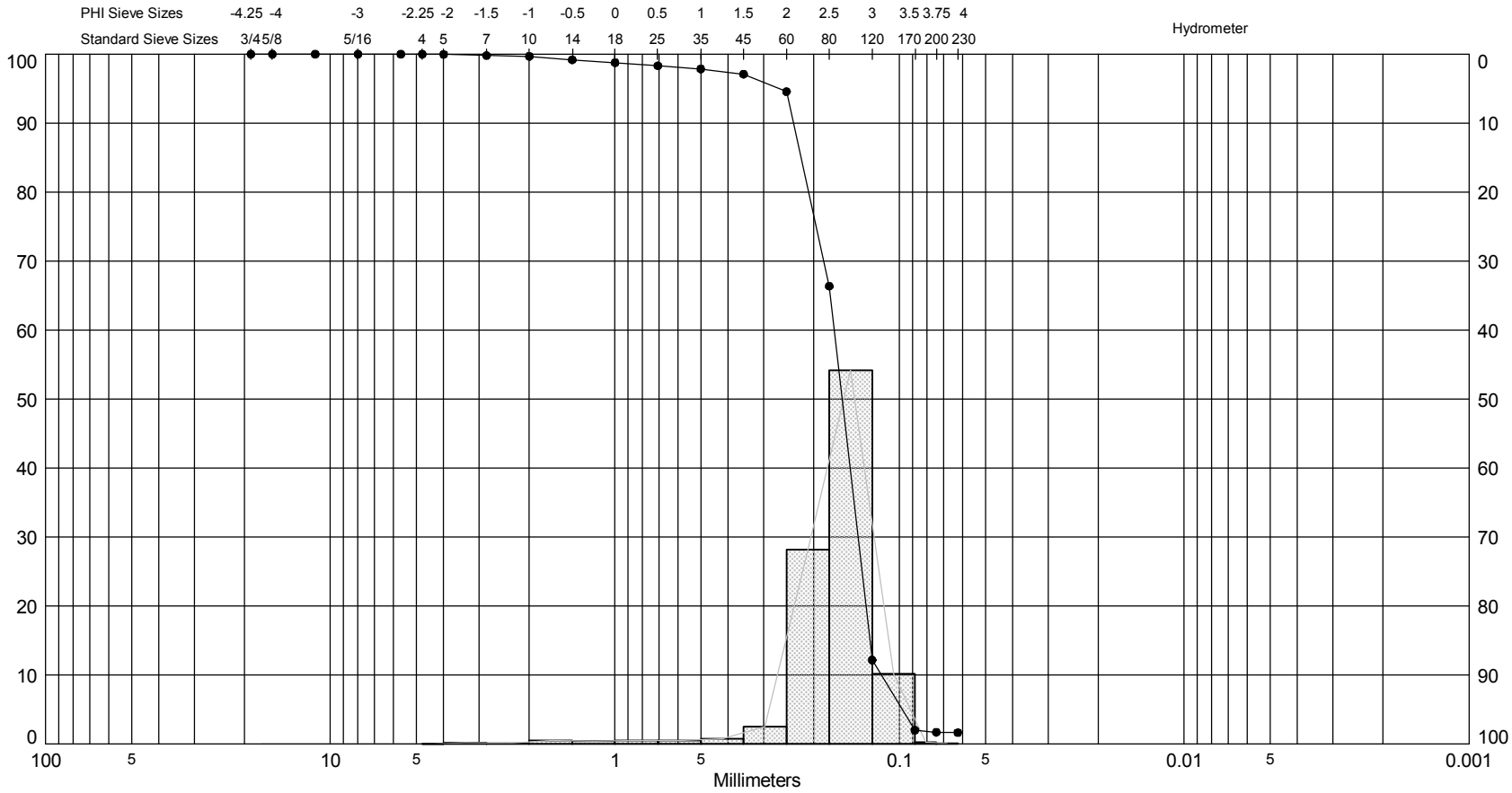

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
160+00 (-14.4)	—●—	-14.4	SP	#200 - 1.70 #230 - 1.63			2.65	2.56	-3.33	21.14	0.56

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-23-07
Analyzed By:	PB
Easting (X, ft):	2,384,134
Northing (Y, ft):	195,171
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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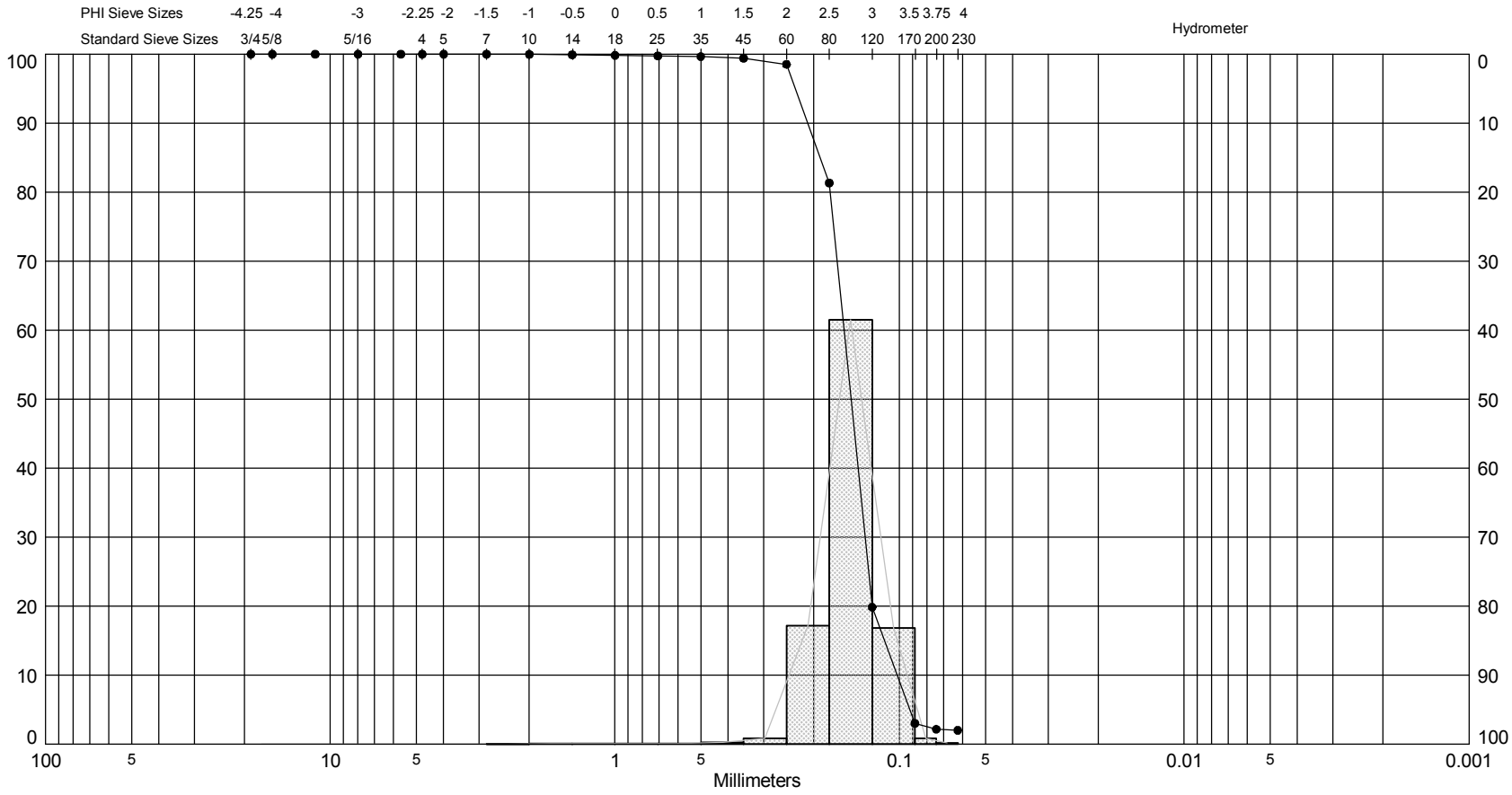

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
160+00 (-17.2)	—●—	-17.2	SP	#200 - 2.15 #230 - 2.00			2.75	2.73	-1.81	17.36	0.37

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-24-07
Analyzed By:	TD
Easting (X, ft):	2,384,296
Northing (Y, ft):	195,067
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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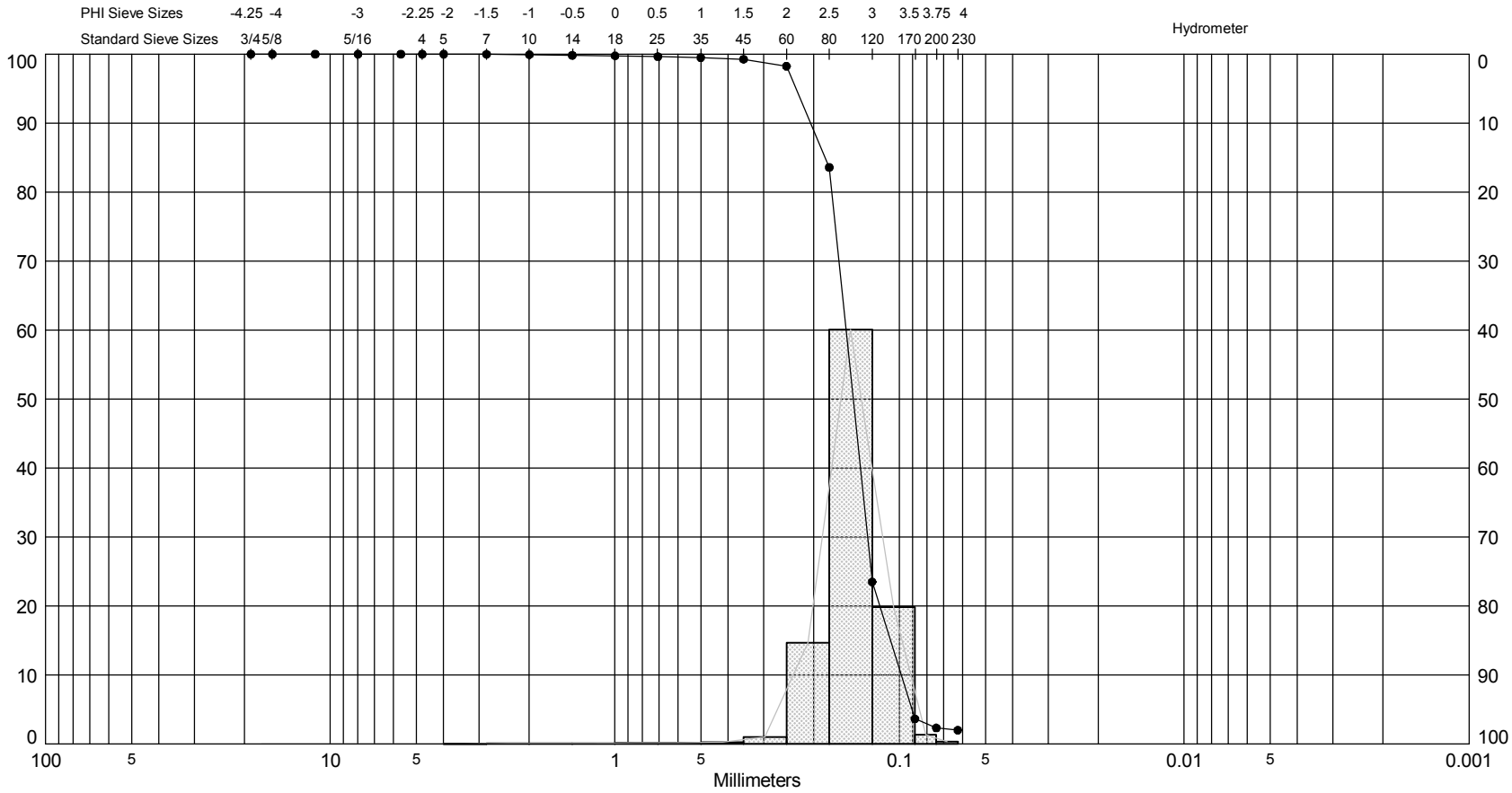

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
160+00 (-20)	—●—	-20.0	SP	#200 - 2.30 #230 - 1.98			2.78	2.76	-2.28	21.27	0.4

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-24-07
Analyzed By:	TD
Easting (X, ft):	2,384,367
Northing (Y, ft):	194,975
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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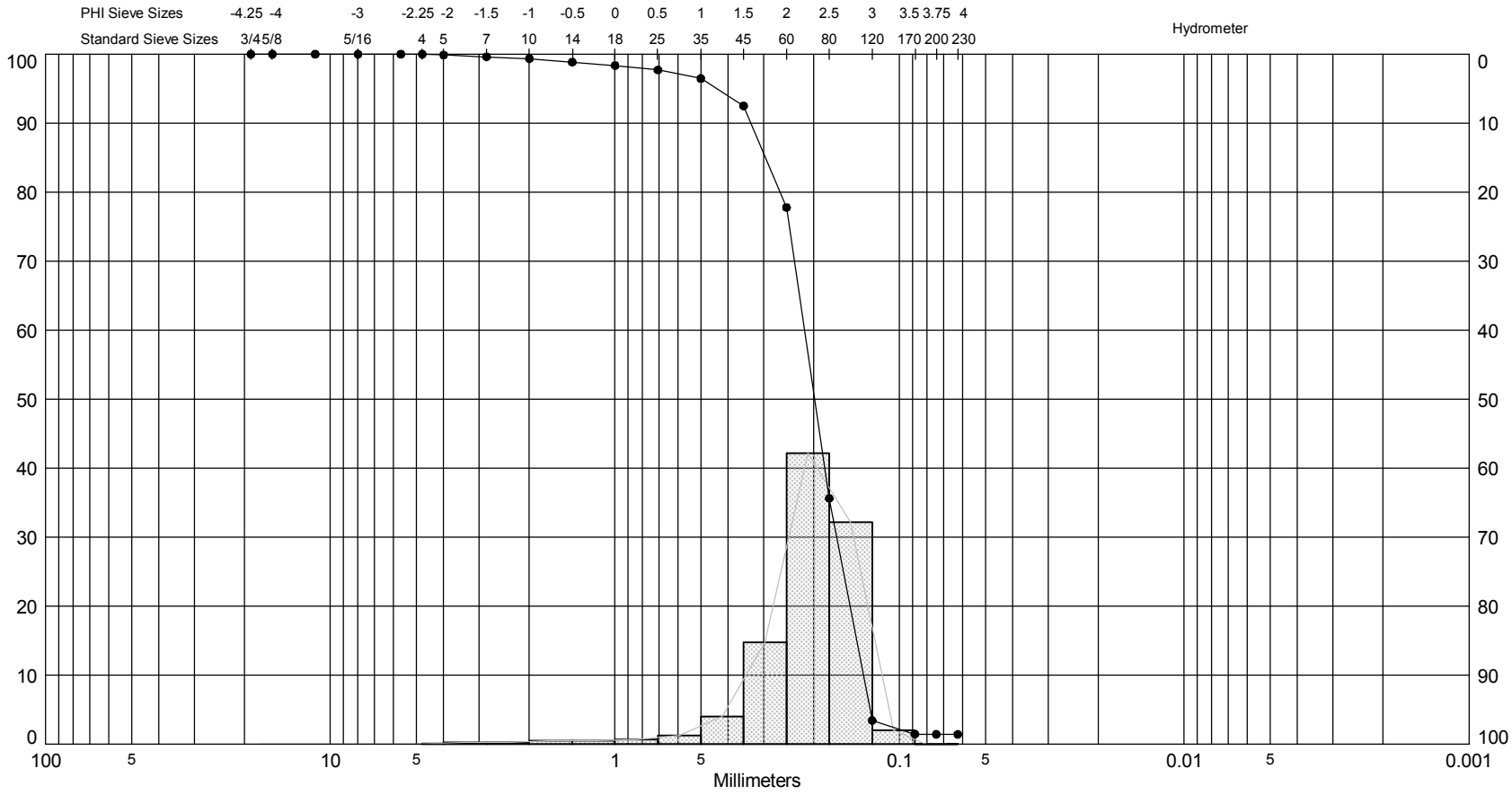

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
160+00 (-6)	—●—	-6.0	SP	#200 - 1.41 #230 - 1.40			2.33	2.23	-2.57	13.96	0.64

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-23-07
Analyzed By:	PB
Easting (X, ft):	2,383,820
Northing (Y, ft):	195,535
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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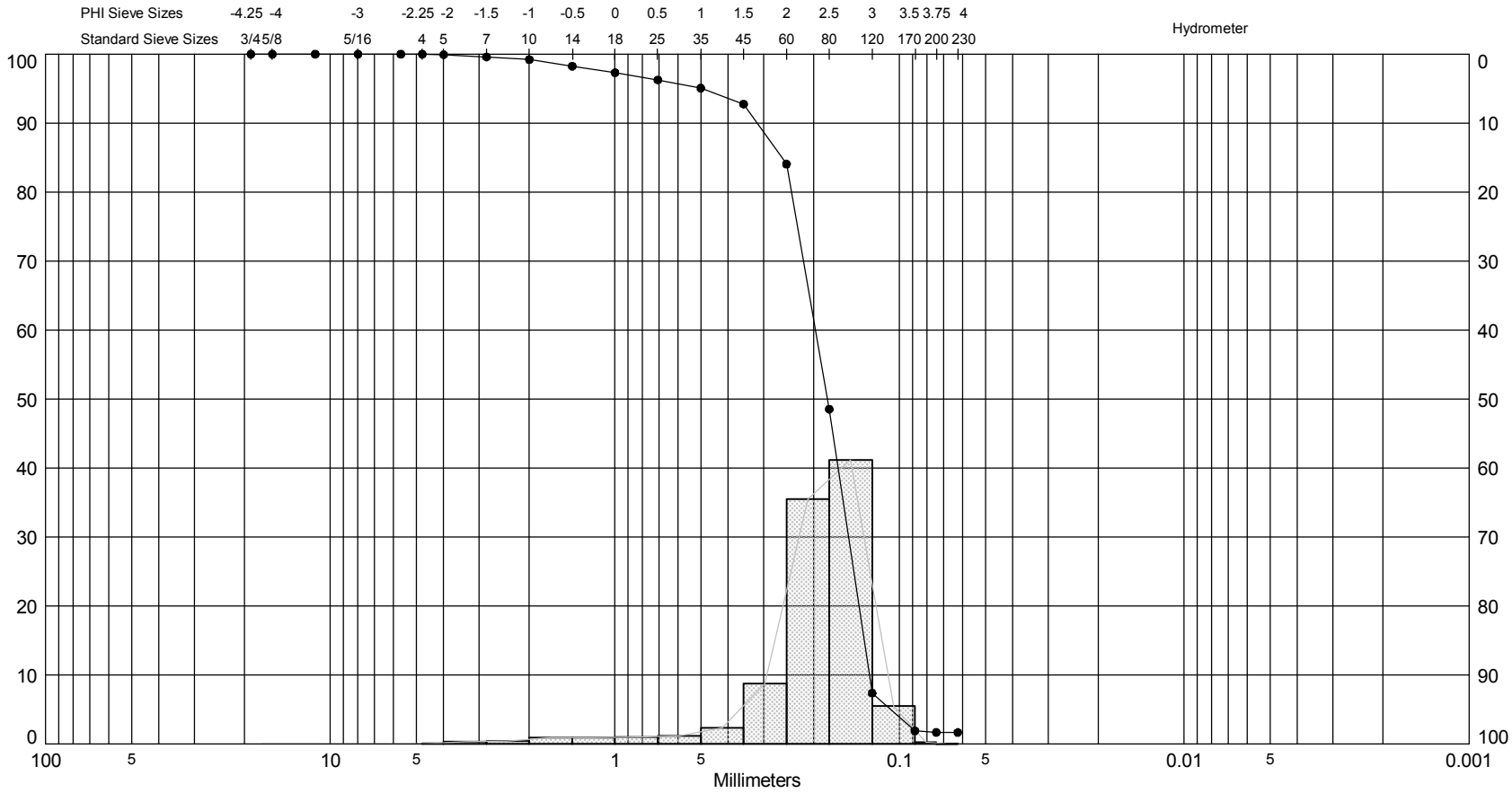

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
160+00 (-8.8)	—●—	-8.8	SP	#200 - 1.66 #230 - 1.65			2.48	2.33	-2.61	12.22	0.73

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-24-07
Analyzed By:	TD
Easting (X, ft):	2,383,938
Northing (Y, ft):	195,481
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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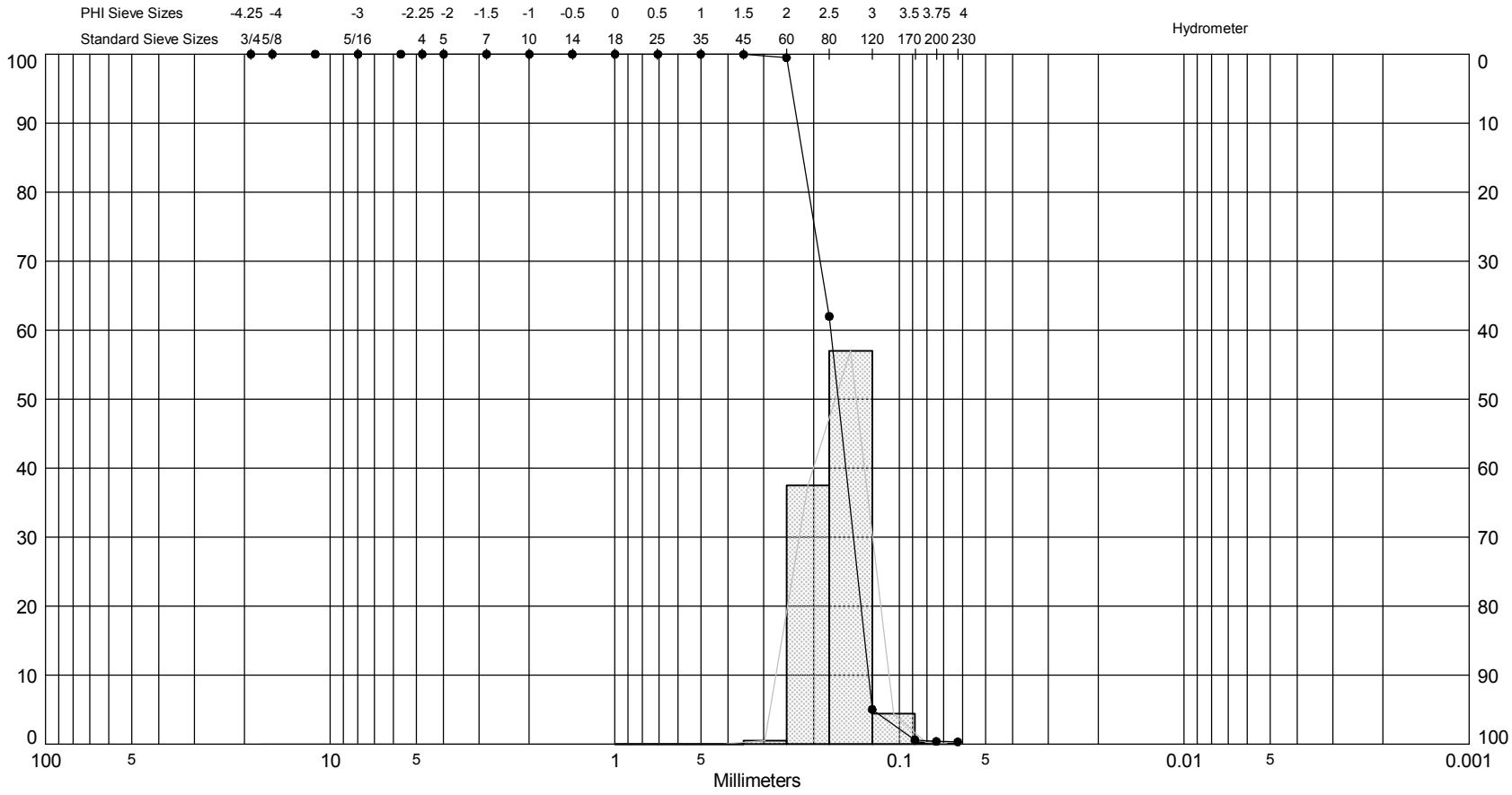

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
160+00 Dune	—●—	13.6	SP	#200 - 0.39 #230 - 0.32			2.61	2.58	0.05	3.51	0.29

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-24-07
Analyzed By:	PB
Easting (X, ft):	2,383,542
Northing (Y, ft):	195,838
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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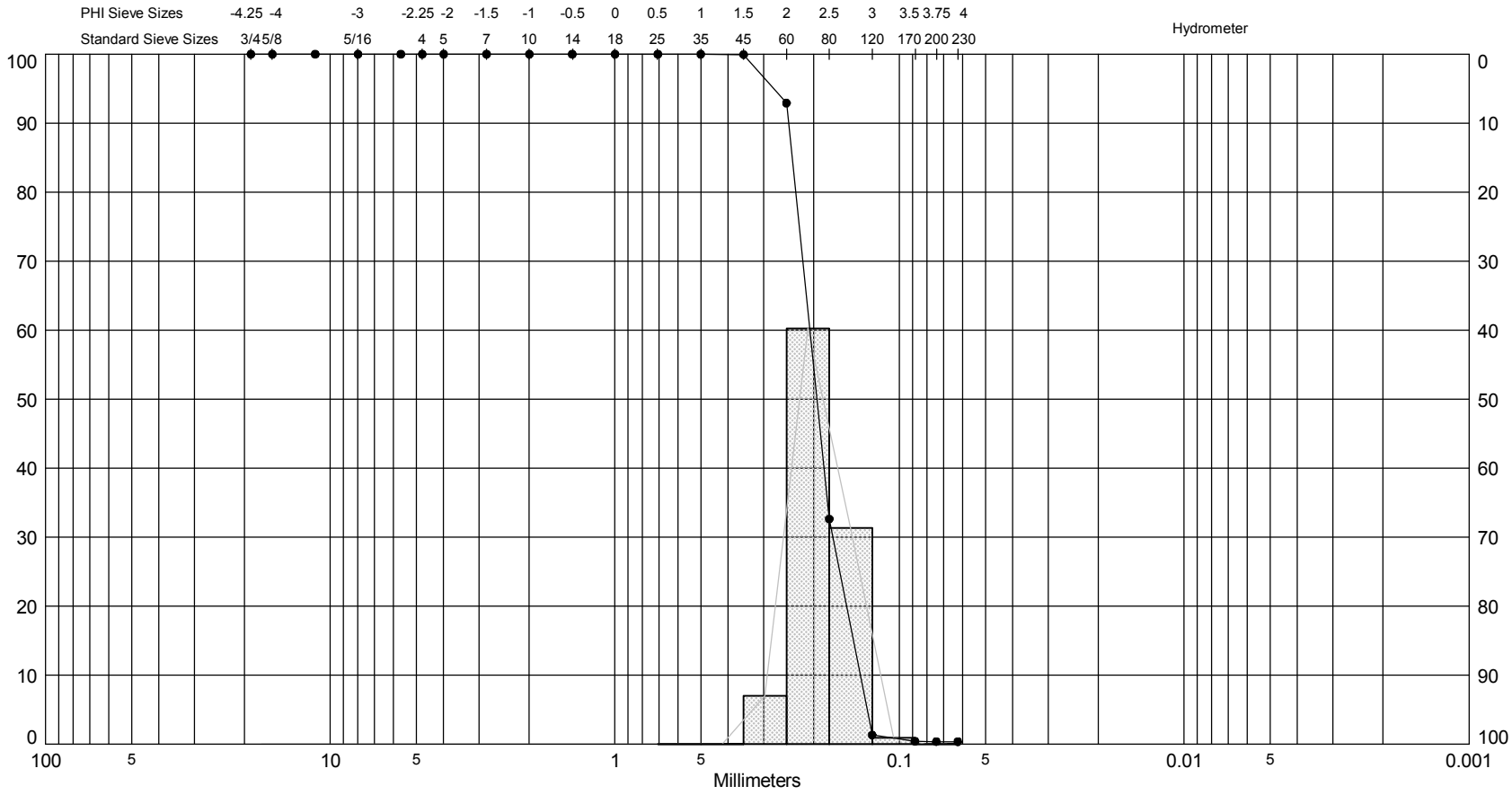

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
160+00 MHW	—●—	1.4	SP	#200 - 0.37 #230 - 0.36			2.36	2.38	0.1	3.13	0.3

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-23-07
Analyzed By:	PB
Easting (X, ft):	2,383,614
Northing (Y, ft):	195,756
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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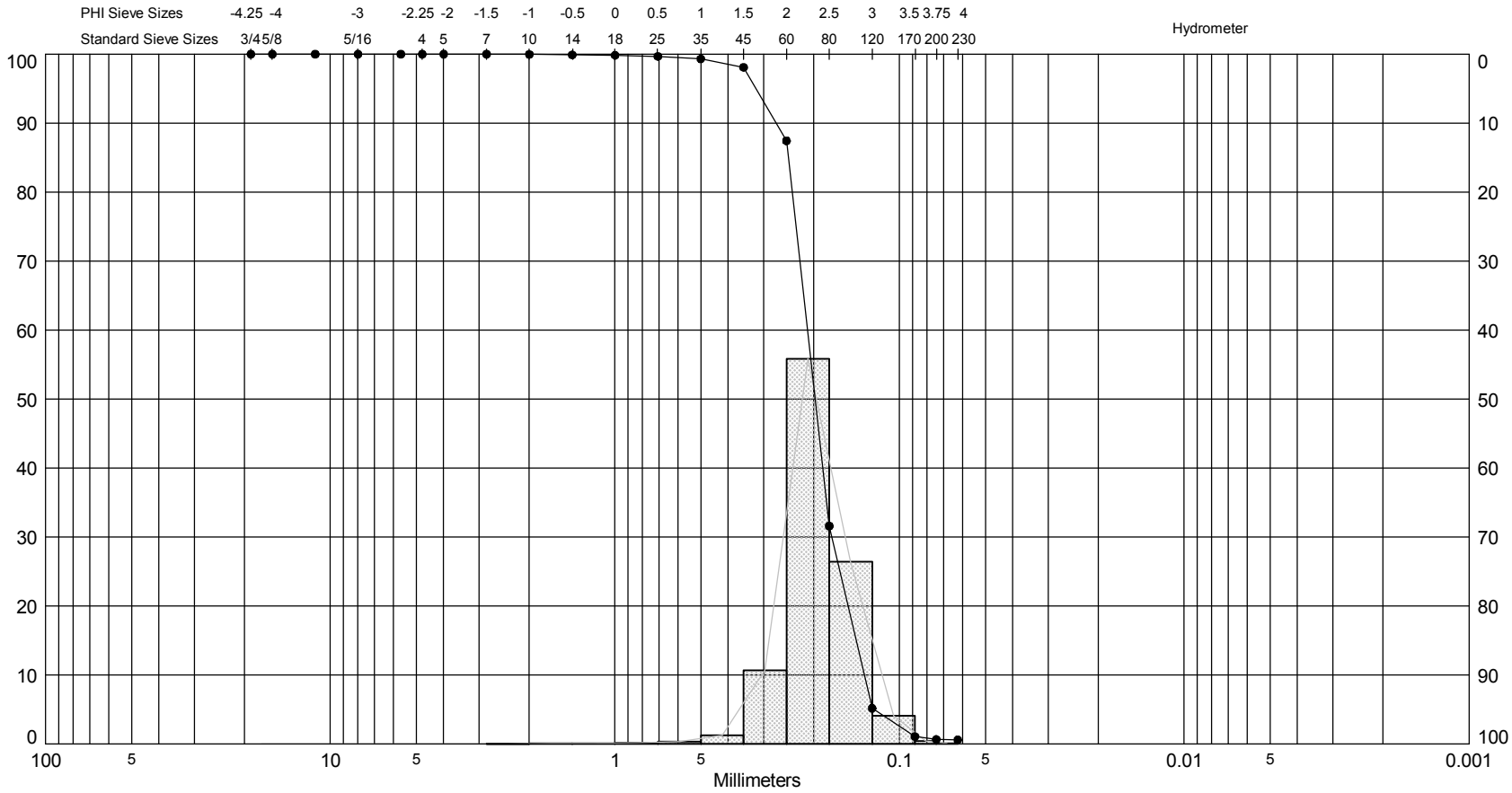

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
160+00 Mid Berm	—●—	6.8	SP	#200 - 0.64 #230 - 0.59			2.34	2.35	-0.82	9.41	0.42

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-24-07
Analyzed By:	TD
Easting (X, ft):	2,383,573
Northing (Y, ft):	195,808
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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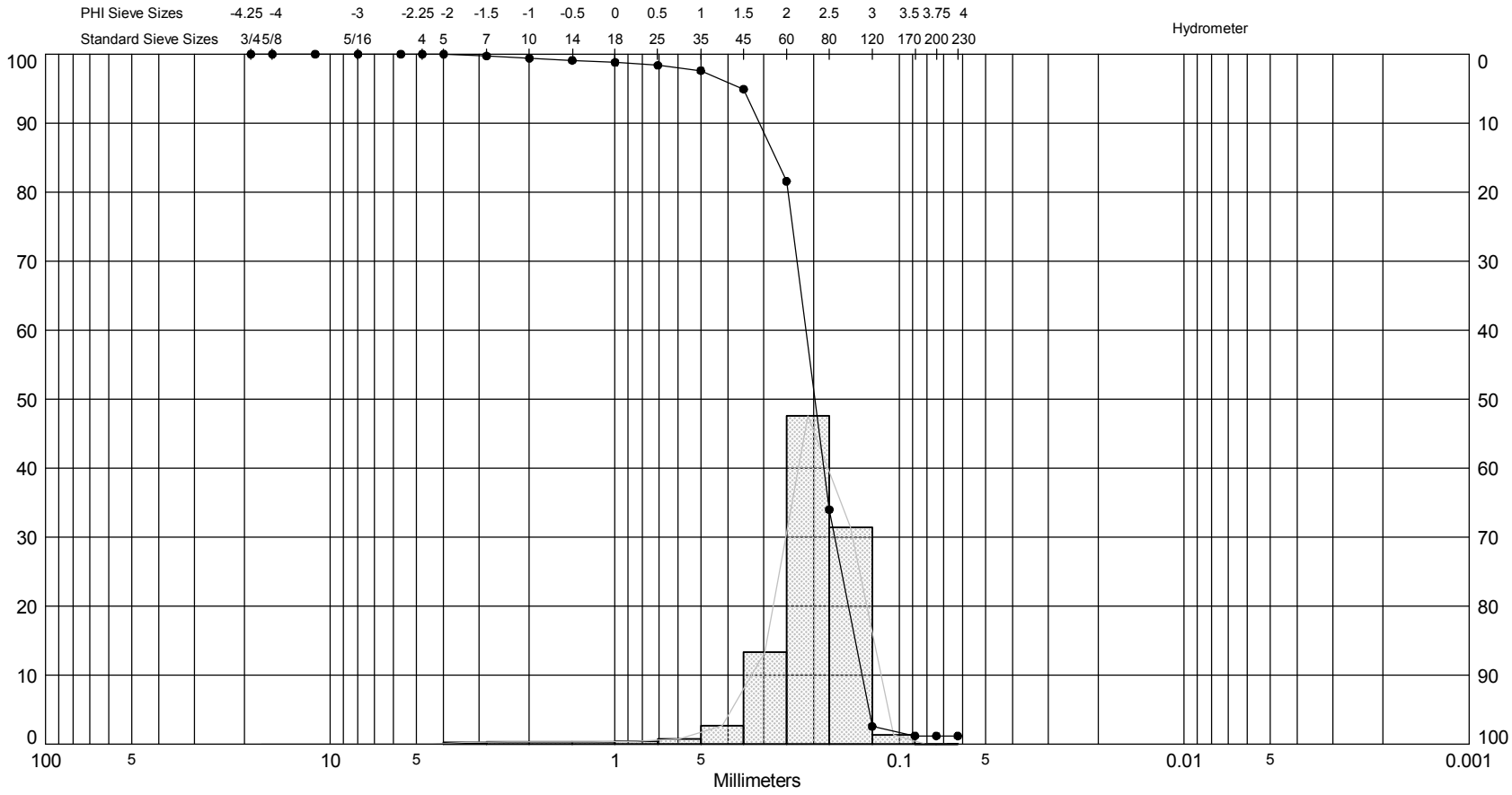

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
160+00 MLW	—●—	-2.8	SP	#200 - 1.19 #230 - 1.18			2.33	2.27	-2.85	17.45	0.56

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	
Analyzed By:	PB
Easting (X, ft):	2,383,720
Northing (Y, ft):	195,645
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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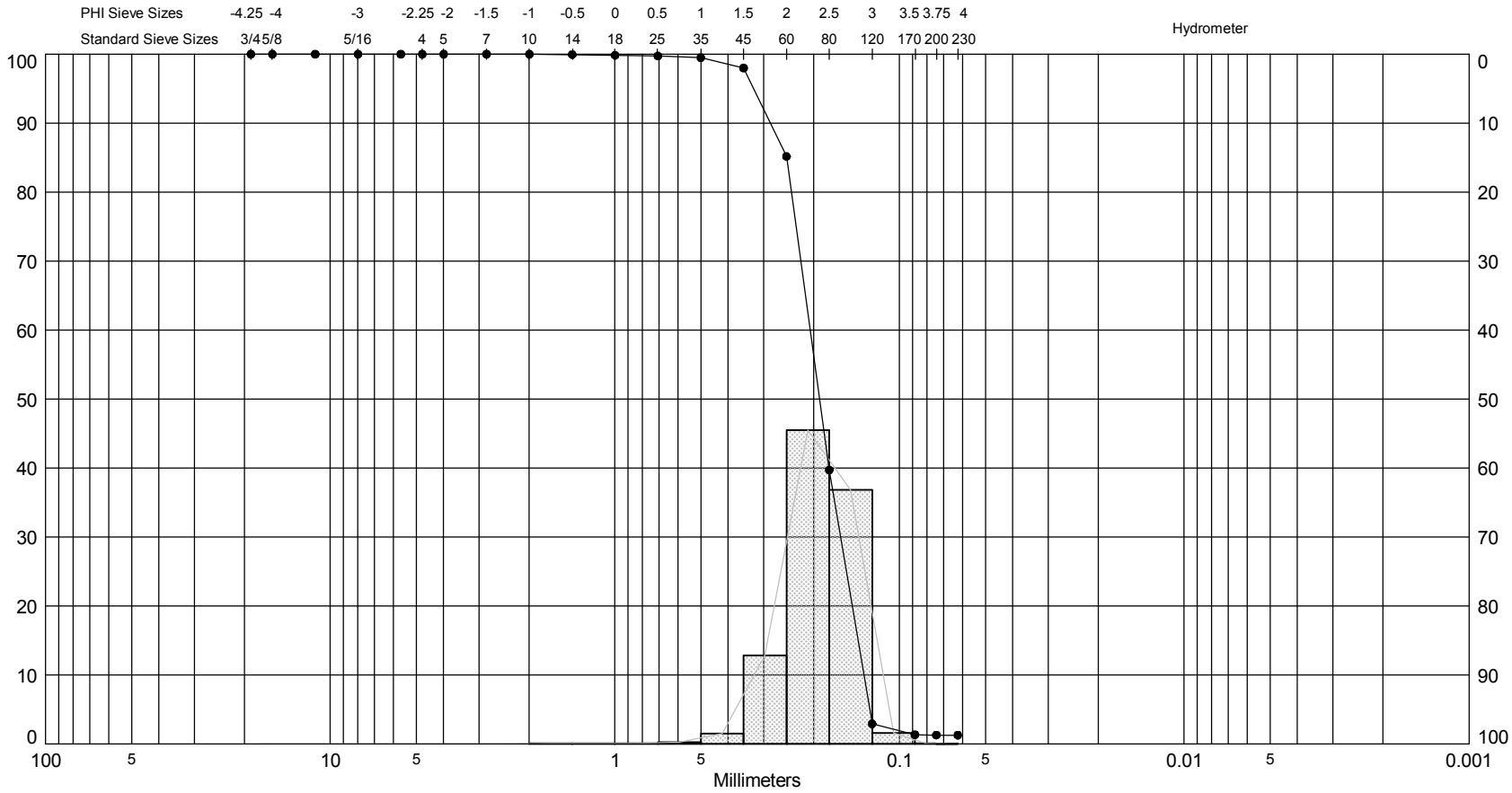

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
160+00 MTL	—●—	-0.8	SP	#200 - 1.29 #230 - 1.28			2.39	2.36	-1.04	6.96	0.41

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-24-07
Analyzed By:	PB
Easting (X, ft):	2,383,640
Northing (Y, ft):	195,726
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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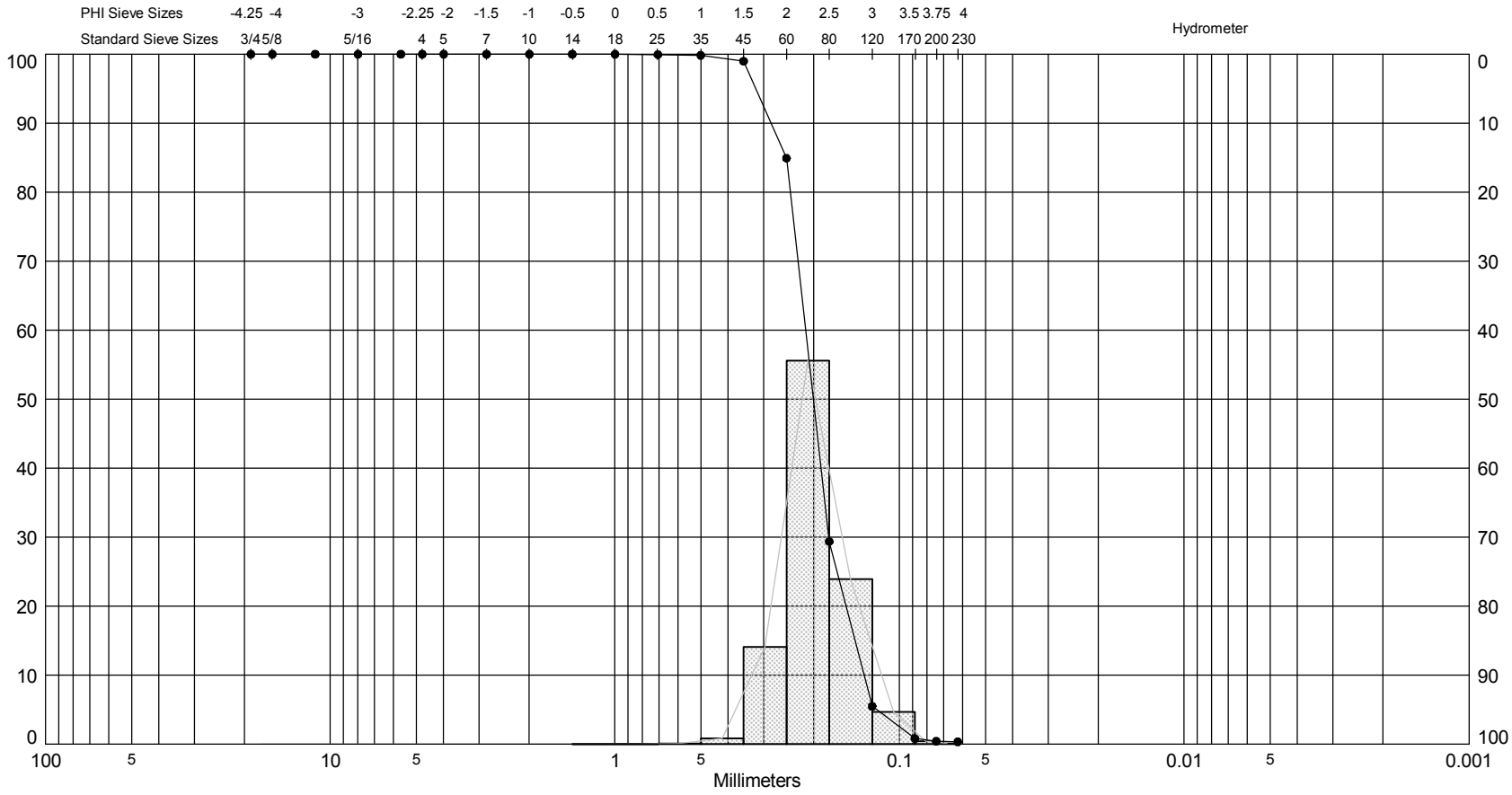

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
160+00 Toe of Dune	—●—	8.0	SP	#200 - 0.41 #230 - 0.33			2.31	2.34	0.19	4.18	0.4

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-24-07
Analyzed By:	PB
Easting (X, ft):	2,383,559
Northing (Y, ft):	195,822
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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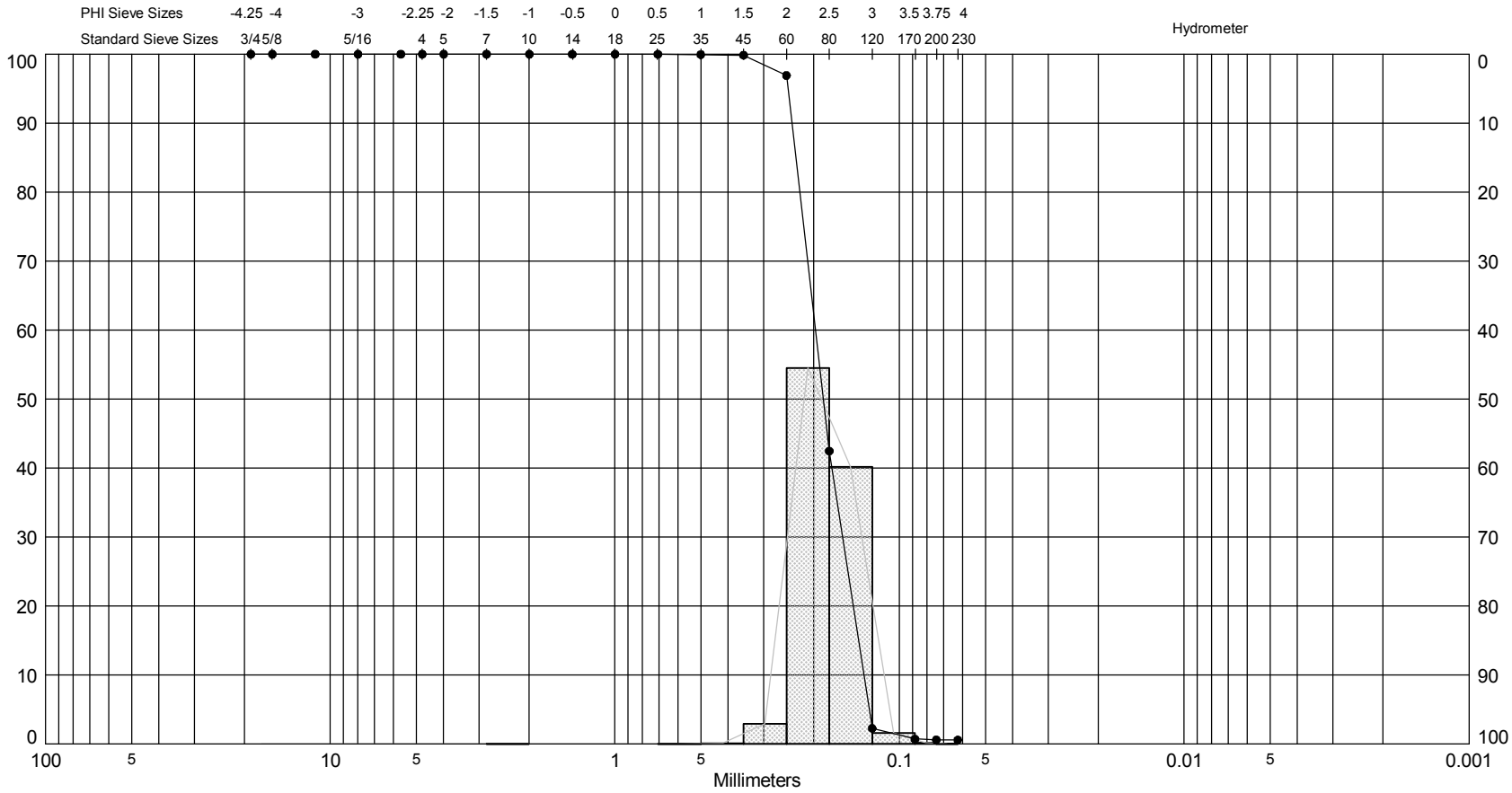

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
200+00 (+2)	—●—	2.0	SP	#200 - 0.58 #230 - 0.57			2.43	2.45	-0.1	5.65	0.3

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-09-07
Analyzed By:	TD
Easting (X, ft):	2,386,854
Northing (Y, ft):	198,499
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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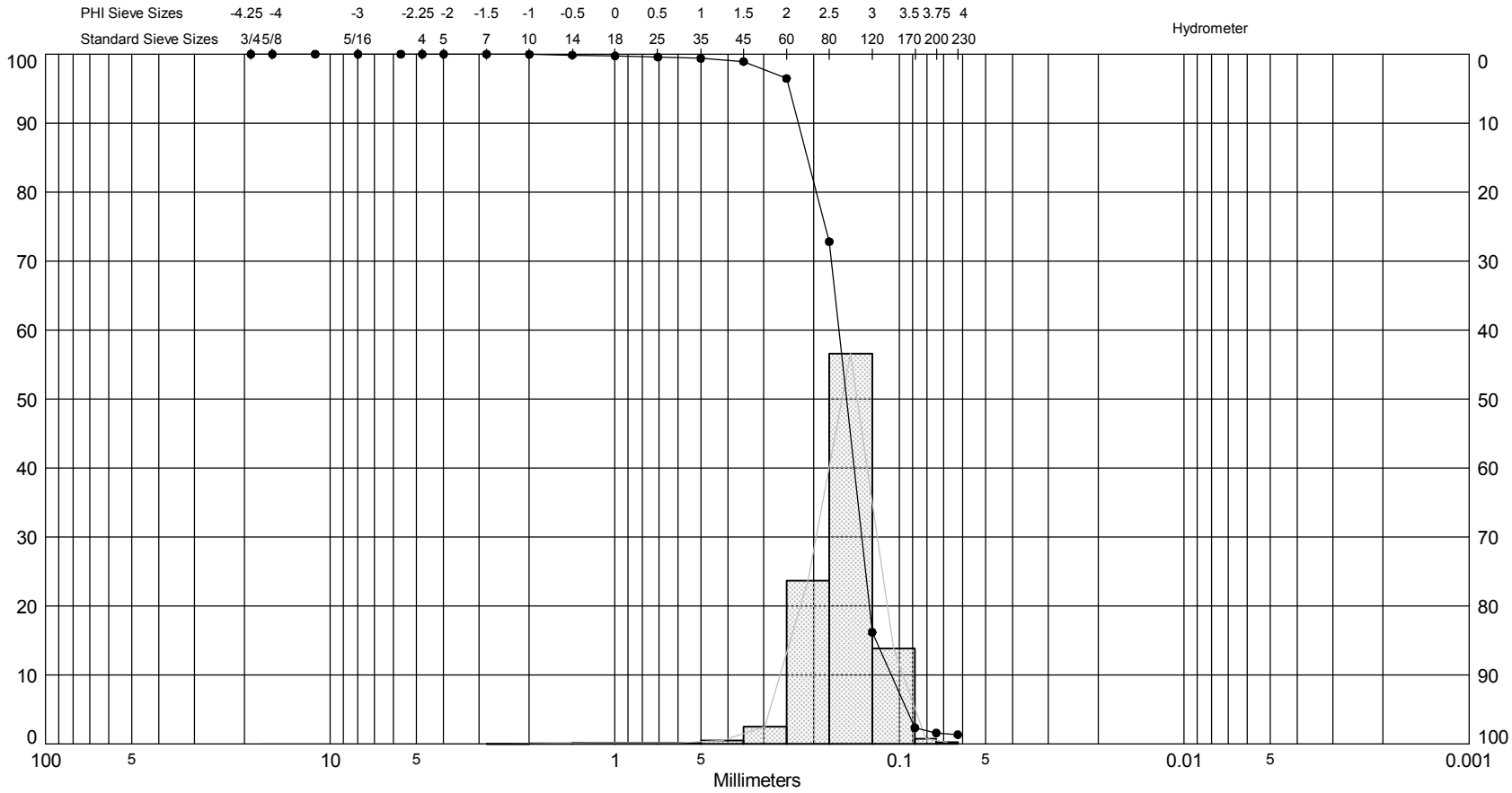

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
200+00 (-11.6)	—●—	-11.6	SP	#200 - 1.58 #230 - 1.35			2.7	2.66	-1.81	14.38	0.42

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-25-07
Analyzed By:	PB
Easting (X, ft):	2,387,178
Northing (Y, ft):	197,908
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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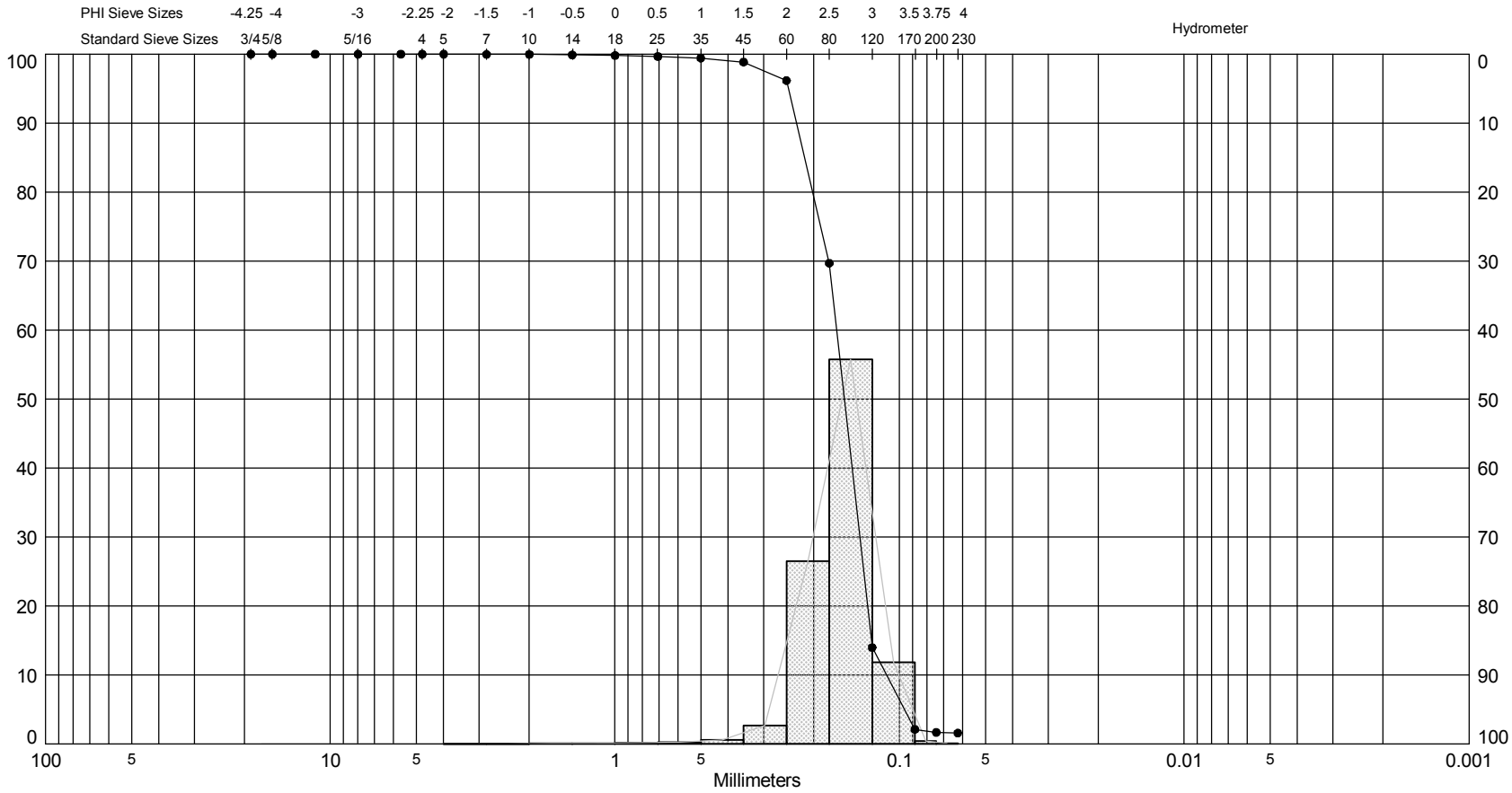

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
200+00 (-14.4)	—●—	-14.4	SP	#200 - 1.66 #230 - 1.57			2.68	2.63	-1.84	15.26	0.41

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-25-07
Analyzed By:	PB
Easting (X, ft):	2,387,403
Northing (Y, ft):	197,618
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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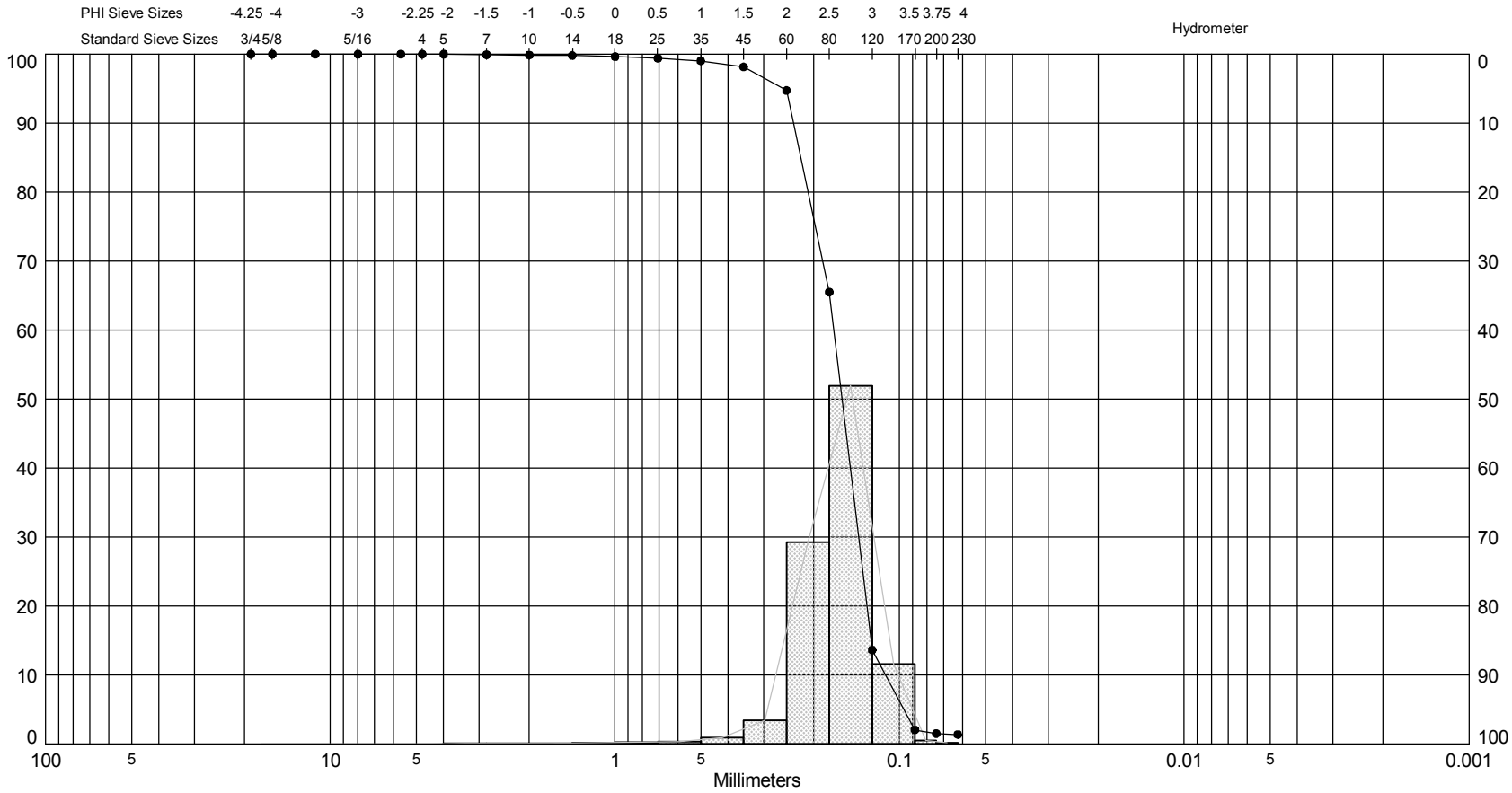

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
200+00 (-17.2)	—●—	-17.2	SP	#200 - 1.51 #230 - 1.37			2.65	2.59	-2.22	16.97	0.47

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-25-07
Analyzed By:	PB
Easting (X, ft):	2,387,565
Northing (Y, ft):	197,384
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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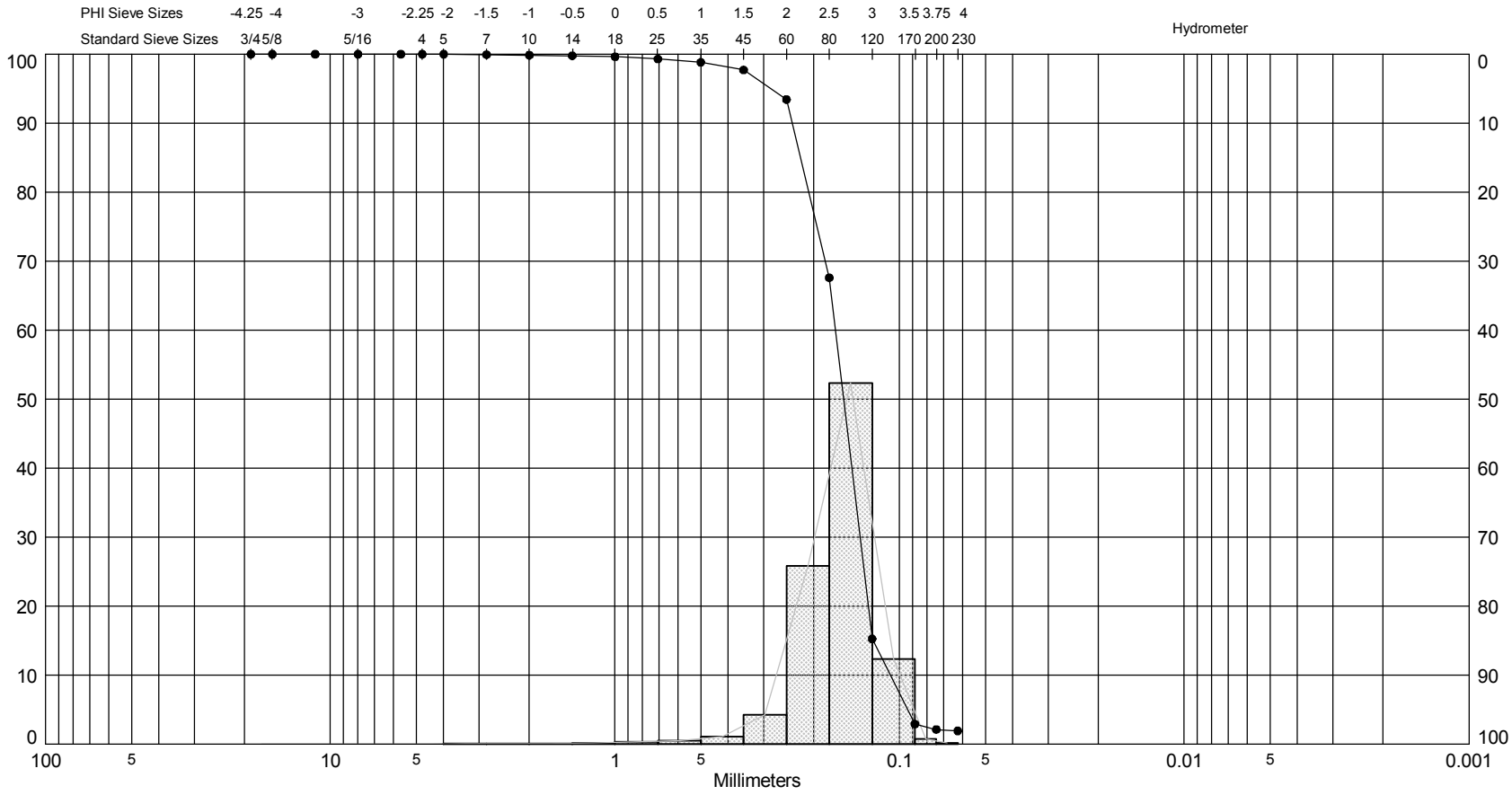

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
200+00 (-20)	—●—	-20.0	SP	#200 - 2.12 #230 - 1.92			2.67	2.6	-2.11	14.69	0.49

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-24-07
Analyzed By:	PB
Easting (X, ft):	2,387,819
Northing (Y, ft):	197,070
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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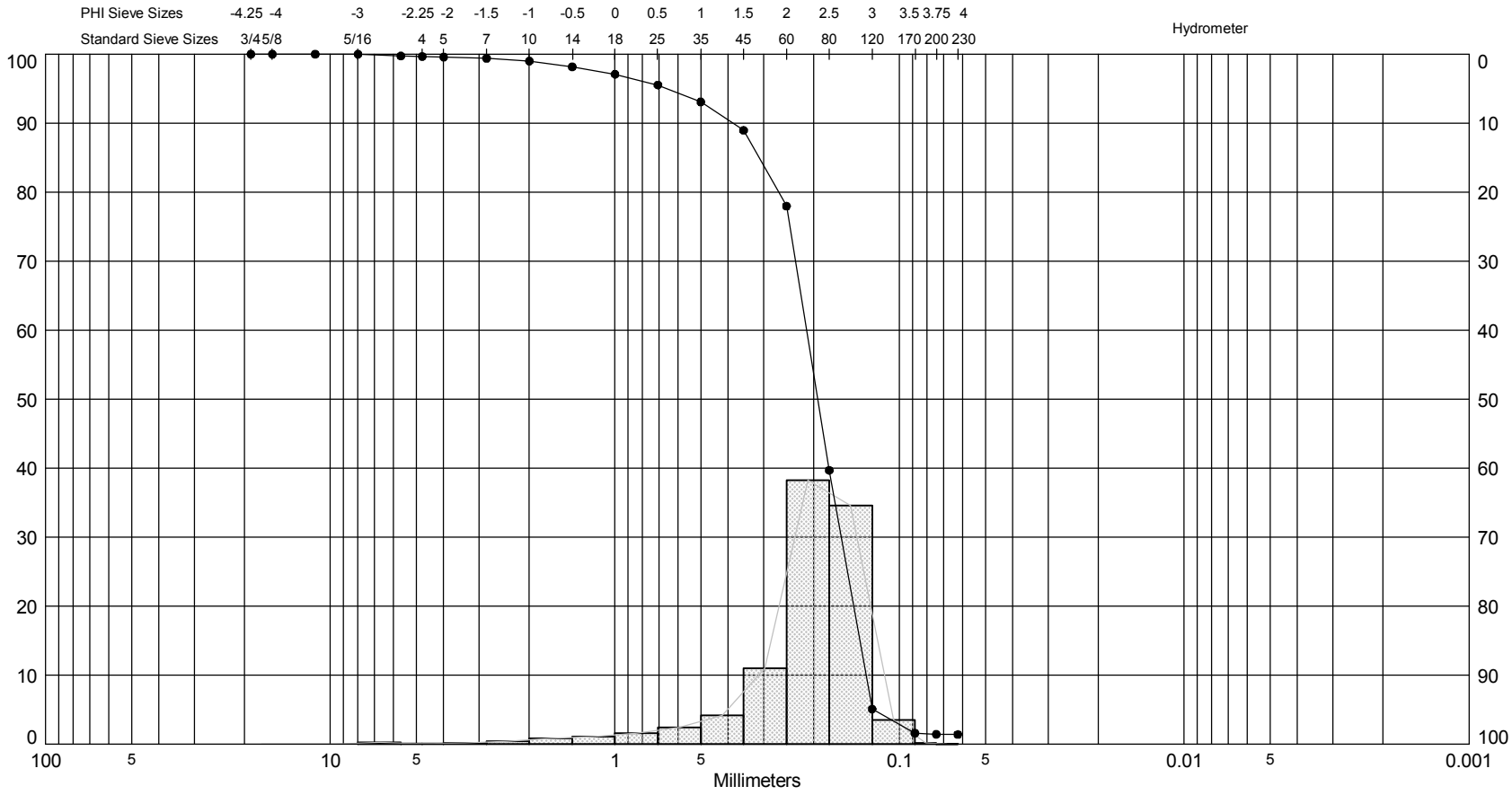

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
200+00 (-6)	—●—	-6.0	SP	#200 - 1.41 #230 - 1.38			2.37	2.2	-2.48	11.72	0.8

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-26-07
Analyzed By:	TD
Easting (X, ft):	2,387,009
Northing (Y, ft):	198,163
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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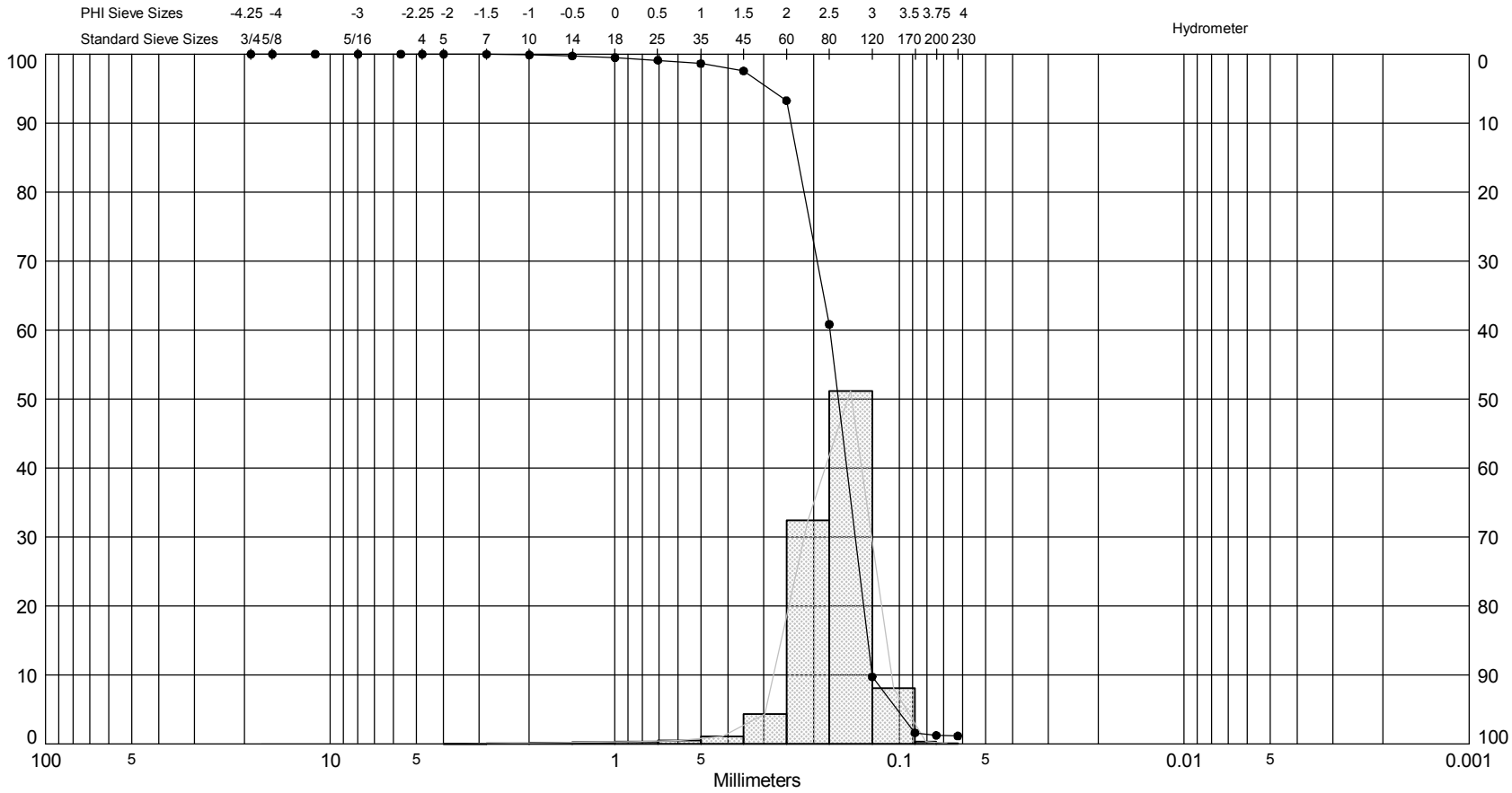

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
200+00 (-8.8)	—●—	-8.8	SP	#200 - 1.23 #230 - 1.14			2.61	2.53	-2.33	15.5	0.48

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-26-07
Analyzed By:	TD
Easting (X, ft):	2,387,013
Northing (Y, ft):	198,077
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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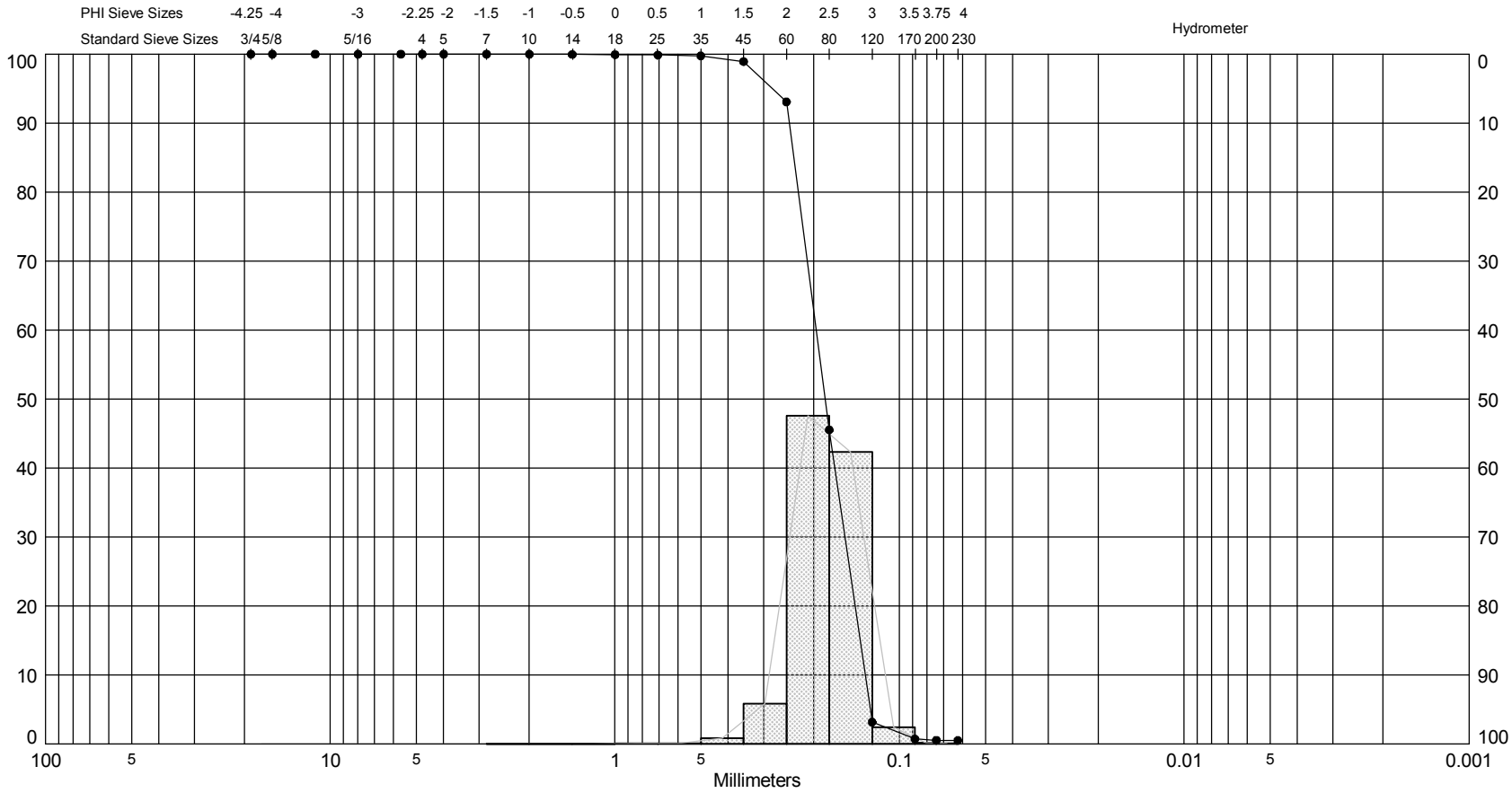


Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
200+00 Dune	—●—	8.6	SP	#200 - 0.54 #230 - 0.49			2.45	2.45	-0.85	8	0.36

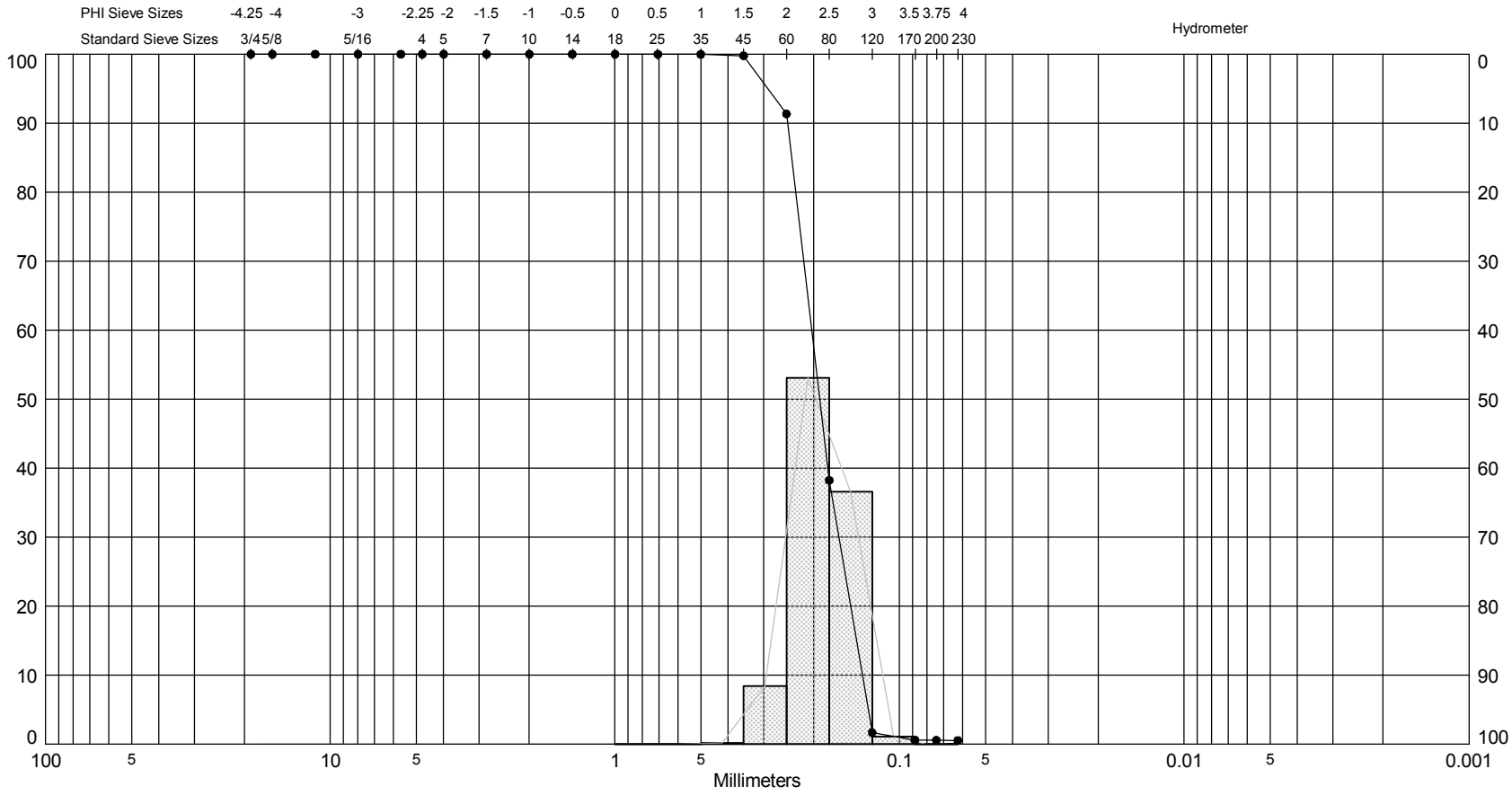
Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-12-07
Analyzed By:	TD
Easting (X, ft):	2,386,832
Northing (Y, ft):	198,518
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

SIEVE ANALYSIS FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
200+00 MHW	—●—	1.4	SP	#200 - 0.56 #230 - 0.54			2.39	2.4	-0.19	3.19	0.32

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-12-07
Analyzed By:	TD
Easting (X, ft):	2,386,863
Northing (Y, ft):	198,487
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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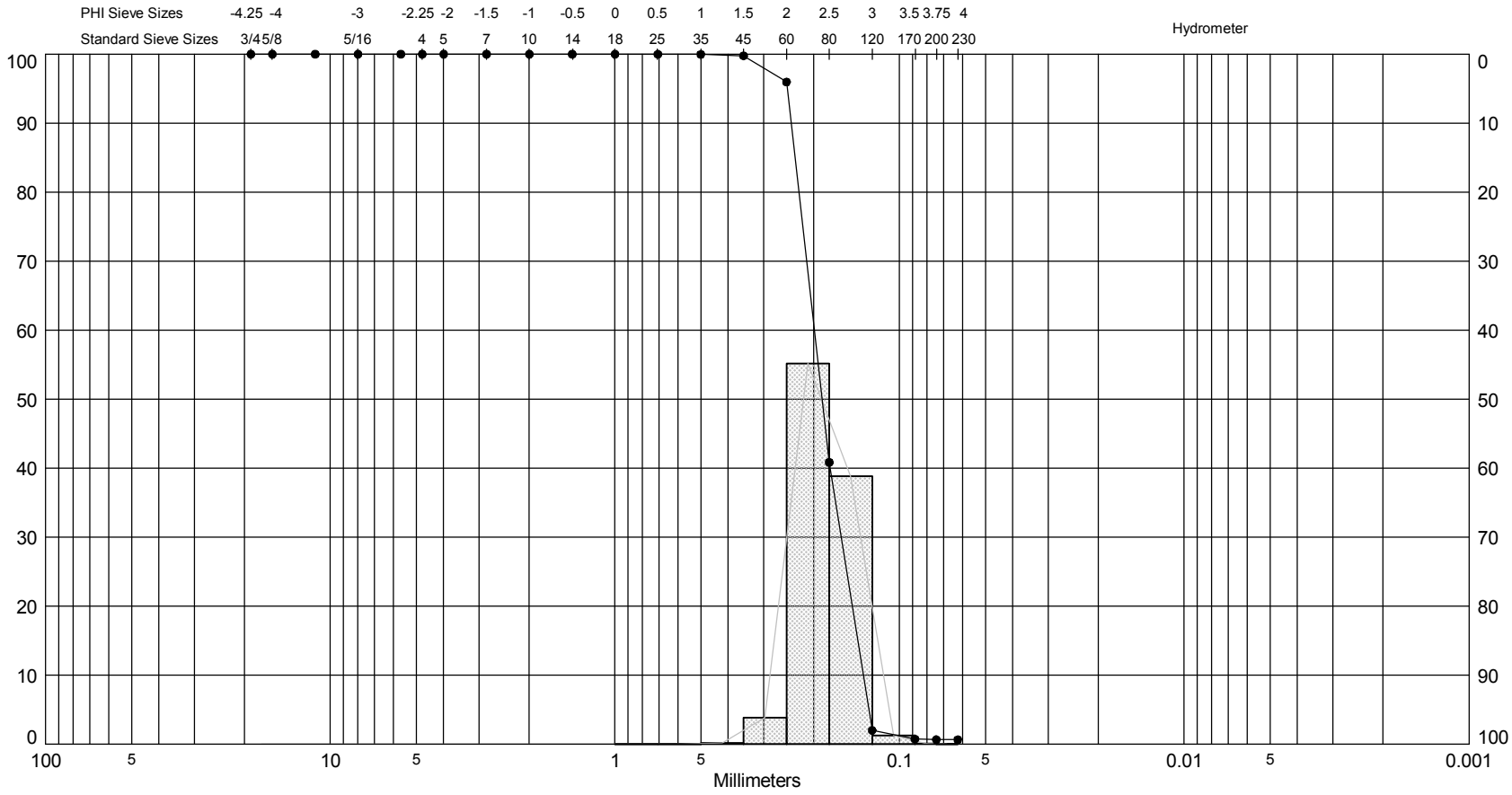
SIEVE ANALYSIS FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
200+00 Mid Berm	—●—	3.3	SP	#200 - 0.64 #230 - 0.63			2.42	2.44	-0.05	3.61	0.3

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-12-07
Analyzed By:	TD
Easting (X, ft):	2,386,837
Northing (Y, ft):	198,513
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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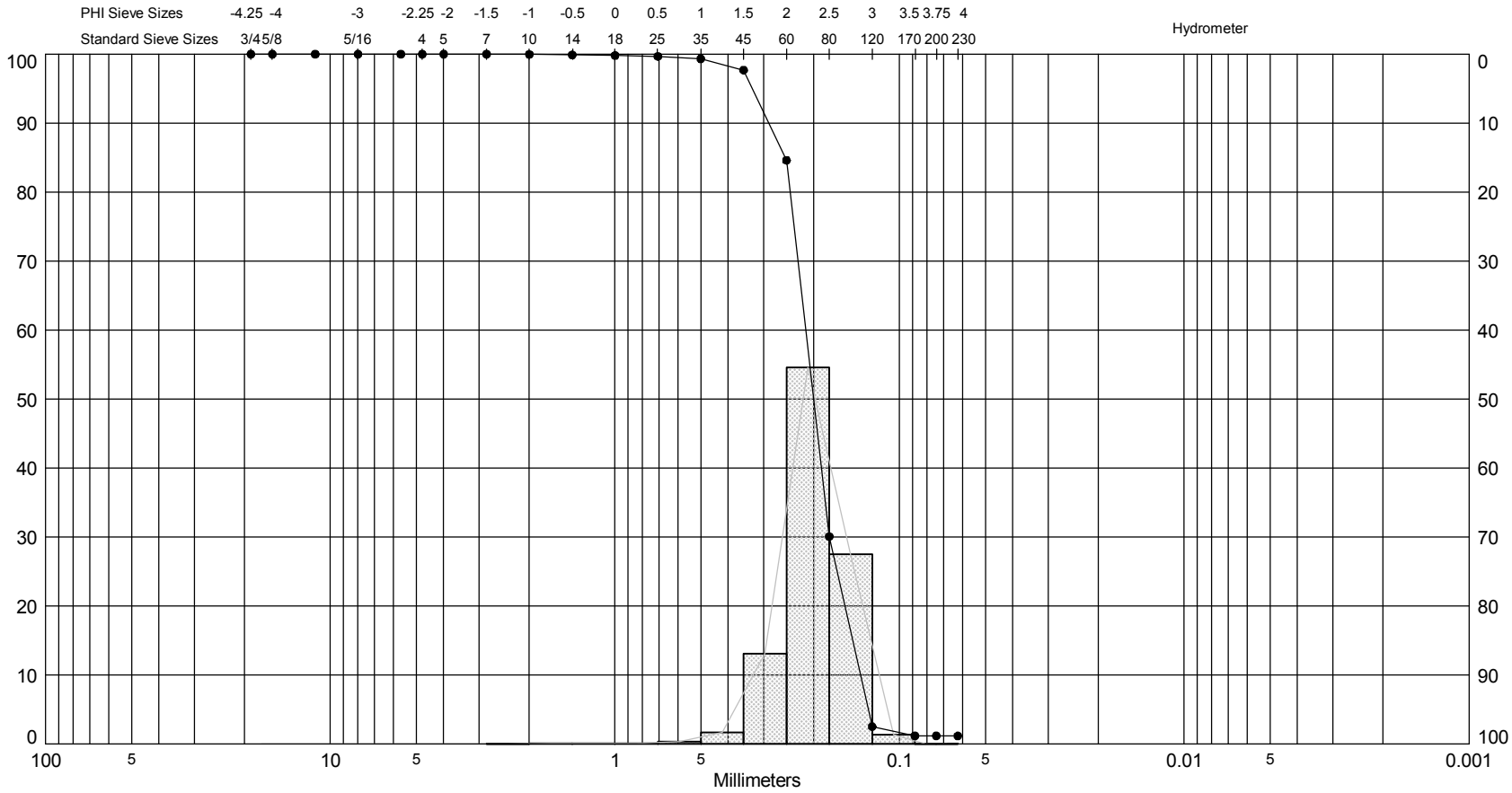
SIEVE ANALYSIS FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
200+00 MLW	—●—	-2.9	SP	#200 - 1.16 #230 - 1.15			2.32	2.31	-1.34	10.54	0.4

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	10-29-07
Analyzed By:	PB
Easting (X, ft):	2,386,954
Northing (Y, ft):	198,390
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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FL 33431
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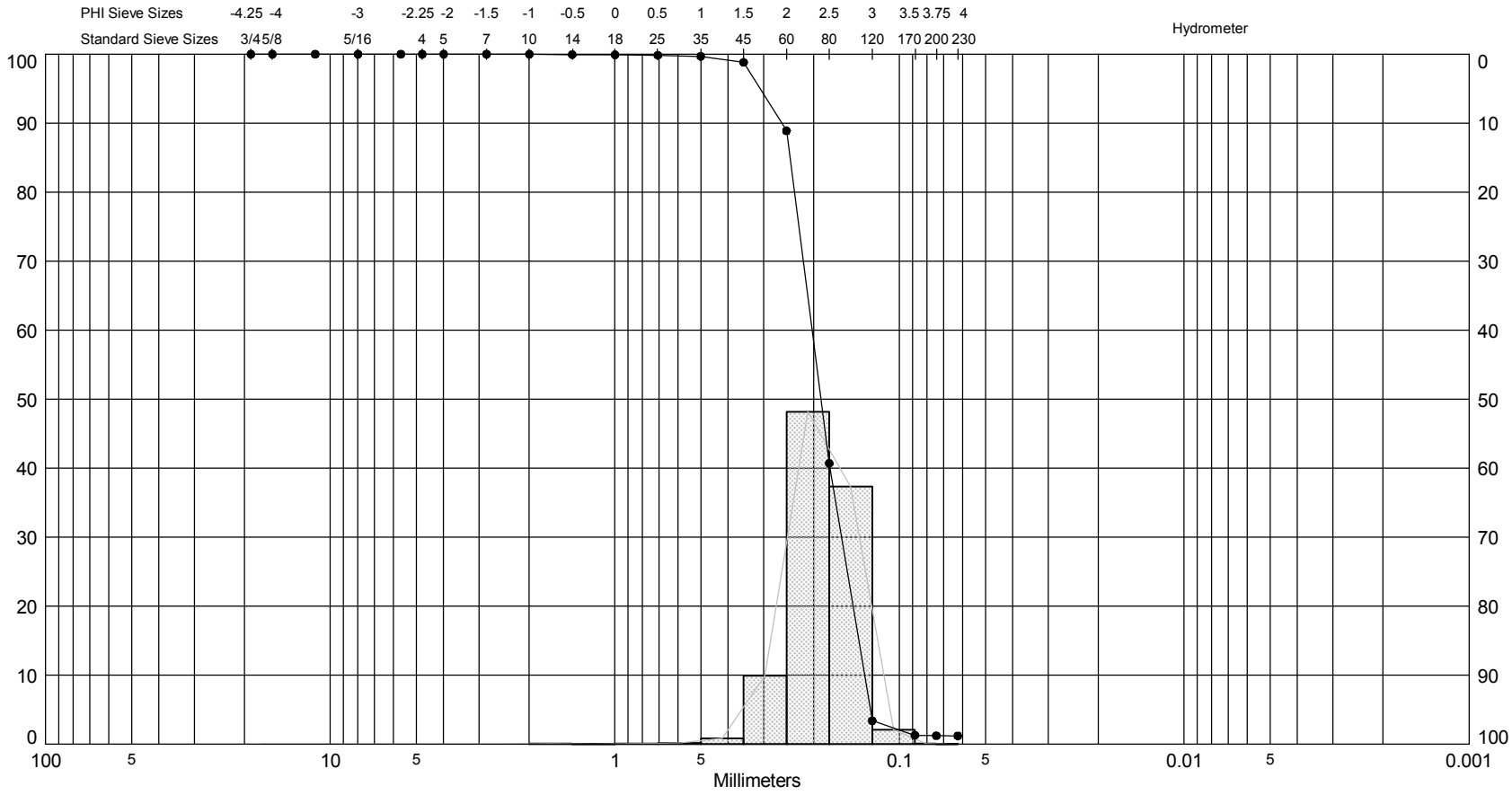
fax (561) 391-9116

SIEVE ANALYSIS FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
200+00 MTL	—●—	-0.7	SP	#200 - 1.21 #230 - 1.20			2.4	2.4	-0.85	7.04	0.38

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-12-07
Analyzed By:	TD
Easting (X, ft):	2,386,888
Northing (Y, ft):	198,459
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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FL 33431
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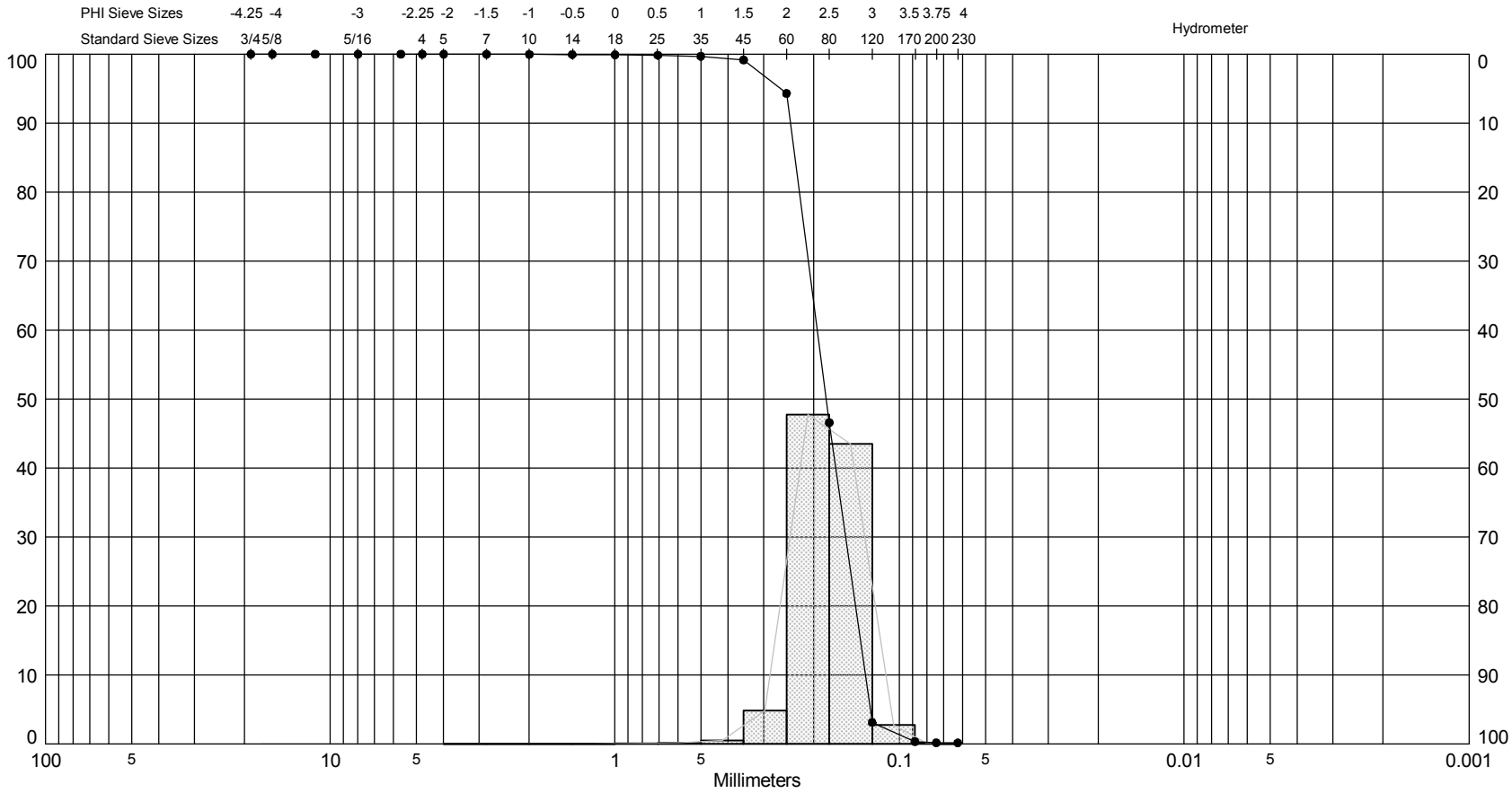
SIEVE ANALYSIS FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
200+00 Toe of Dune	—●—	3.9	SP	#200 - 0.16 #230 - 0.15			2.46	2.46	-1.16	11.71	0.36

Comments: Native Beach

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island 2007
Analysis Date:	11-12-07
Analyzed By:	TD
Easting (X, ft):	2,386,833
Northing (Y, ft):	198,517
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
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SIEVE ANALYSIS FIGURE EIGHT.GPJ JPBRAZIL.GDT 10/27/09

APPENDIX 14

2007 Figure Eight Island Native Beach Composite Grab Sample Granularmetric Reports

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Native Beach

Sample Name: Beach Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.02	0.02	#200 - 1.13 #230 - 1.04			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.03	0.03	0.03	0.03
3.5	-2.50	5.66	0.01	0.01	0.04	0.04
4	-2.25	4.76	0.01	0.01	0.05	0.05
5	-2.00	4.00	0.02	0.02	0.07	0.07
7	-1.50	2.83	0.10	0.10	0.17	0.17
10	-1.00	2.00	0.14	0.14	0.31	0.31
14	-0.50	1.41	0.28	0.28	0.59	0.59
18	0.00	1.00	0.34	0.34	0.93	0.93
25	0.50	0.71	0.43	0.43	1.36	1.36
35	1.00	0.50	0.53	0.53	1.89	1.89
45	1.50	0.35	1.13	1.13	3.02	3.02
60	2.00	0.25	6.54	6.54	9.56	9.56
80	2.50	0.18	40.37	40.37	49.93	49.93
120	3.00	0.13	42.18	42.18	92.11	92.11
170	3.50	0.09	6.39	6.39	98.50	98.50
200	3.75	0.07	0.37	0.37	98.87	98.87
230	4.00	0.06	0.09	0.09	98.96	98.96

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.23	2.90	2.80	2.50	2.19	2.08	1.65

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.44	0.18	0.55	-2.86	20.3

GRANULARMETRIC REPORT FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Native Beach

Sample Name: 200+00 Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.02	0.02	#200 - 1.10 #230 - 1.04		6	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.02	0.02	0.02	0.02
4	-2.25	4.76	0.01	0.01	0.03	0.03
5	-2.00	4.00	0.00	0.00	0.03	0.03
7	-1.50	2.83	0.03	0.03	0.06	0.06
10	-1.00	2.00	0.06	0.06	0.12	0.12
14	-0.50	1.41	0.11	0.11	0.23	0.23
18	0.00	1.00	0.16	0.16	0.39	0.39
25	0.50	0.71	0.24	0.24	0.63	0.63
35	1.00	0.50	0.39	0.39	1.02	1.02
45	1.50	0.35	0.96	0.96	1.98	1.98
60	2.00	0.25	5.93	5.93	7.91	7.91
80	2.50	0.18	41.28	41.28	49.19	49.19
120	3.00	0.13	43.74	43.74	92.93	92.93
170	3.50	0.09	5.68	5.68	98.61	98.61
200	3.75	0.07	0.29	0.29	98.90	98.90
230	4.00	0.06	0.06	0.06	98.96	98.96

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.18	2.90	2.80	2.51	2.21	2.10	1.75

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.47	0.18	0.46	-2.22	18.07

GRANULARMETRIC REPORT FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Native Beach

Sample Name: 160+00 Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.11	0.02	#200 - 1.20 #230 - 1.13		5	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.02	0.02	0.02	0.02
7	-1.50	2.83	0.08	0.08	0.10	0.10
10	-1.00	2.00	0.10	0.10	0.20	0.20
14	-0.50	1.41	0.23	0.23	0.43	0.43
18	0.00	1.00	0.23	0.23	0.66	0.66
25	0.50	0.71	0.29	0.29	0.95	0.95
35	1.00	0.50	0.41	0.41	1.36	1.36
45	1.50	0.35	1.17	1.17	2.53	2.53
60	2.00	0.25	7.40	7.40	9.93	9.93
80	2.50	0.18	40.94	40.94	50.87	50.87
120	3.00	0.13	41.52	41.52	92.39	92.39
170	3.50	0.09	6.09	6.09	98.48	98.48
200	3.75	0.07	0.32	0.32	98.80	98.80
230	4.00	0.06	0.07	0.07	98.87	98.87

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.21	2.90	2.79	2.49	2.18	2.07	1.67

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.45	0.18	0.5	-2.36	16.85

GRANULARMETRIC REPORT FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Native Beach

Sample Name: 120+00 Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.01	0.02	#200 - 1.11 #230 - 1.03		5	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.01	0.01	0.01	0.01
4	-2.25	4.76	0.01	0.01	0.02	0.02
5	-2.00	4.00	0.05	0.05	0.07	0.07
7	-1.50	2.83	0.09	0.09	0.16	0.16
10	-1.00	2.00	0.16	0.16	0.32	0.32
14	-0.50	1.41	0.26	0.26	0.58	0.58
18	0.00	1.00	0.32	0.32	0.90	0.90
25	0.50	0.71	0.45	0.45	1.35	1.35
35	1.00	0.50	0.56	0.56	1.91	1.91
45	1.50	0.35	1.20	1.20	3.11	3.11
60	2.00	0.25	6.76	6.76	9.87	9.87
80	2.50	0.18	38.58	38.58	48.45	48.45
120	3.00	0.13	42.99	42.99	91.44	91.44
170	3.50	0.09	7.06	7.06	98.50	98.50
200	3.75	0.07	0.39	0.39	98.89	98.89
230	4.00	0.06	0.08	0.08	98.97	98.97

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.25	2.91	2.81	2.52	2.20	2.08	1.64

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.45	0.18	0.55	-2.68	17.97

GRANULARMETRIC REPORT FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Native Beach

Sample Name: 80+00 Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.95	0.01	#200 - 1.09 #230 - 0.96			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.12	0.12	0.12	0.12
3.5	-2.50	5.66	0.01	0.01	0.13	0.13
4	-2.25	4.76	0.02	0.02	0.15	0.15
5	-2.00	4.00	0.02	0.02	0.17	0.17
7	-1.50	2.83	0.18	0.18	0.35	0.35
10	-1.00	2.00	0.24	0.24	0.59	0.59
14	-0.50	1.41	0.53	0.53	1.12	1.12
18	0.00	1.00	0.65	0.65	1.77	1.77
25	0.50	0.71	0.76	0.76	2.53	2.53
35	1.00	0.50	0.73	0.73	3.26	3.26
45	1.50	0.35	1.20	1.20	4.46	4.46
60	2.00	0.25	6.08	6.08	10.54	10.54
80	2.50	0.18	40.67	40.67	51.21	51.21
120	3.00	0.13	40.45	40.45	91.66	91.66
170	3.50	0.09	6.76	6.76	98.42	98.42
200	3.75	0.07	0.49	0.49	98.91	98.91
230	4.00	0.06	0.13	0.13	99.04	99.04

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.25	2.91	2.79	2.49	2.18	2.07	1.54

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.4	0.19	0.66	-3.16	19.77

GRANULARMETRIC REPORT FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Native Beach

Sample Name: Dune Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.29	0.03	#200 - 0.38 #230 - 0.32			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.01	0.01	0.01	0.01
14	-0.50	1.41	0.01	0.01	0.02	0.02
18	0.00	1.00	0.02	0.02	0.04	0.04
25	0.50	0.71	0.03	0.03	0.07	0.07
35	1.00	0.50	0.08	0.08	0.15	0.15
45	1.50	0.35	0.37	0.37	0.52	0.52
60	2.00	0.25	3.96	3.96	4.48	4.48
80	2.50	0.18	46.09	46.09	50.57	50.57
120	3.00	0.13	45.16	45.16	95.73	95.73
170	3.50	0.09	3.64	3.64	99.37	99.37
200	3.75	0.07	0.25	0.25	99.62	99.62
230	4.00	0.06	0.06	0.06	99.68	99.68

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.99	2.87	2.77	2.49	2.22	2.12	2.01

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.49	0.18	0.34	-0.52	7.16

GRANULARMETRIC REPORT FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Native Beach

Sample Name: Toe of Dune Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.24	0.02	#200 - 0.34 #230 - 0.26			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.29	0.29	0.29	0.29
3.5	-2.50	5.66	0.03	0.03	0.32	0.32
4	-2.25	4.76	0.00	0.00	0.32	0.32
5	-2.00	4.00	0.04	0.04	0.36	0.36
7	-1.50	2.83	0.05	0.05	0.41	0.41
10	-1.00	2.00	0.10	0.10	0.51	0.51
14	-0.50	1.41	0.23	0.23	0.74	0.74
18	0.00	1.00	0.21	0.21	0.95	0.95
25	0.50	0.71	0.27	0.27	1.22	1.22
35	1.00	0.50	0.20	0.20	1.42	1.42
45	1.50	0.35	0.60	0.60	2.02	2.02
60	2.00	0.25	6.77	6.77	8.79	8.79
80	2.50	0.18	48.68	48.68	57.47	57.47
120	3.00	0.13	37.31	37.31	94.78	94.78
170	3.50	0.09	4.41	4.41	99.19	99.19
200	3.75	0.07	0.47	0.47	99.66	99.66
230	4.00	0.06	0.08	0.08	99.74	99.74

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.02	2.86	2.73	2.42	2.17	2.07	1.72

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.4	0.19	0.57	-4.47	40.33

GRANULARMETRIC REPORT FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Native Beach

Sample Name: Mid-Berm Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.46	0.05	#200 - 0.55 #230 - 0.51			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.04	0.04	0.04	0.04
7	-1.50	2.83	0.05	0.05	0.09	0.09
10	-1.00	2.00	0.05	0.05	0.14	0.14
14	-0.50	1.41	0.07	0.07	0.21	0.21
18	0.00	1.00	0.05	0.05	0.26	0.26
25	0.50	0.71	0.11	0.11	0.37	0.37
35	1.00	0.50	0.20	0.20	0.57	0.57
45	1.50	0.35	0.74	0.74	1.31	1.31
60	2.00	0.25	6.34	6.34	7.65	7.65
80	2.50	0.18	53.01	53.01	60.66	60.66
120	3.00	0.13	35.35	35.35	96.01	96.01
170	3.50	0.09	3.14	3.14	99.15	99.15
200	3.75	0.07	0.30	0.30	99.45	99.45
230	4.00	0.06	0.04	0.04	99.49	99.49

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.99	2.83	2.70	2.40	2.16	2.08	1.79

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.41	0.19	0.41	-2.14	22.05

GRANULARMETRIC REPORT FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Native Beach

Sample Name: 2.0 / 3.0 Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.43	0.01	#200 - 0.46 #230 - 0.44			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.01	0.01	0.01	0.01
10	-1.00	2.00	0.00	0.00	0.01	0.01
14	-0.50	1.41	0.00	0.00	0.01	0.01
18	0.00	1.00	0.00	0.00	0.01	0.01
25	0.50	0.71	0.01	0.01	0.02	0.02
35	1.00	0.50	0.01	0.01	0.03	0.03
45	1.50	0.35	0.10	0.10	0.13	0.13
60	2.00	0.25	4.12	4.12	4.25	4.25
80	2.50	0.18	55.57	55.57	59.82	59.82
120	3.00	0.13	37.79	37.79	97.61	97.61
170	3.50	0.09	1.79	1.79	99.40	99.40
200	3.75	0.07	0.14	0.14	99.54	99.54
230	4.00	0.06	0.02	0.02	99.56	99.56

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.97	2.82	2.70	2.41	2.19	2.11	2.01

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.44	0.18	0.31	-0.12	6.84

GRANULARMETRIC REPORT FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Native Beach

Sample Name: MHW Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.41	0.03	#200 - 0.46 #230 - 0.44			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.01	0.01	0.01	0.01
25	0.50	0.71	0.01	0.01	0.02	0.02
35	1.00	0.50	0.02	0.02	0.04	0.04
45	1.50	0.35	0.08	0.08	0.12	0.12
60	2.00	0.25	6.09	6.09	6.21	6.21
80	2.50	0.18	55.45	55.45	61.66	61.66
120	3.00	0.13	36.65	36.65	98.31	98.31
170	3.50	0.09	1.18	1.18	99.49	99.49
200	3.75	0.07	0.05	0.05	99.54	99.54
230	4.00	0.06	0.02	0.02	99.56	99.56

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.95	2.80	2.68	2.39	2.17	2.09	1.90

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.41	0.19	0.31	-0.11	3.82

GRANULARMETRIC REPORT FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Native Beach

Sample Name: MTL Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.20	0.02	#200 - 1.23 #230 - 1.22			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.02	0.02	0.02	0.02
5	-2.00	4.00	0.00	0.00	0.02	0.02
7	-1.50	2.83	0.00	0.00	0.02	0.02
10	-1.00	2.00	0.02	0.02	0.04	0.04
14	-0.50	1.41	0.04	0.04	0.08	0.08
18	0.00	1.00	0.06	0.06	0.14	0.14
25	0.50	0.71	0.11	0.11	0.25	0.25
35	1.00	0.50	0.23	0.23	0.48	0.48
45	1.50	0.35	1.18	1.18	1.66	1.66
60	2.00	0.25	12.71	12.71	14.37	14.37
80	2.50	0.18	48.72	48.72	63.09	63.09
120	3.00	0.13	34.09	34.09	97.18	97.18
170	3.50	0.09	1.54	1.54	98.72	98.72
200	3.75	0.07	0.05	0.05	98.77	98.77
230	4.00	0.06	0.01	0.01	98.78	98.78

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.97	2.81	2.67	2.37	2.11	2.02	1.63

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.35	0.20	0.4	-1.3	11.36

GRANULARMETRIC REPORT FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Native Beach

Sample Name: MLW Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.07	0.01	#200 - 1.09 #230 - 1.08			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.02	0.02	0.02	0.02
5	-2.00	4.00	0.02	0.02	0.04	0.04
7	-1.50	2.83	0.13	0.13	0.17	0.17
10	-1.00	2.00	0.16	0.16	0.33	0.33
14	-0.50	1.41	0.24	0.24	0.57	0.57
18	0.00	1.00	0.27	0.27	0.84	0.84
25	0.50	0.71	0.36	0.36	1.20	1.20
35	1.00	0.50	0.59	0.59	1.79	1.79
45	1.50	0.35	2.00	2.00	3.79	3.79
60	2.00	0.25	12.87	12.87	16.66	16.66
80	2.50	0.18	51.48	51.48	68.14	68.14
120	3.00	0.13	29.44	29.44	97.58	97.58
170	3.50	0.09	1.29	1.29	98.87	98.87
200	3.75	0.07	0.04	0.04	98.91	98.91
230	4.00	0.06	0.01	0.01	98.92	98.92

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.96	2.77	2.62	2.32	2.08	1.97	1.55

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.28	0.21	0.51	-2.77	19.03

GRANULARMETRIC REPORT FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Native Beach

Sample Name: -6.0 Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.29	0.01	#200 - 1.31 #230 - 1.30			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.07	0.07	0.07	0.07
4	-2.25	4.76	0.08	0.08	0.15	0.15
5	-2.00	4.00	0.07	0.07	0.22	0.22
7	-1.50	2.83	0.38	0.38	0.60	0.60
10	-1.00	2.00	0.62	0.62	1.22	1.22
14	-0.50	1.41	1.30	1.30	2.52	2.52
18	0.00	1.00	1.80	1.80	4.32	4.32
25	0.50	0.71	2.23	2.23	6.55	6.55
35	1.00	0.50	2.59	2.59	9.14	9.14
45	1.50	0.35	5.04	5.04	14.18	14.18
60	2.00	0.25	15.37	15.37	29.55	29.55
80	2.50	0.18	38.17	38.17	67.72	67.72
120	3.00	0.13	28.41	28.41	96.13	96.13
170	3.50	0.09	2.48	2.48	98.61	98.61
200	3.75	0.07	0.08	0.08	98.69	98.69
230	4.00	0.06	0.01	0.01	98.70	98.70

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.98	2.79	2.63	2.27	1.85	1.56	0.15

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.07	0.24	0.85	-2.05	8.23

GRANULARMETRIC REPORT FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Native Beach

Sample Name: -8.8 Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.39	0.01	#200 - 1.49 #230 - 1.40			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.03	0.03	0.03	0.03
7	-1.50	2.83	0.22	0.22	0.25	0.25
10	-1.00	2.00	0.24	0.24	0.49	0.49
14	-0.50	1.41	0.57	0.57	1.06	1.06
18	0.00	1.00	0.53	0.53	1.59	1.59
25	0.50	0.71	0.58	0.58	2.17	2.17
35	1.00	0.50	0.62	0.62	2.79	2.79
45	1.50	0.35	1.21	1.21	4.00	4.00
60	2.00	0.25	4.97	4.97	8.97	8.97
80	2.50	0.18	29.11	29.11	38.08	38.08
120	3.00	0.13	49.44	49.44	87.52	87.52
170	3.50	0.09	10.55	10.55	98.07	98.07
200	3.75	0.07	0.44	0.44	98.51	98.51
230	4.00	0.06	0.09	0.09	98.60	98.60

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.35	2.96	2.87	2.62	2.28	2.12	1.60

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.51	0.18	0.63	-2.95	16.69

GRANULARMETRIC REPORT FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Native Beach

Sample Name: -11.6 Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.43	0.01	#200 - 1.56 #230 - 1.44			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.05	0.05	0.05	0.05
7	-1.50	2.83	0.08	0.08	0.13	0.13
10	-1.00	2.00	0.20	0.20	0.33	0.33
14	-0.50	1.41	0.43	0.43	0.76	0.76
18	0.00	1.00	0.48	0.48	1.24	1.24
25	0.50	0.71	0.62	0.62	1.86	1.86
35	1.00	0.50	0.56	0.56	2.42	2.42
45	1.50	0.35	1.12	1.12	3.54	3.54
60	2.00	0.25	4.87	4.87	8.41	8.41
80	2.50	0.18	30.77	30.77	39.18	39.18
120	3.00	0.13	50.10	50.10	89.28	89.28
170	3.50	0.09	8.75	8.75	98.03	98.03
200	3.75	0.07	0.41	0.41	98.44	98.44
230	4.00	0.06	0.12	0.12	98.56	98.56

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.33	2.95	2.86	2.61	2.27	2.12	1.65

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.51	0.18	0.58	-2.88	17.05

GRANULARMETRIC REPORT FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Native Beach

Sample Name: -14.4 Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
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fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.53	0.00	#200 - 1.65 #230 - 1.53			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.10	0.10	0.10	0.10
3.5	-2.50	5.66	0.00	0.00	0.10	0.10
4	-2.25	4.76	0.00	0.00	0.10	0.10
5	-2.00	4.00	0.09	0.09	0.19	0.19
7	-1.50	2.83	0.06	0.06	0.25	0.25
10	-1.00	2.00	0.09	0.09	0.34	0.34
14	-0.50	1.41	0.33	0.33	0.67	0.67
18	0.00	1.00	0.28	0.28	0.95	0.95
25	0.50	0.71	0.33	0.33	1.28	1.28
35	1.00	0.50	0.32	0.32	1.60	1.60
45	1.50	0.35	0.53	0.53	2.13	2.13
60	2.00	0.25	2.18	2.18	4.31	4.31
80	2.50	0.18	27.46	27.46	31.77	31.77
120	3.00	0.13	54.77	54.77	86.54	86.54
170	3.50	0.09	11.31	11.31	97.85	97.85
200	3.75	0.07	0.50	0.50	98.35	98.35
230	4.00	0.06	0.12	0.12	98.47	98.47

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.37	2.98	2.89	2.67	2.38	2.21	2.01

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.59	0.17	0.55	-3.97	31.97

GRANULARMETRIC REPORT FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Native Beach

Sample Name: -17.2 Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.69	0.02	#200 - 1.95 #230 - 1.71			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.02	0.02	0.02	0.02
7	-1.50	2.83	0.11	0.11	0.13	0.13
10	-1.00	2.00	0.16	0.16	0.29	0.29
14	-0.50	1.41	0.18	0.18	0.47	0.47
18	0.00	1.00	0.25	0.25	0.72	0.72
25	0.50	0.71	0.33	0.33	1.05	1.05
35	1.00	0.50	0.41	0.41	1.46	1.46
45	1.50	0.35	0.58	0.58	2.04	2.04
60	2.00	0.25	1.74	1.74	3.78	3.78
80	2.50	0.18	19.53	19.53	23.31	23.31
120	3.00	0.13	56.23	56.23	79.54	79.54
170	3.50	0.09	17.49	17.49	97.03	97.03
200	3.75	0.07	1.02	1.02	98.05	98.05
230	4.00	0.06	0.24	0.24	98.29	98.29

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.44	3.13	2.96	2.74	2.52	2.31	2.03

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.68	0.16	0.52	-3.15	22.59

GRANULARMETRIC REPORT FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Native Beach

Sample Name: -20.0 Comp.

Analysis Date:

Analyzed By:

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP		COMPOSITE

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.85	0.01	#200 - 2.14 #230 - 1.86			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.03	0.03	0.03	0.03
4	-2.25	4.76	0.00	0.00	0.03	0.03
5	-2.00	4.00	0.00	0.00	0.03	0.03
7	-1.50	2.83	0.10	0.10	0.13	0.13
10	-1.00	2.00	0.16	0.16	0.29	0.29
14	-0.50	1.41	0.34	0.34	0.63	0.63
18	0.00	1.00	0.38	0.38	1.01	1.01
25	0.50	0.71	0.67	0.67	1.68	1.68
35	1.00	0.50	0.97	0.97	2.65	2.65
45	1.50	0.35	1.18	1.18	3.83	3.83
60	2.00	0.25	3.02	3.02	6.85	6.85
80	2.50	0.18	20.76	20.76	27.61	27.61
120	3.00	0.13	53.56	53.56	81.17	81.17
170	3.50	0.09	15.59	15.59	96.76	96.76
200	3.75	0.07	1.10	1.10	97.86	97.86
230	4.00	0.06	0.28	0.28	98.14	98.14

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

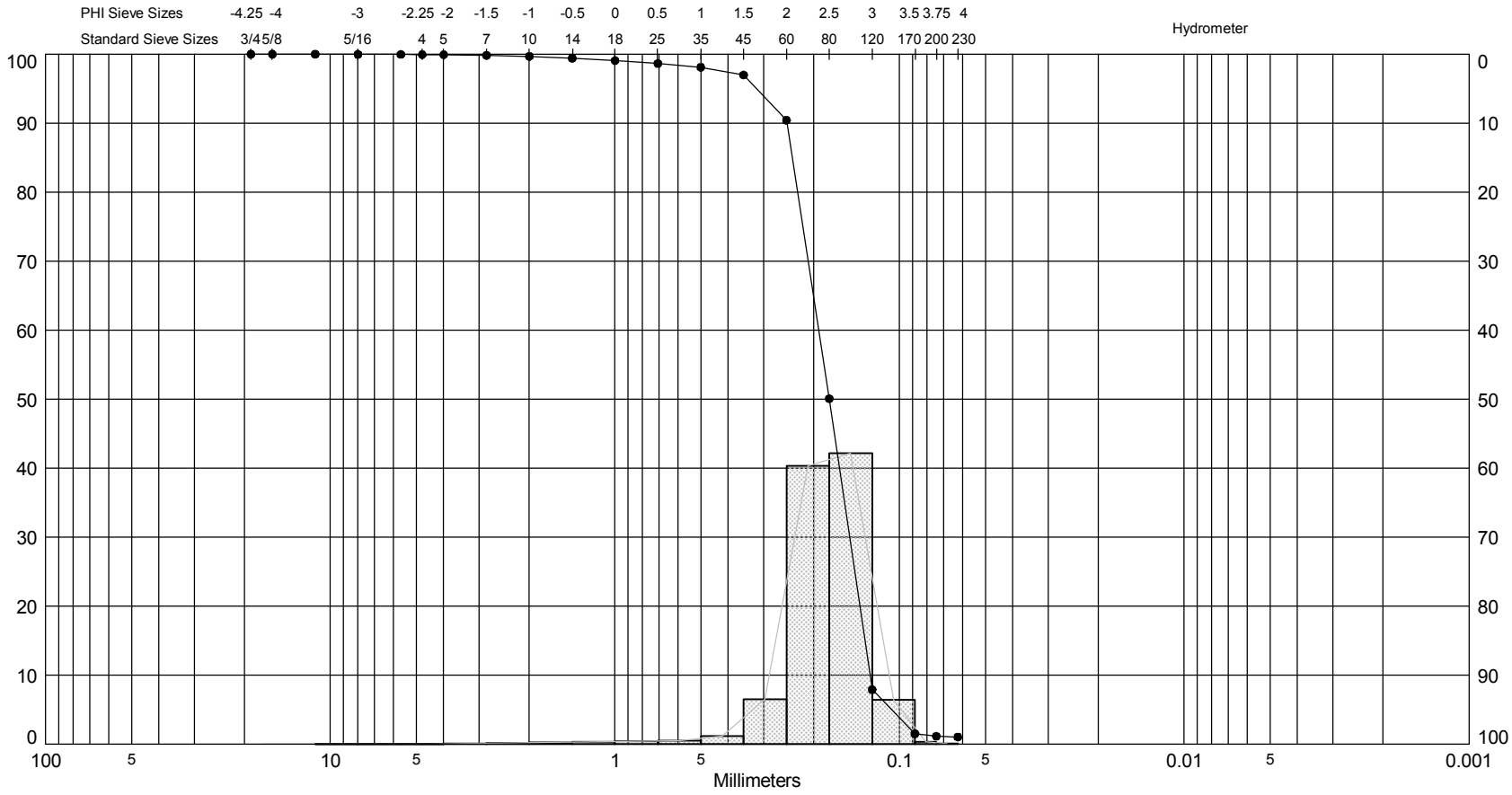
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.44	3.09	2.94	2.71	2.44	2.22	1.69

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.61	0.16	0.6	-2.8	16.47

GRANULARMETRIC REPORT FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

APPENDIX 15

2007 Figure Eight Island Native Beach Composite Grab Sample Grain Size Distribution Curves/Histograms



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
Beach Comp.	—●—		SP	#200 - 1.13 #230 - 1.04			2.5	2.44	-2.86	20.3	0.55

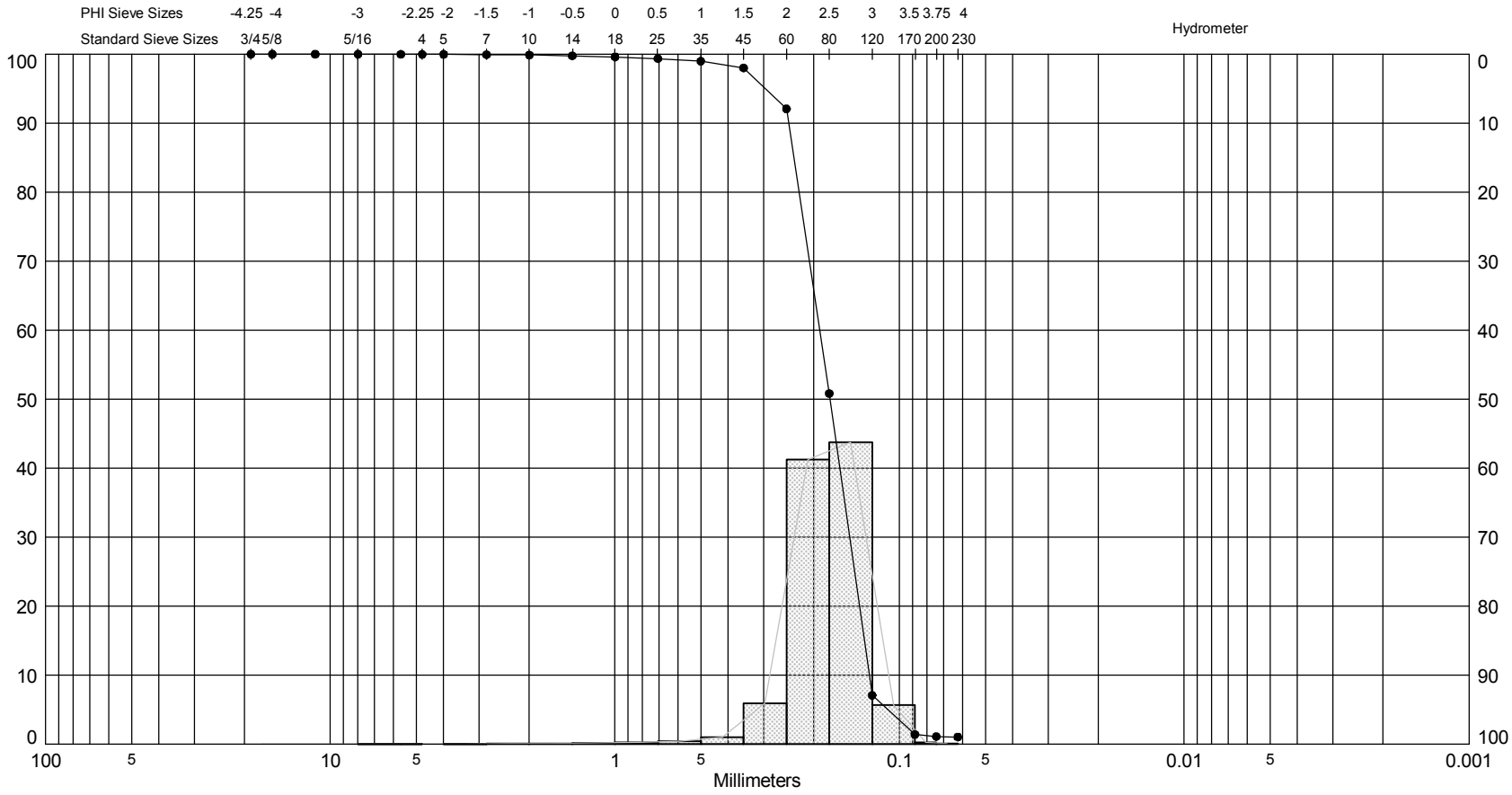
Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Native Beach
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

SIEVE ANALYSIS FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
200+00 Comp.	—●—		SP	#200 - 1.10 #230 - 1.04		6	2.51	2.47	-2.22	18.07	0.46

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Native Beach
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

Coastal Planning & Engineering
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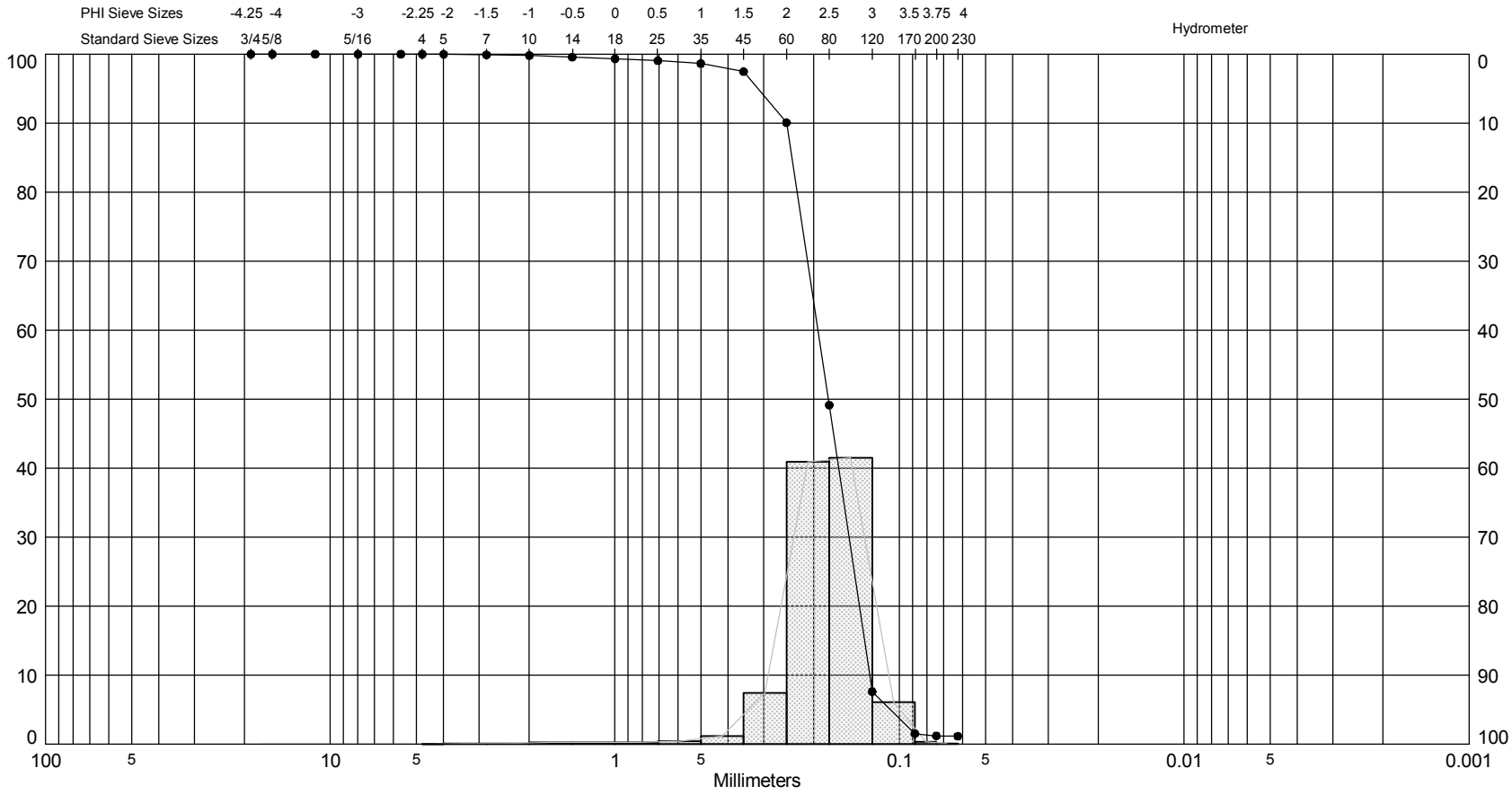
SIEVE ANALYSIS FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
160+00 Comp.	—●—		SP	#200 - 1.20 #230 - 1.13		5	2.49	2.45	-2.36	16.85	0.5

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Native Beach
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

Coastal Planning & Engineering
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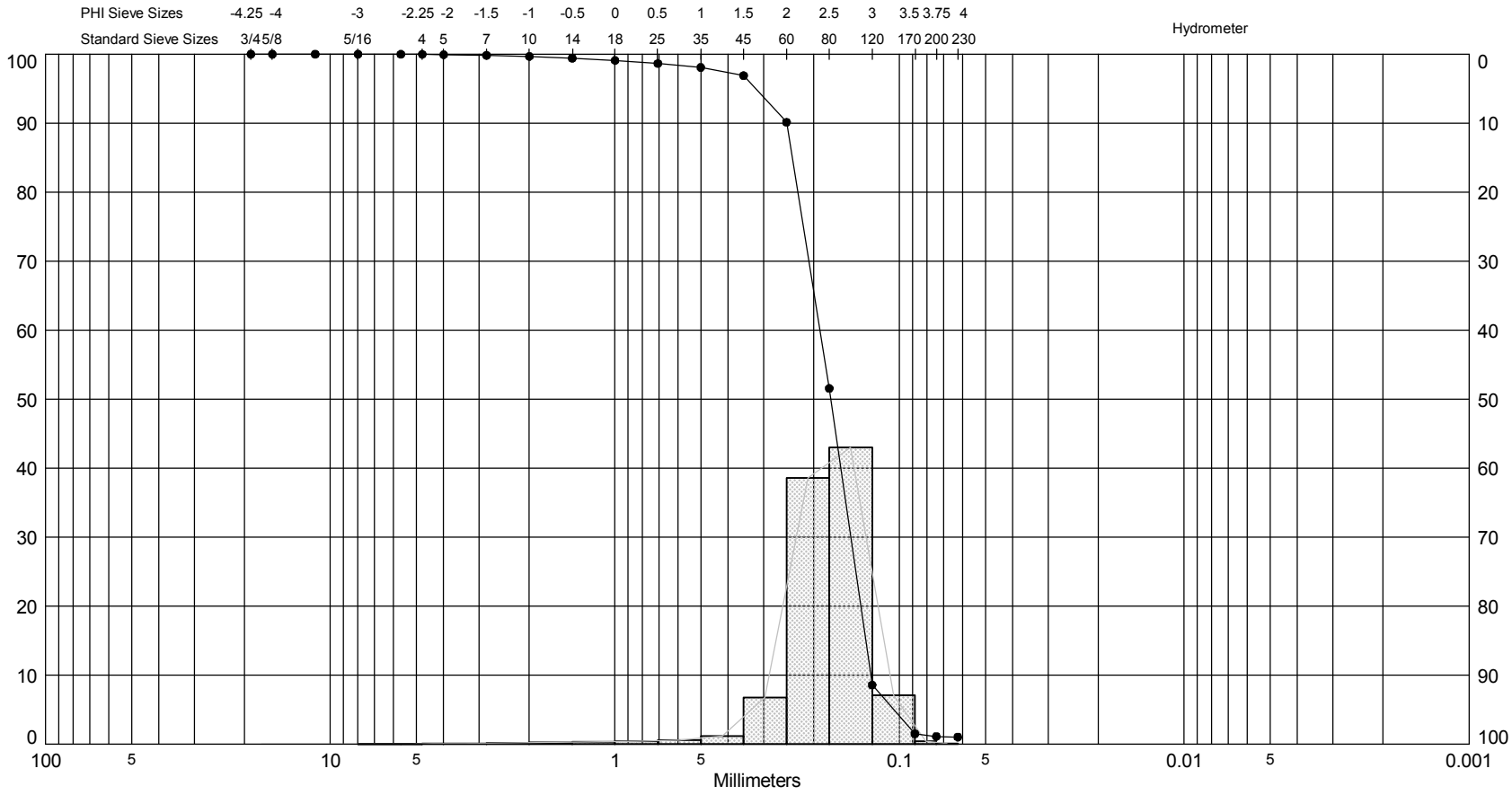
fax (561) 391-9116

SIEVE ANALYSIS FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
120+00 Comp.	—●—		SP	#200 - 1.11 #230 - 1.03		5	2.52	2.45	-2.68	17.97	0.55

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Native Beach
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

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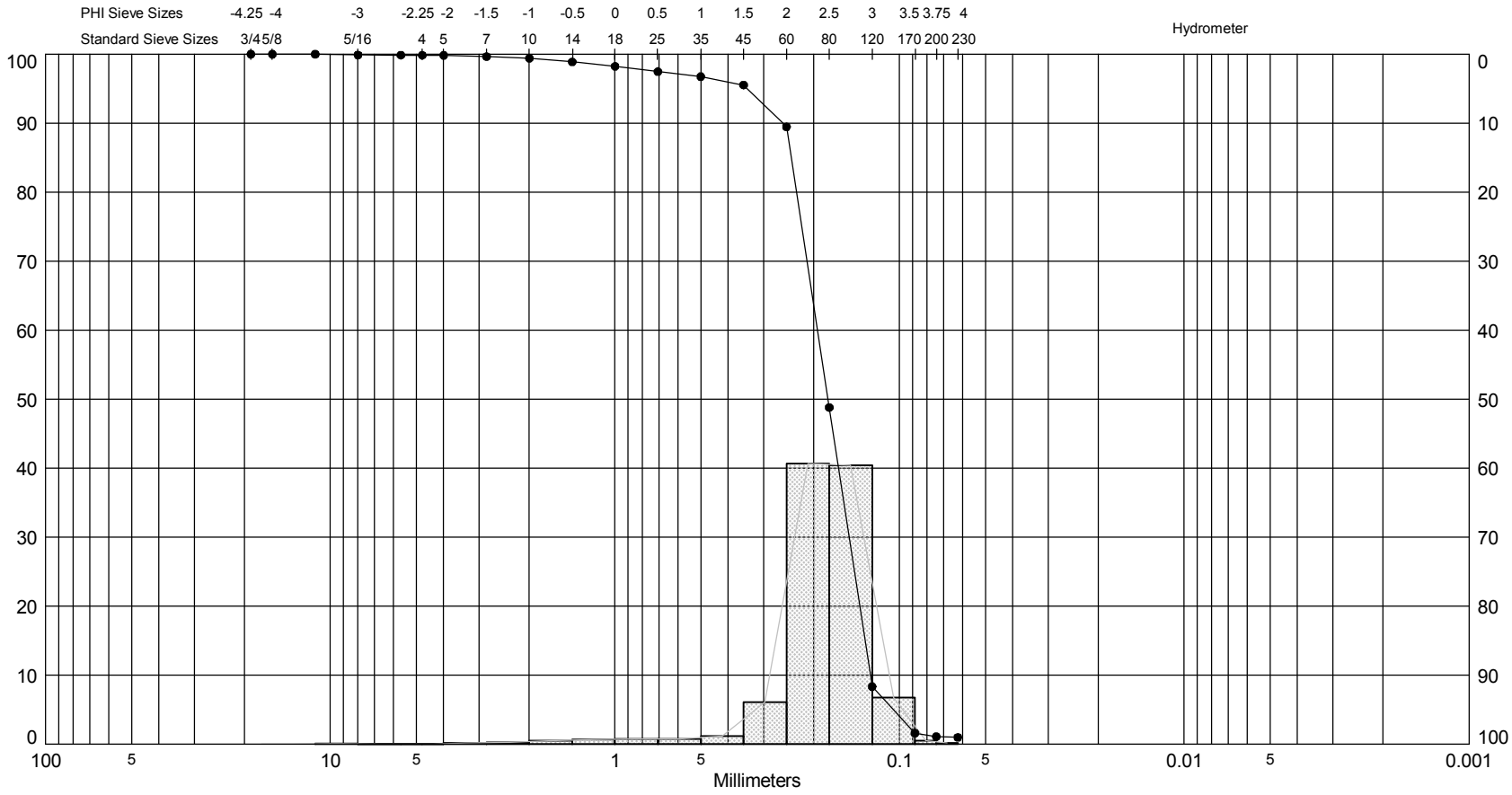
SIEVE ANALYSIS FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
80+00 Comp.	—●—		SP	#200 - 1.09 #230 - 0.96			2.49	2.4	-3.16	19.77	0.66

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Native Beach
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

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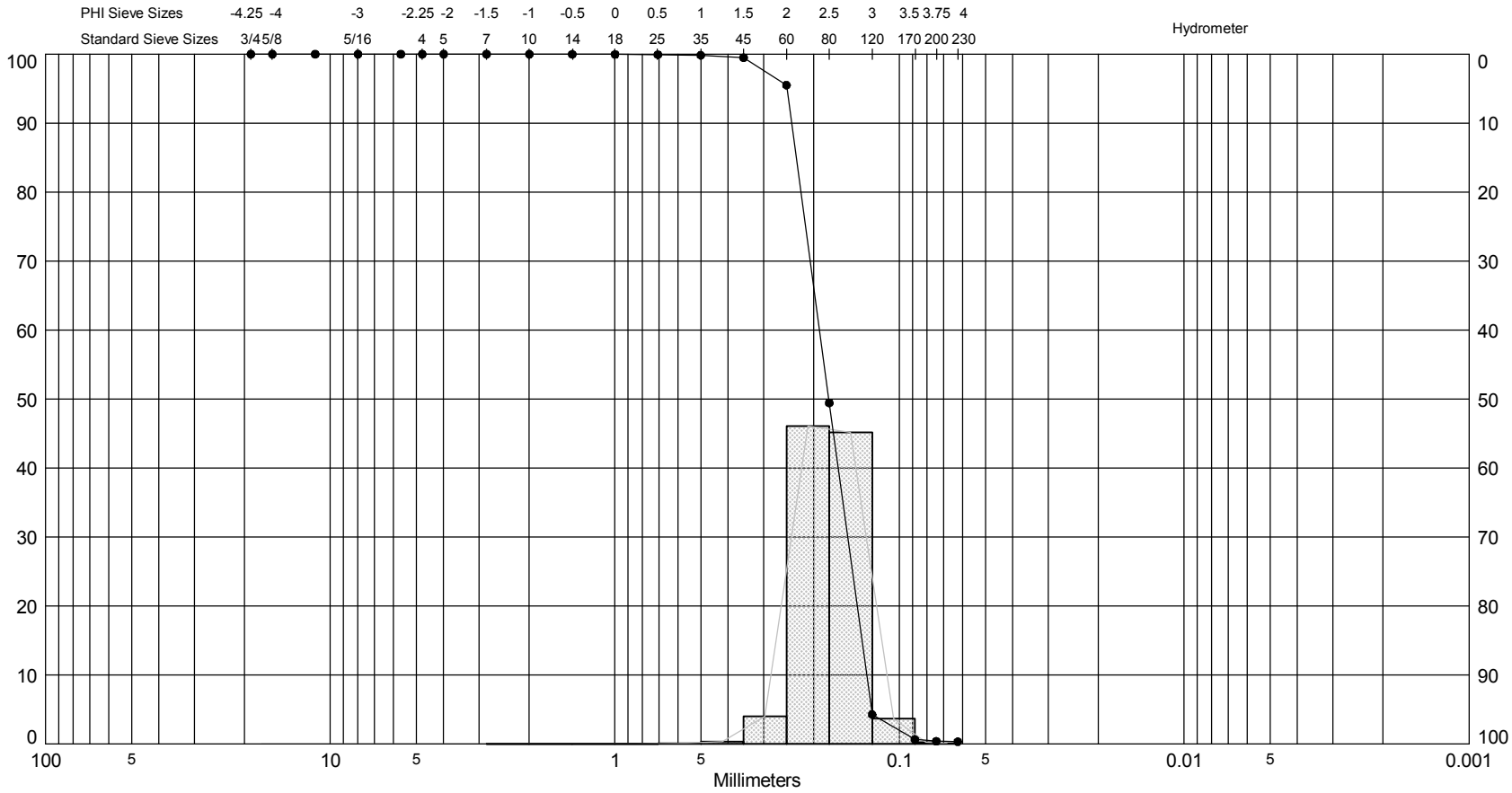
SIEVE ANALYSIS FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
Dune Comp.	—●—		SP	#200 - 0.38 #230 - 0.32			2.49	2.49	-0.52	7.16	0.34

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Native Beach
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

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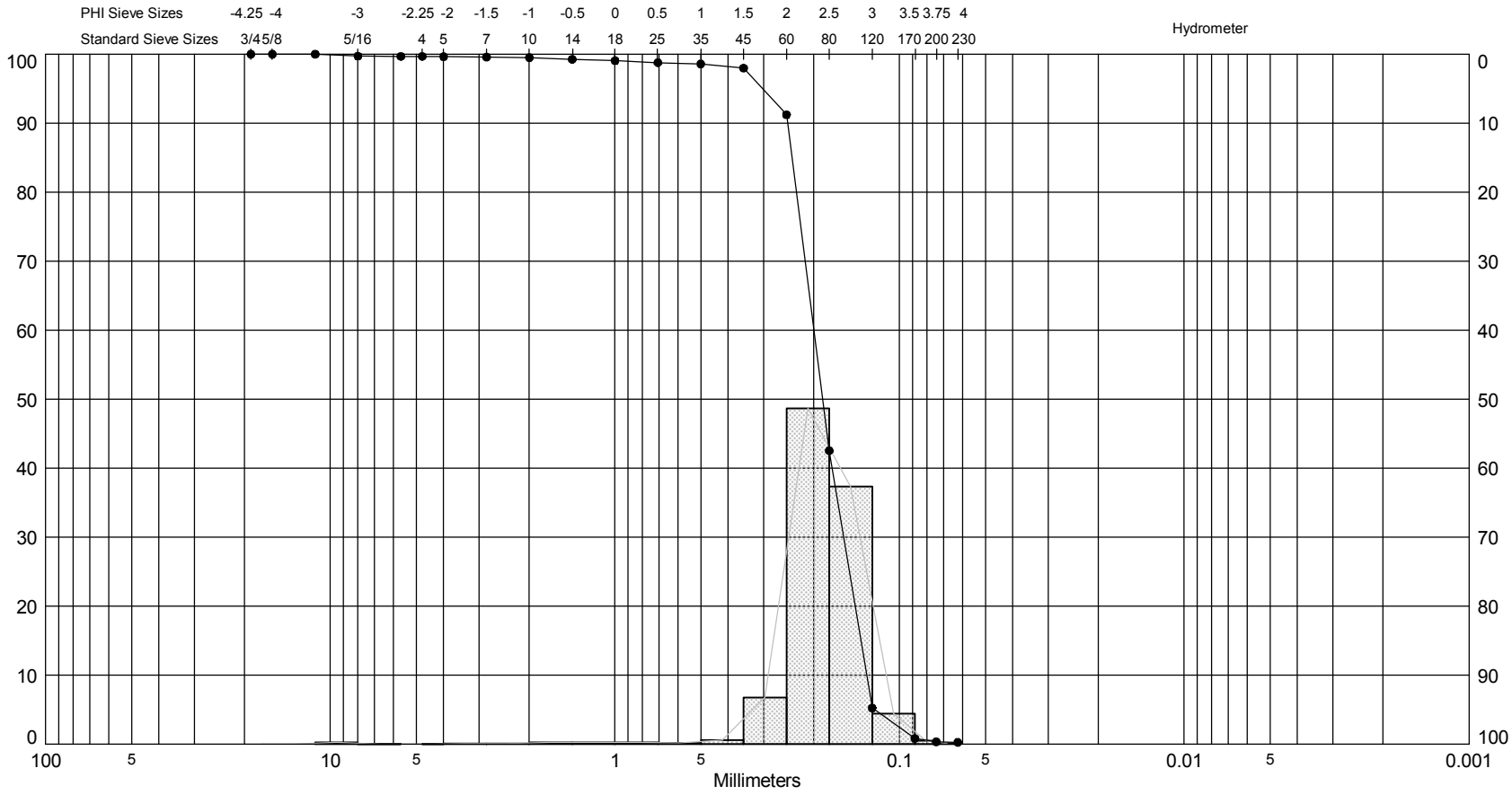
SIEVE ANALYSIS FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
Toe of Dune Comp.	—●—		SP	#200 - 0.34 #230 - 0.26			2.42	2.4	-4.47	40.33	0.57

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Native Beach
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

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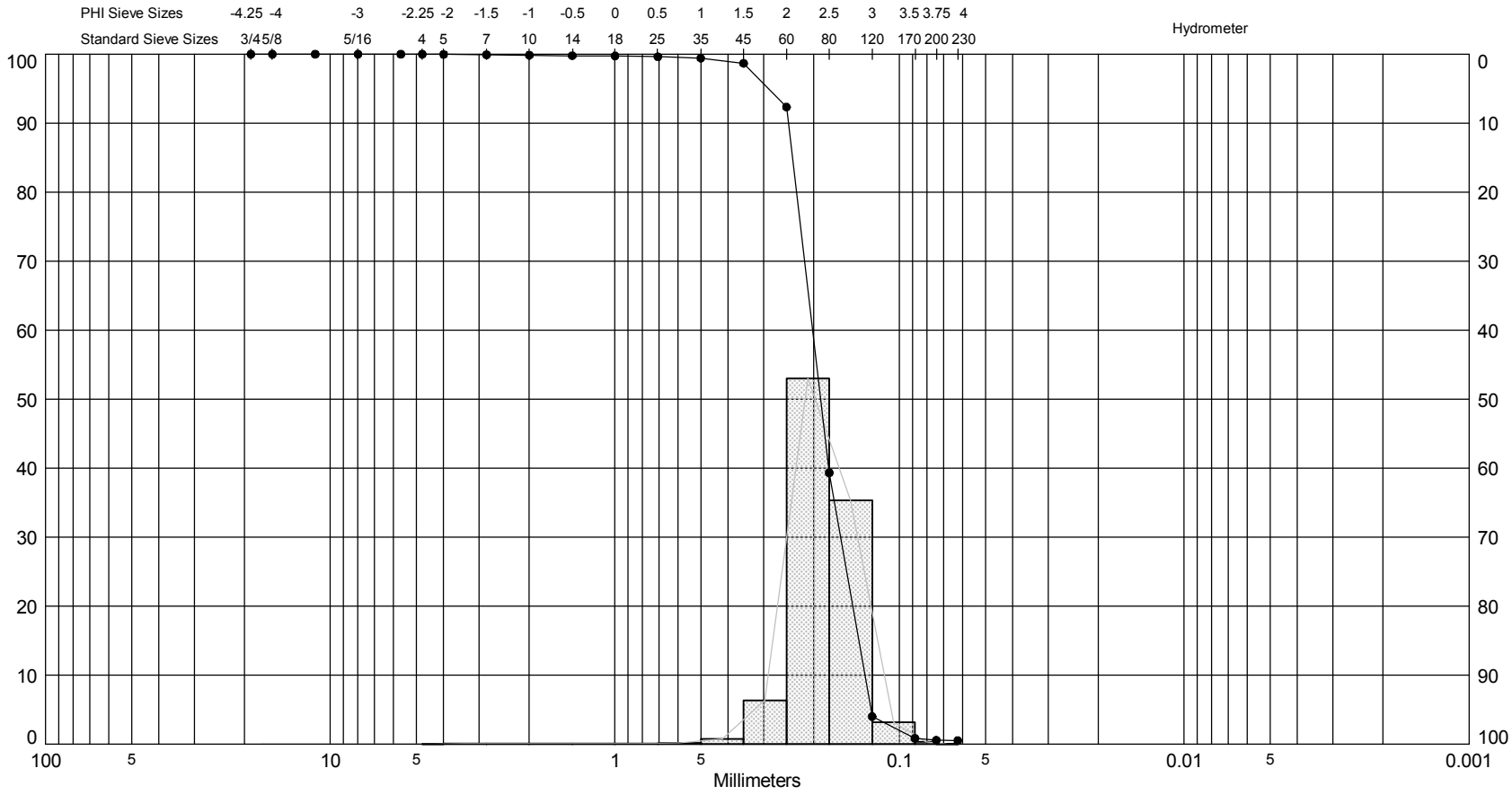
SIEVE ANALYSIS FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
Mid-Berm Comp.	—●—		SP	#200 - 0.55 #230 - 0.51			2.4	2.41	-2.14	22.05	0.41

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Native Beach
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

Coastal Planning & Engineering
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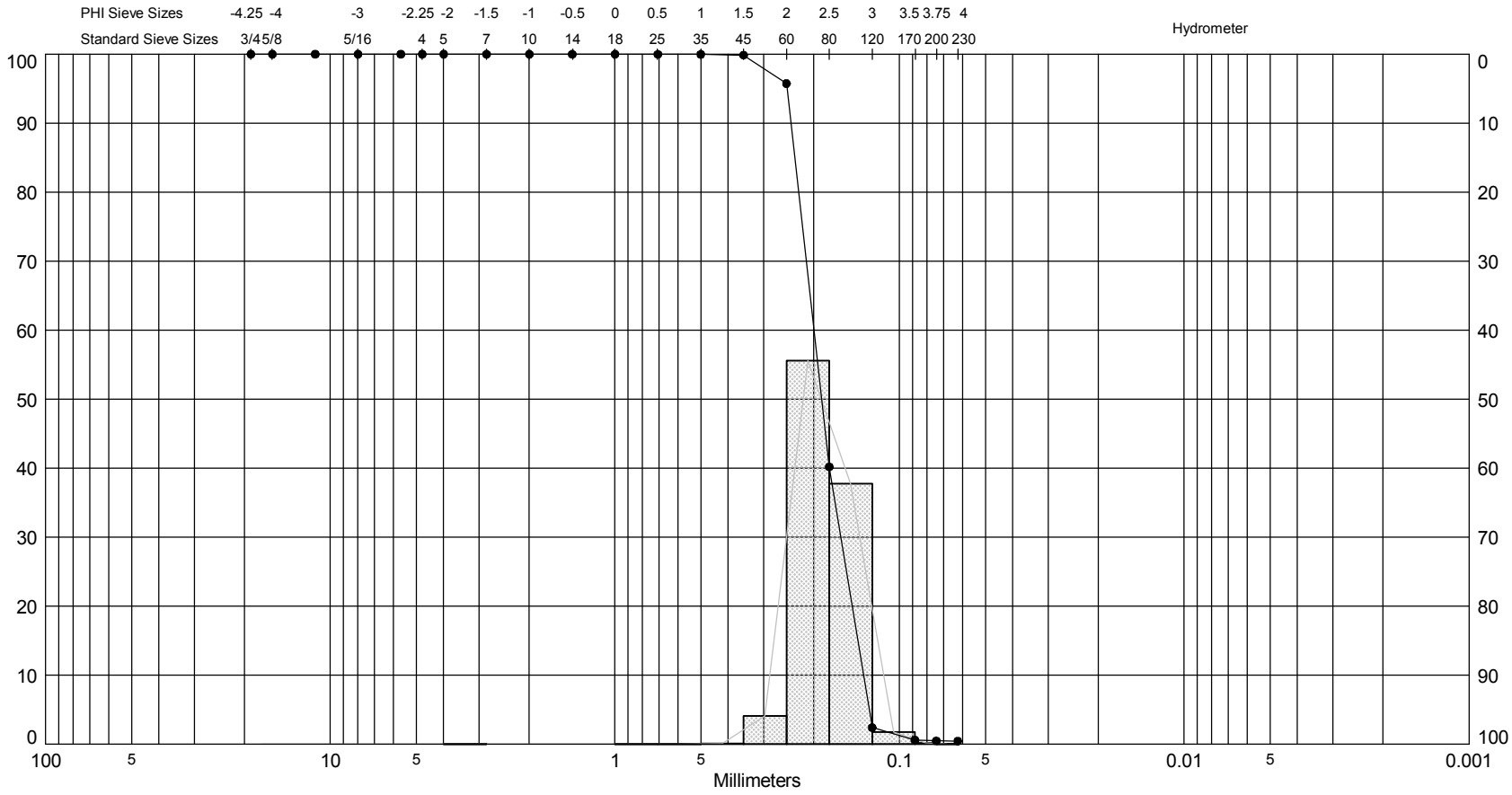
SIEVE ANALYSIS FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
2.0 / 3.0 Comp.	—●—		SP	#200 - 0.46 #230 - 0.44			2.41	2.44	-0.12	6.84	0.31

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Native Beach
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

Coastal Planning & Engineering
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FL 33431
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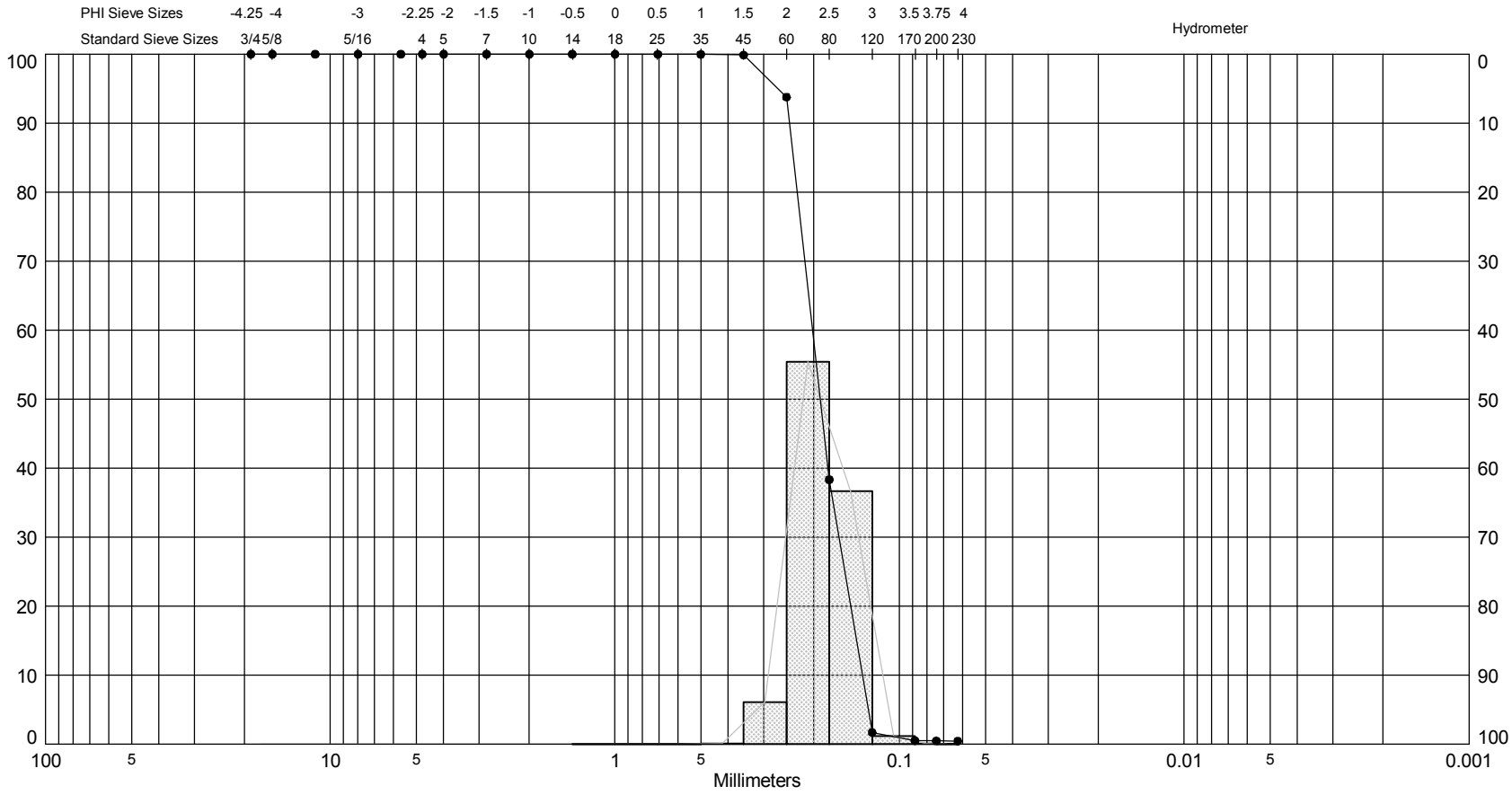
fax (561) 391-9116

SIEVE ANALYSIS FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
MHW Comp.	—●—		SP	#200 - 0.46 #230 - 0.44			2.39	2.41	-0.11	3.82	0.31

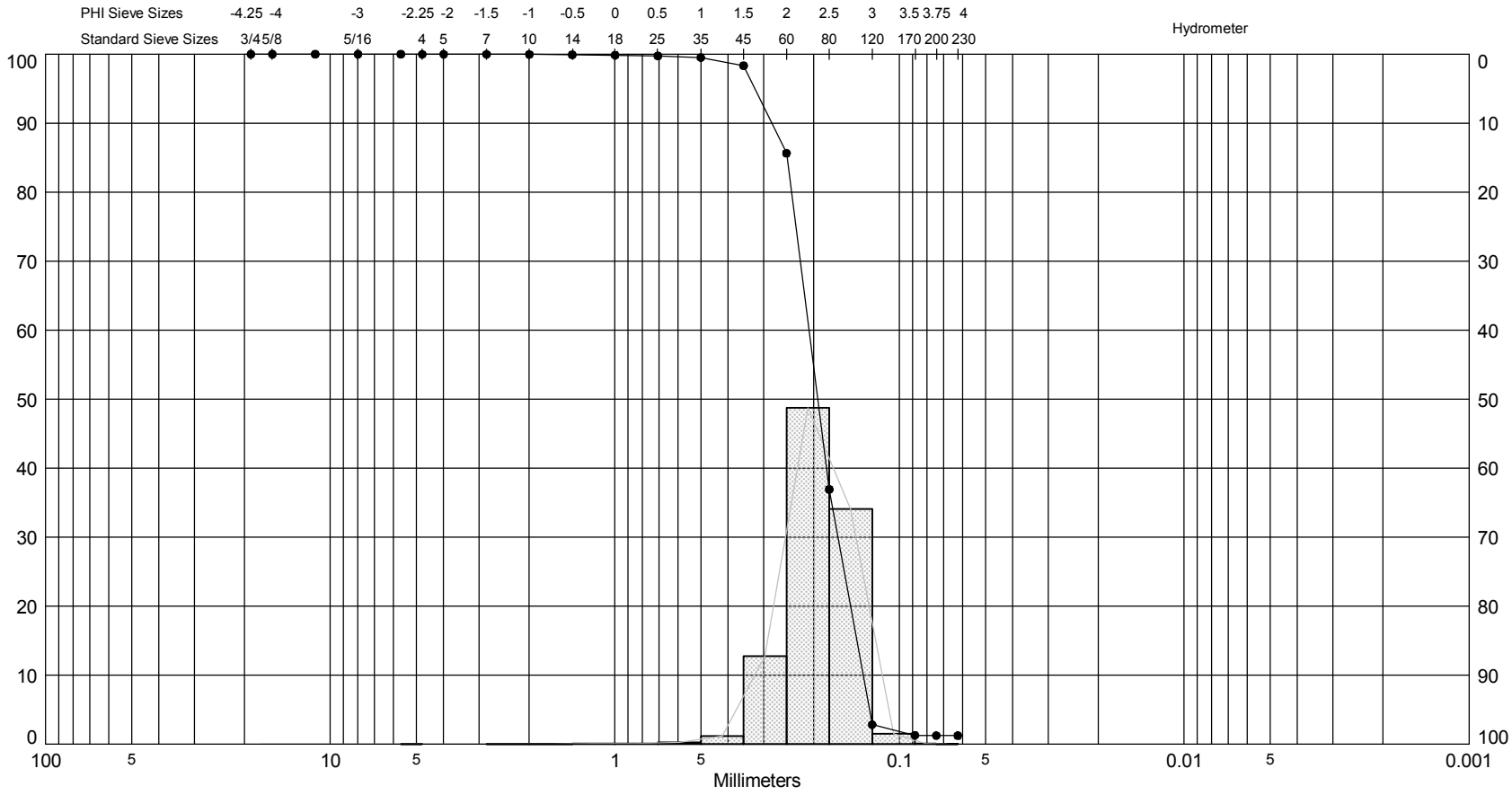
Comments: COMPOSITE

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Native Beach
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
MTL Comp.	—●—		SP	#200 - 1.23 #230 - 1.22			2.37	2.35	-1.3	11.36	0.4

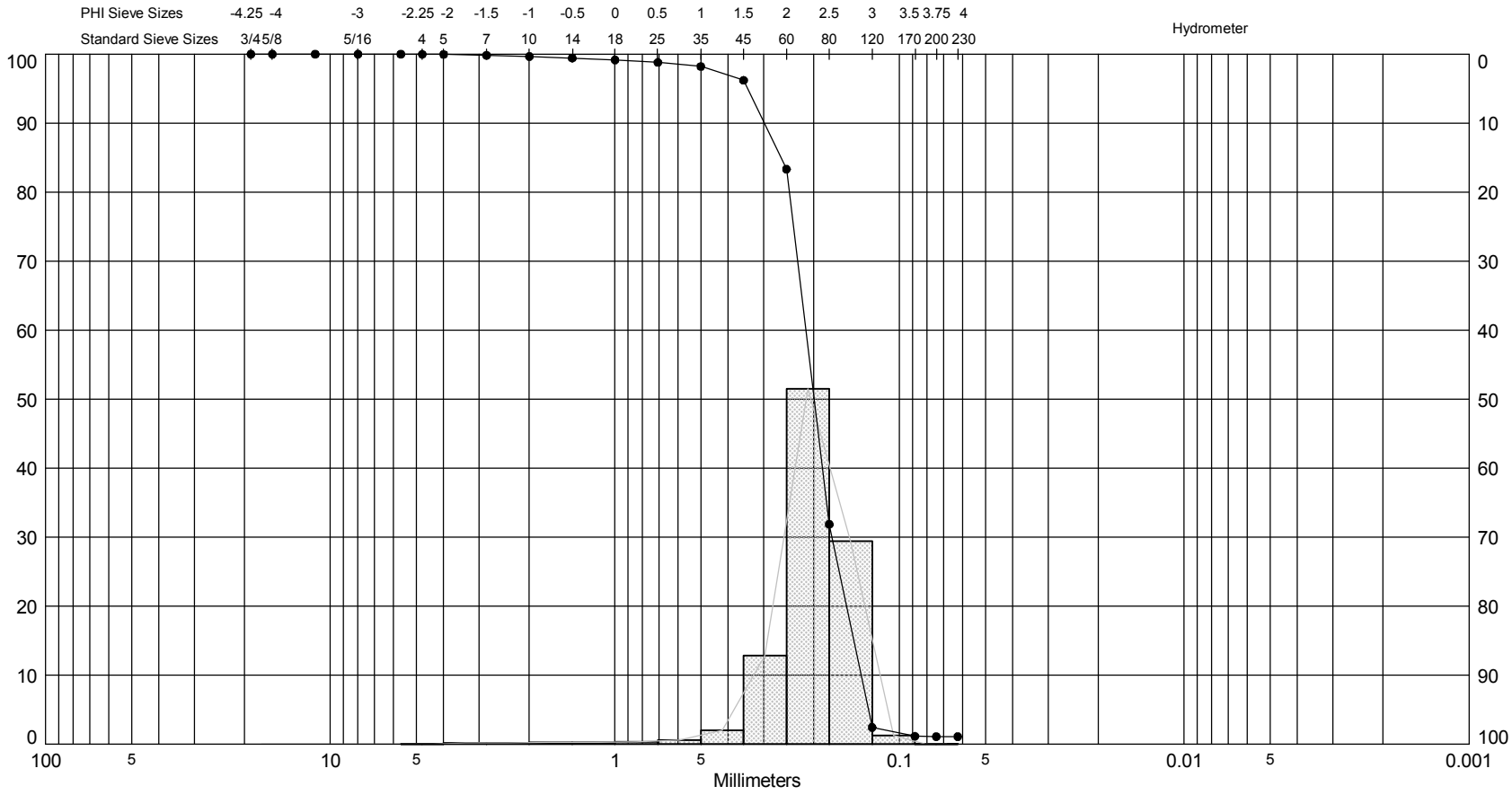
Comments: COMPOSITE

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Native Beach
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
MLW Comp.	—●—		SP	#200 - 1.09 #230 - 1.08			2.32	2.28	-2.77	19.03	0.51

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Native Beach
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

Coastal Planning & Engineering
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FL 33431
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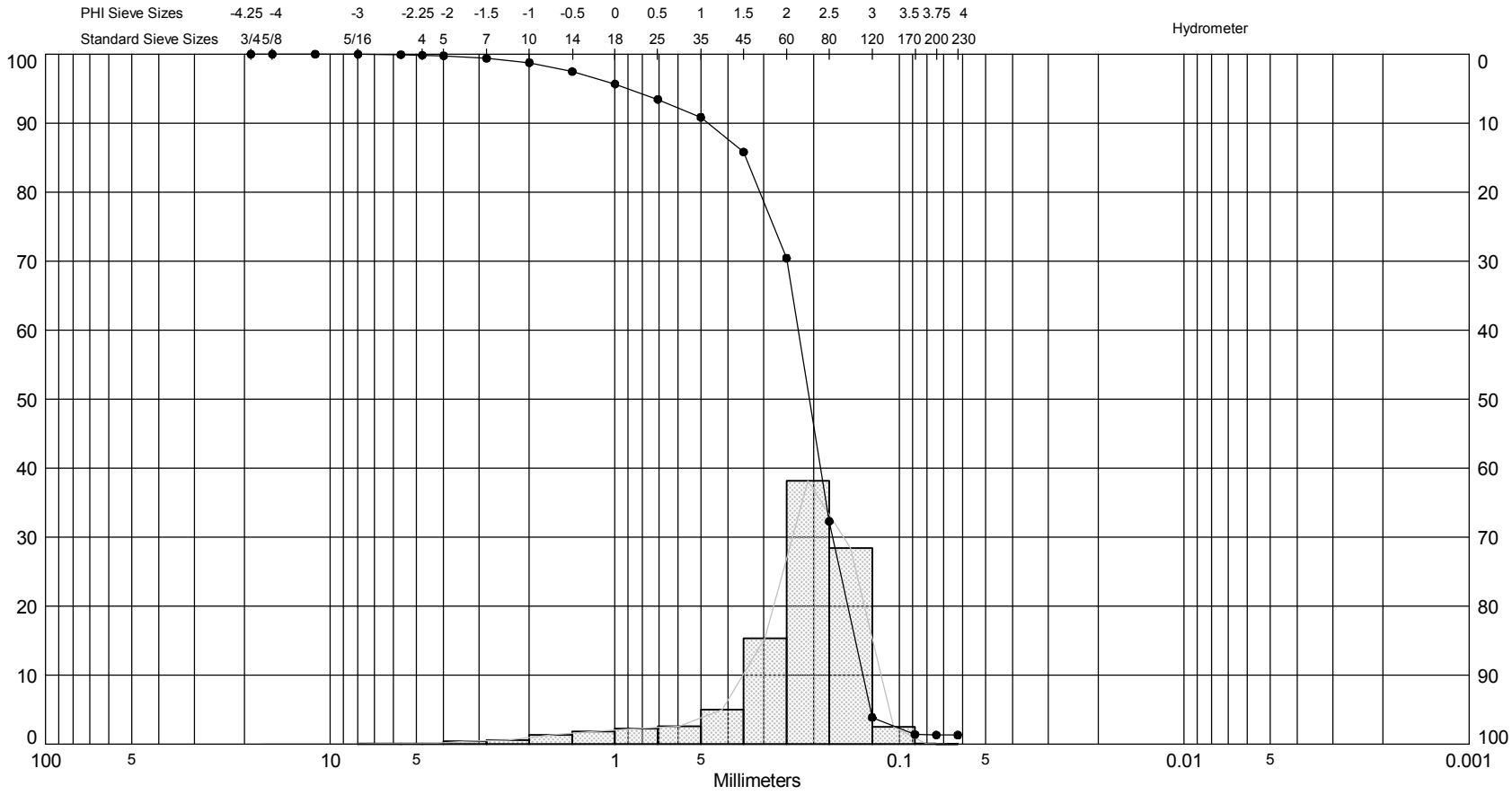
fax (561) 391-9116

SIEVE ANALYSIS FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
-6.0 Comp.	—●—		SP	#200 - 1.31 #230 - 1.30			2.27	2.07	-2.05	8.23	0.85

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Native Beach
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

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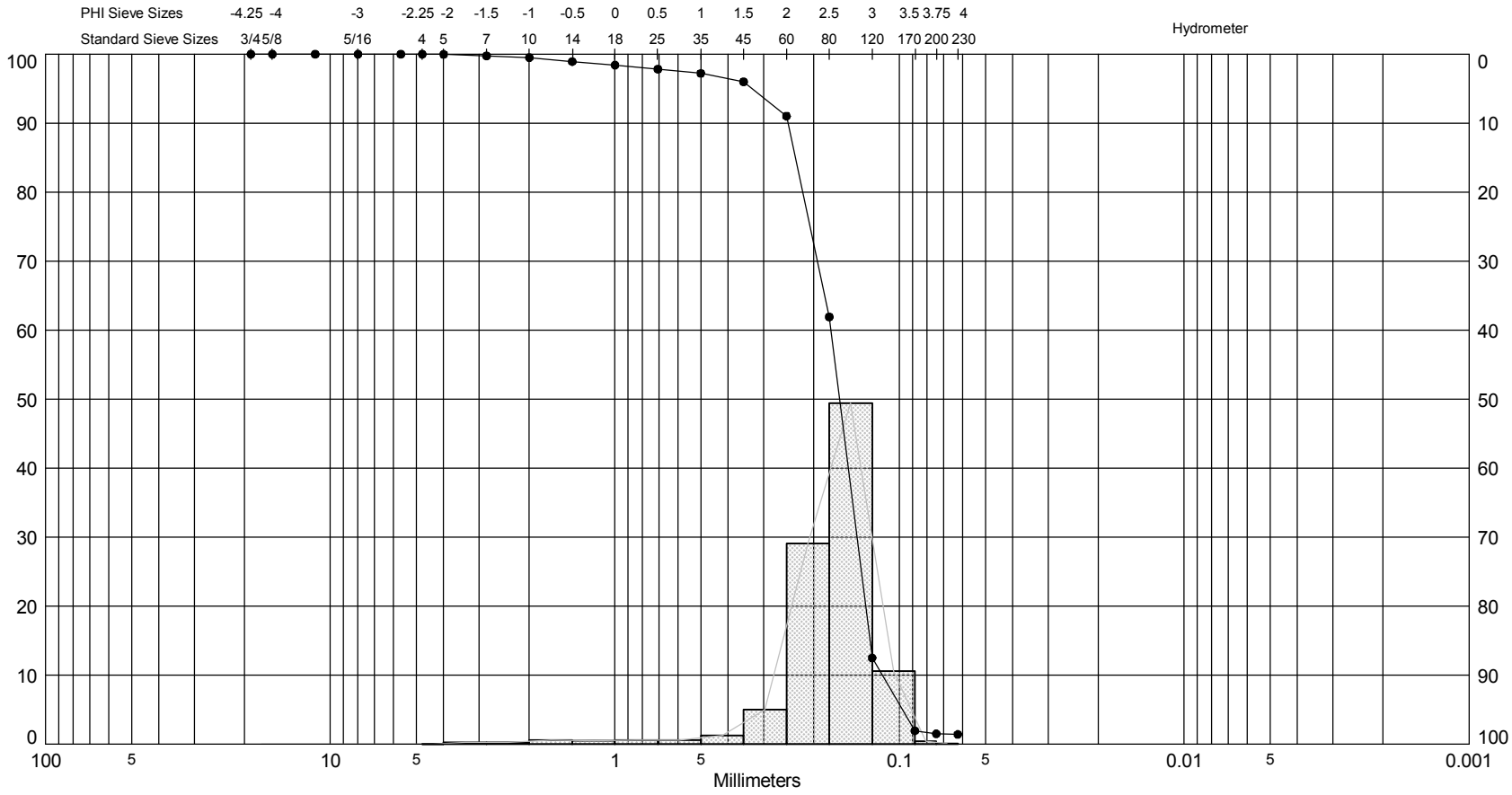
SIEVE ANALYSIS FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
-8.8 Comp.	—●—		SP	#200 - 1.49 #230 - 1.40			2.62	2.51	-2.95	16.69	0.63

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Native Beach
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

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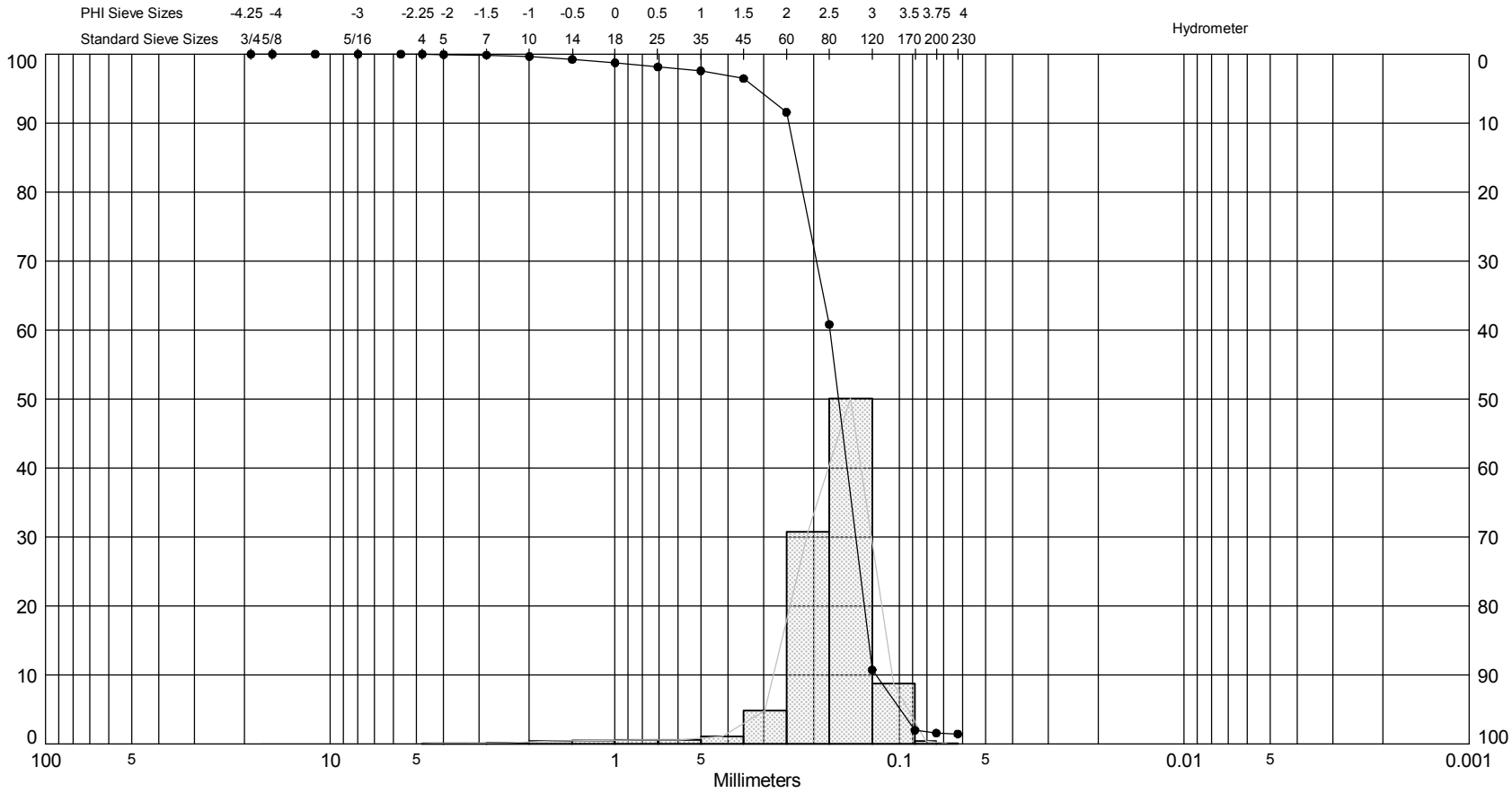
SIEVE ANALYSIS FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
-11.6 Comp.	—●—		SP	#200 - 1.56 #230 - 1.44			2.61	2.51	-2.88	17.05	0.58

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Native Beach
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

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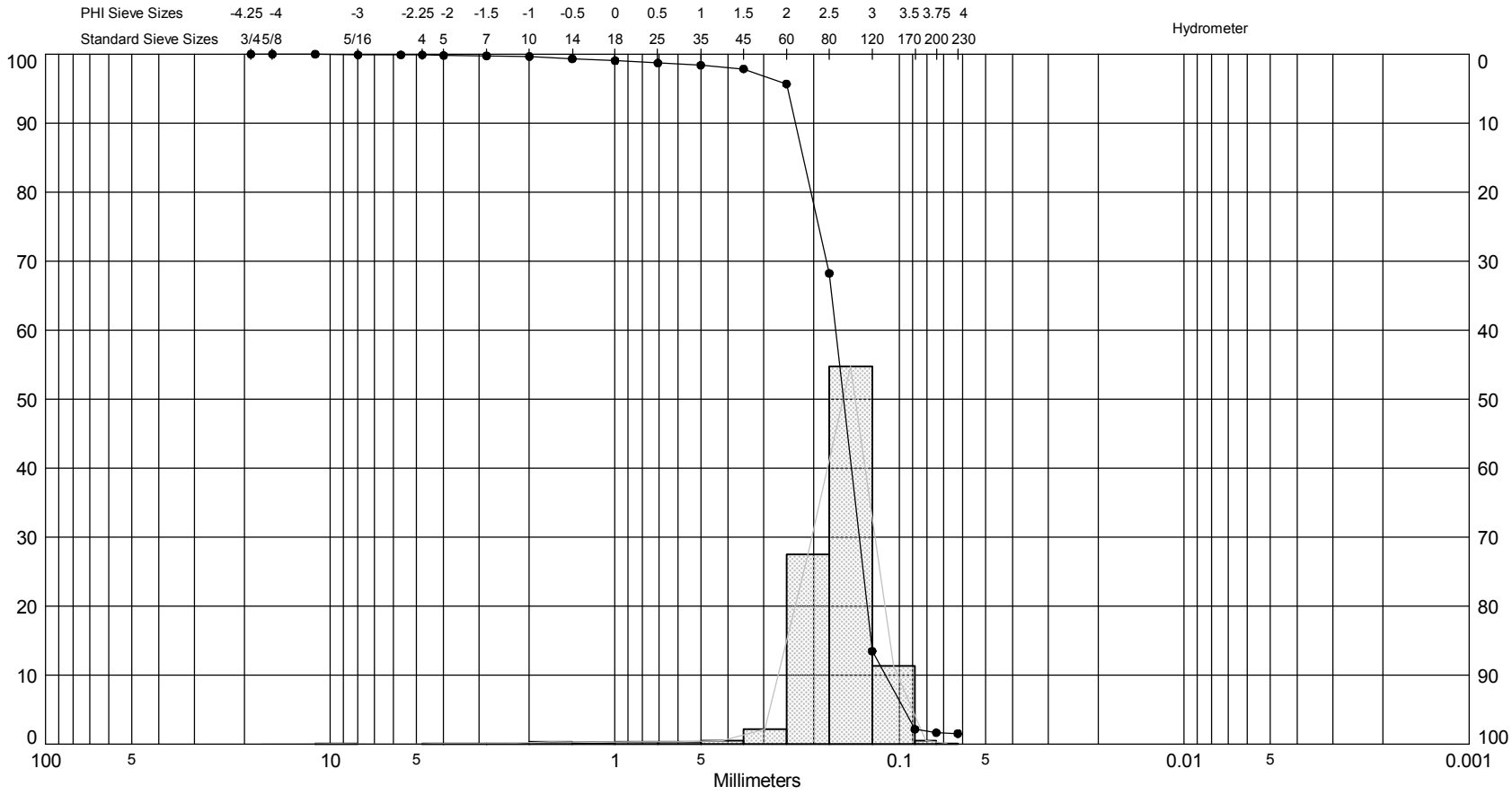
SIEVE ANALYSIS FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
-14.4 Comp.	—●—		SP	#200 - 1.65 #230 - 1.53			2.67	2.59	-3.97	31.97	0.55

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Native Beach
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

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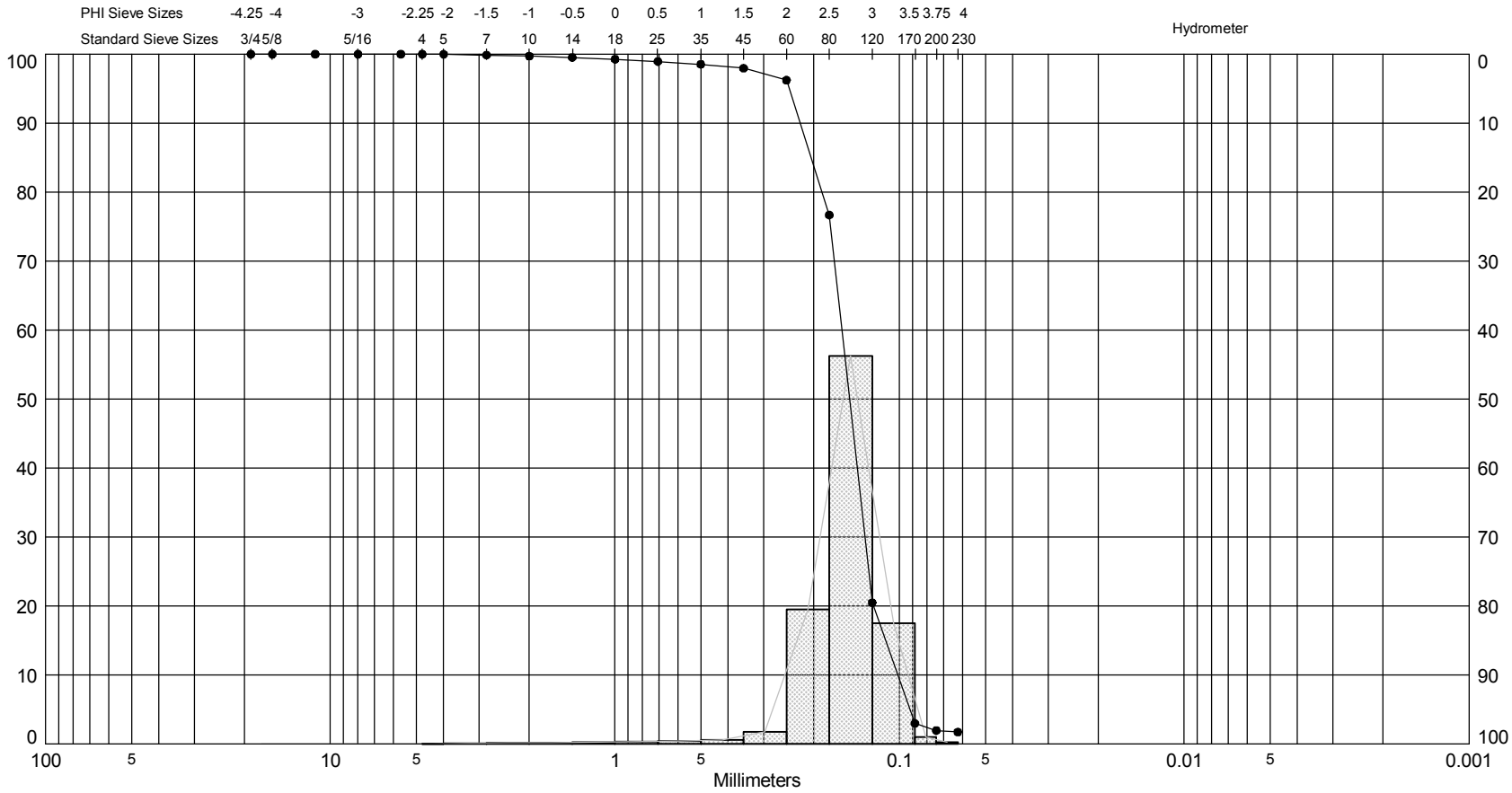
SIEVE ANALYSIS FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
-17.2 Comp.	—●—		SP	#200 - 1.95 #230 - 1.71			2.74	2.68	-3.15	22.59	0.52

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Native Beach
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

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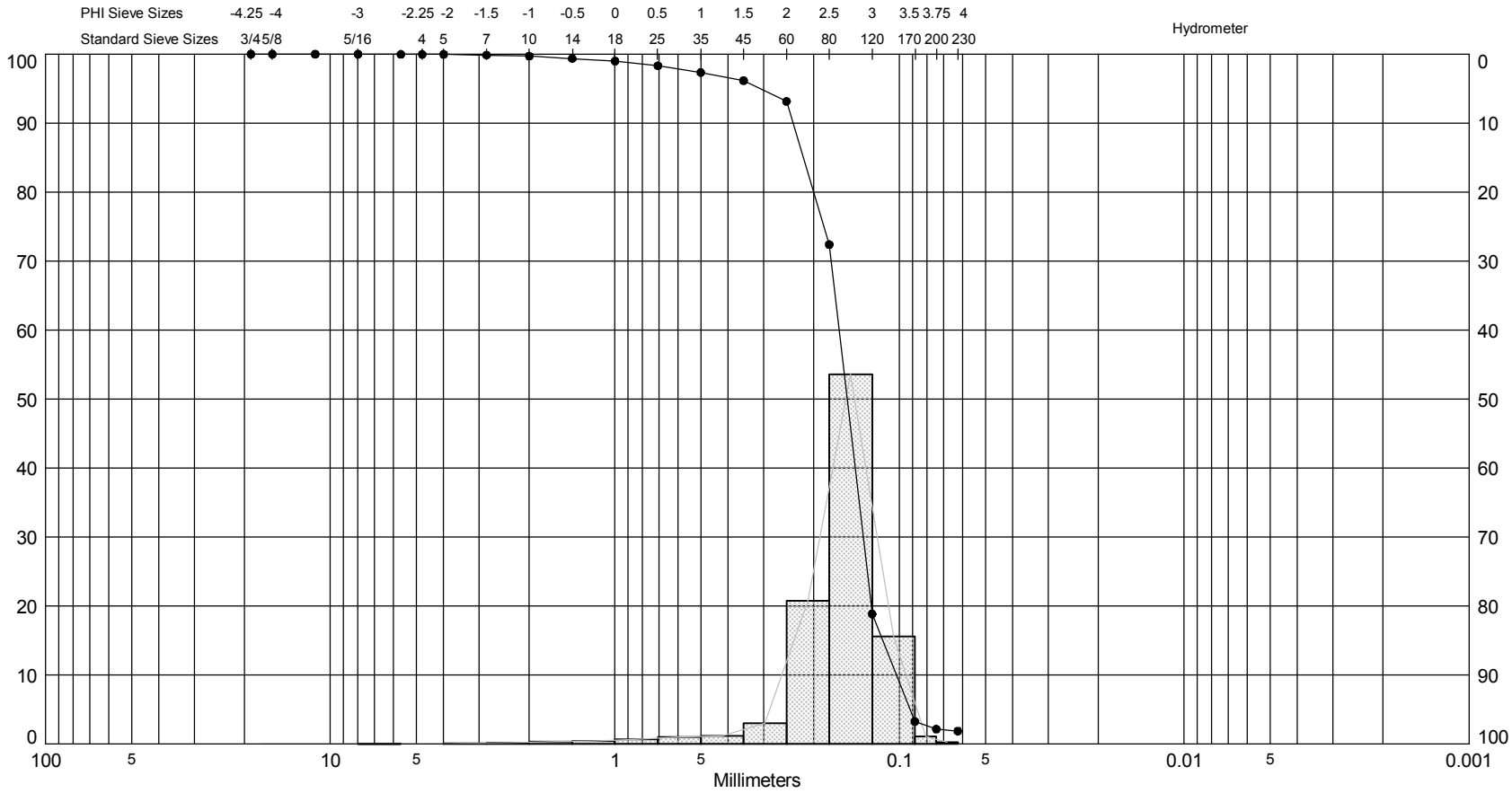
SIEVE ANALYSIS FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
-20.0 Comp.	—●—		SP	#200 - 2.14 #230 - 1.86			2.71	2.61	-2.8	16.47	0.6

Comments: COMPOSITE

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Native Beach
Analysis Date:	
Analyzed By:	
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	
Vertical System:	NAVD 88

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SIEVE ANALYSIS FIGURE EIGHT NATIVE COMPOSITES.GPJ JPBRAZIL.GDT 10/27/09

APPENDIX 16

2007 CPENC Jetprobe Logs

JET PROBE LOG

PROJECT:Figure Eight Island/Rich Inlet

JET PROBE: FEJP-07-01

COORDINATES:
N = 201125
E = 2388382
Horz Coord Sys: North Carolina State Plane
Datum - Horz: NAD 1983 **Vert:** NAVD 88

DATE: 02/22/07
START TIME: 1215
END TIME: 1221

WATER DEPTH (ft): 6.3
TOP DIVER: JB
BOTTOM DIVER: KW

LENGTH OF PVC PIPE (ft): 20.0
PENETRATION DEPTH (ft): 20.0
JET PUMP TYPE: Briggs & Straton 3.0 HP
GAL/HR: 8460
DIAMETER OF PIPE (in): 1.5

SUPPORT VESSEL: Parker
POSITIONING: Real-Time Kinematics (RTK)
NAVIGATION SYSTEM: Hypack

WEATHER:
WIND:
DIR: SW
SPEED (mph): 8-12
WAVES:
DIR: NE
HEIGHT (ft): 1-2
CURRENT:
DIR: Slack Tide
SPEED (mph): N/A

SAND SAMPLES:
TOP:
MID:
BOTTOM:

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

TURBIDITY:
TOP: Low
BOTTOM: Low

DRAWN BY: **CHECKED BY:**
JOB NO. 2700.02

ELEV. (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION
	0		**SEA FLOOR**
	1		SAND, fine grained, quartz, little whole shell, single layer, whole shell (2"x3"), (SP).
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	10		SAND, fine grained, quartz, trace shell hash, single layer, (SP).
	11		
	12		
	13		
	14		
	15		
	16		
	17		
	18		
	19		
	20		
	21		
	22		
	23		
	24		
	25		

JET PROBE LOG FIGURE EIGHT JP.GPJ JPBRAZIL.GDT 10/26/09

JET PROBE LOG

PROJECT:Figure Eight Island/Rich Inlet

JET PROBE: FEJP-07-02

COORDINATES:
N = 198751
E = 2390235
Horz Coord Sys: North Carolina State Plane
Datum - Horz: NAD 1983 **Vert:** NAVD 88

DATE: 02/22/07
START TIME: 1405
END TIME: 1412

WATER DEPTH (ft): 18.9
TOP DIVER: JB
BOTTOM DIVER: KW

LENGTH OF PVC PIPE (ft): 20.0
PENETRATION DEPTH (ft): 20.0
JET PUMP TYPE: Briggs & Straton 3.0 HP
GAL/HR: 8460
DIAMETER OF PIPE (in): 1.5

SUPPORT VESSEL: Parker
POSITIONING: Real-Time Kinematics (RTK)
NAVIGATION SYSTEM: Hypack

WEATHER:
WIND:
DIR: SW
SPEED (mph): 8-12
WAVES:
DIR: NE
HEIGHT (ft): 1-2
CURRENT:
DIR: Outgoing Tide
SPEED (mph): Moderate

SAND SAMPLES:
TOP:

MID: 2.58ϕ, Silt: 1.25%, Shell: 0.02%
Munsell Color: Wet 5Y-4/2, Dry 5Y-6/1

BOTTOM:

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

TURBIDITY:
TOP: Poor Visibility
BOTTOM: Poor Visibility

DRAWN BY: **CHECKED BY:**
JOB NO. 2700.02

ELEV. (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION
			SEA FLOOR
	0–13		SAND, fine grained, quartz, trace shell hash, single layer, (SP).
	13–20		SAND, fine grained, quartz, some shell fragments, single layer, (GP).
	20–25		Sand samples washed away quickly

JET PROBE LOG FIGURE EIGHT JP.GPJ JPBRAZIL.GDT 10/26/09

JET PROBE LOG

PROJECT:Figure Eight Island/Rich Inlet

JET PROBE: FEJP-07-03

COORDINATES:
N = 198786
E = 2389228
Horz Coord Sys: North Carolina State Plane
Datum - Horz: NAD 1983 **Vert:** NAVD 88

DATE: 02/22/07
START TIME: 1510
END TIME: 1517

WATER DEPTH (ft): 13.5
TOP DIVER: JB
BOTTOM DIVER: KW

LENGTH OF PVC PIPE (ft): 20.0
PENETRATION DEPTH (ft): 20.0
JET PUMP TYPE: Briggs & Straton 3.0 HP
GAL/HR: 8460
DIAMETER OF PIPE (in): 1.5

SUPPORT VESSEL: Parker
POSITIONING: Real-Time Kinematics (RTK)
NAVIGATION SYSTEM: Hypack

WEATHER:
WIND:
DIR: S
SPEED (mph): 10-15
WAVES:
DIR: SE
HEIGHT (ft): 2-3
CURRENT:
DIR: Outgoing Tide
SPEED (mph): N/A

SAND SAMPLES:
TOP:

MID: 2.17ϕ, Silt: 1.34%, Shell: 0.08%
Munsell Color: Wet 5Y-4/1, Dry 5Y-7/1

BOTTOM:

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

TURBIDITY:
TOP: No Visibility
BOTTOM: No Visibility

DRAWN BY: **CHECKED BY:**
JOB NO. 2700.02

ELEV. (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION
			SEA FLOOR
	0–14		SAND, fine grained, quartz, trace shell hash, single layer, (SP).
	14–20		SAND, fine grained, quartz, little shell fragments, trace shell hash, single layer, (SP).
	20–25		

JET PROBE LOG FIGURE EIGHT JP.GPJ JPBRAZIL.GDT 10/26/09

JET PROBE LOG

PROJECT:Figure Eight Island/Rich Inlet

JET PROBE: FEJP-07-04

COORDINATES:
N = 202324
E = 2388531
Horz Coord Sys: North Carolina State Plane
Datum - Horz: NAD 1983 **Vert:** NAVD 88

DATE: 02/22/07
START TIME: 1540
END TIME: 1545

WATER DEPTH (ft): 2.1
TOP DIVER: JB
BOTTOM DIVER: KW

LENGTH OF PVC PIPE (ft): 20.0
PENETRATION DEPTH (ft): 20.0
JET PUMP TYPE: Briggs & Straton 3.0 HP
GAL/HR: 8460
DIAMETER OF PIPE (in): 1.5

SUPPORT VESSEL: Parker
POSITIONING: Real-Time Kinematics (RTK)
NAVIGATION SYSTEM: Hypack

WEATHER:
WIND:
DIR: N/A
SPEED (mph): N/A
WAVES:
DIR: N/A
HEIGHT (ft): N/A
CURRENT:
DIR: N/A
SPEED (mph): N/A

SAND SAMPLES:
TOP:

MID: 2.10ϕ, Silt: 1.11%, Shell: 0.02%
Munsell Color: Wet 5Y-5/2, Dry 5Y-7/1

BOTTOM:

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

TURBIDITY:
TOP: N/A
BOTTOM: N/A

DRAWN BY: **CHECKED BY:**
JOB NO. 2700.02

ELEV. (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION
			SEA FLOOR
	0–20		SAND, fine grained, quartz, trace shell hash, single layer, (SP).
	20		Jetprobe done on dry land

JET PROBE LOG FIGURE EIGHT JP.GPJ JPBRAZIL.GDT 10/26/09

JET PROBE LOG

PROJECT:Figure Eight Island/Rich Inlet

JET PROBE: FEJP-07-05

COORDINATES:
N = 201187
E = 2387314
Horz Coord Sys: North Carolina State Plane
Datum - Horz: NAD 1983 **Vert:** NAVD 88

DATE: 02/22/07
START TIME: 1625
END TIME: 1630

WATER DEPTH (ft): 5.5
TOP DIVER: JB
BOTTOM DIVER: KW

LENGTH OF PVC PIPE (ft): 20.0
PENETRATION DEPTH (ft): 20.0
JET PUMP TYPE: Briggs & Straton 3.0 HP
GAL/HR: 8460
DIAMETER OF PIPE (in): 1.5

SUPPORT VESSEL: Parker
POSITIONING: Real-Time Kinematics (RTK)
NAVIGATION SYSTEM: Hypack

WEATHER:
WIND:
DIR: S
SPEED (mph): 10-15
WAVES:
DIR: SE
HEIGHT (ft): 0-1
CURRENT:
DIR: Outgoing Tide
SPEED (mph): N/A

SAND SAMPLES:
TOP:

MID: 2.19ϕ, Silt: 1.09%, Shell: 0.43%
Munsell Color: Wet 5Y-5/1, Dry 5Y-7/1

BOTTOM:

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

TURBIDITY:
TOP: Low
BOTTOM: Low

DRAWN BY: **CHECKED BY:**
JOB NO. 2700.02

ELEV. (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION
	0		**SEA FLOOR**
	1		SAND, fine grained, quartz, little whole shell, single layer, whole shell (2"x3"), (SP).
	2		SAND, fine grained, quartz, trace shell hash, single layer, (SP).
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	10		
	11		SAND, fine grained, quartz, little shell fragments, trace shell hash, single layer, (SP).
	12		
	13		
	14		
	15		
	16		
	17		
	18		
	19		
	20		
	21		
	22		
	23		
	24		
	25		

JET PROBE LOG FIGURE EIGHT JP.GPJ JPBRAZIL.GDT 10/26/09

JET PROBE LOG

PROJECT:Figure Eight Island/Rich Inlet

JET PROBE: FEJP-07-06

COORDINATES:
N = 199397
E = 2389758
Horz Coord Sys: North Carolina State Plane
Datum - Horz: NAD 1983 **Vert:** NAVD 88

DATE: 02/24/07
START TIME: 1250
END TIME: 1300

WATER DEPTH (ft): 6.4
TOP DIVER: RB
BOTTOM DIVER: KW

LENGTH OF PVC PIPE (ft): 20.0
PENETRATION DEPTH (ft): 20.0
JET PUMP TYPE: Briggs & Straton 3.0 HP
GAL/HR: 8460
DIAMETER OF PIPE (in): 1.5

SUPPORT VESSEL: Parker
POSITIONING: Real-Time Kinematics (RTK)
NAVIGATION SYSTEM: Hypack

WEATHER:
WIND:
DIR: E
SPEED (mph): 8-10
WAVES:
DIR: W
HEIGHT (ft): 2-3
CURRENT:
DIR: Slack Tide
SPEED (mph): N/A

SAND SAMPLES:
TOP:
MID:
BOTTOM:

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

TURBIDITY:
TOP: Low
BOTTOM: Low

DRAWN BY: **CHECKED BY:**
JOB NO. 2700.02

ELEV. (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION
			SEA FLOOR
	0–20		SAND, fine grained, quartz, trace shell hash, single layer, (SP).

JET PROBE LOG FIGURE EIGHT JP.GPJ JPBRAZIL.GDT 10/26/09

JET PROBE LOG

PROJECT:Figure Eight Island/Rich Inlet

JET PROBE: FEJP-07-07

COORDINATES:
N = 200745
E = 2391926
Horz Coord Sys: North Carolina State Plane
Datum - Horz: NAD 1983 **Vert:** NAVD 88

DATE: 02/24/07
START TIME: 1315
END TIME: 1326

WATER DEPTH (ft): 9.4
TOP DIVER: RB
BOTTOM DIVER: KW

NOTES

LENGTH OF PVC PIPE (ft): 20.0
PENETRATION DEPTH (ft): 20.0
JET PUMP TYPE: Briggs & Straton 3.0 HP
GAL/HR: 8460
DIAMETER OF PIPE (in): 1.5

SUPPORT VESSEL: Parker
POSITIONING: Real-Time Kinematics (RTK)
NAVIGATION SYSTEM: Hypack

WEATHER:
WIND:
DIR: E
SPEED (mph): 8-10
WAVES:
DIR: W
HEIGHT (ft): 2-3
CURRENT:
DIR: Slack Tide
SPEED (mph): N/A

SAND SAMPLES:
TOP:
MID:
BOTTOM:

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

TURBIDITY:
TOP: Low
BOTTOM: Low

DRAWN BY: **CHECKED BY:**
JOB NO. 2700.02

ELEV. (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION
			SEA FLOOR
	0–20		SAND, fine grained, quartz, trace shell hash, single layer, (SP).

JET PROBE LOG FIGURE EIGHT JP.GPJ JPBRAZIL.GDT 10/26/09

JET PROBE LOG

PROJECT:Figure Eight Island/Rich Inlet

JET PROBE: FEJP-07-08

COORDINATES:
N = 200529
E = 2388581
Horz Coord Sys: North Carolina State Plane
Datum - Horz: NAD 1983 **Vert:** NAVD 88

DATE: 02/24/07
START TIME: 1430
END TIME: 1440

WATER DEPTH (ft): 6.3
TOP DIVER: RB
BOTTOM DIVER: KW

LENGTH OF PVC PIPE (ft): 20.0
PENETRATION DEPTH (ft): 20.0
JET PUMP TYPE: Briggs & Straton 3.0 HP
GAL/HR: 8460
DIAMETER OF PIPE (in): 1.5

SUPPORT VESSEL: Parker
POSITIONING: Real-Time Kinematics (RTK)
NAVIGATION SYSTEM: Hypack

WEATHER:
WIND:
DIR: E
SPEED (mph): 5-10
WAVES:
DIR: W
HEIGHT (ft): 1-2
CURRENT:
DIR: Outgoing Tide
SPEED (mph): N/A

SAND SAMPLES:
TOP:

MID: 2.20ϕ, Silt: 1.28%, Shell: 0.01%
Munsell Color: Wet 5Y-4/1, Dry 5Y-6/1

BOTTOM:

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

TURBIDITY:
TOP: Low
BOTTOM: Low

DRAWN BY: **CHECKED BY:**
JOB NO. 2700.02

ELEV. (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION
			SEA FLOOR
	0–20		SAND, fine grained, quartz, trace shell hash, single layer, (SP).

JET PROBE LOG FIGURE EIGHT JP.GPJ JPBRAZIL.GDT 10/26/09

JET PROBE LOG

PROJECT:Figure Eight Island/Rich Inlet

JET PROBE: FEJP-07-09

COORDINATES:
N = 200664
E = 2386367
Horz Coord Sys: North Carolina State Plane
Datum - Horz: NAD 1983 **Vert:** NAVD 88

DATE: 02/24/07
START TIME: 1530
END TIME: 1545

WATER DEPTH (ft): 9.7
TOP DIVER: RB
BOTTOM DIVER: KW

LENGTH OF PVC PIPE (ft): 20.0
PENETRATION DEPTH (ft): 9.0
JET PUMP TYPE: Briggs & Straton 3.0 HP
GAL/HR: 8460
DIAMETER OF PIPE (in): 1.5

SUPPORT VESSEL: Parker
POSITIONING: Real-Time Kinematics (RTK)
NAVIGATION SYSTEM: Hypack

WEATHER:
WIND:
DIR: ESE
SPEED (mph): 0-5
WAVES:
DIR: N/A
HEIGHT (ft): 0
CURRENT:
DIR: Outgoing Tide
SPEED (mph): N/A

SAND SAMPLES:
TOP:
MID:
BOTTOM:

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

TURBIDITY:
TOP: Low
BOTTOM: Moderate

DRAWN BY: **CHECKED BY:**
JOB NO. 2700.02

ELEV. (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION
			SEA FLOOR
	0–5		SAND, fine grained, quartz, trace shell hash, single layer, (SP).
	5–9		SAND, quartz, little silt, trace shell hash, single layer, (SP-SM).
	9–25		Refusal on coarse shell gravel lag deposit

JET PROBE LOG FIGURE EIGHT JP.GPJ JPBRAZIL.GDT 10/26/09

JET PROBE LOG

PROJECT:Figure Eight Island/Rich Inlet

JET PROBE: FEJP-07-10

COORDINATES:
N = 202398
E = 2387538
Horz Coord Sys: North Carolina State Plane
Datum - Horz: NAD 1983 **Vert:** NAVD 88

DATE: 02/24/07
START TIME: 1630
END TIME: 1635

WATER DEPTH (ft): 2.3
TOP DIVER: JB
BOTTOM DIVER: KW

LENGTH OF PVC PIPE (ft): 20.0
PENETRATION DEPTH (ft): 20.0
JET PUMP TYPE: Briggs & Straton 3.0 HP
GAL/HR: 8460
DIAMETER OF PIPE (in): 1.5

SUPPORT VESSEL: Parker
POSITIONING: Real-Time Kinematics (RTK)
NAVIGATION SYSTEM: Hypack

WEATHER:
WIND:
DIR: SSE
SPEED (mph): 15-20
WAVES:
DIR: N\A
HEIGHT (ft): N\A
CURRENT:
DIR: Outgoing Tide
SPEED (mph): N/A

SAND SAMPLES:
TOP:

MID: 2.18ϕ, Silt: 1.01%, Shell: 0.00%
Munsell Color: Wet 5Y-5/2, Dry 5Y-7/1

BOTTOM:

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

TURBIDITY:
TOP: Low
BOTTOM: Low

DRAWN BY: **CHECKED BY:**
JOB NO. 2700.02

ELEV. (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION
			SEA FLOOR
	0–20		SAND, fine grained, quartz, little silt, trace shell hash, trace wood, single layer, (SM).

JET PROBE LOG FIGURE EIGHT JP.GPJ JPBRAZIL.GDT 10/26/09

JET PROBE LOG

PROJECT:Figure Eight Island/Rich Inlet

JET PROBE: FEJP-07-11

COORDINATES:
N = 202290
E = 2386816
Horz Coord Sys: North Carolina State Plane
Datum - Horz: NAD 1983 **Vert:** NAVD 88

DATE: 02/24/07
START TIME: 1705
END TIME: 1710

WATER DEPTH (ft): 3.8
TOP DIVER: JB
BOTTOM DIVER: KW

LENGTH OF PVC PIPE (ft): 20.0
PENETRATION DEPTH (ft): 20.0
JET PUMP TYPE: Briggs & Straton 3.0 HP
GAL/HR: 8460
DIAMETER OF PIPE (in): 1.5

SUPPORT VESSEL: Parker
POSITIONING: Real-Time Kinematics (RTK)
NAVIGATION SYSTEM: Hypack

WEATHER:
WIND:
DIR: SSE
SPEED (mph): 10-15
WAVES:
DIR: N/A
HEIGHT (ft): N/A
CURRENT:
DIR: Outgoing Tide
SPEED (mph): Strong

SAND SAMPLES:
TOP:

MID: 2.01ϕ, Silt: 1.12%, Shell: 0.32%
Munsell Color: Wet 5Y-5/1, Dry 5Y-6/1

BOTTOM:

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

TURBIDITY:
TOP: Low
BOTTOM: Low

DRAWN BY: **CHECKED BY:**
JOB NO. 2700.02

ELEV. (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION
			SEA FLOOR
	0–20		SAND, fine grained, quartz, little silt, trace shell hash, trace wood, single layer, (SM).
	20		Strong current over flat, 1.5' deep shoal

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

JET PROBE LOG FIGURE EIGHT JP.GPJ JPBRAZIL.GDT 10/26/09

JET PROBE LOG

PROJECT:Figure Eight Island/Rich Inlet

JET PROBE: FEJP-07-12

COORDINATES:
N = 203960
E = 2388525
Horz Coord Sys: North Carolina State Plane
Datum - Horz: NAD 1983 **Vert:** NAVD 88

DATE: 02/25/07
START TIME: 0932
END TIME: 0939

WATER DEPTH (ft): 6.5
TOP DIVER: JB
BOTTOM DIVER: KW

LENGTH OF PVC PIPE (ft): 20.0
PENETRATION DEPTH (ft): 20.0
JET PUMP TYPE: Briggs & Straton 3.0 HP
GAL/HR: 8460
DIAMETER OF PIPE (in): 1.5

SUPPORT VESSEL: Parker
POSITIONING: Real-Time Kinematics (RTK)
NAVIGATION SYSTEM: Hypack

WEATHER:
WIND:
DIR: NE
SPEED (mph): 8-12
WAVES:
DIR: N/A
HEIGHT (ft): N/A
CURRENT:
DIR: Outgoing Tide
SPEED (mph): N/A

SAND SAMPLES:
TOP:

MID: 2.29ϕ, Silt: 1.14%, Shell: 0.01%
Munsell Color: Wet 5Y-5/1, Dry 5Y-7/1

BOTTOM:

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

TURBIDITY:
TOP: Low
BOTTOM: Low

DRAWN BY: **CHECKED BY:**
JOB NO. 2700.02

ELEV. (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION
			SEA FLOOR
	0–12		SAND, fine grained, quartz, trace shell hash, single layer, (SP).
	12–20		SAND, fine grained, quartz, little shell fragments, trace clay, single layer, clay balls in hole, (SP).
	20–25		No clay balls visible on 10.0' penetration

JET PROBE LOG FIGURE EIGHT JP.GPJ JPBRAZIL.GDT 10/26/09

JET PROBE LOG

PROJECT:Figure Eight Island/Rich Inlet

JET PROBE: FEJP-07-13

COORDINATES:
N = 204448
E = 2389926
Horz Coord Sys: North Carolina State Plane
Datum - Horz: NAD 1983 **Vert:** NAVD 88

DATE: 02/25/07
START TIME: 1010
END TIME: 1018

WATER DEPTH (ft): 11.8
TOP DIVER: JB
BOTTOM DIVER: KW

LENGTH OF PVC PIPE (ft): 20.0
PENETRATION DEPTH (ft): 18.0
JET PUMP TYPE: Briggs & Straton 3.0 HP
GAL/HR: 8460
DIAMETER OF PIPE (in): 1.5

SUPPORT VESSEL: Parker
POSITIONING: Real-Time Kinematics (RTK)
NAVIGATION SYSTEM: Hypack

WEATHER:
WIND:
DIR: NE
SPEED (mph): 8-12
WAVES:
DIR: N/A
HEIGHT (ft): N/A
CURRENT:
DIR: Outgoing Tide
SPEED (mph): N/A

SAND SAMPLES:
TOP:

MID: 2.28ϕ, Silt: 2.35%, Shell: 0.21%
Munsell Color: Wet 5Y-4/2, Dry 5Y-6/2

BOTTOM:

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

TURBIDITY:
TOP: Low
BOTTOM: Moderate

DRAWN BY: **CHECKED BY:**
JOB NO. 2700.02

ELEV. (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION
			SEA FLOOR
	0–6		SAND, fine grained, quartz, trace shell hash, single layer, (SP).
	6–18		SAND, fine grained, quartz, little shell fragments, single layer, (SP).
	18		No refusal, pipe seized up in collapsing hole

JET PROBE LOG FIGURE EIGHT JP.GPJ JPBRAZIL.GDT 10/26/09

JET PROBE LOG

PROJECT:Figure Eight Island/Rich Inlet

JET PROBE: FEJP-07-14

COORDINATES:
N = 200322
E = 2385355
Horz Coord Sys: North Carolina State Plane
Datum - Horz: NAD 1983 **Vert:** NAVD 88

DATE: 02/25/07
START TIME: 1056
END TIME: 1103

WATER DEPTH (ft): 8.5
TOP DIVER: JB
BOTTOM DIVER: KW

LENGTH OF PVC PIPE (ft): 20.0
PENETRATION DEPTH (ft): 20.0
JET PUMP TYPE: Briggs & Straton 3.0 HP
GAL/HR: 8460
DIAMETER OF PIPE (in): 1.5

SUPPORT VESSEL: Parker
POSITIONING: Real-Time Kinematics (RTK)
NAVIGATION SYSTEM: Hypack

WEATHER:
WIND:
DIR: ENE
SPEED (mph): 10-15
WAVES:
DIR: N/A
HEIGHT (ft): N/A
CURRENT:
DIR: Incoming Tide
SPEED (mph): N/A

SAND SAMPLES:
TOP:

MID: 2.31ϕ, Silt: 1.12%, Shell: 0.04%
Munsell Color: Wet 5Y-5/1, Dry 5Y-6/1

BOTTOM:

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

TURBIDITY:
TOP: Low
BOTTOM: Low

DRAWN BY: **CHECKED BY:**
JOB NO. 2700.02

ELEV. (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION
			SEA FLOOR
	0–3		SAND, fine grained, quartz, trace shell hash, single layer, (SP).
	3–12		SAND, fine grained, quartz, little silt, single layer, visible mud balls between 3'-12', (SP-SM).
	12–18		SAND, fine grained, quartz, some shell fragments, single layer, (GP).
	18–20		SAND, fine grained, quartz, trace shell fragments, single layer, (SP).
	20–25		Very little material coming out of hole Moderate turbidity from 3.0-12.0'

JET PROBE LOG FIGURE EIGHT JP.GPJ JPBRAZIL.GDT 10/26/09

JET PROBE LOG

PROJECT:Figure Eight Island/Rich Inlet

JET PROBE: FEJP-07-15

COORDINATES:
N = 200150
E = 2383672
Horz Coord Sys: North Carolina State Plane
Datum - Horz: NAD 1983 **Vert:** NAVD 88

DATE: 02/25/07
START TIME: 1111
END TIME: 1124

WATER DEPTH (ft): 6.9
TOP DIVER: JB
BOTTOM DIVER: KW

LENGTH OF PVC PIPE (ft): 20.0
PENETRATION DEPTH (ft): 20.0
JET PUMP TYPE: Briggs & Straton 3.0 HP
GAL/HR: 8460
DIAMETER OF PIPE (in): 1.5

SUPPORT VESSEL: Parker
POSITIONING: Real-Time Kinematics (RTK)
NAVIGATION SYSTEM: Hypack

WEATHER:
WIND:
DIR: ENE
SPEED (mph): 10-15
WAVES:
DIR: N/A
HEIGHT (ft): N/A
CURRENT:
DIR: Incoming Tide
SPEED (mph): N/A

SAND SAMPLES:
TOP:
MID: 2.07ϕ, Silt: 1.17%, Shell: 0.07%
Munsell Color: Wet 5Y-4/1, Dry 5Y-6/1
BOTTOM:

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

TURBIDITY:
TOP: Low
BOTTOM: Low

DRAWN BY: **CHECKED BY:**
JOB NO. 2700.02

ELEV. (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION
			SEA FLOOR
	0–14		SAND, fine grained, quartz, trace shell hash, single layer, (SP).
	14–20		SAND, fine grained, quartz, some shell fragments, single layer, (GP).

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

JET PROBE LOG FIGURE EIGHT JP.GPJ JPBRAZIL.GDT 10/26/09

JET PROBE LOG

PROJECT:Figure Eight Island/Rich Inlet

JET PROBE: FEJP-07-16

COORDINATES:
N = 199696
E = 2384943
Horz Coord Sys: North Carolina State Plane
Datum - Horz: NAD 1983 **Vert:** NAVD 88

DATE: 02/25/07
START TIME: 1150
END TIME: 1200

WATER DEPTH (ft): 11.7
TOP DIVER: JB
BOTTOM DIVER: KW

LENGTH OF PVC PIPE (ft): 20.0
PENETRATION DEPTH (ft): 18.5
JET PUMP TYPE: Briggs & Straton 3.0 HP
GAL/HR: 8460
DIAMETER OF PIPE (in): 1.5

SUPPORT VESSEL: Parker
POSITIONING: Real-Time Kinematics (RTK)
NAVIGATION SYSTEM: Hypack

WEATHER:
WIND:
DIR: ENE
SPEED (mph): 10-15
WAVES:
DIR: N/A
HEIGHT (ft): N/A
CURRENT:
DIR: Incoming Tide
SPEED (mph): N/A

SAND SAMPLES:
TOP:

MID: 2.30ϕ, Silt: 1.11%, Shell: 0.09%
Munsell Color: Wet 5Y-5/1, Dry 5Y-6/1

BOTTOM:

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

TURBIDITY:
TOP: Low
BOTTOM: Low

DRAWN BY: **CHECKED BY:**
JOB NO. 2700.02

ELEV. (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION
			SEA FLOOR
	0–11		SAND, fine grained, quartz, trace shell hash, single layer, (SP).
	11–18		SAND, fine grained, quartz, some shell hash, single layer, (GP).
	19		Hard Refusal at 18.5'

JET PROBE LOG FIGURE EIGHT JP.GPJ JPBRAZIL.GDT 10/26/09

APPENDIX 17

2007 CPENC Vibracore Logs

Boring Designation FEVC-07-01

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

2. BORING DESIGNATION: FEVC-07-01
LOCATION COORDINATES: X = 2,390,205 Y = 198,940

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Walter Sexton

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

8. TOTAL DEPTH OF BORING: 8.7 Ft.

9. SIZE AND TYPE OF BIT: 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane
HORIZONTAL: NAD 1983
VERTICAL: NAVD 88

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES
DISTURBED:
UNDISTURBED (UD):

13. TOTAL NUMBER CORE BOXES:

14. ELEVATION GROUND WATER:

15. DATE BORING
STARTED: 03-28-07 08:07
COMPLETED: 03-28-07 08:11

16. ELEVATION TOP OF BORING: -15.5 Ft.

17. TOTAL RECOVERY FOR BORING: 8.5 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW/KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
-15.5	0.0					
-17.3	1.8		SAND, fine grained, quartz, trace shell hash, trace silt, 1.0" shell fragment @ 1.6', light gray (5Y-7/1), (SP).		1	Sample #1, Depth = 1.0' Mean (mm): 0.19, Phi Sorting: 0.53 Shell Hash: 0%, Fines (230): 0.60% (SP)
-18.7	3.2		SAND, fine grained, quartz, trace shell hash, trace silt, trace whole shell, whole shells up to 0.5", gray (5Y-5/1), (SP).		2	Sample #2, Depth = 2.5' Mean (mm): 0.17, Phi Sorting: 0.51 Shell Hash: 0%, Fines (230): 1.18% (SP)
-22.2	6.7		SAND, fine grained, quartz, trace silt, silt lamina @ 6.0', gray (5Y-6/1), (SP).		3	Sample #3, Depth = 5.0' Mean (mm): 0.19, Phi Sorting: 0.39 Shell Hash: 0%, Fines (230): 1.15% (SP)
-24.0	8.5		SAND, fine grained, quartz, trace silt, silt laminae from 7.2'-7.8' and 8.0', gray (5Y-5/1), (SP-SM).		4	Sample #4, Depth = 7.0' Mean (mm): 0.16, Phi Sorting: 0.40 Shell Hash: 0%, Fines (230): 8.43% (SP-SM)
-24.2	8.7		No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

SAJ FORM 1836 JUN 02 MODIFIED FOR THE FLORIDA DEP JUN 04

Boring Designation FEVC-07-02

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

2. BORING DESIGNATION: FEVC-07-02
LOCATION COORDINATES: X = 2,388,733 Y = 202,440

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Walter Sexton

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

8. TOTAL DEPTH OF BORING: 14.3 Ft.

9. SIZE AND TYPE OF BIT: 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane
HORIZONTAL: NAD 1983
VERTICAL: NAVD 88

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES:
DISTURBED:
UNDISTURBED (UD):

13. TOTAL NUMBER CORE BOXES:

14. ELEVATION GROUND WATER:

15. DATE BORING
STARTED: 03-28-07 10:31
COMPLETED: 03-28-07 10:35

16. ELEVATION TOP OF BORING: -9.0 Ft.

17. TOTAL RECOVERY FOR BORING: 13.5 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW/KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
-9.0	0.0					
-11.5	2.5		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments typically up to 0.5", little shell hash from 2.1'- 2.3', 0.75" shell fragments @ 2.2' and 2.5', gray (5Y-6/1), (SP).		1	Sample #1, Depth = 1.0' Mean (mm): 0.26, Phi Sorting: 0.70 Shell Hash: 0%, Fines (230): 0.98% (SP)
-22.5	13.5		SAND, fine grained, quartz, trace shell hash, trace silt, trace whole shell, whole shells up to 2.0", trace shell hash laminae, 0.5" shell hash pocket @ 3.0', 1.0" shell fragments @ 10.2' and 13.3', 3.0" shell fragment @ 13.5', gray (5Y-6/1), (SP).		2	Sample #2, Depth = 7.0' Mean (mm): 0.21, Phi Sorting: 0.46 Shell Hash: 0%, Fines (230): 1.09% (SP)
					3	Sample #3, Depth = 11.0' Mean (mm): 0.20, Phi Sorting: 0.31 Shell Hash: 0%, Fines (230): 1.24% (SP)
-23.3	14.3		No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

SAJ FORM 1836 JUN 02 MODIFIED FOR THE FLORIDA DEP JUN 04

Boring Designation FEVC-07-03

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

2. BORING DESIGNATION: FEVC-07-03
LOCATION COORDINATES: X = 2,392,093 Y = 200,758

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Walter Sexton

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

8. TOTAL DEPTH OF BORING: 7.0 Ft.

9. SIZE AND TYPE OF BIT: 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane
HORIZONTAL: NAD 1983
VERTICAL: NAVD 88

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES:
DISTURBED:
UNDISTURBED (UD):

13. TOTAL NUMBER CORE BOXES:

14. ELEVATION GROUND WATER:

15. DATE BORING
STARTED: 03-28-07 11:19
COMPLETED: 03-28-07 11:22

16. ELEVATION TOP OF BORING: -15.0 Ft.

17. TOTAL RECOVERY FOR BORING: 5.8 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW/KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
-15.0	0.0					Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
			SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments typically up to 0.5", 2.0" olive gray (5Y-4/2) silty pocket @ 1.6', 1.0" shell fragment @ 2.6', gray (5Y-6/1), (SP).		1	Sample #1, Depth = 1.0' Mean (mm): 0.18, Phi Sorting: 0.37 Shell Hash: 0%, Fines (230): 1.28% (SP)
					2	Sample #2, Depth = 4.0' Mean (mm): 0.18, Phi Sorting: 0.33 Shell Hash: 0%, Fines (230): 1.62% (SP)
-20.4	5.4					Sample #3, Depth = 5.6' Mean (mm): 0.19, Phi Sorting: 1.28 Shell Hash: 4%, Fines (230): 2.05% (SW)
-20.8	5.8		SAND, fine grained, quartz, little shell hash, little silt, trace shell fragments, trace whole shell, whole shells up to 0.5", shell fragments up to 1.5", gray (5Y-5/1), (SW).		3	
-22.0	7.0		No Recovery.			
			End of Boring			

0
5
10
15
20
25

FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

SAJ FORM 1836 JUN 02 MODIFIED FOR THE FLORIDA DEP JUN 04

Boring Designation FEVC-07-04

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

2. BORING DESIGNATION: FEVC-07-04
LOCATION COORDINATES: X = 2,391,811 Y = 199,871

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Walter Sexton

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

8. TOTAL DEPTH OF BORING: 7.7 Ft.

9. SIZE AND TYPE OF BIT: 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane
HORIZONTAL: NAD 1983
VERTICAL: NAVD 88

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES:
DISTURBED:
UNDISTURBED (UD):

13. TOTAL NUMBER CORE BOXES:

14. ELEVATION GROUND WATER:

15. DATE BORING
STARTED: 03-28-07 12:27
COMPLETED: 03-28-07 12:30

16. ELEVATION TOP OF BORING: -15.5 Ft.

17. TOTAL RECOVERY FOR BORING: 6.9 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW/KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
-15.5	0.0					
			SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 1.5", silty laminae from 4.7'-4.9', olive gray (5Y-4/2) silty pockets (0.75") @ 6.8' and (1.0"x0.75") @ 6.9', gray (5Y-6/1), (SP).		1	Sample #1, Depth = 1.0' Mean (mm): 0.18, Phi Sorting: 0.44 Shell Hash: 0%, Fines (230): 1.18% (SP)
					2	Sample #2, Depth = 5.2' Mean (mm): 0.18, Phi Sorting: 0.37 Shell Hash: 0%, Fines (230): 1.18% (SP)
-22.4	6.9					
-23.2	7.7		No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

SAJ FORM 1836 JUN 02 MODIFIED FOR THE FLORIDA DEP JUN 04

Boring Designation FEVC-07-05

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

2. BORING DESIGNATION: FEVC-07-05
LOCATION COORDINATES: X = 2,389,867 Y = 199,037

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Walter Sexton

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

8. TOTAL DEPTH OF BORING: 8.0 Ft.

9. SIZE AND TYPE OF BIT: 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane
HORIZONTAL: NAD 1983
VERTICAL: NAVD 88

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES:
DISTURBED:
UNDISTURBED (UD):

13. TOTAL NUMBER CORE BOXES:

14. ELEVATION GROUND WATER:

15. DATE BORING
STARTED: 03-28-07 13:50
COMPLETED: 03-28-07 13:53

16. ELEVATION TOP OF BORING: -12.9 Ft.

17. TOTAL RECOVERY FOR BORING: 7.2 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW/KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
-12.9	0.0					
			SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, trace whole shell, whole shells up to 0.5", shell fragments up to 1.5", silty laminae from 2.0'-2.2', little shell hash from 3.6'-3.9', 4.8'-4.9' and 5.9'-6.2', (1.0"x1.5") silty pocket @ 2.5', gray (5Y-6/1), (SP).		1	Sample #1, Depth = 1.0' Mean (mm): 0.19, Phi Sorting: 0.47 Shell Hash: 0%, Fines (230): 1.13% (SP)
					2	Sample #2, Depth = 6.5' Mean (mm): 0.21, Phi Sorting: 0.55 Shell Hash: 0%, Fines (230): 0.98% (SP)
-20.1	7.2					
-20.9	8.0		No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

SAJ FORM 1836 JUN 02 MODIFIED FOR THE FLORIDA DEP JUN 04

Boring Designation FEVC-07-06

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

9. SIZE AND TYPE OF BIT 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane | HORIZONTAL: NAD 1983 | VERTICAL: NAVD 88

2. BORING DESIGNATION: FEVC-07-06
LOCATION COORDINATES: X = 2,389,210 Y = 198,965

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.

12. TOTAL SAMPLES | DISTURBED | UNDISTURBED (UD)

4. NAME OF DRILLER: Walter Sexton

13. TOTAL NUMBER CORE BOXES

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL | BEARING

14. ELEVATION GROUND WATER

15. DATE BORING | STARTED: 03-28-07 14:24 | COMPLETED: 03-28-07 14:26

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

16. ELEVATION TOP OF BORING: -12.4 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

17. TOTAL RECOVERY FOR BORING: 8.4 Ft.

8. TOTAL DEPTH OF BORING: 9.0 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW/KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
-12.4	0.0					Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
			SAND, fine grained, quartz, trace shell hash, trace silt, trace medium to coarse grained shell hash laminae and pockets up to 1.0", 0.75" shell fragment @ 2.1', light gray (5Y-7/1), (SW).		1	Sample #1, Depth = 1.5' Mean (mm): 0.36, Phi Sorting: 1.26 Shell Hash: 5%, Fines (230): 0.94% (SW)
-15.8	3.4					
-16.6	4.2		SAND, fine grained, quartz, trace shell hash, trace silt, 1.0" shell fragment @ 3.5', gray (5Y-6/1), (SP).		2	Sample #2, Depth = 3.8' Mean (mm): 0.20, Phi Sorting: 0.61 Shell Hash: 0%, Fines (230): 1.34% (SP)
-18.4	6.0		SAND, fine grained, quartz, little shell hash, trace silt, 3.0" whole shell @ 5.0', 2.0" shell fragment @ 4.7', layer of shell hash and shell fragments from 4.2'-4.5', shell hash layers from 5.2'-5.3' and 5.8'-6.0', gray (5Y-6/1), (SW).		3	Sample #3, Depth = 5.0' Mean (mm): 0.31, Phi Sorting: 0.97 Shell Hash: 2%, Fines (230): 1.14% (SW)
-19.6	7.2				4	Sample #4, Depth = 6.5' Mean (mm): 0.64, Phi Sorting: 1.65 Shell Hash: 12%, Fines (230): 0.98% (SW)
-20.8	8.4		SAND, medium grained, quartz, little shell hash, trace shell fragments, trace silt, trace whole shell, shell fragments and whole shell typically up to 0.5", shell hash laminae @ 6.2', 6.5' and 6.6', 1.0" shell fragment @ 6.8', gray (5Y-5/1), (SW).		5	Sample #5, Depth = 8.0' Mean (mm): 0.19, Phi Sorting: 0.62 Shell Hash: 1%, Fines (230): 1.62% (SP)
-21.4	9.0		SAND, fine grained, quartz, trace shell hash, trace silt, trace whole shell, whole shells typically up to 0.5", shell hash laminae @ 7.5', silty laminae @ 7.6' and 7.7', 0.5" silty sand pocket @ 7.3', 0.75" whole shell @ 7.4', 0.75" shell fragments @ 7.2', 8.0', 8.1' and 8.4', gray (5Y-5/1), (SP).			
			No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

SAJ FORM 1836 JUN 02 **MODIFIED FOR THE FLORIDA DEP** JUN 04

Boring Designation FEVC-07-07

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

2. BORING DESIGNATION: FEVC-07-07
LOCATION COORDINATES: X = 2,390,615 Y = 200,380

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Walter Sexton

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

8. TOTAL DEPTH OF BORING: 8.5 Ft.

9. SIZE AND TYPE OF BIT: 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane
HORIZONTAL: NAD 1983
VERTICAL: NAVD 88

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES:
DISTURBED:
UNDISTURBED (UD):

13. TOTAL NUMBER CORE BOXES:

14. ELEVATION GROUND WATER:

15. DATE BORING
STARTED: 03-28-07 14:52
COMPLETED: 03-28-07 14:56

16. ELEVATION TOP OF BORING: -11.4 Ft.

17. TOTAL RECOVERY FOR BORING: 7.2 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW/KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
-11.4	0.0					
-12.9	1.5		SAND, fine grained, quartz, little shell hash, trace shell fragments, trace silt, shell fragments up to 1.0", gray (5Y-5/1), (SP-SM).		1	Sample #1, Depth = 1.0' Mean (mm): 0.19, Phi Sorting: 0.71 Shell Hash: 1%, Fines (230): 5.97% (SP-SM)
-14.1	2.7		SAND, fine grained, quartz, trace shell hash, trace silt, 1.0" coral fragment @ 1.5', 0.75" shell fragment @ 2.6', 1.5" shell fragment @ 1.6', gray (5Y-6/1), (SP).		2	Sample #2, Depth = 2.0' Mean (mm): 0.19, Phi Sorting: 0.44 Shell Hash: 0%, Fines (230): 1.41% (SP)
-14.6	3.2				1	
-18.6	7.2		SAND, fine grained, quartz, little shell hash, trace shell fragments, trace silt, trace whole shell, whole shells up to 0.5", shell hash pocket @ 3.1', shell fragments up to 1.5", 0.75" rock fragment @ 3.2', gray (5Y-5/1), (SP-SM). SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, trace whole shell, shell fragments up to 0.75", whole shells up to 0.5", laminae of heavy minerals @ 4.6' and 4.7', 0.2" clayey lenses @ 5.7', 5.8' and 6.9', 1.0" clayey pockets @ 7.0' and 7.2', gray (5Y-6/1), (SP).		3	Sample #3, Depth = 5.0' Mean (mm): 0.19, Phi Sorting: 0.33 Shell Hash: 0%, Fines (230): 1.23% (SP)
-19.9	8.5		No Recovery. End of Boring			

0
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FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

SAJ FORM 1836 JUN 02 **MODIFIED FOR THE FLORIDA DEP** JUN 04

Boring Designation FEVC-07-08

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

9. SIZE AND TYPE OF BIT 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane | HORIZONTAL: NAD 1983 | VERTICAL: NAVD 88

2. BORING DESIGNATION: FEVC-07-08
LOCATION COORDINATES: X = 2,390,181 Y = 200,226

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

12. TOTAL SAMPLES | DISTURBED | UNDISTURBED (UD)

4. NAME OF DRILLER: Walter Sexton

13. TOTAL NUMBER CORE BOXES

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL | BEARING

14. ELEVATION GROUND WATER

15. DATE BORING: STARTED 03-28-07 15:37 | COMPLETED 03-28-07 15:39

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

16. ELEVATION TOP OF BORING: -11.4 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

17. TOTAL RECOVERY FOR BORING: 7.9 Ft.

8. TOTAL DEPTH OF BORING: 9.0 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW/KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
-11.4	0.0					Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
-12.4	1.0		SAND, medium grained, quartz, some shell hash, little whole shell, trace rock fragments, trace shell fragments, trace silt, rock fragments typically up to 1.0", whole shells and shell fragments up to 2.0", (3.0"x1.0") limestone fragment @ 0.2', gray (5Y-6/1), (SW).		1	Sample #1, Depth = 0.5' Mean (mm): 1.06, Phi Sorting: 2.08 Shell Hash: 24%, Fines (230): 0.69% (SW)
-14.5	3.1		SAND, fine grained, quartz, little shell hash, trace silt, pocket of shell fragments up to 2.0" from 1.7'-2.3', 0.75" whole shells @ 1.7' and 1.8', gray (5Y-6/1), (SP).		2	Sample #2, Depth = 2.5' Mean (mm): 0.29, Phi Sorting: 0.85 Shell Hash: 1%, Fines (230): 1.42% (SP)
-15.7	4.3		SAND, medium grained, quartz, some shell hash, little shell fragments, trace silt, trace whole shell, 1.0" shell hash layers @ 3.3', 3.6' and 4.2', shell fragments up to 1.5", gray (5Y-6/1), (SW).		1	
-16.9	5.5				3	Sample #3, Depth = 5.0' Mean (mm): 0.55, Phi Sorting: 1.33 Shell Hash: 2%, Fines (230): 0.89% (SW)
-18.2	6.8				2	
-19.3	7.9		SHELL HASH, some sand, trace shell fragments, trace silt, trace whole shell, shell fragments up to 1.5", whole shells up to 2.0", gray (5Y-6/1), (GW).		4	Sample #4, Depth = 7.5' Mean (mm): 1.29, Phi Sorting: 1.80 Shell Hash: 12%, Fines (230): 1.11% (SW)
-20.4	9.0		SAND, fine grained, quartz, little shell hash, trace shell fragments, trace silt, trace whole shell, whole shells up to 0.5", shell hash laminae @ 6.0', 6.1' and 6.3', shell fragments up to 1.5", gray (5Y-6/1), (SP).			
			SHELL HASH, little sand, little shell fragments, little whole shell, trace silt, whole shells and shell fragments up to 1.5", 1.0" silty layer @ 7.8', dark greenish gray (10BG-4/1), (GW).			
			No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

SAJ FORM 1836 JUN 02 **MODIFIED FOR THE FLORIDA DEP** JUN 04

Boring Designation FEVC-07-09

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

9. SIZE AND TYPE OF BIT 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane | HORIZONTAL: NAD 1983 | VERTICAL: NAVD 88

2. BORING DESIGNATION: FEVC-07-09
LOCATION COORDINATES: X = 2,388,776 Y = 201,051

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.

12. TOTAL SAMPLES | DISTURBED | UNDISTURBED (UD)

4. NAME OF DRILLER: Walter Sexton

13. TOTAL NUMBER CORE BOXES

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL | BEARING

14. ELEVATION GROUND WATER

15. DATE BORING | STARTED: 03-30-07 13:14 | COMPLETED: 03-30-07 13:18

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

16. ELEVATION TOP OF BORING: -5.8 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

17. TOTAL RECOVERY FOR BORING: 14 Ft.

8. TOTAL DEPTH OF BORING: 16.5 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW/KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
-5.8	0.0					
-8.1	2.3		SAND, fine grained, quartz, little shell hash, trace shell fragments, trace silt, trace whole shell, shell fragments up to 0.5", whole shells typically up to 1.5", (2.5"x1.0") whole shell @ 0.9', gray (5Y-6/1), (SW).		1	Sample #1, Depth = 1.0' Mean (mm): 0.39, Phi Sorting: 1.22 Shell Hash: 2%, Fines (230): 1.10% (SW)
-14.3	8.5		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments typically up to 0.5", trace shelly laminae from 4.2'-4.7', (2.0"x0.75") whole shell @ 4.8', 0.75" whole shell @ 7.0', (1.0"x0.75") shell fragment @ 8.4', gray (5Y-6/1), (SP).		2	Sample #2, Depth = 5.5' Mean (mm): 0.21, Phi Sorting: 0.32 Shell Hash: 0%, Fines (230): 1.38% (SP)
-16.1	10.3		SAND, fine grained, quartz, little shell hash, trace silt, trace whole shell, whole shells up to 0.5", (1.25"x1.0") shell fragment @ 9.0', (2.5"x1.5") shell fragment @ 9.6', gray (5Y-6/1), (SW).		3	Sample #3, Depth = 9.0' Mean (mm): 0.29, Phi Sorting: 1.04 Shell Hash: 2%, Fines (230): 1.35% (SW)
-19.8	14.0		SAND, medium grained, quartz, trace shell fragments, trace whole shell, shell fragments up to 1.5", whole shell up to 2.0", gray (5Y-5/1), (SW).		4	Sample #4, Depth = 11.9' Mean (mm): 0.58, Phi Sorting: 1.44 Shell Hash: 4%, Fines (230): 1.29% (SW)
-22.3	16.5		No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

SAJ FORM 1836 JUN 02 **MODIFIED FOR THE FLORIDA DEP** JUN 04

Boring Designation FEVC-07-10

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

9. SIZE AND TYPE OF BIT 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane | HORIZONTAL: NAD 1983 | VERTICAL: NAVD 88

2. BORING DESIGNATION: FEVC-07-10
LOCATION COORDINATES: X = 2,385,121 Y = 200,150

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

12. TOTAL SAMPLES | DISTURBED | UNDISTURBED (UD)

4. NAME OF DRILLER: Walter Sexton

13. TOTAL NUMBER CORE BOXES

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL | BEARING

14. ELEVATION GROUND WATER

15. DATE BORING | STARTED: 03-29-07 07:40 | COMPLETED: 03-29-07 07:43

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

16. ELEVATION TOP OF BORING: -9.3 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

17. TOTAL RECOVERY FOR BORING: 14.5 Ft.

8. TOTAL DEPTH OF BORING: 16.0 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW/KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
-9.3	0.0					
-11.3	2.0		SAND, fine grained, quartz, little shell hash, trace shell fragments, trace silt, shell fragments typically up to 0.5", (1.5"x1.0") whole shell @ 0.1', (1.0"x0.75") shell fragment @ 1.4', gray (5Y-6/1), (SP).		1	Sample #1, Depth = 0.7' Mean (mm): 0.28, Phi Sorting: 0.68 Shell Hash: 1%, Fines (230): 0.92% (SP)
-17.1	7.8		SAND, fine grained, quartz, trace organics, trace shell fragments, trace shell hash, trace silt, shell fragments up to 0.5", (2.0"x0.75") whole shell @ 2.4', gray (5Y-6/1), (SP).		2	Sample #2, Depth = 4.5' Mean (mm): 0.20, Phi Sorting: 0.42 Shell Hash: 0%, Fines (230): 1.34% (SP)
-17.7	8.4		SAND, fine grained, quartz, little shell hash, trace shell fragments, trace silt, shell fragments up to 0.5", gray (5Y-6/1), (SP).		1	
-21.5	12.2		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 0.5", gray (5Y-6/1), (SP).		3	Sample #3, Depth = 11.0' Mean (mm): 0.19, Phi Sorting: 0.33 Shell Hash: 0%, Fines (230): 1.43% (SP)
-23.8	14.5		SAND, fine grained, quartz, little shell hash, trace shell fragments, trace silt, trace whole shell, trace wood, whole shells up to 0.5", shell fragments up to 2.0", 2.0" silty pocket @ 13.6', (2.0"x0.75") silty pocket @ 13.8', color is mottled gray (5Y-5/1) and, gray (5Y-6/1), (SW).		4	Sample #4, Depth = 13.9' Mean (mm): 0.25, Phi Sorting: 1.09 Shell Hash: 2%, Fines (230): 2.48% (SW)
-25.3	16.0		No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

SAJ FORM 1836 JUN 02 MODIFIED FOR THE FLORIDA DEP JUN 04

Boring Designation FEVC-07-11

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

9. SIZE AND TYPE OF BIT 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane | HORIZONTAL: NAD 1983 | VERTICAL: NAVD 88

2. BORING DESIGNATION: FEVC-07-11
LOCATION COORDINATES: X = 2,386,946 Y = 201,018

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.

12. TOTAL SAMPLES | DISTURBED | UNDISTURBED (UD)

4. NAME OF DRILLER: Walter Sexton

13. TOTAL NUMBER CORE BOXES

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED | DEG. FROM VERTICAL | BEARING

14. ELEVATION GROUND WATER

15. DATE BORING | STARTED: 03-30-07 16:49 | COMPLETED: 03-30-07 17:52

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

16. ELEVATION TOP OF BORING: -4.4 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

17. TOTAL RECOVERY FOR BORING: 14.4 Ft.

8. TOTAL DEPTH OF BORING: 16.5 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW/KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
-4.4	0.0					
-6.3	1.9		SAND, fine grained, quartz, little shell hash, trace shell fragments, trace silt, shell fragments typically up to 0.5", 0.75" shell fragment @ 1.5', (1.5"x0.75") shell fragment @ 1.7', gray (5Y-6/1), (SP).		1	Sample #1, Depth = 0.9' Mean (mm): 0.25, Phi Sorting: 0.76 Shell Hash: 1%, Fines (230): 1.26% (SP)
-10.6	6.2		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, trace whole shell, shell fragments and whole shells typically up to 0.5", silty lamina @ 5.9', 0.75" whole shell @ 2.0', 0.75" shell fragment @ 2.1', gray (5Y-6/1), (SP).		2	Sample #2, Depth = 4.0' Mean (mm): 0.21, Phi Sorting: 0.34 Shell Hash: 0%, Fines (230): 1.27% (SP)
-11.8	7.4		SAND, fine grained, quartz, little shell hash, trace shell fragments, trace silt, trace whole shell, shell fragments and whole shells typically up to 0.5", (1.0"x0.75") shell fragment @ 6.2', (2.0"x1.0") shell fragment @ 6.4', (0.5"x1.5") shell fragment @ 7.4', gray (5Y-6/1), (SP).		1	
-16.3	11.9		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 0.5"; (3.0"x1.5") silty pocket from 8.1'-8.4', gray (5Y-6/1), (SP).		3	Sample #3, Depth = 9.0' Mean (mm): 0.19, Phi Sorting: 0.36 Shell Hash: 0%, Fines (230): 1.32% (SP)
-18.8	14.4		SAND, fine grained, quartz, little shell hash, trace shell fragments, trace silt, trace whole shell, trace shell hash from 12.1' to 12.4', shell fragments up to 2.0", whole shells up to 0.5", gray (5Y-5/1), (SW).		4	Sample #4, Depth = 13.0' Mean (mm): 0.31, Phi Sorting: 1.06 Shell Hash: 2%, Fines (230): 1.36% (SW)
-20.9	16.5		No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

SAJ FORM 1836 JUN 02 **MODIFIED FOR THE FLORIDA DEP** JUN 04

Boring Designation FEVC-07-12

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

9. SIZE AND TYPE OF BIT 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane | HORIZONTAL: NAD 1983 | VERTICAL: NAVD 88

2. BORING DESIGNATION: FEVC-07-12
LOCATION COORDINATES: X = 2,386,433 Y = 200,711

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.

12. TOTAL SAMPLES | DISTURBED | UNDISTURBED (UD)

4. NAME OF DRILLER: Walter Sexton

13. TOTAL NUMBER CORE BOXES

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL | BEARING

14. ELEVATION GROUND WATER

15. DATE BORING | STARTED: 03-30-07 08:02 | COMPLETED: 03-30-07 08:06

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

16. ELEVATION TOP OF BORING: -7.5 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

17. TOTAL RECOVERY FOR BORING: 12 Ft.

8. TOTAL DEPTH OF BORING: 14.0 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW/KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
-7.5	0.0					Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
			SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, trace whole shell, shell fragments and whole shells typically up to 0.5", little shell hash from 8.1'-8.4', some shell hash from 8.7'-9.0', 1.5" whole shell @ 8.8', 1.0" shell fragment @ 7.6', (1.0"x0.75") shell fragments @ 8.9' and 9.0', gray (5Y-6/1), (SP).		1	Sample #1, Depth = 2.0' Mean (mm): 0.20, Phi Sorting: 0.36 Shell Hash: 0%, Fines (230): 1.38% (SP)
					2	Sample #2, Depth = 7.0' Mean (mm): 0.20, Phi Sorting: 0.39 Shell Hash: 0%, Fines (230): 1.47% (SP)
-16.6	9.1					
-17.6	10.1		Shelly SAND, quartz, trace shell fragments, trace silt, trace whole shell, shell fragments and whole shells up to 1.5", light brownish gray (2.5Y-6/2), (SW).		3	Sample #3, Depth = 9.7' Mean (mm): 0.77, Phi Sorting: 1.88 Shell Hash: 10%, Fines (230): 1.10% (SW)
-19.5	12.0		CLAY, trace shell fragments, trace whole shell, shell fragments typically up to 0.5", whole shells up to 3.0", (2.0"x1.5") shell fragments @ 11.2' and 12.0', very dark gray (5Y-3/1), (CL).			
-21.5	14.0		No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

SAJ FORM 1836 JUN 02 **MODIFIED FOR THE FLORIDA DEP** JUN 04

Boring Designation FEVC-07-13

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

9. SIZE AND TYPE OF BIT 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane | HORIZONTAL: NAD 1983 | VERTICAL: NAVD 88

2. BORING DESIGNATION: FEVC-07-13
LOCATION COORDINATES: X = 2,385,692 Y = 200,595

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

12. TOTAL SAMPLES | DISTURBED | UNDISTURBED (UD)

4. NAME OF DRILLER: Walter Sexton

13. TOTAL NUMBER CORE BOXES

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL | BEARING

14. ELEVATION GROUND WATER

15. DATE BORING | STARTED: 03-30-07 11:59 | COMPLETED: 03-30-07 12:02

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

16. ELEVATION TOP OF BORING: -10.6 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

17. TOTAL RECOVERY FOR BORING: 14 Ft.

8. TOTAL DEPTH OF BORING: 16.5 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW/KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
-10.6	0.0					
-11.6	1.0		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments typically up to 0.5", 1.0" shell fragments @ 0.3' and 0.7', 0.5" shelly clay layer @ 1.0', gray (5Y-5/1), (SW).		1	Sample #1, Depth = 0.5' Mean (mm): 0.35, Phi Sorting: 1.12 Shell Hash: 1%, Fines (230): 1.05% (SW)
-15.9	5.3		SAND, fine grained, quartz, trace shell hash, trace silt, 0.75" shell fragment @ 1.1', silt laminae @ 2.1', gray (5Y-5/1), (SP).		2	Sample #2, Depth = 4.0' Mean (mm): 0.18, Phi Sorting: 0.32 Shell Hash: 0%, Fines (230): 1.76% (SP)
-21.1	10.5		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell hash distributed in laminae and pockets up to 1.0", shell fragments typically up to 1.0", 1.0" silt pockets @ 9.4' 10.3' and 10.5', 1.5" shell fragments @ 7.4' and 9.7'; 2.0" clay pocket from 7.8'-8.0', some silt from 8.2'-8.4', gray (5Y-6/1), (SP).		3	Sample #3, Depth = 6.5' Mean (mm): 0.22, Phi Sorting: 0.56 Shell Hash: 0%, Fines (230): 1.20% (SP)
-23.2	12.6		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments typically up to 0.5", shell hash laminae from 10.6'-11.5' and 12.4', 1.0" shell fragment @ 10.9', gray (5Y-5/1), (SP).		4	Sample #4, Depth = 11.5' Mean (mm): 0.30, Phi Sorting: 0.62 Shell Hash: 1%, Fines (230): 1.47% (SP)
-24.6	14.0		Sandy SHELL, trace silt, shell component is shell hash and shell fragments up to 2.0", sand layer from 13.0'-13.2', clay layer from 13.8'-14.0', gray (5Y-5/1), (GW).		5	Sample #5, Depth = 13.0' Mean (mm): 0.72, Phi Sorting: 2.31 Shell Hash: 27%, Fines (230): 1.67% (SW)
-27.1	16.5		No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

SAJ FORM 1836 JUN 02 MODIFIED FOR THE FLORIDA DEP JUN 04

Boring Designation FEVC-07-14

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

9. SIZE AND TYPE OF BIT 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane | HORIZONTAL: NAD 1983 | VERTICAL: NAVD 88

2. BORING DESIGNATION: FEVC-07-14
LOCATION COORDINATES: X = 2,387,347 Y = 202,224

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

12. TOTAL SAMPLES | DISTURBED | UNDISTURBED (UD)

4. NAME OF DRILLER: Walter Sexton

13. TOTAL NUMBER CORE BOXES

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL | BEARING

14. ELEVATION GROUND WATER

15. DATE BORING | STARTED: 03-30-07 12:33 | COMPLETED: 03-30-07 12:36

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

16. ELEVATION TOP OF BORING: -7.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

17. TOTAL RECOVERY FOR BORING: 15.2 Ft.

8. TOTAL DEPTH OF BORING: 17.5 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW/KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
-7.0	0.0					Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
			SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, trace whole shell, shell fragments and whole shells typically up to 0.5", 1.5" whole shell @ 4.2', gray (5Y-6/1), (SP).		1	Sample #1, Depth = 2.0' Mean (mm): 0.19, Phi Sorting: 0.41 Shell Hash: 0%, Fines (230): 1.14% (SP)
-12.2	5.2					
-12.6	5.6		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, trace whole shell, shell fragments and whole shells typically up to 0.5", 2 (0.5"x3.5") clayey burrows @ 5.4', (2.0"x0.5") whole shell @ 5.6', gray (2.5Y-6/1), (SW).		3	Sample #2, Depth = 5.9' Mean (mm): 0.24, Phi Sorting: 0.69 Shell Hash: 0%, Fines (230): 1.02% (SP)
-13.2	6.2				2	
-14.8	7.8		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 0.5", 2.0" shell hash pocket @ 5.9', gray (5Y-5/1), (SP).		3	Sample #3, Depth = 6.5' Mean (mm): 0.33, Phi Sorting: 1.06 Shell Hash: 2%, Fines (230): 1.02% (SW)
-18.5	11.5		SAND, fine grained, quartz, little shell hash, trace shell fragments, trace silt, trace whole shell, shell fragments and whole shells up to 1.5", trace shell hash from 6.7'-7.0', gray (2.5Y-6/1), (SW).		4	Sample #4, Depth = 9.5' Mean (mm): 0.21, Phi Sorting: 0.58 Shell Hash: 0%, Fines (230): 1.13% (SP)
-19.5	12.5		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, trace whole shell, shell fragments and whole shells typically up to 0.5", organic lens @ 8.6', (0.5"x2.0") whole shell @ 9.0', 0.75" shell fragment @ 9.7', gray (5Y-6/1), (SP).		5	Sample #5, Depth = 11.8' Mean (mm): 0.48, Phi Sorting: 1.86 Shell Hash: 12%, Fines (230): 0.79% (SW)
-22.2	15.2		SAND, medium grained, quartz, little shell hash, trace shell fragments, trace silt, trace whole shell, shell fragments up to 1.5", whole shells up to 2.5", trace shell hash from 12.0'-12.2', gray (5Y-6/1), (SW).		4	
-24.5	17.5		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 0.5", (2.0"x1.5") shell hash pocket @ 14.1', gray (5Y-6/1), (SP).			
			No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

SAJ FORM 1836 JUN 02 **MODIFIED FOR THE FLORIDA DEP** JUN 04

Boring Designation FEVC-07-15

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

2. BORING DESIGNATION: FEVC-07-15
LOCATION COORDINATES: X = 2,388,715 Y = 200,330

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Walter Sexton

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

8. TOTAL DEPTH OF BORING: 16.0 Ft.

9. SIZE AND TYPE OF BIT: 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane
HORIZONTAL: NAD 1983
VERTICAL: NAVD 88

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES
DISTURBED:
UNDISTURBED (UD):

13. TOTAL NUMBER CORE BOXES:

14. ELEVATION GROUND WATER:

15. DATE BORING
STARTED: 03-30-07 13:43
COMPLETED: 03-30-07 13:46

16. ELEVATION TOP OF BORING: -5.3 Ft.

17. TOTAL RECOVERY FOR BORING: 14.2 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW/KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
-5.3	0.0					
-8.3	3.0		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments typicaly up to 0.5", 1.0" whole shell @ 0.4', 2.5" whole shell @ 1.8', 0.75" shell fragment @ 1.7', light olive gray (5Y-6/2), (SP).		1	Sample #1, Depth = 1.5' Mean (mm): 0.24, Phi Sorting: 0.58 Shell Hash: 0%, Fines (230): 1.05% (SP)
-15.8	10.5		SAND, fine grained, quartz, trace shell hash, trace silt, 0.5" silty pocket @ 7.0', 0.75" shell fragment @ 3.4', light olive gray (5Y-6/2), (SP).		2	Sample #2, Depth = 5.5' Mean (mm): 0.18, Phi Sorting: 0.30 Shell Hash: 0%, Fines (230): 1.10% (SP)
-18.3	13.0		SAND, fine grained, quartz, trace shell hash, trace silt, trace whole shell, whole shells up to 0.5", shell hash laminae @ 10.7', 10.9' and 11.3', 0.75" shell fragment @ 10.5', light olive gray (5Y-6/2), (SP).		3	Sample #3, Depth = 12.0' Mean (mm): 0.25, Phi Sorting: 0.37 Shell Hash: 0%, Fines (230): 1.09% (SP)
-19.5	14.2		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments typically up to 0.5", 1.0" shell fragment @ 13.9', light olive gray (5Y-6/2), (SP).		1	
-21.3	16.0		No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

SAJ FORM 1836 JUN 02 MODIFIED FOR THE FLORIDA DEP JUN 04

Boring Designation FEVC-07-16

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

2. BORING DESIGNATION: FEVC-07-16
LOCATION COORDINATES: X = 2,388,474 Y = 201,638

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Walter Sexton

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

8. TOTAL DEPTH OF BORING: 9.0 Ft.

9. SIZE AND TYPE OF BIT: 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane
HORIZONTAL: NAD 1983
VERTICAL: NAVD 88

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES
DISTURBED
UNDISTURBED (UD)

13. TOTAL NUMBER CORE BOXES

14. ELEVATION GROUND WATER

15. DATE BORING
STARTED: 03-30-07 14:15
COMPLETED: 03-30-07 14:19

16. ELEVATION TOP OF BORING: 0.0 Ft.

17. TOTAL RECOVERY FOR BORING: 8 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW/KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
0.0	0.0					
			SAND, fine grained, quartz, trace shell fragments, trace shell hash, shell fragments up to 0.5", shell hash lenses @ 2.0', 2.3', 2.4' and 2.9', 2.0" little shell hash pocket @ 3.6', 1.5" whole shell @ 2.4', light olive gray (5Y-6/2), (SP).		1	Sample #1, Depth = 1.0' Mean (mm): 0.21, Phi Sorting: 0.38 Shell Hash: 0%, Fines (230): 1.13% (SP)
					2	Sample #2, Depth = 4.5' Mean (mm): 0.21, Phi Sorting: 0.44 Shell Hash: 0%, Fines (230): 1.46% (SP)
-7.3	7.3					Sample #3, Depth = 7.7'
-8.0	8.0		SAND, medium grained, quartz, little shell hash, trace shell fragments, trace silt, trace whole shell, shell fragments and whole shells typically up to 0.5", 0.75" shell fragments @ 7.5' and 7.8', 1.0" shell fragment @ 7.6', gray (5Y-6/1), (SW).		3	Mean (mm): 0.49, Phi Sorting: 1.67 Shell Hash: 4%, Fines (230): 1.19% (SW)
-9.0	9.0		No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

SAJ FORM 1836 JUN 02 MODIFIED FOR THE FLORIDA DEP JUN 04

Boring Designation FEVC-07-16A

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

9. SIZE AND TYPE OF BIT 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane | HORIZONTAL: NAD 1983 | VERTICAL: NAVD 88

2. BORING DESIGNATION: FEVC-07-16A
LOCATION COORDINATES: X = 2,388,474 Y = 201,638

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.

12. TOTAL SAMPLES | DISTURBED | UNDISTURBED (UD)

4. NAME OF DRILLER: Walter Sexton

13. TOTAL NUMBER CORE BOXES

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL | BEARING

14. ELEVATION GROUND WATER

15. DATE BORING | STARTED: 03-30-07 14:40 | COMPLETED: 03-30-07 14:45

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

16. ELEVATION TOP OF BORING: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

17. TOTAL RECOVERY FOR BORING: 10.1 Ft.

8. TOTAL DEPTH OF BORING: 18.5 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW/KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
0.0	0.0					Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
			Jetted to 7.5'.			
-7.5	7.5					
-8.0	8.0		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 0.5", gray (5Y-5/1), (SW).		1	Sample #1, Depth = 7.8' Mean (mm): 0.27, Phi Sorting: 1.01 Shell Hash: 1%, Fines (230): 1.13% (SW)
-11.8	11.8		SAND, medium grained, quartz, little shell hash, trace shell fragments, trace silt, trace whole shell, whole shells up to 0.5", shell fragments up to 2.0", gray (5Y-5/1), (SW).		2	Sample #2, Depth = 10.3' Mean (mm): 0.59, Phi Sorting: 1.71 Shell Hash: 3%, Fines (230): 0.85% (SW)
-12.7	12.7		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 0.5", gray (5Y-5/1), (SP).		VC-16 (2)	
-14.9	14.9		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, trace whole shell, whole shells and shell fragments up to 2.0", gray (5Y-6/1), (SW).		3	Sample #3, Depth = 13.9' Mean (mm): 0.30, Phi Sorting: 0.95 Shell Hash: 1%, Fines (230): 1.03% (SW)
-17.6	17.6		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 0.5", little shell hash pocket @ 15.8', gray (5Y-6/1), (SP).		4	Sample #4, Depth = 16.5' Mean (mm): 0.21, Phi Sorting: 0.33 Shell Hash: 0%, Fines (230): 1.45% (SP)
-18.5	18.5		No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

SAJ FORM 1836 JUN 02 **MODIFIED FOR THE FLORIDA DEP** JUN 04

Boring Designation FEVC-07-17

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

2. BORING DESIGNATION: FEVC-07-17
LOCATION COORDINATES: X = 2,387,728 Y = 201,394

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Walter Sexton

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

8. TOTAL DEPTH OF BORING: 13.5 Ft.

9. SIZE AND TYPE OF BIT: 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane
HORIZONTAL: NAD 1983
VERTICAL: NAVD 88

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES
DISTURBED:
UNDISTURBED (UD):

13. TOTAL NUMBER CORE BOXES:

14. ELEVATION GROUND WATER:

15. DATE BORING
STARTED: 03-30-07 15:44
COMPLETED: 03-30-07 15:47

16. ELEVATION TOP OF BORING: -3.0 Ft.

17. TOTAL RECOVERY FOR BORING: 11.9 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW/KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
-3.0	0.0					
			SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 1.0", shell hash and shell fragment layer from 2.7'-3.0', gray (5Y-6/1), (SP).		1	Sample #1, Depth = 2.0' Mean (mm): 0.22, Phi Sorting: 0.44 Shell Hash: 0%, Fines (230): 0.99% (SP)
-7.7	4.7					
-8.4	5.4		Shelly SAND, medium grained, quartz, trace silt, shell component is shell hash and shell fragments up to 1.5", light olive gray (5Y-6/2), (SW).		2	Sample #2, Depth = 5.1' Mean (mm): 0.68, Phi Sorting: 2.25 Shell Hash: 3%, Fines (230): 1.15% (SW)
			SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments typically up to 0.5", shell hash laminae @ 5.8', 6.0', 7.2' and 7.6', some shell hash from 8.5'-8.6', (3) 0.75" shell fragments @ 6.3', gray (5Y-6/1), (SP).		3	Sample #3, Depth = 7.0' Mean (mm): 0.24, Phi Sorting: 0.59 Shell Hash: 0%, Fines (230): 1.17% (SP)
-11.8	8.8					
			SAND, medium grained, quartz, some shell hash, trace shell fragments, trace silt, shell fragments up to 1.0", olive gray (5Y-5/2), (SW).		4	Sample #4, Depth = 10.1' Mean (mm): 0.55, Phi Sorting: 1.61 Shell Hash: 3%, Fines (230): 0.91% (SW)
-13.7	10.7					
			SAND, fine grained, quartz, trace shell hash, trace silt, trace whole shell, whole shells up to 0.5", gray (5Y-6/1), (SP).		5	Sample #5, Depth = 11.5' Mean (mm): 0.26, Phi Sorting: 0.63 Shell Hash: 0%, Fines (230): 1.20% (SP)
-14.9	11.9					
			No Recovery.			
-16.5	13.5					
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

SAJ FORM 1836 JUN 02 **MODIFIED FOR THE FLORIDA DEP** JUN 04

Boring Designation FEVC-07-17A

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

2. BORING DESIGNATION: FEVC-07-17A
LOCATION COORDINATES: X = 2,387,728 Y = 201,394

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Walter Sexton

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

8. TOTAL DEPTH OF BORING: 18.5 Ft.

9. SIZE AND TYPE OF BIT: 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane
HORIZONTAL: NAD 1983
VERTICAL: NAVD 88

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES
DISTURBED
UNDISTURBED (UD)

13. TOTAL NUMBER CORE BOXES

14. ELEVATION GROUND WATER

15. DATE BORING
STARTED: 03-30-07 16:10
COMPLETED: 03-30-07 16:15

16. ELEVATION TOP OF BORING: -3.0 Ft.

17. TOTAL RECOVERY FOR BORING: 9.2 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW/KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
-3.0	0.0					Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
			Jetted to 9.0".			
-12.0	9.0					
			SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 1.0", shell hash laminae @ 10.2', 10.5' and 11.2', gray (5Y-6/1), (SP).		1	Sample #1, Depth = 10.3' Mean (mm): 0.27, Phi Sorting: 0.73 Shell Hash: 1%, Fines (230): 1.27% (SP)
-15.0	12.0					
			SAND, fine to medium grained, quartz, some shell hash, trace shell fragments, trace silt, shell fragments up to 1.5", gray (5Y-6/1), (SW).		2	Sample #2, Depth = 12.6' Mean (mm): 0.41, Phi Sorting: 1.14 Shell Hash: 2%, Fines (230): 0.80% (SW)
-16.3	13.3					
			SAND, fine grained, quartz, trace shell hash, trace silt, some shell hash @ 4.7', 0.75" shell fragment @ 4.7', gray (5Y-6/1), (SP).		1	
-17.2	14.2					
-18.0	15.0				2	
			SAND, fine to medium grained, quartz, some shell hash, trace shell fragments, trace silt, shell fragments typically up to 1.0", trace shell hash from 14.4'-14.5', 2.5" and 3.0" shell fragments @ 14.8', gray (5Y-6/1), (SW).		1	
			SAND, fine grained, quartz, trace shell fragments, trace shell hash, shell fragments up to 2.0", gray (5Y-6/1), (SP).			
-21.2	18.2					
-21.5	18.5		No Recovery.			
			End of Boring			

FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

SAJ FORM 1836 JUN 02 **MODIFIED FOR THE FLORIDA DEP** JUN 04

Boring Designation FEVC-07-18

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

2. BORING DESIGNATION: FEVC-07-18
LOCATION COORDINATES: X = 2,387,894 Y = 201,815

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Walter Sexton

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

8. TOTAL DEPTH OF BORING: 18.0 Ft.

9. SIZE AND TYPE OF BIT: 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane
HORIZONTAL: NAD 1983
VERTICAL: NAVD 88

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES:
DISTURBED:
UNDISTURBED (UD):

13. TOTAL NUMBER CORE BOXES:

14. ELEVATION GROUND WATER:

15. DATE BORING
STARTED: 03-31-07 13:30
COMPLETED: 03-31-07 13:35

16. ELEVATION TOP OF BORING: -3.0 Ft.

17. TOTAL RECOVERY FOR BORING: 16.3 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
-3.0	0.0					Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
			SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 0.5", 3.0" medium grained pocket @ 1.0', gray (5Y-5/1), (SP).		1	Sample #1, Depth = 2.0' Mean (mm): 0.27, Phi Sorting: 0.71 Shell Hash: 0%, Fines (230): 1.01% (SP)
-6.3	3.3					
			SAND, fine grained, quartz, little shell hash, trace shell fragments, trace silt, trace whole shell, shell fragments up to 0.5", whole shells up to 2.0", shell hash laminae from 5.3'-6.0', 6.5' and 6.9', shell hash layer from 6.5'-6.7', gray (5Y-6/1), (SW).		2	Sample #2, Depth = 4.5' Mean (mm): 0.34, Phi Sorting: 1.09 Shell Hash: 1%, Fines (230): 1.12% (SW)
-10.3	7.3					
			SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments typically up to 0.5", shell hash layer from 8.4'-8.5', shell hash and shell fragments up to 1.0" from 9.2'-9.4', shell hash lamina @ 9.8', gray (5Y-5/1), (SP).		1	
-12.9	9.9					
			SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 2.0", (2) 0.75" rock fragments @ 13.0', gray (5Y-6/1), (SP).		3	Sample #3, Depth = 13.0' Mean (mm): 0.23, Phi Sorting: 0.54 Shell Hash: 0%, Fines (230): 1.00% (SP)
-19.3	16.3					
			No Recovery.			
-21.0	18.0					
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

SAJ FORM 1836 JUN 02 MODIFIED FOR THE FLORIDA DEP JUN 04

Boring Designation FEVC-07-19

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

2. BORING DESIGNATION: FEVC-07-19
LOCATION COORDINATES: X = 2,389,020 Y = 200,054

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Walter Sexton

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

8. TOTAL DEPTH OF BORING: 18.0 Ft.

9. SIZE AND TYPE OF BIT: 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane
HORIZONTAL: NAD 1983
VERTICAL: NAVD 88

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES:
DISTURBED:
UNDISTURBED (UD):

13. TOTAL NUMBER CORE BOXES:

14. ELEVATION GROUND WATER:

15. DATE BORING
STARTED: 03-31-07 14:30
COMPLETED: 03-31-07 14:35

16. ELEVATION TOP OF BORING: -4.0 Ft.

17. TOTAL RECOVERY FOR BORING: 15.2 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
-4.0	0.0					
			SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, trace whole shell, little shell hash from 3.5'-8.5', (3.0"x1.5") shell hash pocket @ 14.3', whole shells up to 1.5", shell fragments up to 2.0", gray (5Y-6/1), (SP).		1	Sample #1, Depth = 2.0' Mean (mm): 0.21, Phi Sorting: 0.43 Shell Hash: 0%, Fines (230): 1.00% (SP)
					2	Sample #2, Depth = 7.3' Mean (mm): 0.23, Phi Sorting: 0.39 Shell Hash: 0%, Fines (230): 1.23% (SP)
-18.5	14.5					
-19.2	15.2		SAND, fine grained, quartz, little shell hash, trace shell fragments, trace silt, shell fragments up to 0.5", gray (5Y-6/1), (SW).		3	Sample #3, Depth = 14.9' Mean (mm): 0.31, Phi Sorting: 0.92 Shell Hash: 1%, Fines (230): 1.27% (SW)
			No Recovery.			
-22.0	18.0					
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

SAJ FORM 1836 JUN 02 MODIFIED FOR THE FLORIDA DEP JUN 04

Boring Designation FEVC-07-20

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2007
Figure Eight Island, North Carolina

9. SIZE AND TYPE OF BIT 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane | HORIZONTAL: NAD 1983 | VERTICAL: NAVD 88

2. BORING DESIGNATION: FEVC-07-20
LOCATION COORDINATES: X = 2,386,609 Y = 200,201

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

12. TOTAL SAMPLES | DISTURBED | UNDISTURBED (UD)

4. NAME OF DRILLER: Walter Sexton

13. TOTAL NUMBER CORE BOXES

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL | BEARING

14. ELEVATION GROUND WATER

15. DATE BORING | STARTED: 03-31-07 15:45 | COMPLETED: 03-31-07 15:49

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

16. ELEVATION TOP OF BORING: -12.2 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

17. TOTAL RECOVERY FOR BORING: 13.2 Ft.

8. TOTAL DEPTH OF BORING: 16.0 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KR

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
-12.2	0.0					Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
-14.4	2.2		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 1.5", gray (5Y-5/1), (SP).		1	Sample #1, Depth = 1.0' Mean (mm): 0.22, Phi Sorting: 0.75 Shell Hash: 0%, Fines (230): 1.62% (SP)
-16.0	3.8		SAND, medium grained, quartz, little shell hash, trace shell fragments, trace silt, trace whole shell, shell fragments up to 2.0", whole shells up to 2.5", gray (5Y-6/1), (SW).		2	Sample #2, Depth = 2.6' Mean (mm): 0.96, Phi Sorting: 2.12 Shell Hash: 6%, Fines (230): 0.66% (SW)
-17.6	5.4		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, trace whole shell, whole shells typically up to 0.5", (1.0"x0.75") whole shell @ 3.9', shell fragments up to 1.5", gray (5Y-5/1), (SP).		1	
-18.5	6.3				3	Sample #3, Depth = 5.8' Mean (mm): 0.44, Phi Sorting: 1.46 Shell Hash: 2%, Fines (230): 1.30% (SW)
-19.3	7.1				1	
-23.1	10.9		SAND, medium grained, quartz, trace shell fragments, trace shell hash, trace whole shell, shell fragments up to 2.5", whole shells up to 2.0", gray (5Y-6/1), (SW). SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 0.5", (2.0"x1.25") whole shell @ 6.9', gray (5Y-5/1), (SP).		4	Sample #4, Depth = 8.5' Mean (mm): 0.13, Phi Sorting: 0.44 Shell Hash: 0%, Fines (230): 26.36% (SC)
-25.4	13.2		CLAY, little silt, trace sand, trace shell fragments, trace shell hash, trace whole shell, shell fragments typically up to 0.5", (1.0"x0.5") shell fragment @ 8.0', whole shells up to 1.25", very dark gray (5Y-3/1), (SC).			
-28.2	16.0		SAND, quartz, trace shell hash, trace silt, 1.0" very dark gray (5Y-3/1) silty pocket @ 12.0', dark gray (5Y-4/1), (SP). No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/16/09

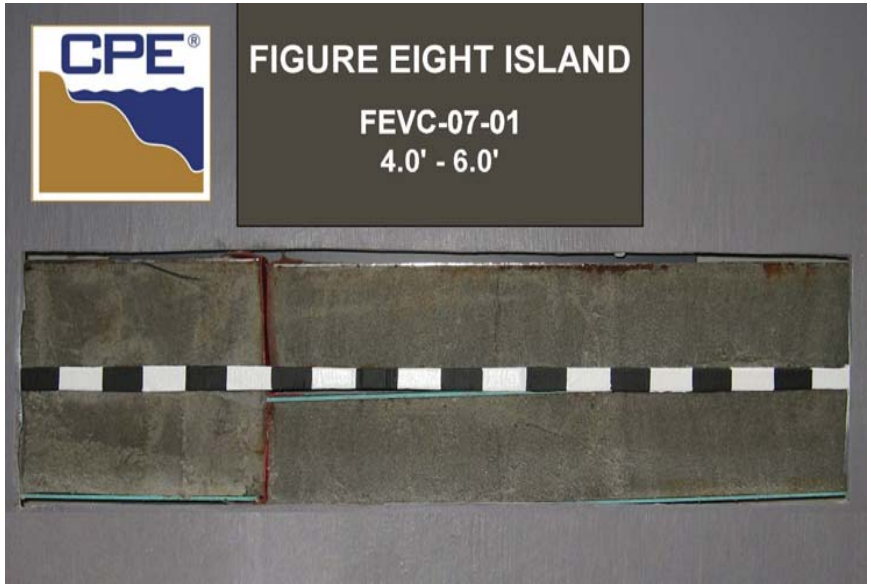
SAJ FORM 1836 JUN 02 **MODIFIED FOR THE FLORIDA DEP** JUN 04

APPENDIX 18

2007 CPENC Vibracore Photographs

CPE
FIGURE EIGHT ISLAND
FEVC-07-01
0.0' - 2.0'

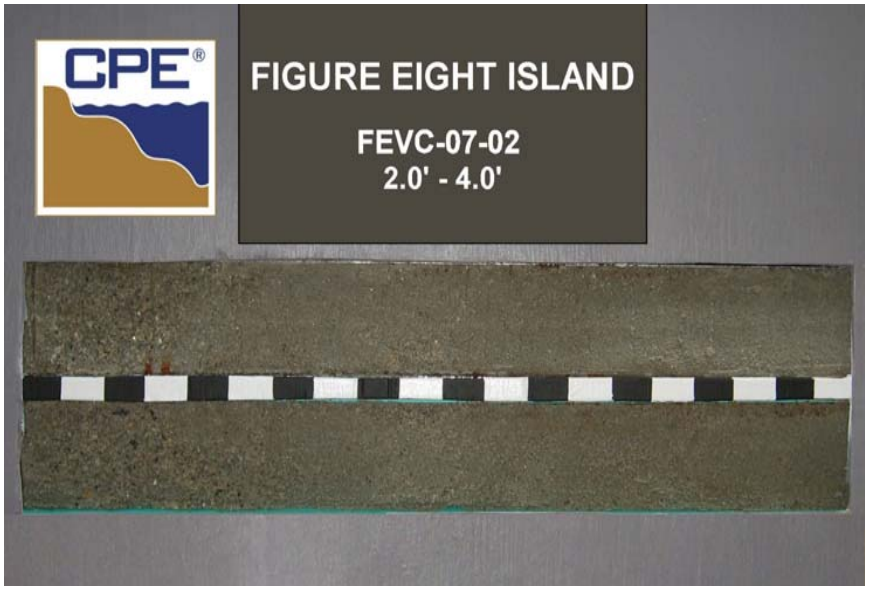
CPE
FIGURE EIGHT ISLAND
FEVC-07-01
2.0' - 4.0'

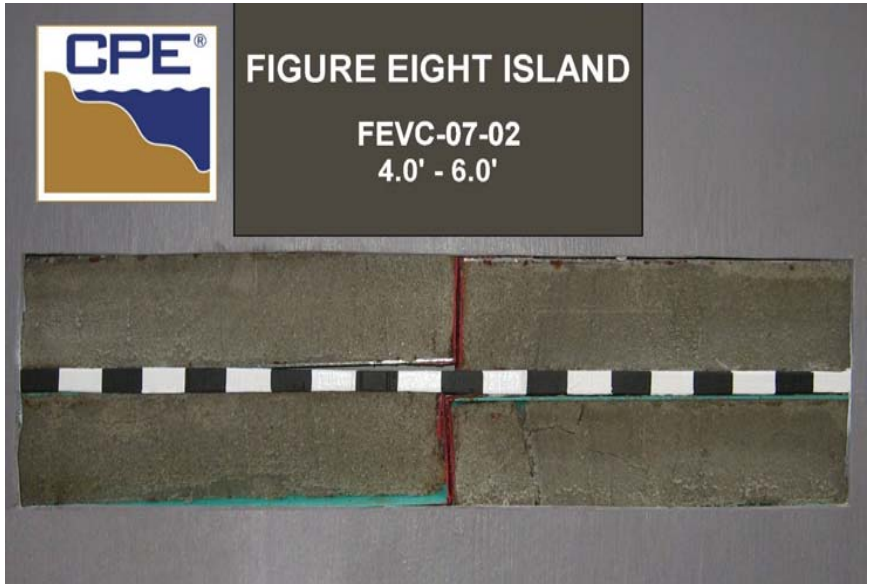

CPE
FIGURE EIGHT ISLAND
FEVC-07-01
4.0' - 6.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-01
6.0' - 8.0'

CPE®
FIGURE EIGHT ISLAND
FEVC-07-01
8.0' - 8.5'

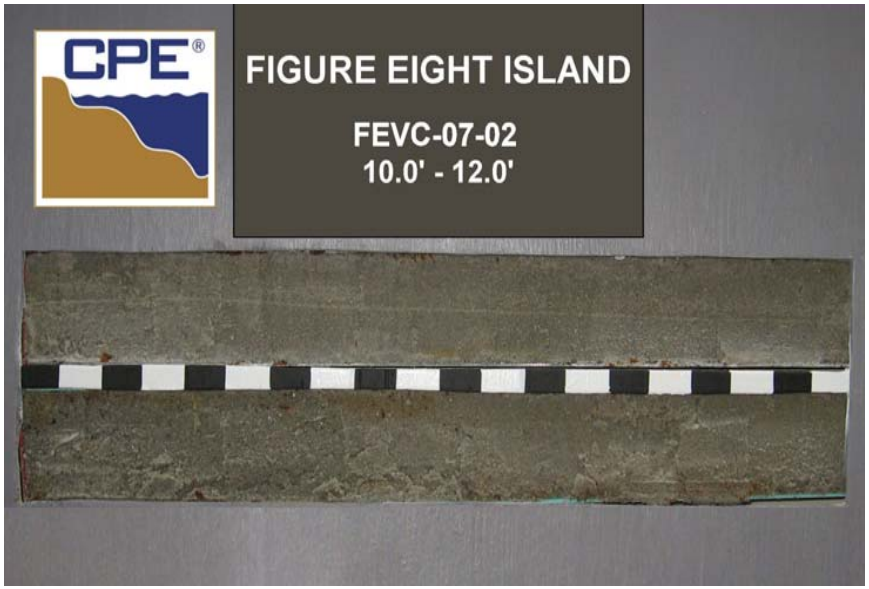
CPE
FIGURE EIGHT ISLAND
FEVC-07-02
0.0' - 2.0'


CPE
FIGURE EIGHT ISLAND
FEVC-07-02
2.0' - 4.0'


CPE
FIGURE EIGHT ISLAND
FEVC-07-02
4.0' - 6.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-02
6.0' - 8.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-02
8.0' - 10.0'


CPE
FIGURE EIGHT ISLAND
FEVC-07-02
10.0' - 12.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-02
12.0' - 13.5'

CPE
FIGURE EIGHT ISLAND
FEVC-07-03
0.0' - 2.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-03
2.0' - 4.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-03
4.0' - 5.8'

CPE
FIGURE EIGHT ISLAND
FEVC-07-04
0.0' - 2.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-04
2.0' - 4.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-04
4.0' - 6.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-04
6.0' - 6.9'

CPE
FIGURE EIGHT ISLAND
FEVC-07-05
0.0' - 2.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-05
2.0' - 4.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-05
4.0' - 6.0'

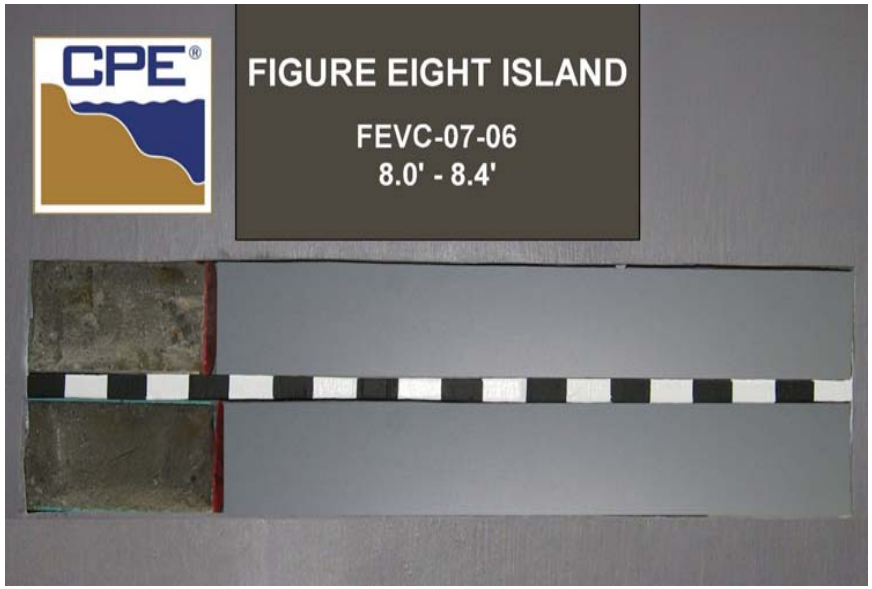
CPE
FIGURE EIGHT ISLAND
FEVC-07-05
6.0' - 7.2'

CPE
FIGURE EIGHT ISLAND
FEVC-07-06
0.0' - 2.0'

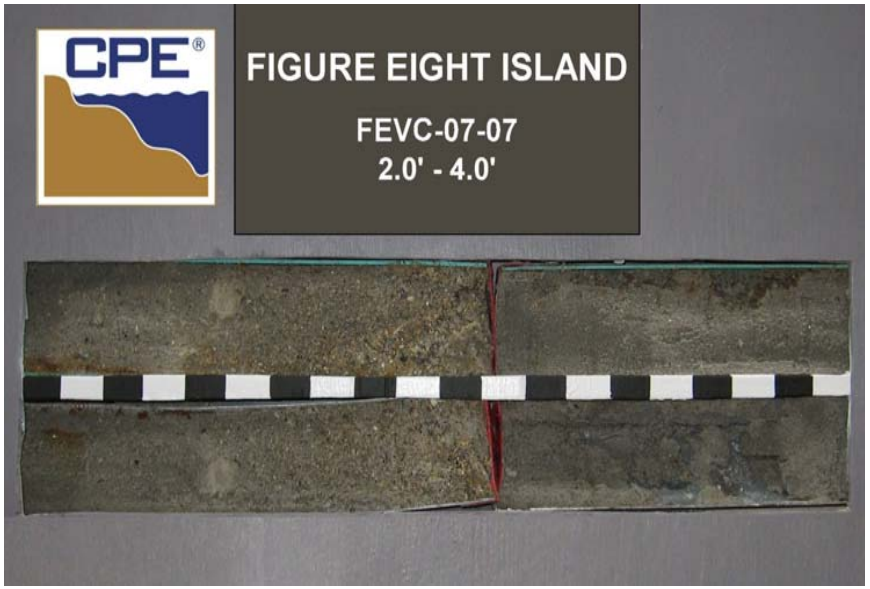
CPE
FIGURE EIGHT ISLAND
FEVC-07-06
2.0' - 4.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-06
4.0' - 6.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-06
6.0' - 8.0'


CPE®
FIGURE EIGHT ISLAND
FEVC-07-06
8.0' - 8.4'

CPE
FIGURE EIGHT ISLAND
FEVC-07-07
0.0' - 2.0'


CPE
FIGURE EIGHT ISLAND
FEVC-07-07
2.0' - 4.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-07
4.0' - 6.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-07
6.0' - 7.2'

CPE
FIGURE EIGHT ISLAND
FEVC-07-08
0.0' - 2.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-08
2.0' - 4.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-08
4.0' - 6.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-08
6.0' - 7.9'

CPE
FIGURE EIGHT ISLAND
FEVC-07-09
0.0' - 2.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-09
2.0' - 4.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-09
4.0' - 6.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-09
6.0' - 8.0'

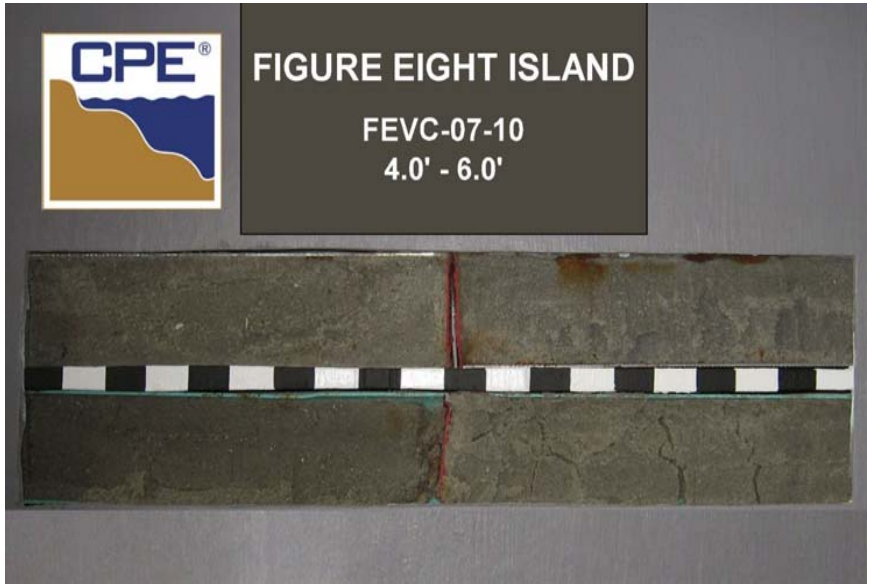
CPE
FIGURE EIGHT ISLAND
FEVC-07-09
8.0' - 10.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-09
10.0' - 12.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-09
12.0' - 14.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-10
0.0' - 2.0'

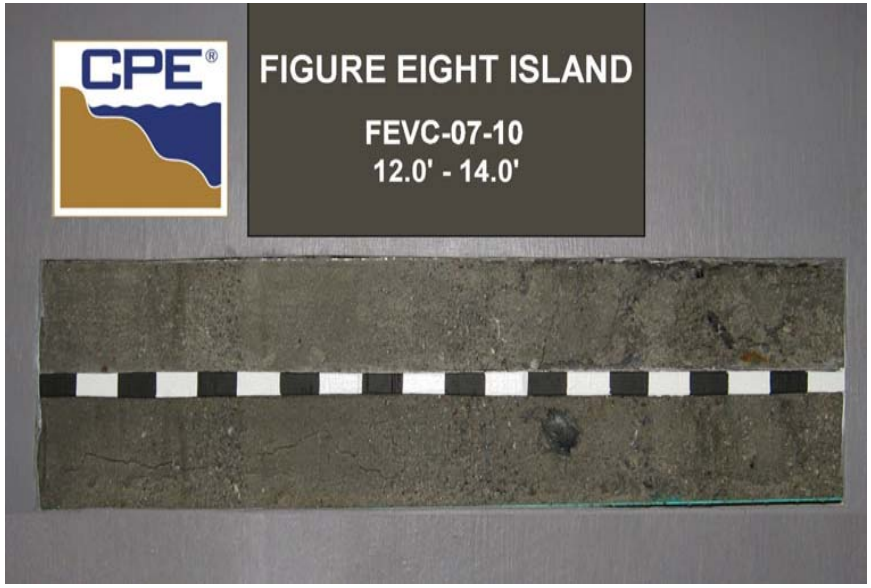
CPE
FIGURE EIGHT ISLAND
FEVC-07-10
2.0' - 4.0'

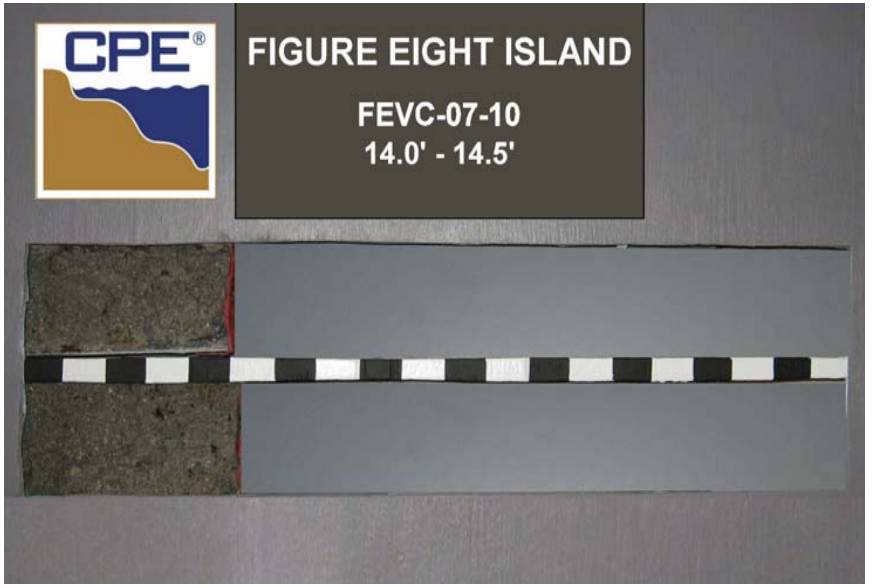

CPE
FIGURE EIGHT ISLAND
FEVC-07-10
4.0' - 6.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-10
6.0' - 8.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-10
8.0' - 10.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-10
10.0' - 12.0'


CPE
FIGURE EIGHT ISLAND
FEVC-07-10
12.0' - 14.0'


CPE
FIGURE EIGHT ISLAND
FEVC-07-10
14.0' - 14.5'

CPE
FIGURE EIGHT ISLAND
FEVC-07-11
0.0' - 2.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-11
2.0' - 4.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-11
4.0' - 6.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-11
6.0' - 8.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-11
8.0' - 10.0'

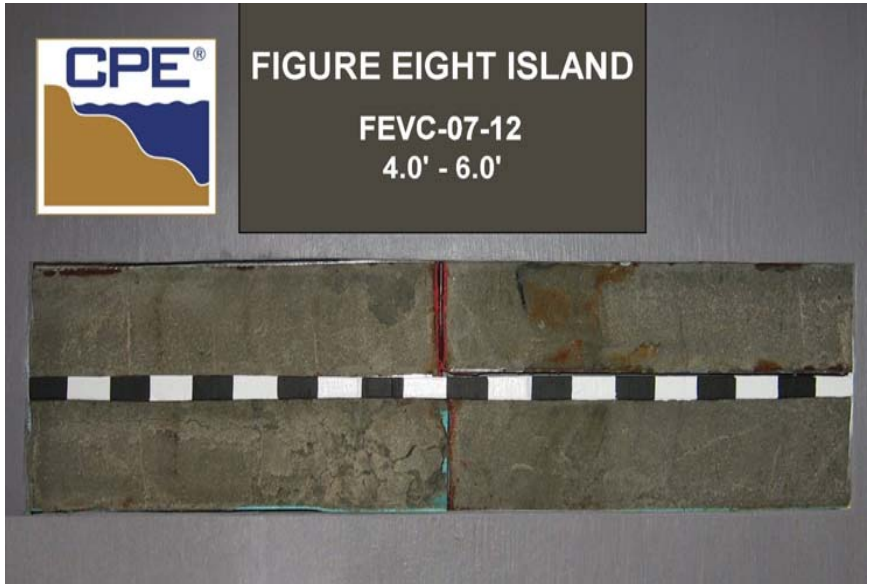
CPE
FIGURE EIGHT ISLAND
FEVC-07-11
10.0' - 12.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-11
12.0' - 14.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-11
14.0' - 14.4'

CPE
FIGURE EIGHT ISLAND
FEVC-07-12
0.0' - 2.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-12
2.0' - 4.0'


CPE
FIGURE EIGHT ISLAND
FEVC-07-12
4.0' - 6.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-12
6.0' - 8.0'

CPE®
FIGURE EIGHT ISLAND
FEVC-07-12
8.0' - 10.0'

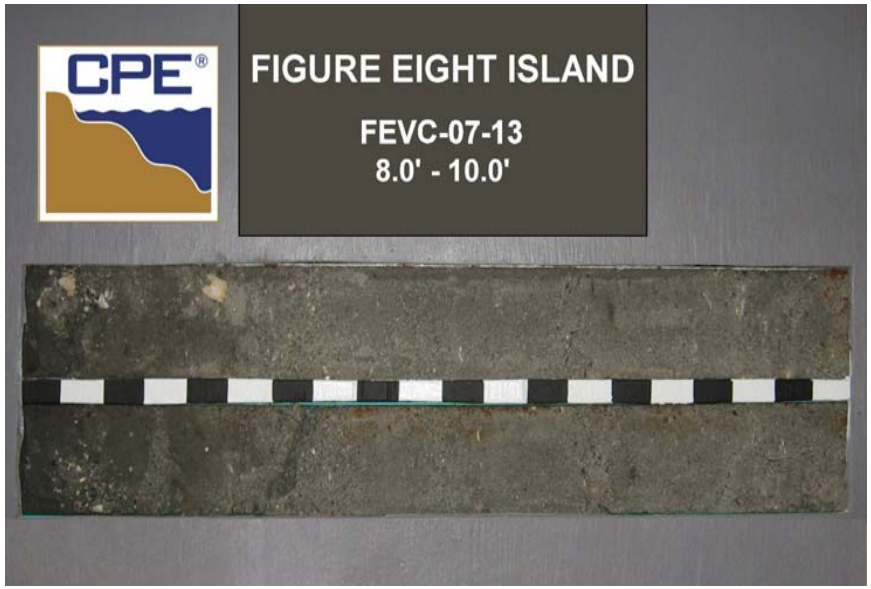
CPE®
FIGURE EIGHT ISLAND
FEVC-07-12
10.0' - 12.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-13
0.0' - 2.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-13
2.0' - 4.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-13
4.0' - 6.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-13
6.0' - 8.0'


CPE
FIGURE EIGHT ISLAND
FEVC-07-13
8.0' - 10.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-13
10.0' - 12.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-13
12.0' - 14.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-14
0.0' - 2.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-14
2.0' - 4.0'

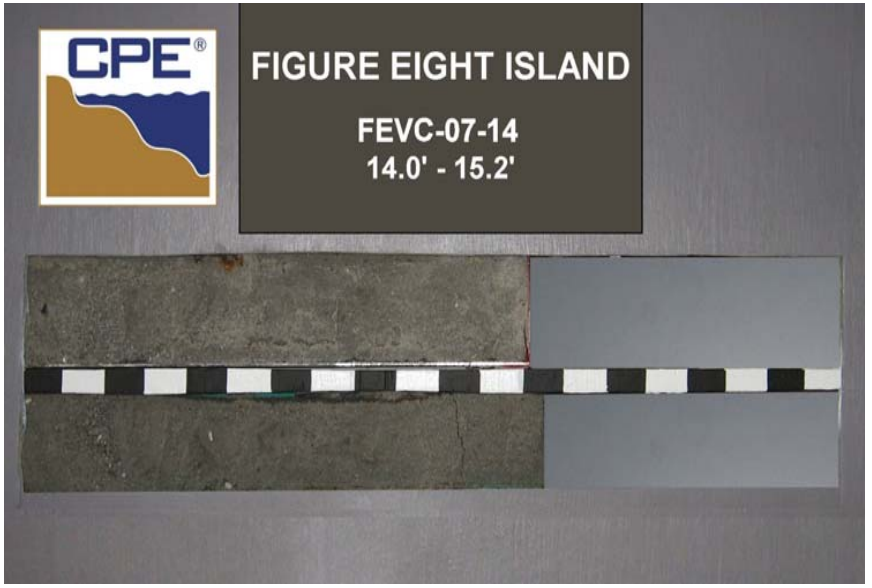
CPE
FIGURE EIGHT ISLAND
FEVC-07-14
4.0' - 6.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-14
6.0' - 8.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-14
8.0' - 10.0'

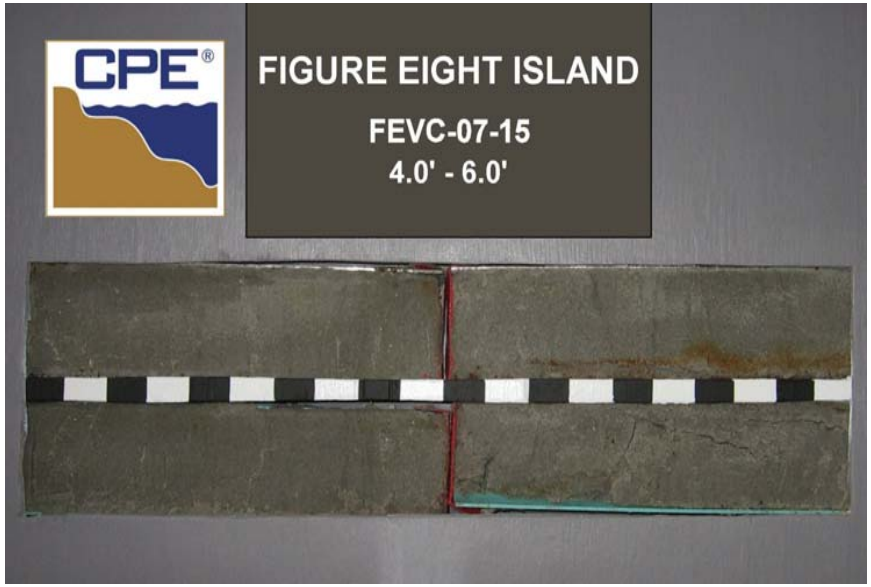
CPE
FIGURE EIGHT ISLAND
FEVC-07-14
10.0' - 12.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-14
12.0' - 14.0'


CPE
FIGURE EIGHT ISLAND
FEVC-07-14
14.0' - 15.2'

CPE
FIGURE EIGHT ISLAND
FEVC-07-15
0.0' - 2.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-15
2.0' - 4.0'


CPE
FIGURE EIGHT ISLAND
FEVC-07-15
4.0' - 6.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-15
6.0' - 8.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-15
8.0' - 10.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-15
10.0' - 12.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-15
12.0' - 14.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-15
14.0' - 14.2'

CPE®
FIGURE EIGHT ISLAND
FEVC-07-16
0.0' - 2.0'

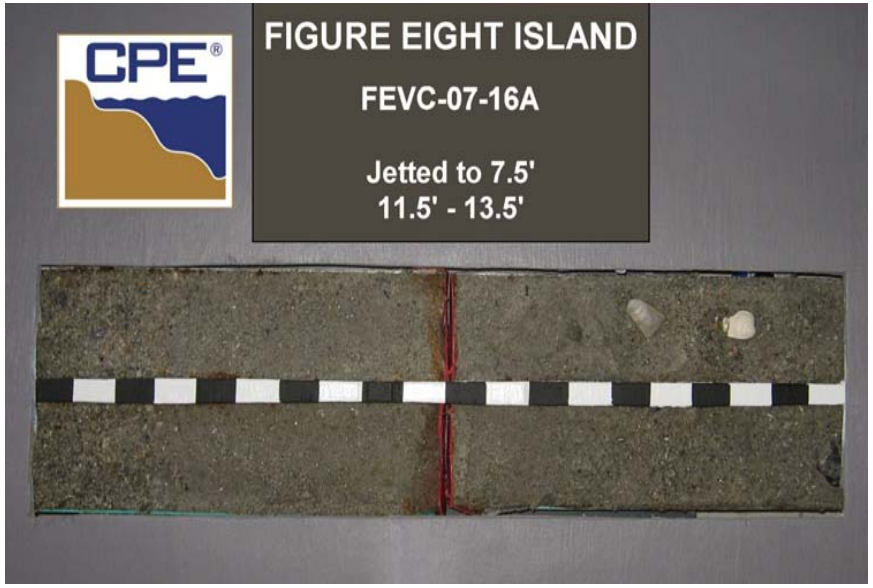
CPE®
FIGURE EIGHT ISLAND
FEVC-07-16
2.0' - 4.0'

CPE®
FIGURE EIGHT ISLAND
FEVC-07-16
4.0' - 6.0'

CPE®
FIGURE EIGHT ISLAND
FEVC-07-16
6.0' - 8.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-16A
Jetted to 7.5'
7.5' - 9.5'

CPE
FIGURE EIGHT ISLAND
FEVC-07-16A
Jetted to 7.5'
9.5' - 11.5'


CPE
FIGURE EIGHT ISLAND
FEVC-07-16A
Jetted to 7.5'
11.5' - 13.5'

CPE
FIGURE EIGHT ISLAND
FEVC-07-16A
Jetted to 7.5'
13.5' - 15.5'

CPE®
FIGURE EIGHT ISLAND
FEVC-07-16A
Jetted to 7.5'
15.5' - 17.5'

CPE®
FIGURE EIGHT ISLAND
FEVC-07-16A
Jetted to 7.5'
17.5' - 17.6'

CPE
FIGURE EIGHT ISLAND
FEVC-07-17
0.0' - 2.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-17
2.0' - 4.0'

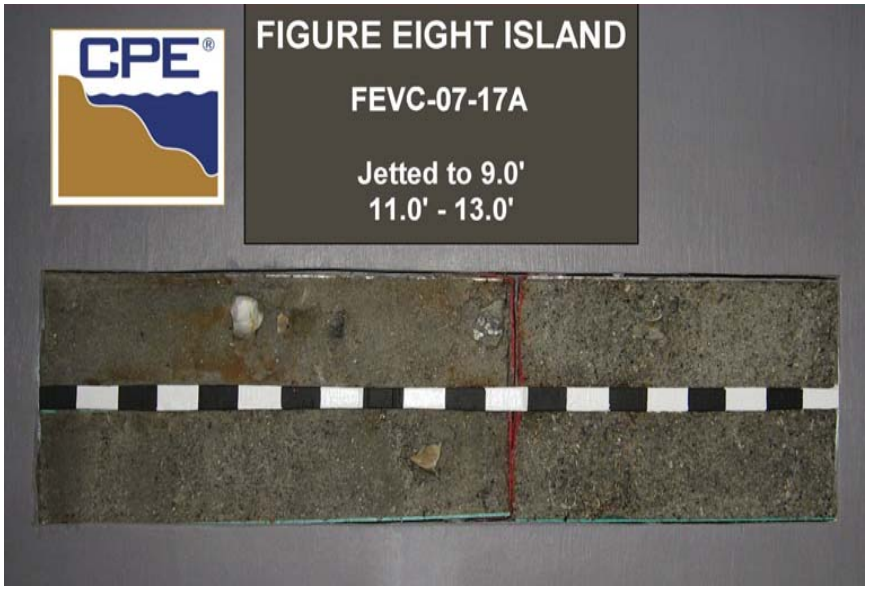
CPE
FIGURE EIGHT ISLAND
FEVC-07-17
4.0' - 6.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-17
6.0' - 8.0'

CPE®
FIGURE EIGHT ISLAND
FEVC-07-17
8.0' - 10.0'

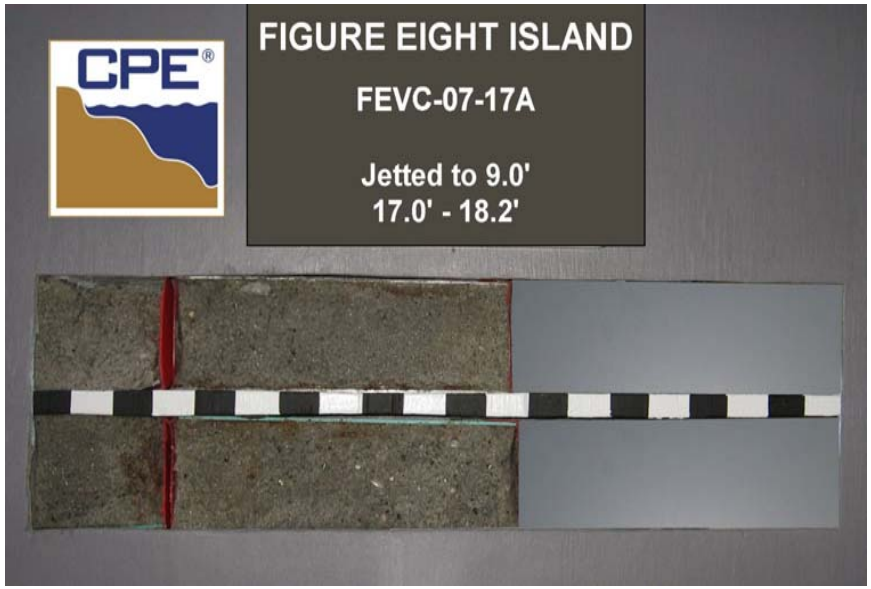
CPE®
FIGURE EIGHT ISLAND
FEVC-07-17
10.0' - 11.9'

CPE
FIGURE EIGHT ISLAND
FEVC-07-17A
Jetted to 9.0'
9.0' - 11.0'


CPE
FIGURE EIGHT ISLAND
FEVC-07-17A
Jetted to 9.0'
11.0' - 13.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-17A
Jetted to 9.0'
13.0' - 15.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-17A
Jetted to 9.0'
15.0' - 17.0'


CPE®
FIGURE EIGHT ISLAND
FEVC-07-17A
Jetted to 9.0'
17.0' - 18.2'

CPE
FIGURE EIGHT ISLAND
FEVC-07-18
0.0' - 2.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-18
2.0' - 4.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-18
4.0' - 6.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-18
6.0' - 8.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-18
8.0' - 10.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-18
10.0' - 12.0'

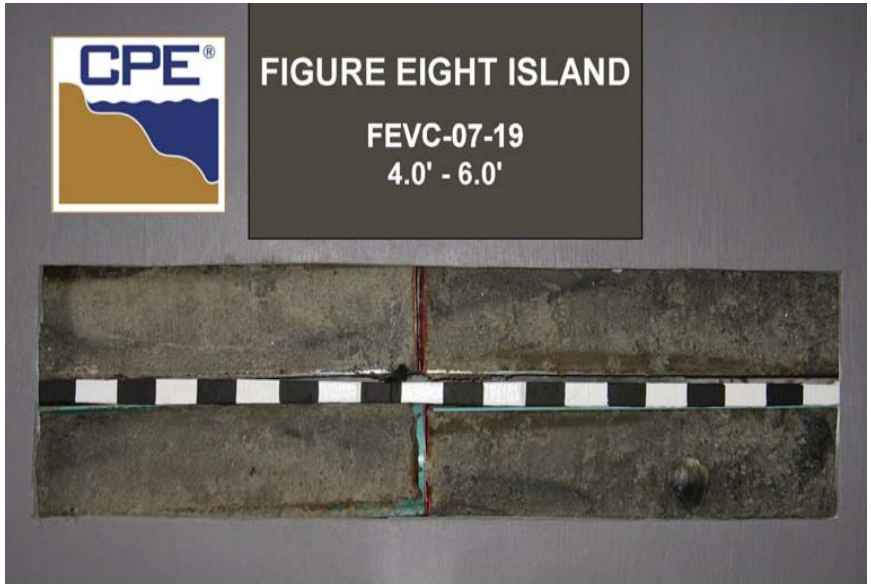
CPE
FIGURE EIGHT ISLAND
FEVC-07-18
12.0' - 14.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-18
14.0' - 16.0'

CPE®
FIGURE EIGHT ISLAND
FEVC-07-18
16.0' - 16.3'

CPE
FIGURE EIGHT ISLAND
FEVC-07-19
0.0' - 2.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-19
2.0' - 4.0'


CPE
FIGURE EIGHT ISLAND
FEVC-07-19
4.0' - 6.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-19
6.0' - 8.0'

CPE®
FIGURE EIGHT ISLAND
FEVC-07-19
8.0' - 10.0'

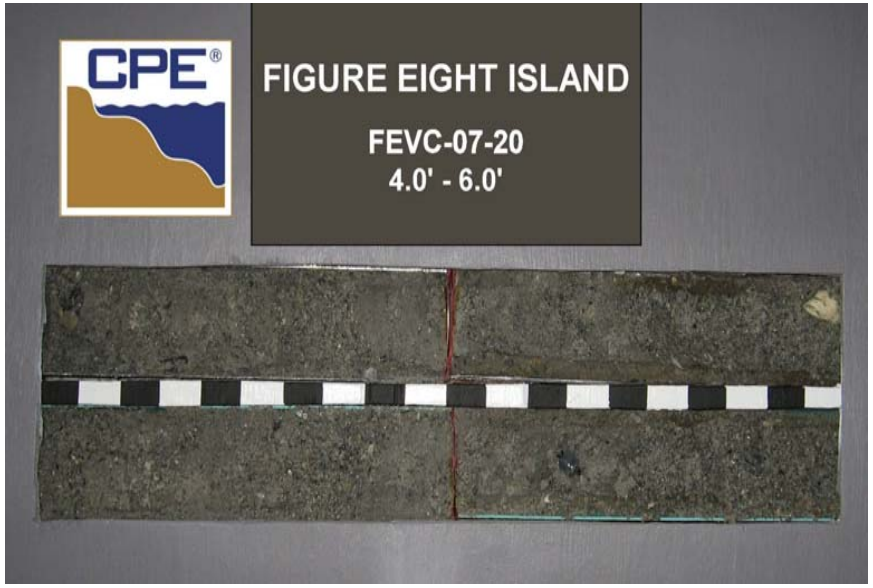
CPE®
FIGURE EIGHT ISLAND
FEVC-07-19
10.0' - 12.0'

CPE®
FIGURE EIGHT ISLAND
FEVC-07-19
12.0' - 14.0'

CPE®
FIGURE EIGHT ISLAND
FEVC-07-19
14.0' - 15.2'

CPE
FIGURE EIGHT ISLAND
FEVC-07-20
0.0' - 2.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-20
2.0' - 4.0'


CPE
FIGURE EIGHT ISLAND
FEVC-07-20
4.0' - 6.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-20
6.0' - 8.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-20
8.0' - 10.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-20
10.0' - 12.0'

CPE
FIGURE EIGHT ISLAND
FEVC-07-20
12.0' - 13.2'

APPENDIX 19

2007 CPENC Individual Vibracore Granularmetric Reports

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-01 #1

Analysis Date: 05-14-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,390,205	198,940	North Carolina State Plane	-16.5 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-7/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
91.26	90.71	0.01	0.00	#200 - 0.65 #230 - 0.60		6	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.08	0.09	0.08	0.09
5	-2.00	4.00	0.08	0.09	0.16	0.18
7	-1.50	2.83	0.00	0.00	0.16	0.18
10	-1.00	2.00	0.06	0.07	0.22	0.25
14	-0.50	1.41	0.20	0.22	0.42	0.47
18	0.00	1.00	0.21	0.23	0.63	0.70
25	0.50	0.71	0.40	0.44	1.03	1.14
35	1.00	0.50	0.70	0.77	1.73	1.91
45	1.50	0.35	1.76	1.93	3.49	3.84
60	2.00	0.25	7.20	7.89	10.69	11.73
80	2.50	0.18	38.88	42.60	49.57	54.33
120	3.00	0.13	36.81	40.34	86.38	94.67
170	3.50	0.09	3.97	4.35	90.35	99.02
200	3.75	0.07	0.30	0.33	90.65	99.35
230	4.00	0.06	0.05	0.05	90.70	99.40

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.04	2.87	2.76	2.45	2.16	2.05	1.57

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.4	0.19	0.53	-2.67	18.94

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-01 #2

Analysis Date: 06-15-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,390,205	198,940	North Carolina State Plane	-18.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 5Y-6/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
98.80	97.69	0.03	0.02	#200 - 1.32 #230 - 1.18		5	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.02	0.02	0.02	0.02
7	-1.50	2.83	0.16	0.16	0.18	0.18
10	-1.00	2.00	0.08	0.08	0.26	0.26
14	-0.50	1.41	0.15	0.15	0.41	0.41
18	0.00	1.00	0.14	0.14	0.55	0.55
25	0.50	0.71	0.26	0.26	0.81	0.81
35	1.00	0.50	0.42	0.43	1.23	1.24
45	1.50	0.35	0.91	0.92	2.14	2.16
60	2.00	0.25	4.50	4.55	6.64	6.71
80	2.50	0.18	32.69	33.09	39.33	39.80
120	3.00	0.13	47.68	48.26	87.01	88.06
170	3.50	0.09	9.78	9.90	96.79	97.96
200	3.75	0.07	0.71	0.72	97.50	98.68
230	4.00	0.06	0.14	0.14	97.64	98.82

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.35	2.96	2.86	2.61	2.28	2.14	1.81

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.54	0.17	0.51	-2.59	19.58

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-01 #3

Analysis Date: 06-15-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,390,205	198,940	North Carolina State Plane	-20.5 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
85.36	84.39	0.00	0.02	#200 - 1.16 #230 - 1.15		4	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.03	0.04	0.03	0.04
14	-0.50	1.41	0.04	0.05	0.07	0.09
18	0.00	1.00	0.03	0.04	0.10	0.13
25	0.50	0.71	0.09	0.11	0.19	0.24
35	1.00	0.50	0.15	0.18	0.34	0.42
45	1.50	0.35	0.73	0.86	1.07	1.28
60	2.00	0.25	6.78	7.94	7.85	9.22
80	2.50	0.18	39.56	46.34	47.41	55.56
120	3.00	0.13	34.54	40.46	81.95	96.02
170	3.50	0.09	2.33	2.73	84.28	98.75
200	3.75	0.07	0.08	0.09	84.36	98.84
230	4.00	0.06	0.01	0.01	84.37	98.85

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.99	2.85	2.74	2.44	2.17	2.07	1.73

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.43	0.19	0.39	-1.21	10.08

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-01 #4

Analysis Date: 07-02-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,390,205	198,940	North Carolina State Plane	-22.5 NAVD 88

USCS:	Munsell:	Comments:
SP-SM	Wet - 5Y-5/1 Dry - 5Y-6/1 Washed - 5Y-6/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
85.04	77.88	0.01	0.00	#200 - 8.56 #230 - 8.43			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.04	0.05	0.04	0.05
14	-0.50	1.41	0.05	0.06	0.09	0.11
18	0.00	1.00	0.08	0.09	0.17	0.20
25	0.50	0.71	0.12	0.14	0.29	0.34
35	1.00	0.50	0.14	0.16	0.43	0.50
45	1.50	0.35	0.30	0.35	0.73	0.85
60	2.00	0.25	1.59	1.87	2.32	2.72
80	2.50	0.18	17.62	20.72	19.94	23.44
120	3.00	0.13	47.04	55.32	66.98	78.76
170	3.50	0.09	10.29	12.10	77.27	90.86
200	3.75	0.07	0.49	0.58	77.76	91.44
230	4.00	0.06	0.11	0.13	77.87	91.57

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
	3.22	2.97	2.74	2.51	2.32	2.06

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.67	0.16	0.4	-1.95	16.27

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-02 #1

Analysis Date: 06-15-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,733	202,440	North Carolina State Plane	-10.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-6/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
86.14	85.29	0.00	0.01	#200 - 0.99 #230 - 0.98		11	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.05	0.06	0.05	0.06
7	-1.50	2.83	0.16	0.19	0.21	0.25
10	-1.00	2.00	0.41	0.48	0.62	0.73
14	-0.50	1.41	0.70	0.81	1.32	1.54
18	0.00	1.00	1.03	1.20	2.35	2.74
25	0.50	0.71	1.59	1.85	3.94	4.59
35	1.00	0.50	2.66	3.09	6.60	7.68
45	1.50	0.35	6.81	7.91	13.41	15.59
60	2.00	0.25	24.36	28.28	37.77	43.87
80	2.50	0.18	34.45	39.99	72.22	83.86
120	3.00	0.13	12.48	14.49	84.70	98.35
170	3.50	0.09	0.55	0.64	85.25	98.99
200	3.75	0.07	0.02	0.02	85.27	99.01
230	4.00	0.06	0.01	0.01	85.28	99.02

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.88	2.50	2.39	2.08	1.67	1.51	0.57

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.94	0.26	0.7	-1.85	8.35

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-02 #2

Analysis Date: 06-15-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,733	202,440	North Carolina State Plane	-16.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
83.93	83.03	0.00	0.01	#200 - 1.10 #230 - 1.09		8	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.01	0.01	0.01	0.01
10	-1.00	2.00	0.04	0.05	0.05	0.06
14	-0.50	1.41	0.09	0.11	0.14	0.17
18	0.00	1.00	0.12	0.14	0.26	0.31
25	0.50	0.71	0.33	0.39	0.59	0.70
35	1.00	0.50	0.76	0.91	1.35	1.61
45	1.50	0.35	2.32	2.76	3.67	4.37
60	2.00	0.25	11.18	13.32	14.85	17.69
80	2.50	0.18	42.51	50.65	57.36	68.34
120	3.00	0.13	24.71	29.44	82.07	97.78
170	3.50	0.09	0.92	1.10	82.99	98.88
200	3.75	0.07	0.02	0.02	83.01	98.90
230	4.00	0.06	0.01	0.01	83.02	98.91

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.95	2.77	2.61	2.32	2.07	1.94	1.52

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.28	0.21	0.46	-1.66	10.12

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-02 #3

Analysis Date: 06-15-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,733	202,440	North Carolina State Plane	-20.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
87.59	86.52	0.01	0.00	#200 - 1.25 #230 - 1.24		4	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.01	0.01	0.01	0.01
25	0.50	0.71	0.04	0.05	0.05	0.06
35	1.00	0.50	0.13	0.15	0.18	0.21
45	1.50	0.35	0.51	0.58	0.69	0.79
60	2.00	0.25	6.52	7.44	7.21	8.23
80	2.50	0.18	54.67	62.42	61.88	70.65
120	3.00	0.13	23.89	27.27	85.77	97.92
170	3.50	0.09	0.70	0.80	86.47	98.72
200	3.75	0.07	0.03	0.03	86.50	98.75
230	4.00	0.06	0.01	0.01	86.51	98.76

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.95	2.74	2.58	2.33	2.13	2.06	1.78

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.35	0.20	0.31	-0.4	5.78

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-03 #1

Analysis Date: 06-15-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,392,093	200,758	North Carolina State Plane	-16.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
87.18	86.07	0.01	0.00	#200 - 1.33 #230 - 1.28			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.02	0.02	0.02	0.02
10	-1.00	2.00	0.00	0.00	0.02	0.02
14	-0.50	1.41	0.01	0.01	0.03	0.03
18	0.00	1.00	0.04	0.05	0.07	0.08
25	0.50	0.71	0.06	0.07	0.13	0.15
35	1.00	0.50	0.09	0.10	0.22	0.25
45	1.50	0.35	0.41	0.47	0.63	0.72
60	2.00	0.25	4.19	4.81	4.82	5.53
80	2.50	0.18	36.11	41.42	40.93	46.95
120	3.00	0.13	40.77	46.77	81.70	93.72
170	3.50	0.09	4.09	4.69	85.79	98.41
200	3.75	0.07	0.23	0.26	86.02	98.67
230	4.00	0.06	0.04	0.05	86.06	98.72

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.14	2.90	2.80	2.53	2.24	2.13	1.94

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.5	0.18	0.37	-1	10.36

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-03 #2

Analysis Date: 06-18-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,392,093	200,758	North Carolina State Plane	-19.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
85.57	84.36	0.01	0.19	#200 - 1.66 #230 - 1.62			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.01	0.01	0.01	0.01
18	0.00	1.00	0.01	0.01	0.02	0.02
25	0.50	0.71	0.01	0.01	0.03	0.03
35	1.00	0.50	0.05	0.06	0.08	0.09
45	1.50	0.35	0.22	0.26	0.30	0.35
60	2.00	0.25	2.56	2.99	2.86	3.34
80	2.50	0.18	39.22	45.83	42.08	49.17
120	3.00	0.13	38.27	44.72	80.35	93.89
170	3.50	0.09	3.64	4.25	83.99	98.14
200	3.75	0.07	0.17	0.20	84.16	98.34
230	4.00	0.06	0.03	0.04	84.19	98.38

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.13	2.89	2.79	2.51	2.24	2.14	2.02

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.5	0.18	0.33	-0.23	5.42

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-03 #3

Analysis Date: 06-18-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,392,093	200,758	North Carolina State Plane	-20.6 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-5/1 Dry - 5Y-6/1 Washed - 5Y-6/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
84.11	82.42	0.03	0.00	#200 - 2.34 #230 - 2.05			4

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.42	0.50	0.42	0.50
5/16"	-3.00	8.00	1.13	1.34	1.55	1.84
3.5	-2.50	5.66	1.38	1.64	2.93	3.48
4	-2.25	4.76	0.00	0.00	2.93	3.48
5	-2.00	4.00	0.29	0.34	3.22	3.82
7	-1.50	2.83	0.43	0.51	3.65	4.33
10	-1.00	2.00	0.41	0.49	4.06	4.82
14	-0.50	1.41	0.44	0.52	4.50	5.34
18	0.00	1.00	0.37	0.44	4.87	5.78
25	0.50	0.71	0.41	0.49	5.28	6.27
35	1.00	0.50	0.46	0.55	5.74	6.82
45	1.50	0.35	0.66	0.78	6.40	7.60
60	2.00	0.25	2.30	2.73	8.70	10.33
80	2.50	0.18	18.52	22.02	27.22	32.35
120	3.00	0.13	42.59	50.64	69.81	82.99
170	3.50	0.09	11.49	13.66	81.30	96.65
200	3.75	0.07	0.85	1.01	82.15	97.66
230	4.00	0.06	0.24	0.29	82.39	97.95

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.44	3.04	2.92	2.67	2.33	2.13	-0.83

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.36	0.19	1.28	-3.28	13.71

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-04 #1

Analysis Date: 06-18-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,391,811	199,871	North Carolina State Plane	-16.5 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
85.19	84.19	0.01	0.00	#200 - 1.22 #230 - 1.18			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.05	0.06	0.05	0.06
5	-2.00	4.00	0.02	0.02	0.07	0.08
7	-1.50	2.83	0.01	0.01	0.08	0.09
10	-1.00	2.00	0.08	0.09	0.16	0.18
14	-0.50	1.41	0.06	0.07	0.22	0.25
18	0.00	1.00	0.06	0.07	0.28	0.32
25	0.50	0.71	0.15	0.18	0.43	0.50
35	1.00	0.50	0.22	0.26	0.65	0.76
45	1.50	0.35	0.53	0.62	1.18	1.38
60	2.00	0.25	5.30	6.22	6.48	7.60
80	2.50	0.18	33.17	38.94	39.65	46.54
120	3.00	0.13	40.28	47.28	79.93	93.82
170	3.50	0.09	4.07	4.78	84.00	98.60
200	3.75	0.07	0.15	0.18	84.15	98.78
230	4.00	0.06	0.03	0.04	84.18	98.82

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.12	2.90	2.80	2.54	2.22	2.11	1.79

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.48	0.18	0.44	-2.68	23.95

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-04 #2

Analysis Date: 06-18-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,391,811	199,871	North Carolina State Plane	-20.7 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
85.31	84.30	0.00	0.00	#200 - 1.20 #230 - 1.18			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.01	0.01	0.01	0.01
18	0.00	1.00	0.04	0.05	0.05	0.06
25	0.50	0.71	0.04	0.05	0.09	0.11
35	1.00	0.50	0.12	0.14	0.21	0.25
45	1.50	0.35	0.59	0.69	0.80	0.94
60	2.00	0.25	5.05	5.92	5.85	6.86
80	2.50	0.18	41.43	48.56	47.28	55.42
120	3.00	0.13	33.08	38.78	80.36	94.20
170	3.50	0.09	3.75	4.40	84.11	98.60
200	3.75	0.07	0.17	0.20	84.28	98.80
230	4.00	0.06	0.02	0.02	84.30	98.82

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.09	2.87	2.75	2.44	2.19	2.09	1.84

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.45	0.18	0.37	-0.5	6.2

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-05 #1

Analysis Date: 06-18-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,867	199,037	North Carolina State Plane	-13.9 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/2 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
85.44	84.47	0.00	0.00	#200 - 1.15 #230 - 1.13		6	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.04	0.05	0.04	0.05
10	-1.00	2.00	0.02	0.02	0.06	0.07
14	-0.50	1.41	0.09	0.11	0.15	0.18
18	0.00	1.00	0.16	0.19	0.31	0.37
25	0.50	0.71	0.25	0.29	0.56	0.66
35	1.00	0.50	0.53	0.62	1.09	1.28
45	1.50	0.35	1.64	1.92	2.73	3.20
60	2.00	0.25	8.25	9.66	10.98	12.86
80	2.50	0.18	35.35	41.37	46.33	54.23
120	3.00	0.13	35.10	41.08	81.43	95.31
170	3.50	0.09	2.93	3.43	84.36	98.74
200	3.75	0.07	0.09	0.11	84.45	98.85
230	4.00	0.06	0.02	0.02	84.47	98.87

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.00	2.86	2.75	2.45	2.15	2.04	1.59

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.4	0.19	0.47	-1.81	11.74

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-05 #2

Analysis Date: 06-18-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,867	199,037	North Carolina State Plane	-19.4 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
85.41	84.56	0.00	0.00	#200 - 1.00 #230 - 0.98		6	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.05	0.06	0.05	0.06
7	-1.50	2.83	0.05	0.06	0.10	0.12
10	-1.00	2.00	0.15	0.18	0.25	0.30
14	-0.50	1.41	0.40	0.47	0.65	0.77
18	0.00	1.00	0.34	0.40	0.99	1.17
25	0.50	0.71	0.54	0.63	1.53	1.80
35	1.00	0.50	0.64	0.75	2.17	2.55
45	1.50	0.35	1.92	2.25	4.09	4.80
60	2.00	0.25	11.74	13.75	15.83	18.55
80	2.50	0.18	45.37	53.12	61.20	71.67
120	3.00	0.13	20.79	24.34	81.99	96.01
170	3.50	0.09	2.43	2.85	84.42	98.86
200	3.75	0.07	0.12	0.14	84.54	99.00
230	4.00	0.06	0.02	0.02	84.56	99.02

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.98	2.75	2.57	2.30	2.06	1.91	1.51

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	2.25	0.21	0.55	-2.44	15.19

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-06 #1

Analysis Date: 06-18-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,210	198,965	North Carolina State Plane	-13.9 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-7/1 Dry - 2.5Y-7/1 Washed - 2.5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
89.01	88.18	0.00	0.00	#200 - 0.95 #230 - 0.94			5

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	1.72	1.93	1.72	1.93
5/16"	-3.00	8.00	0.00	0.00	1.72	1.93
3.5	-2.50	5.66	0.40	0.45	2.12	2.38
4	-2.25	4.76	0.26	0.29	2.38	2.67
5	-2.00	4.00	0.57	0.64	2.95	3.31
7	-1.50	2.83	1.29	1.45	4.24	4.76
10	-1.00	2.00	1.34	1.51	5.58	6.27
14	-0.50	1.41	1.57	1.76	7.15	8.03
18	0.00	1.00	1.94	2.18	9.09	10.21
25	0.50	0.71	2.56	2.88	11.65	13.09
35	1.00	0.50	4.47	5.02	16.12	18.11
45	1.50	0.35	11.03	12.39	27.15	30.50
60	2.00	0.25	27.35	30.73	54.50	61.23
80	2.50	0.18	25.03	28.12	79.53	89.35
120	3.00	0.13	8.21	9.22	87.74	98.57
170	3.50	0.09	0.42	0.47	88.16	99.04
200	3.75	0.07	0.01	0.01	88.17	99.05
230	4.00	0.06	0.01	0.01	88.18	99.06

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.81	2.40	2.24	1.82	1.28	0.79	-1.42

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.49	0.36	1.26	-2.21	8.4

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-06 #2

Analysis Date: 06-19-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,210	198,965	North Carolina State Plane	-16.2 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
83.94	82.81	0.00	0.01	#200 - 1.38 #230 - 1.34			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.09	0.11	0.09	0.11
7	-1.50	2.83	0.05	0.06	0.14	0.17
10	-1.00	2.00	0.32	0.38	0.46	0.55
14	-0.50	1.41	0.33	0.39	0.79	0.94
18	0.00	1.00	0.34	0.41	1.13	1.35
25	0.50	0.71	0.48	0.57	1.61	1.92
35	1.00	0.50	0.87	1.04	2.48	2.96
45	1.50	0.35	2.02	2.41	4.50	5.37
60	2.00	0.25	6.37	7.59	10.87	12.96
80	2.50	0.18	37.26	44.39	48.13	57.35
120	3.00	0.13	30.23	36.01	78.36	93.36
170	3.50	0.09	4.21	5.02	82.57	98.38
200	3.75	0.07	0.20	0.24	82.77	98.62
230	4.00	0.06	0.03	0.04	82.80	98.66

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.16	2.87	2.75	2.42	2.14	2.03	1.42

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	2.35	0.20	0.61	-2.68	15.62

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-06 #3

Analysis Date: 06-19-07

Analyzed By: PB

Coastal Planning & Engineering
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FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,210	198,965	North Carolina State Plane	-17.4 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
88.07	87.07	0.00	0.00	#200 - 1.15 #230 - 1.14			2

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.42	0.48	0.42	0.48
4	-2.25	4.76	0.15	0.17	0.57	0.65
5	-2.00	4.00	0.26	0.30	0.83	0.95
7	-1.50	2.83	0.66	0.75	1.49	1.70
10	-1.00	2.00	0.89	1.01	2.38	2.71
14	-0.50	1.41	2.05	2.33	4.43	5.04
18	0.00	1.00	2.25	2.55	6.68	7.59
25	0.50	0.71	2.86	3.25	9.54	10.84
35	1.00	0.50	3.85	4.37	13.39	15.21
45	1.50	0.35	9.70	11.01	23.09	26.22
60	2.00	0.25	22.81	25.90	45.90	52.12
80	2.50	0.18	32.74	37.17	78.64	89.29
120	3.00	0.13	8.04	9.13	86.68	98.42
170	3.50	0.09	0.35	0.40	87.03	98.82
200	3.75	0.07	0.03	0.03	87.06	98.85
230	4.00	0.06	0.01	0.01	87.07	98.86

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.81	2.43	2.31	1.96	1.44	1.04	-0.51

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.68	0.31	0.97	-1.88	7.05

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-06 #4

Analysis Date: 06-19-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,210	198,965	North Carolina State Plane	-18.9 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-5/1 Dry - 5Y-6/1 Washed - 5Y-6/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
91.28	90.40	0.01	0.01	#200 - 0.99 #230 - 0.98			12

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	3.30	3.62	3.30	3.62
5/16"	-3.00	8.00	0.00	0.00	3.30	3.62
3.5	-2.50	5.66	2.53	2.77	5.83	6.39
4	-2.25	4.76	0.41	0.45	6.24	6.84
5	-2.00	4.00	1.70	1.86	7.94	8.70
7	-1.50	2.83	3.32	3.64	11.26	12.34
10	-1.00	2.00	4.05	4.44	15.31	16.78
14	-0.50	1.41	5.96	6.53	21.27	23.31
18	0.00	1.00	6.01	6.58	27.28	29.89
25	0.50	0.71	6.84	7.49	34.12	37.38
35	1.00	0.50	7.56	8.28	41.68	45.66
45	1.50	0.35	11.71	12.83	53.39	58.49
60	2.00	0.25	16.85	18.46	70.24	76.95
80	2.50	0.18	15.46	16.94	85.70	93.89
120	3.00	0.13	4.47	4.90	90.17	98.79
170	3.50	0.09	0.18	0.20	90.35	98.99
200	3.75	0.07	0.02	0.02	90.37	99.01
230	4.00	0.06	0.01	0.01	90.38	99.02

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.61	2.21	1.95	1.17	-0.37	-1.09	-3.00

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	0.65	0.64	1.65	-0.95	3.15

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-06 #5

Analysis Date: 06-18-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,210	198,965	North Carolina State Plane	-20.4 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 2.5Y-6/2 Washed - 2.5Y-7/2	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
81.59	80.31	0.02	0.01	#200 - 1.68 #230 - 1.62			1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.05	0.06	0.05	0.06
7	-1.50	2.83	0.37	0.45	0.42	0.51
10	-1.00	2.00	0.28	0.34	0.70	0.85
14	-0.50	1.41	0.28	0.34	0.98	1.19
18	0.00	1.00	0.30	0.37	1.28	1.56
25	0.50	0.71	0.42	0.51	1.70	2.07
35	1.00	0.50	0.62	0.76	2.32	2.83
45	1.50	0.35	1.11	1.36	3.43	4.19
60	2.00	0.25	4.02	4.93	7.45	9.12
80	2.50	0.18	29.87	36.61	37.32	45.73
120	3.00	0.13	38.96	47.75	76.28	93.48
170	3.50	0.09	3.84	4.71	80.12	98.19
200	3.75	0.07	0.11	0.13	80.23	98.32
230	4.00	0.06	0.05	0.06	80.28	98.38

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.16	2.90	2.81	2.54	2.22	2.09	1.58

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.43	0.19	0.62	-3.45	20.56

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-07 #1

Analysis Date: 06-19-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,390,615	200,380	North Carolina State Plane	-12.4 NAVD 88

USCS:	Munsell:	Comments:
SP-SM	Wet - 5Y-5/1 Dry - 2.5Y-7/2 Washed - 2.5Y-7/2	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
85.86	84.92	4.19	0.00	#200 - 6.03 #230 - 5.97			1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.50	0.58	0.50	0.58
7	-1.50	2.83	0.37	0.43	0.87	1.01
10	-1.00	2.00	0.28	0.33	1.15	1.34
14	-0.50	1.41	0.28	0.33	1.43	1.67
18	0.00	1.00	0.30	0.35	1.73	2.02
25	0.50	0.71	0.42	0.49	2.15	2.51
35	1.00	0.50	0.62	0.72	2.77	3.23
45	1.50	0.35	1.11	1.29	3.88	4.52
60	2.00	0.25	4.02	4.68	7.90	9.20
80	2.50	0.18	29.87	34.79	37.77	43.99
120	3.00	0.13	38.96	45.38	76.73	89.37
170	3.50	0.09	3.84	4.47	80.57	93.84
200	3.75	0.07	0.11	0.13	80.68	93.97
230	4.00	0.06	0.05	0.06	80.73	94.03

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
	2.94	2.84	2.57	2.23	2.10	1.55

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	2.4	0.19	0.71	-3.72	21.27

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-07 #2

Analysis Date: 06-19-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
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fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,390,615	200,380	North Carolina State Plane	-13.4 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 2.5Y-7/3 Washed - 2.5Y-7/3	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
83.28	82.13	0.01	0.00	#200 - 1.43 #230 - 1.41			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.07	0.08	0.07	0.08
14	-0.50	1.41	0.18	0.22	0.25	0.30
18	0.00	1.00	0.19	0.23	0.44	0.53
25	0.50	0.71	0.29	0.35	0.73	0.88
35	1.00	0.50	0.41	0.49	1.14	1.37
45	1.50	0.35	1.01	1.21	2.15	2.58
60	2.00	0.25	4.45	5.34	6.60	7.92
80	2.50	0.18	46.65	56.02	53.25	63.94
120	3.00	0.13	26.47	31.78	79.72	95.72
170	3.50	0.09	2.21	2.65	81.93	98.37
200	3.75	0.07	0.17	0.20	82.10	98.57
230	4.00	0.06	0.02	0.02	82.12	98.59

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.99	2.82	2.67	2.38	2.15	2.07	1.73

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.37	0.19	0.44	-2.3	16.84

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-07 #3

Analysis Date: 06-19-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,390,615	200,380	North Carolina State Plane	-16.4 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
84.50	83.48	0.01	0.00	#200 - 1.24 #230 - 1.23			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.01	0.01	0.01	0.01
14	-0.50	1.41	0.05	0.06	0.06	0.07
18	0.00	1.00	0.08	0.09	0.14	0.16
25	0.50	0.71	0.10	0.12	0.24	0.28
35	1.00	0.50	0.12	0.14	0.36	0.42
45	1.50	0.35	0.26	0.31	0.62	0.73
60	2.00	0.25	2.69	3.18	3.31	3.91
80	2.50	0.18	52.81	62.50	56.12	66.41
120	3.00	0.13	25.73	30.45	81.85	96.86
170	3.50	0.09	1.53	1.81	83.38	98.67
200	3.75	0.07	0.08	0.09	83.46	98.76
230	4.00	0.06	0.01	0.01	83.47	98.77

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.97	2.79	2.64	2.37	2.17	2.10	2.01

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.4	0.19	0.33	-1.36	16.29

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-08 #1

Analysis Date: 06-19-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,390,181	200,226	North Carolina State Plane	-11.9 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/1 Dry - 2.5Y-6/2 Washed - 2.5Y-6/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
95.96	95.34	0.00	0.03	#200 - 0.70 #230 - 0.69			24

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	4.62	4.81	4.62	4.81
7/16"	-3.50	11.31	5.59	5.83	10.21	10.64
5/16"	-3.00	8.00	4.98	5.19	15.19	15.83
3.5	-2.50	5.66	3.45	3.60	18.64	19.43
4	-2.25	4.76	1.29	1.34	19.93	20.77
5	-2.00	4.00	1.24	1.29	21.17	22.06
7	-1.50	2.83	2.93	3.05	24.10	25.11
10	-1.00	2.00	4.18	4.36	28.28	29.47
14	-0.50	1.41	6.15	6.41	34.43	35.88
18	0.00	1.00	6.59	6.87	41.02	42.75
25	0.50	0.71	6.72	7.00	47.74	49.75
35	1.00	0.50	8.15	8.49	55.89	58.24
45	1.50	0.35	11.95	12.45	67.84	70.69
60	2.00	0.25	13.41	13.97	81.25	84.66
80	2.50	0.18	10.19	10.62	91.44	95.28
120	3.00	0.13	3.61	3.76	95.05	99.04
170	3.50	0.09	0.24	0.25	95.29	99.29
200	3.75	0.07	0.01	0.01	95.30	99.30
230	4.00	0.06	0.01	0.01	95.31	99.31

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.49	1.98	1.65	0.51	-1.52	-2.98	-3.98

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	-0.08	1.06	2.08	-0.59	2.09

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-08 #2

Analysis Date: 06-19-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,390,181	200,226	North Carolina State Plane	-13.9 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 2.5Y-6/1 Washed - 2.5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
86.64	85.42	0.01	0.00	#200 - 1.43 #230 - 1.42			1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.34	0.39	0.34	0.39
5	-2.00	4.00	0.08	0.09	0.42	0.48
7	-1.50	2.83	0.32	0.37	0.74	0.85
10	-1.00	2.00	0.51	0.59	1.25	1.44
14	-0.50	1.41	1.15	1.33	2.40	2.77
18	0.00	1.00	1.48	1.71	3.88	4.48
25	0.50	0.71	2.45	2.83	6.33	7.31
35	1.00	0.50	4.38	5.06	10.71	12.37
45	1.50	0.35	10.29	11.88	21.00	24.25
60	2.00	0.25	22.55	26.03	43.55	50.28
80	2.50	0.18	28.88	33.33	72.43	83.61
120	3.00	0.13	12.15	14.02	84.58	97.63
170	3.50	0.09	0.81	0.93	85.39	98.56
200	3.75	0.07	0.01	0.01	85.40	98.57
230	4.00	0.06	0.01	0.01	85.41	98.58

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.91	2.51	2.37	1.99	1.51	1.15	0.09

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.8	0.29	0.85	-1.71	7.26

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-08 #3

Analysis Date: 06-14-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,390,181	200,226	North Carolina State Plane	-16.4 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/1 Dry - 5Y-6/1 Washed - 5Y-6/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
89.26	88.46	0.00	0.00	#200 - 0.90 #230 - 0.89			2

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.76	0.85	0.76	0.85
3.5	-2.50	5.66	1.82	2.04	2.58	2.89
4	-2.25	4.76	0.73	0.82	3.31	3.71
5	-2.00	4.00	0.42	0.47	3.73	4.18
7	-1.50	2.83	1.38	1.55	5.11	5.73
10	-1.00	2.00	3.13	3.51	8.24	9.24
14	-0.50	1.41	5.41	6.06	13.65	15.30
18	0.00	1.00	7.08	7.93	20.73	23.23
25	0.50	0.71	9.04	10.13	29.77	33.36
35	1.00	0.50	11.88	13.31	41.65	46.67
45	1.50	0.35	14.25	15.96	55.90	62.63
60	2.00	0.25	13.26	14.86	69.16	77.49
80	2.50	0.18	14.19	15.90	83.35	93.39
120	3.00	0.13	4.91	5.50	88.26	98.89
170	3.50	0.09	0.17	0.19	88.43	99.08
200	3.75	0.07	0.02	0.02	88.45	99.10
230	4.00	0.06	0.01	0.01	88.46	99.11

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.65	2.20	1.92	1.10	0.09	-0.46	-1.74

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.86	0.55	1.33	-0.86	3.42

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-08 #4

Analysis Date: 07-10-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,390,181	200,226	North Carolina State Plane	-18.9 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 10BG-4/1 Dry - 10G-5/1 Washed - 10G-5/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
95.36	94.34	0.01	0.01	#200 - 1.12 #230 - 1.11			12

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	3.84	4.03	3.84	4.03
5/16"	-3.00	8.00	3.59	3.76	7.43	7.79
3.5	-2.50	5.66	5.74	6.02	13.17	13.81
4	-2.25	4.76	2.52	2.64	15.69	16.45
5	-2.00	4.00	4.14	4.34	19.83	20.79
7	-1.50	2.83	7.28	7.63	27.11	28.42
10	-1.00	2.00	8.22	8.62	35.33	37.04
14	-0.50	1.41	11.21	11.76	46.54	48.80
18	0.00	1.00	9.08	9.52	55.62	58.32
25	0.50	0.71	8.50	8.91	64.12	67.23
35	1.00	0.50	6.92	7.26	71.04	74.49
45	1.50	0.35	5.36	5.62	76.40	80.11
60	2.00	0.25	4.39	4.60	80.79	84.71
80	2.50	0.18	8.10	8.49	88.89	93.20
120	3.00	0.13	4.95	5.19	93.84	98.39
170	3.50	0.09	0.42	0.44	94.26	98.83
200	3.75	0.07	0.05	0.05	94.31	98.88
230	4.00	0.06	0.01	0.01	94.32	98.89

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.67	1.92	1.05	-0.44	-1.72	-2.29	-3.37

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	-0.37	1.29	1.8	0.04	2.12

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-09 #1

Analysis Date: 07-10-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,776	201,051	North Carolina State Plane	-6.8 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
88.05	87.10	0.00	0.01	#200 - 1.11 #230 - 1.10		23	2

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	1.41	1.60	1.41	1.60
3.5	-2.50	5.66	0.44	0.50	1.85	2.10
4	-2.25	4.76	0.00	0.00	1.85	2.10
5	-2.00	4.00	0.53	0.60	2.38	2.70
7	-1.50	2.83	1.10	1.25	3.48	3.95
10	-1.00	2.00	1.41	1.60	4.89	5.55
14	-0.50	1.41	2.74	3.11	7.63	8.66
18	0.00	1.00	3.46	3.93	11.09	12.59
25	0.50	0.71	4.52	5.13	15.61	17.72
35	1.00	0.50	6.76	7.68	22.37	25.40
45	1.50	0.35	13.48	15.31	35.85	40.71
60	2.00	0.25	22.80	25.89	58.65	66.60
80	2.50	0.18	20.17	22.91	78.82	89.51
120	3.00	0.13	7.74	8.79	86.56	98.30
170	3.50	0.09	0.50	0.57	87.06	98.87
200	3.75	0.07	0.02	0.02	87.08	98.89
230	4.00	0.06	0.01	0.01	87.09	98.90

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.81	2.38	2.18	1.68	0.97	0.33	-1.17

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.35	0.39	1.22	-1.6	5.87

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-09 #2

Analysis Date: 07-09-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,776	201,051	North Carolina State Plane	-11.3 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
84.53	83.39	0.00	0.02	#200 - 1.39 #230 - 1.38		9	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.01	0.01	0.01	0.01
18	0.00	1.00	0.01	0.01	0.02	0.02
25	0.50	0.71	0.02	0.02	0.04	0.04
35	1.00	0.50	0.08	0.09	0.12	0.13
45	1.50	0.35	0.53	0.63	0.65	0.76
60	2.00	0.25	11.14	13.18	11.79	13.94
80	2.50	0.18	54.57	64.56	66.36	78.50
120	3.00	0.13	16.34	19.33	82.70	97.83
170	3.50	0.09	0.62	0.73	83.32	98.56
200	3.75	0.07	0.04	0.05	83.36	98.61
230	4.00	0.06	0.01	0.01	83.37	98.62

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.93	2.64	2.47	2.28	2.09	2.02	1.66

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.28	0.21	0.32	-0.28	5.89

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-09 #3

Analysis Date: 06-20-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,776	201,051	North Carolina State Plane	-14.8 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
88.89	87.71	0.01	0.01	#200 - 1.37 #230 - 1.35		12	2

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.29	0.33	0.29	0.33
4	-2.25	4.76	0.83	0.93	1.12	1.26
5	-2.00	4.00	0.52	0.58	1.64	1.84
7	-1.50	2.83	0.96	1.08	2.60	2.92
10	-1.00	2.00	1.11	1.25	3.71	4.17
14	-0.50	1.41	1.57	1.77	5.28	5.94
18	0.00	1.00	1.52	1.71	6.80	7.65
25	0.50	0.71	1.82	2.05	8.62	9.70
35	1.00	0.50	2.48	2.79	11.10	12.49
45	1.50	0.35	4.72	5.31	15.82	17.80
60	2.00	0.25	18.88	21.24	34.70	39.04
80	2.50	0.18	42.00	47.25	76.70	86.29
120	3.00	0.13	10.46	11.77	87.16	98.06
170	3.50	0.09	0.47	0.53	87.63	98.59
200	3.75	0.07	0.04	0.04	87.67	98.63
230	4.00	0.06	0.02	0.02	87.69	98.65

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.87	2.48	2.38	2.12	1.67	1.33	-0.77

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.8	0.29	1.04	-2.3	8.39

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-09 #4

Analysis Date: 06-20-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,776	201,051	North Carolina State Plane	-17.7 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-5/1 Dry - 5Y-6/1 Washed - 5Y-6/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
90.26	89.15	0.01	0.04	#200 - 1.31 #230 - 1.29		35	4

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.94	1.04	0.94	1.04
3.5	-2.50	5.66	1.98	2.19	2.92	3.23
4	-2.25	4.76	0.51	0.57	3.43	3.80
5	-2.00	4.00	1.36	1.51	4.79	5.31
7	-1.50	2.83	2.31	2.56	7.10	7.87
10	-1.00	2.00	4.08	4.52	11.18	12.39
14	-0.50	1.41	6.60	7.31	17.78	19.70
18	0.00	1.00	7.12	7.89	24.90	27.59
25	0.50	0.71	8.55	9.47	33.45	37.06
35	1.00	0.50	8.70	9.64	42.15	46.70
45	1.50	0.35	11.41	12.64	53.56	59.34
60	2.00	0.25	13.87	15.37	67.43	74.71
80	2.50	0.18	17.25	19.11	84.68	93.82
120	3.00	0.13	4.12	4.56	88.80	98.38
170	3.50	0.09	0.23	0.25	89.03	98.63
200	3.75	0.07	0.05	0.06	89.08	98.69
230	4.00	0.06	0.02	0.02	89.10	98.71

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.63	2.24	2.01	1.13	-0.16	-0.75	-2.05

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	0.78	0.58	1.44	-0.75	2.84

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-10 #1

Analysis Date: 06-20-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,385,121	200,150	North Carolina State Plane	-10.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
87.89	87.09	0.00	0.00	#200 - 0.93 #230 - 0.92		5	1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.05	0.06	0.05	0.06
4	-2.25	4.76	0.00	0.00	0.05	0.06
5	-2.00	4.00	0.25	0.28	0.30	0.34
7	-1.50	2.83	0.28	0.32	0.58	0.66
10	-1.00	2.00	0.46	0.52	1.04	1.18
14	-0.50	1.41	0.56	0.64	1.60	1.82
18	0.00	1.00	0.54	0.61	2.14	2.43
25	0.50	0.71	1.06	1.21	3.20	3.64
35	1.00	0.50	2.40	2.73	5.60	6.37
45	1.50	0.35	11.47	13.05	17.07	19.42
60	2.00	0.25	33.46	38.07	50.53	57.49
80	2.50	0.18	29.78	33.88	80.31	91.37
120	3.00	0.13	6.52	7.42	86.83	98.79
170	3.50	0.09	0.24	0.27	87.07	99.06
200	3.75	0.07	0.01	0.01	87.08	99.07
230	4.00	0.06	0.01	0.01	87.09	99.08

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.74	2.39	2.26	1.90	1.57	1.37	0.75

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.82	0.28	0.68	-2.27	12.14

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-10 #2

Analysis Date: 06-20-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,385,121	200,150	North Carolina State Plane	-13.8 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/2 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
83.45	82.34	0.00	0.01	#200 - 1.35 #230 - 1.34		13	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.01	0.01	0.01	0.01
7	-1.50	2.83	0.01	0.01	0.02	0.02
10	-1.00	2.00	0.06	0.07	0.08	0.09
14	-0.50	1.41	0.13	0.16	0.21	0.25
18	0.00	1.00	0.15	0.18	0.36	0.43
25	0.50	0.71	0.20	0.24	0.56	0.67
35	1.00	0.50	0.31	0.37	0.87	1.04
45	1.50	0.35	1.09	1.31	1.96	2.35
60	2.00	0.25	10.33	12.38	12.29	14.73
80	2.50	0.18	45.96	55.07	58.25	69.80
120	3.00	0.13	23.22	27.83	81.47	97.63
170	3.50	0.09	0.82	0.98	82.29	98.61
200	3.75	0.07	0.03	0.04	82.32	98.65
230	4.00	0.06	0.01	0.01	82.33	98.66

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.95	2.76	2.59	2.32	2.09	2.01	1.61

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.3	0.20	0.42	-2.13	16.11

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-10 #3

Analysis Date: 06-20-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,385,121	200,150	North Carolina State Plane	-20.3 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
83.36	82.18	0.00	0.00	#200 - 1.44 #230 - 1.43		4	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.02	0.02	0.02	0.02
14	-0.50	1.41	0.02	0.02	0.04	0.04
18	0.00	1.00	0.02	0.02	0.06	0.06
25	0.50	0.71	0.04	0.05	0.10	0.11
35	1.00	0.50	0.08	0.10	0.18	0.21
45	1.50	0.35	0.30	0.36	0.48	0.57
60	2.00	0.25	3.60	4.32	4.08	4.89
80	2.50	0.18	47.76	57.29	51.84	62.18
120	3.00	0.13	28.05	33.65	79.89	95.83
170	3.50	0.09	2.16	2.59	82.05	98.42
200	3.75	0.07	0.12	0.14	82.17	98.56
230	4.00	0.06	0.01	0.01	82.18	98.57

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.99	2.82	2.69	2.39	2.18	2.10	2.00

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.42	0.19	0.33	-0.68	10.9

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-10 #4

Analysis Date: 06-20-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,385,121	200,150	North Carolina State Plane	-23.2 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
84.52	82.46	0.03	0.01	#200 - 2.53 #230 - 2.48			2

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	1.43	1.69	1.43	1.69
5/16"	-3.00	8.00	0.00	0.00	1.43	1.69
3.5	-2.50	5.66	0.00	0.00	1.43	1.69
4	-2.25	4.76	0.00	0.00	1.43	1.69
5	-2.00	4.00	0.04	0.05	1.47	1.74
7	-1.50	2.83	0.45	0.53	1.92	2.27
10	-1.00	2.00	0.65	0.77	2.57	3.04
14	-0.50	1.41	1.12	1.33	3.69	4.37
18	0.00	1.00	1.04	1.23	4.73	5.60
25	0.50	0.71	1.38	1.63	6.11	7.23
35	1.00	0.50	1.76	2.08	7.87	9.31
45	1.50	0.35	2.63	3.11	10.50	12.42
60	2.00	0.25	10.08	11.93	20.58	24.35
80	2.50	0.18	44.08	52.15	64.66	76.50
120	3.00	0.13	16.42	19.43	81.08	95.93
170	3.50	0.09	1.20	1.42	82.28	97.35
200	3.75	0.07	0.10	0.12	82.38	97.47
230	4.00	0.06	0.04	0.05	82.42	97.52

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.98	2.69	2.49	2.25	2.01	1.65	-0.24

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.98	0.25	1.09	-3.28	15.61

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-11 #1

Analysis Date: 06-20-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,946	201,018	North Carolina State Plane	-5.3 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 2.5Y-6/4 Washed - 2.5Y-7/3	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
84.66	83.60	0.00	0.01	#200 - 1.27 #230 - 1.26		11	1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.09	0.11	0.09	0.11
4	-2.25	4.76	0.09	0.11	0.18	0.22
5	-2.00	4.00	0.07	0.08	0.25	0.30
7	-1.50	2.83	0.51	0.60	0.76	0.90
10	-1.00	2.00	0.34	0.40	1.10	1.30
14	-0.50	1.41	0.67	0.79	1.77	2.09
18	0.00	1.00	0.93	1.10	2.70	3.19
25	0.50	0.71	1.28	1.51	3.98	4.70
35	1.00	0.50	1.77	2.09	5.75	6.79
45	1.50	0.35	5.50	6.50	11.25	13.29
60	2.00	0.25	18.17	21.46	29.42	34.75
80	2.50	0.18	38.45	45.42	67.87	80.17
120	3.00	0.13	14.81	17.49	82.68	97.66
170	3.50	0.09	0.86	1.02	83.54	98.68
200	3.75	0.07	0.04	0.05	83.58	98.73
230	4.00	0.06	0.01	0.01	83.59	98.74

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.92	2.61	2.44	2.17	1.77	1.56	0.57

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.01	0.25	0.76	-2.44	11.62

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-11 #2

Analysis Date: 06-20-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,946	201,018	North Carolina State Plane	-8.4 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 2.5Y-7/4 Washed - 2.5Y-7/4	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
83.81	82.78	0.01	0.02	#200 - 1.28 #230 - 1.27		5	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.01	0.01	0.01	0.01
18	0.00	1.00	0.02	0.02	0.03	0.03
25	0.50	0.71	0.07	0.08	0.10	0.11
35	1.00	0.50	0.19	0.23	0.29	0.34
45	1.50	0.35	0.79	0.94	1.08	1.28
60	2.00	0.25	14.78	17.64	15.86	18.92
80	2.50	0.18	52.74	62.93	68.60	81.85
120	3.00	0.13	13.63	16.26	82.23	98.11
170	3.50	0.09	0.50	0.60	82.73	98.71
200	3.75	0.07	0.01	0.01	82.74	98.72
230	4.00	0.06	0.01	0.01	82.75	98.73

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.90	2.57	2.45	2.25	2.05	1.92	1.61

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.23	0.21	0.34	-0.54	6.38

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-11 #3

Analysis Date: 06-20-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,946	201,018	North Carolina State Plane	-13.4 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 2.5Y-7/2 Washed - 2.5Y-7/2	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
83.77	82.68	0.01	0.01	#200 - 1.33 #230 - 1.32		5	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.00	0.00	0.00	0.00
18	0.00	1.00	0.04	0.05	0.04	0.05
25	0.50	0.71	0.07	0.08	0.11	0.13
35	1.00	0.50	0.25	0.30	0.36	0.43
45	1.50	0.35	1.02	1.22	1.38	1.65
60	2.00	0.25	6.85	8.18	8.23	9.83
80	2.50	0.18	48.15	57.48	56.38	67.31
120	3.00	0.13	24.60	29.37	80.98	96.68
170	3.50	0.09	1.61	1.92	82.59	98.60
200	3.75	0.07	0.06	0.07	82.65	98.67
230	4.00	0.06	0.01	0.01	82.66	98.68

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.97	2.78	2.63	2.35	2.13	2.05	1.70

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.36	0.19	0.36	-0.68	6.57

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-11 #4

Analysis Date: 06-21-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,946	201,018	North Carolina State Plane	-17.4 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-5/1 Dry - 5Y-6/1 Washed - 5Y-6/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
86.57	85.43	0.01	0.02	#200 - 1.37 #230 - 1.36		17	2

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.23	0.27	0.23	0.27
4	-2.25	4.76	0.19	0.22	0.42	0.49
5	-2.00	4.00	0.36	0.42	0.78	0.91
7	-1.50	2.83	1.15	1.33	1.93	2.24
10	-1.00	2.00	1.35	1.56	3.28	3.80
14	-0.50	1.41	2.20	2.54	5.48	6.34
18	0.00	1.00	2.36	2.73	7.84	9.07
25	0.50	0.71	2.78	3.21	10.62	12.28
35	1.00	0.50	4.01	4.63	14.63	16.91
45	1.50	0.35	7.12	8.22	21.75	25.13
60	2.00	0.25	16.91	19.53	38.66	44.66
80	2.50	0.18	35.05	40.49	73.71	85.15
120	3.00	0.13	11.18	12.91	84.89	98.06
170	3.50	0.09	0.47	0.54	85.36	98.60
200	3.75	0.07	0.03	0.03	85.39	98.63
230	4.00	0.06	0.01	0.01	85.40	98.64

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.88	2.49	2.37	2.07	1.49	0.90	-0.76

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.71	0.31	1.06	-1.76	5.95

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-12 #1

Analysis Date: 06-21-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,433	200,711	North Carolina State Plane	-9.5 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
84.68	83.56	0.00	0.05	#200 - 1.40 #230 - 1.38		4	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.01	0.01	0.01	0.01
18	0.00	1.00	0.02	0.02	0.03	0.03
25	0.50	0.71	0.04	0.05	0.07	0.08
35	1.00	0.50	0.16	0.19	0.23	0.27
45	1.50	0.35	0.77	0.91	1.00	1.18
60	2.00	0.25	10.18	12.02	11.18	13.20
80	2.50	0.18	48.88	57.72	60.06	70.92
120	3.00	0.13	21.95	25.92	82.01	96.84
170	3.50	0.09	1.42	1.68	83.43	98.52
200	3.75	0.07	0.07	0.08	83.50	98.60
230	4.00	0.06	0.02	0.02	83.52	98.62

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.96	2.75	2.58	2.32	2.10	2.02	1.66

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.32	0.20	0.36	-0.39	5.66

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-12 #2

Analysis Date: 06-21-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,433	200,711	North Carolina State Plane	-14.5 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/2 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
82.75	81.57	0.01	0.01	#200 - 1.49 #230 - 1.47		5	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.06	0.07	0.06	0.07
10	-1.00	2.00	0.02	0.02	0.08	0.09
14	-0.50	1.41	0.02	0.02	0.10	0.11
18	0.00	1.00	0.03	0.04	0.13	0.15
25	0.50	0.71	0.06	0.07	0.19	0.22
35	1.00	0.50	0.21	0.25	0.40	0.47
45	1.50	0.35	0.97	1.17	1.37	1.64
60	2.00	0.25	9.08	10.97	10.45	12.61
80	2.50	0.18	46.96	56.75	57.41	69.36
120	3.00	0.13	22.20	26.83	79.61	96.19
170	3.50	0.09	1.85	2.24	81.46	98.43
200	3.75	0.07	0.07	0.08	81.53	98.51
230	4.00	0.06	0.02	0.02	81.55	98.53

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.98	2.77	2.61	2.33	2.11	2.03	1.65

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.33	0.20	0.39	-1.47	15.61

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-12 #3

Analysis Date: 06-21-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,433	200,711	North Carolina State Plane	-17.2 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 2.5Y-6/2 Dry - 2.5Y-6/2 Washed - 2.5Y-7/2	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
90.27	89.31	0.00	0.03	#200 - 1.12 #230 - 1.10		35	10

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	1.18	1.31	1.18	1.31
5/16"	-3.00	8.00	1.04	1.15	2.22	2.46
3.5	-2.50	5.66	2.91	3.22	5.13	5.68
4	-2.25	4.76	1.16	1.29	6.29	6.97
5	-2.00	4.00	3.11	3.45	9.40	10.42
7	-1.50	2.83	7.10	7.87	16.50	18.29
10	-1.00	2.00	8.74	9.68	25.24	27.97
14	-0.50	1.41	10.80	11.96	36.04	39.93
18	0.00	1.00	7.24	8.02	43.28	47.95
25	0.50	0.71	4.77	5.28	48.05	53.23
35	1.00	0.50	2.58	2.86	50.63	56.09
45	1.50	0.35	2.42	2.68	53.05	58.77
60	2.00	0.25	4.90	5.43	57.95	64.20
80	2.50	0.18	17.36	19.23	75.31	83.43
120	3.00	0.13	12.93	14.32	88.24	97.75
170	3.50	0.09	0.97	1.07	89.21	98.82
200	3.75	0.07	0.05	0.06	89.26	98.88
230	4.00	0.06	0.02	0.02	89.28	98.90

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.90	2.52	2.28	0.19	-1.15	-1.65	-2.61

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.38	0.77	1.88	-0.16	1.73

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-13 #1

Analysis Date: 06-21-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,385,692	200,595	North Carolina State Plane	-11.1 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-5/1 Dry - 5Y-6/1 Washed - 5Y-6/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
92.55	91.61	0.01	0.03	#200 - 1.07 #230 - 1.05		17	1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	1.02	1.10	1.02	1.10
3.5	-2.50	5.66	0.05	0.05	1.07	1.15
4	-2.25	4.76	0.22	0.24	1.29	1.39
5	-2.00	4.00	0.36	0.39	1.65	1.78
7	-1.50	2.83	0.81	0.88	2.46	2.66
10	-1.00	2.00	1.49	1.61	3.95	4.27
14	-0.50	1.41	2.30	2.49	6.25	6.76
18	0.00	1.00	2.83	3.06	9.08	9.82
25	0.50	0.71	3.49	3.77	12.57	13.59
35	1.00	0.50	5.13	5.54	17.70	19.13
45	1.50	0.35	12.17	13.15	29.87	32.28
60	2.00	0.25	26.90	29.07	56.77	61.35
80	2.50	0.18	24.12	26.06	80.89	87.41
120	3.00	0.13	10.01	10.82	90.90	98.23
170	3.50	0.09	0.62	0.67	91.52	98.90
200	3.75	0.07	0.03	0.03	91.55	98.93
230	4.00	0.06	0.02	0.02	91.57	98.95

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.85	2.43	2.26	1.80	1.22	0.72	-0.85

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.53	0.35	1.12	-1.81	6.96

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-13 #2

Analysis Date: 06-21-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,385,692	200,595	North Carolina State Plane	-14.6 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 5Y-6/2 Washed - 5Y-6/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
83.69	82.27	0.02	0.02	#200 - 1.82 #230 - 1.76		4	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.01	0.01	0.01	0.01
14	-0.50	1.41	0.01	0.01	0.02	0.02
18	0.00	1.00	0.01	0.01	0.03	0.03
25	0.50	0.71	0.01	0.01	0.04	0.04
35	1.00	0.50	0.04	0.05	0.08	0.09
45	1.50	0.35	0.14	0.17	0.22	0.26
60	2.00	0.25	1.56	1.86	1.78	2.12
80	2.50	0.18	40.97	48.95	42.75	51.07
120	3.00	0.13	35.83	42.81	78.58	93.88
170	3.50	0.09	3.46	4.13	82.04	98.01
200	3.75	0.07	0.14	0.17	82.18	98.18
230	4.00	0.06	0.05	0.06	82.23	98.24

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.14	2.88	2.78	2.49	2.23	2.14	2.03

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.5	0.18	0.32	-0.23	7.69

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-13 #3

Analysis Date: 06-21-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,385,692	200,595	North Carolina State Plane	-17.1 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-6/1 Washed - 5Y-6/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
85.12	84.12	0.00	0.02	#200 - 1.22 #230 - 1.20		6	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.01	0.01	0.01	0.01
10	-1.00	2.00	0.15	0.18	0.16	0.19
14	-0.50	1.41	0.24	0.28	0.40	0.47
18	0.00	1.00	0.39	0.46	0.79	0.93
25	0.50	0.71	0.73	0.86	1.52	1.79
35	1.00	0.50	1.43	1.68	2.95	3.47
45	1.50	0.35	4.64	5.45	7.59	8.92
60	2.00	0.25	14.65	17.21	22.24	26.13
80	2.50	0.18	40.44	47.51	62.68	73.64
120	3.00	0.13	20.36	23.92	83.04	97.56
170	3.50	0.09	0.99	1.16	84.03	98.72
200	3.75	0.07	0.05	0.06	84.08	98.78
230	4.00	0.06	0.02	0.02	84.10	98.80

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.95	2.72	2.53	2.25	1.97	1.71	1.14

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.17	0.22	0.56	-1.77	9.11

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-13 #4

Analysis Date: 06-21-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,385,692	200,595	North Carolina State Plane	-22.1 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 5Y-6/1 Washed - 5Y-6/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
84.48	83.29	0.01	0.05	#200 - 1.48 #230 - 1.47			1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.14	0.17	0.14	0.17
5	-2.00	4.00	0.12	0.14	0.26	0.31
7	-1.50	2.83	0.19	0.22	0.45	0.53
10	-1.00	2.00	0.24	0.28	0.69	0.81
14	-0.50	1.41	0.31	0.37	1.00	1.18
18	0.00	1.00	0.73	0.86	1.73	2.04
25	0.50	0.71	1.51	1.79	3.24	3.83
35	1.00	0.50	3.27	3.87	6.51	7.70
45	1.50	0.35	8.63	10.22	15.14	17.92
60	2.00	0.25	43.89	51.95	59.03	69.87
80	2.50	0.18	19.30	22.85	78.33	92.72
120	3.00	0.13	4.67	5.53	83.00	98.25
170	3.50	0.09	0.21	0.25	83.21	98.50
200	3.75	0.07	0.02	0.02	83.23	98.52
230	4.00	0.06	0.01	0.01	83.24	98.53

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.71	2.31	2.11	1.81	1.57	1.41	0.65

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.75	0.30	0.62	-2.16	12.54

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-13 #5

Analysis Date: 06-22-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,385,692	200,595	North Carolina State Plane	-23.6 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-5/1 Dry - N-6/0 Washed - N-6/0	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
90.23	88.78	0.03	0.02	#200 - 1.71 #230 - 1.67			27

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	4.73	5.24	4.73	5.24
5/16"	-3.00	8.00	5.82	6.45	10.55	11.69
3.5	-2.50	5.66	5.79	6.42	16.34	18.11
4	-2.25	4.76	1.33	1.47	17.67	19.58
5	-2.00	4.00	2.93	3.25	20.60	22.83
7	-1.50	2.83	4.36	4.83	24.96	27.66
10	-1.00	2.00	3.26	3.61	28.22	31.27
14	-0.50	1.41	3.60	3.99	31.82	35.26
18	0.00	1.00	2.62	2.90	34.44	38.16
25	0.50	0.71	1.98	2.19	36.42	40.35
35	1.00	0.50	1.51	1.67	37.93	42.02
45	1.50	0.35	2.73	3.03	40.66	45.05
60	2.00	0.25	8.74	9.69	49.40	54.74
80	2.50	0.18	21.02	23.30	70.42	78.04
120	3.00	0.13	16.80	18.62	87.22	96.66
170	3.50	0.09	1.35	1.50	88.57	98.16
200	3.75	0.07	0.12	0.13	88.69	98.29
230	4.00	0.06	0.04	0.04	88.73	98.33

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.96	2.66	2.43	1.76	-1.78	-2.66	-3.53

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	0.47	0.72	2.31	-0.57	1.72

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-14 #1

Analysis Date: 06-22-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,347	202,224	North Carolina State Plane	-9.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
84.12	83.16	0.01	0.00	#200 - 1.15 #230 - 1.14			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.17	0.20	0.17	0.20
4	-2.25	4.76	0.00	0.00	0.17	0.20
5	-2.00	4.00	0.00	0.00	0.17	0.20
7	-1.50	2.83	0.01	0.01	0.18	0.21
10	-1.00	2.00	0.03	0.04	0.21	0.25
14	-0.50	1.41	0.04	0.05	0.25	0.30
18	0.00	1.00	0.03	0.04	0.28	0.34
25	0.50	0.71	0.04	0.05	0.32	0.39
35	1.00	0.50	0.11	0.13	0.43	0.52
45	1.50	0.35	0.42	0.50	0.85	1.02
60	2.00	0.25	5.41	6.43	6.26	7.45
80	2.50	0.18	47.92	56.97	54.18	64.42
120	3.00	0.13	27.86	33.12	82.04	97.54
170	3.50	0.09	1.06	1.26	83.10	98.80
200	3.75	0.07	0.04	0.05	83.14	98.85
230	4.00	0.06	0.01	0.01	83.15	98.86

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.96	2.80	2.66	2.37	2.15	2.08	1.81

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.38	0.19	0.41	-4.62	54.91

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-14 #2

Analysis Date: 06-22-07

Analyzed By: PB

Coastal Planning & Engineering
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FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,347	202,224	North Carolina State Plane	-12.9 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 2.5Y-7/1 Washed - 5Y-7/2	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
86.42	85.55	0.00	0.02	#200 - 1.03 #230 - 1.02			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.27	0.31	0.27	0.31
10	-1.00	2.00	0.29	0.34	0.56	0.65
14	-0.50	1.41	0.50	0.58	1.06	1.23
18	0.00	1.00	0.82	0.95	1.88	2.18
25	0.50	0.71	1.42	1.64	3.30	3.82
35	1.00	0.50	2.52	2.92	5.82	6.74
45	1.50	0.35	5.86	6.78	11.68	13.52
60	2.00	0.25	13.87	16.05	25.55	29.57
80	2.50	0.18	41.08	47.54	66.63	77.11
120	3.00	0.13	17.92	20.74	84.55	97.85
170	3.50	0.09	0.94	1.09	85.49	98.94
200	3.75	0.07	0.03	0.03	85.52	98.97
230	4.00	0.06	0.01	0.01	85.53	98.98

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.93	2.67	2.48	2.21	1.86	1.58	0.70

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.07	0.24	0.69	-2.04	9.2

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-14 #3

Analysis Date: 06-22-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,347	202,224	North Carolina State Plane	-13.5 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 2.5Y-6/1 Dry - 2.5Y-7/2 Washed - 2.5Y-7/2	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
88.57	87.71	0.01	0.02	#200 - 1.03 #230 - 1.02			2

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.18	0.20	0.18	0.20
3.5	-2.50	5.66	0.54	0.61	0.72	0.81
4	-2.25	4.76	0.05	0.06	0.77	0.87
5	-2.00	4.00	0.17	0.19	0.94	1.06
7	-1.50	2.83	0.44	0.50	1.38	1.56
10	-1.00	2.00	0.87	0.98	2.25	2.54
14	-0.50	1.41	2.02	2.28	4.27	4.82
18	0.00	1.00	3.13	3.53	7.40	8.35
25	0.50	0.71	4.60	5.19	12.00	13.54
35	1.00	0.50	7.00	7.90	19.00	21.44
45	1.50	0.35	12.22	13.80	31.22	35.24
60	2.00	0.25	15.93	17.99	47.15	53.23
80	2.50	0.18	26.52	29.94	73.67	83.17
120	3.00	0.13	13.16	14.86	86.83	98.03
170	3.50	0.09	0.81	0.91	87.64	98.94
200	3.75	0.07	0.03	0.03	87.67	98.97
230	4.00	0.06	0.01	0.01	87.68	98.98

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.90	2.53	2.36	1.91	1.13	0.66	-0.47

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.61	0.33	1.06	-1.44	5.61

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-14 #4

Analysis Date: 06-25-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,347	202,224	North Carolina State Plane	-16.5 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/2 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
85.11	84.16	0.01	0.00	#200 - 1.13 #230 - 1.13			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.10	0.12	0.10	0.12
5	-2.00	4.00	0.06	0.07	0.16	0.19
7	-1.50	2.83	0.11	0.13	0.27	0.32
10	-1.00	2.00	0.15	0.18	0.42	0.50
14	-0.50	1.41	0.25	0.29	0.67	0.79
18	0.00	1.00	0.28	0.33	0.95	1.12
25	0.50	0.71	0.49	0.58	1.44	1.70
35	1.00	0.50	1.05	1.23	2.49	2.93
45	1.50	0.35	2.66	3.13	5.15	6.06
60	2.00	0.25	12.30	14.45	17.45	20.51
80	2.50	0.18	39.21	46.07	56.66	66.58
120	3.00	0.13	26.95	31.66	83.61	98.24
170	3.50	0.09	0.52	0.61	84.13	98.85
200	3.75	0.07	0.02	0.02	84.15	98.87
230	4.00	0.06	0.00	0.00	84.15	98.87

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.95	2.78	2.63	2.32	2.05	1.84	1.33

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.24	0.21	0.58	-2.86	17.67

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-14 #5

Analysis Date: 06-25-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,347	202,224	North Carolina State Plane	-18.8 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/1 Dry - N-7/0 Washed - N-7/0	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
95.53	94.80	0.01	0.02	#200 - 0.81 #230 - 0.79			12

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	4.35	4.55	4.35	4.55
5/16"	-3.00	8.00	4.11	4.30	8.46	8.85
3.5	-2.50	5.66	0.83	0.87	9.29	9.72
4	-2.25	4.76	0.30	0.31	9.59	10.03
5	-2.00	4.00	0.84	0.88	10.43	10.91
7	-1.50	2.83	1.65	1.73	12.08	12.64
10	-1.00	2.00	2.10	2.20	14.18	14.84
14	-0.50	1.41	3.12	3.27	17.30	18.11
18	0.00	1.00	3.15	3.30	20.45	21.41
25	0.50	0.71	3.36	3.52	23.81	24.93
35	1.00	0.50	3.75	3.93	27.56	28.86
45	1.50	0.35	8.10	8.48	35.66	37.34
60	2.00	0.25	18.64	19.51	54.30	56.85
80	2.50	0.18	28.65	29.99	82.95	86.84
120	3.00	0.13	11.12	11.64	94.07	98.48
170	3.50	0.09	0.62	0.65	94.69	99.13
200	3.75	0.07	0.06	0.06	94.75	99.19
230	4.00	0.06	0.02	0.02	94.77	99.21

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.85	2.45	2.30	1.82	0.51	-0.82	-3.45

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.06	0.48	1.86	-1.43	3.89

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-15 #1

Analysis Date: 06-25-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
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fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,715	200,330	North Carolina State Plane	-6.8 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/2 Dry - 5Y-7/2 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
87.50	86.61	0.01	0.02	#200 - 1.07 #230 - 1.05		8	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.12	0.14	0.12	0.14
10	-1.00	2.00	0.20	0.23	0.32	0.37
14	-0.50	1.41	0.36	0.41	0.68	0.78
18	0.00	1.00	0.46	0.53	1.14	1.31
25	0.50	0.71	0.90	1.03	2.04	2.34
35	1.00	0.50	1.78	2.03	3.82	4.37
45	1.50	0.35	4.37	4.99	8.19	9.36
60	2.00	0.25	21.49	24.56	29.68	33.92
80	2.50	0.18	43.77	50.02	73.45	83.94
120	3.00	0.13	11.91	13.61	85.36	97.55
170	3.50	0.09	1.16	1.33	86.52	98.88
200	3.75	0.07	0.04	0.05	86.56	98.93
230	4.00	0.06	0.02	0.02	86.58	98.95

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.91	2.50	2.41	2.16	1.82	1.64	1.06

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.07	0.24	0.58	-2.01	10.99

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-15 #2

Analysis Date: 06-25-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,715	200,330	North Carolina State Plane	-10.8 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/2 Dry - 5Y-7/2 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
85.39	84.47	0.01	0.02	#200 - 1.11 #230 - 1.10		3	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.01	0.01	0.01	0.01
18	0.00	1.00	0.01	0.01	0.02	0.02
25	0.50	0.71	0.02	0.02	0.04	0.04
35	1.00	0.50	0.05	0.06	0.09	0.10
45	1.50	0.35	0.16	0.19	0.25	0.29
60	2.00	0.25	2.56	3.00	2.81	3.29
80	2.50	0.18	43.81	51.31	46.62	54.60
120	3.00	0.13	36.50	42.75	83.12	97.35
170	3.50	0.09	1.27	1.49	84.39	98.84
200	3.75	0.07	0.04	0.05	84.43	98.89
230	4.00	0.06	0.01	0.01	84.44	98.90

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.97	2.84	2.74	2.46	2.21	2.12	2.02

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	2.46	0.18	0.3	-0.45	6.17

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-15 #3

Analysis Date: 06-25-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,715	200,330	North Carolina State Plane	-17.3 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/2 Dry - 2.5Y-7/2 Washed - 2.5Y-7/2	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
87.41	86.50	0.01	0.02	#200 - 1.10 #230 - 1.09		6	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.04	0.05	0.04	0.05
7	-1.50	2.83	0.00	0.00	0.04	0.05
10	-1.00	2.00	0.00	0.00	0.04	0.05
14	-0.50	1.41	0.03	0.03	0.07	0.08
18	0.00	1.00	0.02	0.02	0.09	0.10
25	0.50	0.71	0.10	0.11	0.19	0.21
35	1.00	0.50	0.37	0.42	0.56	0.63
45	1.50	0.35	3.69	4.22	4.25	4.85
60	2.00	0.25	38.96	44.57	43.21	49.42
80	2.50	0.18	38.58	44.14	81.79	93.56
120	3.00	0.13	4.52	5.17	86.31	98.73
170	3.50	0.09	0.13	0.15	86.44	98.88
200	3.75	0.07	0.02	0.02	86.46	98.90
230	4.00	0.06	0.01	0.01	86.47	98.91

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.64	2.39	2.29	2.01	1.73	1.63	1.50

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2	0.25	0.37	-0.96	12.17

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-16 #1

Analysis Date: 06-26-07

Analyzed By: RS

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,474	201,638	North Carolina State Plane	-1.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/2 Dry - 5Y-7/2 Washed - 5Y-7/2	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
85.81	84.95	0.00	0.14	#200 - 1.13 #230 - 1.13		4	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.03	0.03	0.03	0.03
10	-1.00	2.00	0.02	0.02	0.05	0.05
14	-0.50	1.41	0.04	0.05	0.09	0.10
18	0.00	1.00	0.10	0.12	0.19	0.22
25	0.50	0.71	0.20	0.23	0.39	0.45
35	1.00	0.50	0.35	0.41	0.74	0.86
45	1.50	0.35	1.55	1.81	2.29	2.67
60	2.00	0.25	14.14	16.48	16.43	19.15
80	2.50	0.18	54.30	63.28	70.73	82.43
120	3.00	0.13	13.58	15.83	84.31	98.26
170	3.50	0.09	0.46	0.54	84.77	98.80
200	3.75	0.07	0.06	0.07	84.83	98.87
230	4.00	0.06	0.00	0.00	84.83	98.87

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.90	2.55	2.44	2.24	2.05	1.90	1.57

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.22	0.21	0.38	-1.72	14.47

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-16 #2

Analysis Date: 06-26-07

Analyzed By: RS

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,474	201,638	North Carolina State Plane	-4.5 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-6/1 Dry - 2.5Y-7/2 Washed - 5Y-7/2	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
88.31	87.28	0.01	0.28	#200 - 1.49 #230 - 1.46		6	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.05	0.06	0.05	0.06
7	-1.50	2.83	0.15	0.17	0.20	0.23
10	-1.00	2.00	0.03	0.03	0.23	0.26
14	-0.50	1.41	0.08	0.09	0.31	0.35
18	0.00	1.00	0.12	0.14	0.43	0.49
25	0.50	0.71	0.26	0.29	0.69	0.78
35	1.00	0.50	0.27	0.31	0.96	1.09
45	1.50	0.35	1.09	1.23	2.05	2.32
60	2.00	0.25	10.72	12.14	12.77	14.46
80	2.50	0.18	53.38	60.45	66.15	74.91
120	3.00	0.13	20.06	22.72	86.21	97.63
170	3.50	0.09	0.69	0.78	86.90	98.41
200	3.75	0.07	0.09	0.10	86.99	98.51
230	4.00	0.06	0.03	0.03	87.02	98.54

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.94	2.70	2.50	2.29	2.09	2.01	1.61

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.27	0.21	0.44	-3.08	26.85

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-16 #3

Analysis Date: 06-26-07

Analyzed By: RS

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,474	201,638	North Carolina State Plane	-7.7 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/1 Dry - 5Y-6/1 Washed - 5Y-6/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
92.73	91.91	0.28	0.00	#200 - 1.22 #230 - 1.19		20	4

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	3.40	3.67	3.40	3.67
5/16"	-3.00	8.00	0.00	0.00	3.40	3.67
3.5	-2.50	5.66	1.28	1.38	4.68	5.05
4	-2.25	4.76	1.30	1.40	5.98	6.45
5	-2.00	4.00	0.58	0.63	6.56	7.08
7	-1.50	2.83	2.79	3.01	9.35	10.09
10	-1.00	2.00	3.06	3.30	12.41	13.39
14	-0.50	1.41	5.00	5.39	17.41	18.78
18	0.00	1.00	4.34	4.68	21.75	23.46
25	0.50	0.71	4.96	5.35	26.71	28.81
35	1.00	0.50	5.41	5.83	32.12	34.64
45	1.50	0.35	9.49	10.23	41.61	44.87
60	2.00	0.25	16.19	17.46	57.80	62.33
80	2.50	0.18	23.24	25.06	81.04	87.39
120	3.00	0.13	9.91	10.69	90.95	98.08
170	3.50	0.09	0.57	0.61	91.52	98.69
200	3.75	0.07	0.08	0.09	91.60	98.78
230	4.00	0.06	0.03	0.03	91.63	98.81

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.86	2.43	2.25	1.65	0.14	-0.76	-2.54

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.02	0.49	1.67	-1.23	3.77

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-16A #1

Analysis Date: 06-15-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,474	201,638	North Carolina State Plane	-7.8 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-5/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
85.39	84.45	0.00	0.04	#200 - 1.14 #230 - 1.13			1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.22	0.26	0.22	0.26
5	-2.00	4.00	0.21	0.25	0.43	0.51
7	-1.50	2.83	0.57	0.67	1.00	1.18
10	-1.00	2.00	1.16	1.36	2.16	2.54
14	-0.50	1.41	2.33	2.73	4.49	5.27
18	0.00	1.00	2.42	2.83	6.91	8.10
25	0.50	0.71	2.60	3.04	9.51	11.14
35	1.00	0.50	2.71	3.17	12.22	14.31
45	1.50	0.35	4.79	5.61	17.01	19.92
60	2.00	0.25	12.44	14.57	29.45	34.49
80	2.50	0.18	36.35	42.57	65.80	77.06
120	3.00	0.13	17.86	20.92	83.66	97.98
170	3.50	0.09	0.69	0.81	84.35	98.79
200	3.75	0.07	0.06	0.07	84.41	98.86
230	4.00	0.06	0.01	0.01	84.42	98.87

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.93	2.67	2.48	2.18	1.67	1.15	-0.55

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.87	0.27	1.01	-1.82	6.08

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-16A #2

Analysis Date: 06-26-07

Analyzed By: RS

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,474	201,638	North Carolina State Plane	-10.3 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-5/1 Dry - 5Y-6/1 Washed - 5Y-6/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
89.58	88.95	0.00	0.17	#200 - 0.85 #230 - 0.85		29	3

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	6.18	6.90	6.18	6.90
5/16"	-3.00	8.00	0.25	0.28	6.43	7.18
3.5	-2.50	5.66	1.11	1.24	7.54	8.42
4	-2.25	4.76	0.24	0.27	7.78	8.69
5	-2.00	4.00	1.03	1.15	8.81	9.84
7	-1.50	2.83	1.60	1.79	10.41	11.63
10	-1.00	2.00	2.11	2.36	12.52	13.99
14	-0.50	1.41	3.45	3.85	15.97	17.84
18	0.00	1.00	4.18	4.67	20.15	22.51
25	0.50	0.71	6.13	6.84	26.28	29.35
35	1.00	0.50	8.47	9.46	34.75	38.81
45	1.50	0.35	14.13	15.77	48.88	54.58
60	2.00	0.25	19.34	21.59	68.22	76.17
80	2.50	0.18	17.78	19.85	86.00	96.02
120	3.00	0.13	2.54	2.84	88.54	98.86
170	3.50	0.09	0.25	0.28	88.79	99.14
200	3.75	0.07	0.01	0.01	88.80	99.15
230	4.00	0.06	0.00	0.00	88.80	99.15

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.47	2.20	1.97	1.35	0.18	-0.74	-3.71

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.77	0.59	1.71	-1.41	4.18

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-16A #3

Analysis Date: 06-26-07

Analyzed By: RS

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,474	201,638	North Carolina State Plane	-13.9 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
87.77	86.91	0.00	0.05	#200 - 1.03 #230 - 1.03		13	1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.72	0.82	0.72	0.82
4	-2.25	4.76	0.00	0.00	0.72	0.82
5	-2.00	4.00	0.42	0.48	1.14	1.30
7	-1.50	2.83	0.53	0.60	1.67	1.90
10	-1.00	2.00	1.20	1.37	2.87	3.27
14	-0.50	1.41	1.58	1.80	4.45	5.07
18	0.00	1.00	1.46	1.66	5.91	6.73
25	0.50	0.71	1.83	2.08	7.74	8.81
35	1.00	0.50	2.75	3.13	10.49	11.94
45	1.50	0.35	7.53	8.58	18.02	20.52
60	2.00	0.25	26.06	29.69	44.08	50.21
80	2.50	0.18	36.50	41.59	80.58	91.80
120	3.00	0.13	6.09	6.94	86.67	98.74
170	3.50	0.09	0.20	0.23	86.87	98.97
200	3.75	0.07	0.00	0.00	86.87	98.97
230	4.00	0.06	0.00	0.00	86.87	98.97

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.73	2.41	2.30	2.00	1.58	1.24	-0.52

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.73	0.30	0.95	-2.36	9.34

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-16A #4

Analysis Date: 06-26-07

Analyzed By: RS

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,474	201,638	North Carolina State Plane	-16.5 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
84.56	83.60	0.00	0.31	#200 - 1.45 #230 - 1.45		4	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.02	0.02	0.02	0.02
14	-0.50	1.41	0.03	0.04	0.05	0.06
18	0.00	1.00	0.02	0.02	0.07	0.08
25	0.50	0.71	0.03	0.04	0.10	0.12
35	1.00	0.50	0.15	0.18	0.25	0.30
45	1.50	0.35	0.77	0.91	1.02	1.21
60	2.00	0.25	14.85	17.56	15.87	18.77
80	2.50	0.18	54.79	64.79	70.66	83.56
120	3.00	0.13	12.38	14.64	83.04	98.20
170	3.50	0.09	0.28	0.33	83.32	98.53
200	3.75	0.07	0.02	0.02	83.34	98.55
230	4.00	0.06	0.00	0.00	83.34	98.55

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.89	2.52	2.43	2.24	2.05	1.92	1.61

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.22	0.21	0.33	-0.95	10.38

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-17 #1

Analysis Date: 07-05-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,728	201,394	North Carolina State Plane	-5.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/2 Washed - 5Y-7/2	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
88.19	87.34	0.01	0.00	#200 - 1.00 #230 - 0.99		5	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.16	0.18	0.16	0.18
14	-0.50	1.41	0.12	0.14	0.28	0.32
18	0.00	1.00	0.18	0.20	0.46	0.52
25	0.50	0.71	0.33	0.37	0.79	0.89
35	1.00	0.50	0.49	0.56	1.28	1.45
45	1.50	0.35	2.11	2.39	3.39	3.84
60	2.00	0.25	17.65	20.01	21.04	23.85
80	2.50	0.18	51.91	58.86	72.95	82.71
120	3.00	0.13	13.79	15.64	86.74	98.35
170	3.50	0.09	0.55	0.62	87.29	98.97
200	3.75	0.07	0.03	0.03	87.32	99.00
230	4.00	0.06	0.01	0.01	87.33	99.01

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.89	2.54	2.43	2.22	2.01	1.80	1.53

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.18	0.22	0.44	-2.12	15.07

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-17 #2

Analysis Date: 07-05-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,728	201,394	North Carolina State Plane	-8.1 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/2 Dry - 5Y-6/1 Washed - 5Y-6/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
90.94	89.90	0.01	0.00	#200 - 1.17 #230 - 1.15		25	3

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
1"	-4.75	26.91	0.00	0.00	0.00	0.00
3/4"	-4.25	19.03	6.83	7.51	6.83	7.51
5/8"	-4.00	16.00	0.00	0.00	6.83	7.51
7/16"	-3.50	11.31	3.18	3.50	10.01	11.01
5/16"	-3.00	8.00	1.71	1.88	11.72	12.89
3.5	-2.50	5.66	1.97	2.17	13.69	15.06
4	-2.25	4.76	0.50	0.55	14.19	15.61
5	-2.00	4.00	0.67	0.74	14.86	16.35
7	-1.50	2.83	2.27	2.50	17.13	18.85
10	-1.00	2.00	2.62	2.88	19.75	21.73
14	-0.50	1.41	3.53	3.88	23.28	25.61
18	0.00	1.00	4.11	4.52	27.39	30.13
25	0.50	0.71	3.91	4.30	31.30	34.43
35	1.00	0.50	4.38	4.82	35.68	39.25
45	1.50	0.35	6.47	7.11	42.15	46.36
60	2.00	0.25	14.17	15.58	56.32	61.94
80	2.50	0.18	24.90	27.38	81.22	89.32
120	3.00	0.13	8.35	9.18	89.57	98.50
170	3.50	0.09	0.27	0.30	89.84	98.80
200	3.75	0.07	0.03	0.03	89.87	98.83
230	4.00	0.06	0.02	0.02	89.89	98.85

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.81	2.40	2.24	1.62	-0.58	-2.12	-4.25

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.56	0.68	2.25	-1.11	2.93

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-17 #3

Analysis Date: 07-06-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,728	201,394	North Carolina State Plane	-10.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
86.55	85.55	0.01	0.00	#200 - 1.18 #230 - 1.17		9	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.13	0.15	0.13	0.15
4	-2.25	4.76	0.00	0.00	0.13	0.15
5	-2.00	4.00	0.00	0.00	0.13	0.15
7	-1.50	2.83	0.16	0.18	0.29	0.33
10	-1.00	2.00	0.19	0.22	0.48	0.55
14	-0.50	1.41	0.32	0.37	0.80	0.92
18	0.00	1.00	0.38	0.44	1.18	1.36
25	0.50	0.71	0.68	0.79	1.86	2.15
35	1.00	0.50	1.61	1.86	3.47	4.01
45	1.50	0.35	6.00	6.93	9.47	10.94
60	2.00	0.25	21.57	24.92	31.04	35.86
80	2.50	0.18	43.02	49.71	74.06	85.57
120	3.00	0.13	11.22	12.96	85.28	98.53
170	3.50	0.09	0.25	0.29	85.53	98.82
200	3.75	0.07	0.00	0.00	85.53	98.82
230	4.00	0.06	0.01	0.01	85.54	98.83

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.86	2.48	2.39	2.14	1.78	1.60	1.07

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.03	0.24	0.59	-2.6	15.94

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-17 #4

Analysis Date: 07-06-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,728	201,394	North Carolina State Plane	-13.1 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-5/2 Dry - 2.5Y-6/2 Washed - 2.5Y-6/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
93.49	92.66	0.00	0.00	#200 - 0.92 #230 - 0.91		28	3

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	3.33	3.56	3.33	3.56
7/16"	-3.50	11.31	0.00	0.00	3.33	3.56
5/16"	-3.00	8.00	1.14	1.22	4.47	4.78
3.5	-2.50	5.66	0.60	0.64	5.07	5.42
4	-2.25	4.76	0.18	0.19	5.25	5.61
5	-2.00	4.00	0.83	0.89	6.08	6.50
7	-1.50	2.83	1.93	2.06	8.01	8.56
10	-1.00	2.00	3.23	3.45	11.24	12.01
14	-0.50	1.41	5.52	5.90	16.76	17.91
18	0.00	1.00	5.66	6.05	22.42	23.96
25	0.50	0.71	6.38	6.82	28.80	30.78
35	1.00	0.50	7.32	7.83	36.12	38.61
45	1.50	0.35	12.47	13.34	48.59	51.95
60	2.00	0.25	22.66	24.24	71.25	76.19
80	2.50	0.18	16.94	18.12	88.19	94.31
120	3.00	0.13	4.26	4.56	92.45	98.87
170	3.50	0.09	0.19	0.20	92.64	99.07
200	3.75	0.07	0.01	0.01	92.65	99.08
230	4.00	0.06	0.01	0.01	92.66	99.09

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.58	2.22	1.98	1.43	0.08	-0.66	-2.83

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.85	0.55	1.61	-1.41	4.66

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-17 #5

Analysis Date: 07-06-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,728	201,394	North Carolina State Plane	-14.5 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 2.5Y-7/2 Washed - 2.5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
88.66	87.63	0.01	0.03	#200 - 1.21 #230 - 1.20		9	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.24	0.27	0.24	0.27
4	-2.25	4.76	0.00	0.00	0.24	0.27
5	-2.00	4.00	0.00	0.00	0.24	0.27
7	-1.50	2.83	0.13	0.15	0.37	0.42
10	-1.00	2.00	0.36	0.41	0.73	0.83
14	-0.50	1.41	0.53	0.60	1.26	1.43
18	0.00	1.00	0.52	0.59	1.78	2.02
25	0.50	0.71	0.76	0.86	2.54	2.88
35	1.00	0.50	1.48	1.67	4.02	4.55
45	1.50	0.35	6.13	6.91	10.15	11.46
60	2.00	0.25	32.53	36.69	42.68	48.15
80	2.50	0.18	37.15	41.90	79.83	90.05
120	3.00	0.13	7.44	8.39	87.27	98.44
170	3.50	0.09	0.30	0.34	87.57	98.78
200	3.75	0.07	0.01	0.01	87.58	98.79
230	4.00	0.06	0.01	0.01	87.59	98.80

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.79	2.43	2.32	2.02	1.68	1.56	1.03

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.93	0.26	0.63	-2.8	17.02

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-17A #1

Analysis Date: 07-09-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,728	201,394	North Carolina State Plane	-13.3 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 2.5Y-7/2 Washed - 2.5Y-7/2	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
87.18	86.11	0.00	0.02	#200 - 1.28 #230 - 1.27		12	1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.09	0.10	0.09	0.10
5	-2.00	4.00	0.10	0.11	0.19	0.21
7	-1.50	2.83	0.35	0.40	0.54	0.61
10	-1.00	2.00	0.55	0.63	1.09	1.24
14	-0.50	1.41	0.71	0.81	1.80	2.05
18	0.00	1.00	0.83	0.95	2.63	3.00
25	0.50	0.71	1.34	1.54	3.97	4.54
35	1.00	0.50	2.75	3.15	6.72	7.69
45	1.50	0.35	7.78	8.92	14.50	16.61
60	2.00	0.25	22.35	25.64	36.85	42.25
80	2.50	0.18	39.30	45.08	76.15	87.33
120	3.00	0.13	9.72	11.15	85.87	98.48
170	3.50	0.09	0.20	0.23	86.07	98.71
200	3.75	0.07	0.01	0.01	86.08	98.72
230	4.00	0.06	0.01	0.01	86.09	98.73

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.84	2.46	2.36	2.09	1.66	1.47	0.57

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.91	0.27	0.73	-2.27	10.45

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-17A #2

Analysis Date: 07-09-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,728	201,394	North Carolina State Plane	-15.6 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/1 Dry - 5Y-6/1 Washed - 5Y-6/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
92.19	91.47	0.00	0.02	#200 - 0.81 #230 - 0.80		20	2

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.43	0.47	0.43	0.47
3.5	-2.50	5.66	0.97	1.05	1.40	1.52
4	-2.25	4.76	0.22	0.24	1.62	1.76
5	-2.00	4.00	0.34	0.37	1.96	2.13
7	-1.50	2.83	1.16	1.26	3.12	3.39
10	-1.00	2.00	1.82	1.97	4.94	5.36
14	-0.50	1.41	3.16	3.43	8.10	8.79
18	0.00	1.00	3.80	4.12	11.90	12.91
25	0.50	0.71	5.06	5.49	16.96	18.40
35	1.00	0.50	7.83	8.49	24.79	26.89
45	1.50	0.35	16.12	17.49	40.91	44.38
60	2.00	0.25	26.67	28.93	67.58	73.31
80	2.50	0.18	19.12	20.74	86.70	94.05
120	3.00	0.13	4.51	4.89	91.21	98.94
170	3.50	0.09	0.22	0.24	91.43	99.18
200	3.75	0.07	0.01	0.01	91.44	99.19
230	4.00	0.06	0.01	0.01	91.45	99.20

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.60	2.26	2.04	1.60	0.89	0.28	-1.09

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.28	0.41	1.14	-1.5	5.4

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-18 #1

Analysis Date: 07-09-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,894	201,815	North Carolina State Plane	-5.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 2.5Y-7/2 Washed - 2.5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
86.79	85.93	0.00	0.02	#200 - 1.02 #230 - 1.01		11	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.27	0.31	0.27	0.31
7	-1.50	2.83	0.04	0.05	0.31	0.36
10	-1.00	2.00	0.39	0.45	0.70	0.81
14	-0.50	1.41	0.63	0.73	1.33	1.54
18	0.00	1.00	0.63	0.73	1.96	2.27
25	0.50	0.71	1.32	1.52	3.28	3.79
35	1.00	0.50	3.40	3.92	6.68	7.71
45	1.50	0.35	10.77	12.41	17.45	20.12
60	2.00	0.25	21.87	25.20	39.32	45.32
80	2.50	0.18	34.26	39.47	73.58	84.79
120	3.00	0.13	11.74	13.53	85.32	98.32
170	3.50	0.09	0.55	0.63	85.87	98.95
200	3.75	0.07	0.03	0.03	85.90	98.98
230	4.00	0.06	0.01	0.01	85.91	98.99

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.88	2.49	2.38	2.06	1.60	1.33	0.65

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.91	0.27	0.71	-1.8	8.8

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-18 #2

Analysis Date: 06-26-07

Analyzed By: ST

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,894	201,815	North Carolina State Plane	-7.5 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
87.57	86.79	0.01	0.23	#200 - 1.13 #230 - 1.12		13	1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.99	1.13	0.99	1.13
3.5	-2.50	5.66	0.71	0.81	1.70	1.94
4	-2.25	4.76	0.28	0.32	1.98	2.26
5	-2.00	4.00	0.20	0.23	2.18	2.49
7	-1.50	2.83	0.66	0.75	2.84	3.24
10	-1.00	2.00	0.96	1.10	3.80	4.34
14	-0.50	1.41	1.27	1.45	5.07	5.79
18	0.00	1.00	1.82	2.08	6.89	7.87
25	0.50	0.71	2.89	3.30	9.78	11.17
35	1.00	0.50	4.95	5.65	14.73	16.82
45	1.50	0.35	11.75	13.42	26.48	30.24
60	2.00	0.25	25.77	29.43	52.25	59.67
80	2.50	0.18	28.92	33.03	81.17	92.70
120	3.00	0.13	5.27	6.02	86.44	98.72
170	3.50	0.09	0.13	0.15	86.57	98.87
200	3.75	0.07	0.00	0.00	86.57	98.87
230	4.00	0.06	0.01	0.01	86.58	98.88

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.69	2.37	2.23	1.84	1.30	0.93	-0.77

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.55	0.34	1.09	-2.26	8.99

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-18 #3

Analysis Date: 06-26-07

Analyzed By: RS

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,894	201,815	North Carolina State Plane	-16.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
85.52	84.70	0.00	0.05	#200 - 1.00 #230 - 1.00		6	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.03	0.04	0.03	0.04
4	-2.25	4.76	0.00	0.00	0.03	0.04
5	-2.00	4.00	0.01	0.01	0.04	0.05
7	-1.50	2.83	0.11	0.13	0.15	0.18
10	-1.00	2.00	0.09	0.11	0.24	0.29
14	-0.50	1.41	0.19	0.22	0.43	0.51
18	0.00	1.00	0.25	0.29	0.68	0.80
25	0.50	0.71	0.50	0.58	1.18	1.38
35	1.00	0.50	1.33	1.56	2.51	2.94
45	1.50	0.35	5.27	6.16	7.78	9.10
60	2.00	0.25	20.60	24.09	28.38	33.19
80	2.50	0.18	40.44	47.29	68.82	80.48
120	3.00	0.13	15.24	17.82	84.06	98.30
170	3.50	0.09	0.59	0.69	84.65	98.99
200	3.75	0.07	0.01	0.01	84.66	99.00
230	4.00	0.06	0.00	0.00	84.66	99.00

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.91	2.60	2.44	2.18	1.83	1.64	1.17

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.1	0.23	0.54	-1.98	12.51

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-19 #1

Analysis Date: 07-05-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,020	200,054	North Carolina State Plane	-6.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-7/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
89.86	88.98	0.00	0.00	#200 - 1.00 #230 - 1.00		6	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.03	0.03	0.03	0.03
7	-1.50	2.83	0.03	0.03	0.06	0.06
10	-1.00	2.00	0.03	0.03	0.09	0.09
14	-0.50	1.41	0.19	0.21	0.28	0.30
18	0.00	1.00	0.14	0.16	0.42	0.46
25	0.50	0.71	0.21	0.23	0.63	0.69
35	1.00	0.50	0.57	0.63	1.20	1.32
45	1.50	0.35	2.14	2.38	3.34	3.70
60	2.00	0.25	13.81	15.37	17.15	19.07
80	2.50	0.18	54.03	60.13	71.18	79.20
120	3.00	0.13	17.50	19.47	88.68	98.67
170	3.50	0.09	0.29	0.32	88.97	98.99
200	3.75	0.07	0.01	0.01	88.98	99.00
230	4.00	0.06	0.00	0.00	88.98	99.00

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.91	2.62	2.47	2.26	2.05	1.90	1.54

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.22	0.21	0.43	-2.37	17.59

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-19 #2

Analysis Date: 07-10-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,020	200,054	North Carolina State Plane	-11.3 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
88.43	87.38	0.00	0.05	#200 - 1.23 #230 - 1.23		4	0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.08	0.09	0.08	0.09
14	-0.50	1.41	0.05	0.06	0.13	0.15
18	0.00	1.00	0.07	0.08	0.20	0.23
25	0.50	0.71	0.08	0.09	0.28	0.32
35	1.00	0.50	0.35	0.40	0.63	0.72
45	1.50	0.35	2.93	3.31	3.56	4.03
60	2.00	0.25	26.18	29.61	29.74	33.64
80	2.50	0.18	48.85	55.24	78.59	88.88
120	3.00	0.13	8.48	9.59	87.07	98.47
170	3.50	0.09	0.26	0.29	87.33	98.76
200	3.75	0.07	0.01	0.01	87.34	98.77
230	4.00	0.06	0.00	0.00	87.34	98.77

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.82	2.46	2.37	2.15	1.85	1.70	1.52

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.1	0.23	0.39	-1.31	11.24

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-19 #3

Analysis Date: 07-10-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,020	200,054	North Carolina State Plane	-18.9 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/1 Dry - 5Y-6/1 Washed - 5Y-6/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
91.48	90.33	0.01	0.00	#200 - 1.28 #230 - 1.27		20	1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.13	0.14	0.13	0.14
4	-2.25	4.76	0.11	0.12	0.24	0.26
5	-2.00	4.00	0.12	0.13	0.36	0.39
7	-1.50	2.83	0.53	0.58	0.89	0.97
10	-1.00	2.00	0.83	0.91	1.72	1.88
14	-0.50	1.41	1.56	1.71	3.28	3.59
18	0.00	1.00	2.43	2.66	5.71	6.25
25	0.50	0.71	3.47	3.79	9.18	10.04
35	1.00	0.50	6.43	7.03	15.61	17.07
45	1.50	0.35	10.66	11.65	26.27	28.72
60	2.00	0.25	20.29	22.18	46.56	50.90
80	2.50	0.18	32.05	35.03	78.61	85.93
120	3.00	0.13	11.28	12.33	89.89	98.26
170	3.50	0.09	0.39	0.43	90.28	98.69
200	3.75	0.07	0.03	0.03	90.31	98.72
230	4.00	0.06	0.01	0.01	90.32	98.73

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.87	2.47	2.34	1.98	1.34	0.92	-0.23

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.71	0.31	0.92	-1.54	5.83

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-20 #1

Analysis Date: 07-10-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,609	200,201	North Carolina State Plane	-13.2 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 5Y-5/1 Washed - 5Y-6/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
82.93	81.59	0.01	0.00	#200 - 1.67 #230 - 1.62			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.08	0.10	0.08	0.10
5	-2.00	4.00	0.00	0.00	0.08	0.10
7	-1.50	2.83	0.20	0.24	0.28	0.34
10	-1.00	2.00	0.27	0.33	0.55	0.67
14	-0.50	1.41	0.58	0.70	1.13	1.37
18	0.00	1.00	0.86	1.04	1.99	2.41
25	0.50	0.71	1.22	1.47	3.21	3.88
35	1.00	0.50	1.84	2.22	5.05	6.10
45	1.50	0.35	4.03	4.86	9.08	10.96
60	2.00	0.25	11.02	13.29	20.10	24.25
80	2.50	0.18	29.85	35.99	49.95	60.24
120	3.00	0.13	27.71	33.41	77.66	93.65
170	3.50	0.09	3.73	4.50	81.39	98.15
200	3.75	0.07	0.15	0.18	81.54	98.33
230	4.00	0.06	0.04	0.05	81.58	98.38

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.15	2.86	2.72	2.36	2.01	1.69	0.75

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.21	0.22	0.75	-2.06	9.37

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-20 #2

Analysis Date: 07-10-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,609	200,201	North Carolina State Plane	-14.8 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/1 Dry - 5Y-6/1 Washed - 5Y-6/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
91.13	90.50	0.00	0.00	#200 - 0.67 #230 - 0.66			6

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	4.08	4.48	4.08	4.48
7/16"	-3.50	11.31	1.61	1.77	5.69	6.25
5/16"	-3.00	8.00	7.09	7.78	12.78	14.03
3.5	-2.50	5.66	3.37	3.70	16.15	17.73
4	-2.25	4.76	0.86	0.94	17.01	18.67
5	-2.00	4.00	2.96	3.25	19.97	21.92
7	-1.50	2.83	3.07	3.37	23.04	25.29
10	-1.00	2.00	4.77	5.23	27.81	30.52
14	-0.50	1.41	5.91	6.49	33.72	37.01
18	0.00	1.00	6.03	6.62	39.75	43.63
25	0.50	0.71	5.61	6.16	45.36	49.79
35	1.00	0.50	5.81	6.38	51.17	56.17
45	1.50	0.35	7.15	7.85	58.32	64.02
60	2.00	0.25	9.73	10.68	68.05	74.70
80	2.50	0.18	15.28	16.77	83.33	91.47
120	3.00	0.13	6.77	7.43	90.10	98.90
170	3.50	0.09	0.37	0.41	90.47	99.31
200	3.75	0.07	0.02	0.02	90.49	99.33
230	4.00	0.06	0.01	0.01	90.50	99.34

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.74	2.28	2.01	0.52	-1.54	-2.73	-3.85

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.06	0.96	2.12	-0.49	1.98

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-20 #3

Analysis Date: 07-10-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,609	200,201	North Carolina State Plane	-18.0 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/1 Dry - 5Y-5/1 Washed - 5Y-6/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
86.05	84.93	0.00	0.01	#200 - 1.31 #230 - 1.30			2

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	3.93	4.57	3.93	4.57
3.5	-2.50	5.66	0.71	0.83	4.64	5.40
4	-2.25	4.76	0.32	0.37	4.96	5.77
5	-2.00	4.00	0.25	0.29	5.21	6.06
7	-1.50	2.83	1.18	1.37	6.39	7.43
10	-1.00	2.00	1.53	1.78	7.92	9.21
14	-0.50	1.41	2.45	2.85	10.37	12.06
18	0.00	1.00	3.12	3.63	13.49	15.69
25	0.50	0.71	4.35	5.06	17.84	20.75
35	1.00	0.50	6.68	7.76	24.52	28.51
45	1.50	0.35	12.00	13.95	36.52	42.46
60	2.00	0.25	21.78	25.31	58.30	67.77
80	2.50	0.18	19.67	22.86	77.97	90.63
120	3.00	0.13	6.67	7.75	84.64	98.38
170	3.50	0.09	0.26	0.30	84.90	98.68
200	3.75	0.07	0.01	0.01	84.91	98.69
230	4.00	0.06	0.01	0.01	84.92	98.70

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.78	2.35	2.16	1.65	0.77	0.03	-2.74

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.18	0.44	1.46	-1.63	5.2

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2007

Sample Name: FEVC-07-20 #4

Analysis Date: 07-10-07

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,609	200,201	North Carolina State Plane	-20.7 NAVD 88

USCS:	Munsell:	Comments:
SC	Wet - 5Y-3/1 Dry - 5Y-6/1 Washed - 5Y-6/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
79.95	59.02	0.15	0.01	#200 - 28.90 #230 - 26.36			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.03	0.04	0.03	0.04
10	-1.00	2.00	0.01	0.01	0.04	0.05
14	-0.50	1.41	0.02	0.03	0.06	0.08
18	0.00	1.00	0.01	0.01	0.07	0.09
25	0.50	0.71	0.02	0.03	0.09	0.12
35	1.00	0.50	0.02	0.03	0.11	0.15
45	1.50	0.35	0.04	0.05	0.15	0.20
60	2.00	0.25	0.22	0.28	0.37	0.48
80	2.50	0.18	5.80	7.25	6.17	7.73
120	3.00	0.13	24.23	30.31	30.40	38.04
170	3.50	0.09	22.17	27.73	52.57	65.77
200	3.75	0.07	4.26	5.33	56.83	71.10
230	4.00	0.06	2.03	2.54	58.86	73.64

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

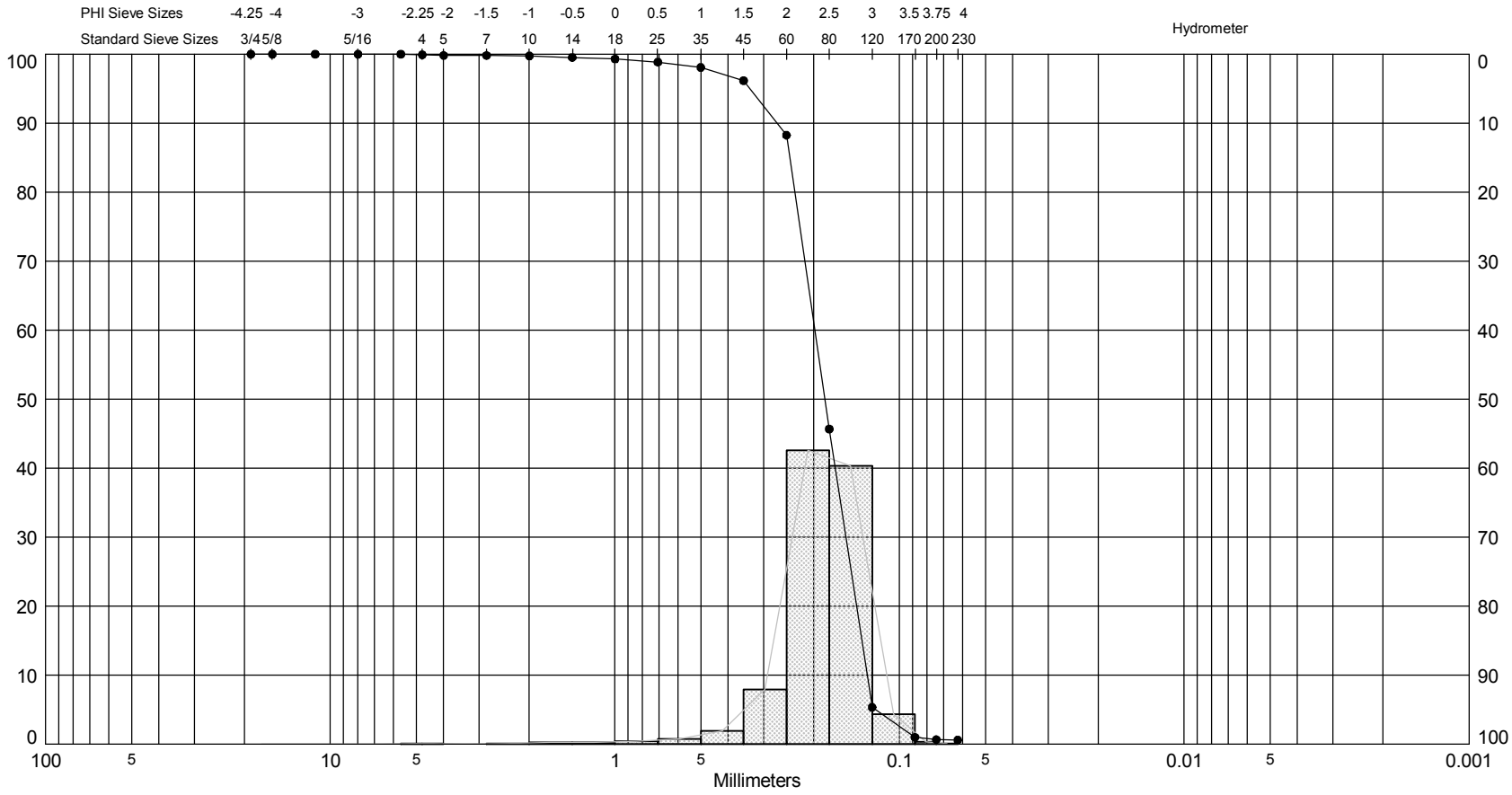
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
			3.22	2.78	2.64	2.31

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.98	0.13	0.44	-1.22	13.56

GRANULARMETRIC REPORT FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

APPENDIX 20

2007 CPENC Individual Vibracore Grain Size Distribution Curves/Histograms



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-01 #1	—●—	-16.5	SP	#200 - 0.65 #230 - 0.60		6	2.45	2.4	-2.67	18.94	0.53

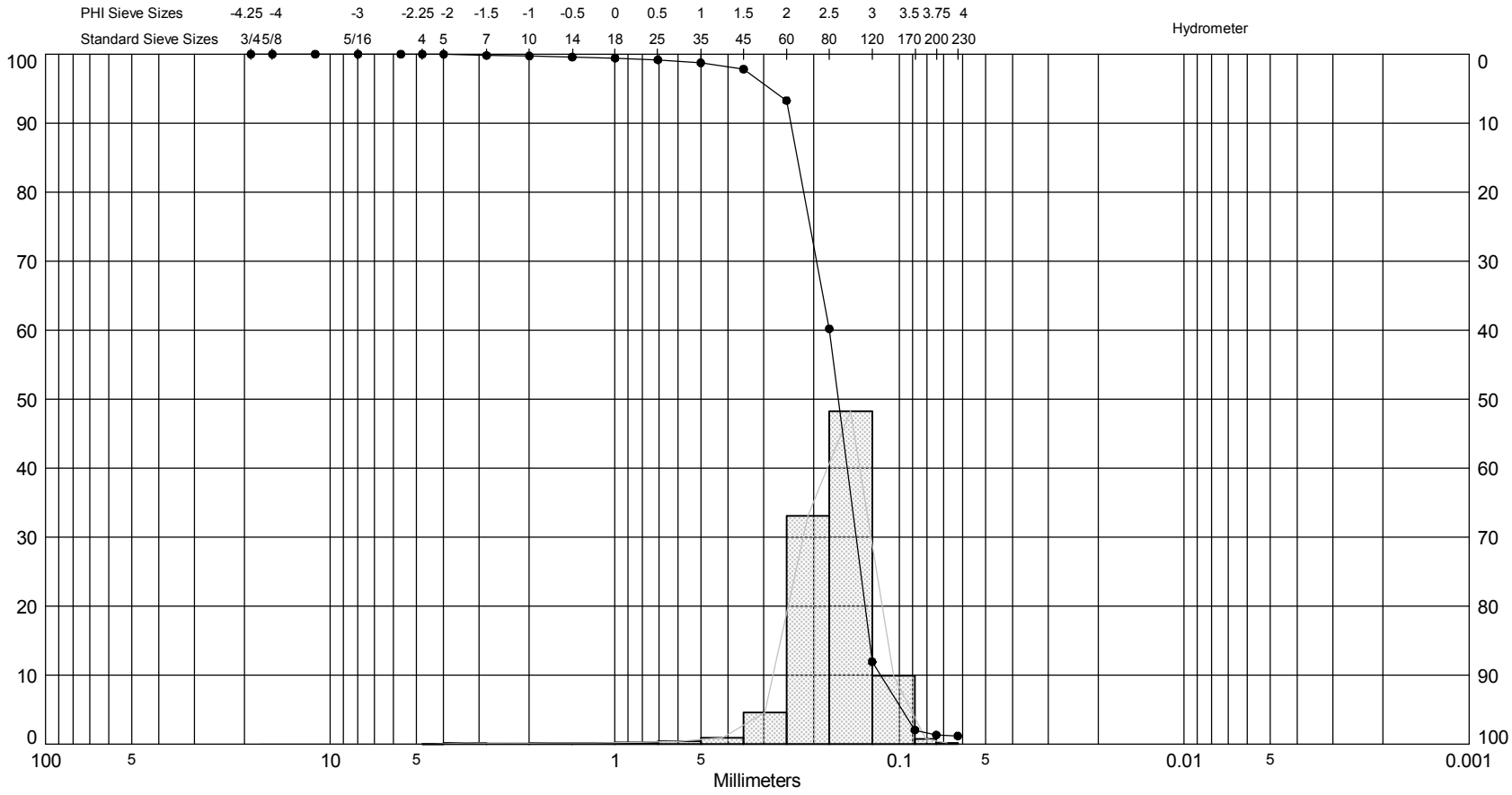
Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	05-14-07
Analyzed By:	PB
Easting (X, ft):	2,390,205
Northing (Y, ft):	198,940
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-01 #2	—●—	-18.0	SP	#200 - 1.32 #230 - 1.18		5	2.61	2.54	-2.59	19.58	0.51

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-15-07
Analyzed By:	PB
Easting (X, ft):	2,390,205
Northing (Y, ft):	198,940
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
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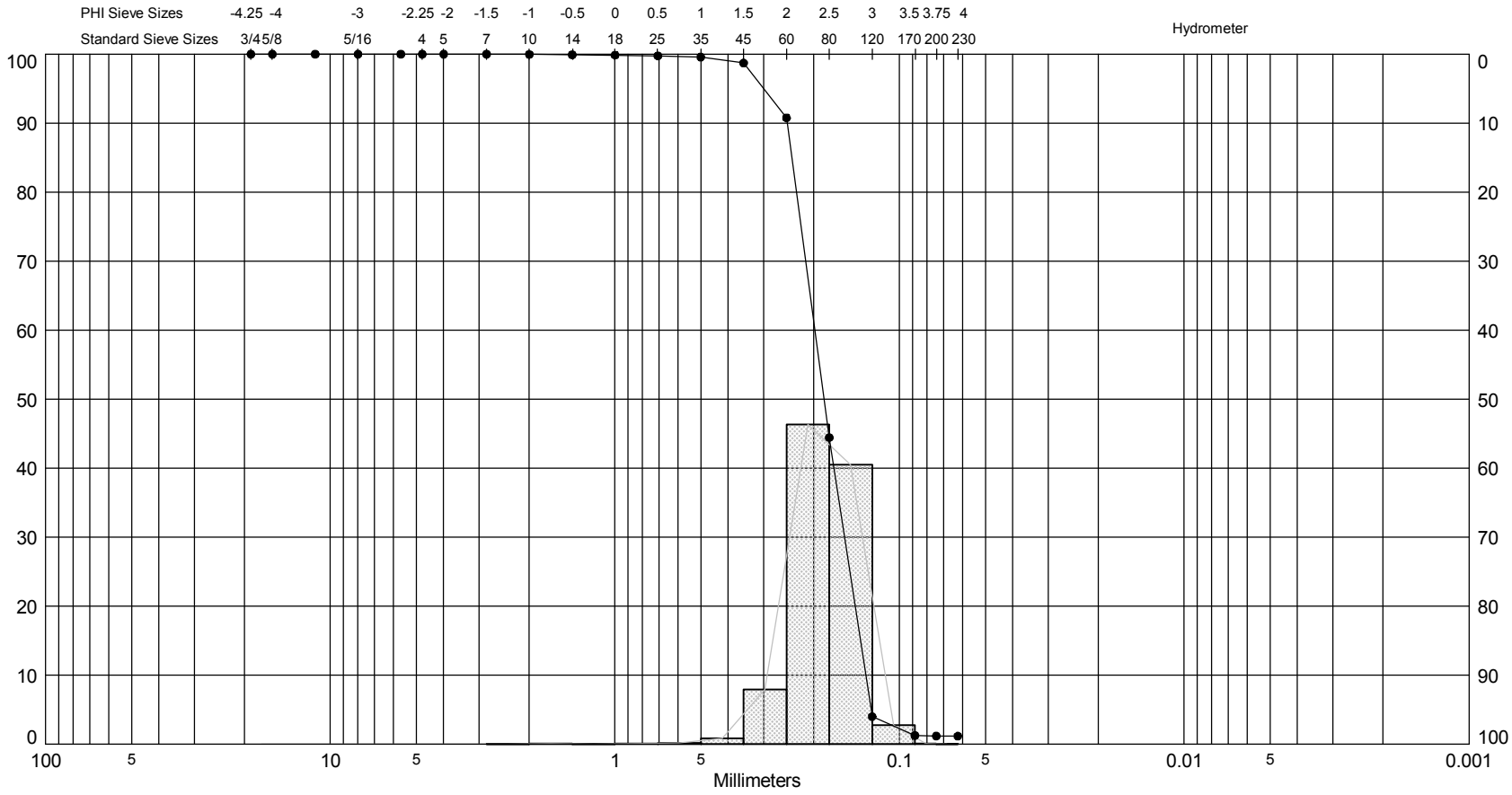
SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-01 #3	—●—	-20.5	SP	#200 - 1.16 #230 - 1.15		4	2.44	2.43	-1.21	10.08	0.39

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-15-07
Analyzed By:	PB
Easting (X, ft):	2,390,205
Northing (Y, ft):	198,940
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
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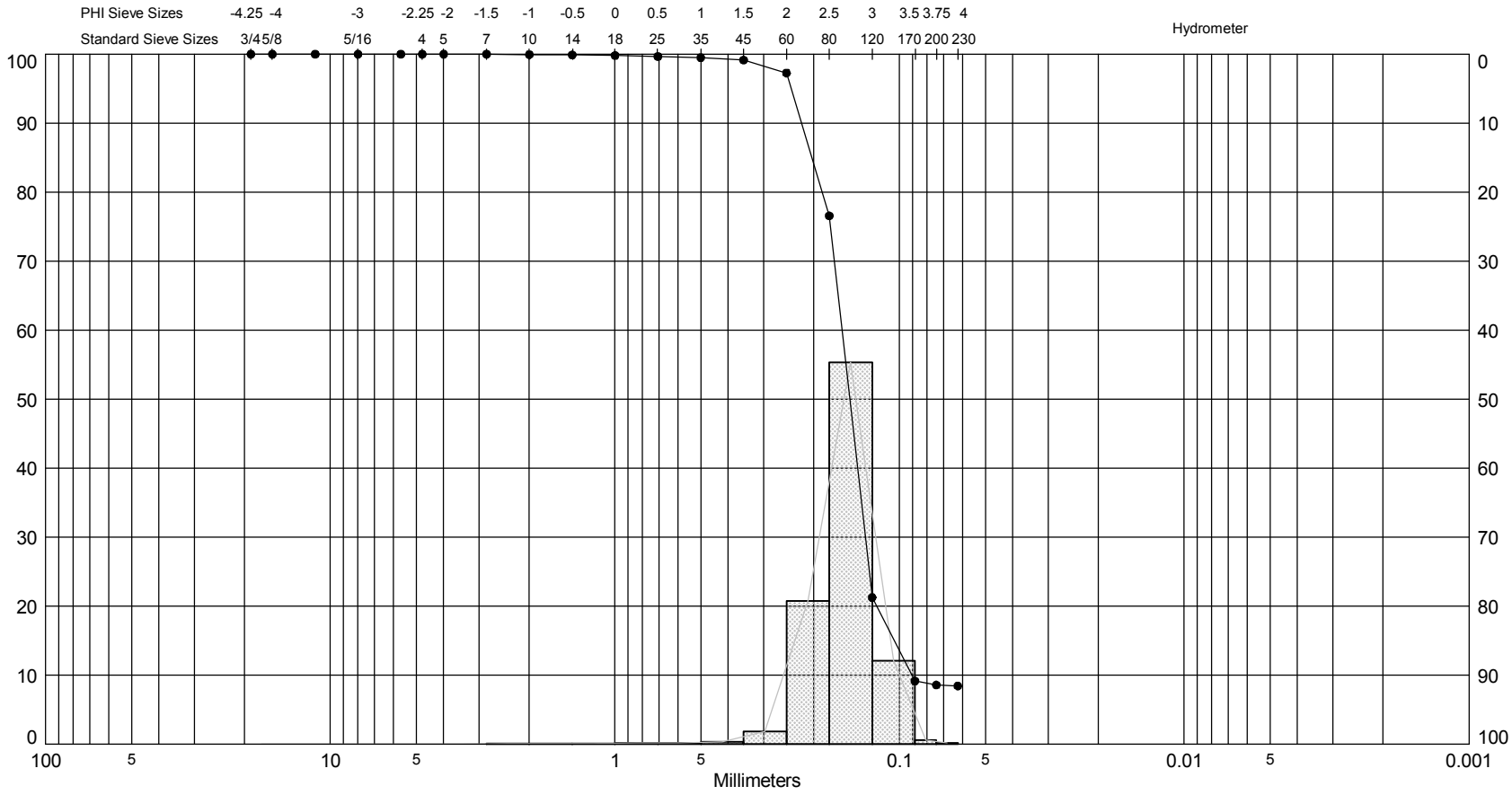
fax (561) 391-9116

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-01 #4	—●—	-22.5	SP-SM	#200 - 8.56 #230 - 8.43			2.74	2.67	-1.95	16.27	0.4

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	07-02-07
Analyzed By:	PB
Easting (X, ft):	2,390,205
Northing (Y, ft):	198,940
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
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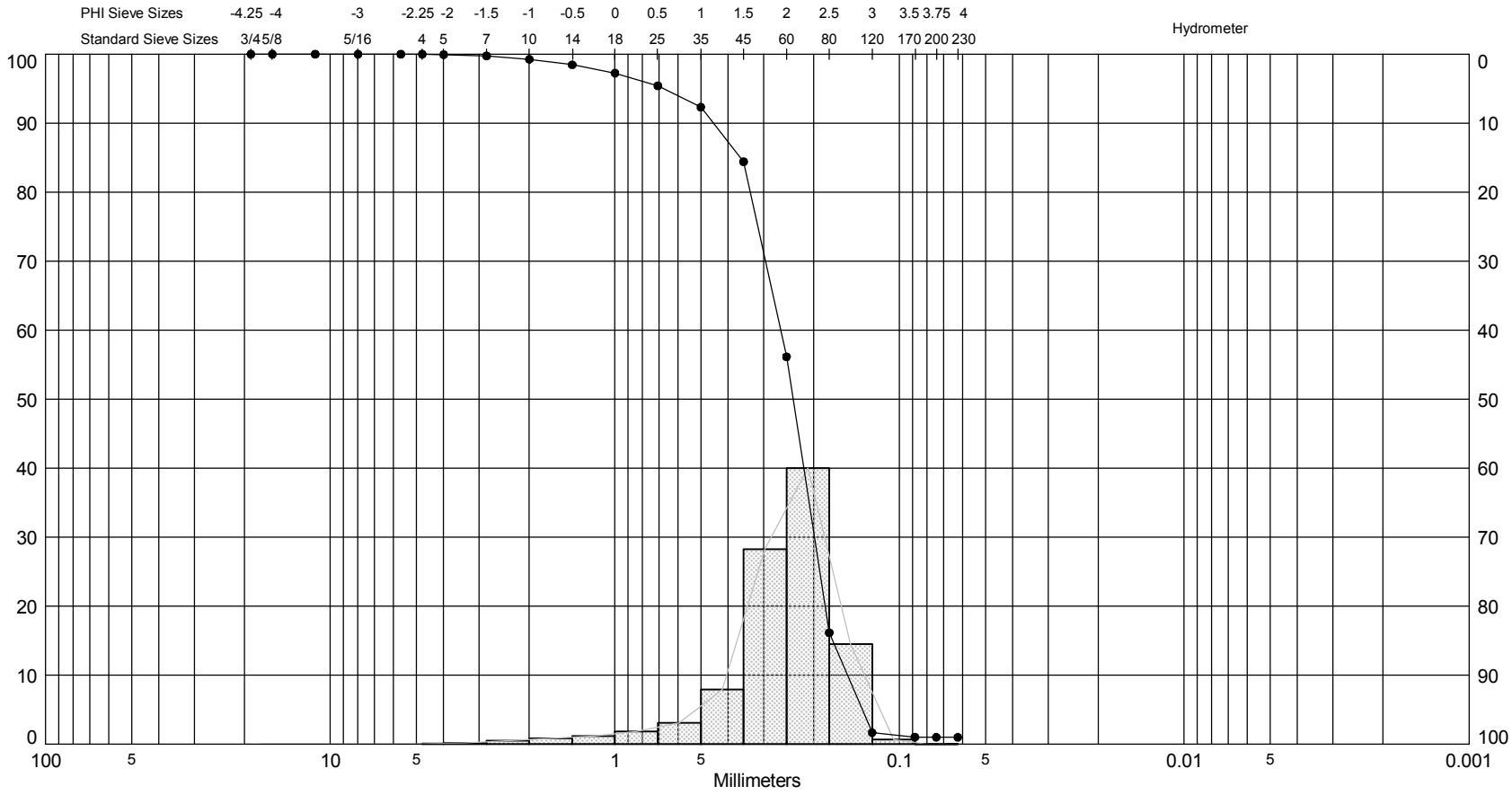
fax (561) 391-9116

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-02 #1	—●—	-10.0	SP	#200 - 0.99 #230 - 0.98		11	2.08	1.94	-1.85	8.35	0.7

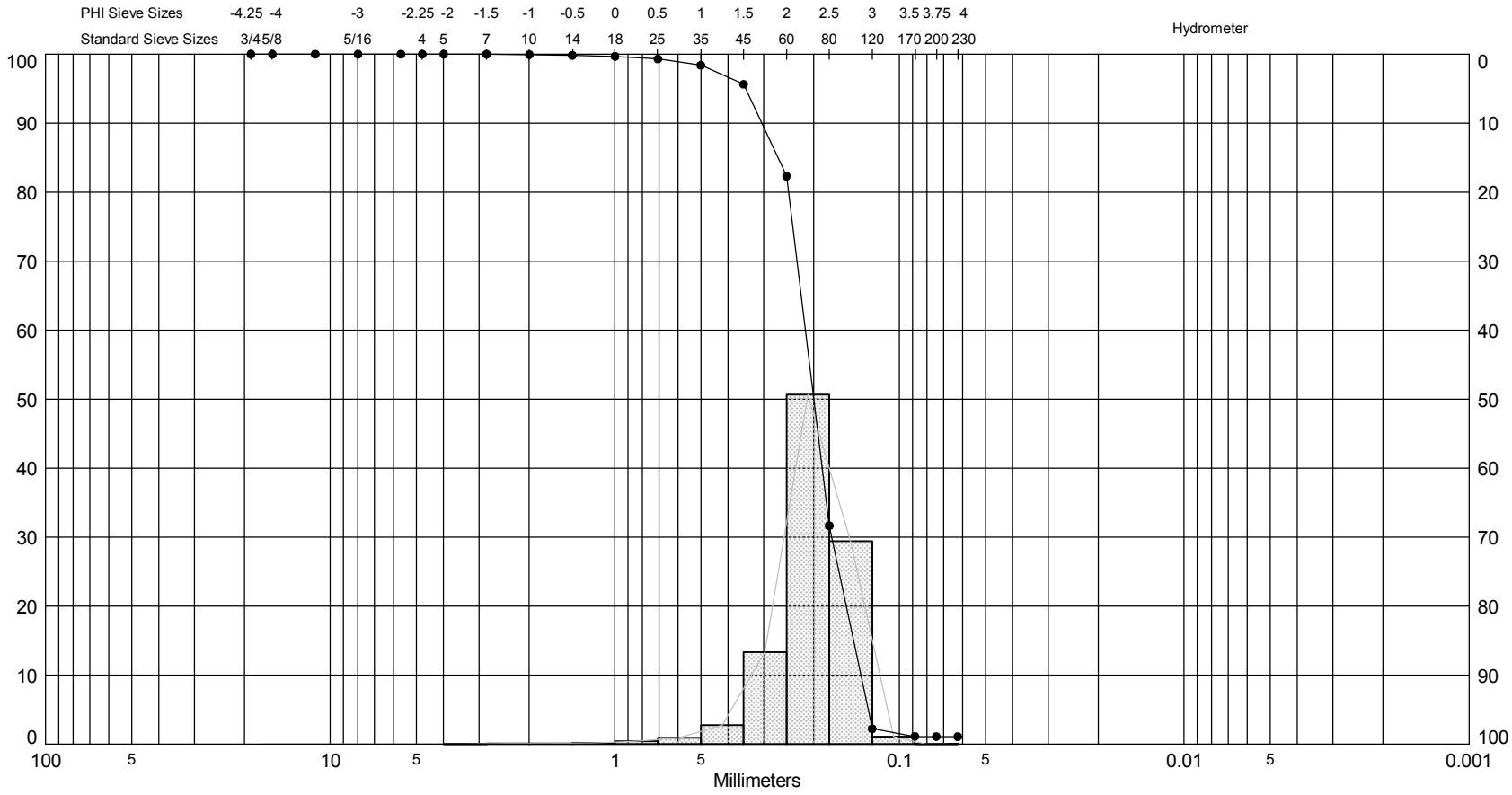
Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-15-07
Analyzed By:	PB
Easting (X, ft):	2,388,733
Northing (Y, ft):	202,440
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-02 #2	—●—	-16.0	SP	#200 - 1.10 #230 - 1.09		8	2.32	2.28	-1.66	10.12	0.46

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-15-07
Analyzed By:	PB
Easting (X, ft):	2,388,733
Northing (Y, ft):	202,440
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
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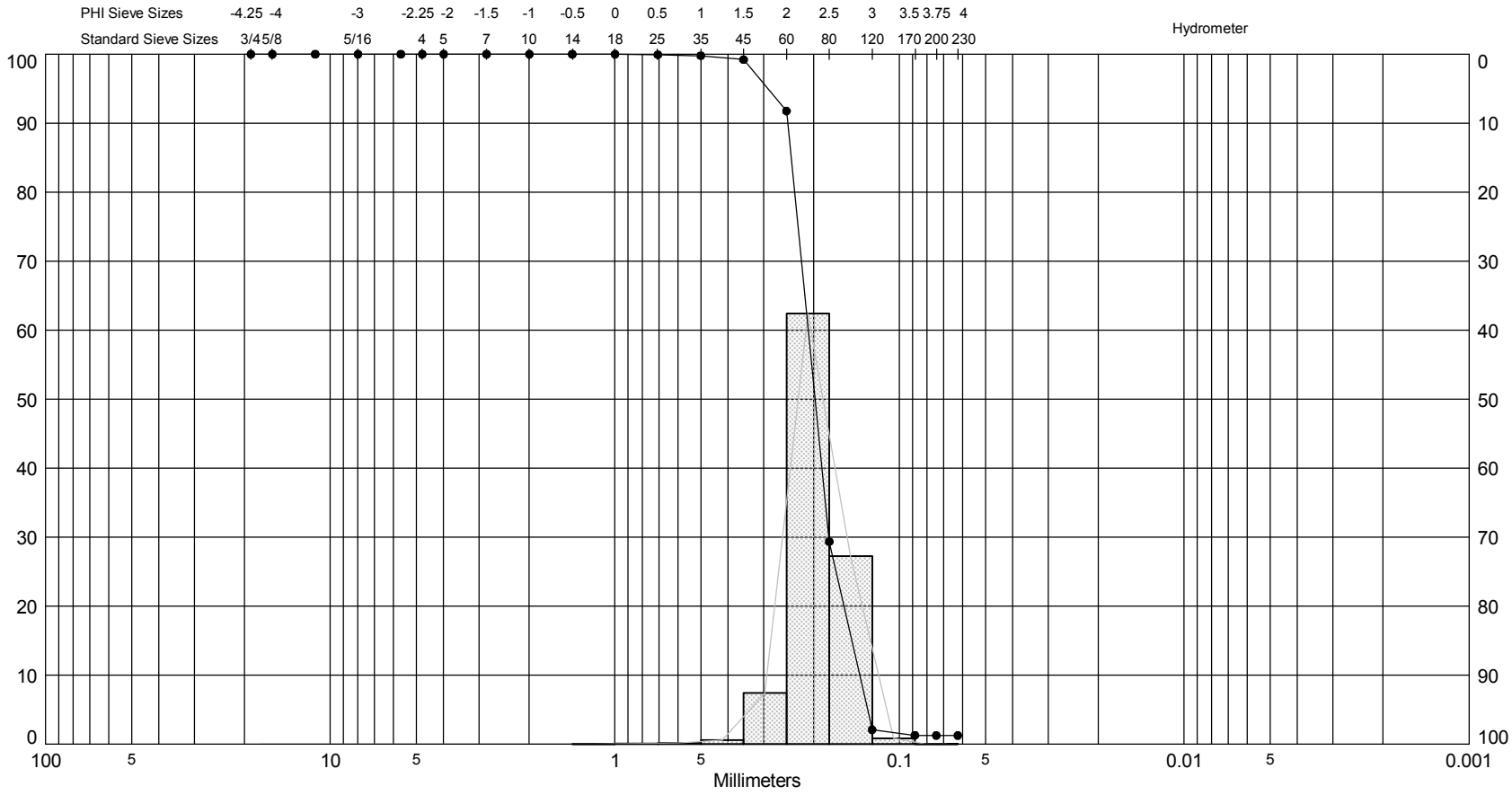
fax (561) 391-9116

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-02 #3	—●—	-20.0	SP	#200 - 1.25 #230 - 1.24		4	2.33	2.35	-0.4	5.78	0.31

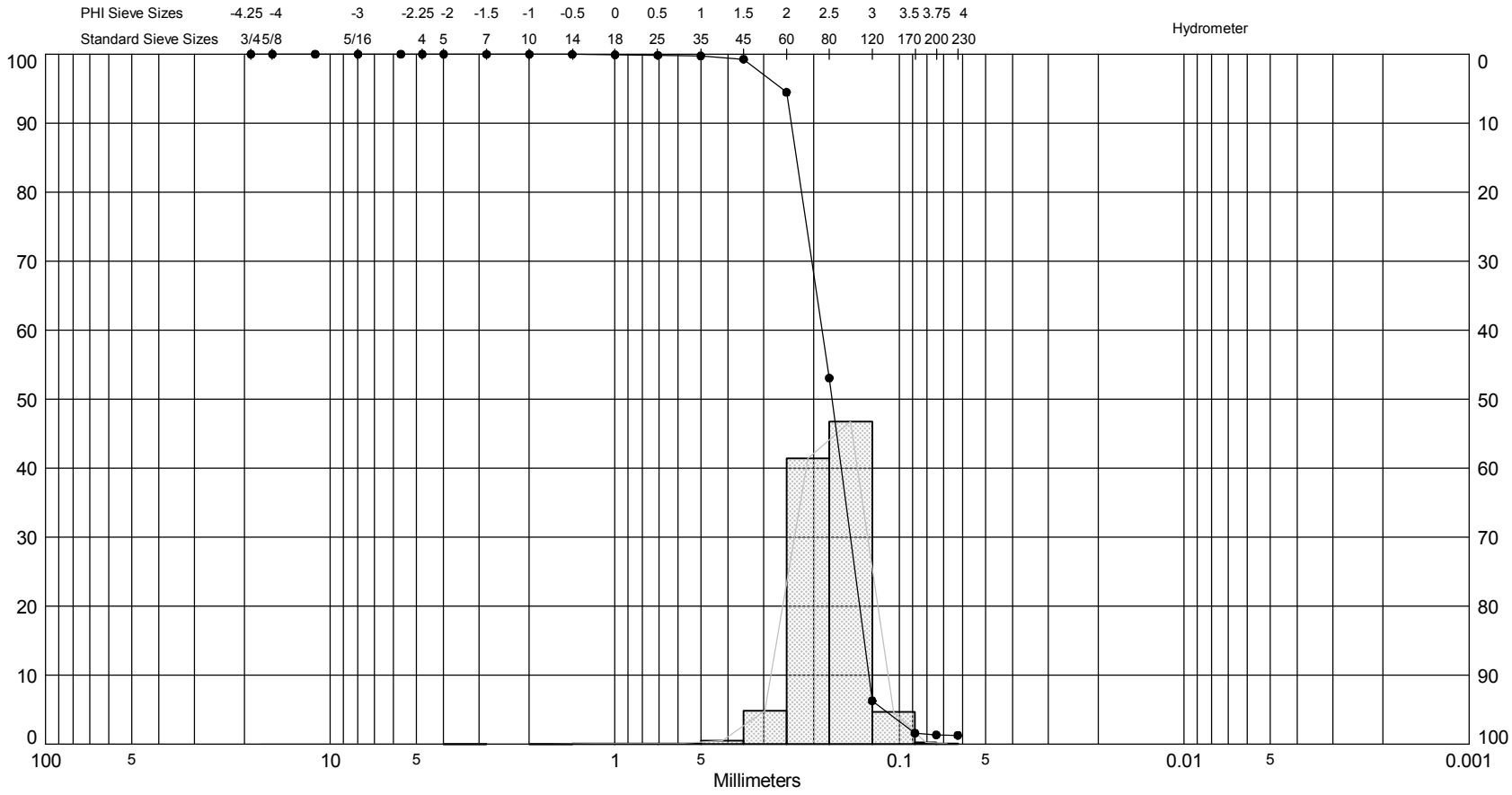
Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-15-07
Analyzed By:	PB
Easting (X, ft):	2,388,733
Northing (Y, ft):	202,440
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-03 #1	—●—	-16.0	SP	#200 - 1.33 #230 - 1.28			2.53	2.5	-1	10.36	0.37

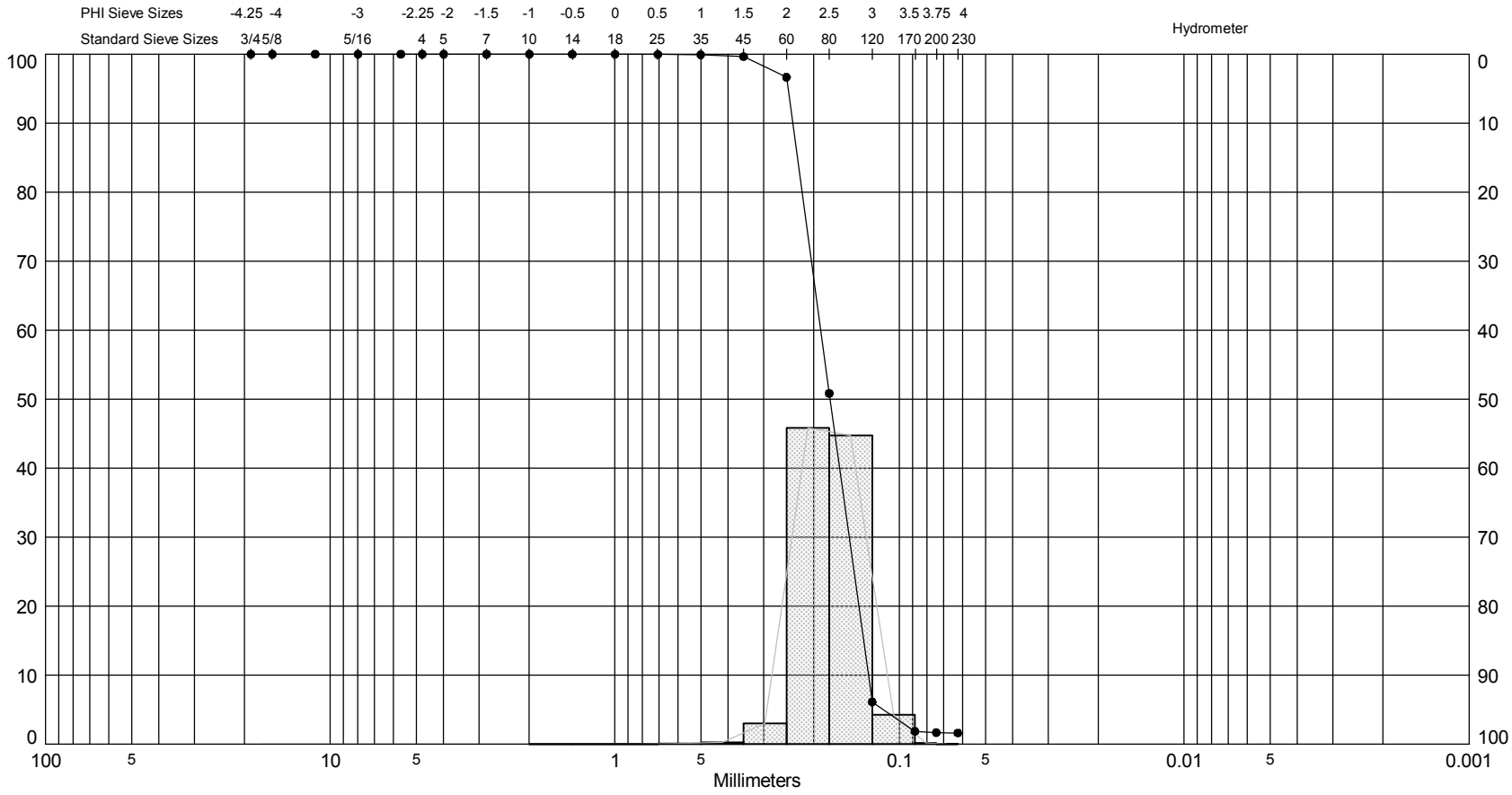
Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-15-07
Analyzed By:	PB
Easting (X, ft):	2,392,093
Northing (Y, ft):	200,758
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-03 #2	—●—	-19.0	SP	#200 - 1.66 #230 - 1.62			2.51	2.5	-0.23	5.42	0.33

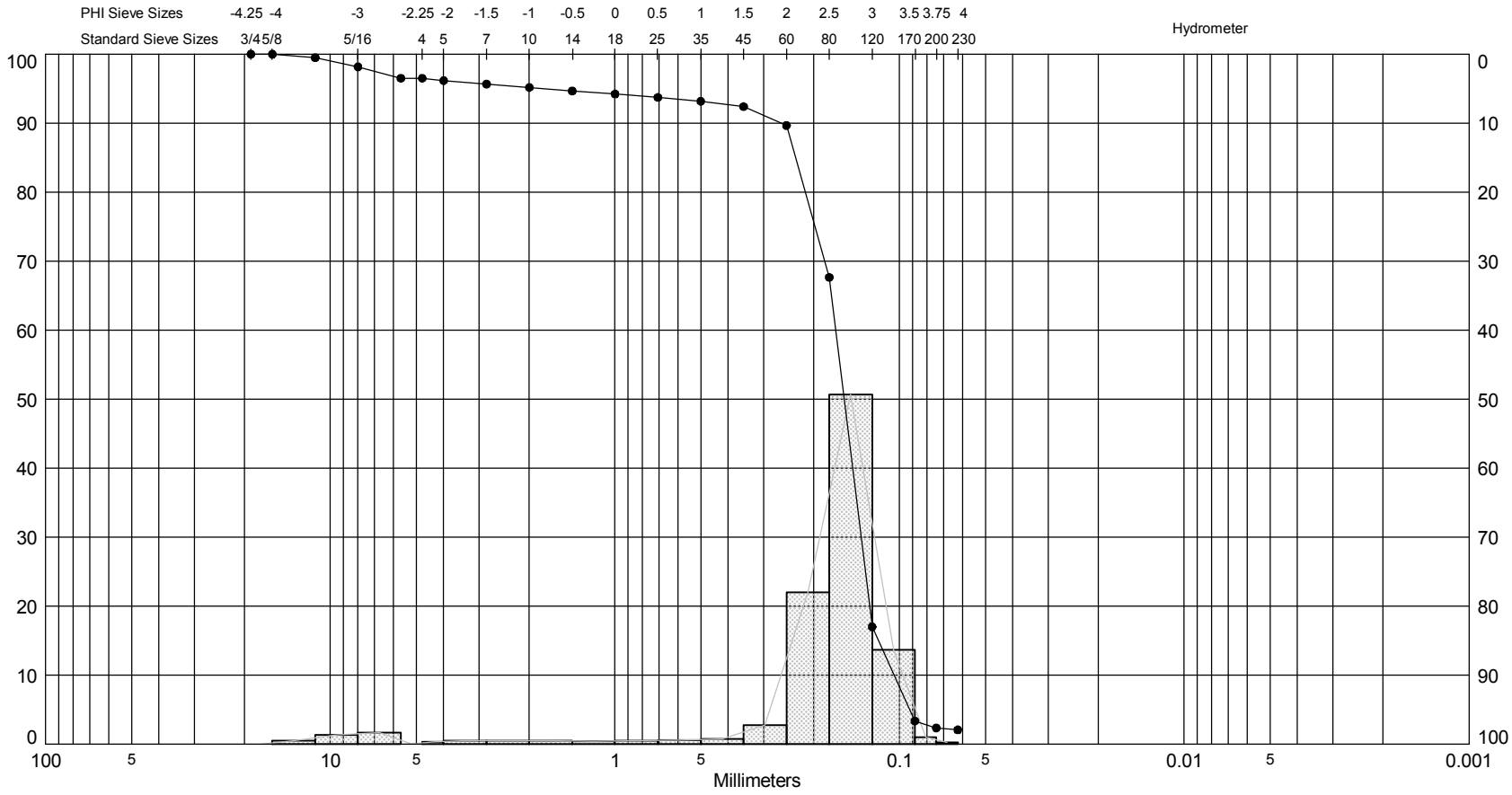
Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-18-07
Analyzed By:	PB
Easting (X, ft):	2,392,093
Northing (Y, ft):	200,758
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-03 #3	—●—	-20.6	SW	#200 - 2.34 #230 - 2.05			2.67	2.36	-3.28	13.71	1.28

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-18-07
Analyzed By:	PB
Easting (X, ft):	2,392,093
Northing (Y, ft):	200,758
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
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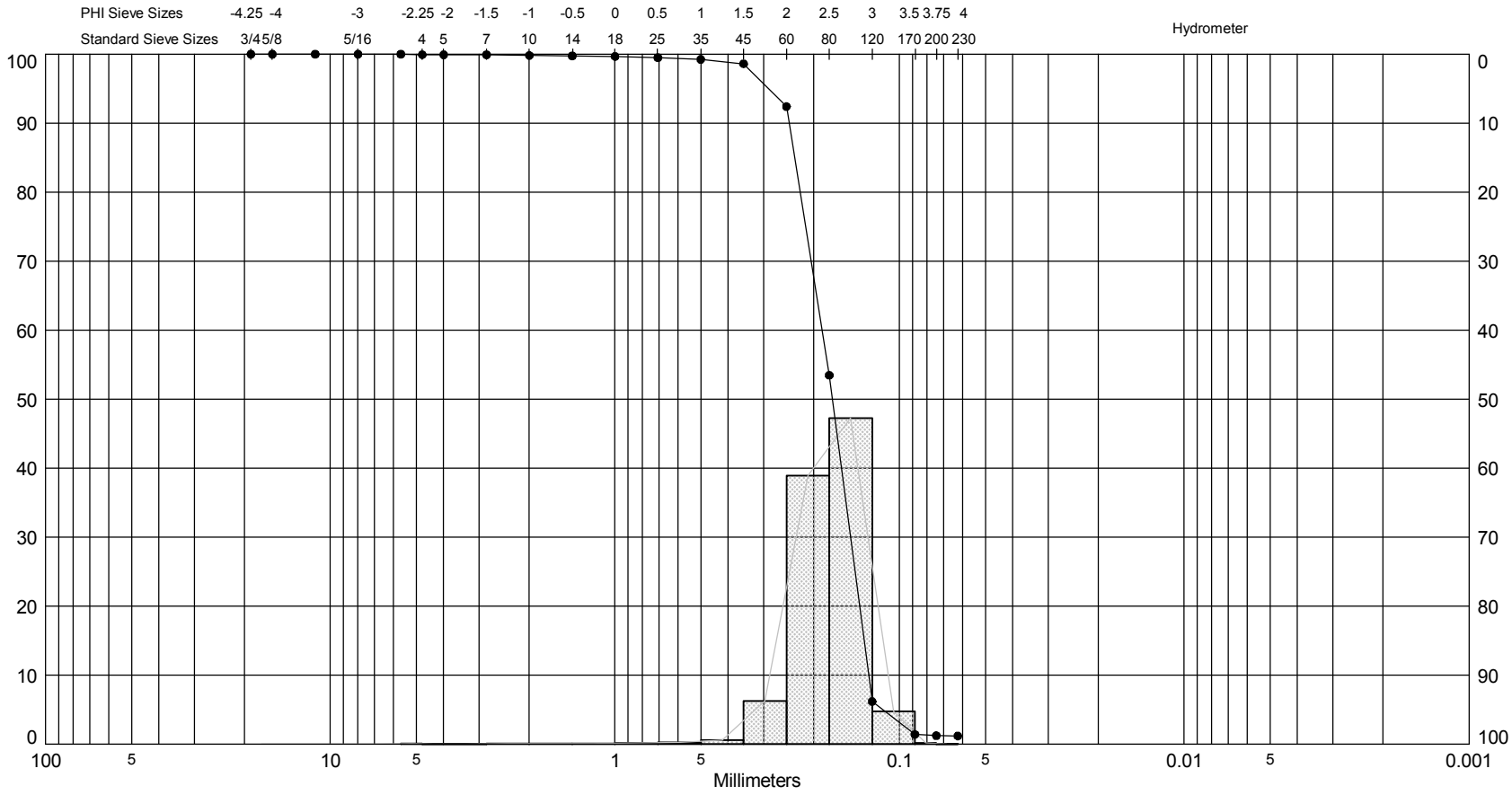
fax (561) 391-9116

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-04 #1	—●—	-16.5	SP	#200 - 1.22 #230 - 1.18			2.54	2.48	-2.68	23.95	0.44

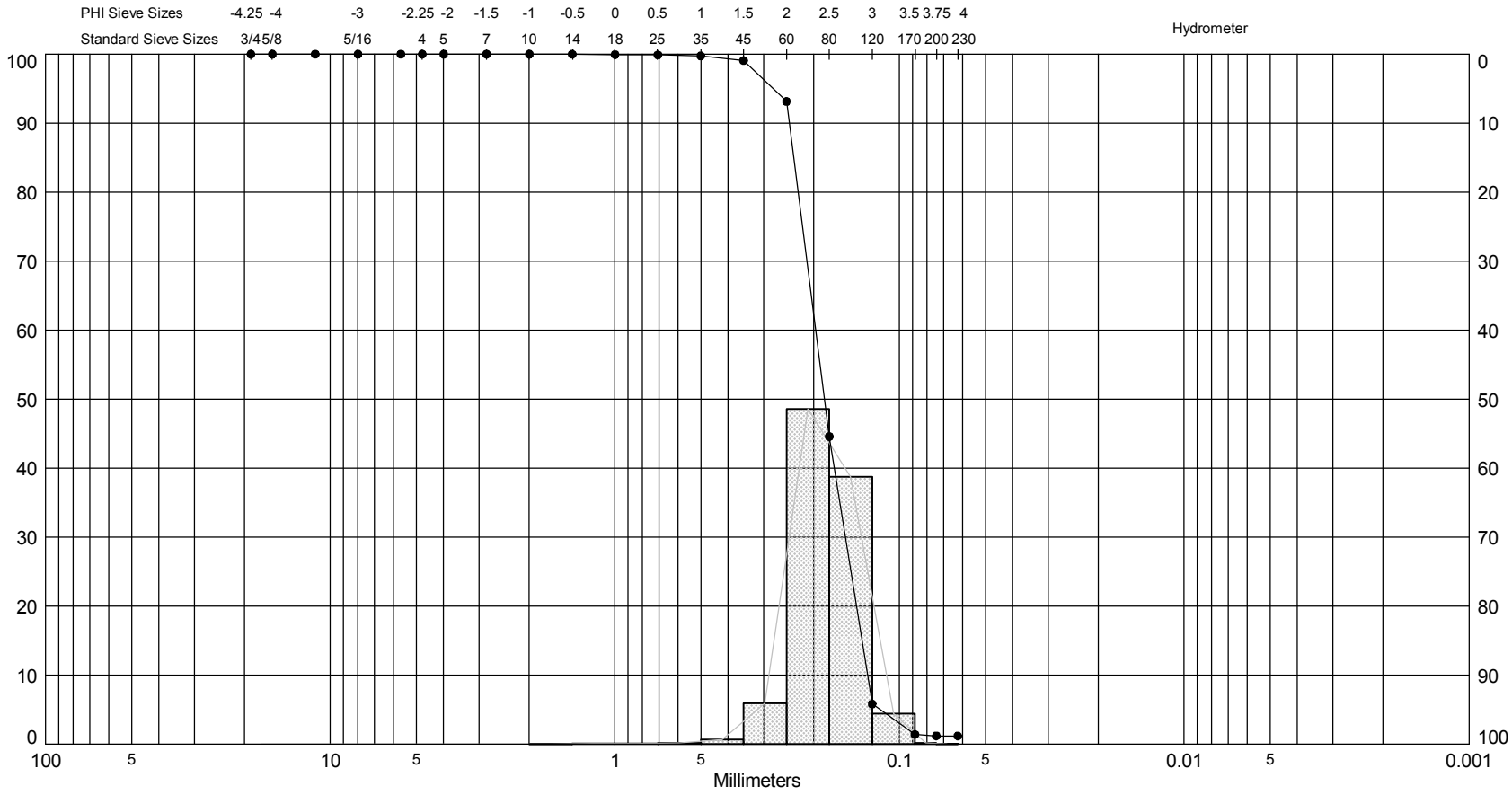
Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-18-07
Analyzed By:	PB
Easting (X, ft):	2,391,811
Northing (Y, ft):	199,871
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-04 #2	—●—	-20.7	SP	#200 - 1.20 #230 - 1.18			2.44	2.45	-0.5	6.2	0.37

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-18-07
Analyzed By:	PB
Easting (X, ft):	2,391,811
Northing (Y, ft):	199,871
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
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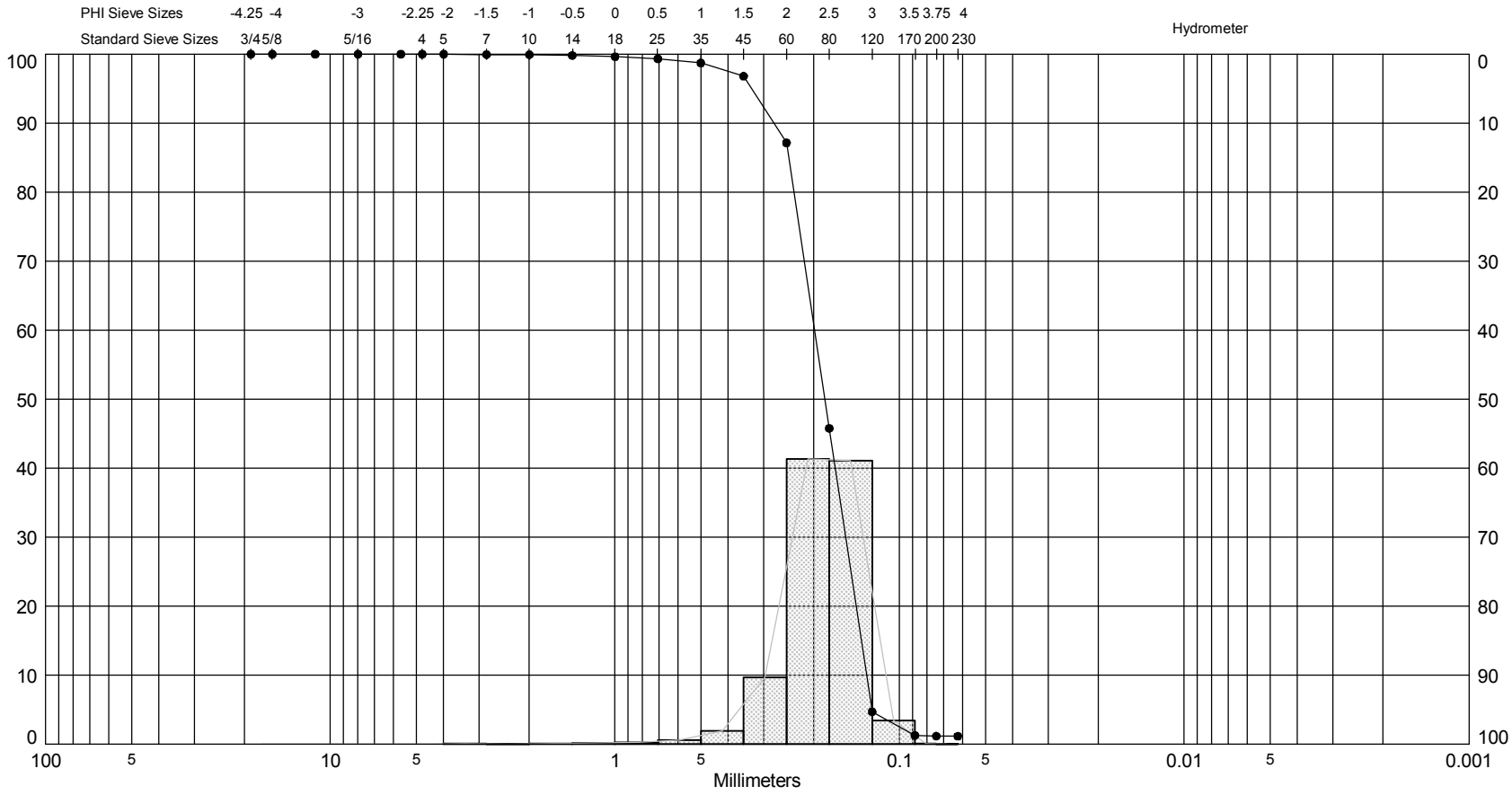
fax (561) 391-9116

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-05 #1	—●—	-13.9	SP	#200 - 1.15 #230 - 1.13		6	2.45	2.4	-1.81	11.74	0.47

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-18-07
Analyzed By:	PB
Easting (X, ft):	2,389,867
Northing (Y, ft):	199,037
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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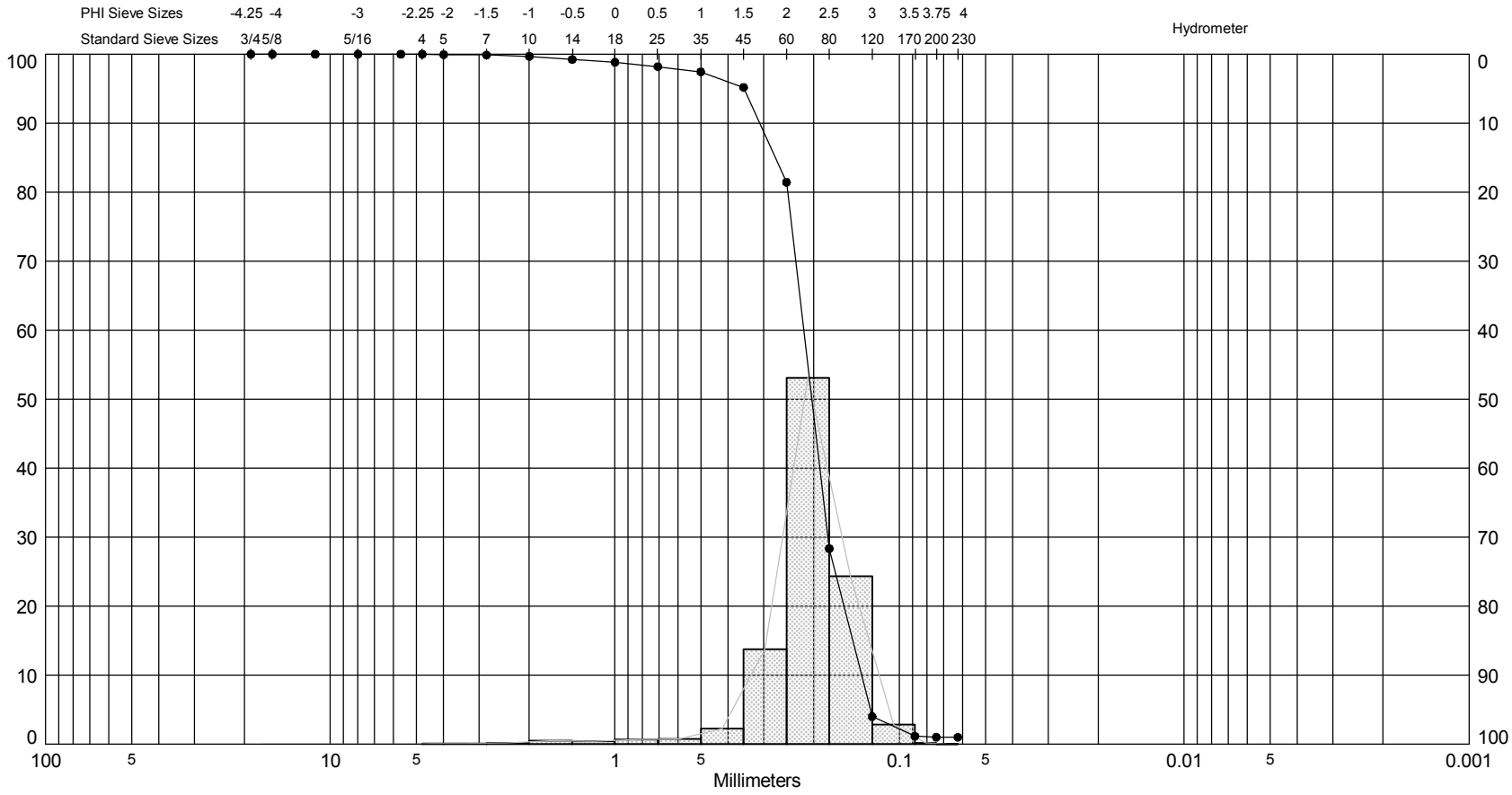

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-05 #2	—●—	-19.4	SP	#200 - 1.00 #230 - 0.98		6	2.3	2.25	-2.44	15.19	0.55

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-18-07
Analyzed By:	PB
Easting (X, ft):	2,389,867
Northing (Y, ft):	199,037
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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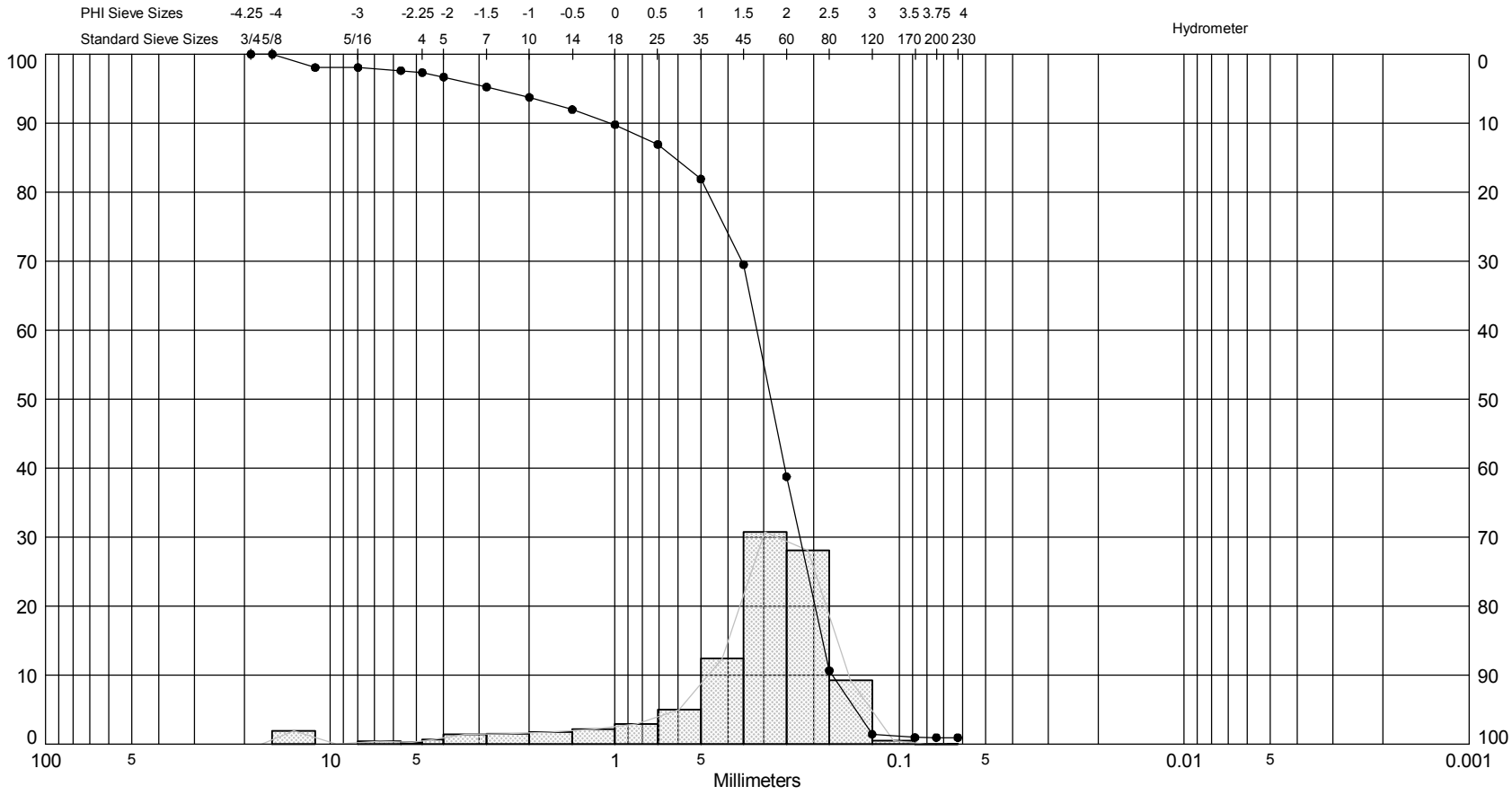

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-06 #1	—●—	-13.9	SW	#200 - 0.95 #230 - 0.94			1.82	1.49	-2.21	8.4	1.26

Comments:

Depths and elevations based on measured values

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Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-18-07
Analyzed By:	PB
Easting (X, ft):	2,389,210
Northing (Y, ft):	198,965
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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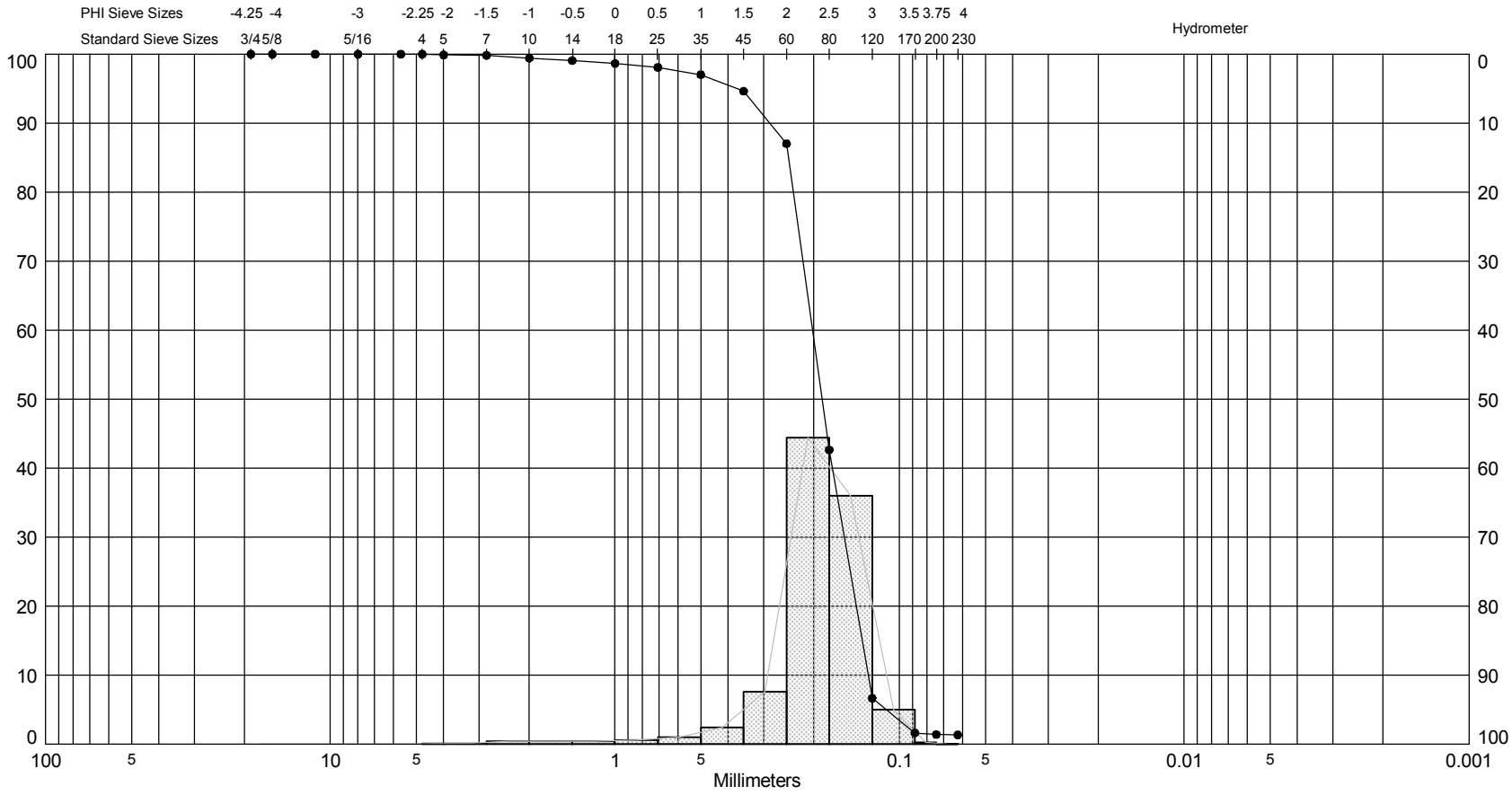

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-06 #2	—●—	-16.2	SP	#200 - 1.38 #230 - 1.34			2.42	2.35	-2.68	15.62	0.61

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-19-07
Analyzed By:	PB
Easting (X, ft):	2,389,210
Northing (Y, ft):	198,965
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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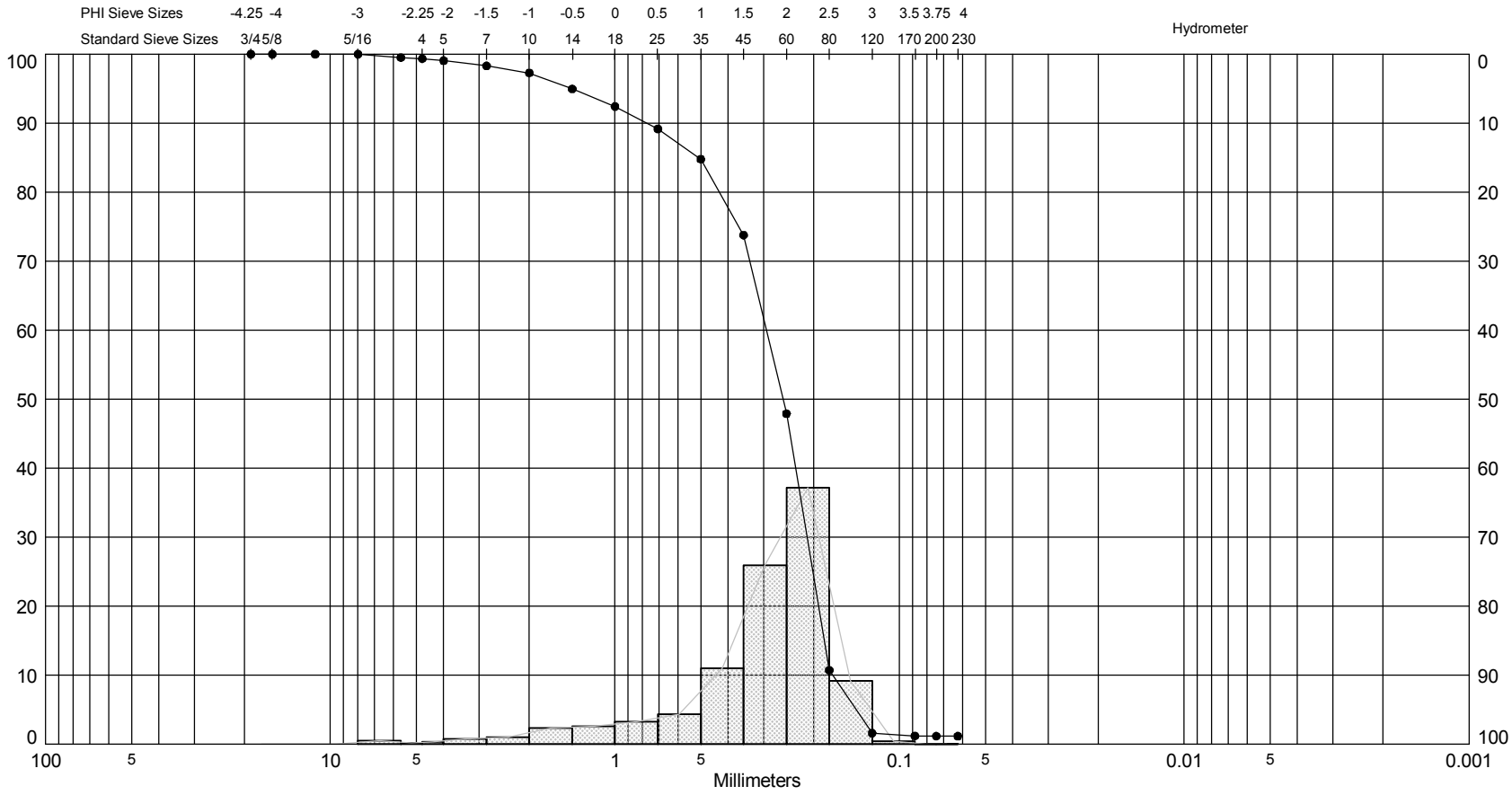

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-06 #3	—●—	-17.4	SW	#200 - 1.15 #230 - 1.14			1.96	1.68	-1.88	7.05	0.97

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-19-07
Analyzed By:	PB
Easting (X, ft):	2,389,210
Northing (Y, ft):	198,965
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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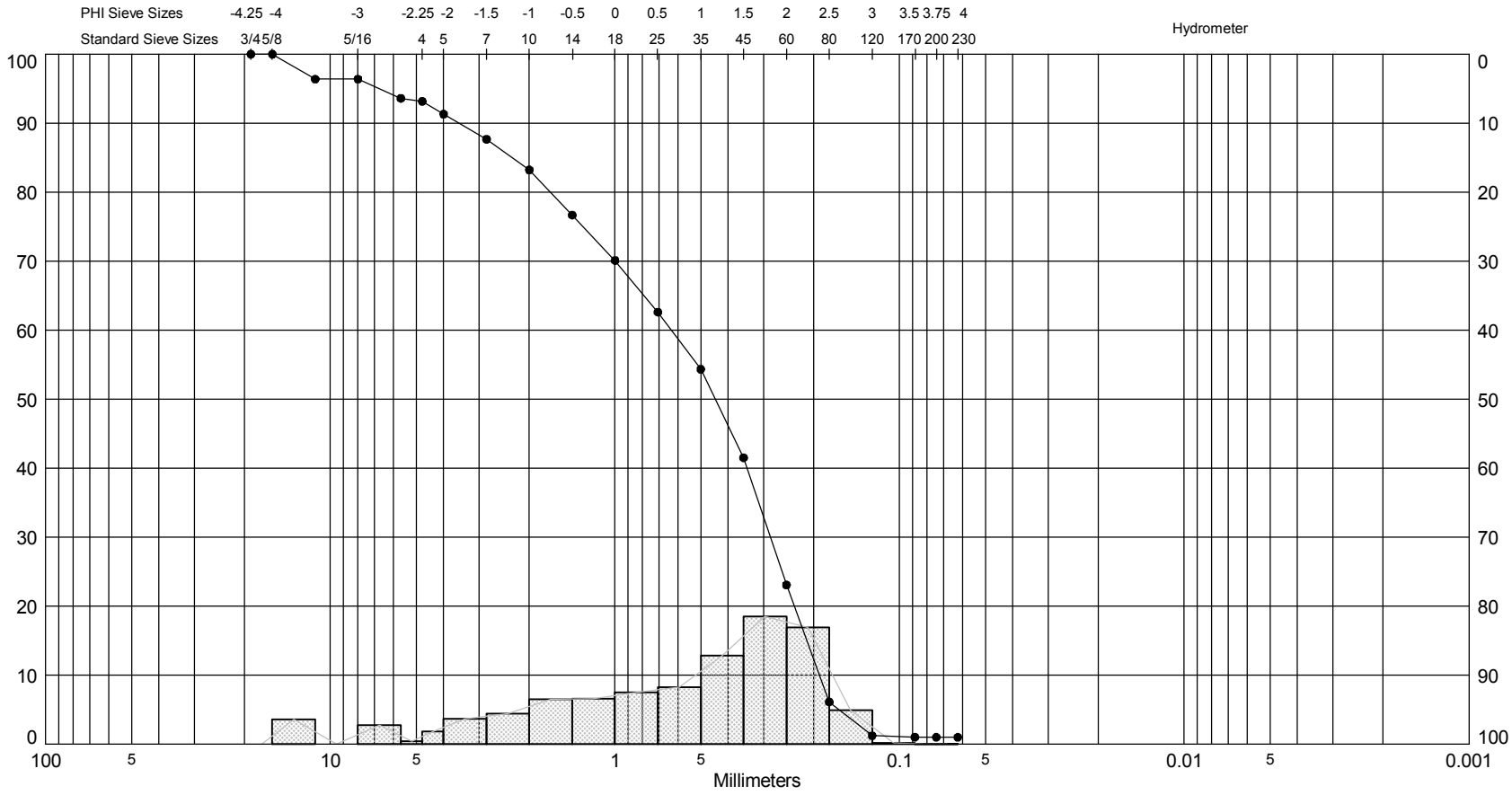

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-06 #4	—●—	-18.9	SW	#200 - 0.99 #230 - 0.98			1.17	0.65	-0.95	3.15	1.65

Comments:

Depths and elevations based on measured values

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Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-19-07
Analyzed By:	PB
Easting (X, ft):	2,389,210
Northing (Y, ft):	198,965
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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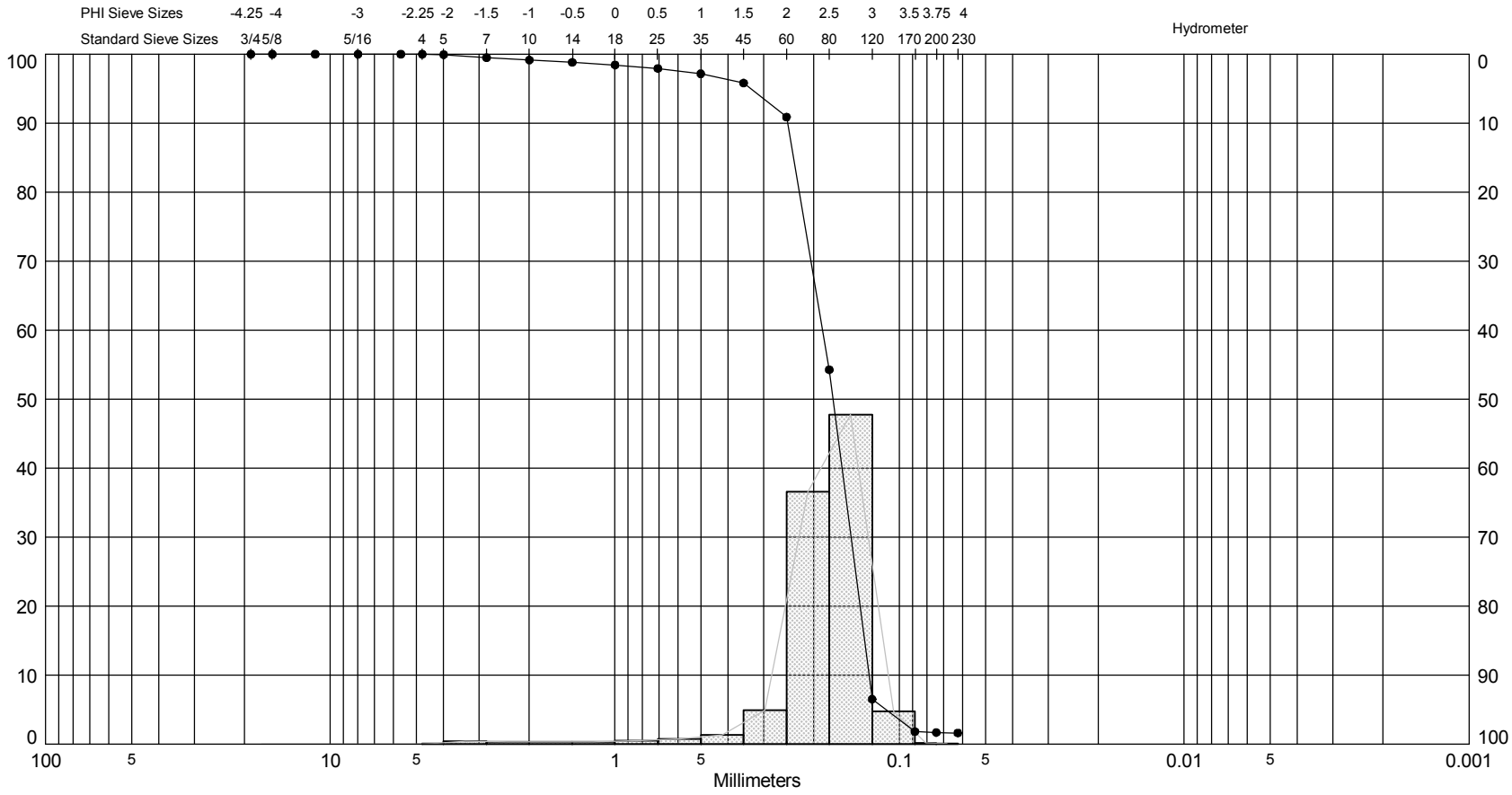

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-06 #5	—●—	-20.4	SP	#200 - 1.68 #230 - 1.62			2.54	2.43	-3.45	20.56	0.62

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-18-07
Analyzed By:	PB
Easting (X, ft):	2,389,210
Northing (Y, ft):	198,965
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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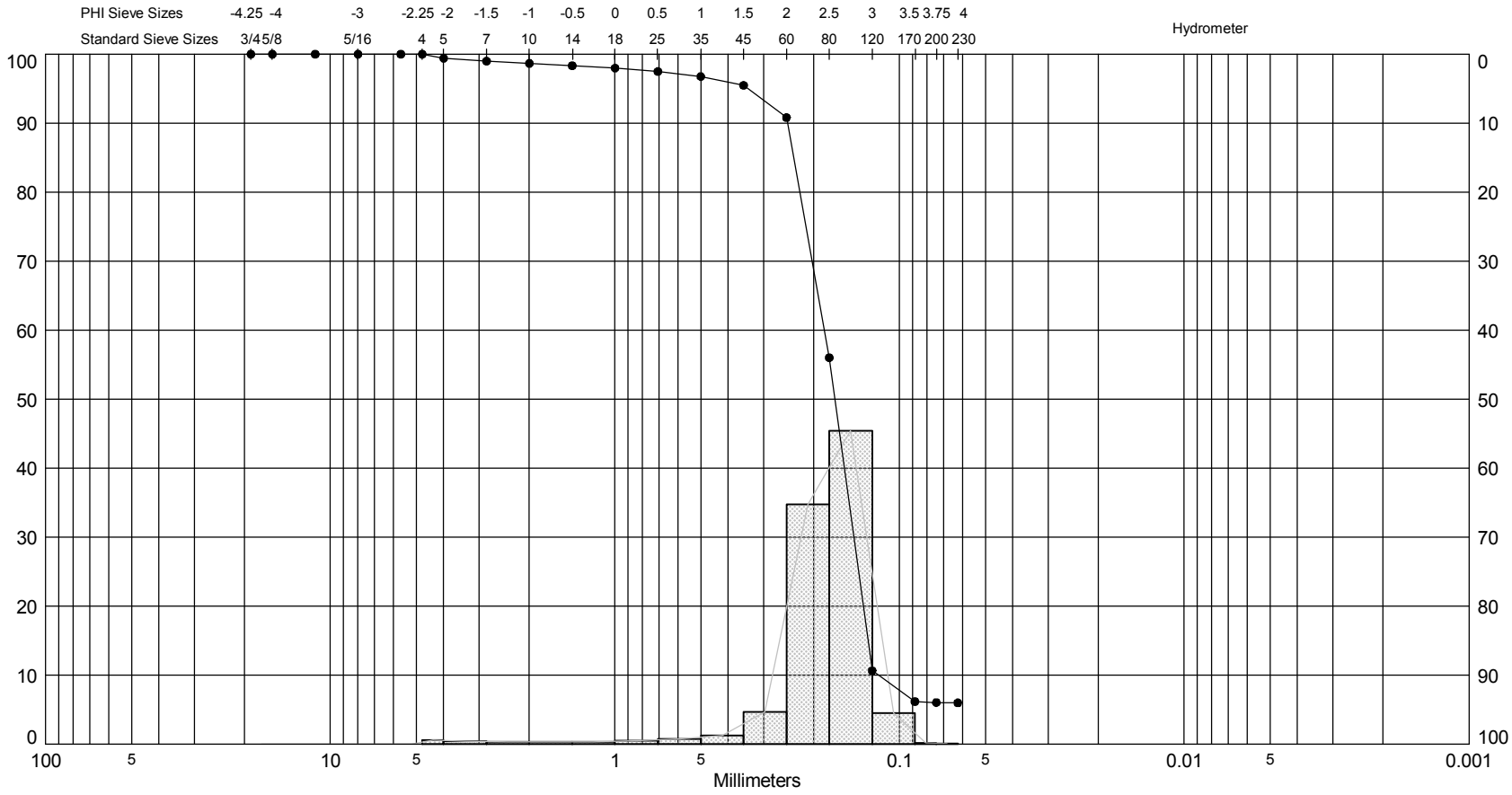

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-07 #1	—●—	-12.4	SP-SM	#200 - 6.03 #230 - 5.97			2.57	2.4	-3.72	21.27	0.71

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-19-07
Analyzed By:	PB
Easting (X, ft):	2,390,615
Northing (Y, ft):	200,380
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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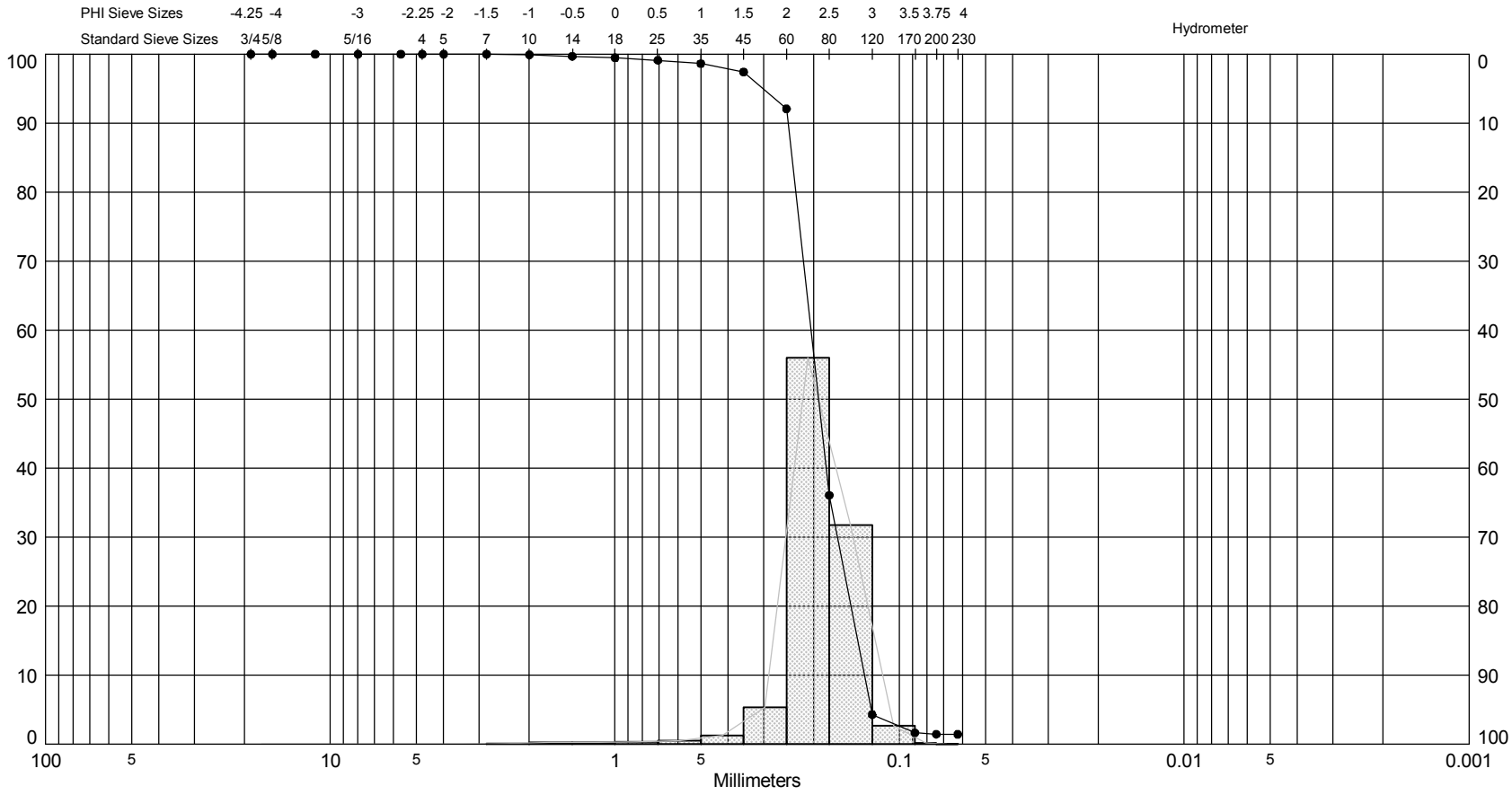

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-07 #2	—●—	-13.4	SP	#200 - 1.43 #230 - 1.41			2.38	2.37	-2.3	16.84	0.44

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-19-07
Analyzed By:	PB
Easting (X, ft):	2,390,615
Northing (Y, ft):	200,380
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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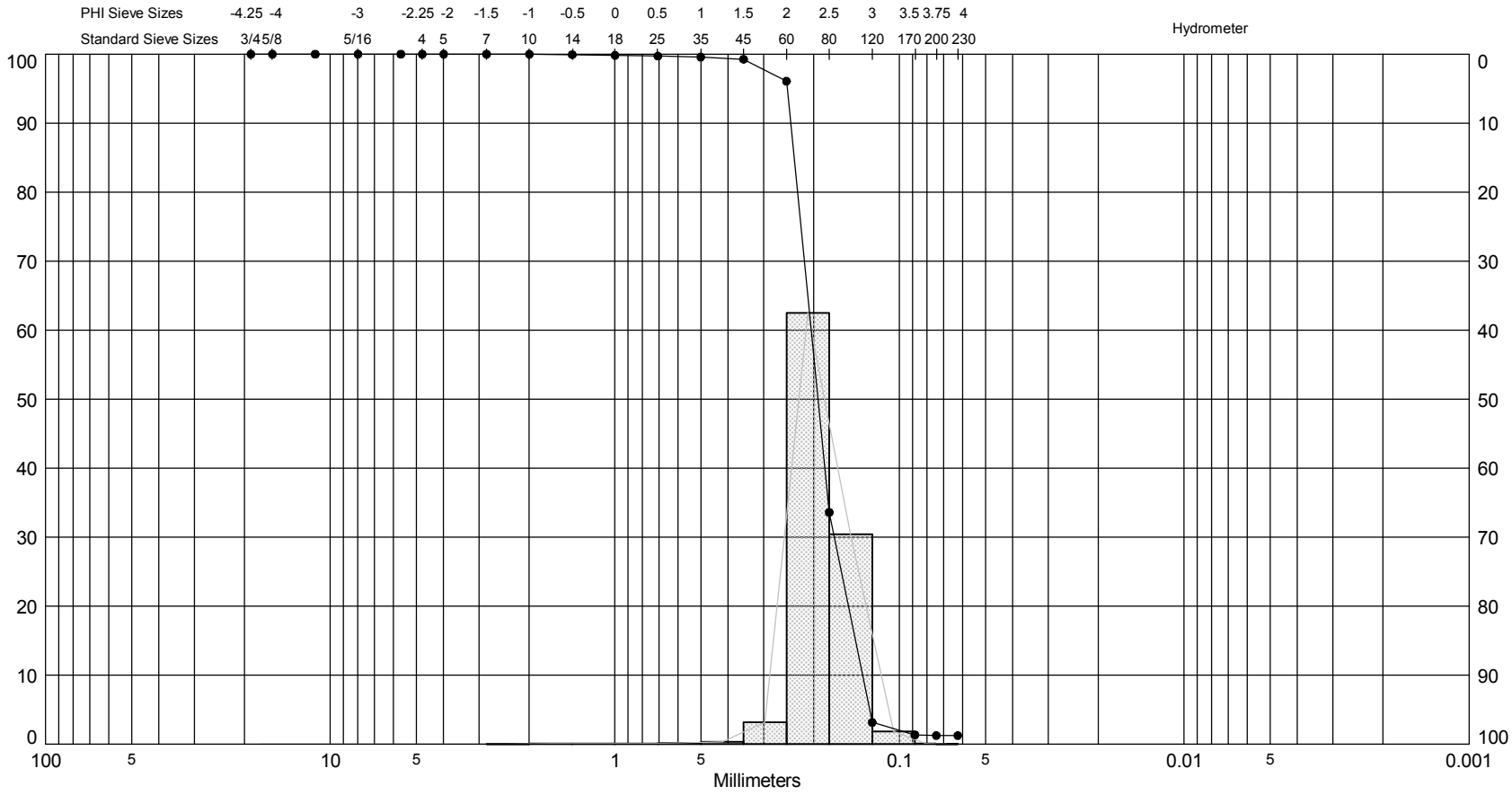

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-07 #3	—●—	-16.4	SP	#200 - 1.24 #230 - 1.23			2.37	2.4	-1.36	16.29	0.33

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-19-07
Analyzed By:	PB
Easting (X, ft):	2,390,615
Northing (Y, ft):	200,380
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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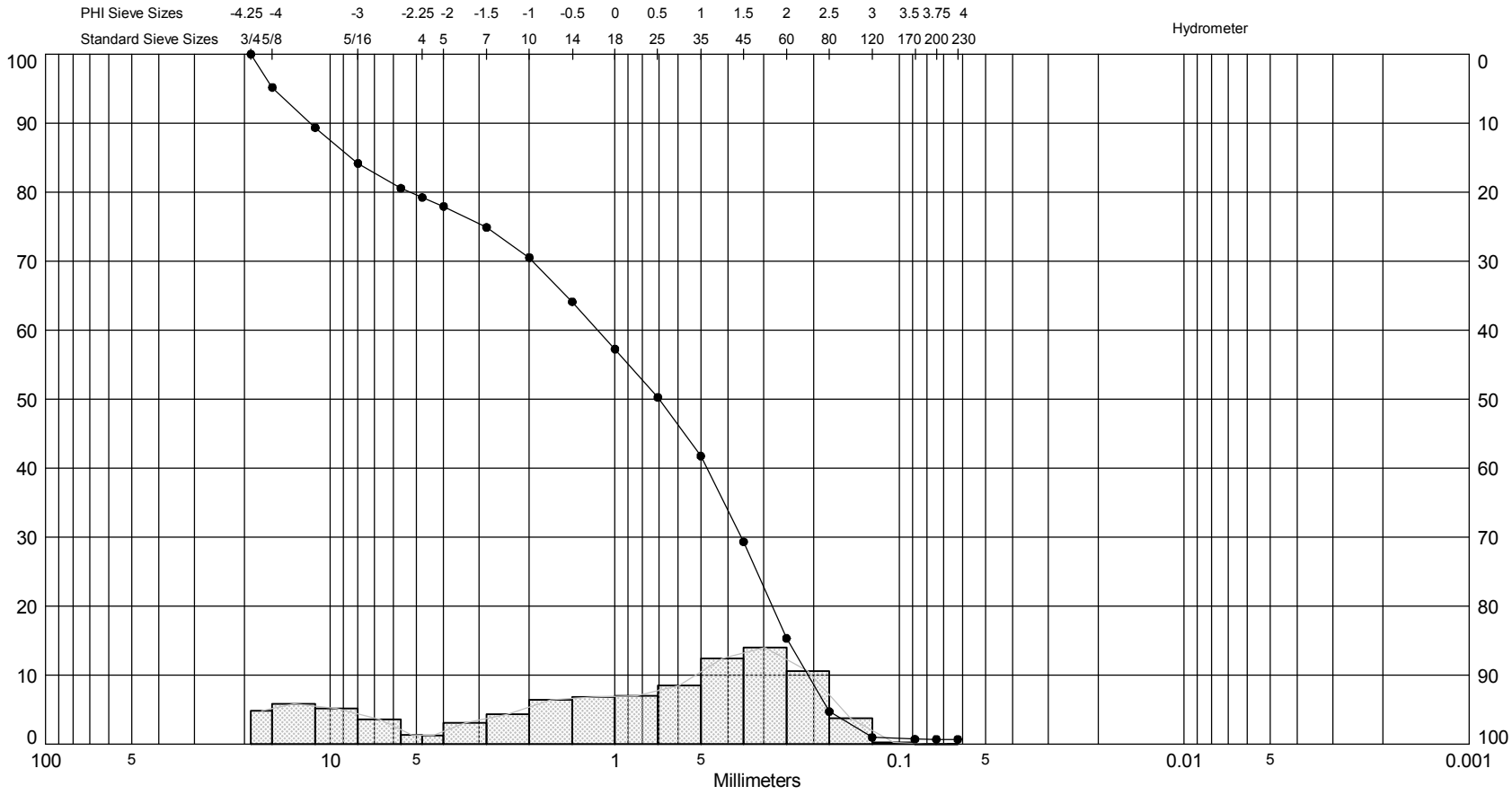

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-08 #1	—●—	-11.9	SW	#200 - 0.70 #230 - 0.69			0.51	-0.08	-0.59	2.09	2.08

Comments:

Depths and elevations based on measured values

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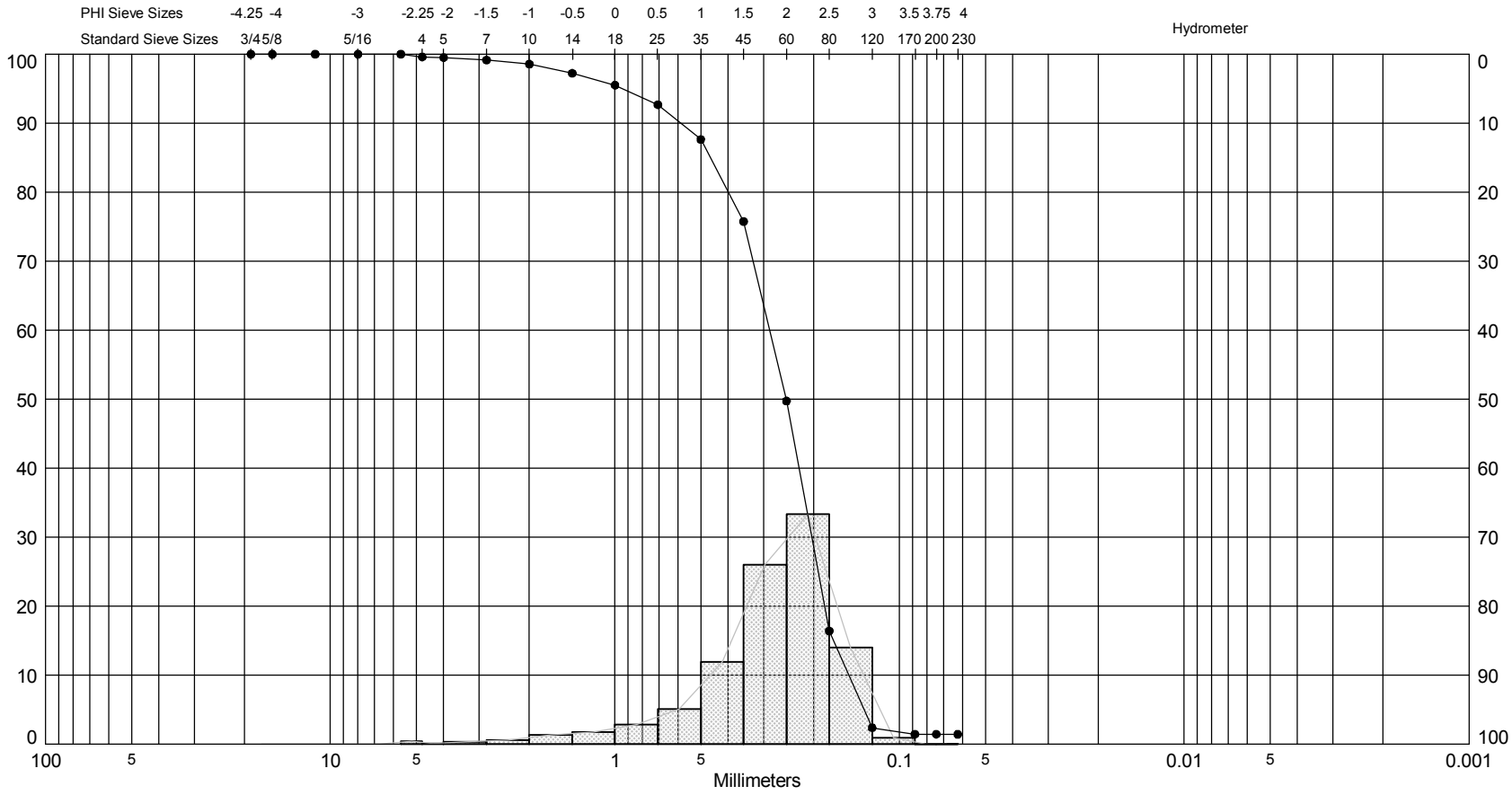
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-19-07
Analyzed By:	PB
Easting (X, ft):	2,390,181
Northing (Y, ft):	200,226
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-08 #2	—●—	-13.9	SP	#200 - 1.43 #230 - 1.42			1.99	1.8	-1.71	7.26	0.85

Comments:

Depths and elevations based on measured values

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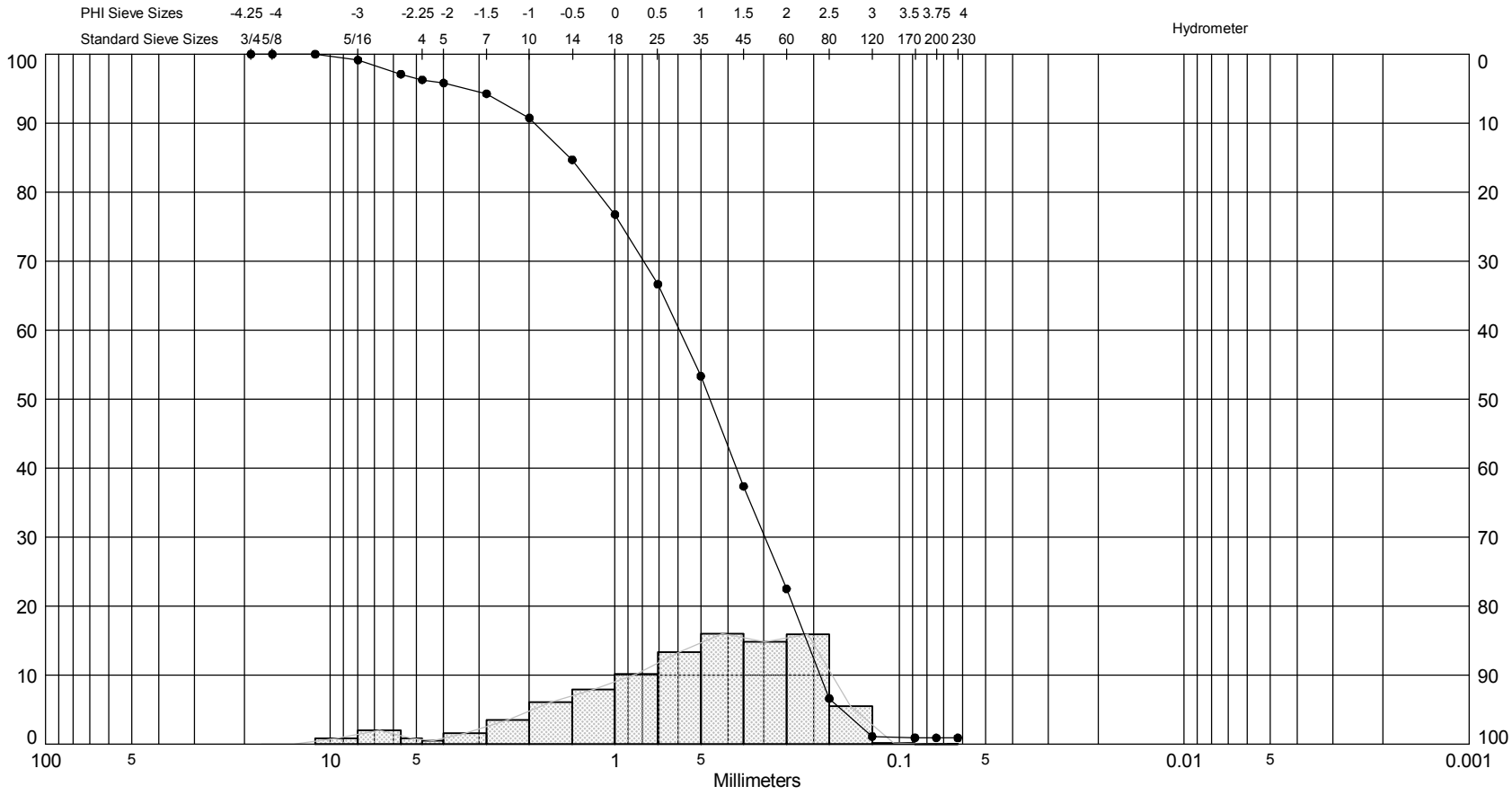
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-19-07
Analyzed By:	PB
Easting (X, ft):	2,390,181
Northing (Y, ft):	200,226
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-08 #3	—●—	-16.4	SW	#200 - 0.90 #230 - 0.89			1.1	0.86	-0.86	3.42	1.33

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-14-07
Analyzed By:	PB
Easting (X, ft):	2,390,181
Northing (Y, ft):	200,226
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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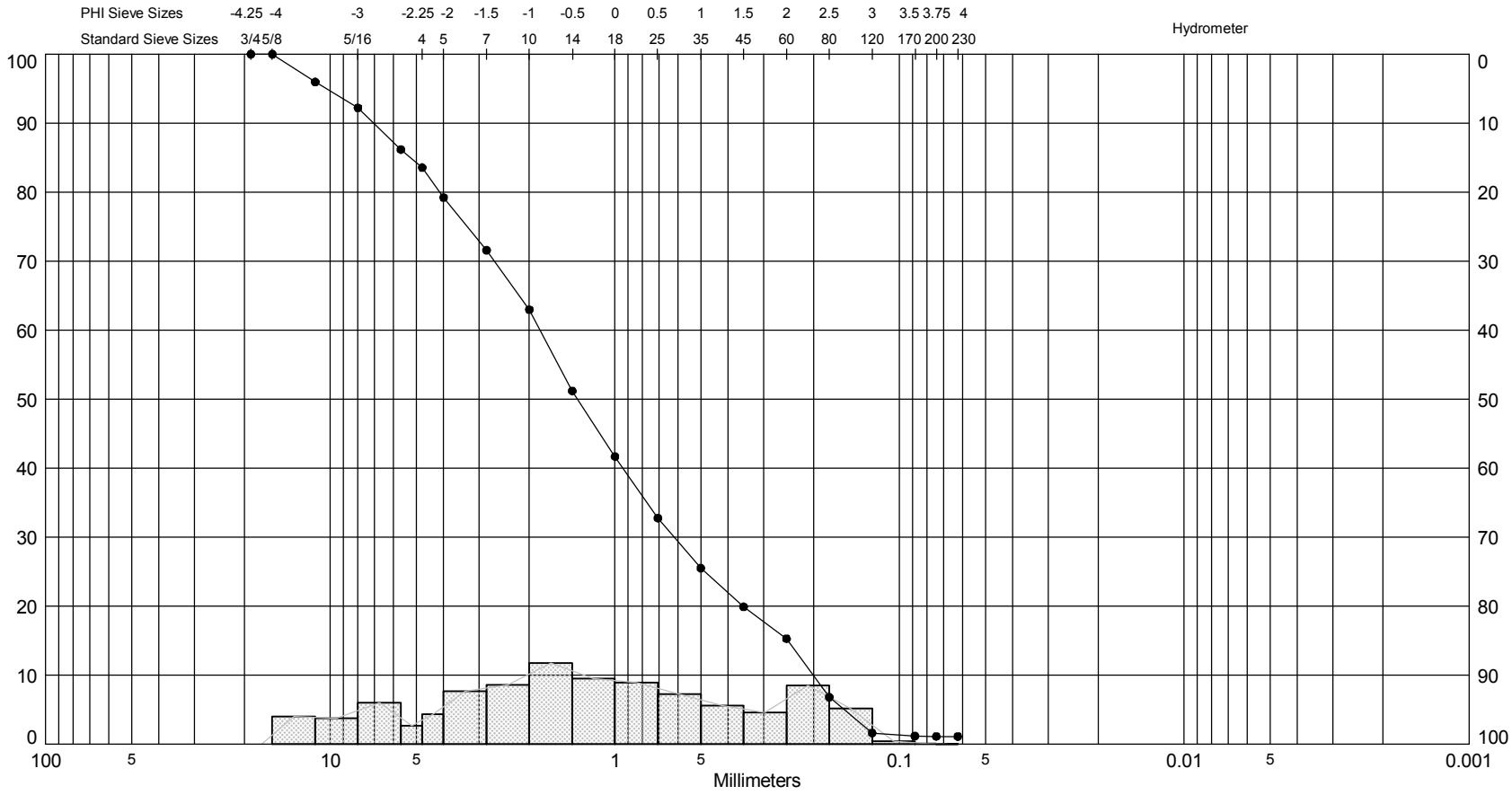

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-08 #4	—●—	-18.9	SW	#200 - 1.12 #230 - 1.11				-0.37	0.04	2.12	1.8

Comments:

Depths and elevations based on measured values

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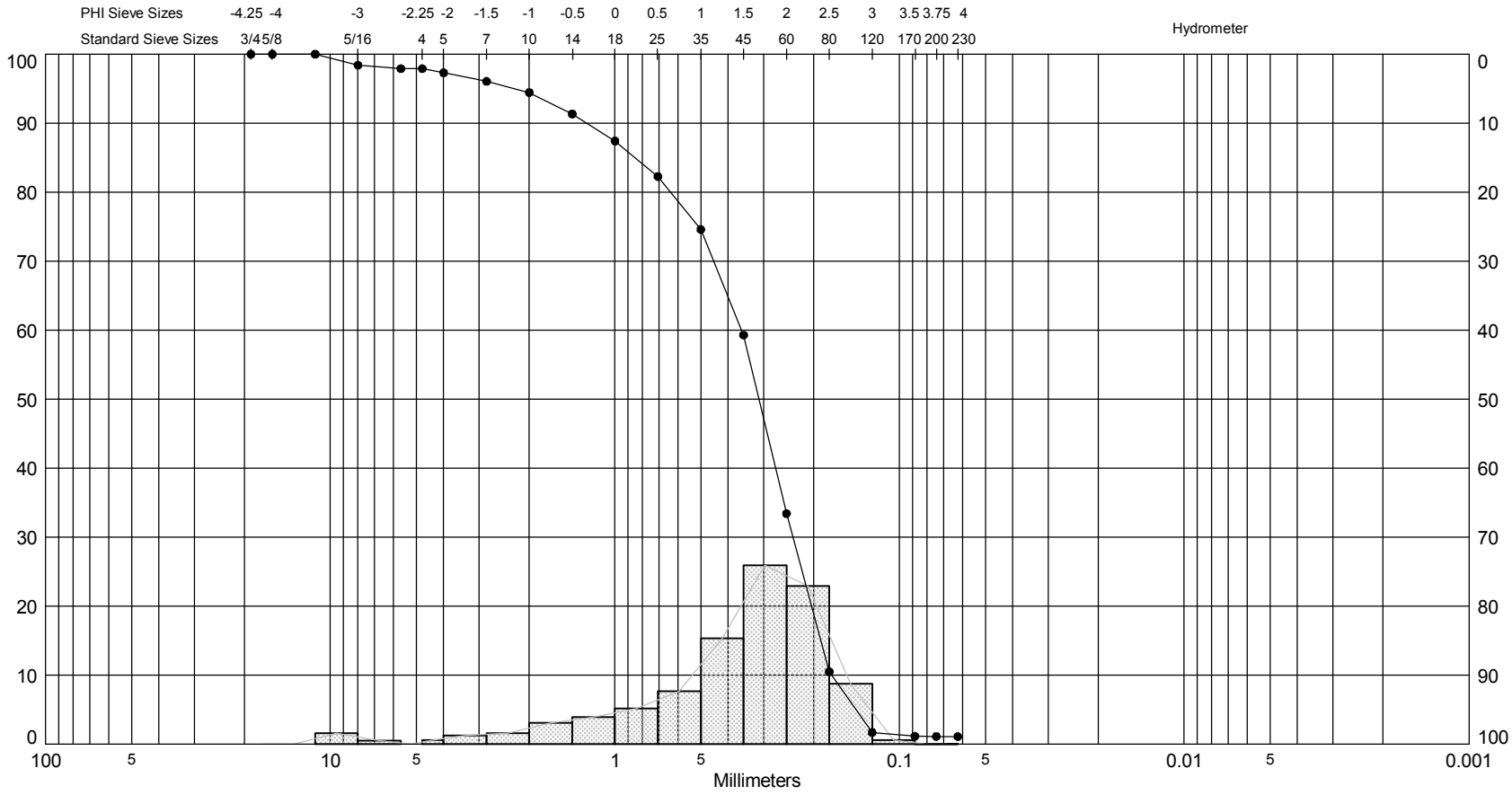
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	07-10-07
Analyzed By:	PB
Easting (X, ft):	2,390,181
Northing (Y, ft):	200,226
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-09 #1	—●—	-6.8	SW	#200 - 1.11 #230 - 1.10		23	1.68	1.35	-1.6	5.87	1.22

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	07-10-07
Analyzed By:	PB
Easting (X, ft):	2,388,776
Northing (Y, ft):	201,051
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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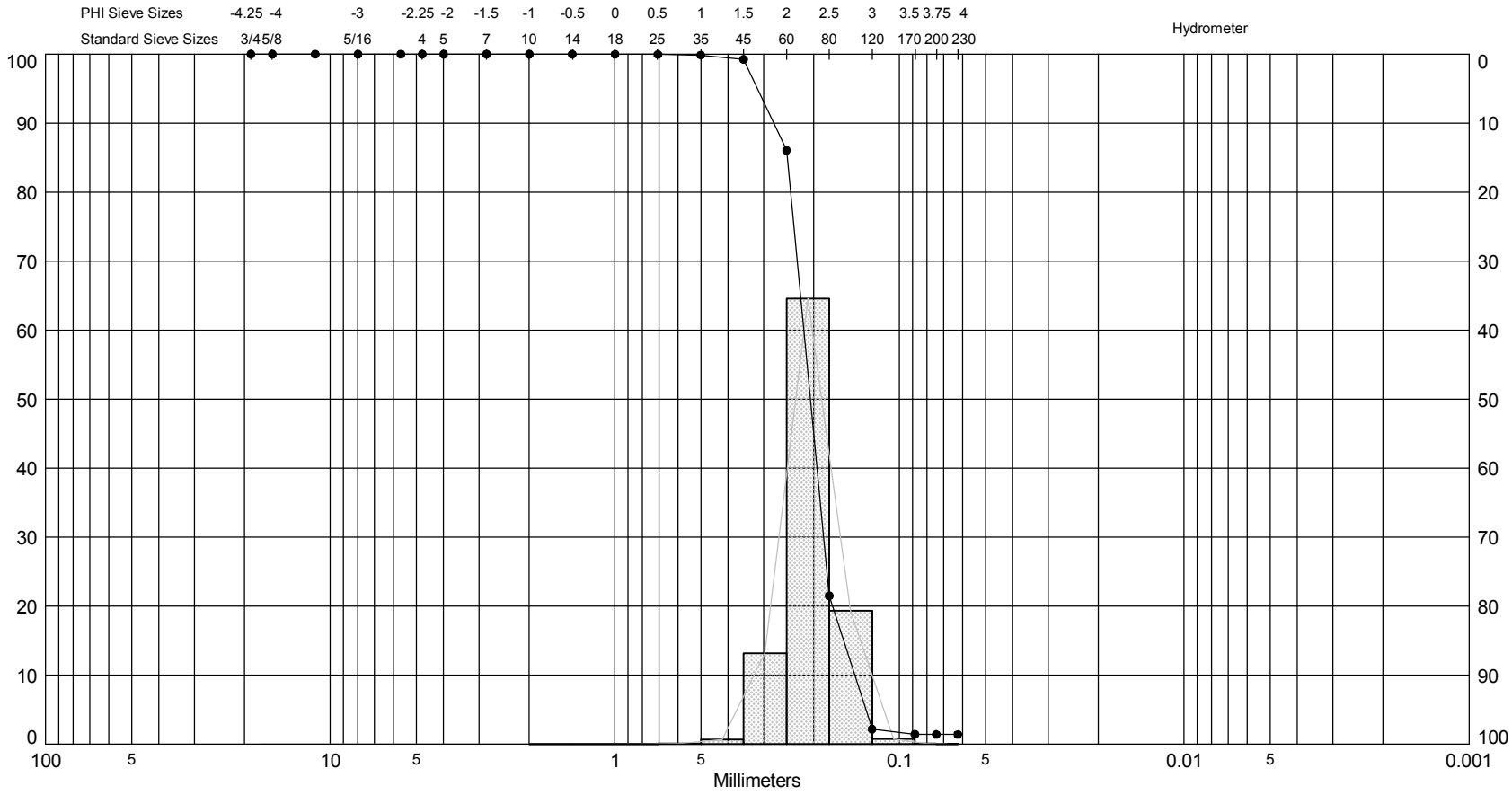

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-09 #2	—●—	-11.3	SP	#200 - 1.39 #230 - 1.38		9	2.28	2.28	-0.28	5.89	0.32

Comments:

Depths and elevations based on measured values

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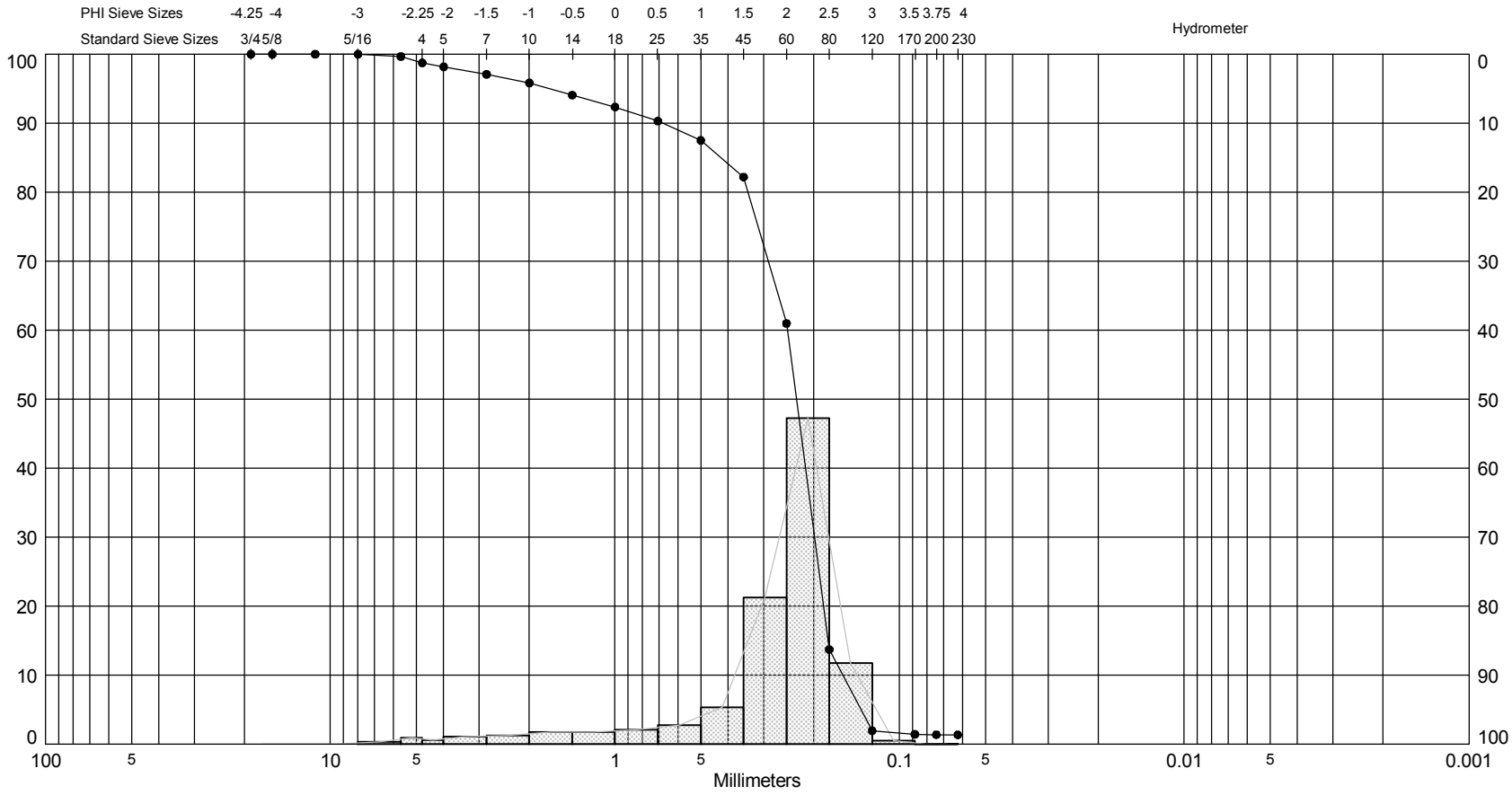
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	07-09-07
Analyzed By:	PB
Easting (X, ft):	2,388,776
Northing (Y, ft):	201,051
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-09 #3	—●—	-14.8	SW	#200 - 1.37 #230 - 1.35		12	2.12	1.8	-2.3	8.39	1.04

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-20-07
Analyzed By:	PB
Easting (X, ft):	2,388,776
Northing (Y, ft):	201,051
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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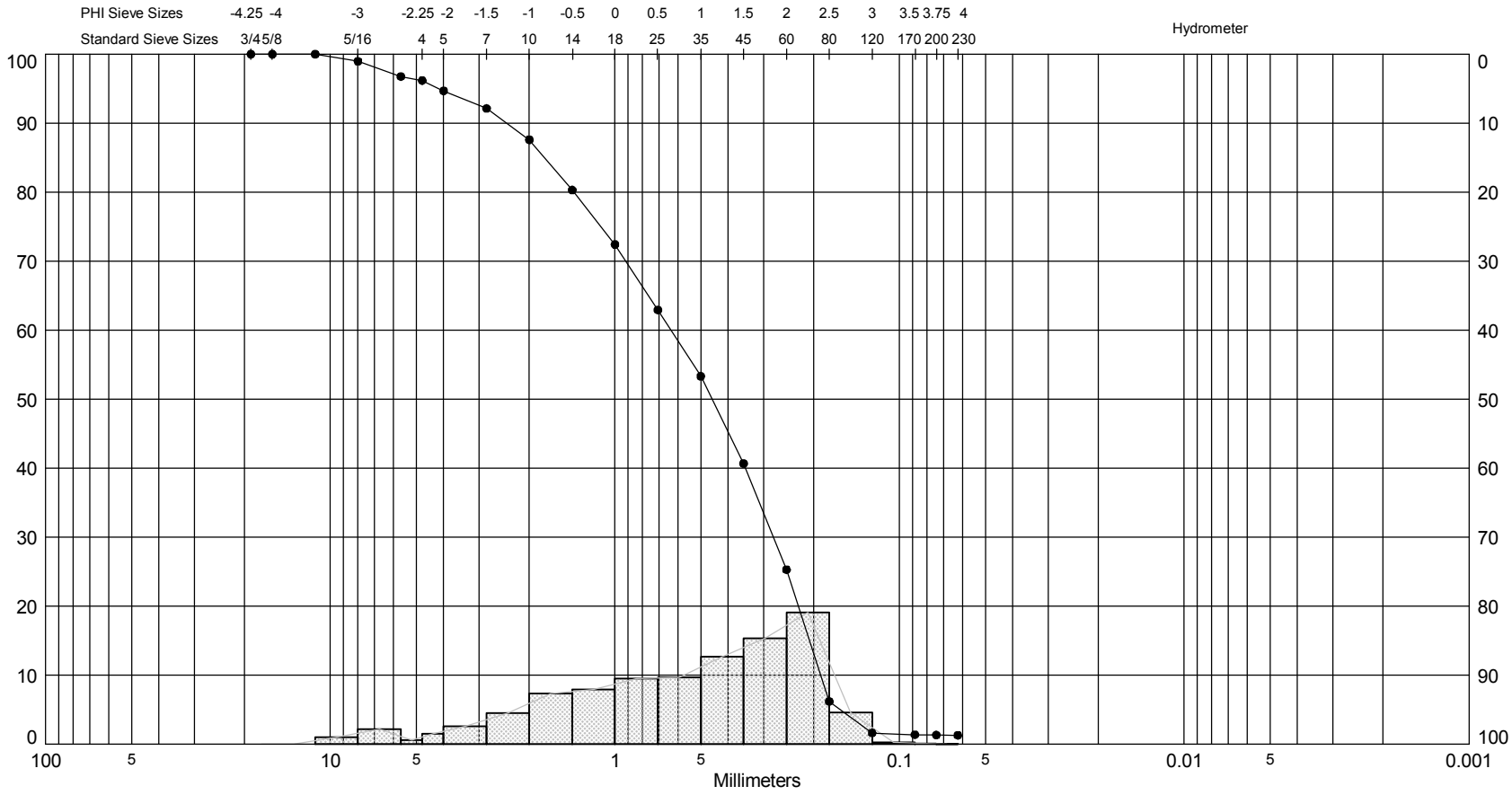

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-09 #4	—●—	-17.7	SW	#200 - 1.31 #230 - 1.29		35	1.13	0.78	-0.75	2.84	1.44

Comments:

Depths and elevations based on measured values

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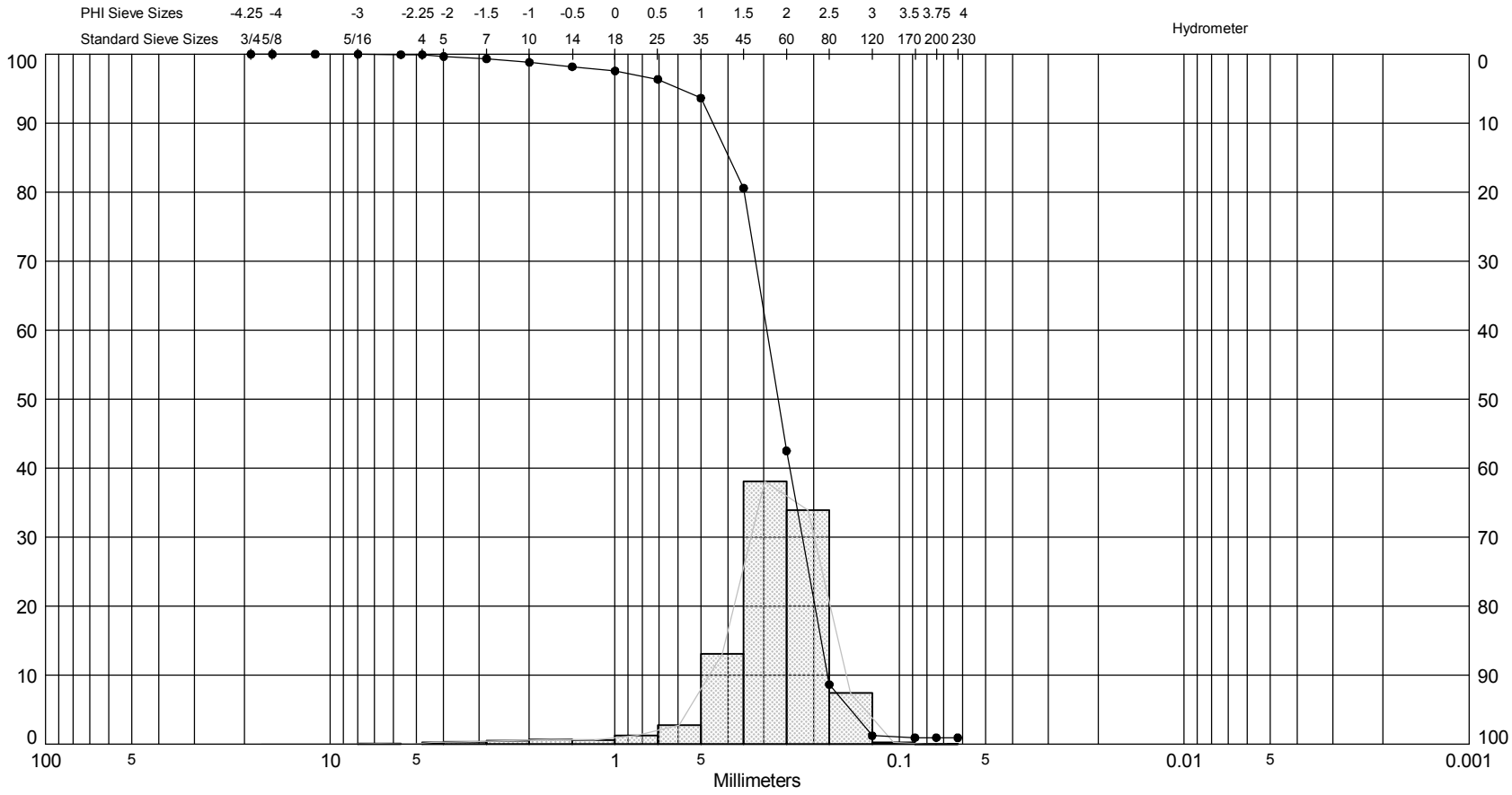
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-20-07
Analyzed By:	PB
Easting (X, ft):	2,388,776
Northing (Y, ft):	201,051
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-10 #1	—●—	-10.0	SP	#200 - 0.93 #230 - 0.92		5	1.9	1.82	-2.27	12.14	0.68

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-20-07
Analyzed By:	PB
Easting (X, ft):	2,385,121
Northing (Y, ft):	200,150
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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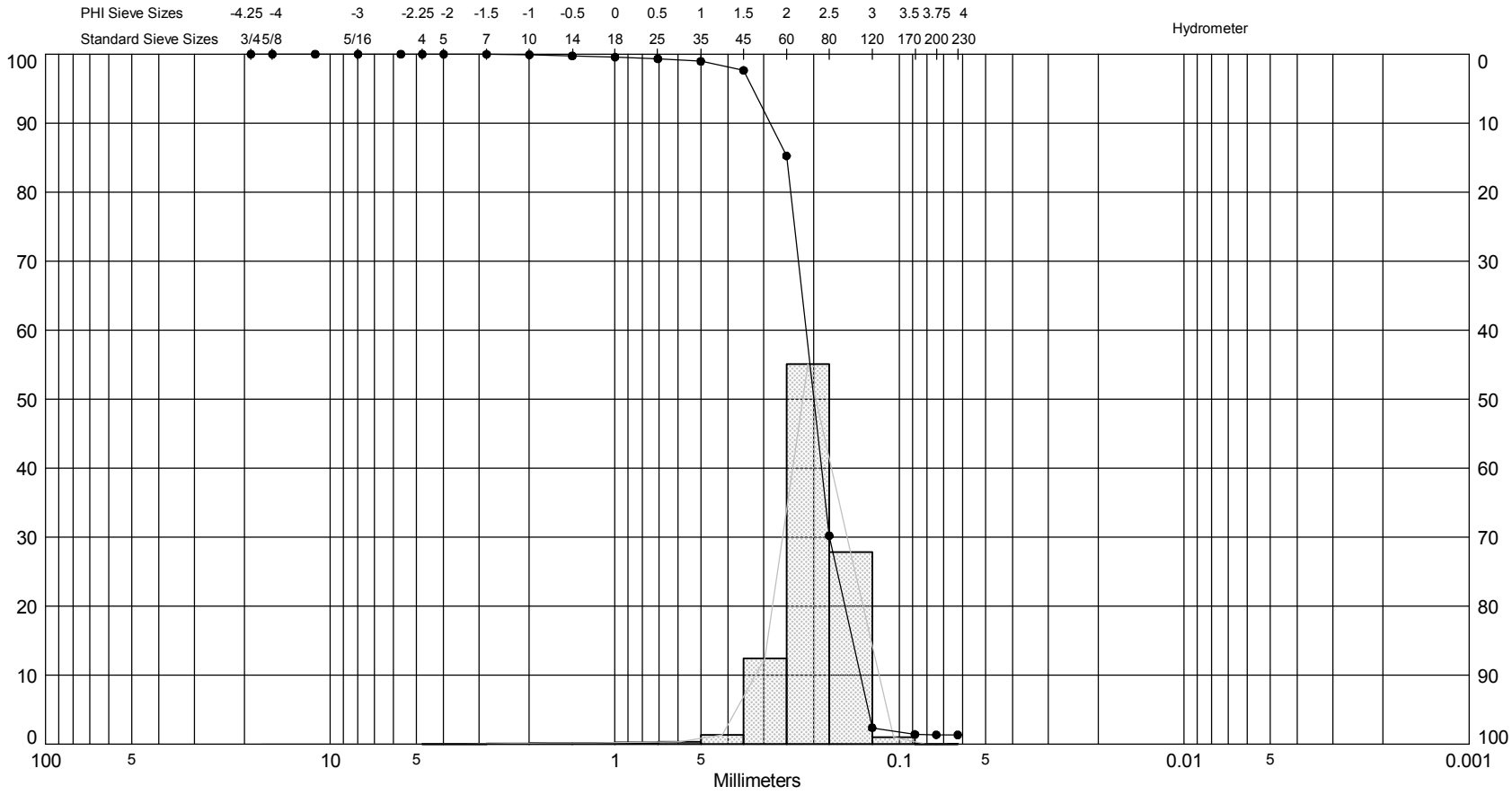

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-10 #2	—●—	-13.8	SP	#200 - 1.35 #230 - 1.34		13	2.32	2.3	-2.13	16.11	0.42

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-20-07
Analyzed By:	PB
Easting (X, ft):	2,385,121
Northing (Y, ft):	200,150
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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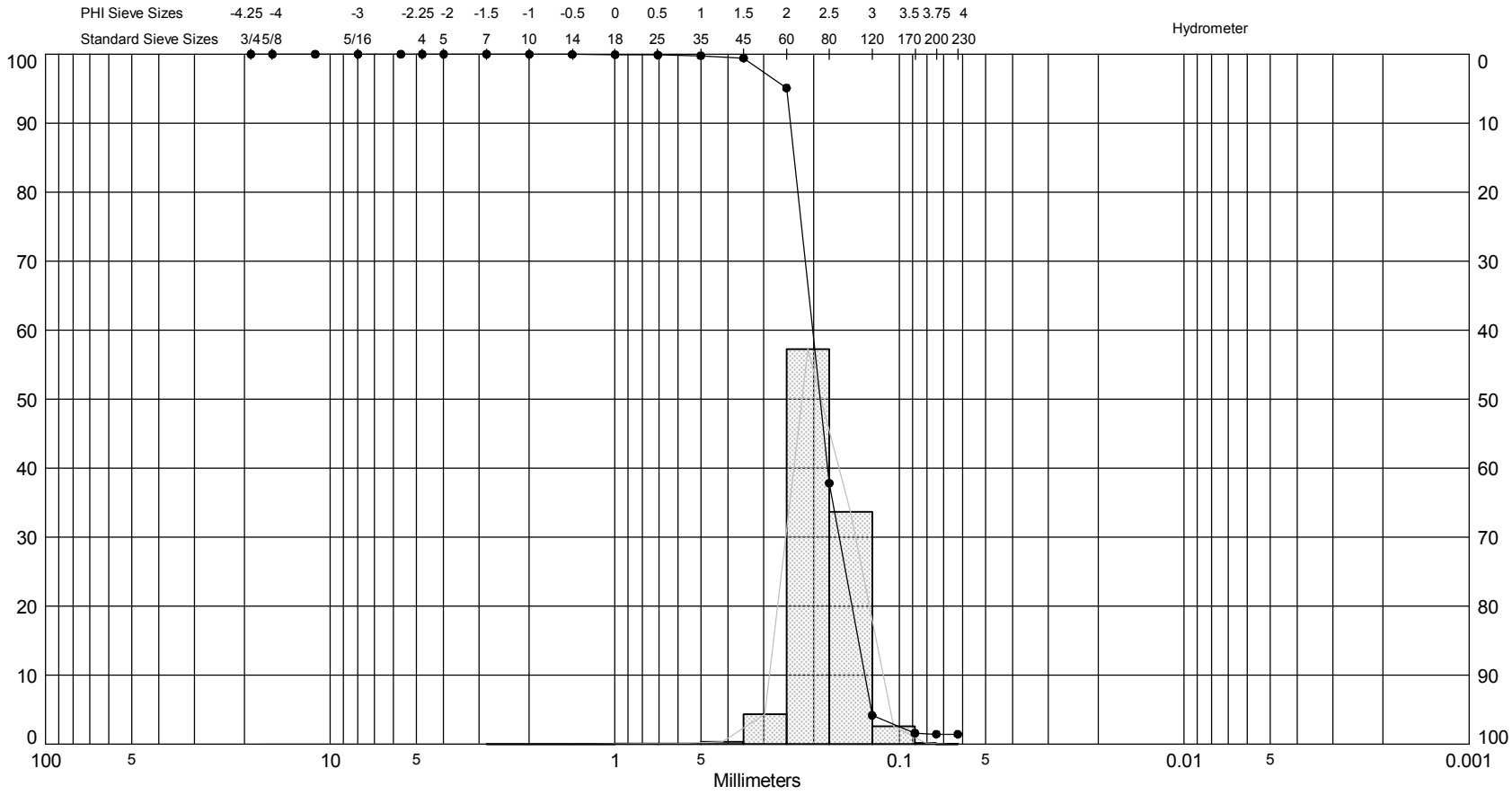

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-10 #3	—●—	-20.3	SP	#200 - 1.44 #230 - 1.43		4	2.39	2.42	-0.68	10.9	0.33

Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
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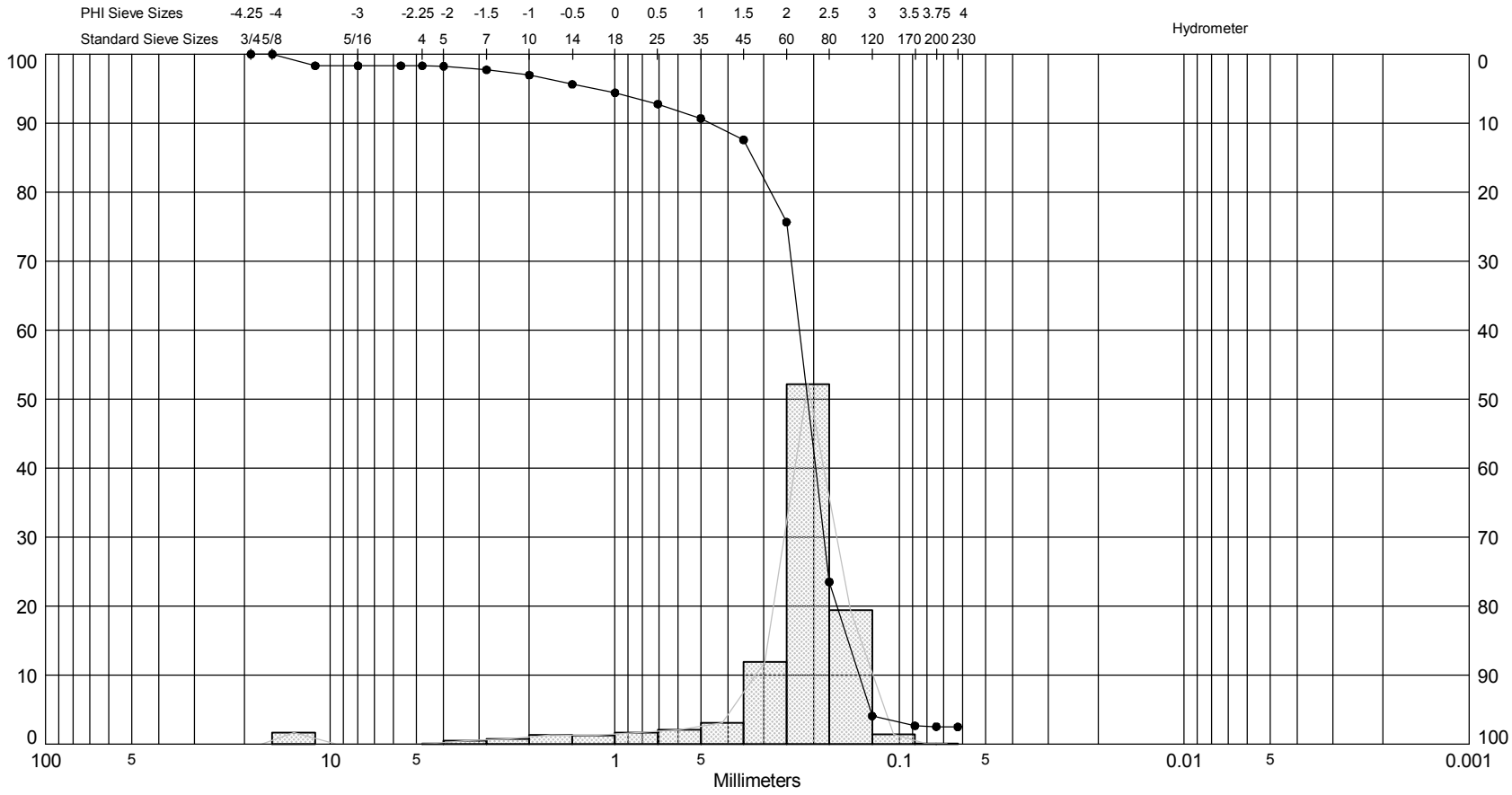
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-20-07
Analyzed By:	PB
Easting (X, ft):	2,385,121
Northing (Y, ft):	200,150
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-10 #4	—●—	-23.2	SW	#200 - 2.53 #230 - 2.48			2.25	1.98	-3.28	15.61	1.09

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-20-07
Analyzed By:	PB
Easting (X, ft):	2,385,121
Northing (Y, ft):	200,150
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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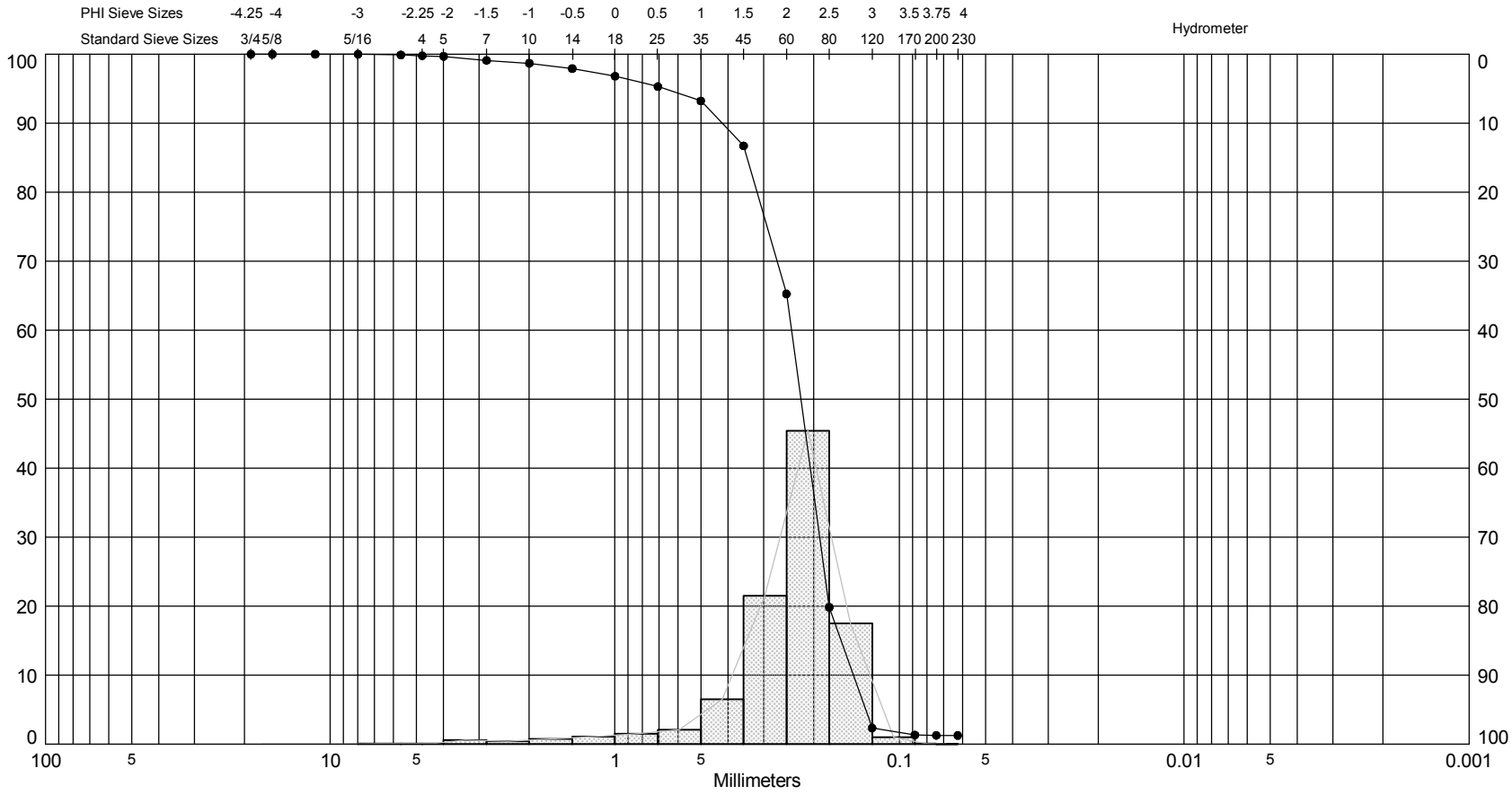

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-11 #1	—●—	-5.3	SP	#200 - 1.27 #230 - 1.26		11	2.17	2.01	-2.44	11.62	0.76

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-20-07
Analyzed By:	PB
Easting (X, ft):	2,386,946
Northing (Y, ft):	201,018
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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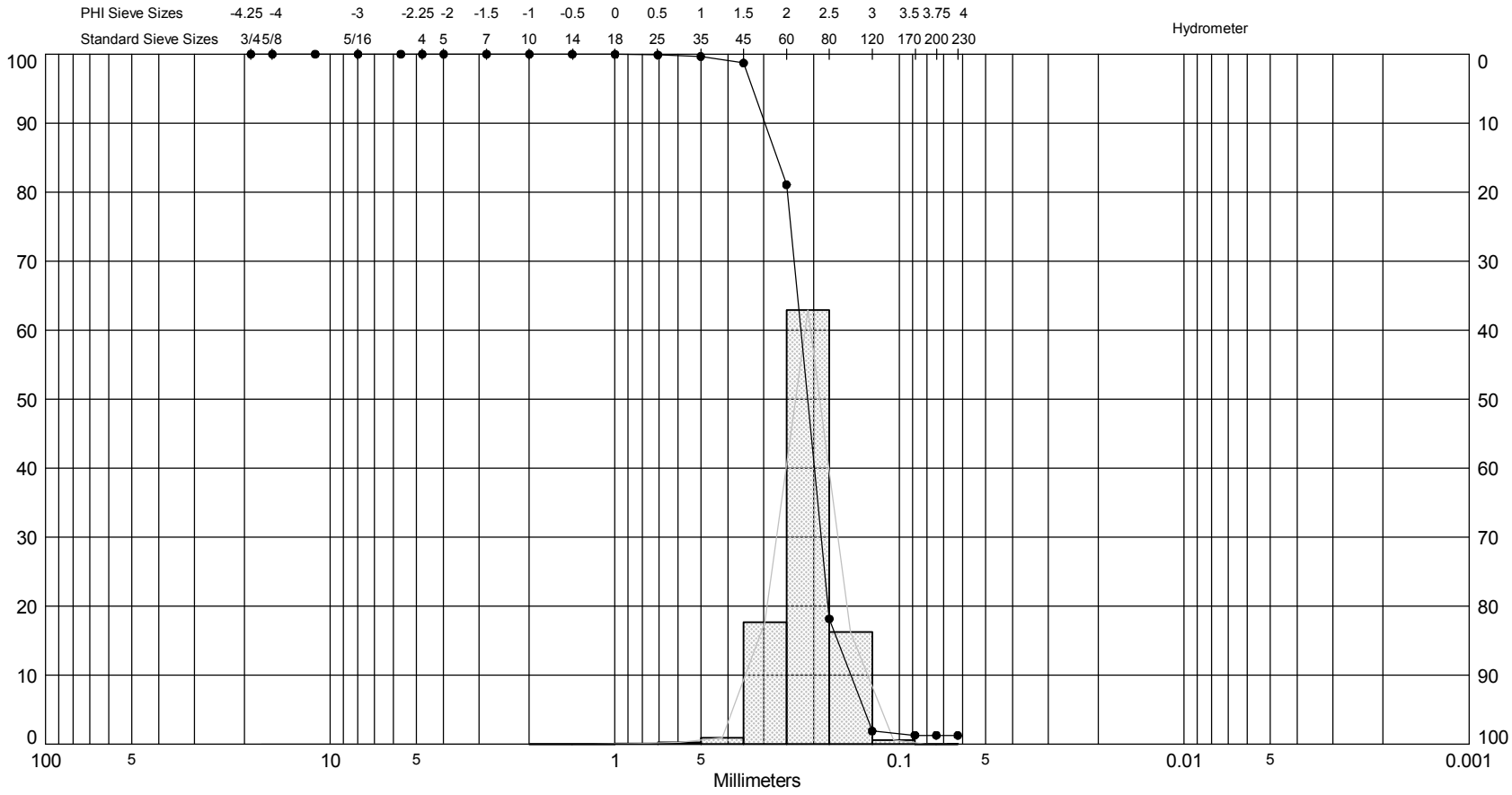

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-11 #2	—●—	-8.4	SP	#200 - 1.28 #230 - 1.27		5	2.25	2.23	-0.54	6.38	0.34

Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
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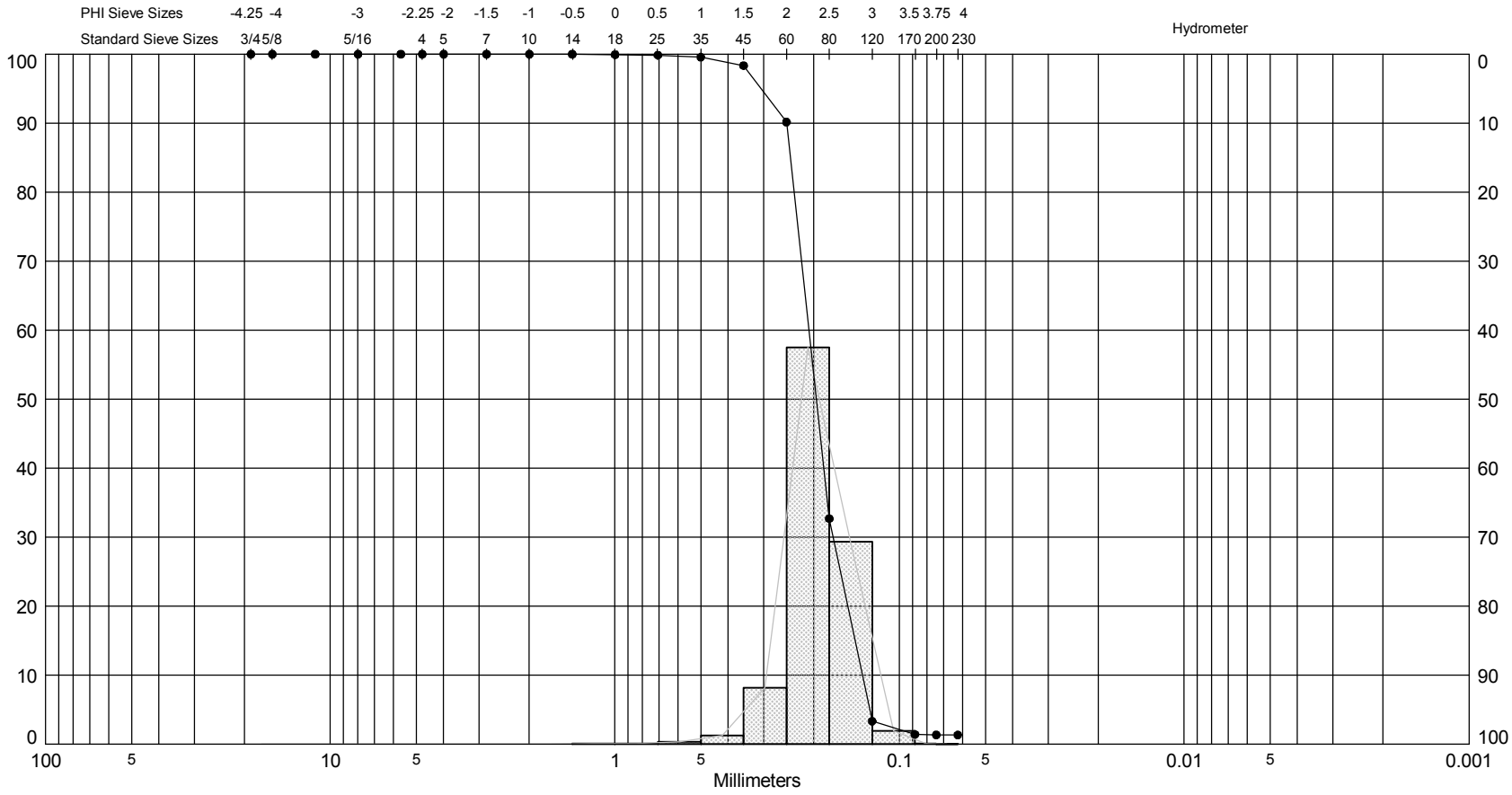
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-20-07
Analyzed By:	PB
Easting (X, ft):	2,386,946
Northing (Y, ft):	201,018
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-11 #3	—●—	-13.4	SP	#200 - 1.33 #230 - 1.32		5	2.35	2.36	-0.68	6.57	0.36

Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
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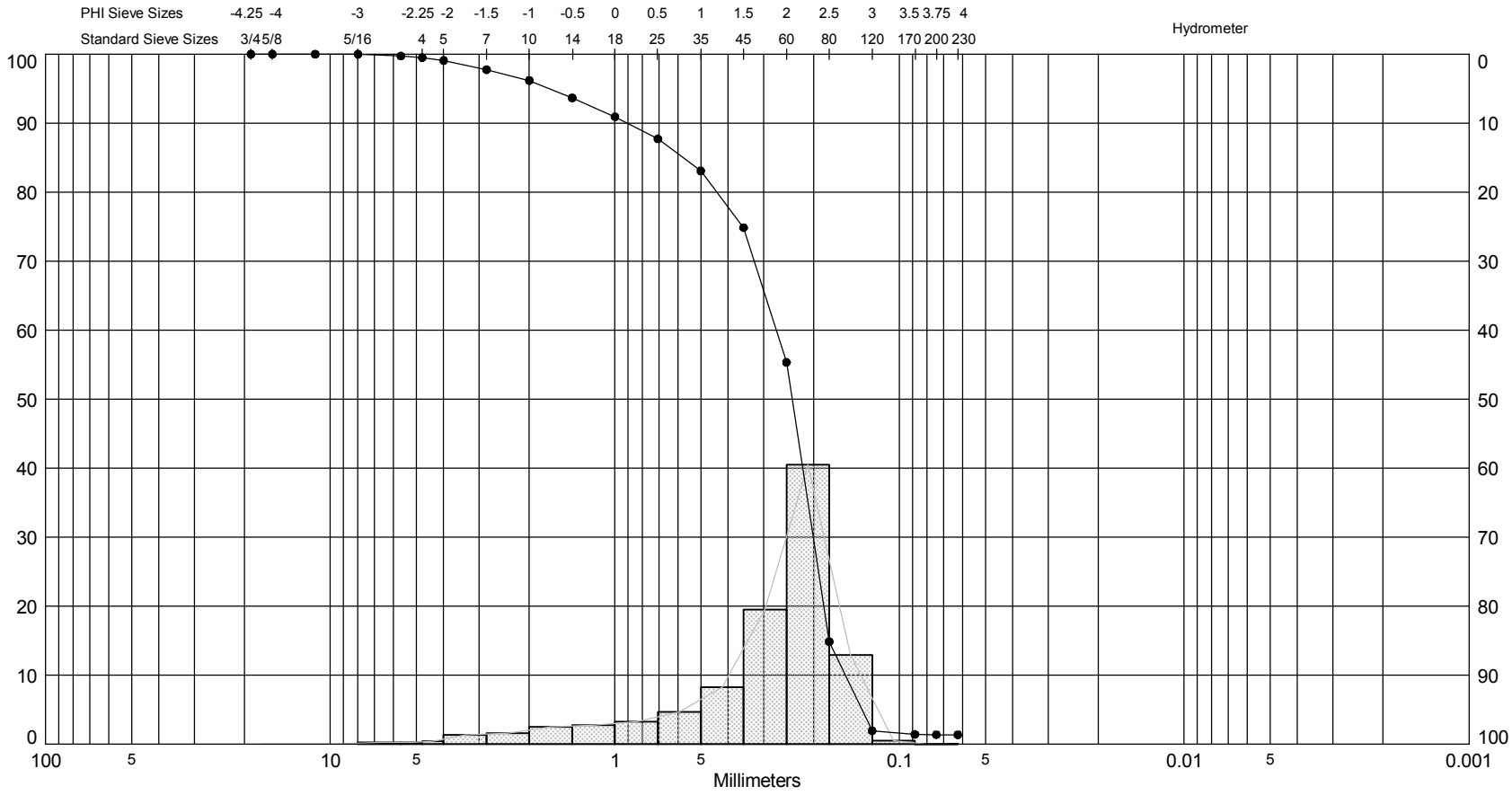
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-20-07
Analyzed By:	PB
Easting (X, ft):	2,386,946
Northing (Y, ft):	201,018
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-11 #4	—●—	-17.4	SW	#200 - 1.37 #230 - 1.36		17	2.07	1.71	-1.76	5.95	1.06

Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
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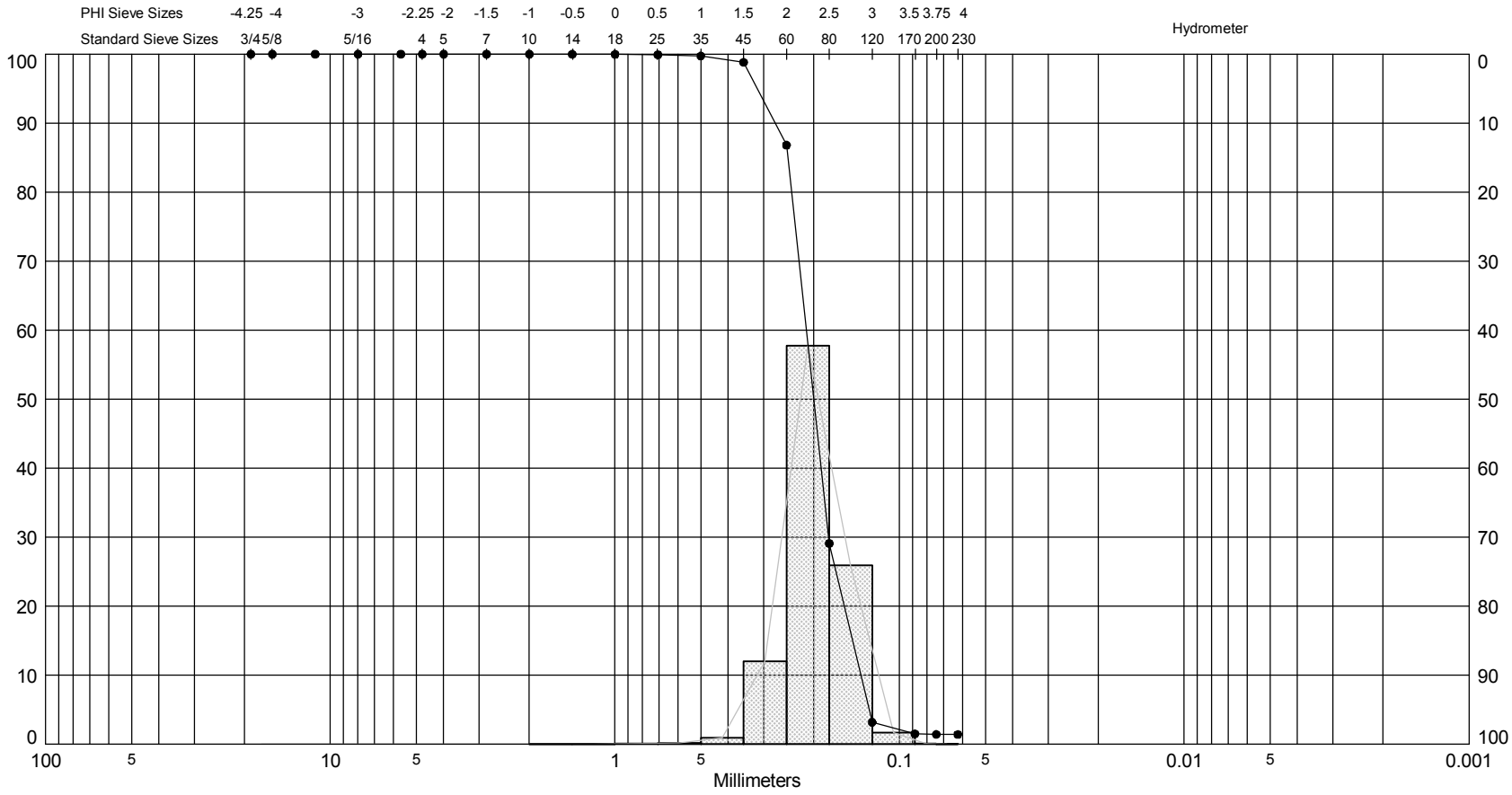
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-21-07
Analyzed By:	PB
Easting (X, ft):	2,386,946
Northing (Y, ft):	201,018
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-12 #1	—●—	-9.5	SP	#200 - 1.40 #230 - 1.38		4	2.32	2.32	-0.39	5.66	0.36

Comments:

Depths and elevations based on measured values

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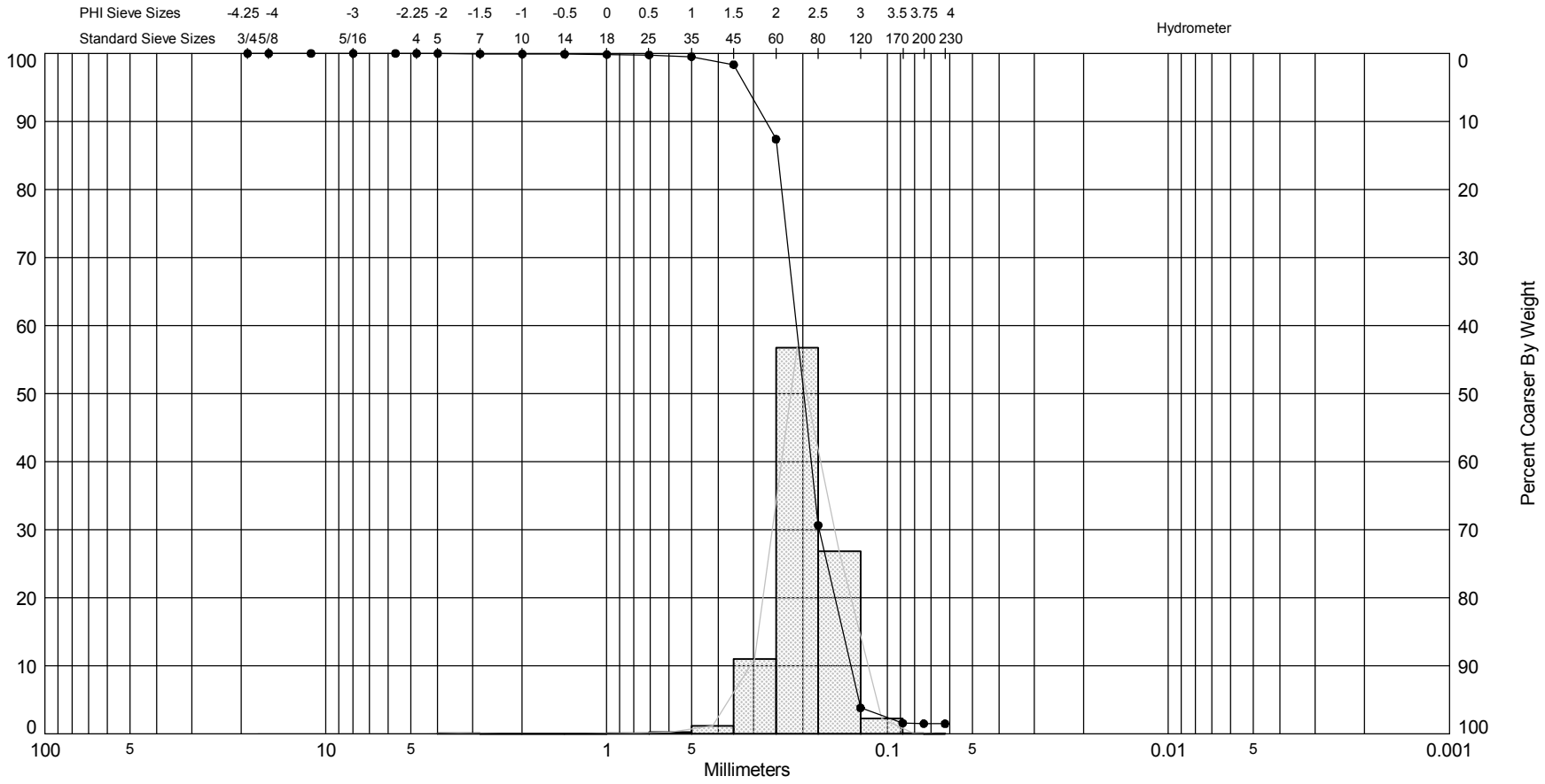
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-21-07
Analyzed By:	PB
Easting (X, ft):	2,386,433
Northing (Y, ft):	200,711
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-12 #2	—●—	-14.5	SP	#200 - 1.49 #230 - 1.47		5	2.33	2.33	-1.47	15.61	0.39

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-21-07
Analyzed By:	PB
Easting (X, ft):	2,386,433
Northing (Y, ft):	200,711
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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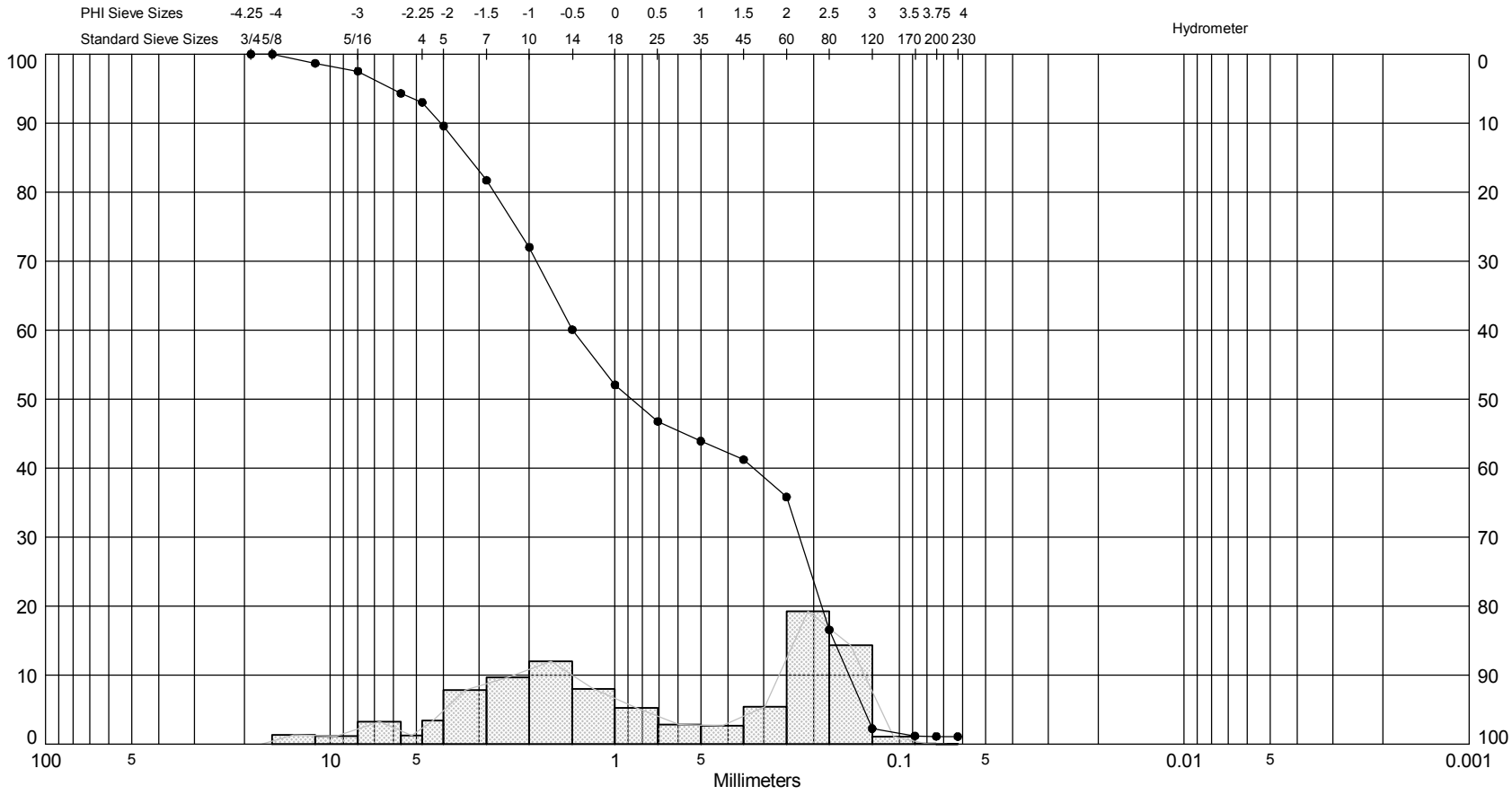
SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-12 #3	—●—	-17.2	SW	#200 - 1.12 #230 - 1.10		35	0.19	0.38	-0.16	1.73	1.88

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-21-07
Analyzed By:	PB
Easting (X, ft):	2,386,433
Northing (Y, ft):	200,711
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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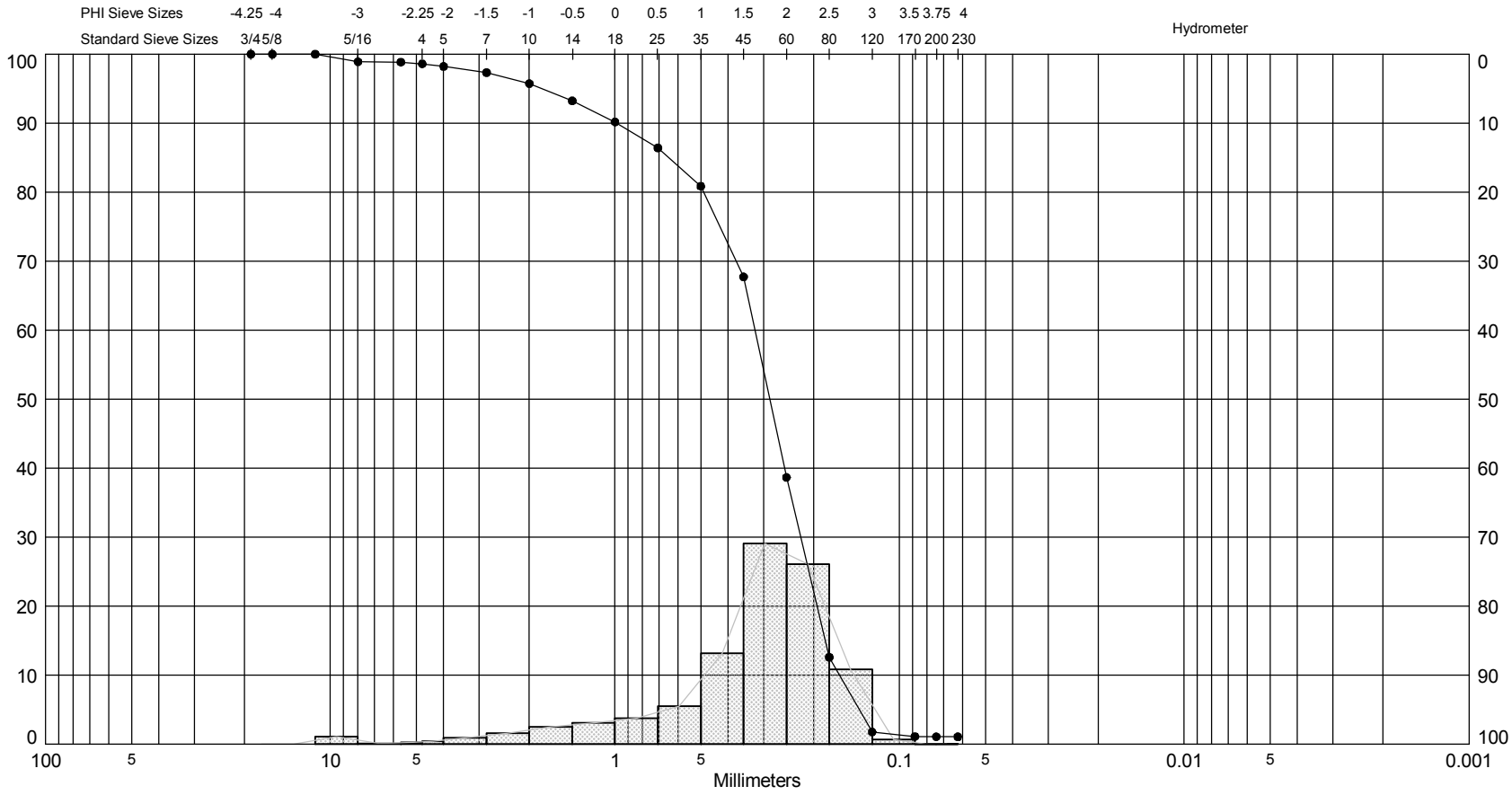

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-13 #1	—●—	-11.1	SW	#200 - 1.07 #230 - 1.05		17	1.8	1.53	-1.81	6.96	1.12

Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
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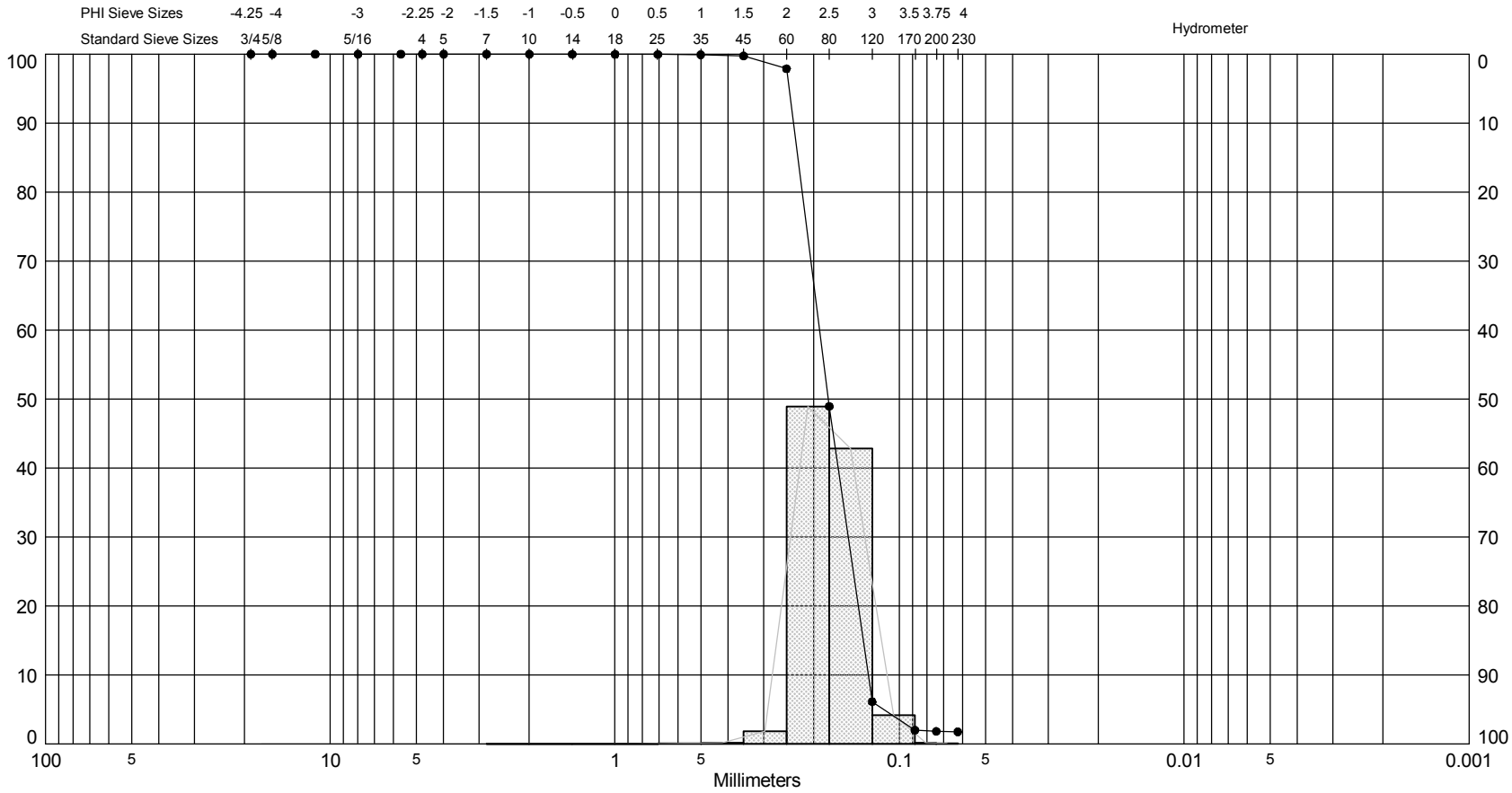
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-21-07
Analyzed By:	PB
Easting (X, ft):	2,385,692
Northing (Y, ft):	200,595
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-13 #2	—●—	-14.6	SP	#200 - 1.82 #230 - 1.76		4	2.49	2.5	-0.23	7.69	0.32

Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
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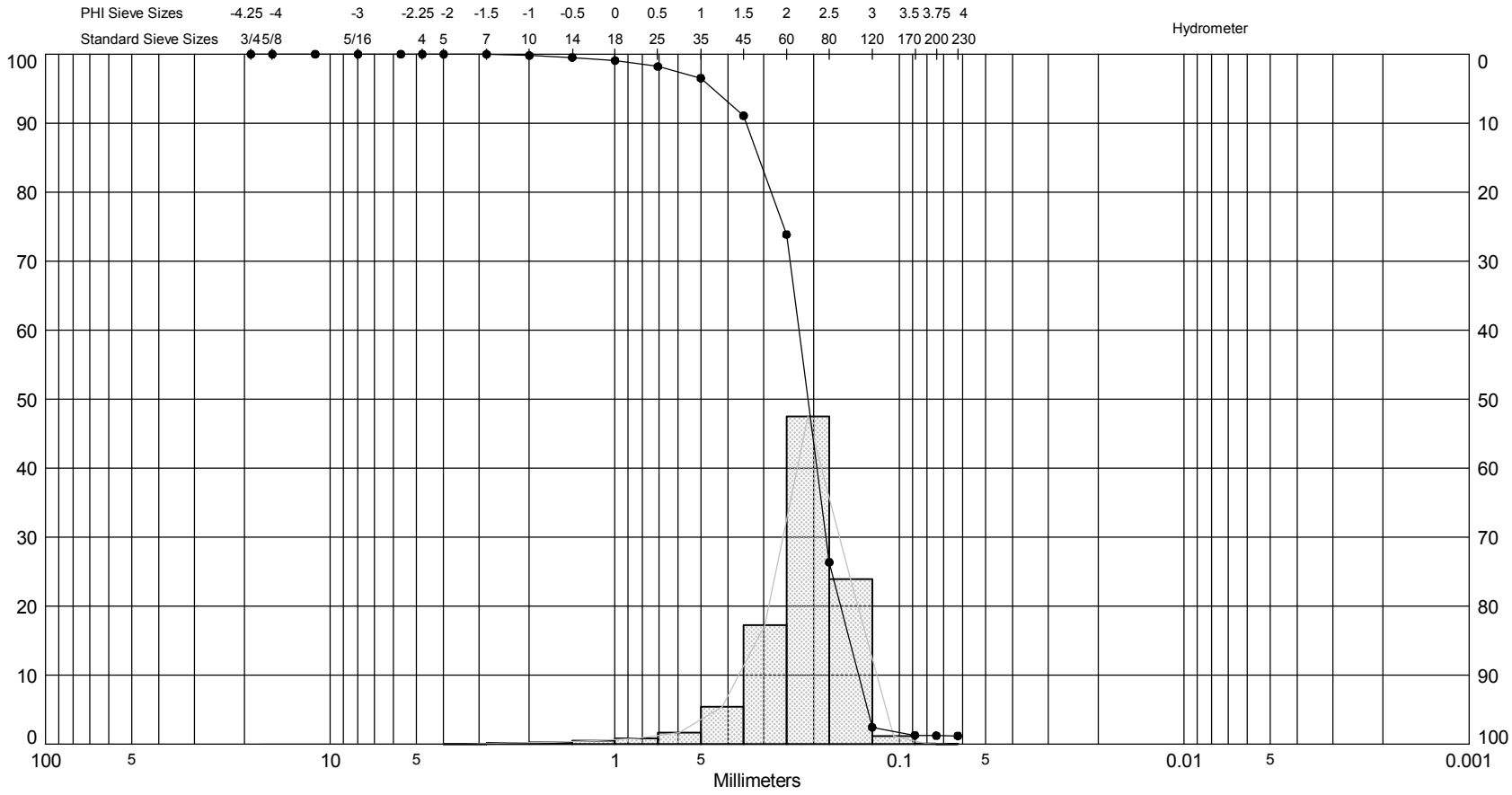
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-21-07
Analyzed By:	PB
Easting (X, ft):	2,385,692
Northing (Y, ft):	200,595
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-13 #3	—●—	-17.1	SP	#200 - 1.22 #230 - 1.20		6	2.25	2.17	-1.77	9.11	0.56

Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
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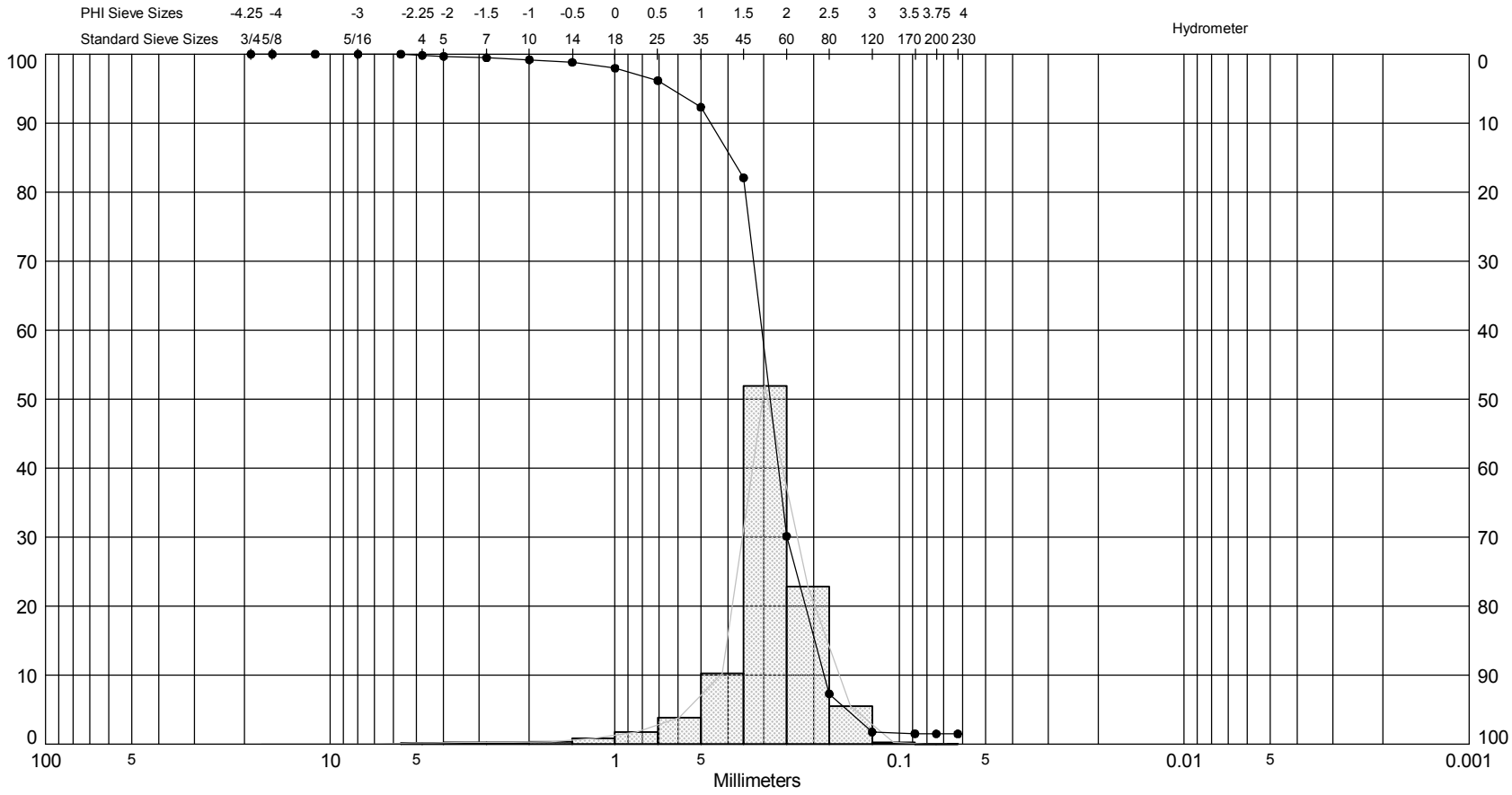
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-21-07
Analyzed By:	PB
Easting (X, ft):	2,385,692
Northing (Y, ft):	200,595
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-13 #4	—●—	-22.1	SP	#200 - 1.48 #230 - 1.47			1.81	1.75	-2.16	12.54	0.62

Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
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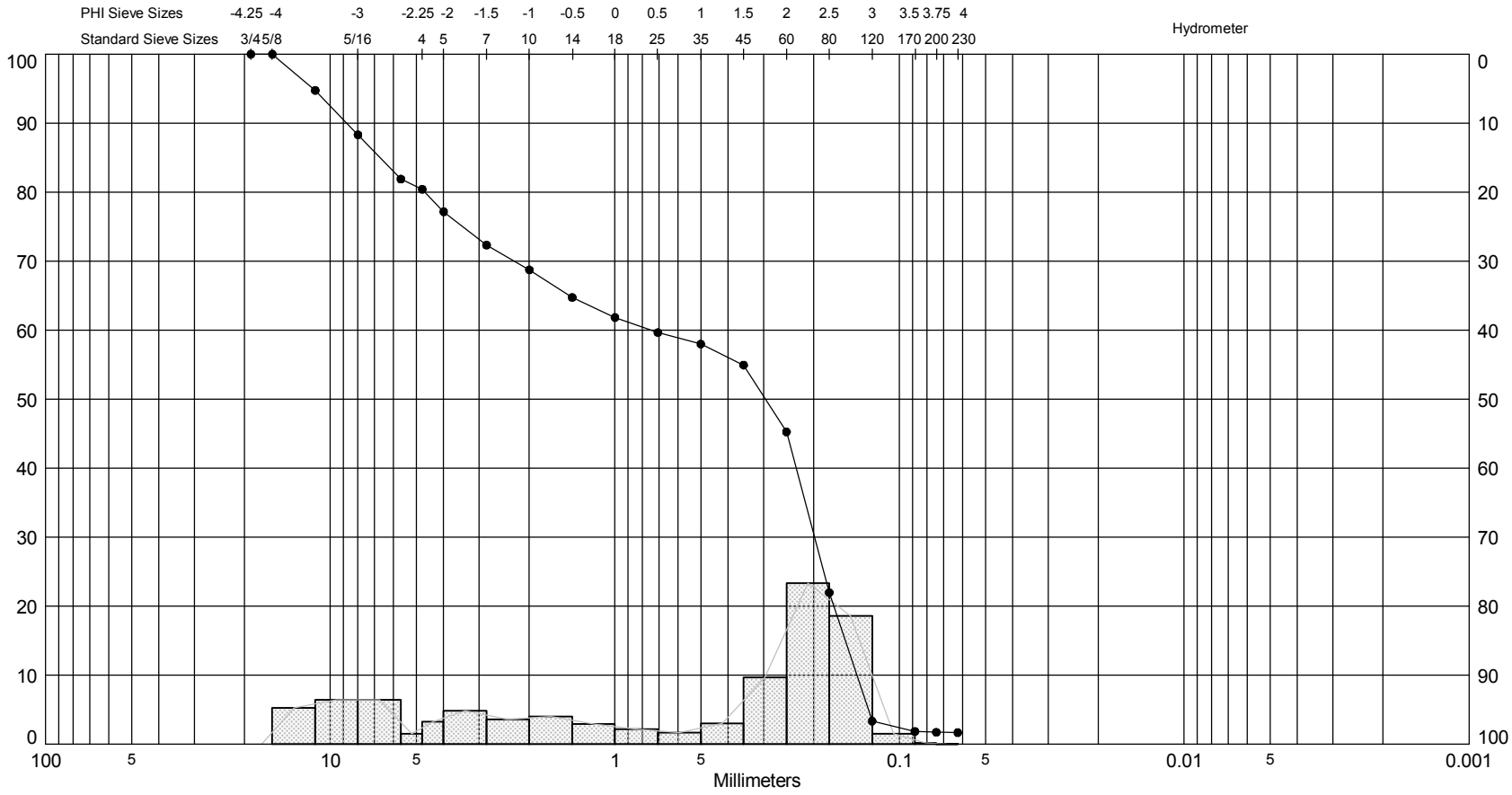
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-21-07
Analyzed By:	PB
Easting (X, ft):	2,385,692
Northing (Y, ft):	200,595
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-13 #5	—●—	-23.6	SW	#200 - 1.71 #230 - 1.67			1.76	0.47	-0.57	1.72	2.31

Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
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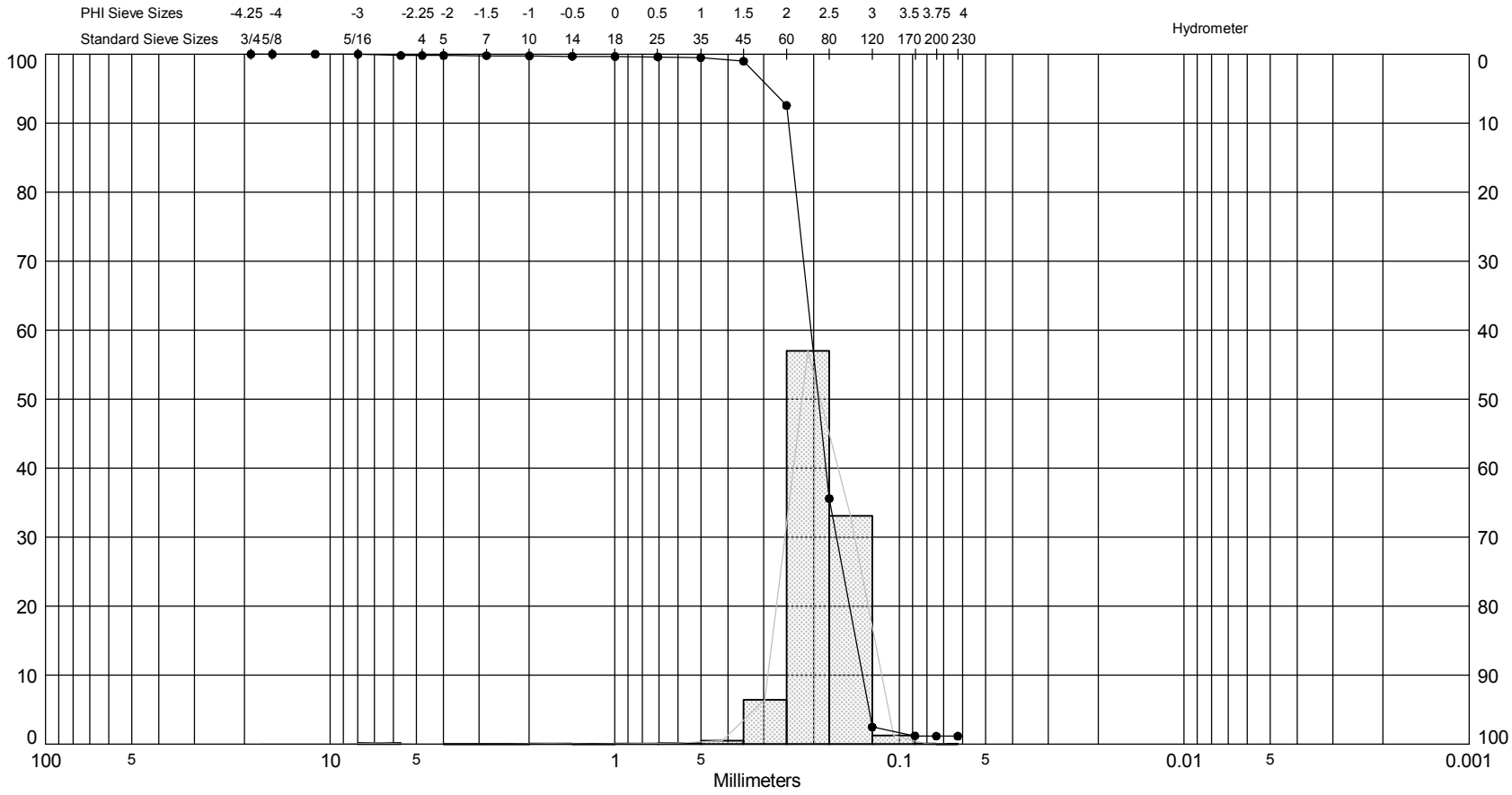
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-22-07
Analyzed By:	PB
Easting (X, ft):	2,385,692
Northing (Y, ft):	200,595
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-14 #1	—●—	-9.0	SP	#200 - 1.15 #230 - 1.14			2.37	2.38	-4.62	54.91	0.41

Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
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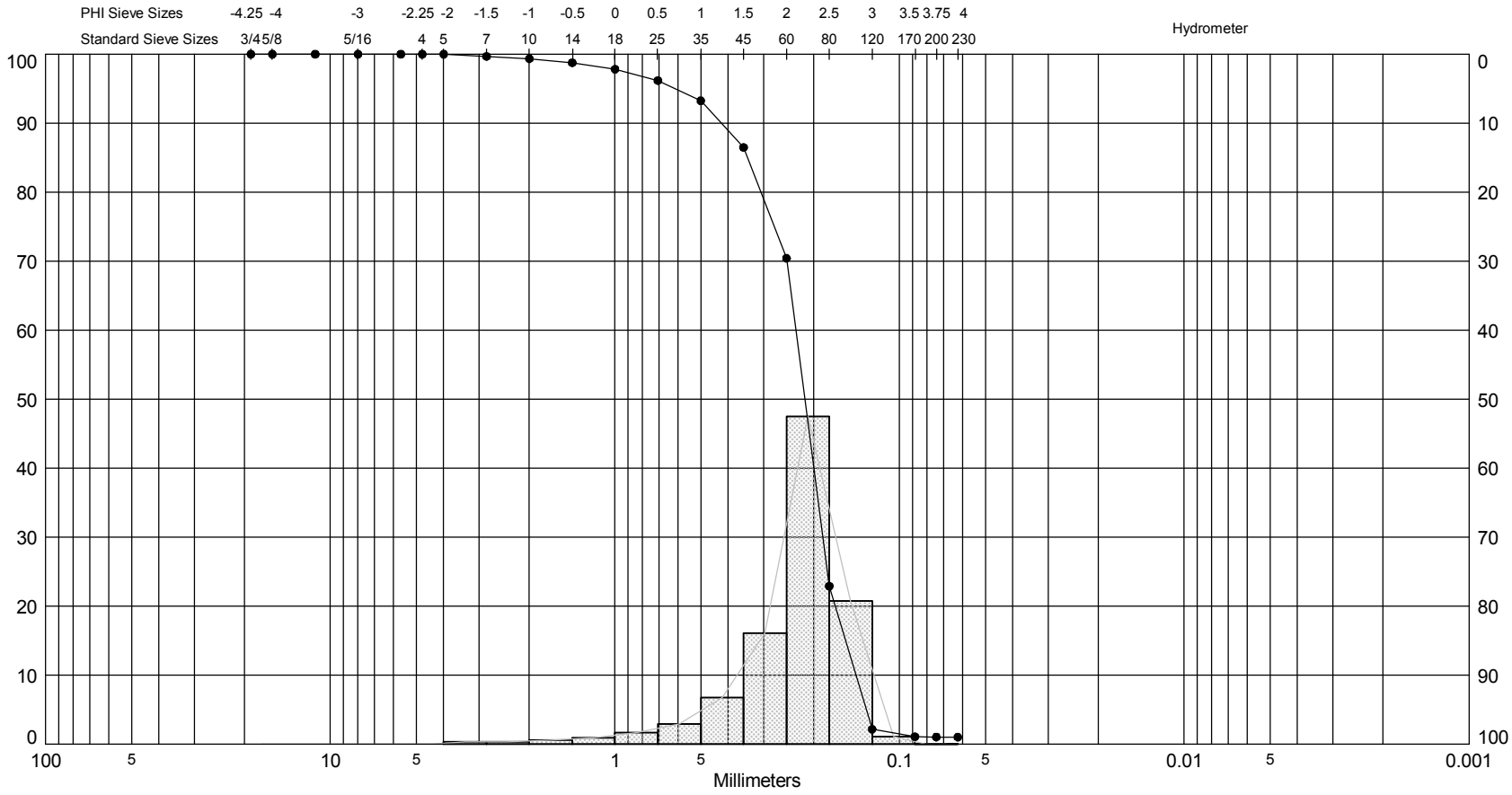
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-22-07
Analyzed By:	PB
Easting (X, ft):	2,387,347
Northing (Y, ft):	202,224
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-14 #2	—●—	-12.9	SP	#200 - 1.03 #230 - 1.02			2.21	2.07	-2.04	9.2	0.69

Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
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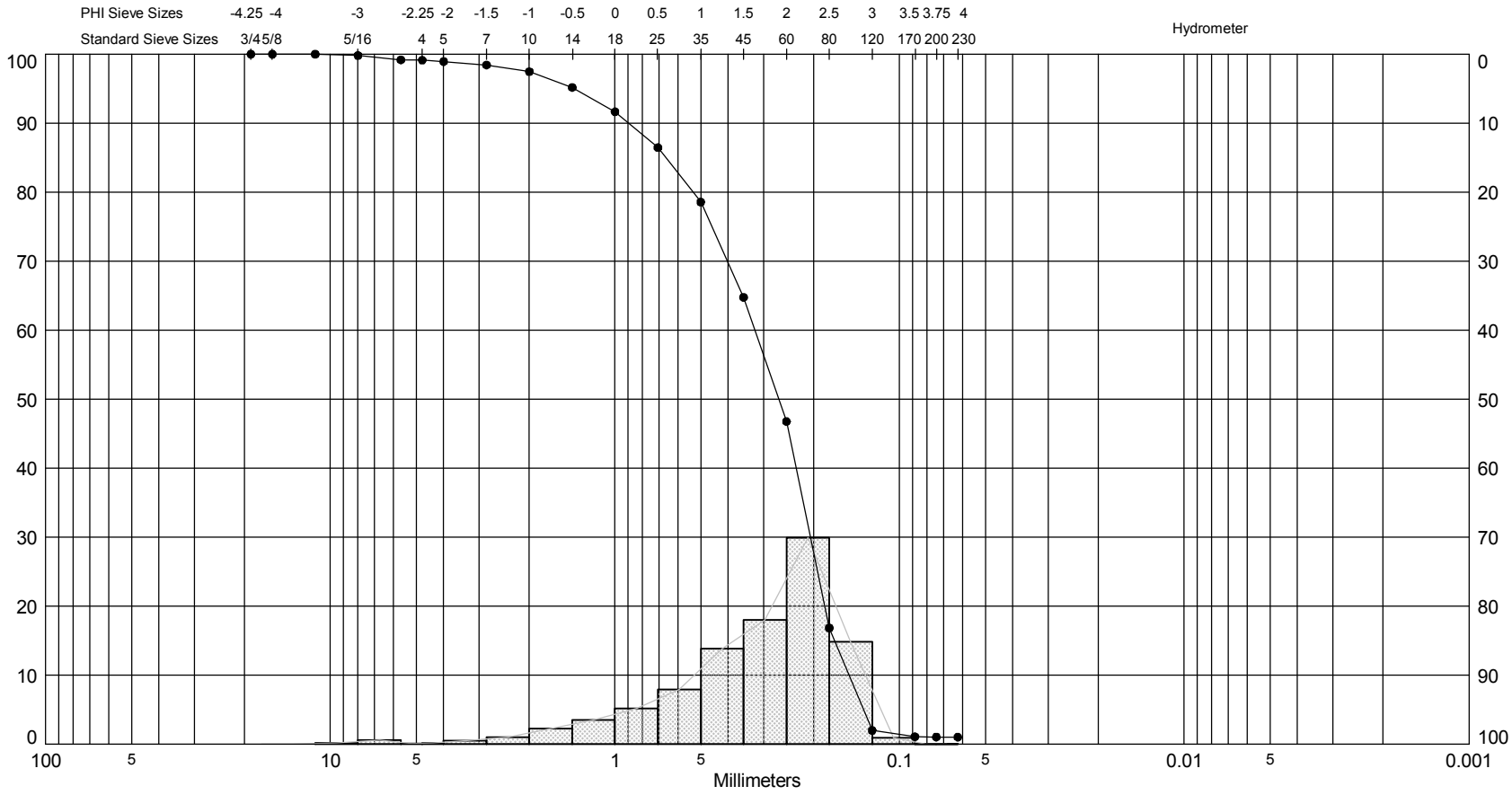
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-22-07
Analyzed By:	PB
Easting (X, ft):	2,387,347
Northing (Y, ft):	202,224
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-14 #3	—●—	-13.5	SW	#200 - 1.03 #230 - 1.02			1.91	1.61	-1.44	5.61	1.06

Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
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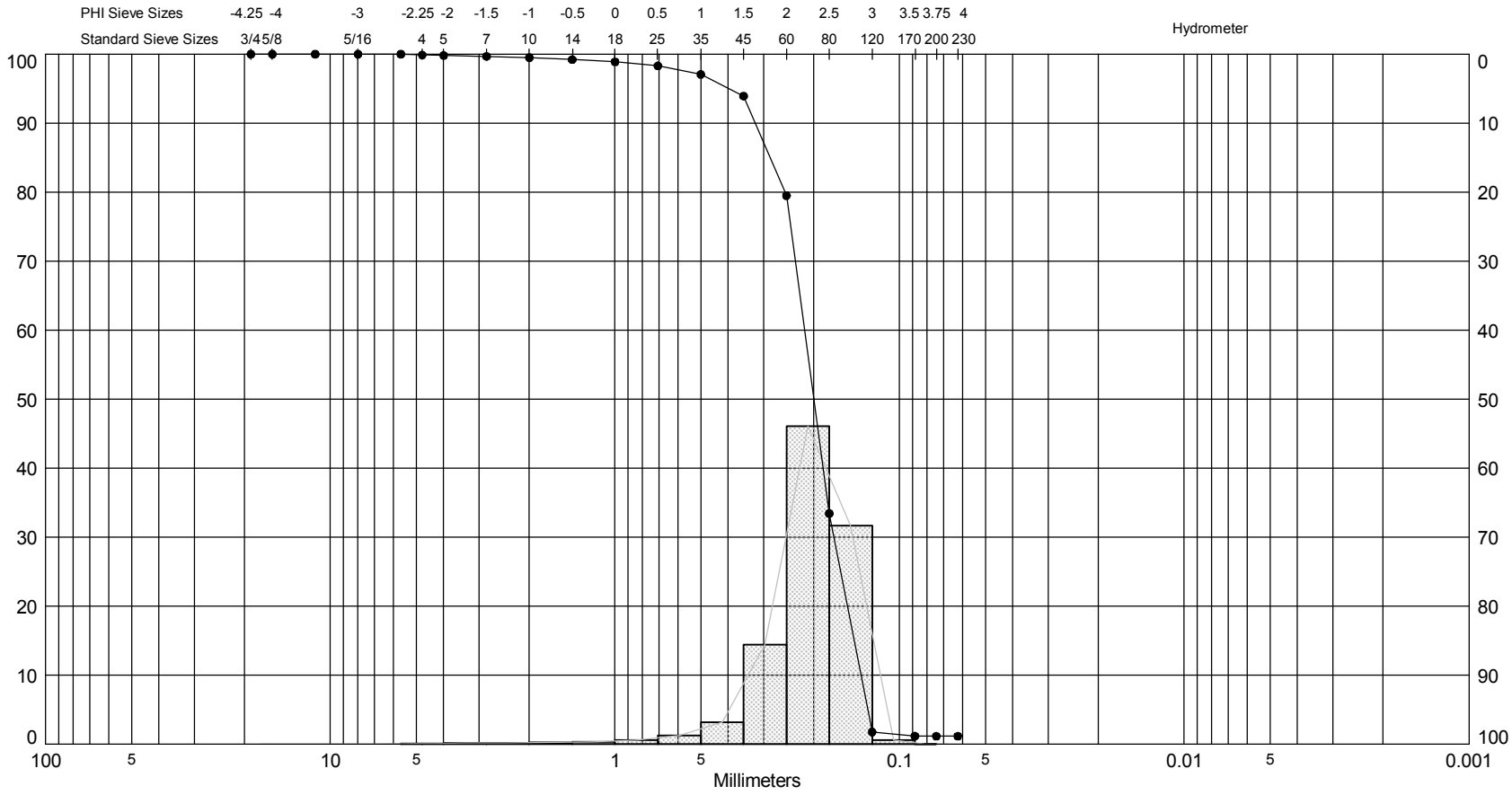
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-22-07
Analyzed By:	PB
Easting (X, ft):	2,387,347
Northing (Y, ft):	202,224
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-14 #4	—●—	-16.5	SP	#200 - 1.13 #230 - 1.13			2.32	2.24	-2.86	17.67	0.58

Comments:

Depths and elevations based on measured values

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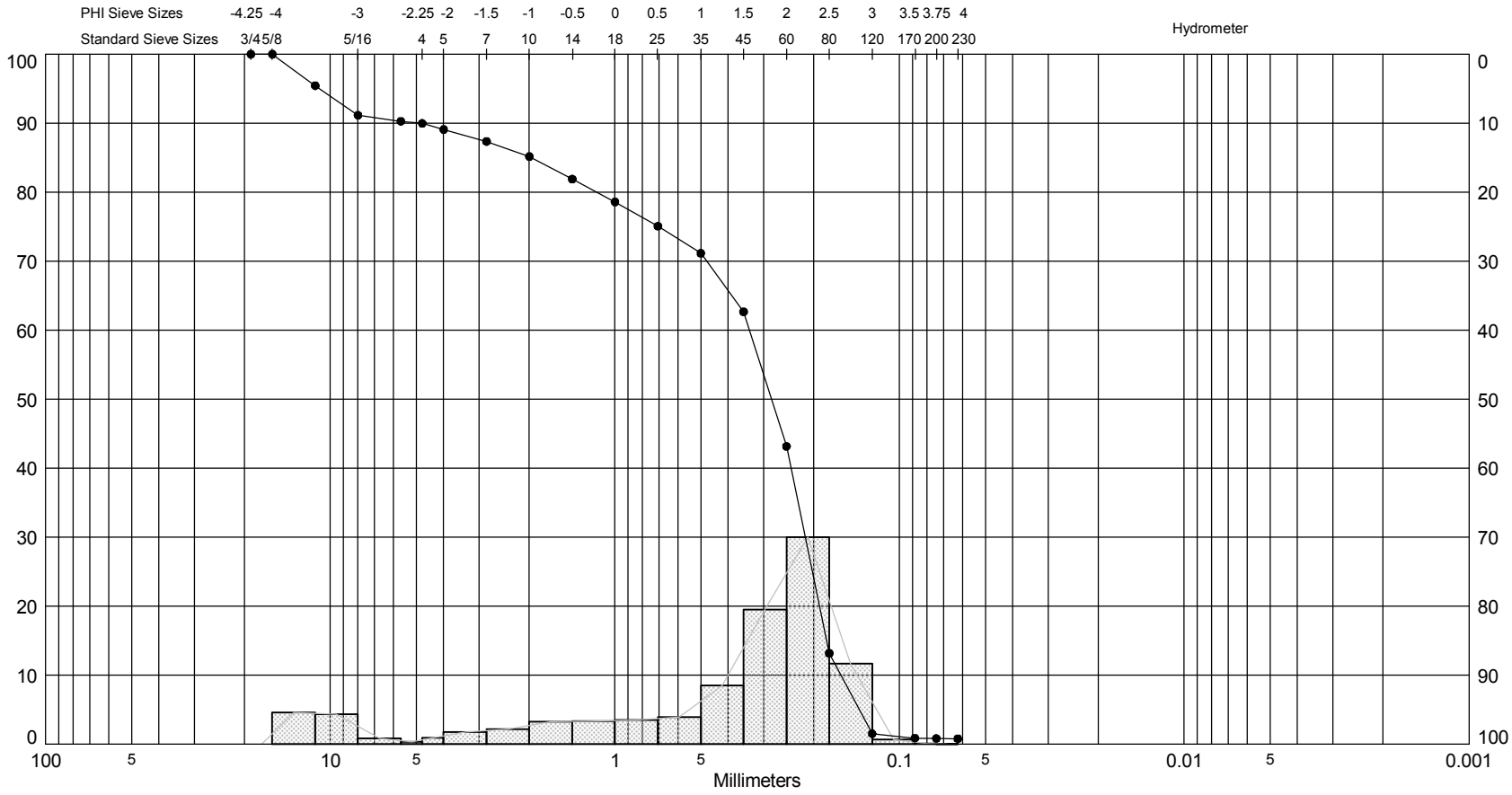
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-25-07
Analyzed By:	PB
Easting (X, ft):	2,387,347
Northing (Y, ft):	202,224
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-14 #5	—●—	-18.8	SW	#200 - 0.81 #230 - 0.79			1.82	1.06	-1.43	3.89	1.86

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-25-07
Analyzed By:	PB
Easting (X, ft):	2,387,347
Northing (Y, ft):	202,224
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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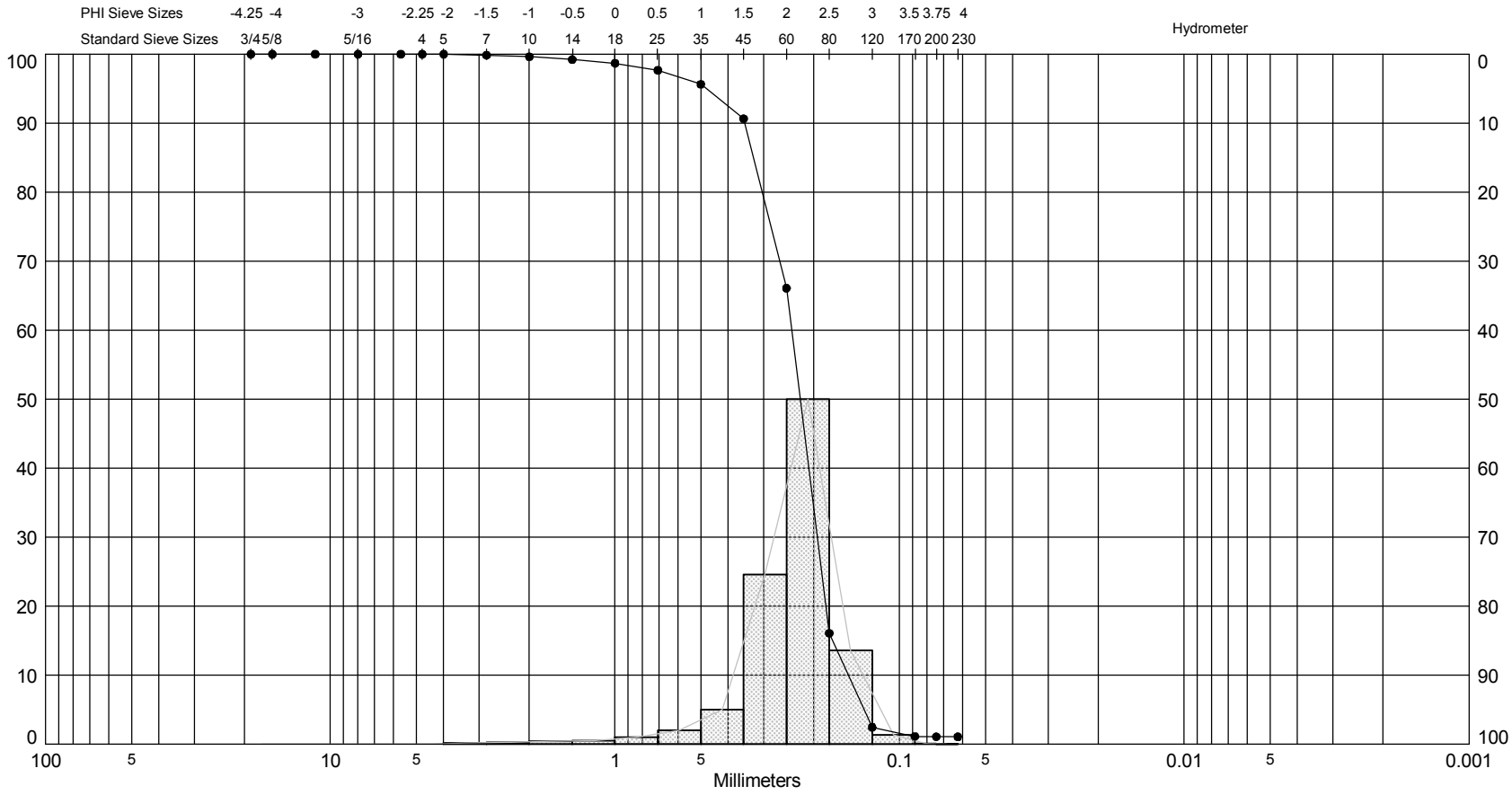
SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-15 #1	—●—	-6.8	SP	#200 - 1.07 #230 - 1.05		8	2.16	2.07	-2.01	10.99	0.58

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-25-07
Analyzed By:	PB
Easting (X, ft):	2,388,715
Northing (Y, ft):	200,330
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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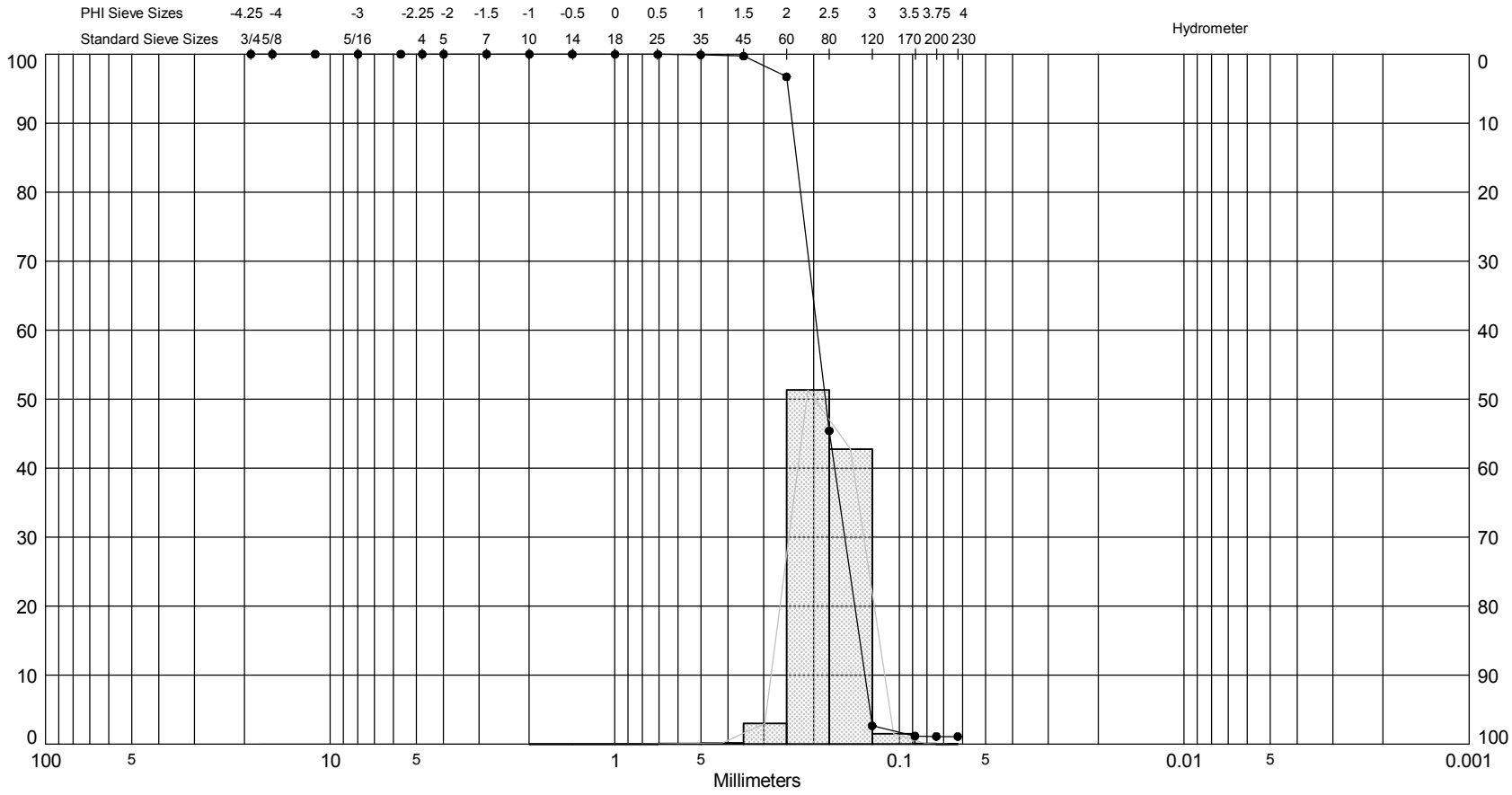
SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-15 #2	—●—	-10.8	SP	#200 - 1.11 #230 - 1.10		3	2.46	2.46	-0.45	6.17	0.3

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-25-07
Analyzed By:	PB
Easting (X, ft):	2,388,715
Northing (Y, ft):	200,330
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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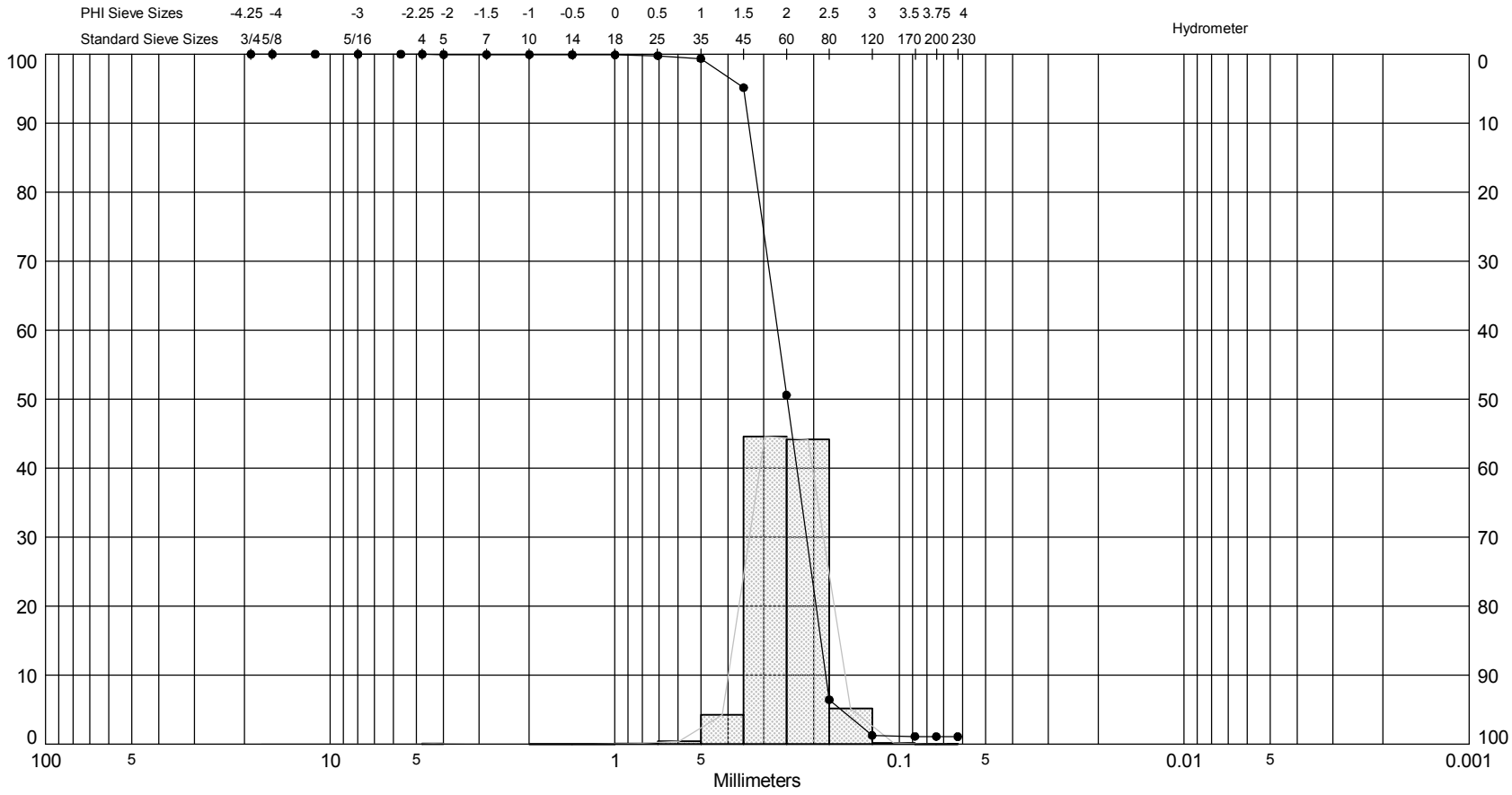

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-15 #3	—●—	-17.3	SP	#200 - 1.10 #230 - 1.09		6	2.01	2	-0.96	12.17	0.37

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-25-07
Analyzed By:	PB
Easting (X, ft):	2,388,715
Northing (Y, ft):	200,330
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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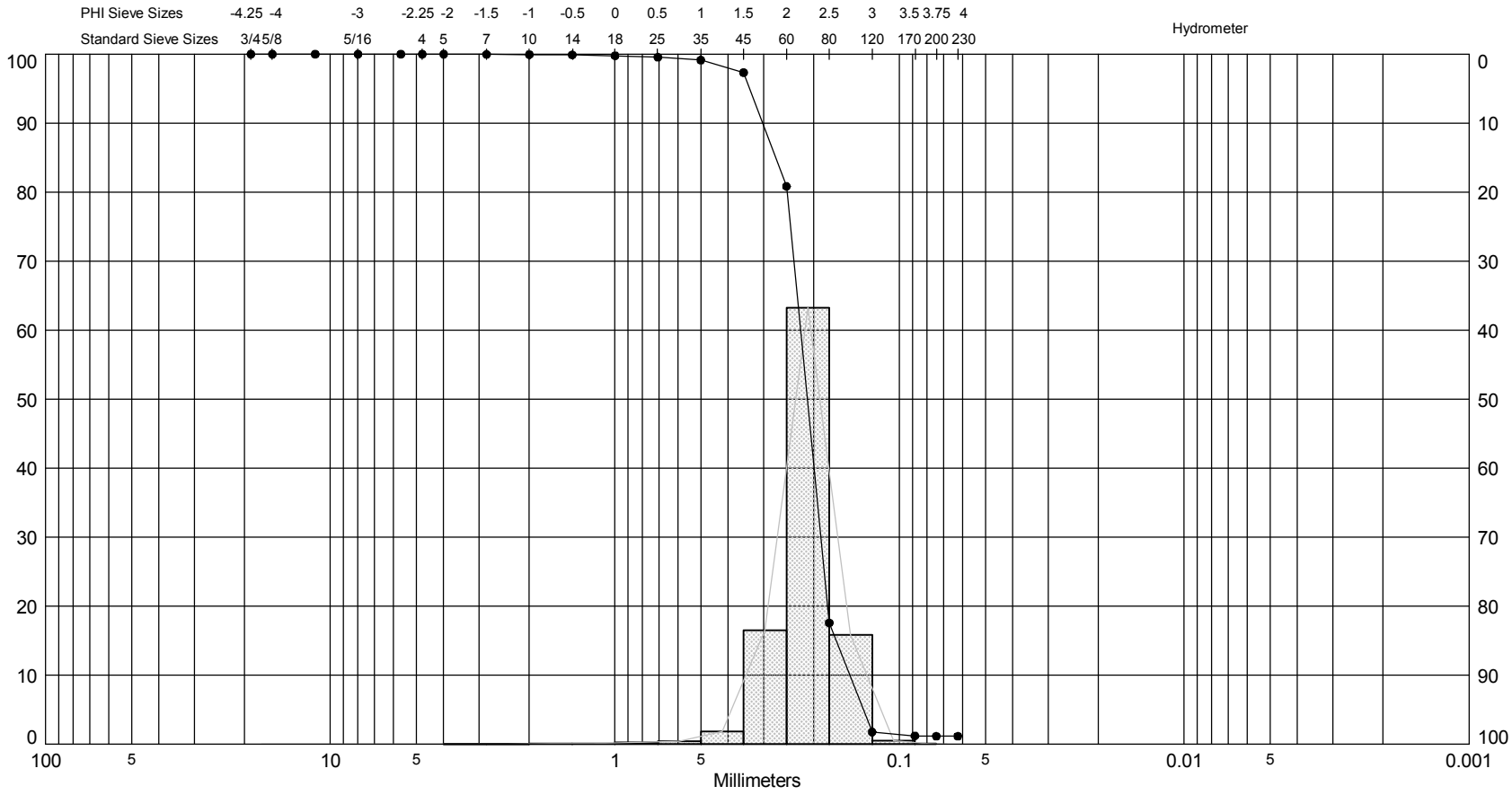

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-16 #1	—●—	-1.0	SP	#200 - 1.13 #230 - 1.13		4	2.24	2.22	-1.72	14.47	0.38

Comments:

Depths and elevations based on measured values

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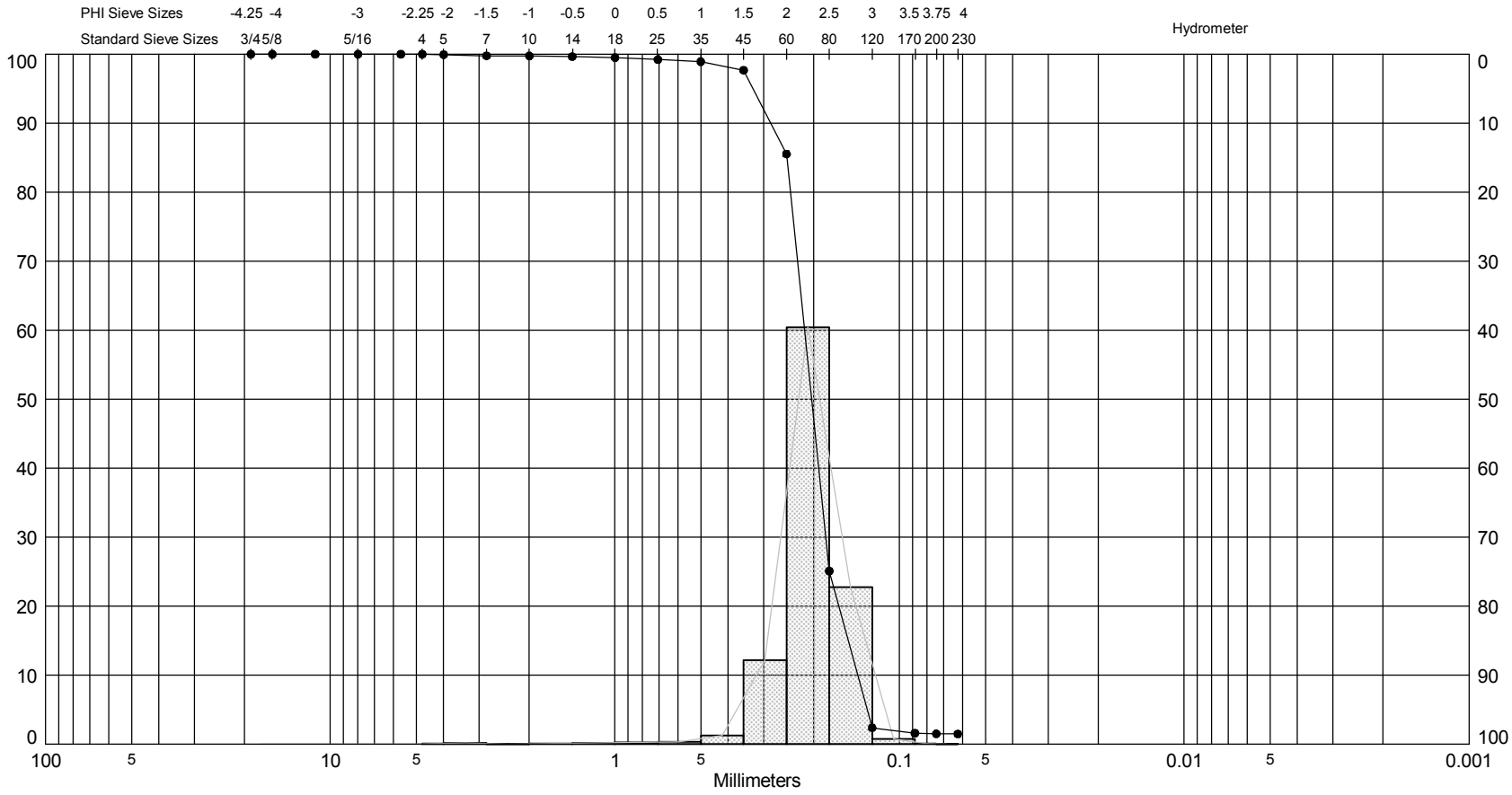
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-26-07
Analyzed By:	RS
Easting (X, ft):	2,388,474
Northing (Y, ft):	201,638
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-16 #2	—●—	-4.5	SP	#200 - 1.49 #230 - 1.46		6	2.29	2.27	-3.08	26.85	0.44

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-26-07
Analyzed By:	RS
Easting (X, ft):	2,388,474
Northing (Y, ft):	201,638
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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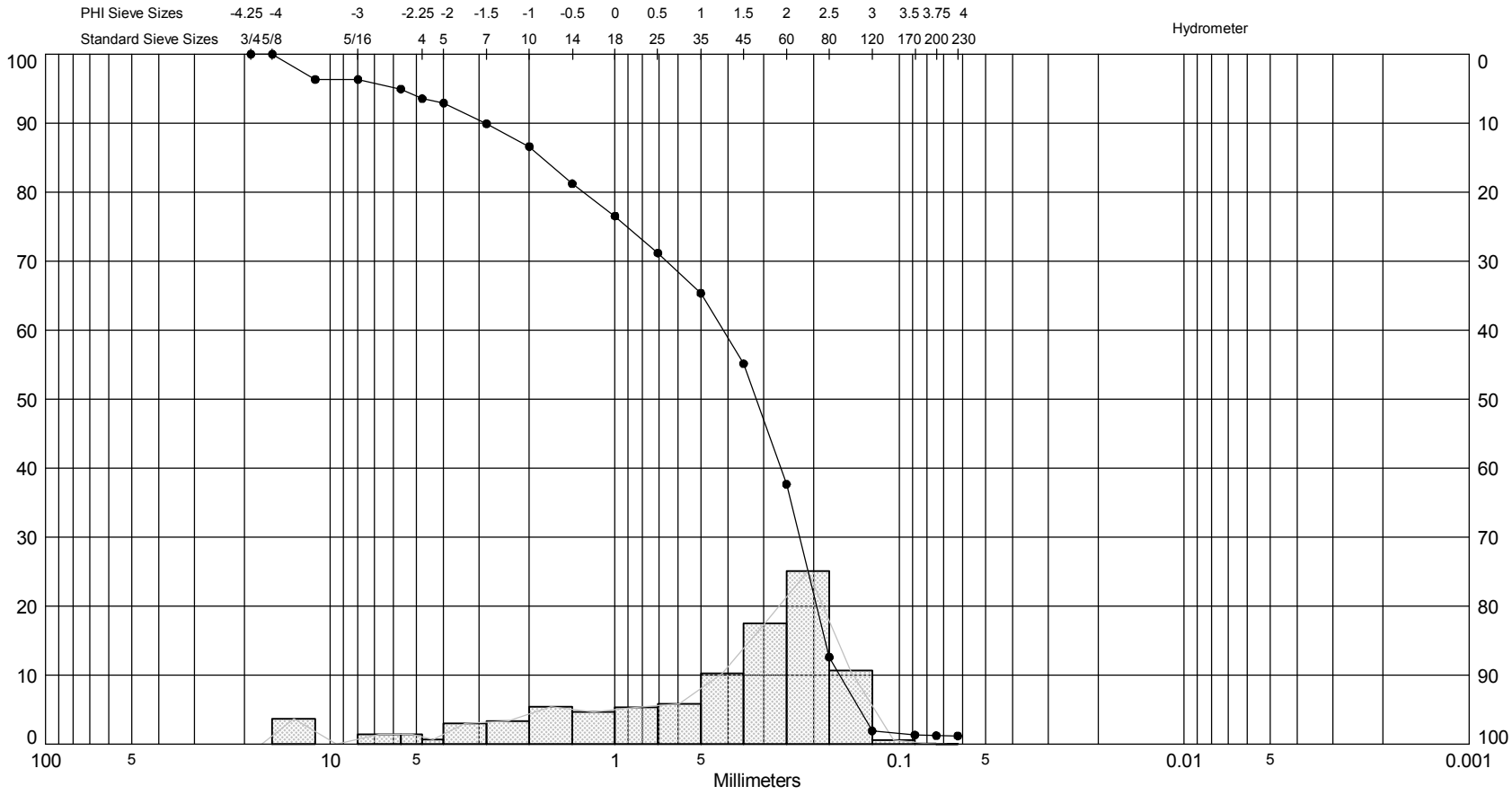

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-16 #3	—●—	-7.7	SW	#200 - 1.22 #230 - 1.19		20	1.65	1.02	-1.23	3.77	1.67

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-26-07
Analyzed By:	RS
Easting (X, ft):	2,388,474
Northing (Y, ft):	201,638
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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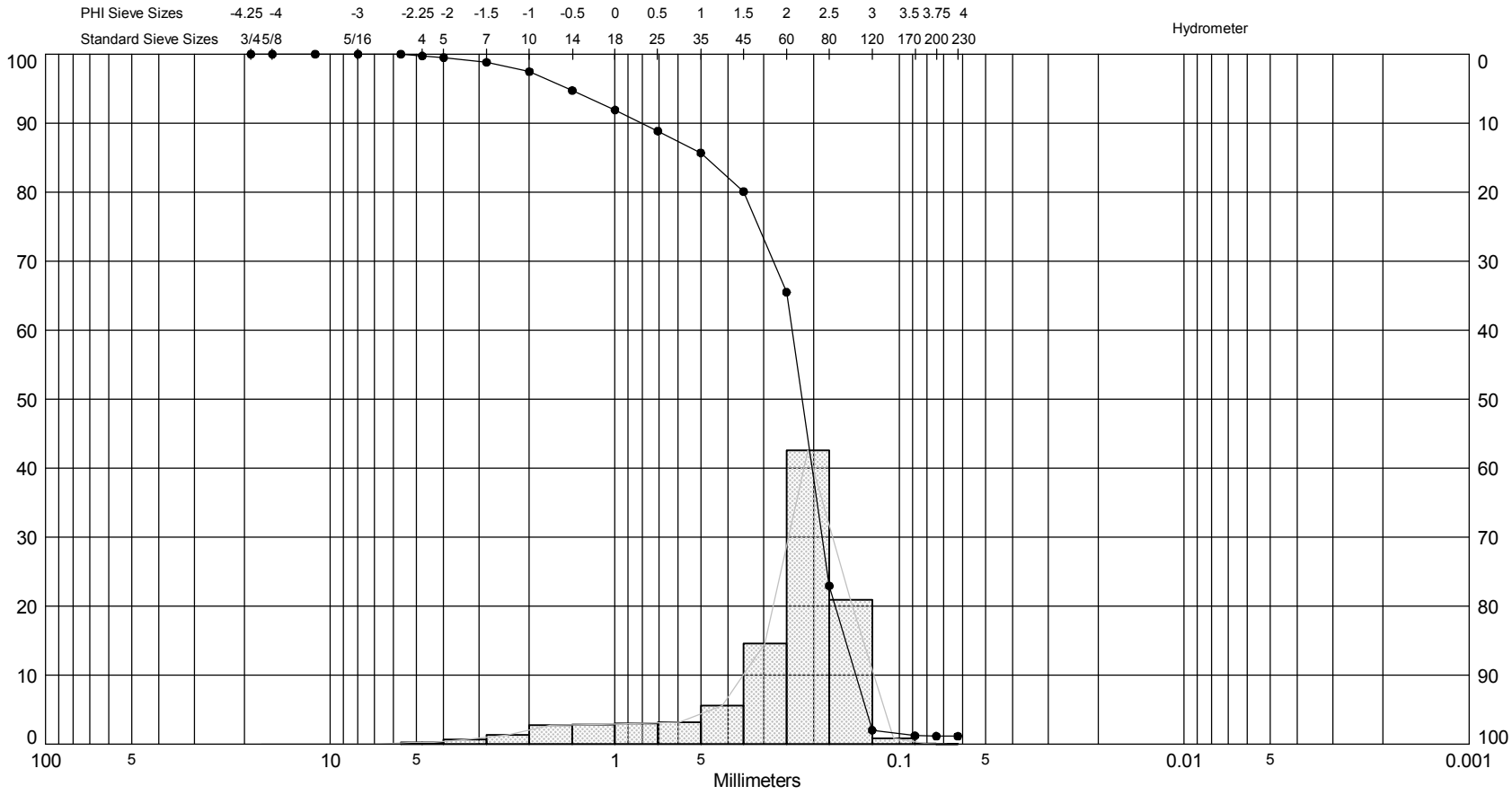

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-16A #1	—●—	-7.8	SW	#200 - 1.14 #230 - 1.13			2.18	1.87	-1.82	6.08	1.01

Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
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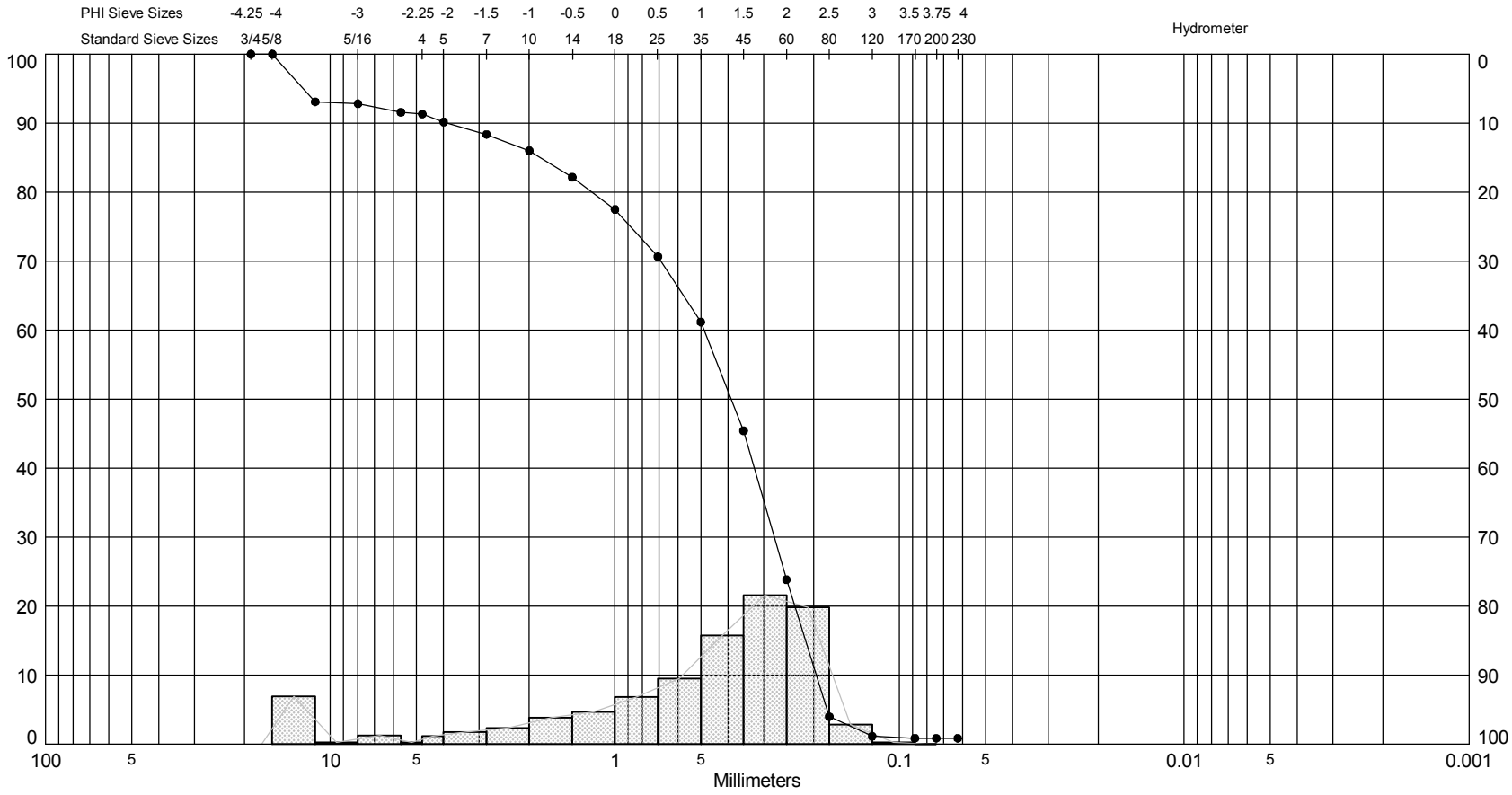
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-15-07
Analyzed By:	PB
Easting (X, ft):	2,388,474
Northing (Y, ft):	201,638
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-16A #2	—●—	-10.3	SW	#200 - 0.85 #230 - 0.85		29	1.35	0.77	-1.41	4.18	1.71

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-26-07
Analyzed By:	RS
Easting (X, ft):	2,388,474
Northing (Y, ft):	201,638
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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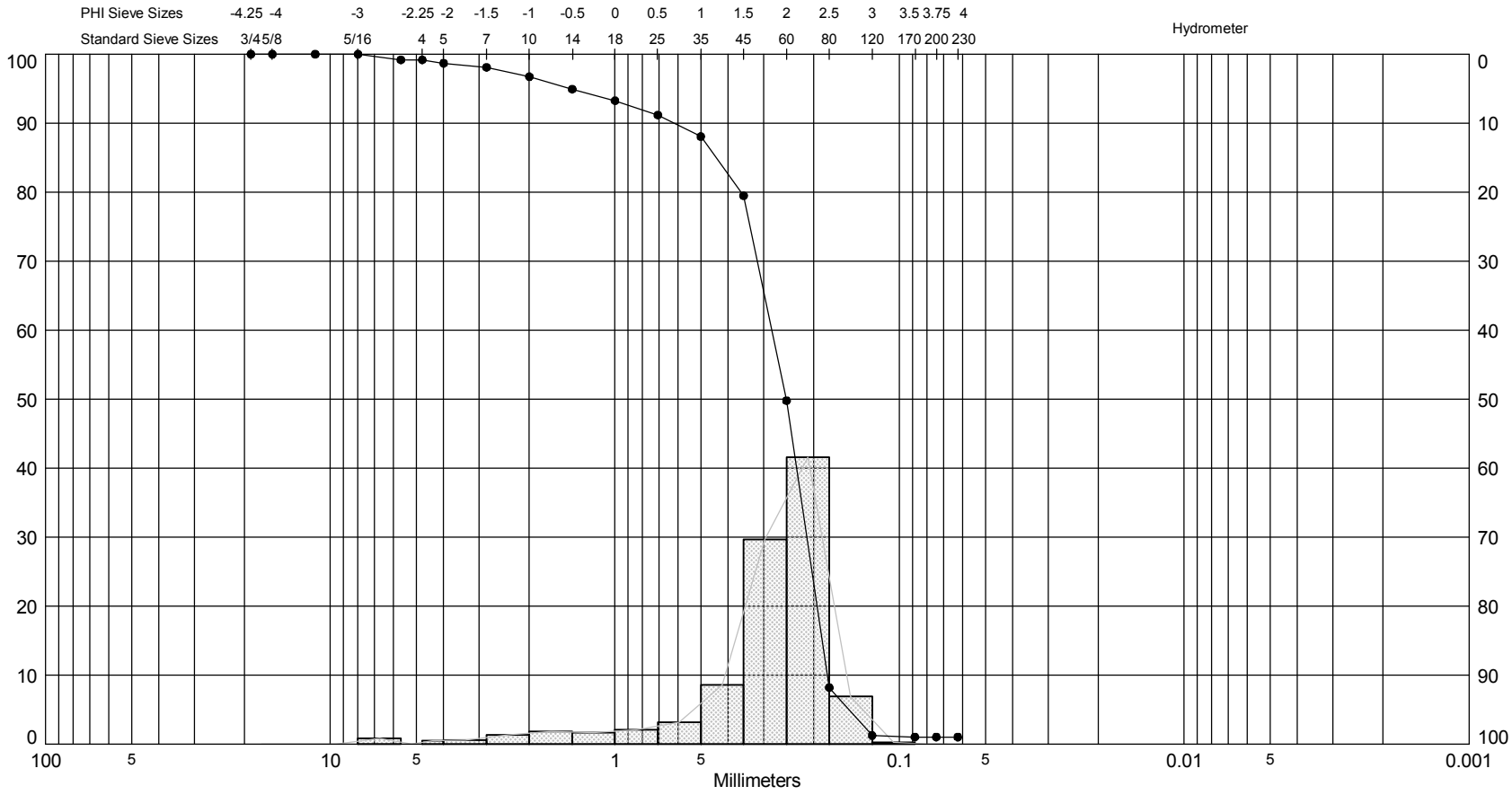

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-16A #3	—●—	-13.9	SW	#200 - 1.03 #230 - 1.03		13	2	1.73	-2.36	9.34	0.95

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-26-07
Analyzed By:	RS
Easting (X, ft):	2,388,474
Northing (Y, ft):	201,638
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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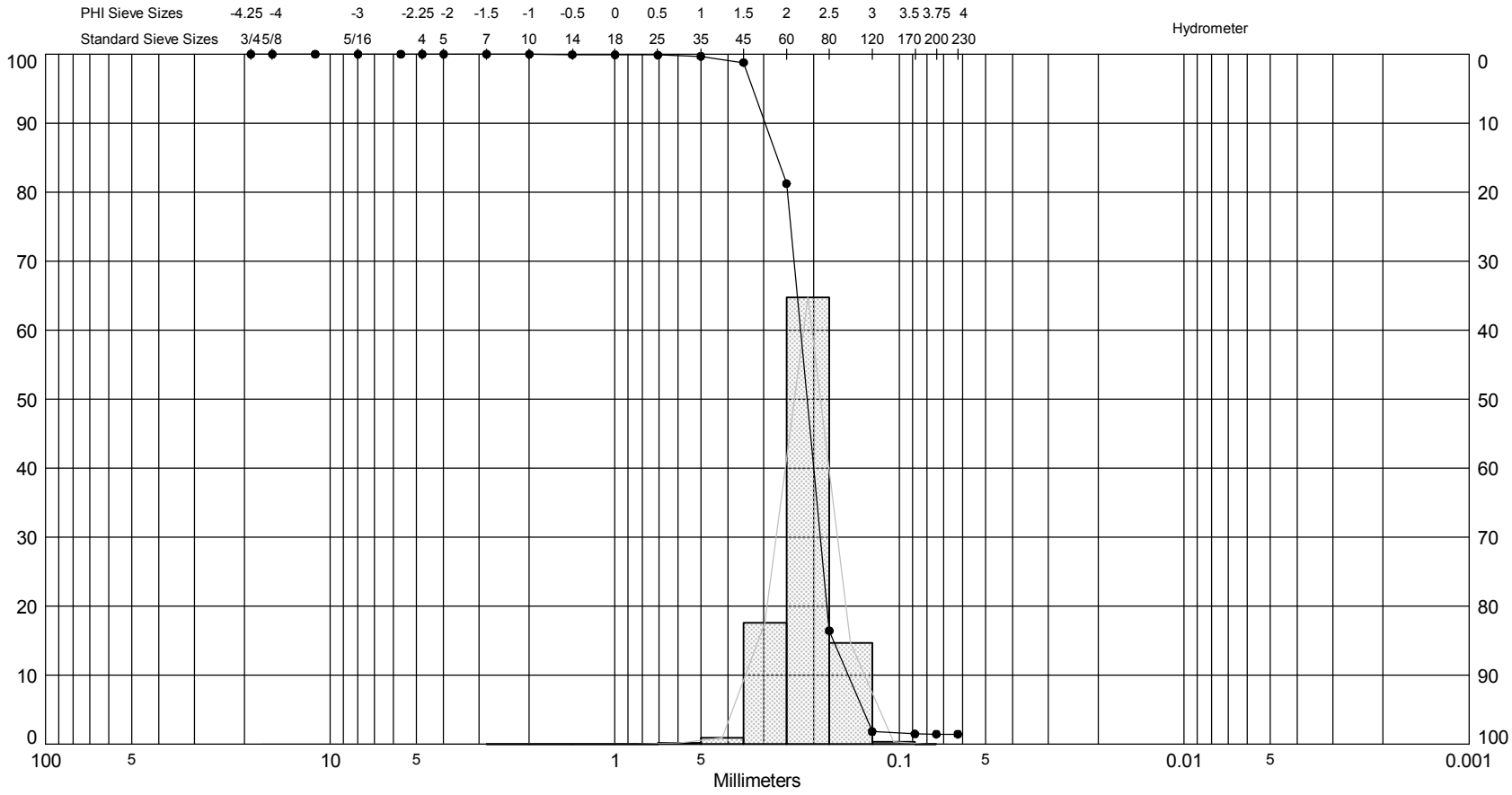

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-16A #4	—●—	-16.5	SP	#200 - 1.45 #230 - 1.45		4	2.24	2.22	-0.95	10.38	0.33

Comments:

Depths and elevations based on measured values

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Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-26-07
Analyzed By:	RS
Easting (X, ft):	2,388,474
Northing (Y, ft):	201,638
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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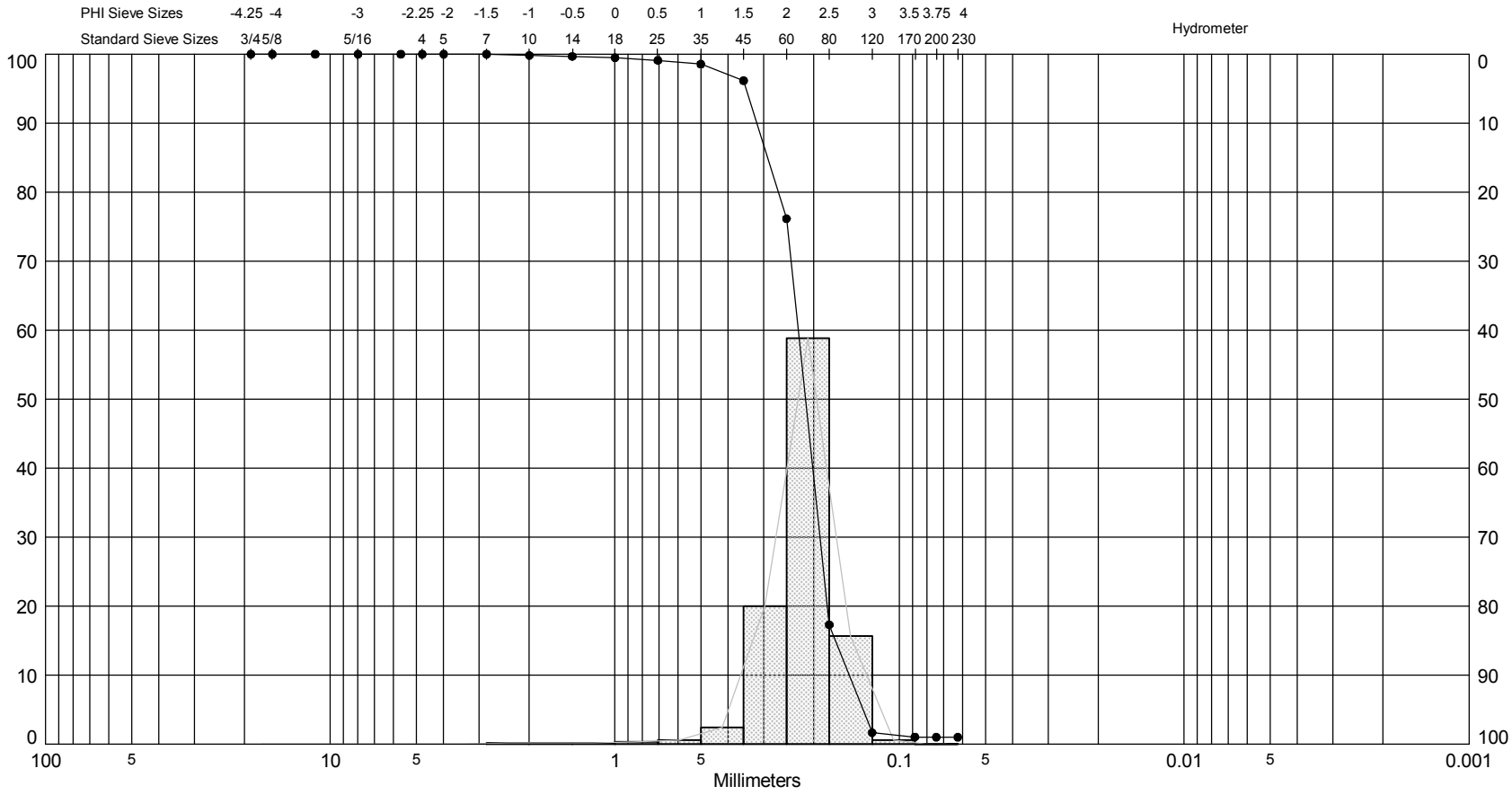

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-17 #1	—●—	-5.0	SP	#200 - 1.00 #230 - 0.99		5	2.22	2.18	-2.12	15.07	0.44

Comments:

Depths and elevations based on measured values

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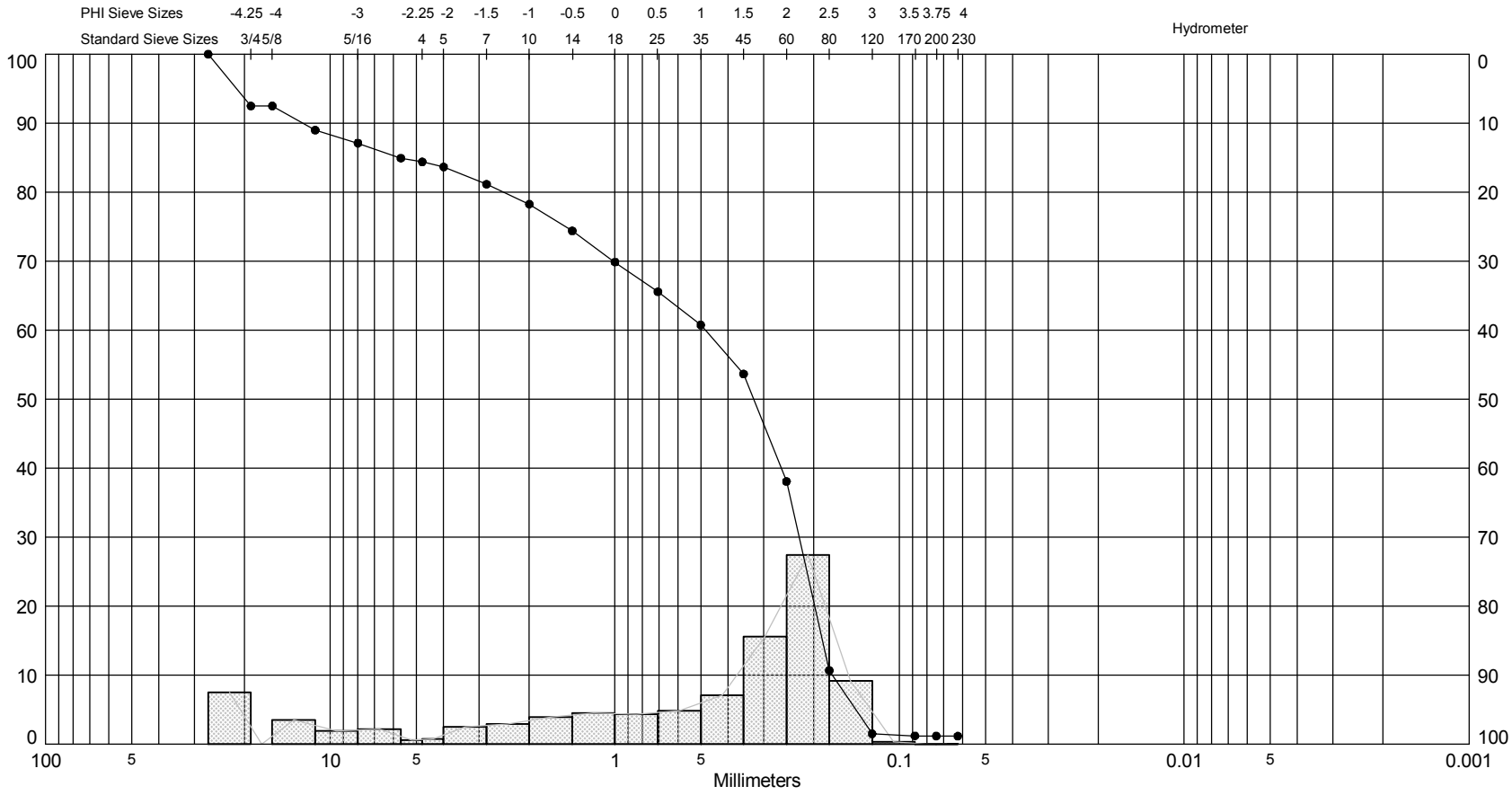
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	07-05-07
Analyzed By:	PB
Easting (X, ft):	2,387,728
Northing (Y, ft):	201,394
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-17 #2	—●—	-8.1	SW	#200 - 1.17 #230 - 1.15		25	1.62	0.56	-1.11	2.93	2.25

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	07-05-07
Analyzed By:	PB
Easting (X, ft):	2,387,728
Northing (Y, ft):	201,394
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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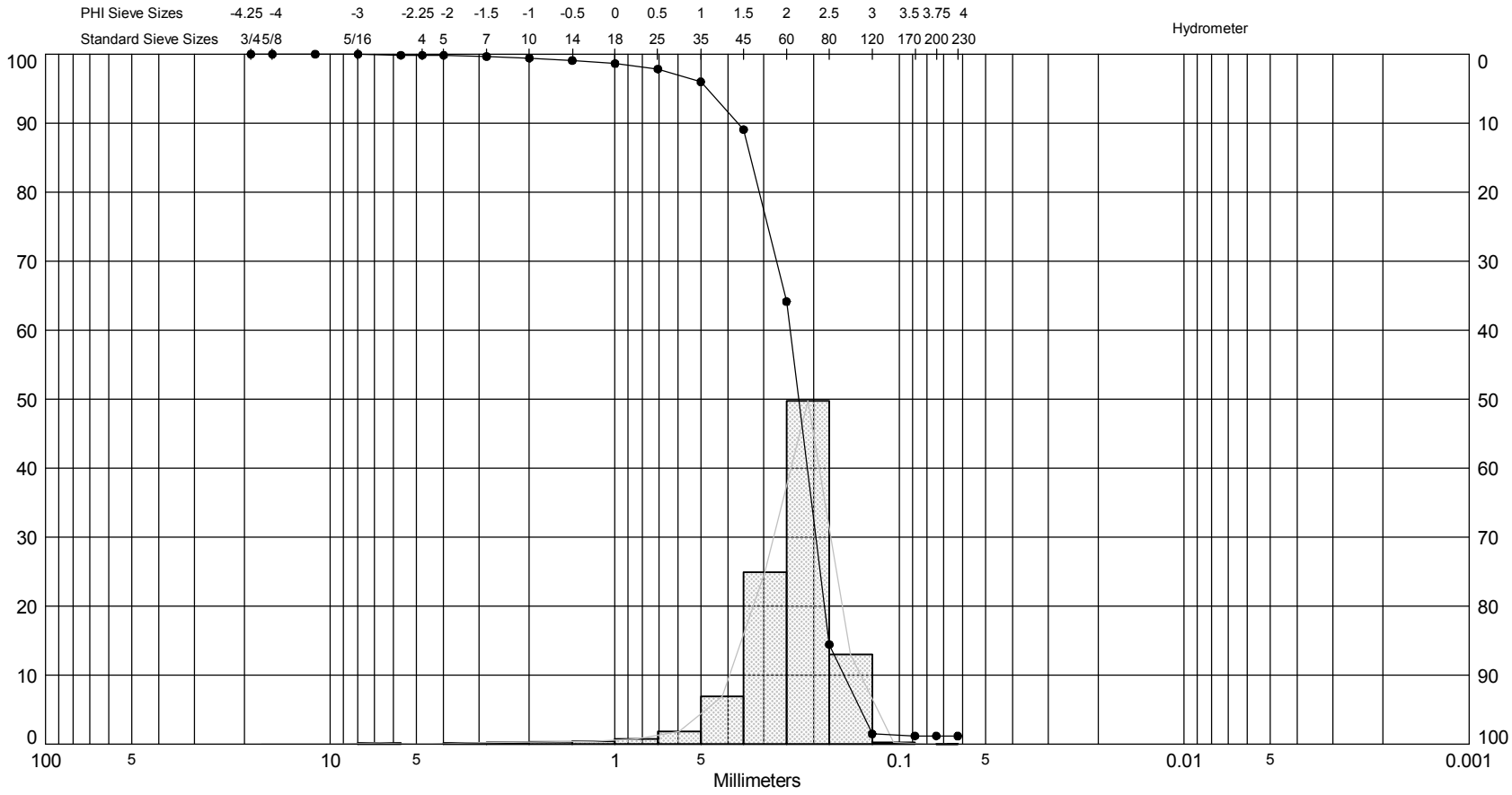

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-17 #3	—●—	-10.0	SP	#200 - 1.18 #230 - 1.17		9	2.14	2.03	-2.6	15.94	0.59

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	07-06-07
Analyzed By:	PB
Easting (X, ft):	2,387,728
Northing (Y, ft):	201,394
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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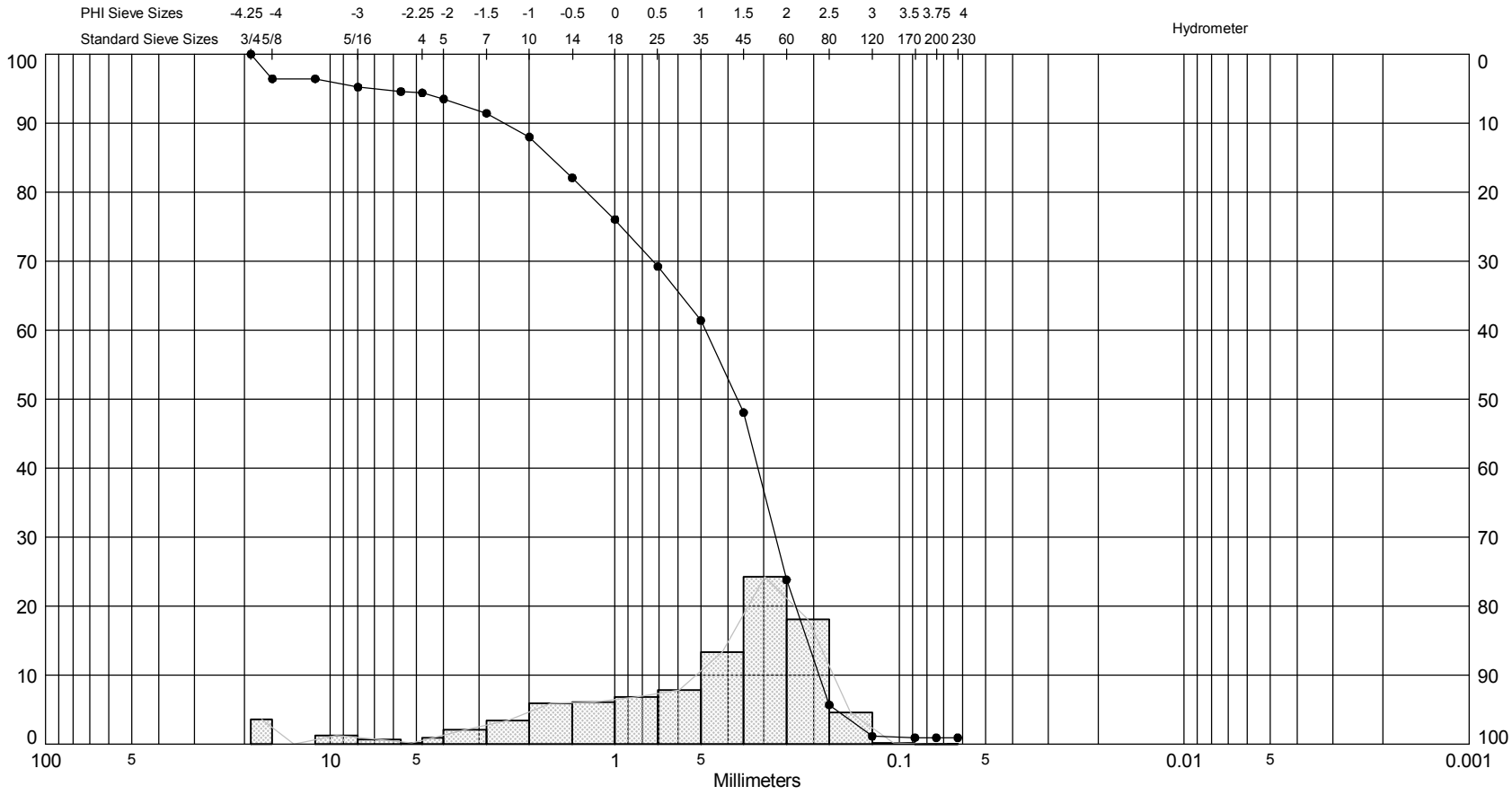

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-17 #4	—●—	-13.1	SW	#200 - 0.92 #230 - 0.91		28	1.43	0.85	-1.41	4.66	1.61

Comments:

Depths and elevations based on measured values

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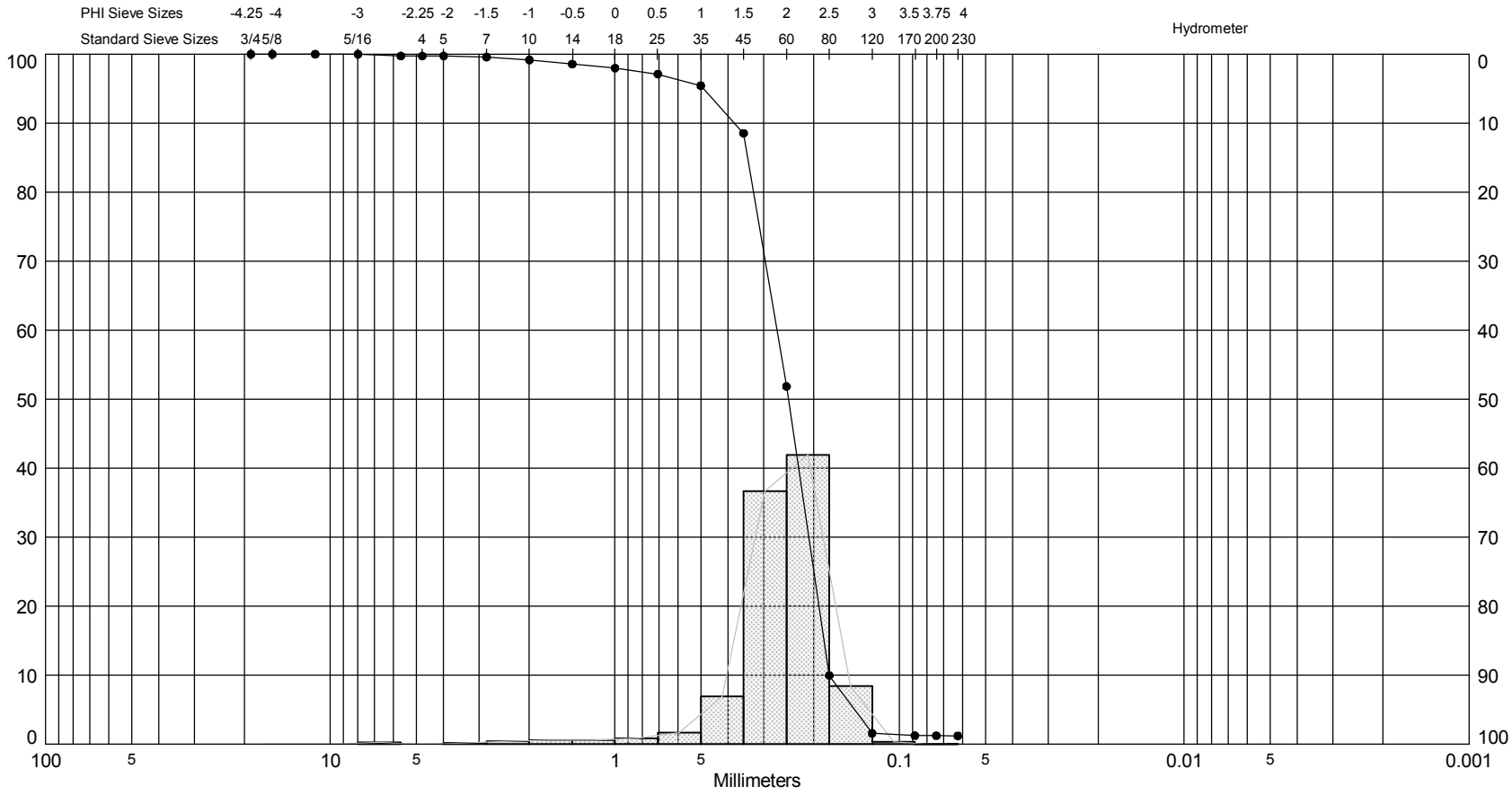
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	07-06-07
Analyzed By:	PB
Easting (X, ft):	2,387,728
Northing (Y, ft):	201,394
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-17 #5	—●—	-14.5	SP	#200 - 1.21 #230 - 1.20		9	2.02	1.93	-2.8	17.02	0.63

Comments:

Depths and elevations based on measured values

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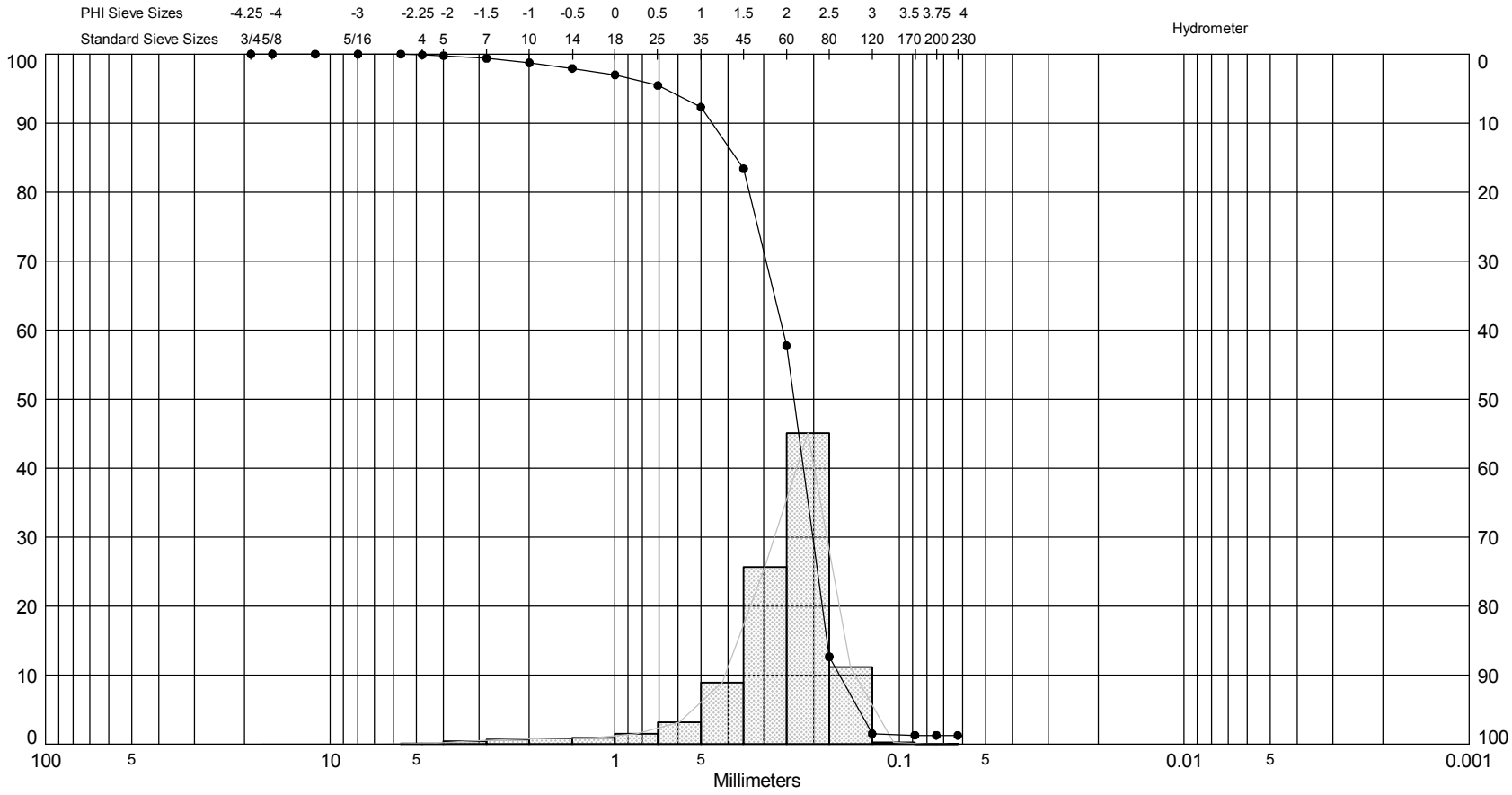
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	07-06-07
Analyzed By:	PB
Easting (X, ft):	2,387,728
Northing (Y, ft):	201,394
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-17A #1	—●—	-13.3	SP	#200 - 1.28 #230 - 1.27		12	2.09	1.91	-2.27	10.45	0.73

Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
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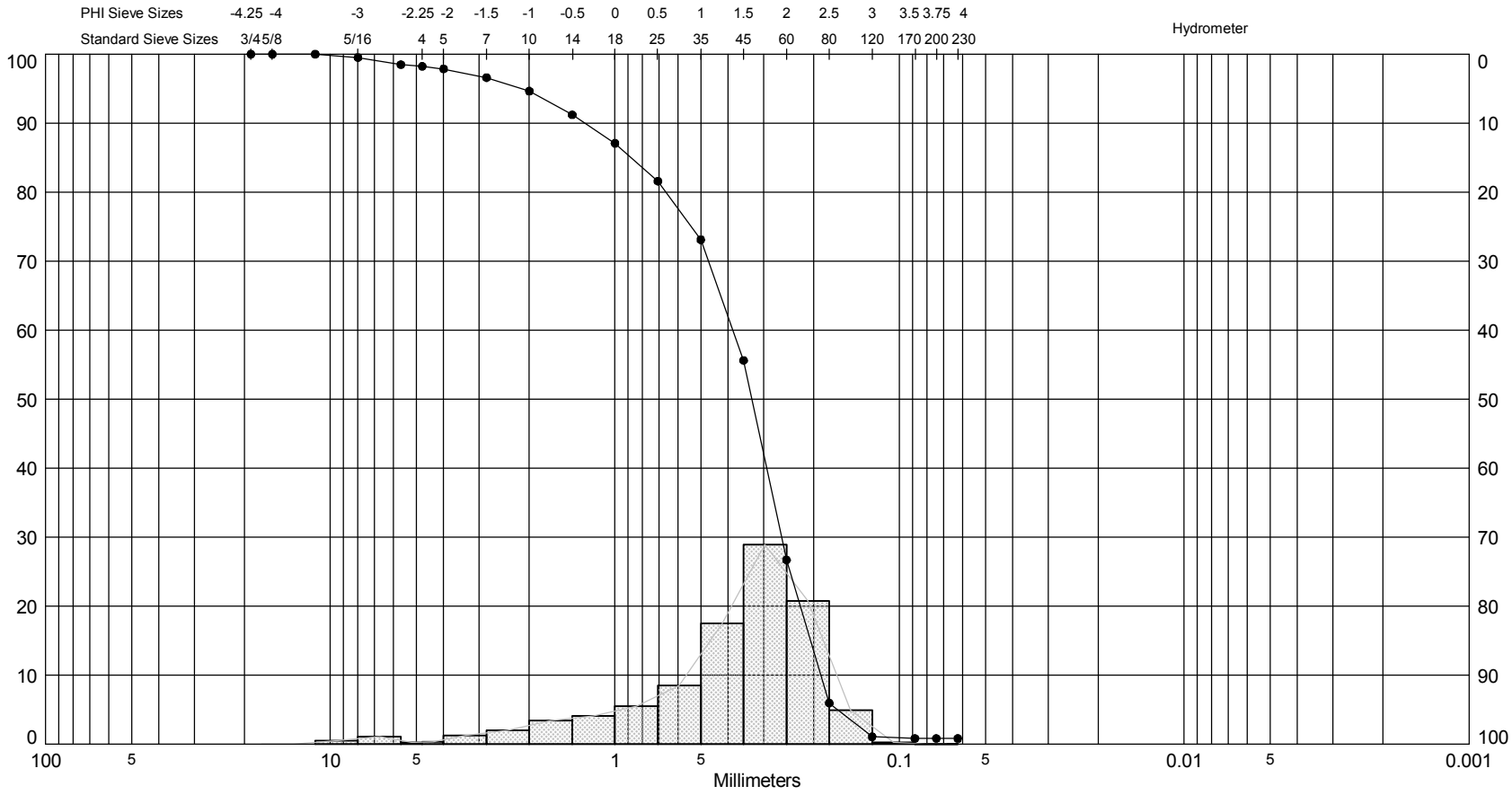
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	07-09-07
Analyzed By:	PB
Easting (X, ft):	2,387,728
Northing (Y, ft):	201,394
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-17A #2	—●—	-15.6	SW	#200 - 0.81 #230 - 0.80		20	1.6	1.28	-1.5	5.4	1.14

Comments:

Depths and elevations based on measured values

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Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	07-09-07
Analyzed By:	PB
Easting (X, ft):	2,387,728
Northing (Y, ft):	201,394
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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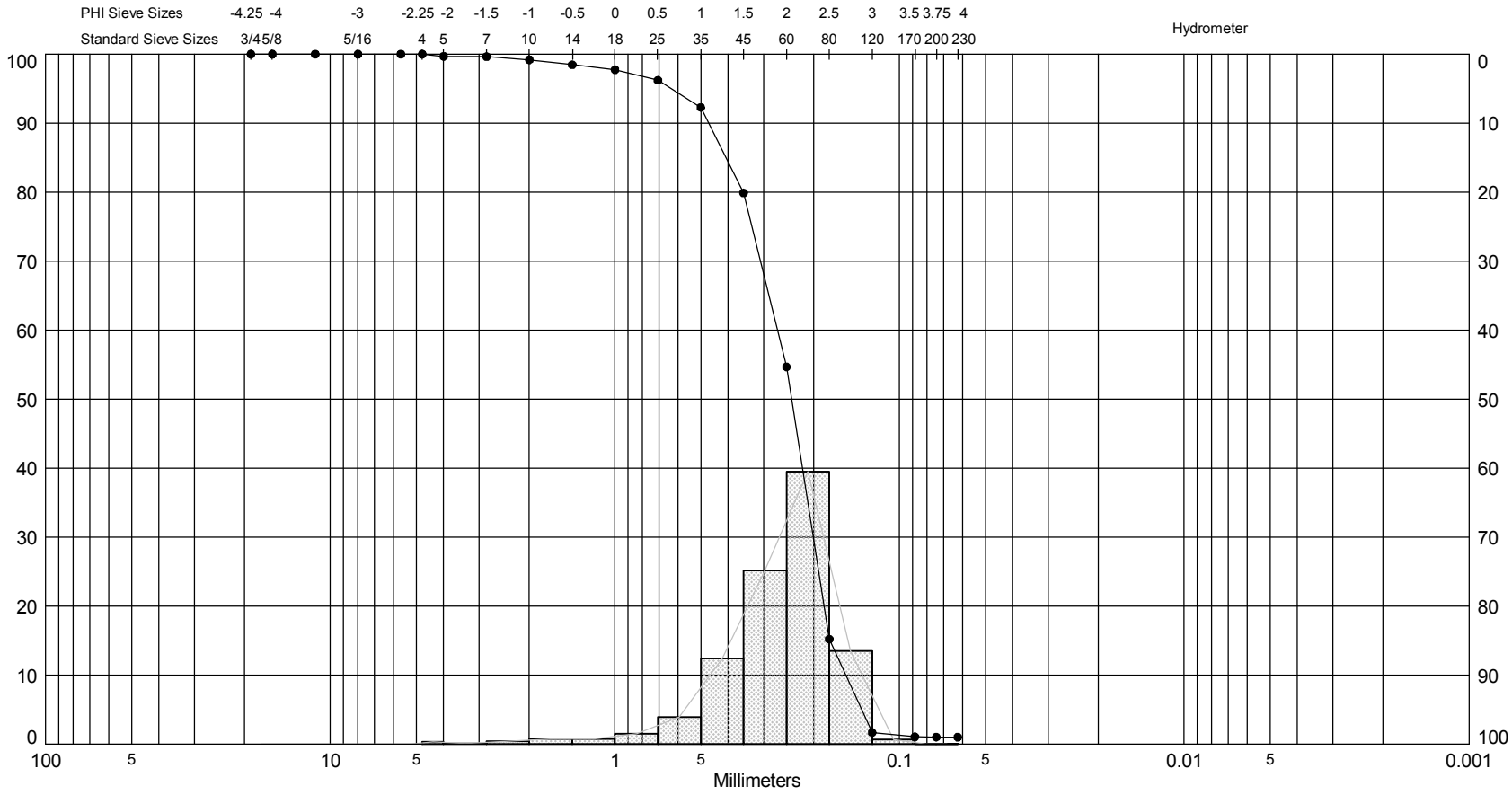

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-18 #1	—●—	-5.0	SP	#200 - 1.02 #230 - 1.01		11	2.06	1.91	-1.8	8.8	0.71

Comments:

Depths and elevations based on measured values

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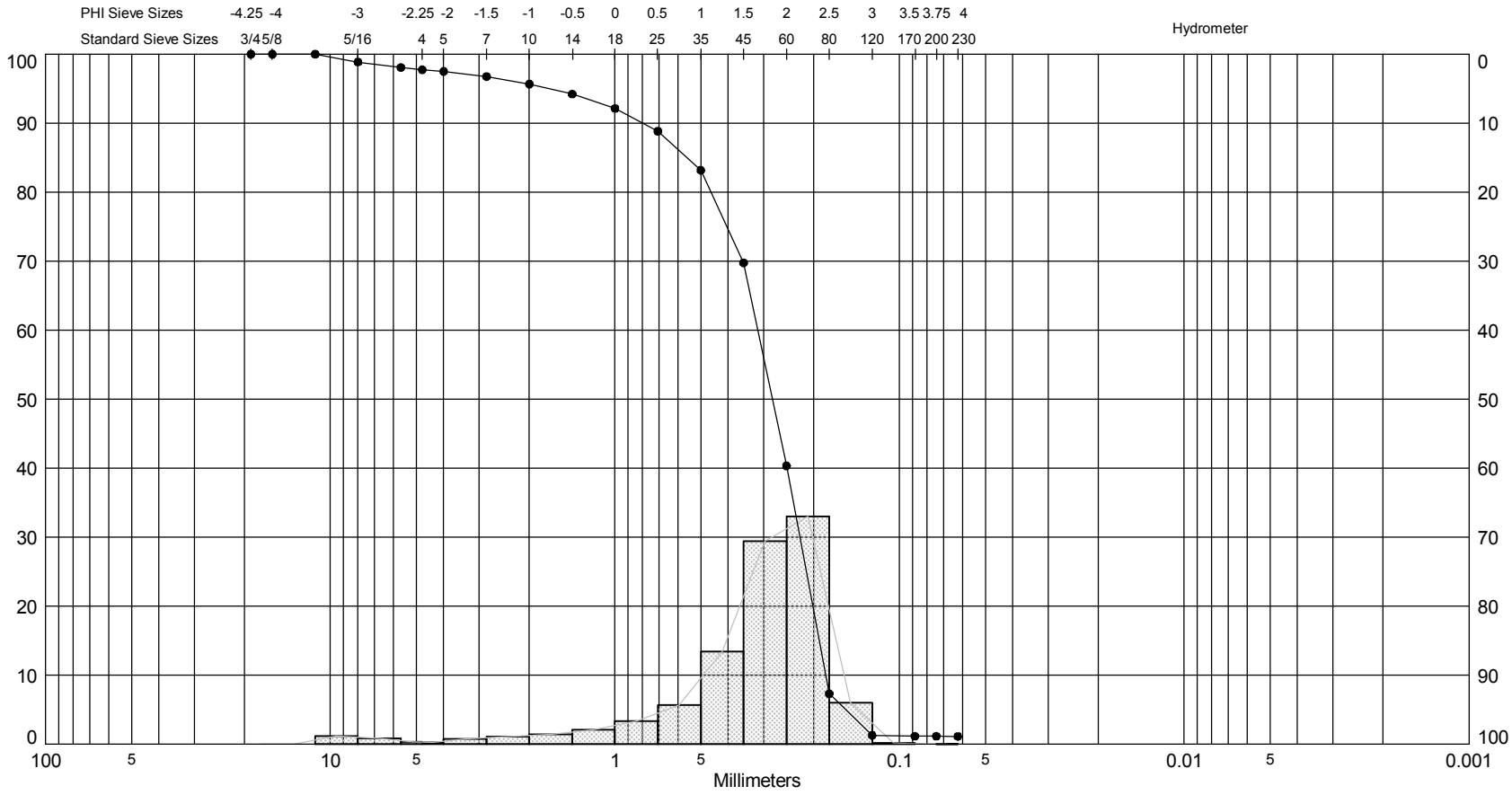
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	07-09-07
Analyzed By:	PB
Easting (X, ft):	2,387,894
Northing (Y, ft):	201,815
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-18 #2	—●—	-7.5	SW	#200 - 1.13 #230 - 1.12		13	1.84	1.55	-2.26	8.99	1.09

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-26-07
Analyzed By:	ST
Easting (X, ft):	2,387,894
Northing (Y, ft):	201,815
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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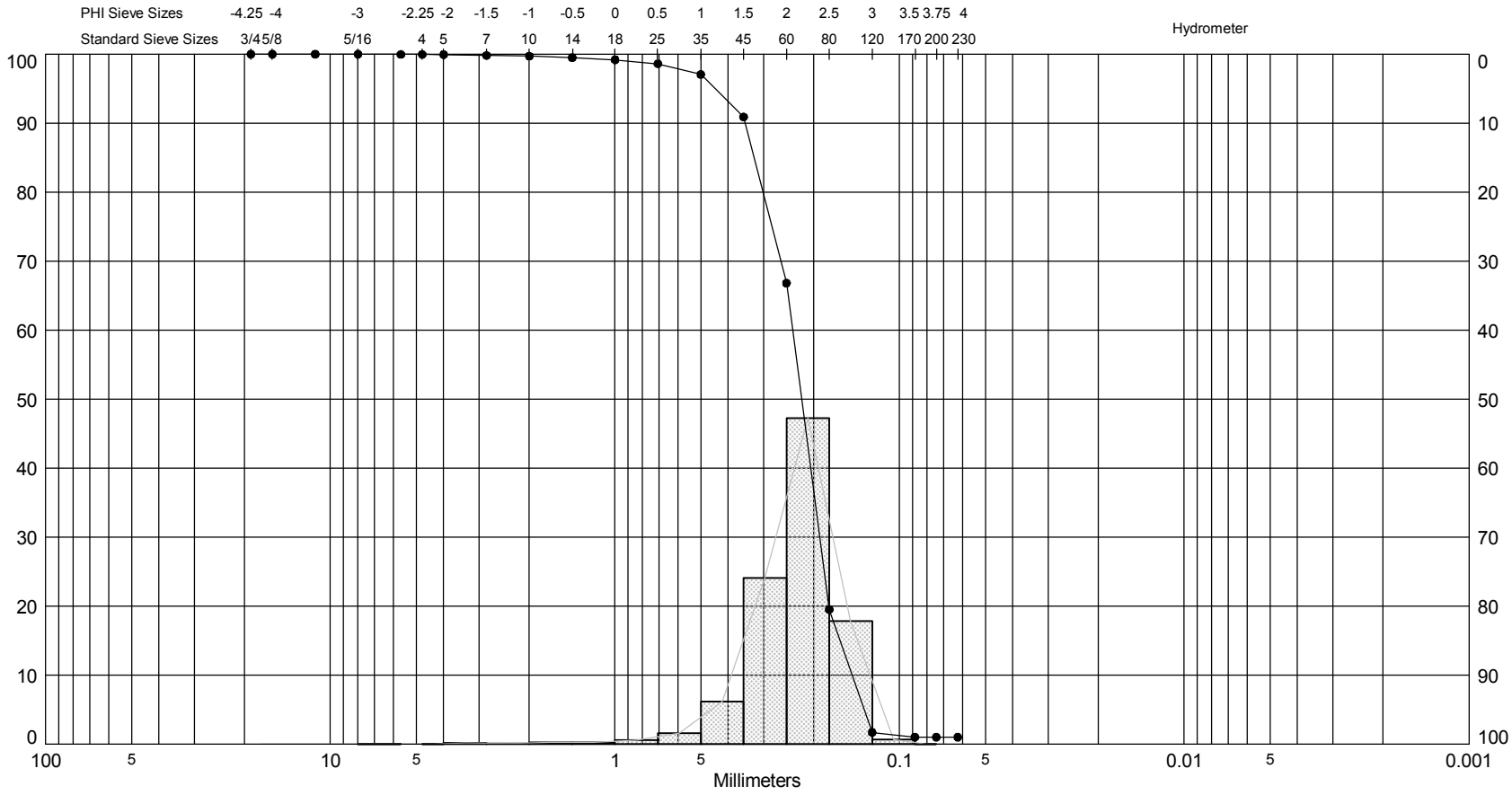

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-18 #3	—●—	-16.0	SP	#200 - 1.00 #230 - 1.00		6	2.18	2.1	-1.98	12.51	0.54

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	06-26-07
Analyzed By:	RS
Easting (X, ft):	2,387,894
Northing (Y, ft):	201,815
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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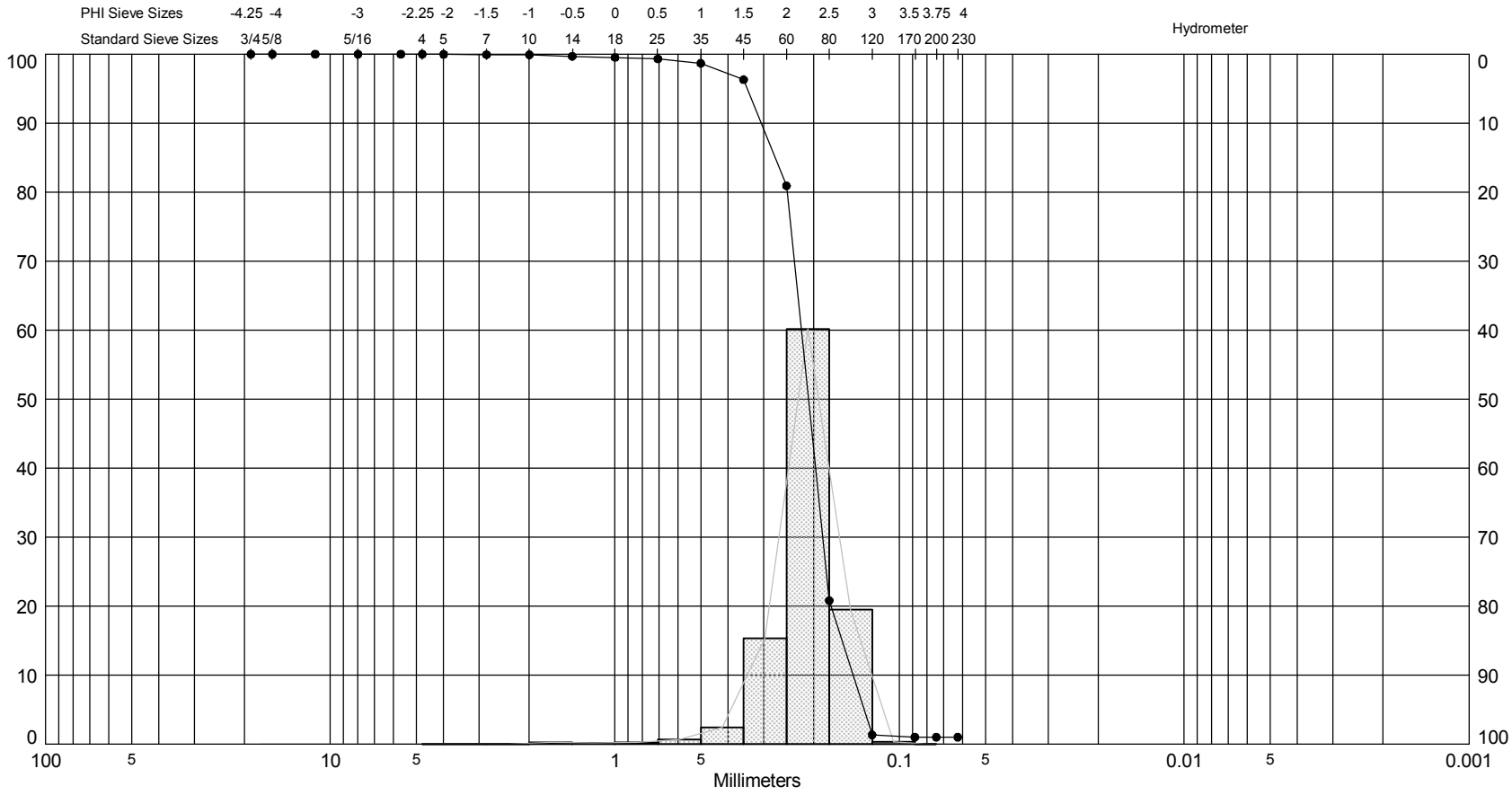

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-19 #1	—●—	-6.0	SP	#200 - 1.00 #230 - 1.00		6	2.26	2.22	-2.37	17.59	0.43

Comments:

Depths and elevations based on measured values

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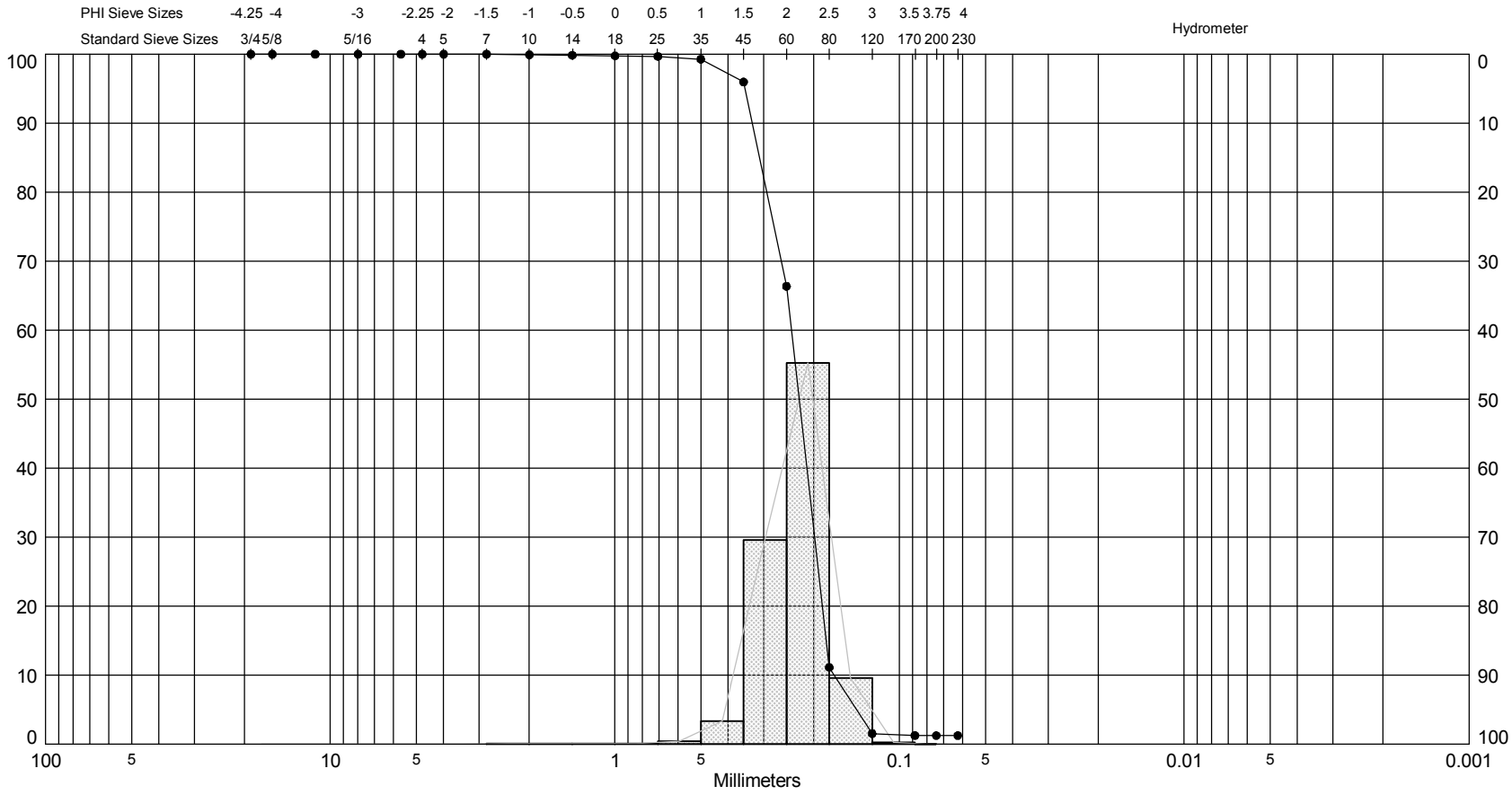
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	07-05-07
Analyzed By:	PB
Easting (X, ft):	2,389,020
Northing (Y, ft):	200,054
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-19 #2	—●—	-11.3	SP	#200 - 1.23 #230 - 1.23		4	2.15	2.1	-1.31	11.24	0.39

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	07-10-07
Analyzed By:	PB
Easting (X, ft):	2,389,020
Northing (Y, ft):	200,054
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
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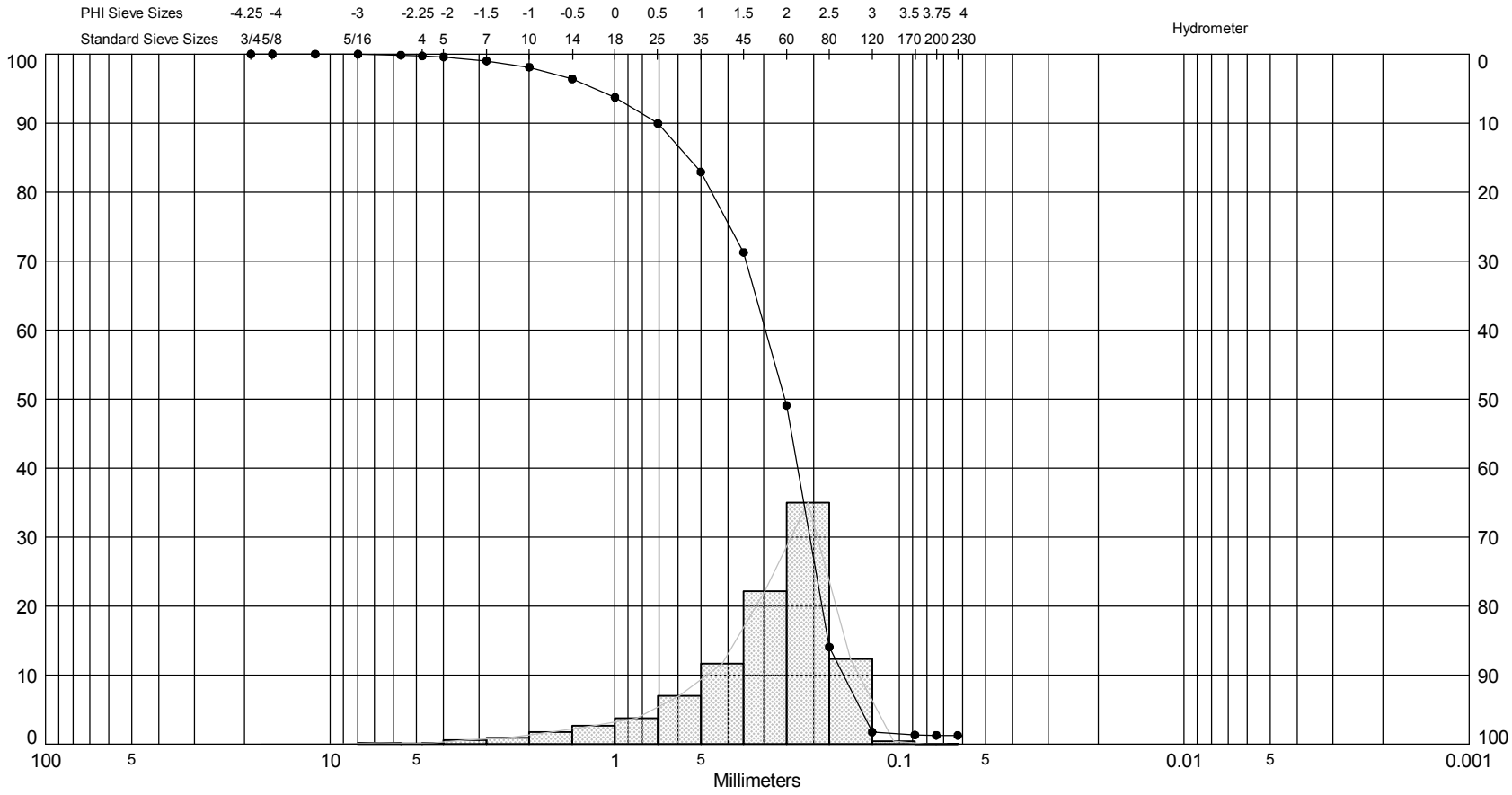
fax (561) 391-9116

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-19 #3	—●—	-18.9	SW	#200 - 1.28 #230 - 1.27		20	1.98	1.71	-1.54	5.83	0.92

Comments:

Depths and elevations based on measured values

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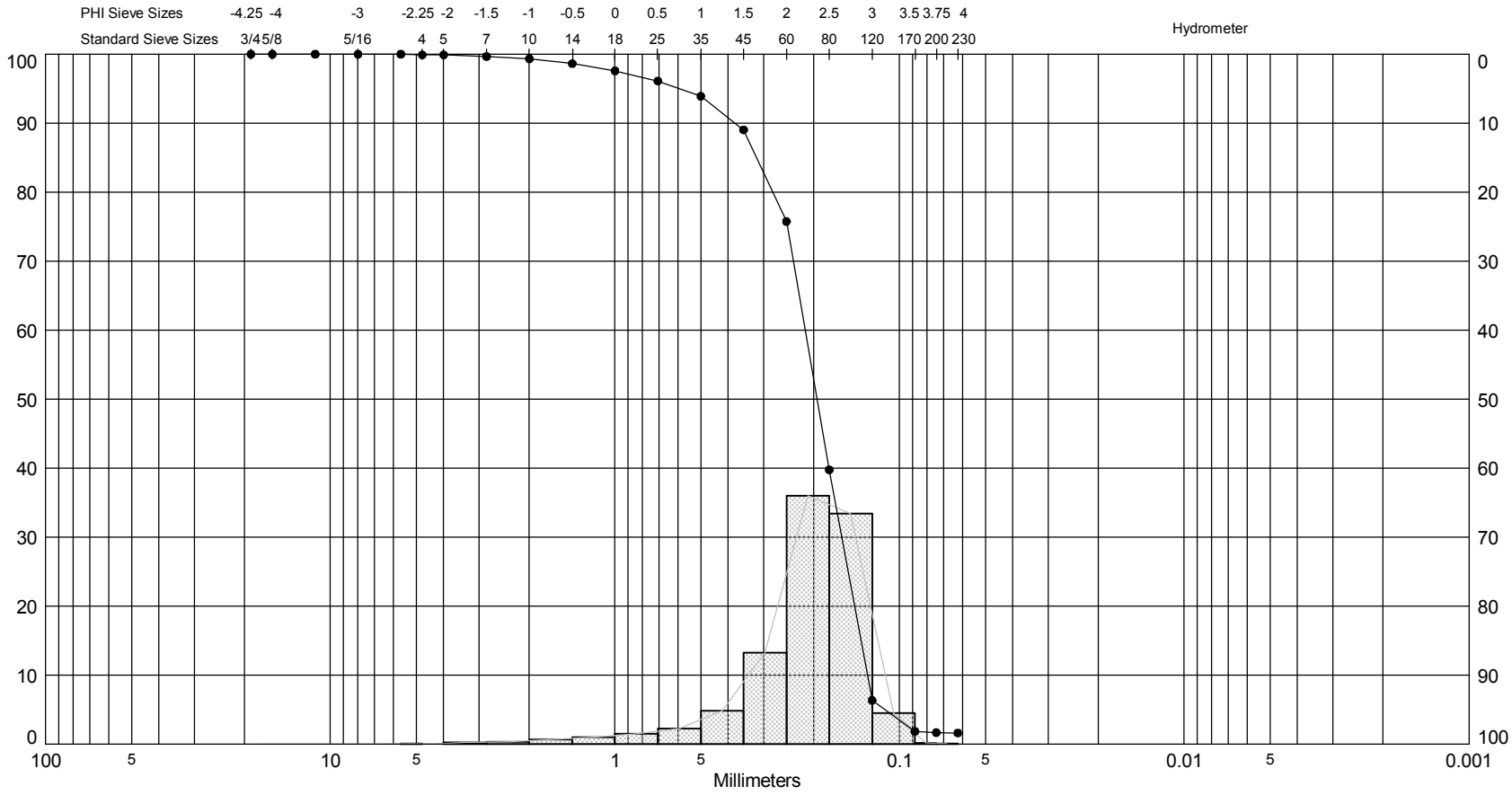
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	07-10-07
Analyzed By:	PB
Easting (X, ft):	2,389,020
Northing (Y, ft):	200,054
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-20 #1	—●—	-13.2	SP	#200 - 1.67 #230 - 1.62			2.36	2.21	-2.06	9.37	0.75

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	07-10-07
Analyzed By:	PB
Easting (X, ft):	2,386,609
Northing (Y, ft):	200,201
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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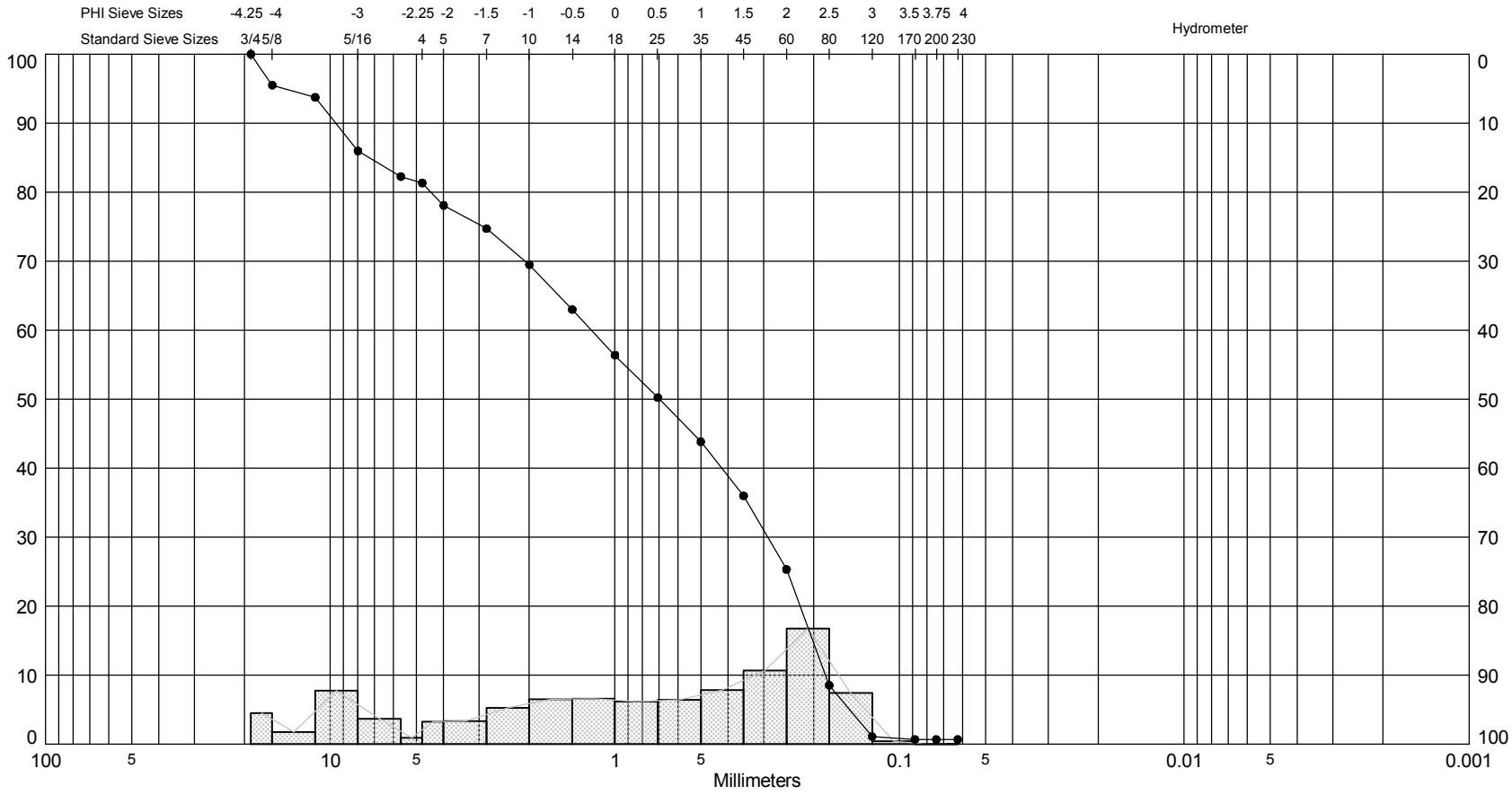
SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-20 #2	—●—	-14.8	SW	#200 - 0.67 #230 - 0.66			0.52	0.06	-0.49	1.98	2.12

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	07-10-07
Analyzed By:	PB
Easting (X, ft):	2,386,609
Northing (Y, ft):	200,201
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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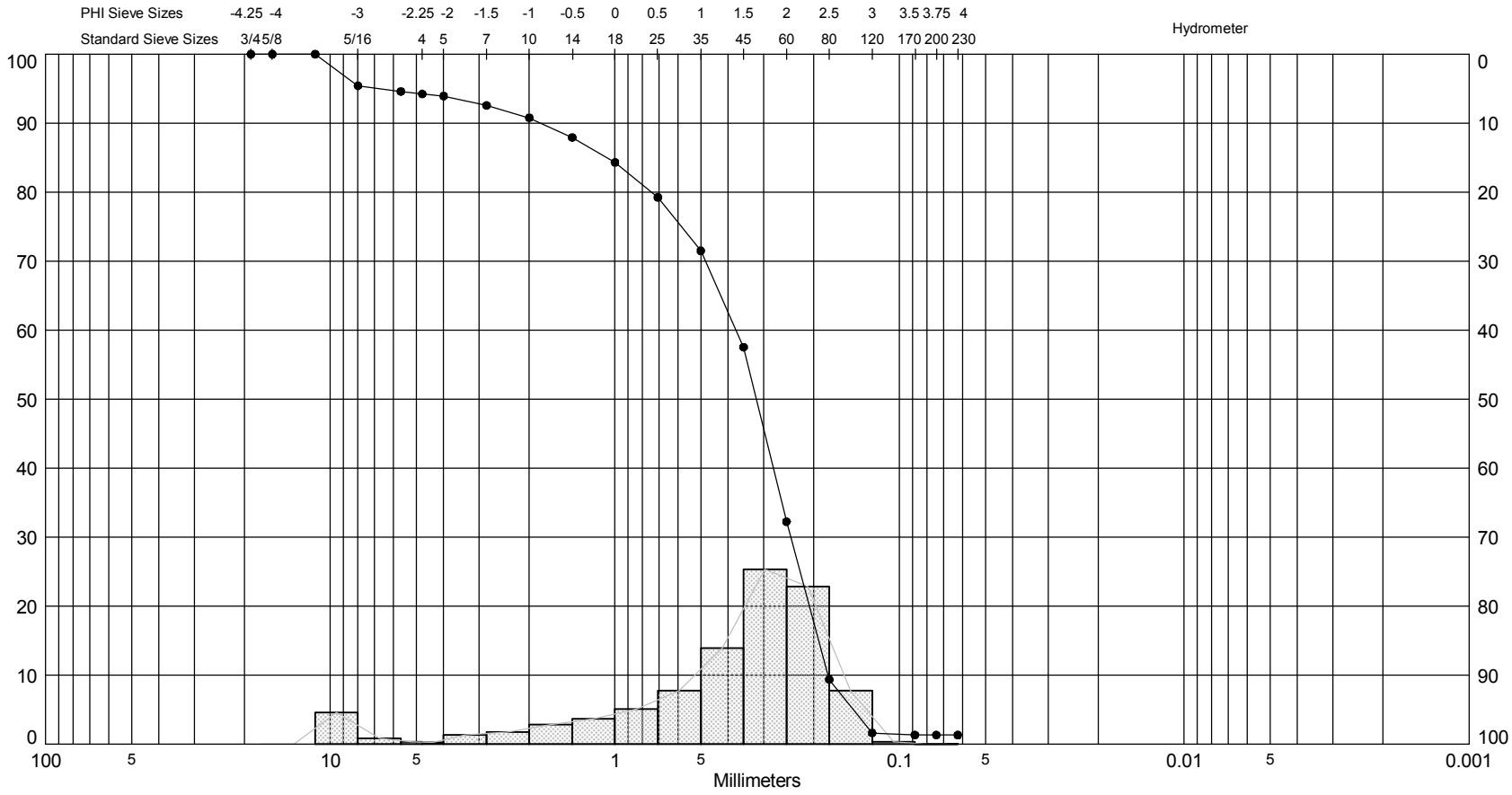
SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-20 #3	—●—	-18.0	SW	#200 - 1.31 #230 - 1.30			1.65	1.18	-1.63	5.2	1.46

Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
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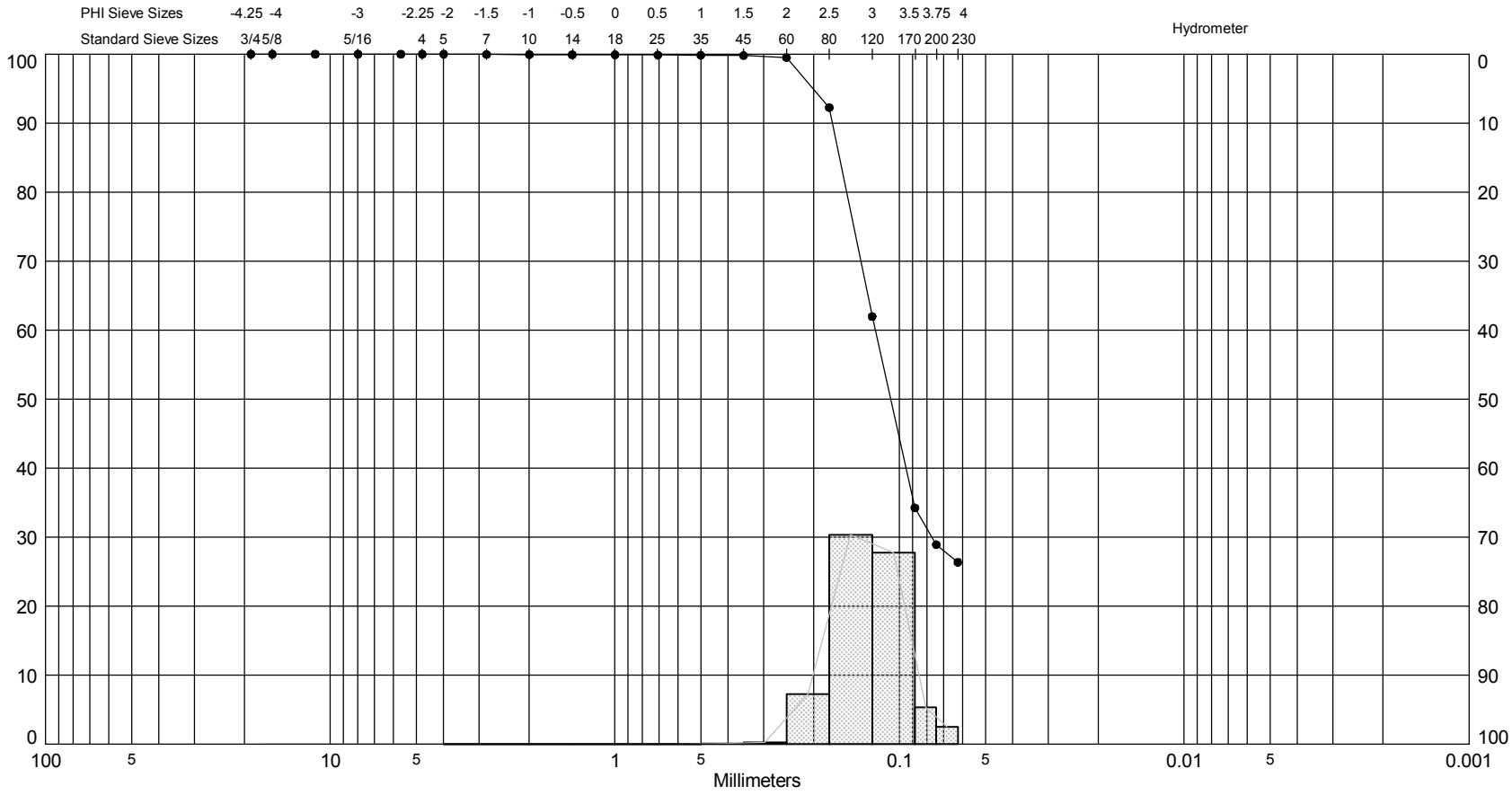
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	07-10-07
Analyzed By:	PB
Easting (X, ft):	2,386,609
Northing (Y, ft):	200,201
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-20 #4	—●—	-20.7	SC	#200 - 28.90 #230 - 26.36			3.22	2.98	-1.22	13.56	0.44

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2007
Analysis Date:	07-10-07
Analyzed By:	PB
Easting (X, ft):	2,386,609
Northing (Y, ft):	200,201
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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SIEVE ANALYSIS FIGUREEIGHT_2007.GPJ JPBRAZIL.GDT 10/19/09

APPENDIX 21

2008 CPENC Vibracore Logs

Boring Designation FEVC-08-01

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2008
Figure Eight Island, North Carolina

2. BORING DESIGNATION: FEVC-08-01
LOCATION COORDINATES: X = 2,385,534 Y = 200,207

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Walter Sexton

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

8. TOTAL DEPTH OF BORING: 14.4 Ft.

9. SIZE AND TYPE OF BIT: 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane
HORIZONTAL: NAD 1983
VERTICAL: NAVD 88

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES
DISTURBED:
UNDISTURBED (UD):

13. TOTAL NUMBER CORE BOXES:

14. ELEVATION GROUND WATER:

15. DATE BORING
STARTED: 10-06-08 07:32
COMPLETED: 10-06-08 07:35

16. ELEVATION TOP OF BORING: -10.6 Ft.

17. TOTAL RECOVERY FOR BORING: 12.2 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
-10.6	0.0					
			SAND, fine to medium grained, quartz, trace shell hash, trace silt, trace shelly lenses up to (3.0"x1.0"), silty laminae @ 4.2' and 8.6', gray (5Y-6/1), (SP).		1	Sample #1, Depth = 2.0' Mean (mm): 0.18, Phi Sorting: 0.40 Shell Hash: 0%, Fines (230): 1.48% (SP)
					2	Sample #2, Depth = 7.0' Mean (mm): 0.21, Phi Sorting: 0.53 Shell Hash: 0%, Fines (230): 1.37% (SP)
-19.6	9.0					
			SAND, fine to medium grained, quartz, little shell fragments, little shell hash, trace whole shell, shell fragments and whole shells up to (2.0"x1.0"), trace shelll hash from 9.2' to 9.3' and 9.6' to 9.7', light olive gray (5Y-6/2), (SW).		3	Sample #3, Depth = 10.5' Mean (mm): 0.57, Phi Sorting: 1.75 Shell Hash: 2%, Fines (230): 1.76% (SW)
-21.6	11.0					
			SAND, fine to medium grained, quartz, trace shell hash, trace silt, gray (5Y-5/1), (SP).		4	Sample #4, Depth = 11.6' Mean (mm): 0.14, Phi Sorting: 0.31 Shell Hash: 0%, Fines (230): 3.29% (SP)
-22.8	12.2					
			No Recovery.			
-25.0	14.4					
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/15/09

SAJ FORM 1836 JUN 02 MODIFIED FOR THE FLORIDA DEP JUN 04

Boring Designation FEVC-08-02

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2008
Figure Eight Island, North Carolina

2. BORING DESIGNATION: FEVC-08-02
LOCATION COORDINATES: X = 2,386,109 Y = 200,498

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Walter Sexton

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

8. TOTAL DEPTH OF BORING: 10.5 Ft.

9. SIZE AND TYPE OF BIT: 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane
HORIZONTAL: NAD 1983
VERTICAL: NAVD 88

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES:
DISTURBED:
UNDISTURBED (UD):

13. TOTAL NUMBER CORE BOXES:

14. ELEVATION GROUND WATER:

15. DATE BORING
STARTED: 10-06-08 08:15
COMPLETED: 10-06-08 08:25

16. ELEVATION TOP OF BORING: -4.8 Ft.

17. TOTAL RECOVERY FOR BORING: 9.1 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
-4.8	0.0					
			SAND, fine to medium grained, quartz, trace organics, trace shell fragments, trace shell hash, trace silt, shell fragments up to 1.0", 0.12" silty lens @ 4.9', gray (5Y-6/1), (SP).		1	Sample #1, Depth = 2.0' Mean (mm): 0.23, Phi Sorting: 0.70 Shell Hash: 0%, Fines (230): 1.30% (SP)
					2	Sample #2, Depth = 7.0' Mean (mm): 0.18, Phi Sorting: 0.33 Shell Hash: 0%, Fines (230): 1.14% (SP)
-13.9	9.1					
-15.3	10.5		No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/15/09

SAJ FORM 1836 JUN 02 MODIFIED FOR THE FLORIDA DEP JUN 04

Boring Designation FEVC-08-02A

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2008
Figure Eight Island, North Carolina

2. BORING DESIGNATION: FEVC-08-02A
LOCATION COORDINATES: X = 2,386,110 Y = 200,509

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Walter Sexton

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

8. TOTAL DEPTH OF BORING: 17.0 Ft.

9. SIZE AND TYPE OF BIT: 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane
HORIZONTAL: NAD 1983
VERTICAL: NAVD 88

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES
DISTURBED:
UNDISTURBED (UD):

13. TOTAL NUMBER CORE BOXES:

14. ELEVATION GROUND WATER:

15. DATE BORING
STARTED: 11-06-08 12:39
COMPLETED: 11-06-08 12:45

16. ELEVATION TOP OF BORING: -5.0 Ft.

17. TOTAL RECOVERY FOR BORING: 10 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS (Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.)
-5.0	0.0					
			Jetted to 7.0'.			
-12.0	7.0					
			SAND, fine to medium grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 1.0", gray (5Y-6/1), (SP).		1	Sample #1, Depth = 10.0' Mean (mm): 0.18, Phi Sorting: 0.35 Shell Hash: 0%, Fines (230): 1.25% (SP)
					2	Sample #2, Depth = 15.0' Mean (mm): 0.18, Phi Sorting: 0.34 Shell Hash: 0%, Fines (230): 1.29% (SP)
-22.0	17.0					
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/15/09

SAJ FORM 1836 JUN 02 MODIFIED FOR THE FLORIDA DEP JUN 04

Boring Designation FEVC-08-03

DRILLING LOG

DIVISION	
INSTALLATION	
SHEET 1 OF 1 SHEETS	

1. PROJECT: Figure Eight Island / Rich Inlet 2008; Figure Eight Island, North Carolina
2. BORING DESIGNATION: FEVC-08-03
3. DRILLING AGENCY: Athena Technologies
4. NAME OF DRILLER: Walter Sexton
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
6. THICKNESS OF OVERBURDEN: 0.0 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.
8. TOTAL DEPTH OF BORING: 20.0 Ft.
9. SIZE AND TYPE OF BIT: 3.0 In.
10. COORDINATE SYSTEM/DATUM: North Carolina State Plane; HORIZONTAL: NAD 1983; VERTICAL: NAVD 88
11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic; ☐ AUTO HAMMER ☐ MANUAL HAMMER
12. TOTAL SAMPLES; DISTURBED; UNDISTURBED (UD)
13. TOTAL NUMBER CORE BOXES
14. ELEVATION GROUND WATER
15. DATE BORING: STARTED 10-06-08 10:20; COMPLETED 10-06-08 10:26
16. ELEVATION TOP OF BORING: -3.6 Ft.
17. TOTAL RECOVERY FOR BORING: 19 Ft.
18. SIGNATURE AND TITLE OF INSPECTOR: KW

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS (Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.)
-3.6	0.0					
-5.7	2.1		SAND, medium grained, quartz, little shell hash, trace shell fragments, trace silt, shell fragments up to (1.0"x0.5"), (3.0"x1.5") shell hash pocket @ 0.3', gray (5Y-6/1), (SW).		1	Sample #1, Depth = 1.4' Mean (mm): 0.35, Phi Sorting: 1.43 Shell Hash: 2%, Fines (230): 0.93% (SW)
					2	Sample #2, Depth = 3.5' Mean (mm): 0.19, Phi Sorting: 0.49 Shell Hash: 0%, Fines (230): 1.26% (SP)
			SAND, fine to medium grained, quartz, trace shell fragments, trace shell hash, trace silt, 0.12" silty lens @ 5.8' and 11.2', (1.0"x0.25") silty pocket @ 7.1', gray (5Y-6/1), (SP).		3	Sample #3, Depth = 8.5' Mean (mm): 0.17, Phi Sorting: 0.35 Shell Hash: 0%, Fines (230): 1.30% (SP)
-15.3	11.7					
-16.8	13.2		SAND, fine to medium grained, quartz, little shell hash, trace organics, trace shell fragments, trace silt, trace whole shell, shell fragments and whole shells up to 1.0", (3.0"x1.5") shelly pocket @ 11.8', (3.0"x2.0") shelly pocket @ 13.0', (3.0"x1.5") silty peat pocket @ 12.2', gray (5Y-6/1), (SW).		4	Sample #4, Depth = 12.6' Mean (mm): 0.60, Phi Sorting: 1.59 Shell Hash: 7%, Fines (230): 0.93% (SW)
					5	Sample #5, Depth = 14.0' Mean (mm): 0.19, Phi Sorting: 0.34 Fines (230): 1.29% (SP)
			SAND, fine to medium grained, quartz, trace shell hash, trace silt, 0.25" silty lens @ 16.2', gray (5Y-6/1), (SP).		6	Sample #6, Depth = 17.0' Mean (mm): 0.20, Phi Sorting: 0.35 Shell Hash: 0%, Fines (230): 1.16% (SP)
-22.6	19.0					
-23.6	20.0		No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/15/09

SAJ FORM 1836 JUN 02 **MODIFIED FOR THE FLORIDA DEP** JUN 04

Boring Designation FEVC-08-04

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2008
Figure Eight Island, North Carolina

2. BORING DESIGNATION: FEVC-08-04
LOCATION COORDINATES: X = 2,388,485 Y = 202,080

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Walter Sexton

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

8. TOTAL DEPTH OF BORING: 20.0 Ft.

9. SIZE AND TYPE OF BIT: 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane
HORIZONTAL: NAD 1983
VERTICAL: NAVD 88

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES
DISTURBED:
UNDISTURBED (UD):

13. TOTAL NUMBER CORE BOXES:

14. ELEVATION GROUND WATER:

15. DATE BORING
STARTED: 10-06-08 10:49
COMPLETED: 10-06-08 10:53

16. ELEVATION TOP OF BORING: -3.0 Ft.

17. TOTAL RECOVERY FOR BORING: 10.4 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
-3.0	0.0					Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
-5.2	2.2		SAND, fine to medium grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 1.0", gray (5Y-5/1), (SW).		1	Sample #1, Depth = 1.0' Mean (mm): 0.29, Phi Sorting: 1.03 Shell Hash: 1%, Fines (230): 1.15% (SW)
-7.0	4.0		Shelly SAND, fine to medium grained, quartz, trace shell fragments, trace silt, trace whole shell, shell fragments up to 1.0", whole shells up to (2.0"x1.5"), shell component is shell hash, pale olive (5Y-6/3), (SW).		2	Sample #2, Depth = 3.0' Mean (mm): 1.09, Phi Sorting: 1.71 Shell Hash: 14%, Fines (230): 0.98% (SW)
-9.5	6.5		SAND, fine to medium grained, quartz, little shell hash, trace shell fragments, trace silt, shell fragments up to (3.0"x1.0"). Approximately 0.6' of material was lost during transfer of core from galvenized steel tube to PVC, light olive gray (5Y-6/2), (SW).		3	Sample #3, Depth = 5.5' Mean (mm): 0.48, Phi Sorting: 1.62 Shell Hash: 2%, Fines (230): 1.30% (SW)
-13.4	10.4		SAND, fine to medium grained, quartz, trace shell fragments, trace shell hash, trace silt, trace whole shell, whole shells up to 0.5", shell fragments up to (2.0"x1.0"), (3.0"x1.0") shelly pocket @ 7.2', (3.0"x 1.5") shelly pocket @ 9.4', (2.5"x1.5") shelly pocket @ 10.2', shell components are shell hash, gray (5Y-6/1), (SP).		4	Sample #4, Depth = 8.0' Mean (mm): 0.23, Phi Sorting: 0.42 Shell Hash: 0%, Fines (230): 1.14% (SP)
			No Recovery.			
-23.0	20.0		End of Boring			

FLORIDA DEP ROSS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/15/09

SAJ FORM 1836 JUN 02 MODIFIED FOR THE FLORIDA DEP JUN 04

Boring Designation FEVC-08-04A

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2008
Figure Eight Island, North Carolina

9. SIZE AND TYPE OF BIT 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane | HORIZONTAL: NAD 1983 | VERTICAL: NAVD 88

2. BORING DESIGNATION: FEVC-08-04A
LOCATION COORDINATES: X = 2,388,477 Y = 202,102

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

12. TOTAL SAMPLES | DISTURBED | UNDISTURBED (UD)

4. NAME OF DRILLER: Walter Sexton

13. TOTAL NUMBER CORE BOXES

14. ELEVATION GROUND WATER

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL | BEARING

15. DATE BORING | STARTED: 11-07-08 07:35 | COMPLETED: 11-07-08 07:40

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

16. ELEVATION TOP OF BORING: -1.4 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

17. TOTAL RECOVERY FOR BORING: 11 Ft.

8. TOTAL DEPTH OF BORING: 20.0 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
-1.4	0.0					
			Jetted to 8.0'.			
-9.4	8.0					
			SAND, fine to medium grained, quartz, trace shell fragments, trace shell hash, trace silt, trace whole shell, whole shells up to 1.0", shell fragments up to (2.0"x1.25"), (6.0"x1.5") shelly pocket @ 8.5', 3.0" shelly pocket @ 9.3', pockets are probably associated with jetting, light gray (5Y-7/1), (SP).		VC-4 (4)	
-10.9	9.5					
			SAND, fine to medium grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments and whole shells typically up to 1.0", (3.0"x1.5") shell fragment at 13.3', 0.25" shelly lenses from 11.5' to 11.9', (3.0"x2.0") shelly pocket @ 14.4', gray (5Y-6/1), (SP).		1	Sample #1, Depth = 10.5' Mean (mm): 0.22, Phi Sorting: 0.34 Shell Hash: 0%, Fines (230): 0.98% (SP)
-16.2	14.8				2	Sample #2, Depth = 13.5' Mean (mm): 0.19, Phi Sorting: 0.32 Shell Hash: 0%, Fines (230): 1.24% (SP)
			SAND, fine to medium grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to (2.0"x1.25"), whole shells up to 1.5", (3.0"x2.0") shell hash pocket @ 15.1', gray (5Y-6/1), (SW).		3	Sample #3, Depth = 15.7' Mean (mm): 0.34, Phi Sorting: 0.87 Shell Hash: 1%, Fines (230): 0.95% (SW)
-17.7	16.3					
			SAND, fine to medium grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 0.5", (3.0"x1.0") some shell hash pocket @ 16.9', gray (5Y-6/1), (SP).		4	Sample #4, Depth = 17.5' Mean (mm): 0.25, Phi Sorting: 0.46 Shell Hash: 0%, Fines (230): 1.09% (SP)
-20.4	19.0					
			No Recovery.			
-21.4	20.0					
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/15/09

SAJ FORM 1836 JUN 02 **MODIFIED FOR THE FLORIDA DEP** JUN 04

Boring Designation FEVC-08-05

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2008
Figure Eight Island, North Carolina

2. BORING DESIGNATION: FEVC-08-05
LOCATION COORDINATES: X = 2,388,173 Y = 201,385

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Walter Sexton

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

8. TOTAL DEPTH OF BORING: 14.5 Ft.

9. SIZE AND TYPE OF BIT: 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane
HORIZONTAL: NAD 1983
VERTICAL: NAVD 88

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES
DISTURBED:
UNDISTURBED (UD):

13. TOTAL NUMBER CORE BOXES:

14. ELEVATION GROUND WATER:

15. DATE BORING
STARTED: 10-06-08 11:57
COMPLETED: 10-06-08 12:02

16. ELEVATION TOP OF BORING: -2.0 Ft.

17. TOTAL RECOVERY FOR BORING: 10.9 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
-2.0	0.0					Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
			SAND, fine to medium grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to (1.0"x0.75"), light olive gray (5Y-6/2), (SP).		1	Sample #1, Depth = 2.5' Mean (mm): 0.22, Phi Sorting: 0.64 Shell Hash: 1%, Fines (230): 1.06% (SP)
-6.7	4.7					
			SAND, fine to medium grained, quartz, little shell hash, trace shell fragments, trace silt, trace whole shell, shell fragments up to 2.5", whole shells up to (2.0"x1.25"), gray (5Y-5/1), (SW).		2	Sample #2, Depth = 6.5' Mean (mm): 0.46, Phi Sorting: 1.21 Shell Hash: 3%, Fines (230): 1.17% (SW)
-9.6	7.6					
			SAND, fine to medium grained, quartz, trace shell hash, trace silt, trace whole shell, whole shells up to 1.0", gray (5Y-5/1), (SP).		3	Sample #3, Depth = 8.0' Mean (mm): 0.27, Phi Sorting: 0.68 Shell Hash: 0%, Fines (230): 1.13% (SP)
-10.5	8.5					
-11.2	9.2				4	
			SAND, fine to medium grained, quartz, trace shell fragments, trace shell hash, trace silt, trace whole shell, shell fragments up to 1.25", whole shells up to (2.5"x0.75"), gray (5Y-5/1), (SW).		5	Sample #4, Depth = 8.8' Mean (mm): 0.34, Phi Sorting: 1.16 Shell Hash: 2%, Fines (230): 1.16% (SW) Sample #5, Depth = 9.8' Mean (mm): 0.22, Phi Sorting: 0.39 Shell Hash: 0%, Fines (230): 1.20% (SP)
-12.9	10.9					
			SAND, fine to medium grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 2.0", gray (5Y-6/1), (SP). No Recovery.			
-16.5	14.5					
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/15/09

SAJ FORM 1836 JUN 02 MODIFIED FOR THE FLORIDA DEP JUN 04

Boring Designation FEVC-08-05A

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2008
Figure Eight Island, North Carolina

2. BORING DESIGNATION: FEVC-08-05A
LOCATION COORDINATES: X = 2,388,174 Y = 201,399

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Walter Sexton

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

8. TOTAL DEPTH OF BORING: 20.0 Ft.

9. SIZE AND TYPE OF BIT: 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane
HORIZONTAL: NAD 1983
VERTICAL: NAVD 88

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES
DISTURBED:
UNDISTURBED (UD):

13. TOTAL NUMBER CORE BOXES:

14. ELEVATION GROUND WATER:

15. DATE BORING
STARTED: 11-07-08 11:17
COMPLETED: 11-07-08 11:21

16. ELEVATION TOP OF BORING: -1.5 Ft.

17. TOTAL RECOVERY FOR BORING: 9.5 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
-1.5	0.0					Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
			Jetted to 9.0'.			
-10.5	9.0					
-11.4	9.9		SAND, fine to medium grained, quartz, some shell hash, trace shell fragments, trace silt, trace whole shell, shell fragments up to (1.5"x1.25"), whole shells up to 1.5", light olive gray (5Y-6/2), (SW).		1	Sample #1, Depth = 9.5' Mean (mm): 2.77, Phi Sorting: 2.31 Shell Hash: 8%, Fines (230): 0.80% (SW)
-14.1	12.6		SAND, fine to medium grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to (0.75"x0.5"), (2.5"x1.5") whole shell @ 10.6', 2.0" little shell hash pocket @ 10.3', gray (5Y-6/1), (SP).		VC-5 (5)	
-16.5	15.0		SAND, fine to medium grained, quartz, little shell hash, trace shell fragments, trace silt, trace whole shell, shell fragments up to (1.0"x0.75"), some shell hash layer from 13.9' to 14.2', 0.25" olive (5Y-4/3) silty lens @ 13.2', gray (5Y-6/1), (SP).		2	Sample #2, Depth = 13.4' Mean (mm): 0.25, Phi Sorting: 0.74 Shell Hash: 1%, Fines (230): 0.97% (SP) Sample #3, Depth = 15.3' Mean (mm): 0.65, Phi Sorting: 1.30 Shell Hash: 4%, Fines (230): 1.32% (SW) Sample #4, Depth = 16.3' Mean (mm): 0.23, Phi Sorting: 0.63 Shell Hash: 0%, Fines (230): 0.88% (SP) Sample #5, Depth = 17.5' Mean (mm): 0.29, Phi Sorting: 0.81 Shell Hash: 1%, Fines (230): 0.80% (SP)
-17.0	15.5				3	
-18.2	16.7				4	
-20.0	18.5		SAND, fine to medium grained, quartz, some shell hash, trace shell fragments, trace silt, shell fragments up to (2.0"x1.25"), olive gray (5Y-5/2), (SW).		5	
-21.5	20.0		SAND, fine to medium grained, quartz, trace shell hash, trace silt, shell fragments up to 0.25", 1.5" whole shell @ 16.6', 0.25" shelly lenses from 15.9' to 16.2', gray (5Y-6/1), (SP).			
			SAND, fine to medium grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 0.75", gray (5Y-6/1), (SP).			
			No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/15/09

SAJ FORM 1836 JUN 02 MODIFIED FOR THE FLORIDA DEP JUN 04

Boring Designation FEVC-08-06

DRILLING LOG

DIVISION		INSTALLATION	SHEET 1 OF 1 SHEETS

1. PROJECT: Figure Eight Island / Rich Inlet 2008; Figure Eight Island, North Carolina
2. BORING DESIGNATION: FEVC-08-06
3. DRILLING AGENCY: Athena Technologies
4. NAME OF DRILLER: Walter Sexton
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
6. THICKNESS OF OVERBURDEN: 0.0 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.
8. TOTAL DEPTH OF BORING: 22.6 Ft.
9. SIZE AND TYPE OF BIT: 3.0 In.
10. COORDINATE SYSTEM/DATUM: North Carolina State Plane; HORIZONTAL: NAD 1983; VERTICAL: NAVD 88
11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic; ☐ AUTO HAMMER ☐ MANUAL HAMMER
12. TOTAL SAMPLES: DISTURBED: UNDISTURBED (UD):
13. TOTAL NUMBER CORE BOXES:
14. ELEVATION GROUND WATER:
15. DATE BORING: STARTED 10-06-08 12:52; COMPLETED 10-06-08 12:55
16. ELEVATION TOP OF BORING: -1.1 Ft.
17. TOTAL RECOVERY FOR BORING: 20.9 Ft.
18. SIGNATURE AND TITLE OF INSPECTOR: KW

LOCATION COORDINATES: X = 2,386,618 Y = 200,973

CONTRACTOR FILE NO.:

DEG. FROM VERTICAL:

BEARING:

ELEV. (ft)	DEPTH (ft)	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
-1.1	0.0				Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
		SAND, fine to medium grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 1.25", 2.0" litttle shell hash pocket @ 5.0', 0.25" olive (5Y-5/3) silty lenses from 11.9' to 12.2', gray (5Y-6/1), (SP).		1	Sample #1, Depth = 2.0' Mean (mm): 0.19, Phi Sorting: 0.38 Shell Hash: 0%, Fines (230): 1.15% (SP)
				2	Sample #2, Depth = 6.0' Mean (mm): 0.21, Phi Sorting: 0.72 Shell Hash: 0%, Fines (230): 1.09% (SP)
				3	Sample #3, Depth = 11.5' Mean (mm): 0.17, Phi Sorting: 0.33 Shell Hash: 0%, Fines (230): 1.42% (SP)
-13.9	12.8				
		SAND, fine to medium grained, quartz, trace shell fragments, trace shell hash, trace silt, trace whole shell, shell fragments up to (1.5"x1.0"), (2.0"x1.25") whole shell @ 13.1', (1.0"x2.0") shelly pocket @ 13.1', (3.0"x1.5") shelly pocket @ 13.6', gray (5Y-6/1), (SW).		4	Sample #4, Depth = 13.8' Mean (mm): 0.34, Phi Sorting: 1.48 Shell Hash: 3%, Fines (230): 1.23% (SW)
-15.3	14.2				
				5	Sample #5, Depth = 15.0' Mean (mm): 0.14, Phi Sorting: 0.89 Shell Hash: 0%, Fines (230): 32.97% (SC)
-16.3	15.2				
		SAND, some clay, trace shell fragments, trace shell hash, shell fragments typically up to 0.75", (1.0"x4.0") shell fragment @ 14.6', (1.0"x0.75") limestone rock fragment @ 14.6', dark olive gray (5Y-3/2), (SC).			
-18.5	17.4				
		CLAY, trace sand, trace shell fragments, trace shell hash, trace whole shell, shell fragments up to (2.0"x1.0"), (2.0"x0.5") sandy pocket @ 15.4', 0.75" sandy pocket @ 17.0', dark olive gray (5Y-3/2), (CL).			
-19.7	18.6				
		Sandy CLAY, trace shell fragments, trace shell hash, trace whole shell, shell fragments up to 1.5", whole shells up to (2.0"x0.75"), dark olive gray (5Y-3/2), (CL).			
-22.0	20.9				
		CLAY, trace sand, trace shell hash, dark olive gray (5Y-3/2), (CL).			
-23.7	22.6	No Recovery.			
		End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/15/09

SAJ FORM 1836 JUN 02 **MODIFIED FOR THE FLORIDA DEP** JUN 04

Boring Designation FEVC-08-07

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2008
Figure Eight Island, North Carolina

9. SIZE AND TYPE OF BIT 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane | HORIZONTAL: NAD 1983 | VERTICAL: NAVD 88

2. BORING DESIGNATION: FEVC-08-07
LOCATION COORDINATES: X = 2,388,723 Y = 200,701

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

12. TOTAL SAMPLES | DISTURBED | UNDISTURBED (UD)

4. NAME OF DRILLER: Walter Sexton

13. TOTAL NUMBER CORE BOXES

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL | BEARING

14. ELEVATION GROUND WATER

15. DATE BORING | STARTED: 11-07-08 09:08 | COMPLETED: 11-07-08 09:12

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

16. ELEVATION TOP OF BORING: -3.7 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

17. TOTAL RECOVERY FOR BORING: 12.7 Ft.

8. TOTAL DEPTH OF BORING: 13.5 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
-3.7	0.0					Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
			SAND, fine to medium grained, quartz, trace shell fragments, trace shell hash, trace silt, trace whole shell, shell fragments up to 1.5", whole shells up to (2.0"x1.25"), 0.5" shelly layer @ 7.0', (2.0"x2.5") shelly pocket @ 4.9', (2.0"x1.0") shelly pocket @ 5.9', light gray (5Y-7/1), (SP).		1	Sample #1, Depth = 2.0' Mean (mm): 0.23, Phi Sorting: 0.72 Shell Hash: 1%, Fines (230): 0.79% (SP)
					2	Sample #2, Depth = 8.0' Mean (mm): 0.20, Phi Sorting: 0.43 Shell Hash: 0%, Fines (230): 1.05% (SP)
-13.5	9.8					
			SAND, fine to medium grained, quartz, little shell hash, trace rock fragments, trace shell fragments, trace silt, shell fragments up to (2.0"x1.0"), (3.0"x2.0") whole shell @ 11.6',		3	Sample #3, Depth = 10.5' Mean (mm): 0.39, Phi Sorting: 1.20 Shell Hash: 2%, Fines (230): 0.90% (SW)
-15.3	11.6					
-16.4	12.7		limestone rock fragments up to 1.0", gray (5Y-5/1), (SW).		4	Sample #4, Depth = 12.3' Mean (mm): 0.20, Phi Sorting: 0.32 Shell Hash: 0%, Fines (230): 1.20% (SP)
-17.2	13.5		SAND, fine to medium grained, quartz, trace shell hash, trace silt, gray (5Y-6/1), (SP).			
			No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/15/09

SAJ FORM 1836 JUN 02 **MODIFIED FOR THE FLORIDA DEP** JUN 04

Boring Designation FEVC-08-07A

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2008
Figure Eight Island, North Carolina

2. BORING DESIGNATION: FEVC-08-07A
LOCATION COORDINATES: X = 2,388,723 Y = 200,701

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Walter Sexton

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

8. TOTAL DEPTH OF BORING: 18.5 Ft.

9. SIZE AND TYPE OF BIT: 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane
HORIZONTAL: NAD 1983
VERTICAL: NAVD 88

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES:
DISTURBED:
UNDISTURBED (UD):

13. TOTAL NUMBER CORE BOXES:

14. ELEVATION GROUND WATER:

15. DATE BORING
STARTED: 11-07-08 09:35
COMPLETED: 11-07-08 09:40

16. ELEVATION TOP OF BORING: -3.7 Ft.

17. TOTAL RECOVERY FOR BORING: 7.5 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
-3.7	0.0					Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
			Jetted to 9.4'.			
-13.1	9.4					
-14.1	10.4		SAND, fine to medium grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 0.5", gray (5Y-6/1), (SP).		VC-7 (2)	
-15.2	11.5		SAND, fine to medium grained, quartz, some shell hash, trace shell fragments, trace silt, shell fragments up to 0.5", gray (5Y-5/1), (SW).		VC-7 (3)	
			SAND, fine to medium grained, quartz, trace shell hash, trace silt, gray (5Y-5/1), (SP).		1	Sample #1, Depth = 15.0' Mean (mm): 0.21, Phi Sorting: 0.36 Shell Hash: 0%, Fines (230): 1.20% (SP)
-20.6	16.9					
-22.2	18.5		No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/15/09

SAJ FORM 1836 JUN 02 MODIFIED FOR THE FLORIDA DEP JUN 04

Boring Designation FEVC-08-08

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2008
Figure Eight Island, North Carolina

2. BORING DESIGNATION: FEVC-08-08
LOCATION COORDINATES: X = 2,389,411 Y = 200,087

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Walter Sexton

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

8. TOTAL DEPTH OF BORING: 11.5 Ft.

9. SIZE AND TYPE OF BIT: 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane
HORIZONTAL: NAD 1983
VERTICAL: NAVD 88

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES
DISTURBED:
UNDISTURBED (UD):

13. TOTAL NUMBER CORE BOXES:

14. ELEVATION GROUND WATER:

15. DATE BORING
STARTED: 11-07-08 13:27
COMPLETED: 11-07-08 13:33

16. ELEVATION TOP OF BORING: -7.0 Ft.

17. TOTAL RECOVERY FOR BORING: 10.8 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
-7.0	0.0					
-11.0	4.0		SAND, fine to medium grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 0.5", (2.0"x1.0") shelly pocket @ 2.3', gray (5Y-6/1), (SW).		1	Sample #1, Depth = 2.0' Mean (mm): 0.26, Phi Sorting: 0.88 Shell Hash: 1%, Fines (230): 1.13% (SW)
-16.5	9.5		SAND, fine to medium grained, quartz, little shell hash, trace shell fragments, trace silt, trace whole shell, shell fragments up to (2.0"x1.0"), whole shells up to (2.0"x1.25"), gray (5Y-6/1) from 6.0' to 6.1' and 8.0' to 8.2', gray (5Y-5/1), (SW).		2	Sample #2, Depth = 7.2' Mean (mm): 0.30, Phi Sorting: 0.86 Shell Hash: 1%, Fines (230): 1.24% (SW)
-17.8	10.8		Shelly SAND, fine to medium grained, quartz, trace shell fragments, trace silt, shell fragments up to (1.0"x0.75"), shell component is shell hash, gray (5Y-5/1), (SW).		3	Sample #3, Depth = 10.3' Mean (mm): 0.60, Phi Sorting: 1.29 Shell Hash: 4%, Fines (230): 1.48% (SW)
-18.5	11.5		No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/15/09

SAJ FORM 1836 JUN 02 **MODIFIED FOR THE FLORIDA DEP** JUN 04

Boring Designation FEVC-08-09

DRILLING LOG

DIVISION		INSTALLATION	SHEET 1 OF 1 SHEETS

1. PROJECT: Figure Eight Island / Rich Inlet 2008; Figure Eight Island, North Carolina
2. BORING DESIGNATION: FEVC-08-09
3. DRILLING AGENCY: Athena Technologies
4. NAME OF DRILLER: Walter Sexton
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
6. THICKNESS OF OVERBURDEN: 0.0 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.
8. TOTAL DEPTH OF BORING: 12.0 Ft.
9. SIZE AND TYPE OF BIT: 3.0 In.
10. COORDINATE SYSTEM/DATUM: North Carolina State Plane; HORIZONTAL: NAD 1983; VERTICAL: NAVD 88
11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic; ☐ AUTO HAMMER ☐ MANUAL HAMMER
12. TOTAL SAMPLES; DISTURBED; UNDISTURBED (UD)
13. TOTAL NUMBER CORE BOXES
14. ELEVATION GROUND WATER
15. DATE BORING: STARTED 11-07-08 14:00; COMPLETED 11-07-08 14:05
16. ELEVATION TOP OF BORING: -9.7 Ft.
17. TOTAL RECOVERY FOR BORING: 10.3 Ft.
18. SIGNATURE AND TITLE OF INSPECTOR: KW

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
-9.7	0.0					
			SAND, fine to medium grained, quartz, trace rock fragments, trace shell fragments, trace shell hash, trace silt, shell fragments typically up to (1.0"x1.25"), rock fragments up to 0.5", (2.0"x0.5") shell fragment @ 2.0', 0.25" shell hash lenses @ 3.3', 4.3', 4.7', and 4.8', some shell from 6.5' to 6.6', material from 8.0'-8.3' lost during core transfer in one half, gray (5Y-6/1), (SP).		1	Sample #1, Depth = 1.0' Mean (mm): 0.23, Phi Sorting: 0.68 Shell Hash: 0%, Fines (230): 1.13% (SP)
					2	Sample #2, Depth = 4.0' Mean (mm): 0.21, Phi Sorting: 0.44 Shell Hash: 0%, Fines (230): 1.20% (SP)
					3	Sample #3, Depth = 8.0' Mean (mm): 0.17, Phi Sorting: 0.35 Shell Hash: 0%, Fines (230): 1.34% (SP)
-20.0	10.3					
			No Recovery.			
-21.7	12.0					
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/15/09

SAJ FORM 1836 JUN 02 **MODIFIED FOR THE FLORIDA DEP** JUN 04

Boring Designation FEVC-08-10

DRILLING LOG

DIVISION

INSTALLATION

SHEET 1 OF 1 SHEETS

1. PROJECT
Figure Eight Island / Rich Inlet 2008
Figure Eight Island, North Carolina

2. BORING DESIGNATION: FEVC-08-10
LOCATION COORDINATES: X = 2,389,697 Y = 199,802

3. DRILLING AGENCY: Athena Technologies
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Walter Sexton

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: 0.0 Ft.

7. DEPTH DRILLED INTO ROCK: 0.0 Ft.

8. TOTAL DEPTH OF BORING: 9.0 Ft.

9. SIZE AND TYPE OF BIT: 3.0 In.

10. COORDINATE SYSTEM/DATUM: North Carolina State Plane
HORIZONTAL: NAD 1983
VERTICAL: NAVD 88

11. MANUFACTURER'S DESIGNATION OF DRILL: Hydraulic
☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES
DISTURBED:
UNDISTURBED (UD):

13. TOTAL NUMBER CORE BOXES:

14. ELEVATION GROUND WATER:

15. DATE BORING
STARTED: 11-07-08 14:39
COMPLETED: 11-07-08 14:45

16. ELEVATION TOP OF BORING: -8.5 Ft.

17. TOTAL RECOVERY FOR BORING: 7.9 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: KW

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.
-8.5	0.0					
			SAND, fine to medium grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 1.5", gray (5Y-6/1), (SP).		1	Sample #1, Depth = 1.5' Mean (mm): 0.21, Phi Sorting: 0.57 Shell Hash: 0%, Fines (230): 1.20% (SP)
					2	Sample #2, Depth = 4.0' Mean (mm): 0.21, Phi Sorting: 0.43 Shell Hash: 0%, Fines (230): 1.13% (SP)
-13.6	5.1		SAND, fine to medium grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 1.25", (3.0"x0.75") whole shell @ 5.8', shell hash layers from 5.9' to 6.0' and 6.6' to 6.9', trace shelly laminae, gray (5Y-6/1), (SP).		3	Sample #3, Depth = 5.6' Mean (mm): 0.30, Phi Sorting: 0.80 Shell Hash: 0%, Fines (230): 1.18% (SP)
-15.7	7.2					
-16.4	7.9				4	Sample #4, Depth = 7.6' Mean (mm): 0.71, Phi Sorting: 1.75 Shell Hash: 6%, Fines (230): 1.05% (SW)
-17.5	9.0		SAND, fine to medium grained, quartz, some shell hash, trace shell fragments, trace silt, trace whole shell, shell fragments up to 1.25", whole shells up to 1.0", olive gray (5Y-5/2), (SW).			
			No Recovery.			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/15/09

SAJ FORM 1836 JUN 02 MODIFIED FOR THE FLORIDA DEP JUN 04

APPENDIX 22

2008 CPENC Vibracore Photographs

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-01
0.0' - 2.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-01
2.0' - 4.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-01
4.0' - 6.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-01
6.0' - 8.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-01
8.0' - 10.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-01
10.0' - 12.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-01
12.0' - 12.2'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-02
0.0' - 2.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-02
2.0' - 4.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-02
4.0' - 6.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-02
6.0' - 8.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-02
8.0' - 9.1'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-02A
Jetted to 7.0'
7.0' - 9.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-02A
Jetted to 7.0'
9.0'- 11.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-02A
Jetted to 7.0'
11.0' - 13.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-02A
Jetted to 7.0'
13.0' - 15.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-02A
Jetted to 7.0'
15.0' - 17.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-03
0.0' - 2.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-03
2.0' - 4.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-03
4.0' - 6.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-03
6.0' - 8.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-03
8.0' - 10.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-03
10.0' - 12.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-03
12.0' - 14.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-03
14.0' - 16.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-03
16.0' - 18.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-03
18.0' - 19.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-04
0.0' - 2.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-04
2.0' - 4.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-04
4.0' - 6.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-04
6.0' - 8.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-04
8.0' - 10.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-04
10.0' - 10.4'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-04A
Jetted to 8.0'
8.0' - 10.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-04A
Jetted to 8.0'
10.0' - 12.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-04A
Jetted to 8.0'
12.0' - 14.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-04A
Jetted to 8.0'
14.0' - 16.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-04A
Jetted to 8.0'
16.0' - 18.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-04A
Jetted to 8.0'
18.0' - 19.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-05
0.0' - 2.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-05
2.0' - 4.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-05
4.0' - 6.0'

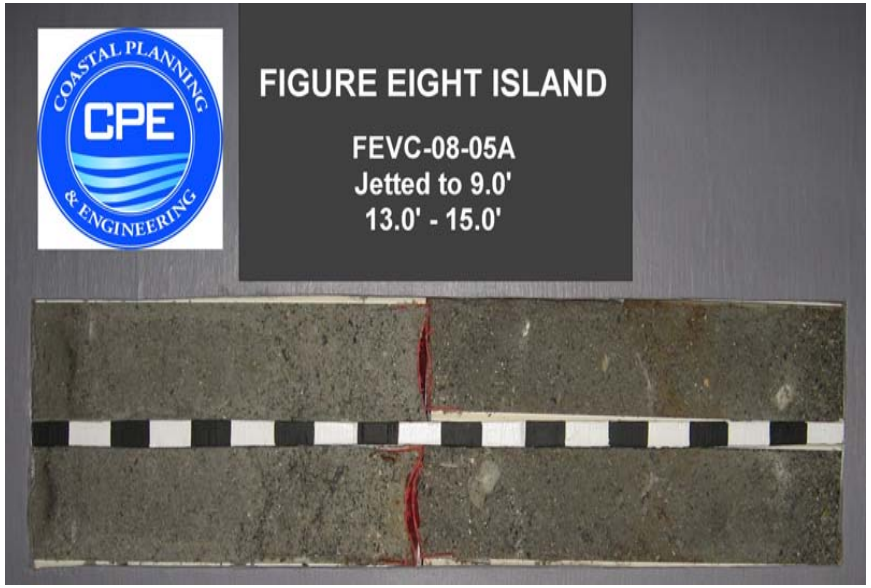
COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-05
6.0' - 8.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-05
8.0' - 10.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-05
10.0' - 10.9'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-05A
Jetted to 9.0'
9.0' - 11.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-05A
Jetted to 9.0'
11.0' - 13.0'


COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-05A
Jetted to 9.0'
13.0' - 15.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-05A
Jetted to 9.0'
15.0' - 17.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-05A
Jetted to 9.0'
17.0' - 18.5'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-06
0.0' - 2.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-06
2.0' - 4.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-06
4.0' - 6.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-06
6.0' - 8.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-06
8.0' - 10.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-06
10.0' - 12.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-06
12.0' - 14.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-06
14.0' - 16.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-06
16.0' - 18.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-06
18.0' - 20.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-06
20.0' - 20.9'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-07
0.0' - 2.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-07
2.0' - 4.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-07
4.0' - 6.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-07
6.0' - 8.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-07
8.0' - 10.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-07
10.0' - 12.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-07
12.0' - 12.7'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-07A
Jetted to 9.4'
9.4' - 11.4'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-07A
Jetted to 9.4'
11.4' - 13.4'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-07A
Jetted to 9.4'
13.4' - 15.4'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-07A
Jetted to 9.4'
15.4' - 16.9'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-08
0.0' - 2.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-08
2.0' - 4.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-08
4.0' - 6.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-08
6.0' - 8.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-08
8.0' - 10.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-08
10.0' - 10.8'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-09
0.0' - 2.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-09
2.0' - 4.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-09
4.0' - 6.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-09
6.0' - 8.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-09
8.0' - 10.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-09
10.0' - 10.3'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-10
0.0' - 2.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-10
2.0' - 4.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-10
4.0' - 6.0'

COASTAL PLANNING
CPE
& ENGINEERING
FIGURE EIGHT ISLAND
FEVC-08-10
6.0' - 7.9'

APPENDIX 23

2008 CPENC Individual Vibracore Granularmetric Reports

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-01 #1

Analysis Date: 03-17-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,385,534	200,207	North Carolina State Plane	-12.6 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
87.98	86.68	0.01	0.00	#200 - 1.51 #230 - 1.48			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.04	0.05	0.04	0.05
10	-1.00	2.00	0.11	0.13	0.15	0.18
14	-0.50	1.41	0.08	0.09	0.23	0.27
18	0.00	1.00	0.06	0.07	0.29	0.34
25	0.50	0.71	0.06	0.07	0.35	0.41
35	1.00	0.50	0.16	0.18	0.51	0.59
45	1.50	0.35	0.44	0.50	0.95	1.09
60	2.00	0.25	2.84	3.23	3.79	4.32
80	2.50	0.18	36.69	41.70	40.48	46.02
120	3.00	0.13	42.21	47.98	82.69	94.00
170	3.50	0.09	3.78	4.30	86.47	98.30
200	3.75	0.07	0.17	0.19	86.64	98.49
230	4.00	0.06	0.03	0.03	86.67	98.52

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.12	2.90	2.80	2.54	2.25	2.14	2.01

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.5	0.18	0.4	-2.61	24.09

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-01 #2

Analysis Date: 03-17-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,385,534	200,207	North Carolina State Plane	-17.6 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
92.61	91.36	0.00	0.00	#200 - 1.40 #230 - 1.37			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.05	0.05	0.05	0.05
7	-1.50	2.83	0.10	0.11	0.15	0.16
10	-1.00	2.00	0.17	0.18	0.32	0.34
14	-0.50	1.41	0.31	0.33	0.63	0.67
18	0.00	1.00	0.28	0.30	0.91	0.97
25	0.50	0.71	0.54	0.58	1.45	1.55
35	1.00	0.50	0.80	0.86	2.25	2.41
45	1.50	0.35	2.08	2.25	4.33	4.66
60	2.00	0.25	14.71	15.88	19.04	20.54
80	2.50	0.18	49.01	52.92	68.05	73.46
120	3.00	0.13	21.87	23.62	89.92	97.08
170	3.50	0.09	1.35	1.46	91.27	98.54
200	3.75	0.07	0.06	0.06	91.33	98.60
230	4.00	0.06	0.03	0.03	91.36	98.63

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.96	2.72	2.53	2.28	2.04	1.86	1.51

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.23	0.21	0.53	-2.57	16.52

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-01 #3

Analysis Date: 03-17-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,385,534	200,207	North Carolina State Plane	-21.1 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/2 Dry - 5Y-7/1 Washed - 5Y-8/1	(2.0"x0.5") shell removed, 5.65g

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
88.45	87.02	0.02	0.12	#200 - 1.81 #230 - 1.76			2

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	5.86	6.63	5.86	6.63
5/16"	-3.00	8.00	0.29	0.33	6.15	6.96
3.5	-2.50	5.66	2.13	2.41	8.28	9.37
4	-2.25	4.76	0.22	0.25	8.50	9.62
5	-2.00	4.00	0.69	0.78	9.19	10.40
7	-1.50	2.83	1.49	1.68	10.68	12.08
10	-1.00	2.00	1.78	2.01	12.46	14.09
14	-0.50	1.41	2.88	3.26	15.34	17.35
18	0.00	1.00	3.78	4.27	19.12	21.62
25	0.50	0.71	5.17	5.85	24.29	27.47
35	1.00	0.50	7.59	8.58	31.88	36.05
45	1.50	0.35	14.69	16.61	46.57	52.66
60	2.00	0.25	18.57	20.99	65.14	73.65
80	2.50	0.18	16.64	18.81	81.78	92.46
120	3.00	0.13	4.61	5.21	86.39	97.67
170	3.50	0.09	0.42	0.47	86.81	98.14
200	3.75	0.07	0.04	0.05	86.85	98.19
230	4.00	0.06	0.04	0.05	86.89	98.24

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.74	2.28	2.04	1.42	0.29	-0.71	-3.68

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.82	0.57	1.75	-1.39	4.09

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-01 #4

Analysis Date: 03-17-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,385,534	200,207	North Carolina State Plane	-22.2 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
87.78	84.95	0.04	0.02	#200 - 3.53 #230 - 3.29			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.02	0.02	0.02	0.02
14	-0.50	1.41	0.00	0.00	0.02	0.02
18	0.00	1.00	0.00	0.00	0.02	0.02
25	0.50	0.71	0.03	0.03	0.05	0.05
35	1.00	0.50	0.01	0.01	0.06	0.06
45	1.50	0.35	0.05	0.06	0.11	0.12
60	2.00	0.25	0.22	0.25	0.33	0.37
80	2.50	0.18	8.75	9.97	9.08	10.34
120	3.00	0.13	57.60	65.62	66.68	75.96
170	3.50	0.09	17.10	19.48	83.78	95.44
200	3.75	0.07	0.90	1.03	84.68	96.47
230	4.00	0.06	0.21	0.24	84.89	96.71

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.49	3.21	2.99	2.80	2.61	2.54	2.23

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.81	0.14	0.31	-0.66	12.65

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-02 #1

Analysis Date: 03-17-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,109	200,498	North Carolina State Plane	-6.8 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-8/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
98.37	97.26	0.00	0.17	#200 - 1.31 #230 - 1.30			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.58	0.59	0.58	0.59
4	-2.25	4.76	0.00	0.00	0.58	0.59
5	-2.00	4.00	0.03	0.03	0.61	0.62
7	-1.50	2.83	0.11	0.11	0.72	0.73
10	-1.00	2.00	0.48	0.49	1.20	1.22
14	-0.50	1.41	0.14	0.14	1.34	1.36
18	0.00	1.00	0.41	0.42	1.75	1.78
25	0.50	0.71	0.54	0.55	2.29	2.33
35	1.00	0.50	1.63	1.66	3.92	3.99
45	1.50	0.35	5.05	5.13	8.97	9.12
60	2.00	0.25	21.00	21.35	29.97	30.47
80	2.50	0.18	44.78	45.52	74.75	75.99
120	3.00	0.13	20.91	21.26	95.66	97.25
170	3.50	0.09	1.36	1.38	97.02	98.63
200	3.75	0.07	0.06	0.06	97.08	98.69
230	4.00	0.06	0.01	0.01	97.09	98.70

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.95	2.69	2.49	2.21	1.87	1.66	1.10

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.11	0.23	0.7	-3.19	19.91

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-02 #2

Analysis Date: 03-17-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,109	200,498	North Carolina State Plane	-11.8 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-8/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
96.50	95.40	0.00	0.00	#200 - 1.16 #230 - 1.14			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.01	0.01	0.01	0.01
18	0.00	1.00	0.01	0.01	0.02	0.02
25	0.50	0.71	0.02	0.02	0.04	0.04
35	1.00	0.50	0.04	0.04	0.08	0.08
45	1.50	0.35	0.23	0.24	0.31	0.32
60	2.00	0.25	4.17	4.32	4.48	4.64
80	2.50	0.18	41.84	43.36	46.32	48.00
120	3.00	0.13	45.66	47.32	91.98	95.32
170	3.50	0.09	3.33	3.45	95.31	98.77
200	3.75	0.07	0.07	0.07	95.38	98.84
230	4.00	0.06	0.02	0.02	95.40	98.86

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.00	2.88	2.79	2.52	2.23	2.13	2.00

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.5	0.18	0.33	-0.45	5.14

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-02A #1

Analysis Date: 04-20-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,110	200,509	North Carolina State Plane	-15.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-8/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
104.88	103.57	0.01	0.00	#200 - 1.28 #230 - 1.25			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.01	0.01	0.01	0.01
7	-1.50	2.83	0.00	0.00	0.01	0.01
10	-1.00	2.00	0.01	0.01	0.02	0.02
14	-0.50	1.41	0.03	0.03	0.05	0.05
18	0.00	1.00	0.02	0.02	0.07	0.07
25	0.50	0.71	0.07	0.07	0.14	0.14
35	1.00	0.50	0.11	0.10	0.25	0.24
45	1.50	0.35	0.37	0.35	0.62	0.59
60	2.00	0.25	4.99	4.76	5.61	5.35
80	2.50	0.18	53.38	50.90	58.99	56.25
120	3.00	0.13	41.42	39.49	100.41	95.74
170	3.50	0.09	3.02	2.88	103.43	98.62
200	3.75	0.07	0.10	0.10	103.53	98.72
230	4.00	0.06	0.03	0.03	103.56	98.75

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.99	2.85	2.74	2.44	2.19	2.10	1.96

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.45	0.18	0.35	-0.91	11.35

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-02A #2

Analysis Date: 04-20-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,110	200,509	North Carolina State Plane	-20.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-8/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
106.88	105.50	0.00	0.00	#200 - 1.30 #230 - 1.29			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.02	0.02	0.02	0.02
18	0.00	1.00	0.05	0.05	0.07	0.07
25	0.50	0.71	0.03	0.03	0.10	0.10
35	1.00	0.50	0.08	0.07	0.18	0.17
45	1.50	0.35	0.31	0.29	0.49	0.46
60	2.00	0.25	4.01	3.75	4.50	4.21
80	2.50	0.18	51.82	48.48	56.32	52.69
120	3.00	0.13	45.55	42.62	101.87	95.31
170	3.50	0.09	3.48	3.26	105.35	98.57
200	3.75	0.07	0.14	0.13	105.49	98.70
230	4.00	0.06	0.01	0.01	105.50	98.71

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.00	2.87	2.76	2.47	2.21	2.12	2.01

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	2.48	0.18	0.34	-0.58	7.53

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-03 #1

Analysis Date: 09-01-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,390	201,128	North Carolina State Plane	-5.0 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/1 Dry - 5Y-8/1 Washed - 5Y-8/1	(1.0"x0.75") shell fragment removed, 2.91g

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
110.13	109.17	0.01	0.05	#200 - 0.94 #230 - 0.93			2

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.60	0.54	0.60	0.54
5/16"	-3.00	8.00	1.44	1.31	2.04	1.85
3.5	-2.50	5.66	1.51	1.37	3.55	3.22
4	-2.25	4.76	1.06	0.96	4.61	4.18
5	-2.00	4.00	0.73	0.66	5.34	4.84
7	-1.50	2.83	1.30	1.18	6.64	6.02
10	-1.00	2.00	1.98	1.80	8.62	7.82
14	-0.50	1.41	2.89	2.62	11.51	10.44
18	0.00	1.00	3.61	3.28	15.12	13.72
25	0.50	0.71	4.13	3.75	19.25	17.47
35	1.00	0.50	5.12	4.65	24.37	22.12
45	1.50	0.35	8.90	8.08	33.27	30.20
60	2.00	0.25	17.12	15.55	50.39	45.75
80	2.50	0.18	36.64	33.27	87.03	79.02
120	3.00	0.13	20.75	18.84	107.78	97.86
170	3.50	0.09	1.17	1.06	108.95	98.92
200	3.75	0.07	0.15	0.14	109.10	99.06
230	4.00	0.06	0.01	0.01	109.11	99.07

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.92	2.63	2.44	2.06	1.18	0.30	-1.93

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.53	0.35	1.43	-1.73	5.56

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-03 #2

Analysis Date: 03-17-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,390	201,128	North Carolina State Plane	-7.1 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/2 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
85.12	84.08	0.01	0.00	#200 - 1.27 #230 - 1.26			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.06	0.07	0.06	0.07
5	-2.00	4.00	0.00	0.00	0.06	0.07
7	-1.50	2.83	0.14	0.16	0.20	0.23
10	-1.00	2.00	0.08	0.09	0.28	0.32
14	-0.50	1.41	0.17	0.20	0.45	0.52
18	0.00	1.00	0.22	0.26	0.67	0.78
25	0.50	0.71	0.18	0.21	0.85	0.99
35	1.00	0.50	0.31	0.36	1.16	1.35
45	1.50	0.35	0.82	0.96	1.98	2.31
60	2.00	0.25	5.46	6.41	7.44	8.72
80	2.50	0.18	37.03	43.50	44.47	52.22
120	3.00	0.13	36.78	43.21	81.25	95.43
170	3.50	0.09	2.77	3.25	84.02	98.68
200	3.75	0.07	0.04	0.05	84.06	98.73
230	4.00	0.06	0.01	0.01	84.07	98.74

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.00	2.87	2.76	2.47	2.19	2.08	1.71

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	2.42	0.19	0.49	-3.36	25.67

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-03 #3

Analysis Date: 03-17-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,390	201,128	North Carolina State Plane	-12.1 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
89.09	87.94	0.00	0.00	#200 - 1.34 #230 - 1.30			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.05	0.06	0.05	0.06
7	-1.50	2.83	0.00	0.00	0.05	0.06
10	-1.00	2.00	0.01	0.01	0.06	0.07
14	-0.50	1.41	0.02	0.02	0.08	0.09
18	0.00	1.00	0.11	0.12	0.19	0.21
25	0.50	0.71	0.07	0.08	0.26	0.29
35	1.00	0.50	0.16	0.18	0.42	0.47
45	1.50	0.35	0.27	0.30	0.69	0.77
60	2.00	0.25	1.17	1.31	1.86	2.08
80	2.50	0.18	36.74	41.24	38.60	43.32
120	3.00	0.13	46.54	52.24	85.14	95.56
170	3.50	0.09	2.70	3.03	87.84	98.59
200	3.75	0.07	0.06	0.07	87.90	98.66
230	4.00	0.06	0.04	0.04	87.94	98.70

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.99	2.89	2.80	2.56	2.28	2.17	2.04

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.53	0.17	0.35	-2.7	29.24

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-03 #4

Analysis Date: 03-17-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,390	201,128	North Carolina State Plane	-16.2 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
102.69	101.74	0.00	0.00	#200 - 0.93 #230 - 0.93			7

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.58	0.56	0.58	0.56
5/16"	-3.00	8.00	1.73	1.68	2.31	2.24
3.5	-2.50	5.66	1.38	1.34	3.69	3.58
4	-2.25	4.76	1.51	1.47	5.20	5.05
5	-2.00	4.00	1.92	1.87	7.12	6.92
7	-1.50	2.83	4.77	4.65	11.89	11.57
10	-1.00	2.00	4.88	4.75	16.77	16.32
14	-0.50	1.41	7.94	7.73	24.71	24.05
18	0.00	1.00	7.81	7.61	32.52	31.66
25	0.50	0.71	5.86	5.71	38.38	37.37
35	1.00	0.50	6.82	6.64	45.20	44.01
45	1.50	0.35	9.72	9.47	54.92	53.48
60	2.00	0.25	20.71	20.17	75.63	73.65
80	2.50	0.18	20.19	19.66	95.82	93.31
120	3.00	0.13	5.70	5.55	101.52	98.86
170	3.50	0.09	0.21	0.20	101.73	99.06
200	3.75	0.07	0.01	0.01	101.74	99.07
230	4.00	0.06	0.00	0.00	101.74	99.07

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.65	2.26	2.03	1.32	-0.44	-1.03	-2.26

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	0.74	0.60	1.59	-0.78	2.61

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-03 #5

Analysis Date: 03-17-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,390	201,128	North Carolina State Plane	-17.6 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-8/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
95.11	93.89	0.01	0.00	#200 - 1.31 #230 - 1.29			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.02	0.02	0.02	0.02
14	-0.50	1.41	0.02	0.02	0.04	0.04
18	0.00	1.00	0.02	0.02	0.06	0.06
25	0.50	0.71	0.03	0.03	0.09	0.09
35	1.00	0.50	0.11	0.12	0.20	0.21
45	1.50	0.35	0.51	0.54	0.71	0.75
60	2.00	0.25	5.59	5.88	6.30	6.63
80	2.50	0.18	51.97	54.64	58.27	61.27
120	3.00	0.13	33.86	35.60	92.13	96.87
170	3.50	0.09	1.67	1.76	93.80	98.63
200	3.75	0.07	0.06	0.06	93.86	98.69
230	4.00	0.06	0.02	0.02	93.88	98.71

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.97	2.82	2.69	2.40	2.17	2.09	1.86

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.41	0.19	0.34	-0.8	9.46

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-03 #6

Analysis Date: 03-17-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,390	201,128	North Carolina State Plane	-20.6 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-8/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
85.62	84.61	0.00	0.00	#200 - 1.16 #230 - 1.16			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.04	0.05	0.04	0.05
10	-1.00	2.00	0.01	0.01	0.05	0.06
14	-0.50	1.41	0.09	0.11	0.14	0.17
18	0.00	1.00	0.09	0.11	0.23	0.28
25	0.50	0.71	0.09	0.11	0.32	0.39
35	1.00	0.50	0.10	0.12	0.42	0.51
45	1.50	0.35	0.32	0.37	0.74	0.88
60	2.00	0.25	7.20	8.41	7.94	9.29
80	2.50	0.18	55.01	64.25	62.95	73.54
120	3.00	0.13	21.06	24.60	84.01	98.14
170	3.50	0.09	0.56	0.65	84.57	98.79
200	3.75	0.07	0.04	0.05	84.61	98.84
230	4.00	0.06	0.00	0.00	84.61	98.84

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.94	2.71	2.53	2.32	2.12	2.05	1.74

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.32	0.20	0.35	-2.26	23.45

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-04 #1

Analysis Date: 03-17-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,485	202,080	North Carolina State Plane	-4.0 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-5/1 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
87.05	86.06	0.00	0.00	#200 - 1.18 #230 - 1.15			1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.20	0.23	0.20	0.23
4	-2.25	4.76	0.61	0.70	0.81	0.93
5	-2.00	4.00	0.15	0.17	0.96	1.10
7	-1.50	2.83	0.76	0.87	1.72	1.97
10	-1.00	2.00	1.05	1.21	2.77	3.18
14	-0.50	1.41	1.95	2.24	4.72	5.42
18	0.00	1.00	2.18	2.50	6.90	7.92
25	0.50	0.71	2.79	3.21	9.69	11.13
35	1.00	0.50	3.51	4.03	13.20	15.16
45	1.50	0.35	6.99	8.03	20.19	23.19
60	2.00	0.25	16.08	18.47	36.27	41.66
80	2.50	0.18	35.87	41.21	72.14	82.87
120	3.00	0.13	13.41	15.40	85.55	98.27
170	3.50	0.09	0.45	0.52	86.00	98.79
200	3.75	0.07	0.03	0.03	86.03	98.82
230	4.00	0.06	0.03	0.03	86.06	98.85

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.89	2.54	2.40	2.10	1.55	1.05	-0.59

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.77	0.29	1.03	-1.89	6.74

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-04 #2

Analysis Date: 03-17-09

Analyzed By: KW

Coastal Planning & Engineering
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FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,485	202,080	North Carolina State Plane	-6.0 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/3 Dry - 5Y-7/1 Washed - 5Y-7/1	(1.25"x1.25") and (1.25"x0.5") shell fragments removed, 20.20g

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
88.78	87.93	0.00	0.00	#200 - 0.99 #230 - 0.98			14

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	1.66	1.87	1.66	1.87
5/16"	-3.00	8.00	2.08	2.34	3.74	4.21
3.5	-2.50	5.66	3.28	3.69	7.02	7.90
4	-2.25	4.76	1.77	1.99	8.79	9.89
5	-2.00	4.00	4.13	4.65	12.92	14.54
7	-1.50	2.83	8.24	9.28	21.16	23.82
10	-1.00	2.00	9.33	10.51	30.49	34.33
14	-0.50	1.41	10.75	12.11	41.24	46.44
18	0.00	1.00	7.74	8.72	48.98	55.16
25	0.50	0.71	5.88	6.62	54.86	61.78
35	1.00	0.50	5.13	5.78	59.99	67.56
45	1.50	0.35	6.10	6.87	66.09	74.43
60	2.00	0.25	8.72	9.82	74.81	84.25
80	2.50	0.18	10.13	11.41	84.94	95.66
120	3.00	0.13	2.78	3.13	87.72	98.79
170	3.50	0.09	0.17	0.19	87.89	98.98
200	3.75	0.07	0.03	0.03	87.92	99.01
230	4.00	0.06	0.01	0.01	87.93	99.02

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.47	1.99	1.53	-0.30	-1.44	-1.92	-2.89

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	-0.13	1.09	1.71	-0.03	1.99

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-04 #3

Analysis Date: 03-17-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
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fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,485	202,080	North Carolina State Plane	-8.5 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/2 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
91.99	90.79	0.00	0.00	#200 - 1.30 #230 - 1.30			2

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	1.66	1.80	1.66	1.80
7/16"	-3.50	11.31	3.07	3.34	4.73	5.14
5/16"	-3.00	8.00	0.00	0.00	4.73	5.14
3.5	-2.50	5.66	1.08	1.17	5.81	6.31
4	-2.25	4.76	0.36	0.39	6.17	6.70
5	-2.00	4.00	0.42	0.46	6.59	7.16
7	-1.50	2.83	1.40	1.52	7.99	8.68
10	-1.00	2.00	1.79	1.95	9.78	10.63
14	-0.50	1.41	2.79	3.03	12.57	13.66
18	0.00	1.00	4.14	4.50	16.71	18.16
25	0.50	0.71	4.31	4.69	21.02	22.85
35	1.00	0.50	7.46	8.11	28.48	30.96
45	1.50	0.35	12.02	13.07	40.50	44.03
60	2.00	0.25	21.27	23.12	61.77	67.15
80	2.50	0.18	24.43	26.56	86.20	93.71
120	3.00	0.13	4.43	4.82	90.63	98.53
170	3.50	0.09	0.14	0.15	90.77	98.68
200	3.75	0.07	0.02	0.02	90.79	98.70
230	4.00	0.06	0.00	0.00	90.79	98.70

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.63	2.32	2.15	1.63	0.63	-0.24	-3.04

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.05	0.48	1.62	-1.72	5.45

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-04 #4

Analysis Date: 03-19-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
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fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,485	202,080	North Carolina State Plane	-11.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
92.52	91.52	0.02	0.04	#200 - 1.14 #230 - 1.14			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.10	0.11	0.10	0.11
7	-1.50	2.83	0.00	0.00	0.10	0.11
10	-1.00	2.00	0.01	0.01	0.11	0.12
14	-0.50	1.41	0.11	0.12	0.22	0.24
18	0.00	1.00	0.16	0.17	0.38	0.41
25	0.50	0.71	0.36	0.39	0.74	0.80
35	1.00	0.50	0.63	0.68	1.37	1.48
45	1.50	0.35	2.23	2.41	3.60	3.89
60	2.00	0.25	20.89	22.58	24.49	26.47
80	2.50	0.18	56.97	61.58	81.46	88.05
120	3.00	0.13	9.79	10.58	91.25	98.63
170	3.50	0.09	0.19	0.21	91.44	98.84
200	3.75	0.07	0.02	0.02	91.46	98.86
230	4.00	0.06	0.00	0.00	91.46	98.86

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.83	2.47	2.39	2.19	1.97	1.77	1.52

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.14	0.23	0.42	-2.6	21.04

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-04A #1

Analysis Date: 03-19-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,477	202,102	North Carolina State Plane	-11.9 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-8/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
96.94	96.00	0.00	0.01	#200 - 0.98 #230 - 0.98			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.01	0.01	0.01	0.01
18	0.00	1.00	0.03	0.03	0.04	0.04
25	0.50	0.71	0.07	0.07	0.11	0.11
35	1.00	0.50	0.29	0.30	0.40	0.41
45	1.50	0.35	1.97	2.03	2.37	2.44
60	2.00	0.25	19.01	19.61	21.38	22.05
80	2.50	0.18	62.14	64.10	83.52	86.15
120	3.00	0.13	12.23	12.62	95.75	98.77
170	3.50	0.09	0.23	0.24	95.98	99.01
200	3.75	0.07	0.01	0.01	95.99	99.02
230	4.00	0.06	0.00	0.00	95.99	99.02

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.85	2.48	2.41	2.22	2.02	1.85	1.57

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.19	0.22	0.34	-0.78	6.34

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-04A #2

Analysis Date: 03-19-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,477	202,102	North Carolina State Plane	-14.9 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
94.52	93.37	0.00	0.01	#200 - 1.24 #230 - 1.24			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.01	0.01	0.01	0.01
18	0.00	1.00	0.01	0.01	0.02	0.02
25	0.50	0.71	0.07	0.07	0.09	0.09
35	1.00	0.50	0.12	0.13	0.21	0.22
45	1.50	0.35	0.58	0.61	0.79	0.83
60	2.00	0.25	6.45	6.82	7.24	7.65
80	2.50	0.18	58.73	62.13	65.97	69.78
120	3.00	0.13	26.52	28.06	92.49	97.84
170	3.50	0.09	0.83	0.88	93.32	98.72
200	3.75	0.07	0.04	0.04	93.36	98.76
230	4.00	0.06	0.00	0.00	93.36	98.76

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.95	2.75	2.59	2.34	2.14	2.07	1.81

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.36	0.19	0.32	-0.55	7.01

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-04A #3

Analysis Date: 03-19-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,477	202,102	North Carolina State Plane	-17.1 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/1 Dry - 5Y-7/2 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
116.53	115.42	0.01	0.01	#200 - 0.96 #230 - 0.95			1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.52	0.45	0.52	0.45
3.5	-2.50	5.66	0.45	0.39	0.97	0.84
4	-2.25	4.76	0.16	0.14	1.13	0.98
5	-2.00	4.00	0.20	0.17	1.33	1.15
7	-1.50	2.83	0.65	0.56	1.98	1.71
10	-1.00	2.00	0.84	0.72	2.82	2.43
14	-0.50	1.41	1.39	1.19	4.21	3.62
18	0.00	1.00	2.06	1.77	6.27	5.39
25	0.50	0.71	2.76	2.37	9.03	7.76
35	1.00	0.50	7.66	6.57	16.69	14.33
45	1.50	0.35	21.45	18.41	38.14	32.74
60	2.00	0.25	40.54	34.79	78.68	67.53
80	2.50	0.18	32.94	28.27	111.62	95.80
120	3.00	0.13	3.67	3.15	115.29	98.95
170	3.50	0.09	0.09	0.08	115.38	99.03
200	3.75	0.07	0.01	0.01	115.39	99.04
230	4.00	0.06	0.01	0.01	115.40	99.05

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.49	2.29	2.13	1.75	1.29	1.05	-0.11

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.57	0.34	0.87	-2.36	10.97

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-04A #4

Analysis Date: 03-19-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,477	202,102	North Carolina State Plane	-18.9 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-8/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
101.31	100.28	0.01	0.07	#200 - 1.09 #230 - 1.09			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.03	0.03	0.03	0.03
7	-1.50	2.83	0.00	0.00	0.03	0.03
10	-1.00	2.00	0.11	0.11	0.14	0.14
14	-0.50	1.41	0.13	0.13	0.27	0.27
18	0.00	1.00	0.28	0.28	0.55	0.55
25	0.50	0.71	0.43	0.42	0.98	0.97
35	1.00	0.50	1.42	1.40	2.40	2.37
45	1.50	0.35	6.42	6.34	8.82	8.71
60	2.00	0.25	33.11	32.68	41.93	41.39
80	2.50	0.18	50.22	49.57	92.15	90.96
120	3.00	0.13	7.87	7.77	100.02	98.73
170	3.50	0.09	0.17	0.17	100.19	98.90
200	3.75	0.07	0.01	0.01	100.20	98.91
230	4.00	0.06	0.00	0.00	100.20	98.91

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.76	2.43	2.34	2.09	1.75	1.61	1.21

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.02	0.25	0.46	-1.71	11.1

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-05 #1

Analysis Date: 03-19-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,173	201,385	North Carolina State Plane	-4.5 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/2 Dry - 5Y-8/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
106.00	104.87	0.00	0.00	#200 - 1.07 #230 - 1.06			1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.09	0.08	0.09	0.08
4	-2.25	4.76	0.15	0.14	0.24	0.22
5	-2.00	4.00	0.23	0.22	0.47	0.44
7	-1.50	2.83	0.34	0.32	0.81	0.76
10	-1.00	2.00	0.26	0.25	1.07	1.01
14	-0.50	1.41	0.42	0.40	1.49	1.41
18	0.00	1.00	0.52	0.49	2.01	1.90
25	0.50	0.71	0.58	0.55	2.59	2.45
35	1.00	0.50	0.68	0.64	3.27	3.09
45	1.50	0.35	2.36	2.23	5.63	5.32
60	2.00	0.25	16.88	15.92	22.51	21.24
80	2.50	0.18	55.80	52.64	78.31	73.88
120	3.00	0.13	24.88	23.47	103.19	97.35
170	3.50	0.09	1.64	1.55	104.83	98.90
200	3.75	0.07	0.03	0.03	104.86	98.93
230	4.00	0.06	0.01	0.01	104.87	98.94

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.95	2.72	2.52	2.27	2.04	1.84	1.43

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.19	0.22	0.64	-3.45	21.37

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-05 #2

Analysis Date: 03-19-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,173	201,385	North Carolina State Plane	-8.5 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-5/1 Dry - 5Y-7/1 Washed - 5Y-8/2	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
108.31	107.06	0.01	0.01	#200 - 1.19 #230 - 1.17			3

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.26	0.24	0.26	0.24
3.5	-2.50	5.66	0.53	0.49	0.79	0.73
4	-2.25	4.76	0.69	0.64	1.48	1.37
5	-2.00	4.00	1.21	1.12	2.69	2.49
7	-1.50	2.83	1.64	1.51	4.33	4.00
10	-1.00	2.00	3.17	2.93	7.50	6.93
14	-0.50	1.41	5.22	4.82	12.72	11.75
18	0.00	1.00	6.73	6.21	19.45	17.96
25	0.50	0.71	6.77	6.25	26.22	24.21
35	1.00	0.50	11.09	10.24	37.31	34.45
45	1.50	0.35	17.02	15.71	54.33	50.16
60	2.00	0.25	24.45	22.57	78.78	72.73
80	2.50	0.18	23.17	21.39	101.95	94.12
120	3.00	0.13	4.87	4.50	106.82	98.62
170	3.50	0.09	0.18	0.17	107.00	98.79
200	3.75	0.07	0.02	0.02	107.02	98.81
230	4.00	0.06	0.02	0.02	107.04	98.83

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.60	2.26	2.05	1.49	0.54	-0.16	-1.33

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.13	0.46	1.21	-1.08	3.7

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-05 #3

Analysis Date: 03-19-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,173	201,385	North Carolina State Plane	-10.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
104.44	103.28	0.02	0.00	#200 - 1.13 #230 - 1.13			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.29	0.28	0.29	0.28
5	-2.00	4.00	0.20	0.19	0.49	0.47
7	-1.50	2.83	0.28	0.27	0.77	0.74
10	-1.00	2.00	0.27	0.26	1.04	1.00
14	-0.50	1.41	0.58	0.56	1.62	1.56
18	0.00	1.00	0.73	0.70	2.35	2.26
25	0.50	0.71	1.24	1.19	3.59	3.45
35	1.00	0.50	2.44	2.34	6.03	5.79
45	1.50	0.35	11.18	10.70	17.21	16.49
60	2.00	0.25	32.61	31.22	49.82	47.71
80	2.50	0.18	43.65	41.79	93.47	89.50
120	3.00	0.13	9.54	9.13	103.01	98.63
170	3.50	0.09	0.23	0.22	103.24	98.85
200	3.75	0.07	0.02	0.02	103.26	98.87
230	4.00	0.06	0.00	0.00	103.26	98.87

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.80	2.43	2.33	2.03	1.64	1.48	0.83

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.9	0.27	0.68	-2.49	13.5

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-05 #4

Analysis Date: 03-19-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
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ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,173	201,385	North Carolina State Plane	-10.8 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-5/1 Dry - 5Y-7/1 Washed - 5Y-7/2	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
102.77	101.57	0.01	0.00	#200 - 1.19 #230 - 1.16			2

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.55	0.54	0.55	0.54
3.5	-2.50	5.66	0.82	0.80	1.37	1.34
4	-2.25	4.76	0.33	0.32	1.70	1.66
5	-2.00	4.00	0.62	0.60	2.32	2.26
7	-1.50	2.83	1.08	1.05	3.40	3.31
10	-1.00	2.00	1.46	1.42	4.86	4.73
14	-0.50	1.41	2.32	2.26	7.18	6.99
18	0.00	1.00	3.42	3.33	10.60	10.32
25	0.50	0.71	3.74	3.64	14.34	13.96
35	1.00	0.50	7.22	7.03	21.56	20.99
45	1.50	0.35	13.68	13.31	35.24	34.30
60	2.00	0.25	20.99	20.42	56.23	54.72
80	2.50	0.18	32.83	31.95	89.06	86.67
120	3.00	0.13	12.25	11.92	101.31	98.59
170	3.50	0.09	0.12	0.12	101.43	98.71
200	3.75	0.07	0.10	0.10	101.53	98.81
230	4.00	0.06	0.03	0.03	101.56	98.84

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.85	2.46	2.32	1.88	1.15	0.65	-0.94

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.54	0.34	1.16	-1.72	6.19

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-05 #5

Analysis Date: 03-19-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,173	201,385	North Carolina State Plane	-11.8 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-8/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
98.75	97.56	0.00	0.00	#200 - 1.20 #230 - 1.20			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.04	0.04	0.04	0.04
14	-0.50	1.41	0.07	0.07	0.11	0.11
18	0.00	1.00	0.17	0.17	0.28	0.28
25	0.50	0.71	0.23	0.23	0.51	0.51
35	1.00	0.50	0.49	0.50	1.00	1.01
45	1.50	0.35	2.34	2.37	3.34	3.38
60	2.00	0.25	18.00	18.23	21.34	21.61
80	2.50	0.18	60.82	61.59	82.16	83.20
120	3.00	0.13	14.91	15.10	97.07	98.30
170	3.50	0.09	0.47	0.48	97.54	98.78
200	3.75	0.07	0.02	0.02	97.56	98.80
230	4.00	0.06	0.00	0.00	97.56	98.80

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.89	2.53	2.43	2.23	2.03	1.85	1.54

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.2	0.22	0.39	-1.61	11.75

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-05A #1

Analysis Date: 03-20-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,174	201,399	North Carolina State Plane	-11.0 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/2 Dry - 5Y-8/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
128.21	127.30	0.01	0.05	#200 - 0.82 #230 - 0.80			8

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
1"	-4.75	26.91	0.00	0.00	0.00	0.00
3/4"	-4.25	19.03	15.57	12.14	15.57	12.14
5/8"	-4.00	16.00	7.02	5.48	22.59	17.62
7/16"	-3.50	11.31	11.48	8.95	34.07	26.57
5/16"	-3.00	8.00	10.48	8.17	44.55	34.74
3.5	-2.50	5.66	9.33	7.28	53.88	42.02
4	-2.25	4.76	3.10	2.42	56.98	44.44
5	-2.00	4.00	3.47	2.71	60.45	47.15
7	-1.50	2.83	7.21	5.62	67.66	52.77
10	-1.00	2.00	7.04	5.49	74.70	58.26
14	-0.50	1.41	7.67	5.98	82.37	64.24
18	0.00	1.00	6.21	4.84	88.58	69.08
25	0.50	0.71	4.44	3.46	93.02	72.54
35	1.00	0.50	5.65	4.41	98.67	76.95
45	1.50	0.35	7.67	5.98	106.34	82.93
60	2.00	0.25	9.87	7.70	116.21	90.63
80	2.50	0.18	9.08	7.08	125.29	97.71
120	3.00	0.13	1.66	1.29	126.95	99.00
170	3.50	0.09	0.21	0.16	127.16	99.16
200	3.75	0.07	0.03	0.02	127.19	99.18
230	4.00	0.06	0.03	0.02	127.22	99.20

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.31	1.57	0.78	-1.75	-3.59	-4.07	-4.54

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	-1.47	2.77	2.31	0.27	1.7

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-05A #2

Analysis Date: 03-20-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,174	201,399	North Carolina State Plane	-14.9 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
106.55	105.51	0.00	0.00	#200 - 1.01 #230 - 0.97			1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.28	0.26	0.28	0.26
3.5	-2.50	5.66	0.14	0.13	0.42	0.39
4	-2.25	4.76	0.00	0.00	0.42	0.39
5	-2.00	4.00	0.35	0.33	0.77	0.72
7	-1.50	2.83	0.26	0.24	1.03	0.96
10	-1.00	2.00	0.44	0.41	1.47	1.37
14	-0.50	1.41	0.47	0.44	1.94	1.81
18	0.00	1.00	0.65	0.61	2.59	2.42
25	0.50	0.71	0.69	0.65	3.28	3.07
35	1.00	0.50	2.84	2.67	6.12	5.74
45	1.50	0.35	8.26	7.75	14.38	13.49
60	2.00	0.25	26.41	24.79	40.79	38.28
80	2.50	0.18	47.86	44.92	88.65	83.20
120	3.00	0.13	16.56	15.54	105.21	98.74
170	3.50	0.09	0.20	0.19	105.41	98.93
200	3.75	0.07	0.06	0.06	105.47	98.99
230	4.00	0.06	0.04	0.04	105.51	99.03

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.88	2.53	2.41	2.13	1.73	1.55	0.86

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.99	0.25	0.74	-3	17.26

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-05A #3

Analysis Date: 09-01-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,174	201,399	North Carolina State Plane	-16.8 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-5/2 Dry - 5Y-6/2 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
97.33	96.23	0.02	0.17	#200 - 1.35 #230 - 1.32			4

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.50	0.51	0.50	0.51
3.5	-2.50	5.66	2.02	2.08	2.52	2.59
4	-2.25	4.76	0.63	0.65	3.15	3.24
5	-2.00	4.00	1.00	1.03	4.15	4.27
7	-1.50	2.83	3.03	3.11	7.18	7.38
10	-1.00	2.00	4.25	4.37	11.43	11.75
14	-0.50	1.41	7.22	7.42	18.65	19.17
18	0.00	1.00	9.06	9.31	27.71	28.48
25	0.50	0.71	9.02	9.27	36.73	37.75
35	1.00	0.50	15.01	15.42	51.74	53.17
45	1.50	0.35	17.47	17.95	69.21	71.12
60	2.00	0.25	14.45	14.85	83.66	85.97
80	2.50	0.18	9.66	9.92	93.32	95.89
120	3.00	0.13	2.46	2.53	95.78	98.42
170	3.50	0.09	0.18	0.18	95.96	98.60
200	3.75	0.07	0.05	0.05	96.01	98.65
230	4.00	0.06	0.03	0.03	96.04	98.68

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.46	1.93	1.63	0.90	-0.19	-0.71	-1.88

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.63	0.65	1.3	-0.7	3.05

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-05A #4

Analysis Date: 03-20-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,174	201,399	North Carolina State Plane	-17.8 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-8/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
114.67	113.70	0.01	0.02	#200 - 0.90 #230 - 0.88			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.04	0.03	0.04	0.03
7	-1.50	2.83	0.28	0.24	0.32	0.27
10	-1.00	2.00	0.46	0.40	0.78	0.67
14	-0.50	1.41	0.75	0.65	1.53	1.32
18	0.00	1.00	0.83	0.72	2.36	2.04
25	0.50	0.71	1.32	1.15	3.68	3.19
35	1.00	0.50	1.88	1.64	5.56	4.83
45	1.50	0.35	4.17	3.64	9.73	8.47
60	2.00	0.25	15.97	13.93	25.70	22.40
80	2.50	0.18	64.96	56.65	90.66	79.05
120	3.00	0.13	22.26	19.41	112.92	98.46
170	3.50	0.09	0.71	0.62	113.63	99.08
200	3.75	0.07	0.02	0.02	113.65	99.10
230	4.00	0.06	0.02	0.02	113.67	99.12

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.91	2.63	2.46	2.24	2.02	1.77	1.02

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.14	0.23	0.63	-2.72	13.66

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-05A #5

Analysis Date: 03-20-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,174	201,399	North Carolina State Plane	-19.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
106.84	106.05	0.01	0.05	#200 - 0.81 #230 - 0.80			1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.10	0.09	0.10	0.09
4	-2.25	4.76	0.00	0.00	0.10	0.09
5	-2.00	4.00	0.11	0.10	0.21	0.19
7	-1.50	2.83	0.47	0.44	0.68	0.63
10	-1.00	2.00	0.73	0.68	1.41	1.31
14	-0.50	1.41	1.46	1.37	2.87	2.68
18	0.00	1.00	2.29	2.14	5.16	4.82
25	0.50	0.71	2.56	2.40	7.72	7.22
35	1.00	0.50	5.54	5.19	13.26	12.41
45	1.50	0.35	12.28	11.49	25.54	23.90
60	2.00	0.25	28.97	27.12	54.51	51.02
80	2.50	0.18	41.67	39.00	96.18	90.02
120	3.00	0.13	9.51	8.90	105.69	98.92
170	3.50	0.09	0.28	0.26	105.97	99.18
200	3.75	0.07	0.01	0.01	105.98	99.19
230	4.00	0.06	0.01	0.01	105.99	99.20

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.78	2.42	2.31	1.98	1.52	1.16	0.04

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.77	0.29	0.81	-1.8	7.32

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-06 #1

Analysis Date: 03-20-09

Analyzed By: KW

Coastal Planning & Engineering
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FL 33431
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fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,618	200,973	North Carolina State Plane	-3.1 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-8/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
98.74	97.61	0.00	0.00	#200 - 1.17 #230 - 1.15			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.01	0.01	0.01	0.01
10	-1.00	2.00	0.03	0.03	0.04	0.04
14	-0.50	1.41	0.05	0.05	0.09	0.09
18	0.00	1.00	0.08	0.08	0.17	0.17
25	0.50	0.71	0.10	0.10	0.27	0.27
35	1.00	0.50	0.27	0.27	0.54	0.54
45	1.50	0.35	0.84	0.85	1.38	1.39
60	2.00	0.25	7.58	7.68	8.96	9.07
80	2.50	0.18	50.81	51.46	59.77	60.53
120	3.00	0.13	35.59	36.04	95.36	96.57
170	3.50	0.09	2.16	2.19	97.52	98.76
200	3.75	0.07	0.07	0.07	97.59	98.83
230	4.00	0.06	0.02	0.02	97.61	98.85

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.98	2.83	2.70	2.40	2.15	2.07	1.74

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.4	0.19	0.38	-1.42	12.31

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-06 #2

Analysis Date: 03-20-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,618	200,973	North Carolina State Plane	-7.1 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-8/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
104.22	103.09	0.00	0.00	#200 - 1.10 #230 - 1.09			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.89	0.85	0.89	0.85
3.5	-2.50	5.66	0.00	0.00	0.89	0.85
4	-2.25	4.76	0.22	0.21	1.11	1.06
5	-2.00	4.00	0.00	0.00	1.11	1.06
7	-1.50	2.83	0.03	0.03	1.14	1.09
10	-1.00	2.00	0.11	0.11	1.25	1.20
14	-0.50	1.41	0.19	0.18	1.44	1.38
18	0.00	1.00	0.16	0.15	1.60	1.53
25	0.50	0.71	0.31	0.30	1.91	1.83
35	1.00	0.50	0.64	0.61	2.55	2.44
45	1.50	0.35	2.04	1.96	4.59	4.40
60	2.00	0.25	10.54	10.11	15.13	14.51
80	2.50	0.18	54.52	52.31	69.65	66.82
120	3.00	0.13	32.03	30.73	101.68	97.55
170	3.50	0.09	1.35	1.30	103.03	98.85
200	3.75	0.07	0.05	0.05	103.08	98.90
230	4.00	0.06	0.01	0.01	103.09	98.91

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.96	2.78	2.63	2.34	2.10	2.01	1.53

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.26	0.21	0.72	-4.96	36.13

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-06 #3

Analysis Date: 03-20-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,618	200,973	North Carolina State Plane	-12.6 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-8/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
102.64	101.17	0.00	0.00	#200 - 1.42 #230 - 1.42			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.01	0.01	0.01	0.01
14	-0.50	1.41	0.02	0.02	0.03	0.03
18	0.00	1.00	0.05	0.05	0.08	0.08
25	0.50	0.71	0.02	0.02	0.10	0.10
35	1.00	0.50	0.07	0.07	0.17	0.17
45	1.50	0.35	0.19	0.19	0.36	0.36
60	2.00	0.25	1.88	1.83	2.24	2.19
80	2.50	0.18	39.84	38.82	42.08	41.01
120	3.00	0.13	53.99	52.60	96.07	93.61
170	3.50	0.09	4.97	4.84	101.04	98.45
200	3.75	0.07	0.13	0.13	101.17	98.58
230	4.00	0.06	0.00	0.00	101.17	98.58

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.14	2.91	2.82	2.59	2.29	2.18	2.04

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.55	0.17	0.33	-0.91	10.1

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-06 #4

Analysis Date: 03-20-09

Analyzed By: KW

Coastal Planning & Engineering
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FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,618	200,973	North Carolina State Plane	-14.9 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
113.11	111.91	0.02	0.16	#200 - 1.25 #230 - 1.23			3

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	1.99	1.76	1.99	1.76
5/16"	-3.00	8.00	0.90	0.80	2.89	2.56
3.5	-2.50	5.66	1.33	1.18	4.22	3.74
4	-2.25	4.76	0.19	0.17	4.41	3.91
5	-2.00	4.00	0.93	0.82	5.34	4.73
7	-1.50	2.83	2.12	1.87	7.46	6.60
10	-1.00	2.00	2.34	2.07	9.80	8.67
14	-0.50	1.41	2.93	2.59	12.73	11.26
18	0.00	1.00	2.76	2.44	15.49	13.70
25	0.50	0.71	3.23	2.86	18.72	16.56
35	1.00	0.50	4.44	3.93	23.16	20.49
45	1.50	0.35	8.63	7.63	31.79	28.12
60	2.00	0.25	15.93	14.08	47.72	42.20
80	2.50	0.18	41.95	37.09	89.67	79.29
120	3.00	0.13	21.03	18.59	110.70	97.88
170	3.50	0.09	0.92	0.81	111.62	98.69
200	3.75	0.07	0.07	0.06	111.69	98.75
230	4.00	0.06	0.02	0.02	111.71	98.77

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.92	2.63	2.44	2.11	1.30	0.40	-1.93

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	1.54	0.34	1.48	-1.88	6.04

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-06 #5

Analysis Date: 03-20-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,618	200,973	North Carolina State Plane	-16.1 NAVD 88

USCS:	Munsell:	Comments:
SC	Wet - 5Y-3/2 Dry - 5Y-5/2 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
85.90	57.70	0.13	0.00	#200 - 35.65 #230 - 32.97			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.30	0.35	0.30	0.35
3.5	-2.50	5.66	0.50	0.58	0.80	0.93
4	-2.25	4.76	0.00	0.00	0.80	0.93
5	-2.00	4.00	0.02	0.02	0.82	0.95
7	-1.50	2.83	0.11	0.13	0.93	1.08
10	-1.00	2.00	0.04	0.05	0.97	1.13
14	-0.50	1.41	0.07	0.08	1.04	1.21
18	0.00	1.00	0.06	0.07	1.10	1.28
25	0.50	0.71	0.05	0.06	1.15	1.34
35	1.00	0.50	0.05	0.06	1.20	1.40
45	1.50	0.35	0.14	0.16	1.34	1.56
60	2.00	0.25	0.84	0.98	2.18	2.54
80	2.50	0.18	8.29	9.65	10.47	12.19
120	3.00	0.13	20.10	23.40	30.57	35.59
170	3.50	0.09	18.75	21.83	49.32	57.42
200	3.75	0.07	5.95	6.93	55.27	64.35
230	4.00	0.06	2.30	2.68	57.57	67.03

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
			3.33	2.77	2.58	2.13

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.85	0.14	0.89	-4.29	27.62

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-07 #1

Analysis Date: 03-20-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,723	200,701	North Carolina State Plane	-5.7 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-7/1 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
111.93	111.12	0.02	0.05	#200 - 0.80 #230 - 0.79			1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.38	0.34	0.38	0.34
4	-2.25	4.76	0.00	0.00	0.38	0.34
5	-2.00	4.00	0.38	0.34	0.76	0.68
7	-1.50	2.83	0.57	0.51	1.33	1.19
10	-1.00	2.00	0.33	0.29	1.66	1.48
14	-0.50	1.41	0.45	0.40	2.11	1.88
18	0.00	1.00	0.46	0.41	2.57	2.29
25	0.50	0.71	0.58	0.52	3.15	2.81
35	1.00	0.50	1.31	1.17	4.46	3.98
45	1.50	0.35	4.29	3.83	8.75	7.81
60	2.00	0.25	19.37	17.31	28.12	25.12
80	2.50	0.18	56.95	50.88	85.07	76.00
120	3.00	0.13	24.98	22.32	110.05	98.32
170	3.50	0.09	0.94	0.84	110.99	99.16
200	3.75	0.07	0.04	0.04	111.03	99.20
230	4.00	0.06	0.01	0.01	111.04	99.21

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.93	2.68	2.49	2.24	2.00	1.74	1.13

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.13	0.23	0.72	-3.44	19.81

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-07 #2

Analysis Date: 03-20-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,723	200,701	North Carolina State Plane	-11.7 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-7/1 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
112.57	111.38	0.00	0.00	#200 - 1.06 #230 - 1.05			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.08	0.07	0.08	0.07
14	-0.50	1.41	0.16	0.14	0.24	0.21
18	0.00	1.00	0.22	0.20	0.46	0.41
25	0.50	0.71	0.30	0.27	0.76	0.68
35	1.00	0.50	0.61	0.54	1.37	1.22
45	1.50	0.35	1.99	1.77	3.36	2.99
60	2.00	0.25	12.83	11.40	16.19	14.39
80	2.50	0.18	64.39	57.20	80.58	71.59
120	3.00	0.13	29.22	25.96	109.80	97.55
170	3.50	0.09	1.52	1.35	111.32	98.90
200	3.75	0.07	0.05	0.04	111.37	98.94
230	4.00	0.06	0.01	0.01	111.38	98.95

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.95	2.74	2.57	2.31	2.09	2.01	1.59

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.29	0.20	0.43	-1.92	13.68

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-07 #3

Analysis Date: 03-20-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,723	200,701	North Carolina State Plane	-14.2 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-5/1 Dry - 5Y-8/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
105.26	104.32	0.00	0.00	#200 - 0.90 #230 - 0.90			2

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	1.03	0.98	1.03	0.98
4	-2.25	4.76	0.51	0.48	1.54	1.46
5	-2.00	4.00	0.62	0.59	2.16	2.05
7	-1.50	2.83	1.58	1.50	3.74	3.55
10	-1.00	2.00	2.59	2.46	6.33	6.01
14	-0.50	1.41	4.14	3.93	10.47	9.94
18	0.00	1.00	5.59	5.31	16.06	15.25
25	0.50	0.71	5.28	5.02	21.34	20.27
35	1.00	0.50	6.93	6.58	28.27	26.85
45	1.50	0.35	11.79	11.20	40.06	38.05
60	2.00	0.25	24.66	23.43	64.72	61.48
80	2.50	0.18	32.98	31.33	97.70	92.81
120	3.00	0.13	6.51	6.18	104.21	98.99
170	3.50	0.09	0.07	0.07	104.28	99.06
200	3.75	0.07	0.04	0.04	104.32	99.10
230	4.00	0.06	0.00	0.00	104.32	99.10

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.68	2.36	2.22	1.76	0.86	0.07	-1.21

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.35	0.39	1.2	-1.35	4.27

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-07 #4

Analysis Date: 03-20-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
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fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,723	200,701	North Carolina State Plane	-16.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-8/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
99.71	98.52	0.00	0.00	#200 - 1.23 #230 - 1.20			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.01	0.01	0.01	0.01
18	0.00	1.00	0.03	0.03	0.04	0.04
25	0.50	0.71	0.06	0.06	0.10	0.10
35	1.00	0.50	0.13	0.13	0.23	0.23
45	1.50	0.35	0.51	0.51	0.74	0.74
60	2.00	0.25	7.78	7.80	8.52	8.54
80	2.50	0.18	61.19	61.37	69.71	69.91
120	3.00	0.13	27.91	27.99	97.62	97.90
170	3.50	0.09	0.84	0.84	98.46	98.74
200	3.75	0.07	0.03	0.03	98.49	98.77
230	4.00	0.06	0.03	0.03	98.52	98.80

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.95	2.75	2.59	2.34	2.13	2.06	1.77

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.35	0.20	0.32	-0.56	7.21

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-07A #1

Analysis Date: 03-23-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,723	200,701	North Carolina State Plane	-18.7 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-5/1 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.28	99.08	0.00	0.00	#200 - 1.21 #230 - 1.20			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.00	0.00	0.00	0.00
14	-0.50	1.41	0.01	0.01	0.01	0.01
18	0.00	1.00	0.04	0.04	0.05	0.05
25	0.50	0.71	0.12	0.12	0.17	0.17
35	1.00	0.50	0.38	0.38	0.55	0.55
45	1.50	0.35	1.92	1.91	2.47	2.46
60	2.00	0.25	17.27	17.22	19.74	19.68
80	2.50	0.18	60.51	60.34	80.25	80.02
120	3.00	0.13	18.34	18.29	98.59	98.31
170	3.50	0.09	0.42	0.42	99.01	98.73
200	3.75	0.07	0.06	0.06	99.07	98.79
230	4.00	0.06	0.01	0.01	99.08	98.80

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.91	2.61	2.46	2.25	2.04	1.89	1.57

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.23	0.21	0.36	-0.76	6.3

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-08 #1

Analysis Date: 03-23-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,411	200,087	North Carolina State Plane	-9.0 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
101.57	100.42	0.00	0.00	#200 - 1.13 #230 - 1.13			1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.33	0.32	0.33	0.32
5	-2.00	4.00	0.19	0.19	0.52	0.51
7	-1.50	2.83	0.56	0.55	1.08	1.06
10	-1.00	2.00	0.85	0.84	1.93	1.90
14	-0.50	1.41	1.41	1.39	3.34	3.29
18	0.00	1.00	1.77	1.74	5.11	5.03
25	0.50	0.71	2.03	2.00	7.14	7.03
35	1.00	0.50	3.78	3.72	10.92	10.75
45	1.50	0.35	7.07	6.96	17.99	17.71
60	2.00	0.25	17.68	17.41	35.67	35.12
80	2.50	0.18	45.94	45.23	81.61	80.35
120	3.00	0.13	18.13	17.85	99.74	98.20
170	3.50	0.09	0.65	0.64	100.39	98.84
200	3.75	0.07	0.03	0.03	100.42	98.87
230	4.00	0.06	0.00	0.00	100.42	98.87

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.91	2.60	2.44	2.16	1.71	1.38	-0.01

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.93	0.26	0.88	-2.15	8.54

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-08 #2

Analysis Date: 03-23-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,411	200,087	North Carolina State Plane	-14.2 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-5/1 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
106.31	105.03	0.01	0.04	#200 - 1.27 #230 - 1.24			1

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.36	0.34	0.36	0.34
3.5	-2.50	5.66	0.71	0.67	1.07	1.01
4	-2.25	4.76	0.16	0.15	1.23	1.16
5	-2.00	4.00	0.22	0.21	1.45	1.37
7	-1.50	2.83	0.65	0.61	2.10	1.98
10	-1.00	2.00	0.41	0.39	2.51	2.37
14	-0.50	1.41	0.81	0.76	3.32	3.13
18	0.00	1.00	0.80	0.75	4.12	3.88
25	0.50	0.71	1.54	1.45	5.66	5.33
35	1.00	0.50	3.87	3.64	9.53	8.97
45	1.50	0.35	15.31	14.40	24.84	23.37
60	2.00	0.25	36.45	34.29	61.29	57.66
80	2.50	0.18	36.04	33.90	97.33	91.56
120	3.00	0.13	7.43	6.99	104.76	98.55
170	3.50	0.09	0.19	0.18	104.95	98.73
200	3.75	0.07	0.00	0.00	104.95	98.73
230	4.00	0.06	0.03	0.03	104.98	98.76

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.75	2.39	2.26	1.89	1.52	1.24	0.39

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.73	0.30	0.86	-2.8	13.98

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-08 #3

Analysis Date: 03-23-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,411	200,087	North Carolina State Plane	-17.3 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-5/1 Dry - 5Y-7/1 Washed - 5Y-7/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
105.09	103.63	0.02	0.09	#200 - 1.50 #230 - 1.48			4

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	1.31	1.25	1.31	1.25
4	-2.25	4.76	0.91	0.87	2.22	2.12
5	-2.00	4.00	0.87	0.83	3.09	2.95
7	-1.50	2.83	3.18	3.03	6.27	5.98
10	-1.00	2.00	4.90	4.66	11.17	10.64
14	-0.50	1.41	8.59	8.17	19.76	18.81
18	0.00	1.00	10.08	9.59	29.84	28.40
25	0.50	0.71	9.17	8.73	39.01	37.13
35	1.00	0.50	12.15	11.56	51.16	48.69
45	1.50	0.35	15.49	14.74	66.65	63.43
60	2.00	0.25	19.99	19.02	86.64	82.45
80	2.50	0.18	13.89	13.22	100.53	95.67
120	3.00	0.13	2.76	2.63	103.29	98.30
170	3.50	0.09	0.17	0.16	103.46	98.46
200	3.75	0.07	0.04	0.04	103.50	98.50
230	4.00	0.06	0.02	0.02	103.52	98.52

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.47	2.06	1.80	1.04	-0.18	-0.67	-1.66

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.74	0.60	1.29	-0.62	2.63

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-09 #1

Analysis Date: 03-23-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,900	199,466	North Carolina State Plane	-10.7 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-8/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
103.32	102.14	0.00	0.00	#200 - 1.14 #230 - 1.13			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.14	0.14	0.14	0.14
3.5	-2.50	5.66	0.00	0.00	0.14	0.14
4	-2.25	4.76	0.00	0.00	0.14	0.14
5	-2.00	4.00	0.18	0.17	0.32	0.31
7	-1.50	2.83	0.28	0.27	0.60	0.58
10	-1.00	2.00	0.42	0.41	1.02	0.99
14	-0.50	1.41	0.51	0.49	1.53	1.48
18	0.00	1.00	0.65	0.63	2.18	2.11
25	0.50	0.71	0.91	0.88	3.09	2.99
35	1.00	0.50	1.86	1.80	4.95	4.79
45	1.50	0.35	4.67	4.52	9.62	9.31
60	2.00	0.25	21.30	20.62	30.92	29.93
80	2.50	0.18	51.19	49.55	82.11	79.48
120	3.00	0.13	19.23	18.61	101.34	98.09
170	3.50	0.09	0.77	0.75	102.11	98.84
200	3.75	0.07	0.02	0.02	102.13	98.86
230	4.00	0.06	0.01	0.01	102.14	98.87

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.92	2.62	2.45	2.20	1.88	1.66	1.02

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.09	0.23	0.68	-2.93	16.85

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-09 #2

Analysis Date: 03-23-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,900	199,466	North Carolina State Plane	-13.7 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.10	98.90	0.00	0.01	#200 - 1.20 #230 - 1.20			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.04	0.04	0.04	0.04
10	-1.00	2.00	0.13	0.13	0.17	0.17
14	-0.50	1.41	0.13	0.13	0.30	0.30
18	0.00	1.00	0.17	0.17	0.47	0.47
25	0.50	0.71	0.30	0.30	0.77	0.77
35	1.00	0.50	0.64	0.64	1.41	1.41
45	1.50	0.35	2.14	2.14	3.55	3.55
60	2.00	0.25	12.47	12.46	16.02	16.01
80	2.50	0.18	58.68	58.62	74.70	74.63
120	3.00	0.13	23.56	23.54	98.26	98.17
170	3.50	0.09	0.60	0.60	98.86	98.77
200	3.75	0.07	0.03	0.03	98.89	98.80
230	4.00	0.06	0.00	0.00	98.89	98.80

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.93	2.70	2.51	2.29	2.08	2.00	1.56

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.26	0.21	0.44	-2.37	16.86

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-09 #3

Analysis Date: 03-23-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,900	199,466	North Carolina State Plane	-17.7 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.45	99.10	0.00	0.00	#200 - 1.36 #230 - 1.34			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.01	0.01	0.01	0.01
14	-0.50	1.41	0.05	0.05	0.06	0.06
18	0.00	1.00	0.05	0.05	0.11	0.11
25	0.50	0.71	0.10	0.10	0.21	0.21
35	1.00	0.50	0.14	0.14	0.35	0.35
45	1.50	0.35	0.35	0.35	0.70	0.70
60	2.00	0.25	2.60	2.59	3.30	3.29
80	2.50	0.18	39.87	39.69	43.17	42.98
120	3.00	0.13	51.58	51.35	94.75	94.33
170	3.50	0.09	4.26	4.24	99.01	98.57
200	3.75	0.07	0.07	0.07	99.08	98.64
230	4.00	0.06	0.02	0.02	99.10	98.66

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.08	2.90	2.81	2.57	2.27	2.16	2.02

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.53	0.17	0.35	-1.4	12.46

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-10 #1

Analysis Date: 03-23-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,697	199,802	North Carolina State Plane	-10.0 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
98.17	97.01	0.00	0.00	#200 - 1.20 #230 - 1.20			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.15	0.15	0.15	0.15
4	-2.25	4.76	0.02	0.02	0.17	0.17
5	-2.00	4.00	0.00	0.00	0.17	0.17
7	-1.50	2.83	0.03	0.03	0.20	0.20
10	-1.00	2.00	0.14	0.14	0.34	0.34
14	-0.50	1.41	0.25	0.25	0.59	0.59
18	0.00	1.00	0.36	0.37	0.95	0.96
25	0.50	0.71	0.53	0.54	1.48	1.50
35	1.00	0.50	1.25	1.27	2.73	2.77
45	1.50	0.35	3.40	3.46	6.13	6.23
60	2.00	0.25	12.56	12.79	18.69	19.02
80	2.50	0.18	45.13	45.97	63.82	64.99
120	3.00	0.13	32.14	32.74	95.96	97.73
170	3.50	0.09	1.00	1.02	96.96	98.75
200	3.75	0.07	0.05	0.05	97.01	98.80
230	4.00	0.06	0.00	0.00	97.01	98.80

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.96	2.79	2.65	2.34	2.07	1.88	1.32

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.26	0.21	0.57	-2.83	18.73

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-10 #2

Analysis Date: 03-23-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,697	199,802	North Carolina State Plane	-12.5 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.83	99.68	0.00	0.00	#200 - 1.14 #230 - 1.13			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.19	0.19	0.19	0.19
5	-2.00	4.00	0.00	0.00	0.19	0.19
7	-1.50	2.83	0.15	0.15	0.34	0.34
10	-1.00	2.00	0.03	0.03	0.37	0.37
14	-0.50	1.41	0.12	0.12	0.49	0.49
18	0.00	1.00	0.05	0.05	0.54	0.54
25	0.50	0.71	0.09	0.09	0.63	0.63
35	1.00	0.50	0.18	0.18	0.81	0.81
45	1.50	0.35	1.18	1.17	1.99	1.98
60	2.00	0.25	13.10	12.99	15.09	14.97
80	2.50	0.18	64.52	63.99	79.61	78.96
120	3.00	0.13	19.60	19.44	99.21	98.40
170	3.50	0.09	0.43	0.43	99.64	98.83
200	3.75	0.07	0.03	0.03	99.67	98.86
230	4.00	0.06	0.01	0.01	99.68	98.87

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.91	2.63	2.47	2.27	2.08	2.01	1.62

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.25	0.21	0.43	-4.25	41.42

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-10 #3

Analysis Date: 03-23-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,697	199,802	North Carolina State Plane	-14.1 NAVD 88

USCS:	Munsell:	Comments:
SP	Wet - 5Y-6/1 Dry - 5Y-7/2 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
98.88	97.78	0.00	0.06	#200 - 1.18 #230 - 1.18			0

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.22	0.22	0.22	0.22
4	-2.25	4.76	0.17	0.17	0.39	0.39
5	-2.00	4.00	0.17	0.17	0.56	0.56
7	-1.50	2.83	0.29	0.29	0.85	0.85
10	-1.00	2.00	0.69	0.70	1.54	1.55
14	-0.50	1.41	1.01	1.02	2.55	2.57
18	0.00	1.00	1.47	1.49	4.02	4.06
25	0.50	0.71	2.38	2.41	6.40	6.47
35	1.00	0.50	4.70	4.75	11.10	11.22
45	1.50	0.35	12.55	12.69	23.65	23.91
60	2.00	0.25	31.75	32.11	55.40	56.02
80	2.50	0.18	34.41	34.80	89.81	90.82
120	3.00	0.13	7.64	7.73	97.45	98.55
170	3.50	0.09	0.24	0.24	97.69	98.79
200	3.75	0.07	0.03	0.03	97.72	98.82
230	4.00	0.06	0.00	0.00	97.72	98.82

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.77	2.40	2.27	1.91	1.52	1.19	0.20

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.75	0.30	0.8	-2.06	9.38

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Island / Rich Inlet 2008

Sample Name: FEVC-08-10 #4

Analysis Date: 03-23-09

Analyzed By: KW

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,697	199,802	North Carolina State Plane	-16.1 NAVD 88

USCS:	Munsell:	Comments:
SW	Wet - 5Y-5/2 Dry - 5Y-7/1 Washed - 5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
104.11	102.99	0.00	0.00	#200 - 1.06 #230 - 1.05			6

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	4.05	3.89	4.05	3.89
5/16"	-3.00	8.00	0.85	0.82	4.90	4.71
3.5	-2.50	5.66	2.31	2.22	7.21	6.93
4	-2.25	4.76	0.84	0.81	8.05	7.74
5	-2.00	4.00	1.53	1.47	9.58	9.21
7	-1.50	2.83	4.89	4.70	14.47	13.91
10	-1.00	2.00	6.16	5.92	20.63	19.83
14	-0.50	1.41	9.14	8.78	29.77	28.61
18	0.00	1.00	8.55	8.21	38.32	36.82
25	0.50	0.71	7.94	7.63	46.26	44.45
35	1.00	0.50	7.70	7.40	53.96	51.85
45	1.50	0.35	9.72	9.34	63.68	61.19
60	2.00	0.25	13.21	12.69	76.89	73.88
80	2.50	0.18	17.93	17.22	94.82	91.10
120	3.00	0.13	7.70	7.40	102.52	98.50
170	3.50	0.09	0.41	0.39	102.93	98.89
200	3.75	0.07	0.05	0.05	102.98	98.94
230	4.00	0.06	0.01	0.01	102.99	98.95

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

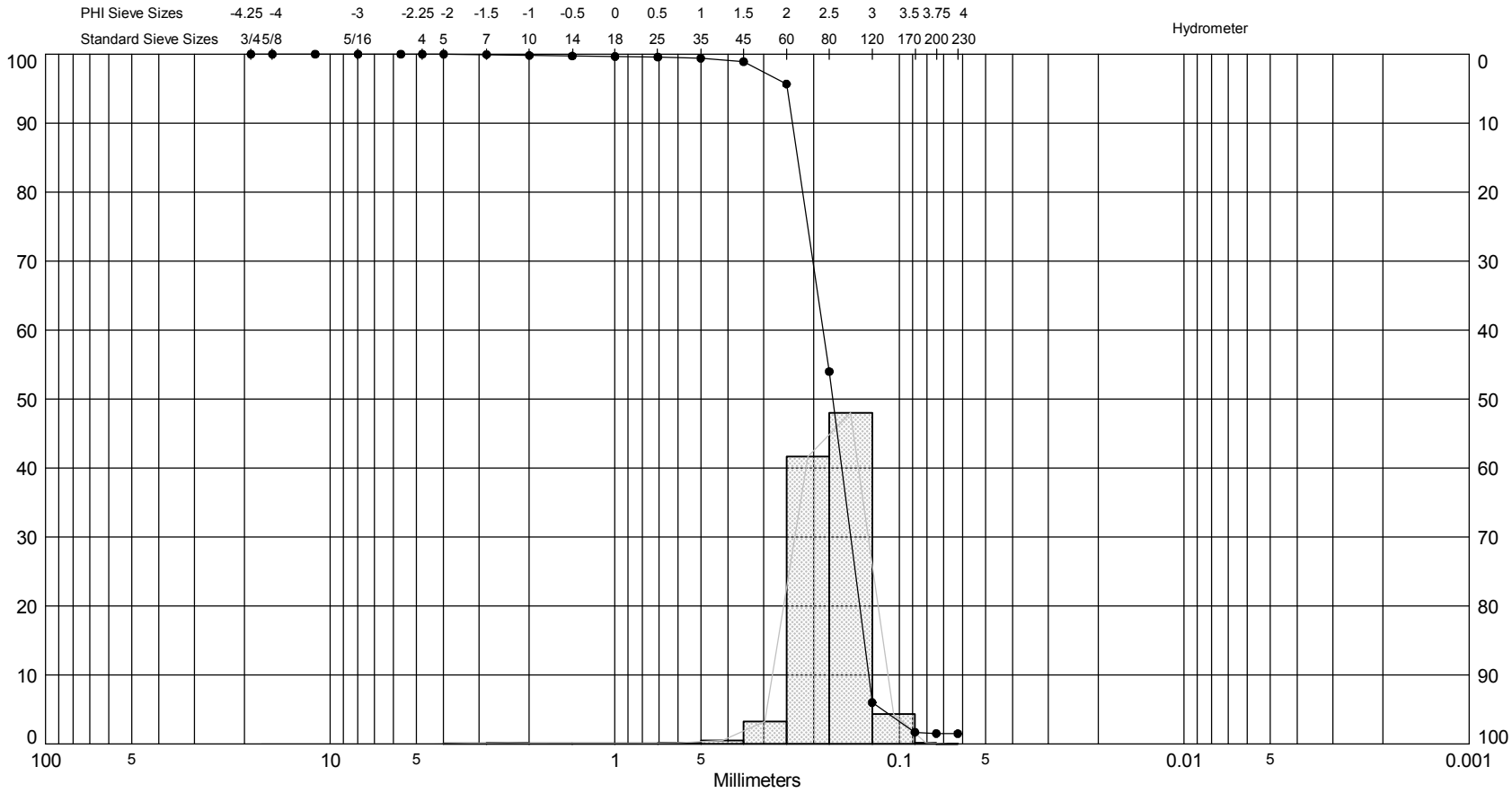
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.76	2.29	2.03	0.88	-0.71	-1.32	-2.93

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	0.5	0.71	1.75	-0.67	2.62

GRANULARMETRIC REPORT FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

APPENDIX 24

2008 CPENC Individual Vibracore Grain Size Distribution Curves/Histograms



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-01 #1	—●—	-12.6	SP	#200 - 1.51 #230 - 1.48			2.54	2.5	-2.61	24.09	0.4

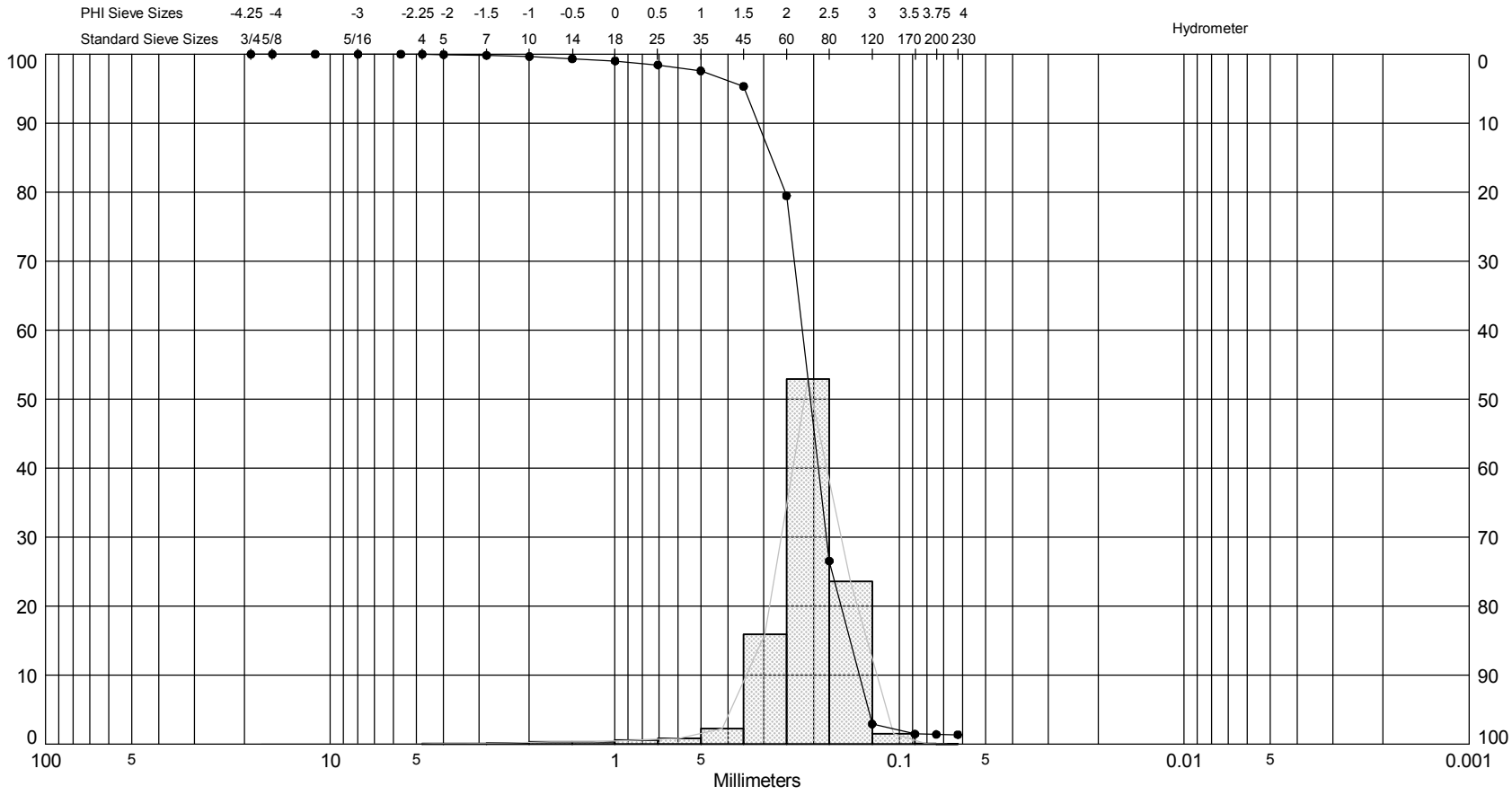
Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-17-09
Analyzed By:	KW
Easting (X, ft):	2,385,534
Northing (Y, ft):	200,207
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-01 #2	—●—	-17.6	SP	#200 - 1.40 #230 - 1.37			2.28	2.23	-2.57	16.52	0.53

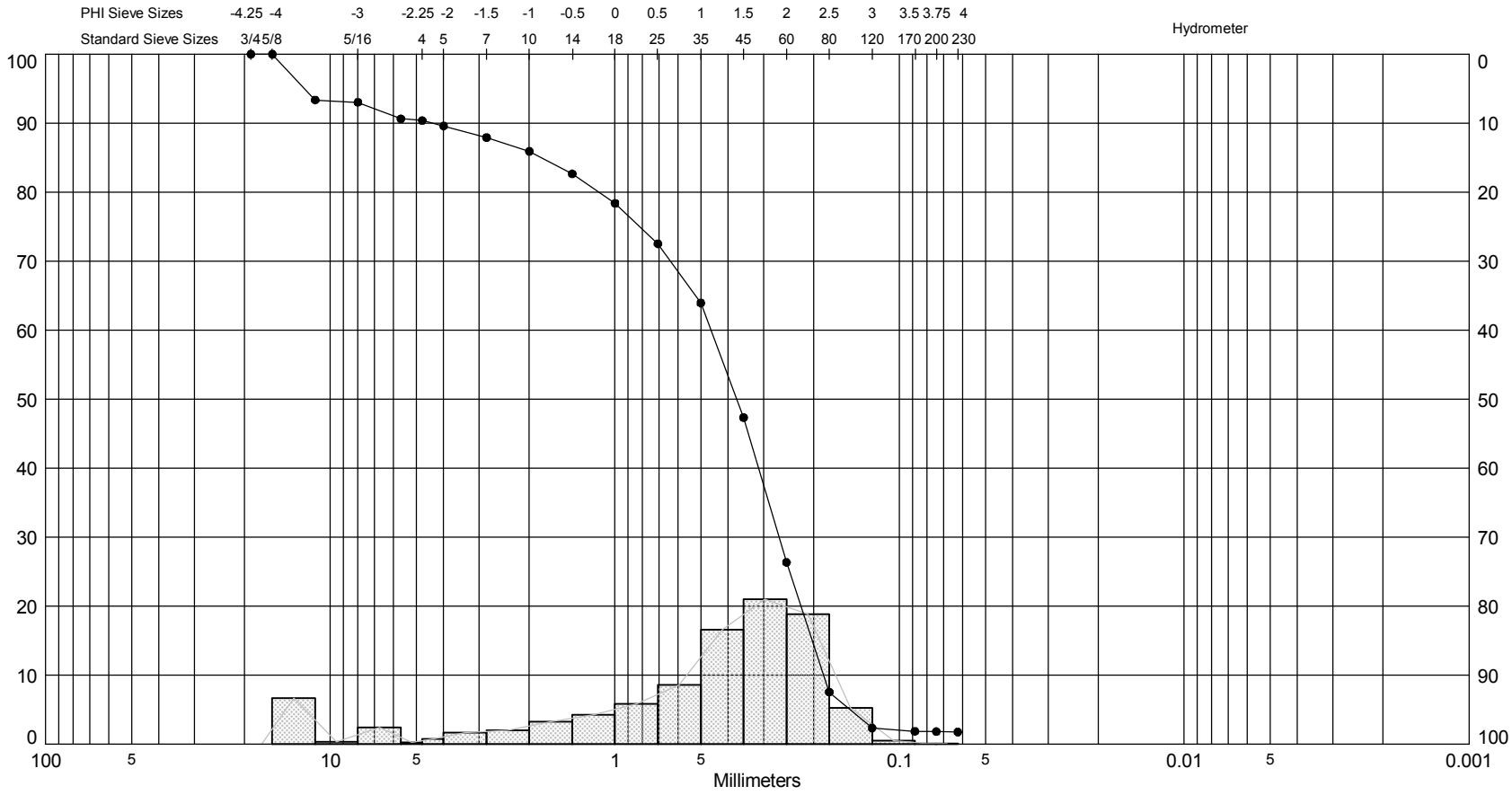
Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-17-09
Analyzed By:	KW
Easting (X, ft):	2,385,534
Northing (Y, ft):	200,207
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-01 #3	—●—	-21.1	SW	#200 - 1.81 #230 - 1.76			1.42	0.82	-1.39	4.09	1.75

Comments: (2.0"x0.5") shell removed, 5.65g

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-17-09
Analyzed By:	KW
Easting (X, ft):	2,385,534
Northing (Y, ft):	200,207
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
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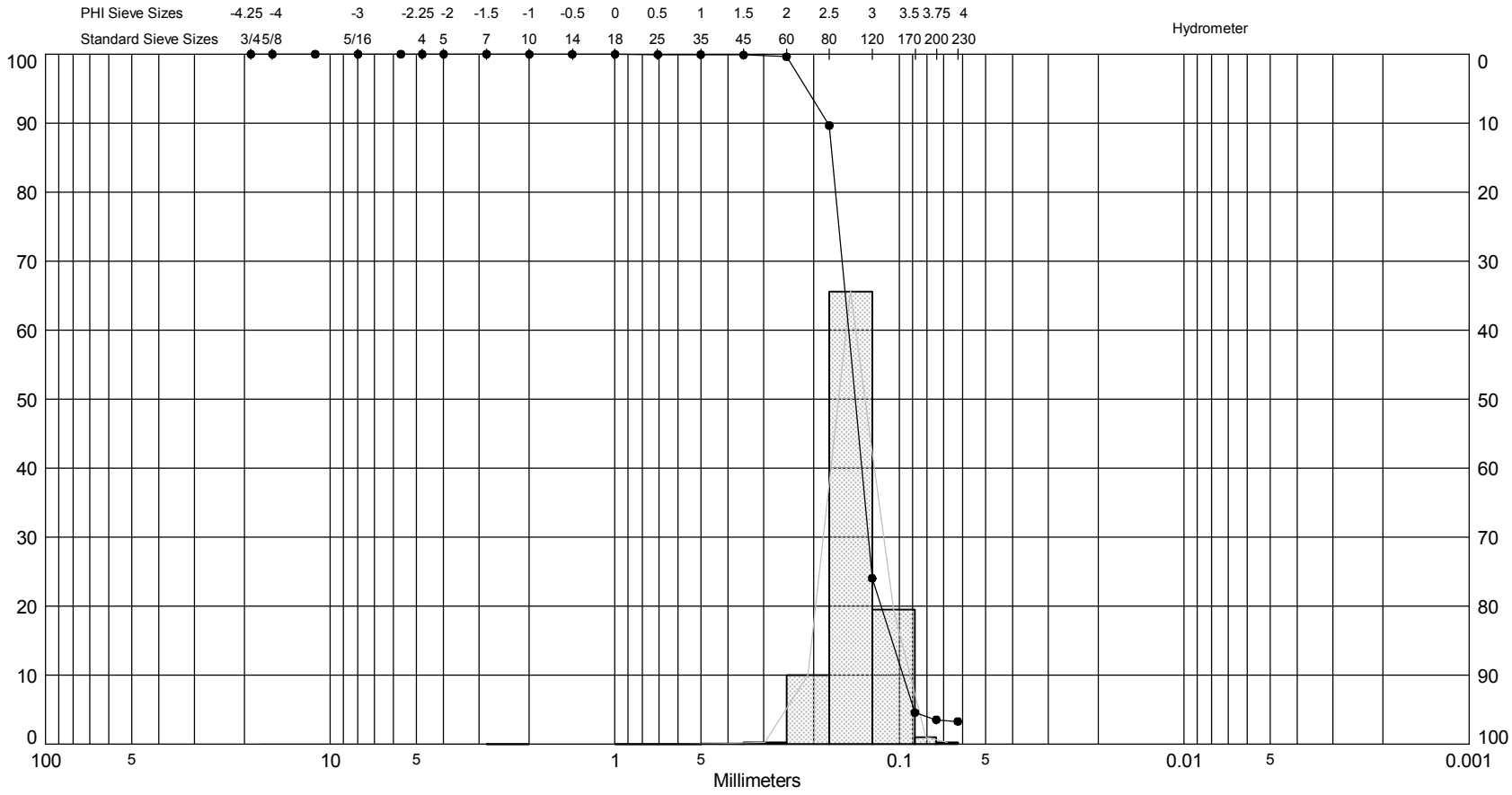
fax (561) 391-9116

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-01 #4	—●—	-22.2	SP	#200 - 3.53 #230 - 3.29			2.8	2.81	-0.66	12.65	0.31

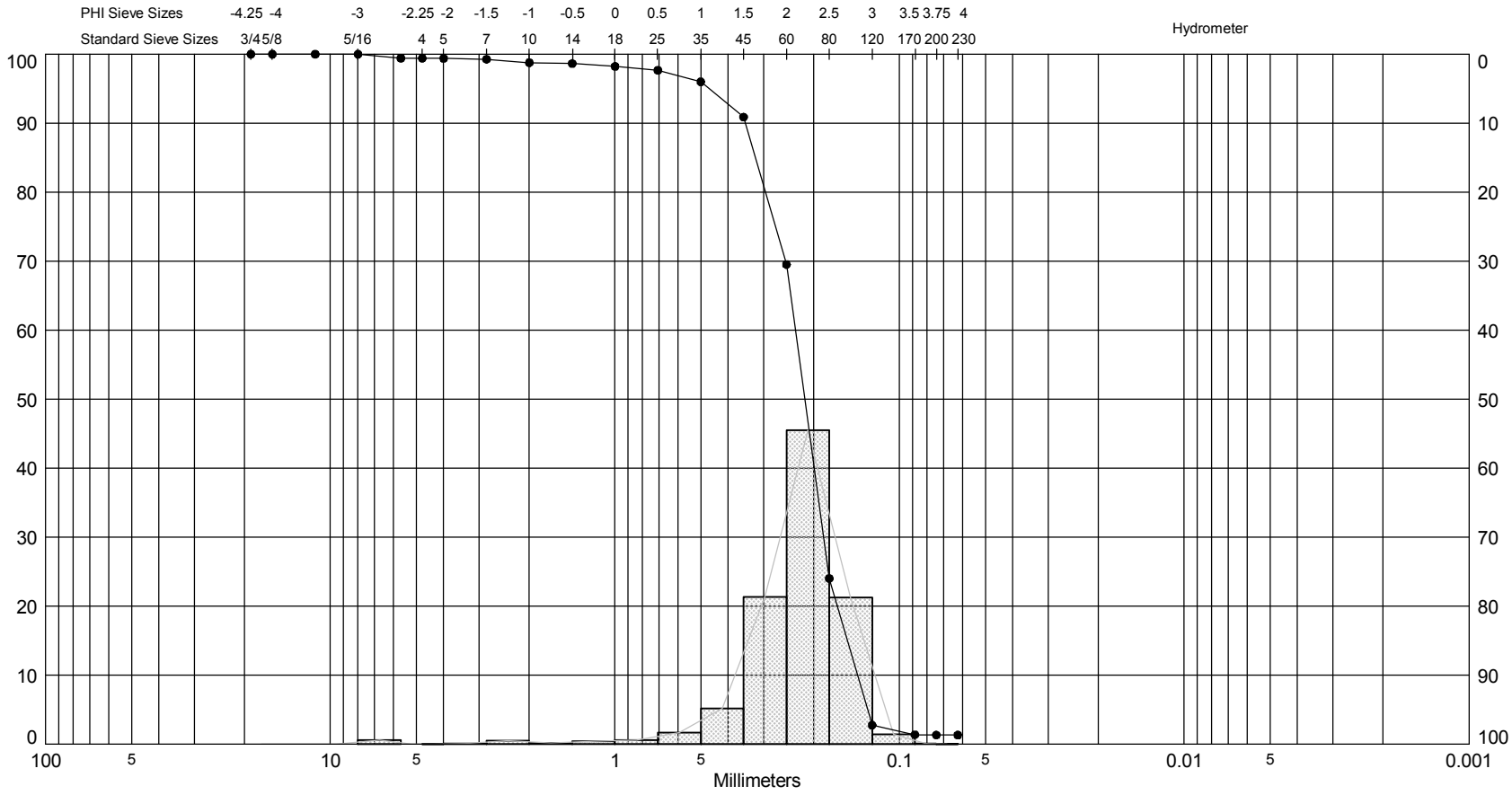
Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-17-09
Analyzed By:	KW
Easting (X, ft):	2,385,534
Northing (Y, ft):	200,207
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-02 #1	—●—	-6.8	SP	#200 - 1.31 #230 - 1.30			2.21	2.11	-3.19	19.91	0.7

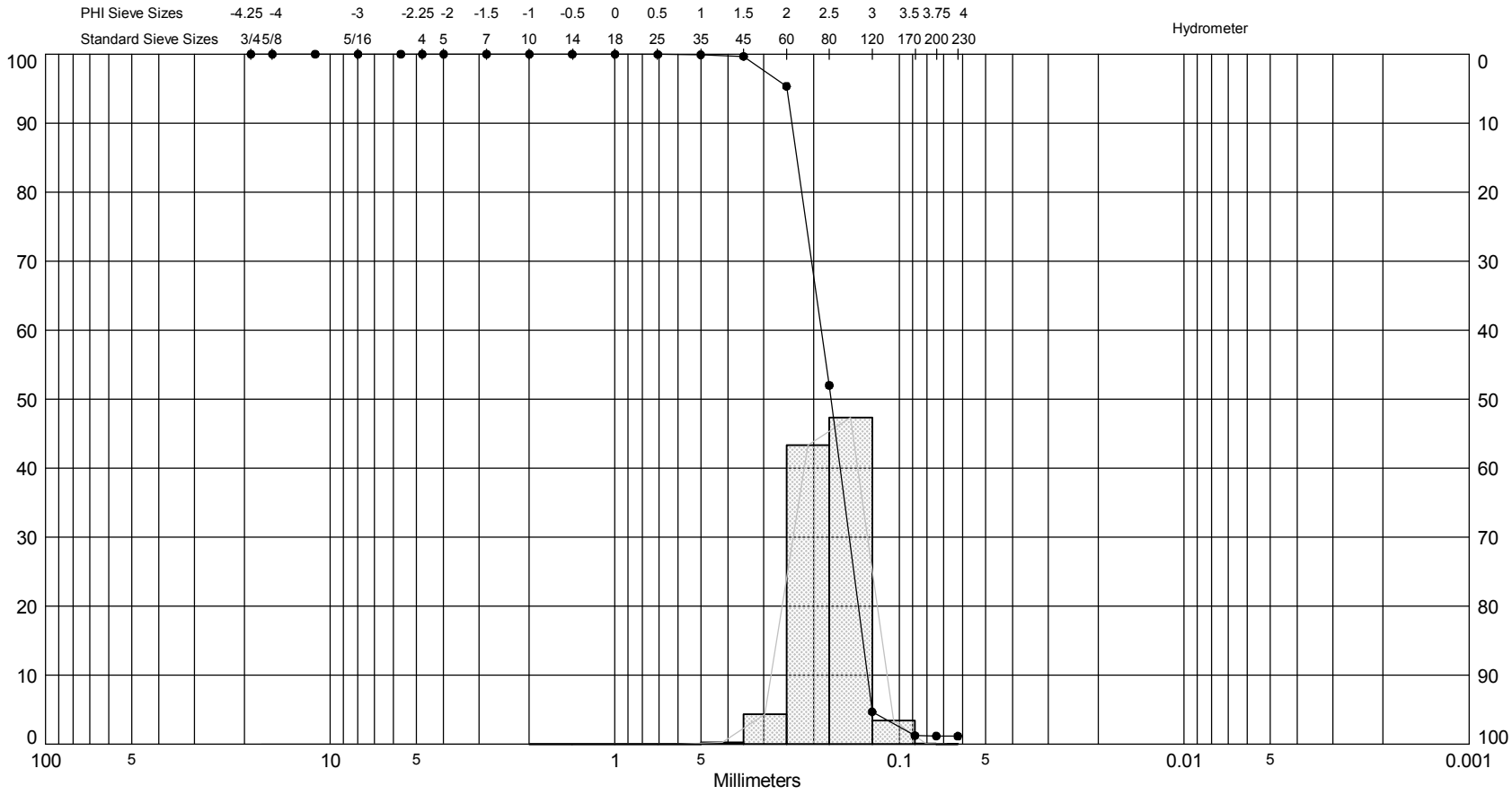
Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-17-09
Analyzed By:	KW
Easting (X, ft):	2,386,109
Northing (Y, ft):	200,498
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-02 #2	—●—	-11.8	SP	#200 - 1.16 #230 - 1.14			2.52	2.5	-0.45	5.14	0.33

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-17-09
Analyzed By:	KW
Easting (X, ft):	2,386,109
Northing (Y, ft):	200,498
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
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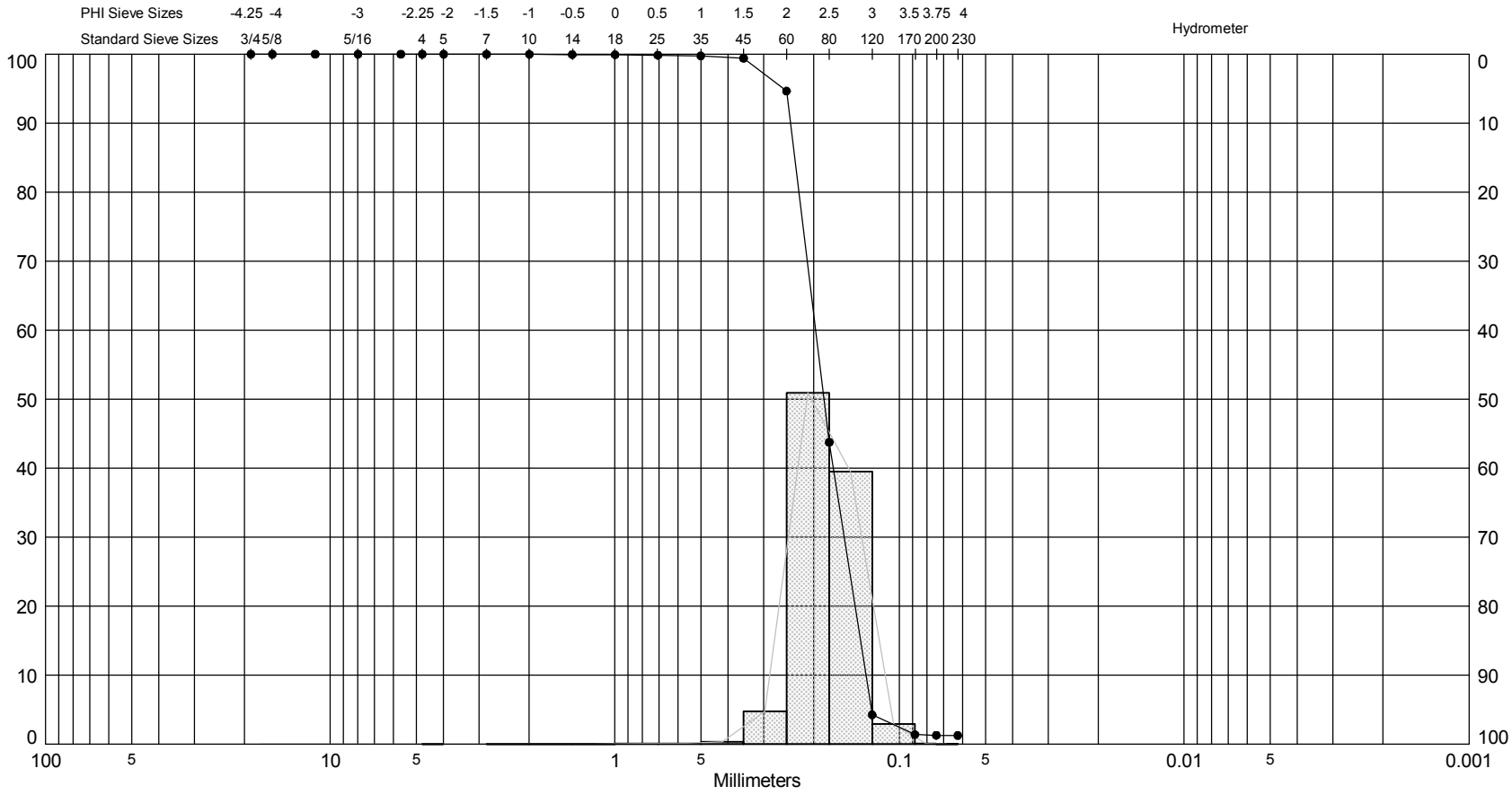
fax (561) 391-9116

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-02A #1	—●—	-15.0	SP	#200 - 1.28 #230 - 1.25			2.44	2.45	-0.91	11.35	0.35

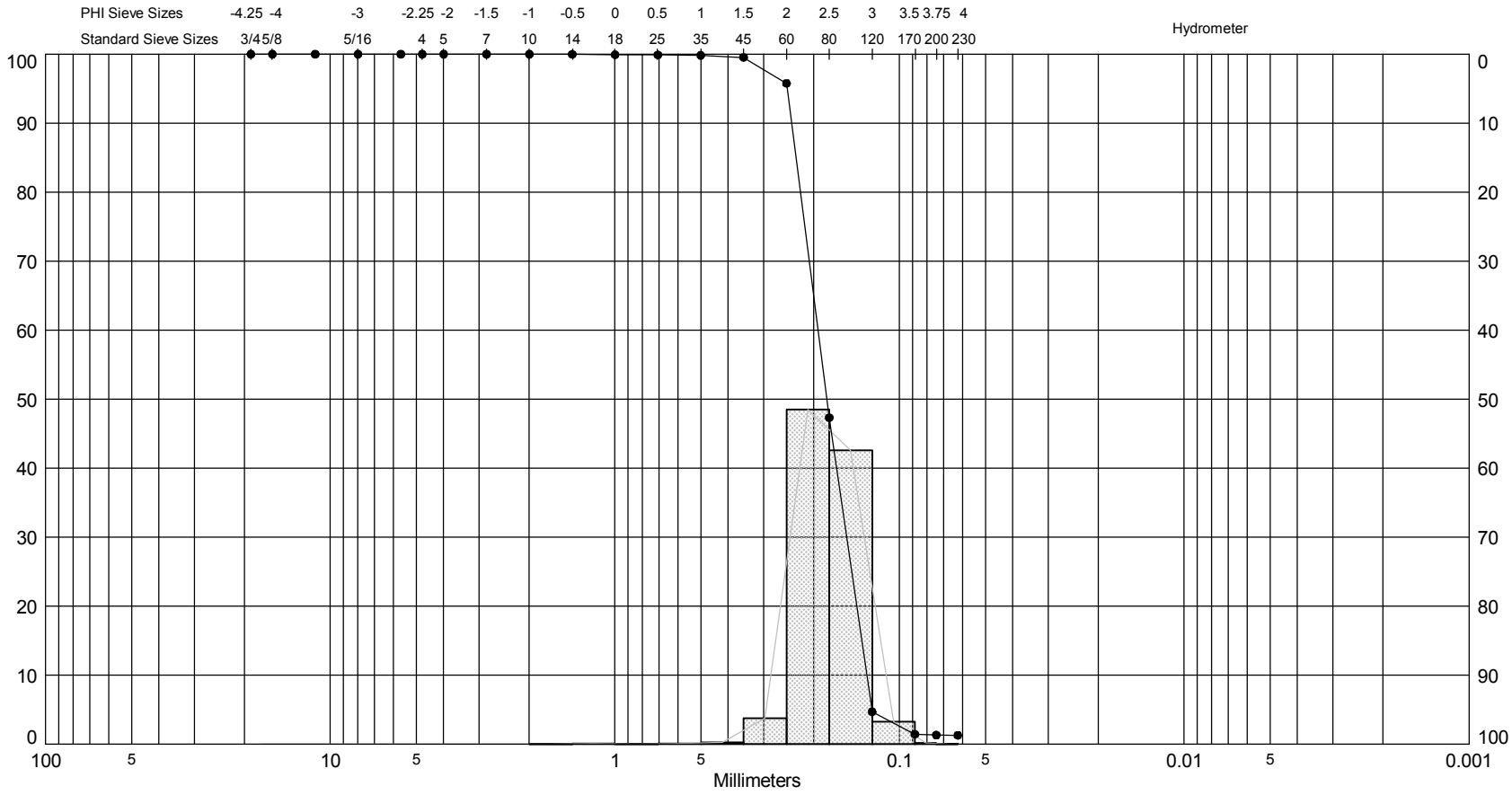
Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	04-20-09
Analyzed By:	KW
Easting (X, ft):	2,386,110
Northing (Y, ft):	200,509
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-02A #2	—●—	-20.0	SP	#200 - 1.30 #230 - 1.29			2.47	2.48	-0.58	7.53	0.34

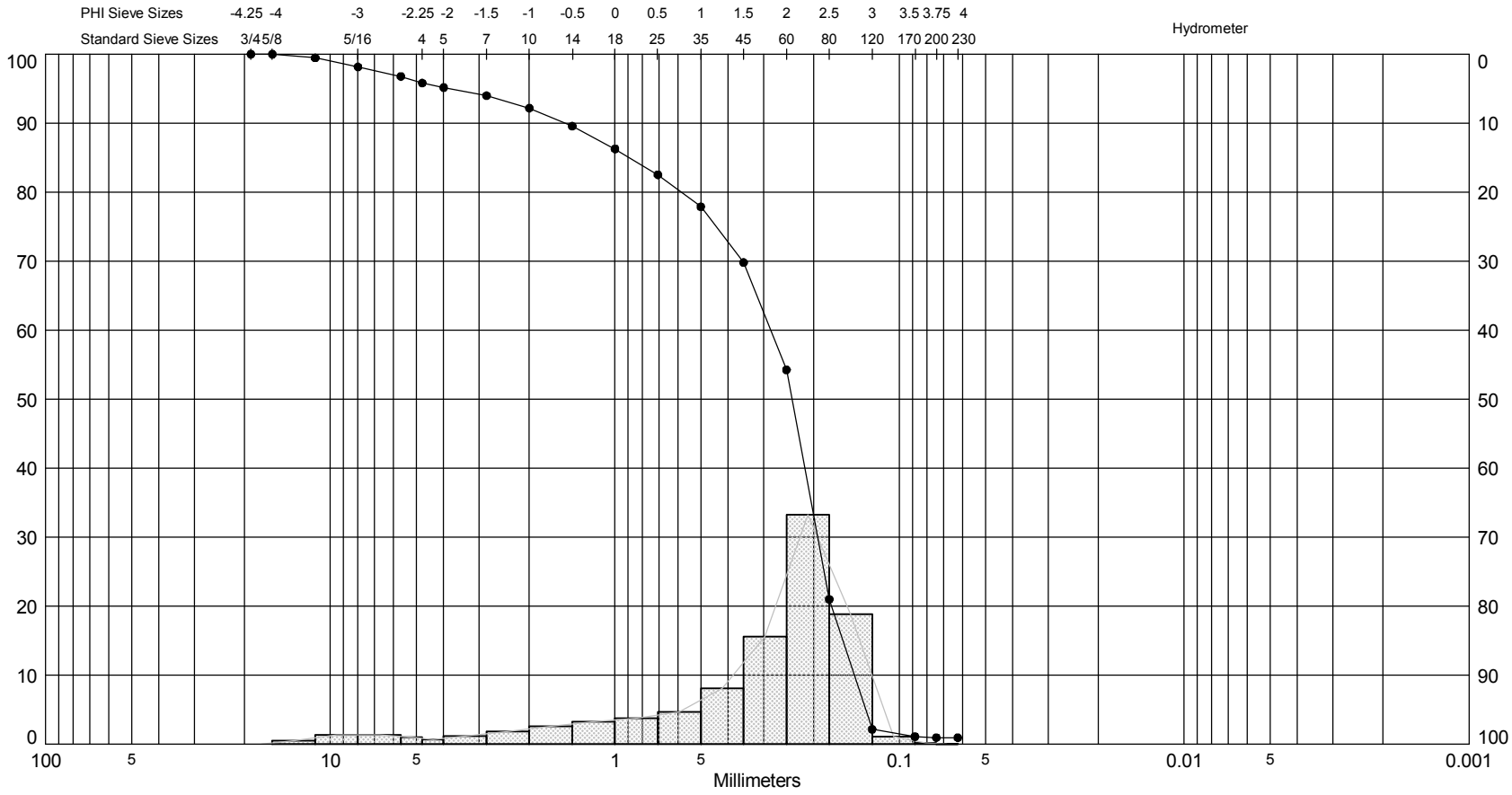
Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	04-20-09
Analyzed By:	KW
Easting (X, ft):	2,386,110
Northing (Y, ft):	200,509
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-03 #1	—●—	-5.0	SW	#200 - 0.94 #230 - 0.93			2.06	1.53	-1.73	5.56	1.43

Comments: (1.0"x0.75") shell fragment removed, 2.91g

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	09-01-09
Analyzed By:	KW
Easting (X, ft):	2,387,390
Northing (Y, ft):	201,128
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
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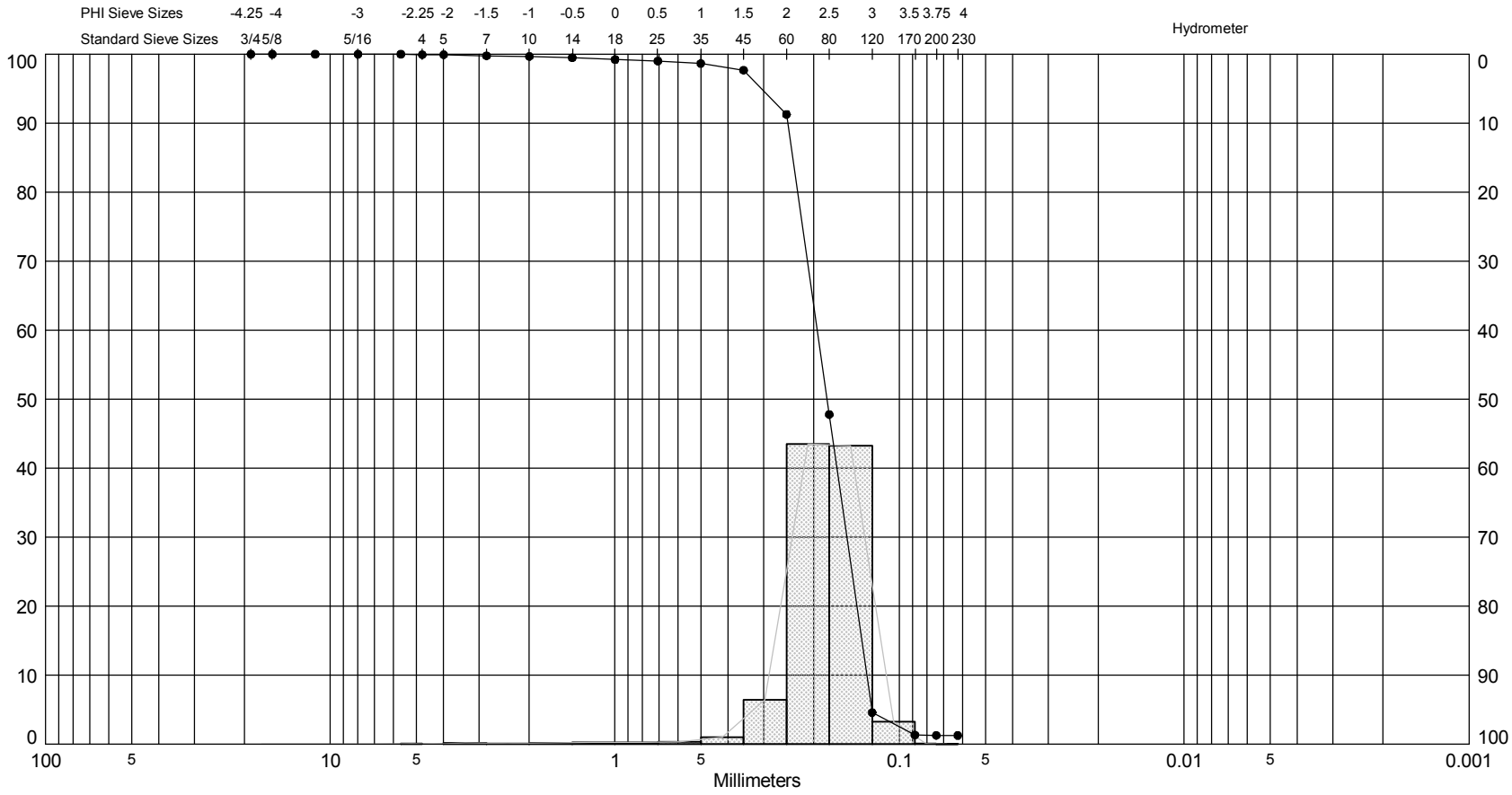
ph (561) 391-8102
fax (561) 391-9116

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-03 #2	—●—	-7.1	SP	#200 - 1.27 #230 - 1.26			2.47	2.42	-3.36	25.67	0.49

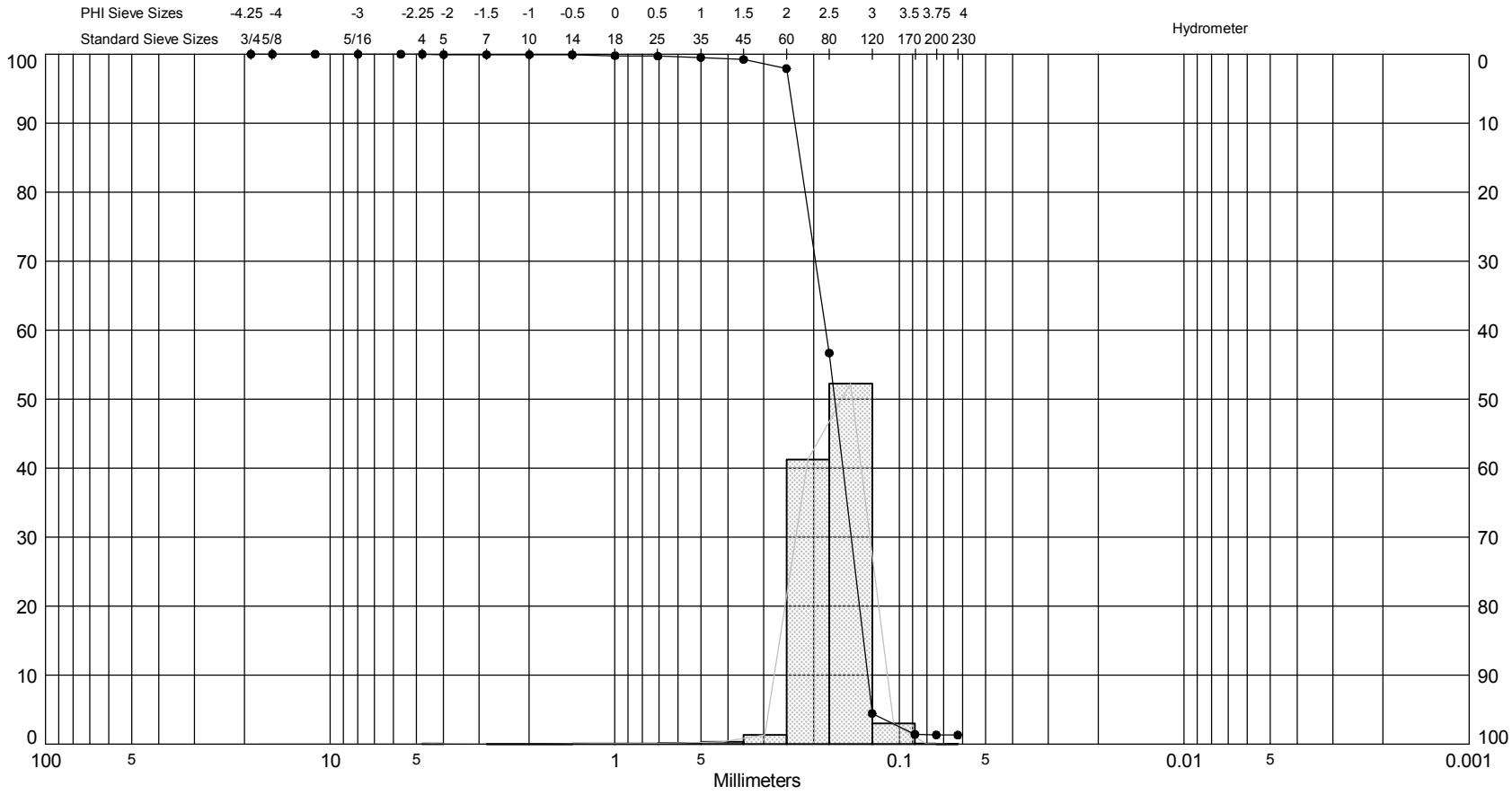
Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-17-09
Analyzed By:	KW
Easting (X, ft):	2,387,390
Northing (Y, ft):	201,128
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-03 #3	—●—	-12.1	SP	#200 - 1.34 #230 - 1.30			2.56	2.53	-2.7	29.24	0.35

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-17-09
Analyzed By:	KW
Easting (X, ft):	2,387,390
Northing (Y, ft):	201,128
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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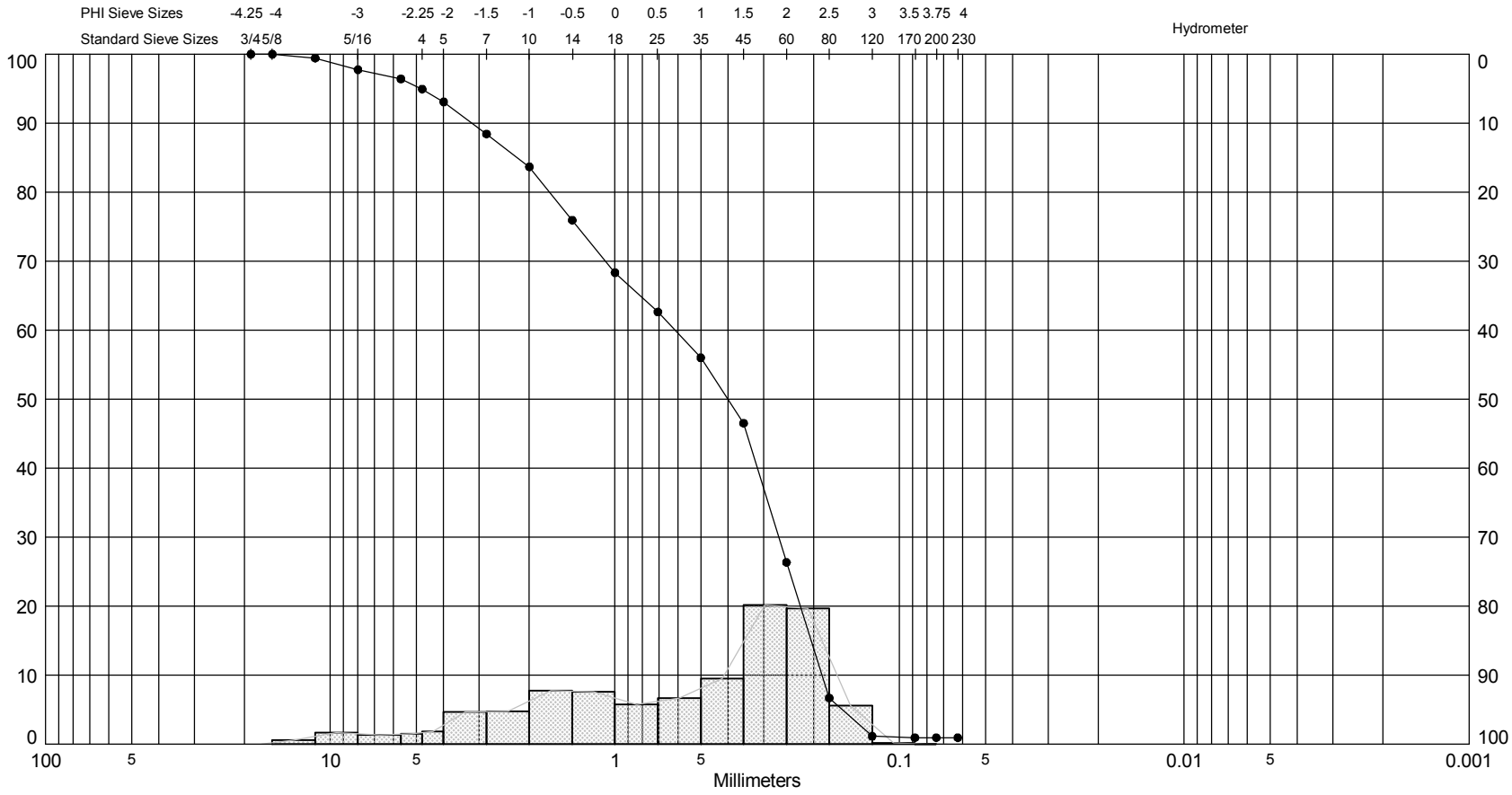
SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-03 #4	—●—	-16.2	SW	#200 - 0.93 #230 - 0.93			1.32	0.74	-0.78	2.61	1.59

Comments:

Depths and elevations based on measured values

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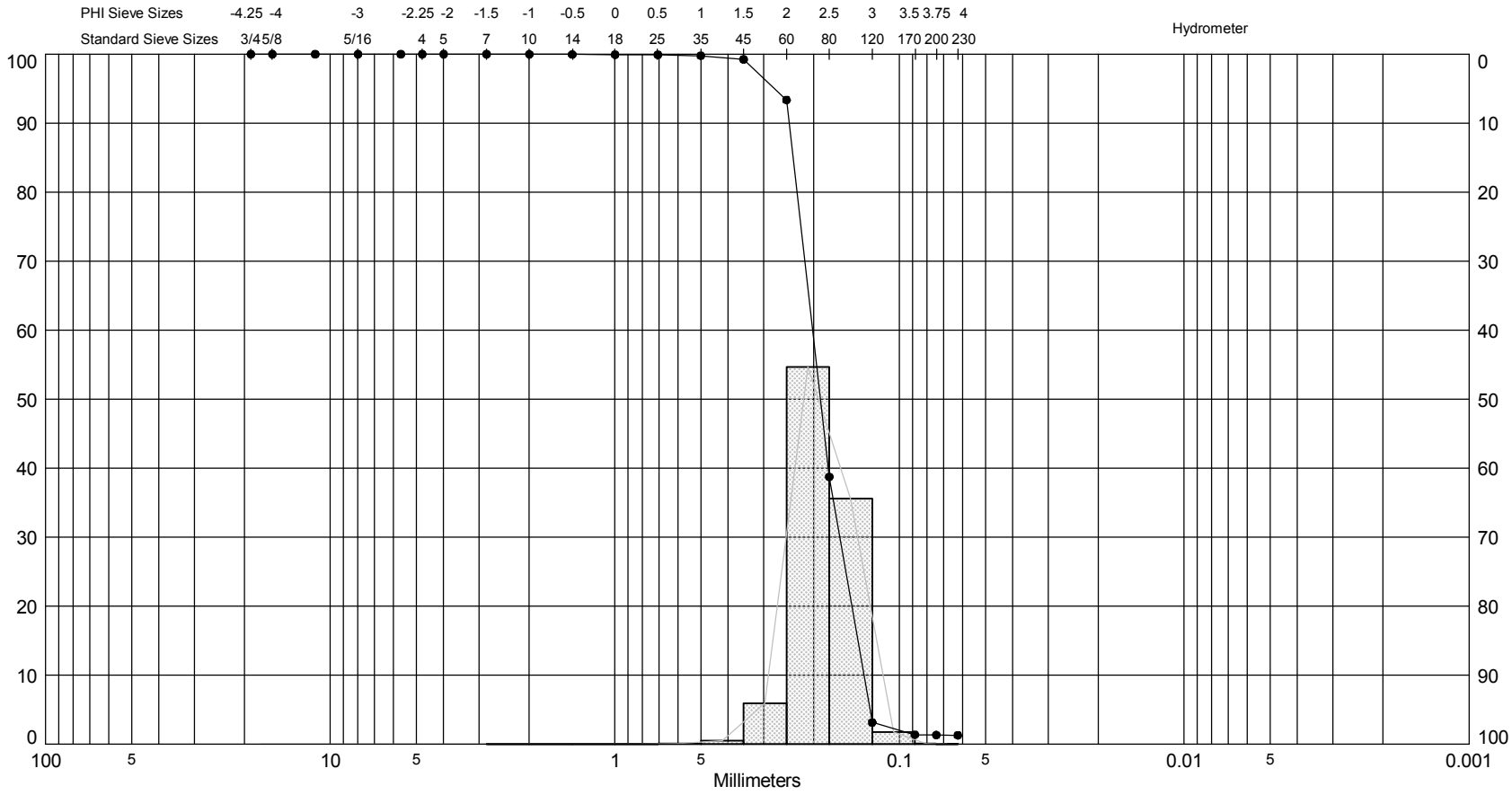
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-17-09
Analyzed By:	KW
Easting (X, ft):	2,387,390
Northing (Y, ft):	201,128
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-03 #5	—●—	-17.6	SP	#200 - 1.31 #230 - 1.29			2.4	2.41	-0.8	9.46	0.34

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-17-09
Analyzed By:	KW
Easting (X, ft):	2,387,390
Northing (Y, ft):	201,128
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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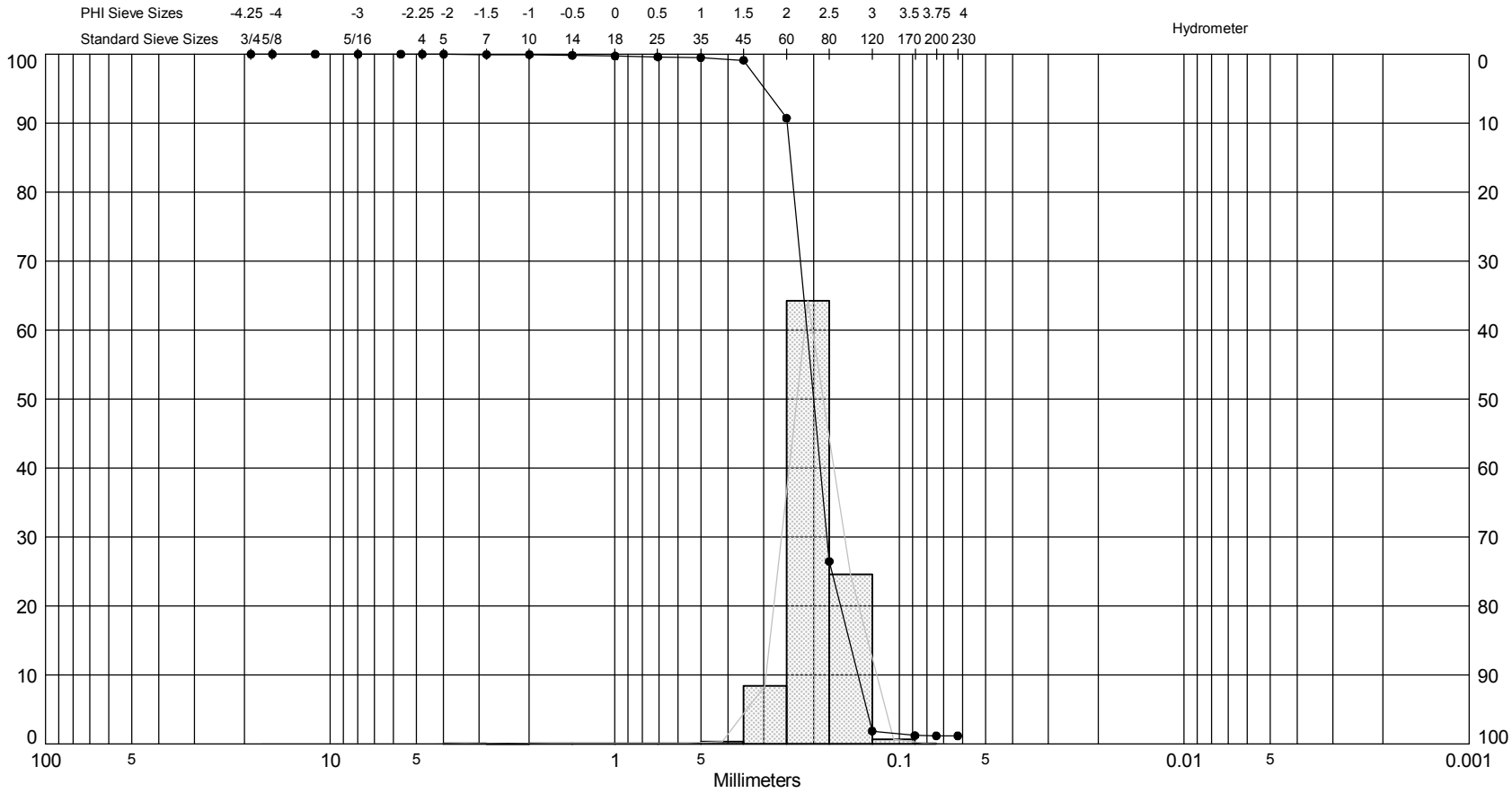

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-03 #6	—●—	-20.6	SP	#200 - 1.16 #230 - 1.16			2.32	2.32	-2.26	23.45	0.35

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-17-09
Analyzed By:	KW
Easting (X, ft):	2,387,390
Northing (Y, ft):	201,128
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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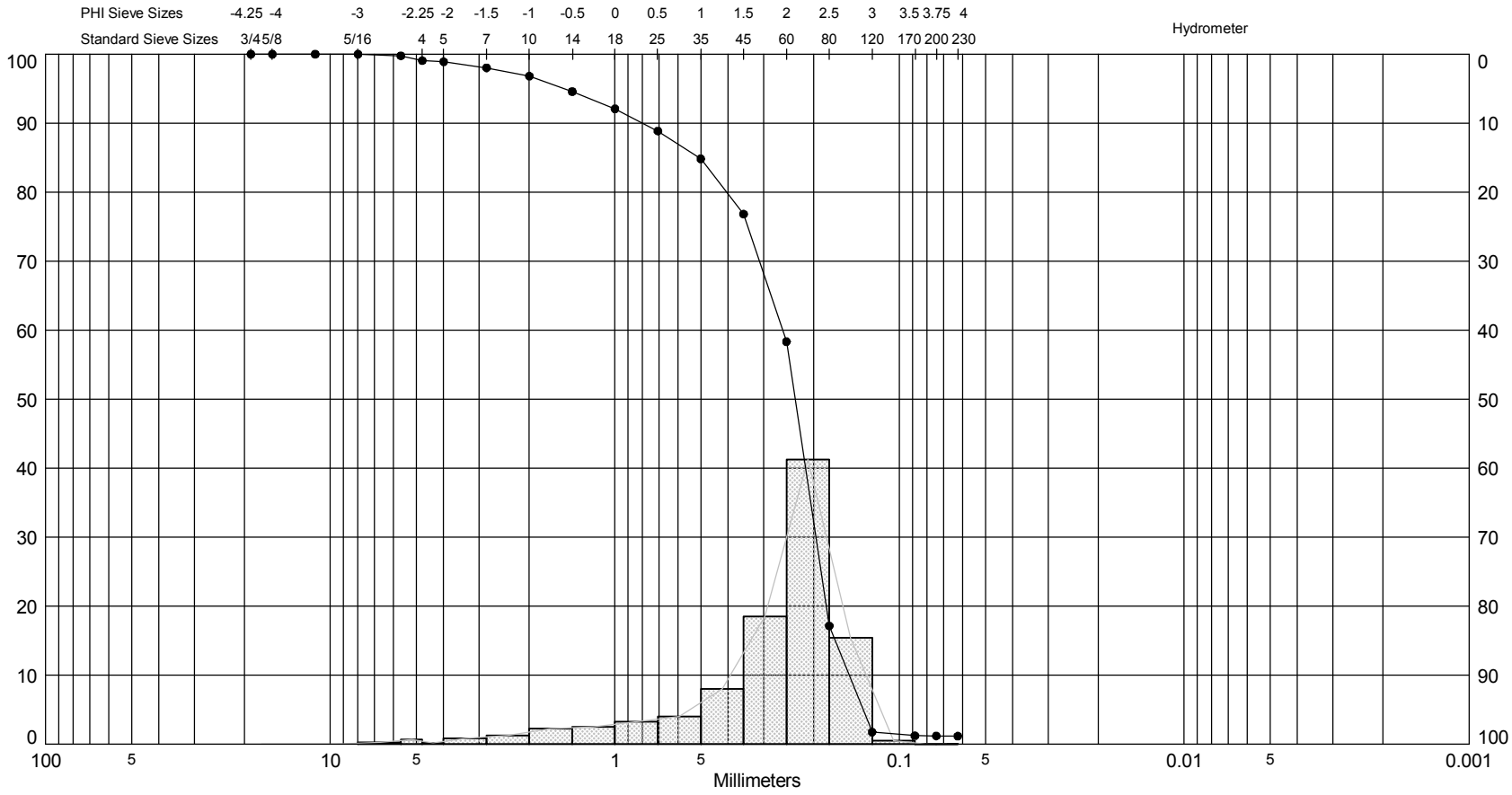
SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-04 #1	—●—	-4.0	SW	#200 - 1.18 #230 - 1.15			2.1	1.77	-1.89	6.74	1.03

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-17-09
Analyzed By:	KW
Easting (X, ft):	2,388,485
Northing (Y, ft):	202,080
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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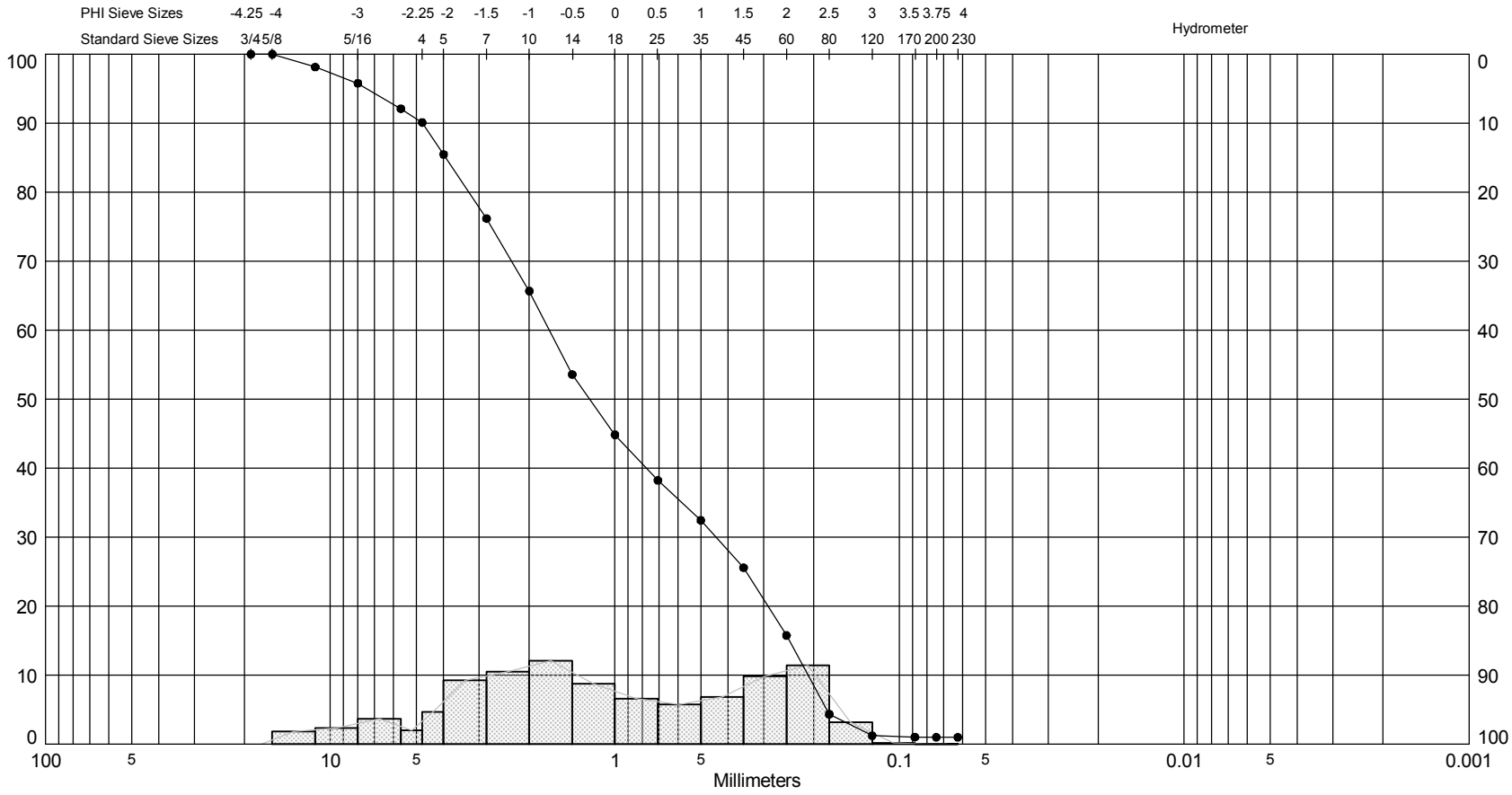

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-04 #2	—●—	-6.0	SW	#200 - 0.99 #230 - 0.98				-0.13	-0.03	1.99	1.71

Comments: (1.25"x1.25") and (1.25"x0.5") shell fragments removed, 20.20g

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-17-09
Analyzed By:	KW
Easting (X, ft):	2,388,485
Northing (Y, ft):	202,080
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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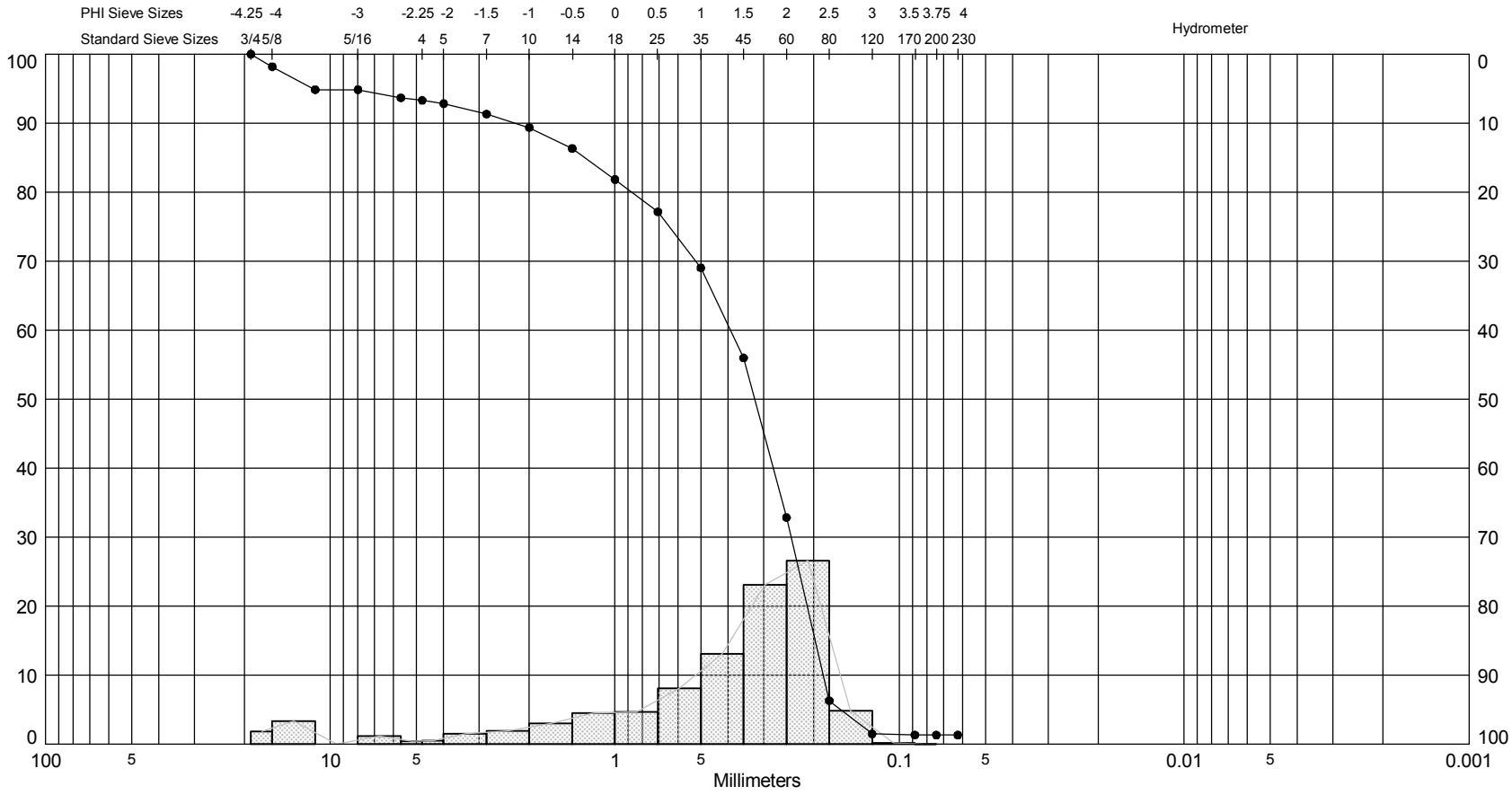

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-04 #3	—●—	-8.5	SW	#200 - 1.30 #230 - 1.30			1.63	1.05	-1.72	5.45	1.62

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-17-09
Analyzed By:	KW
Easting (X, ft):	2,388,485
Northing (Y, ft):	202,080
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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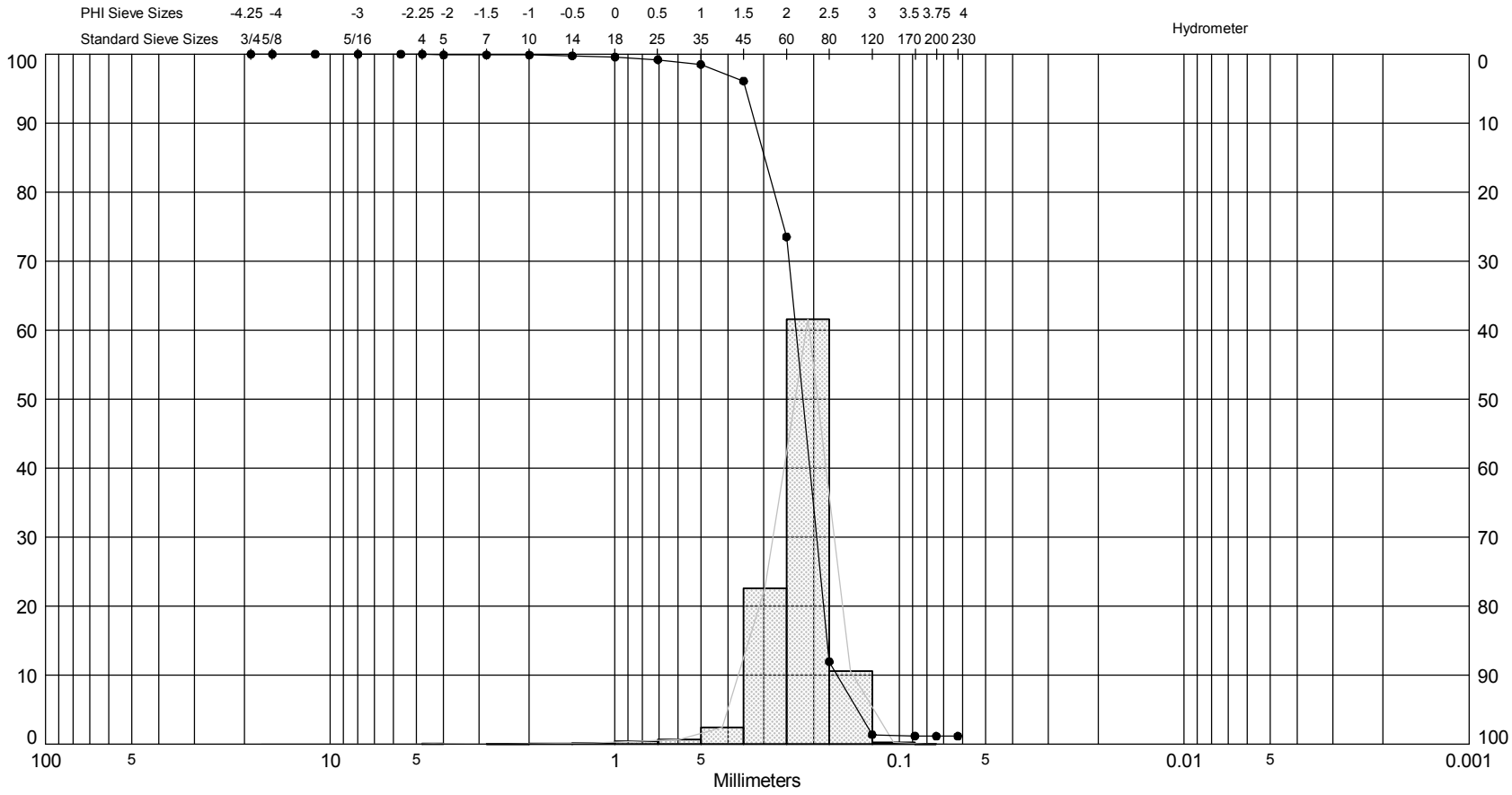

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-04 #4	—●—	-11.0	SP	#200 - 1.14 #230 - 1.14			2.19	2.14	-2.6	21.04	0.42

Comments:

Depths and elevations based on measured values

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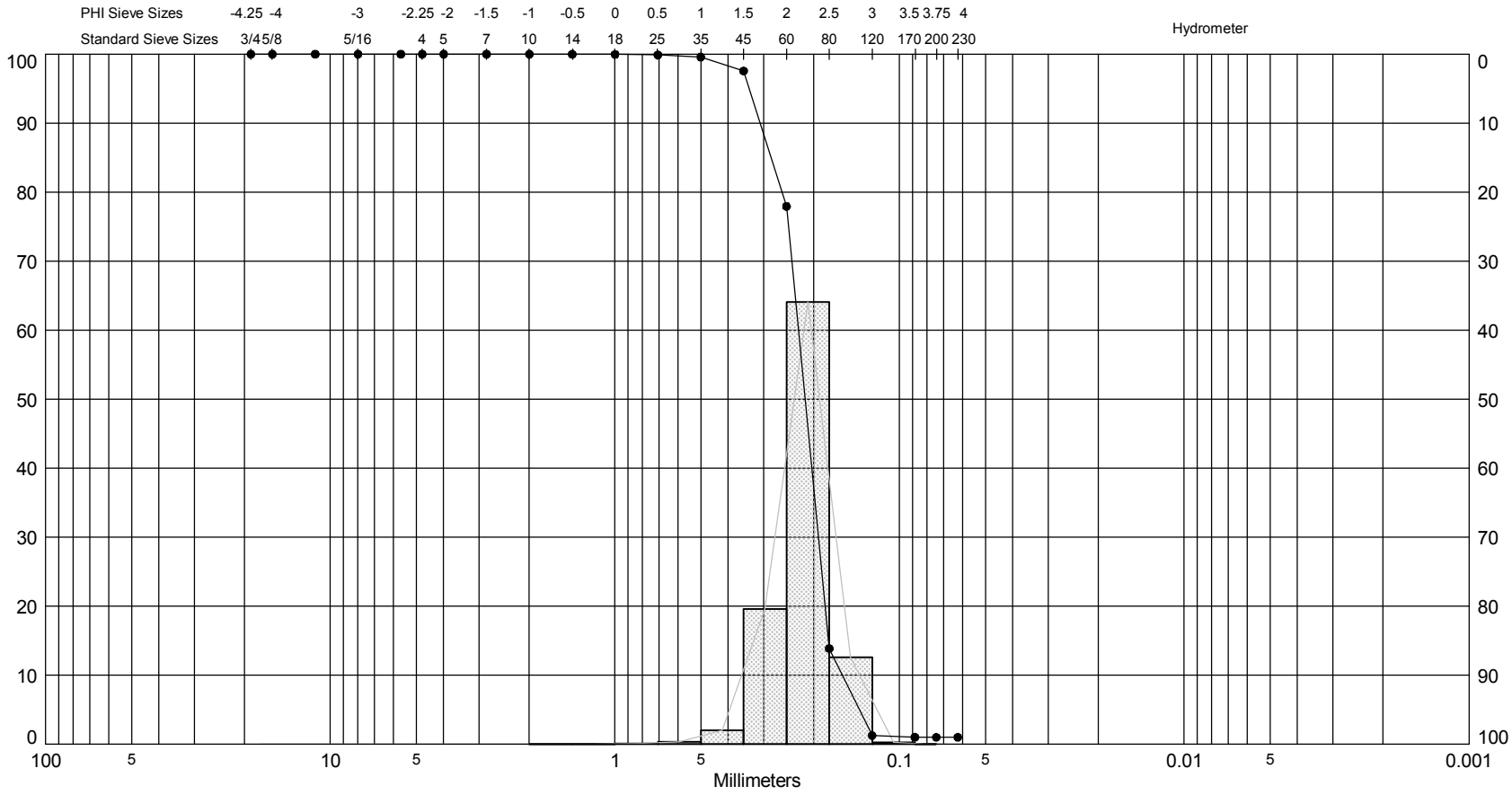
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-19-09
Analyzed By:	KW
Easting (X, ft):	2,388,485
Northing (Y, ft):	202,080
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-04A #1	—●—	-11.9	SP	#200 - 0.98 #230 - 0.98			2.22	2.19	-0.78	6.34	0.34

Comments:

Depths and elevations based on measured values

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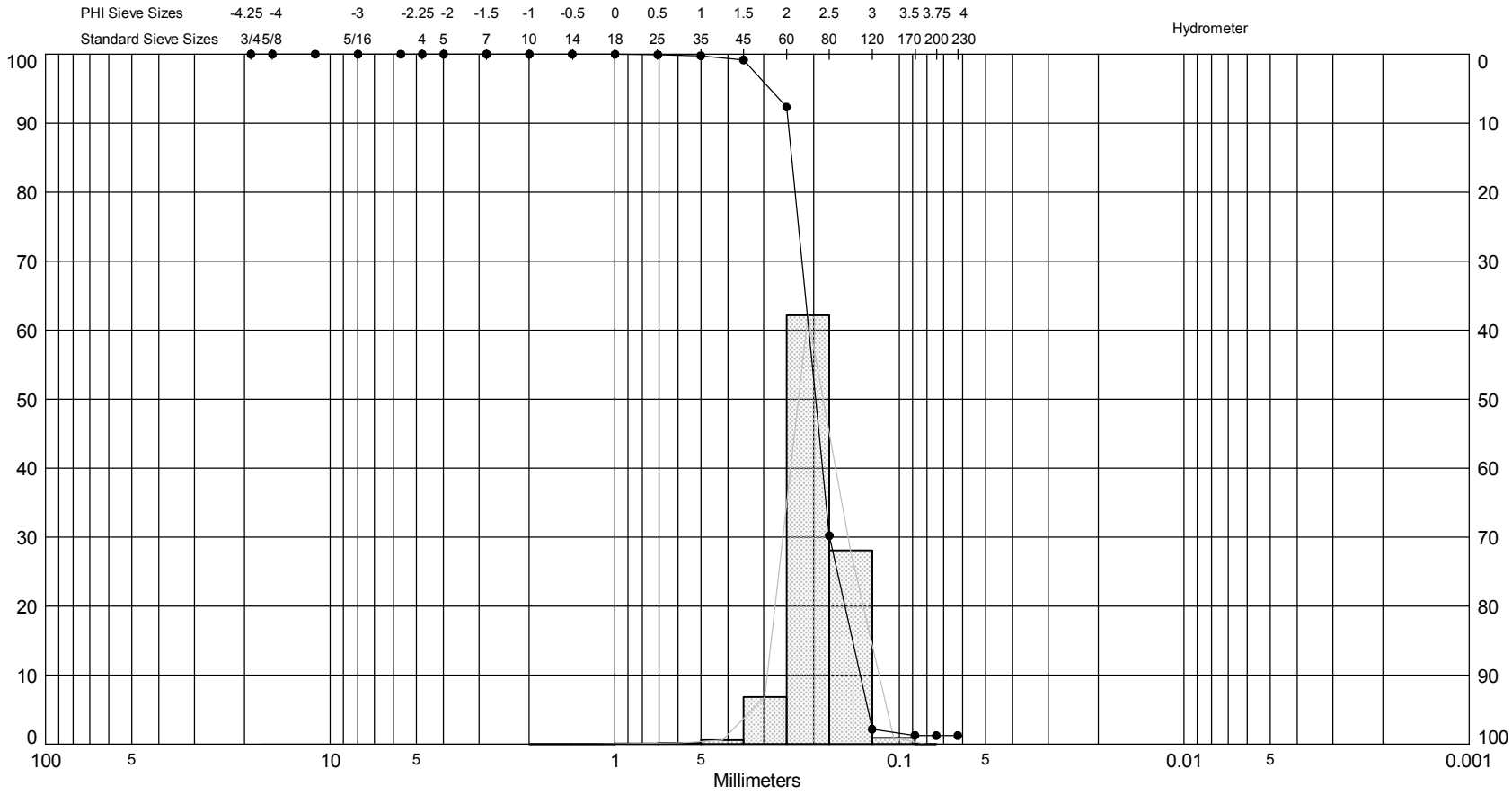
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-19-09
Analyzed By:	KW
Easting (X, ft):	2,388,477
Northing (Y, ft):	202,102
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-04A #2	—●—	-14.9	SP	#200 - 1.24 #230 - 1.24			2.34	2.36	-0.55	7.01	0.32

Comments:

Depths and elevations based on measured values

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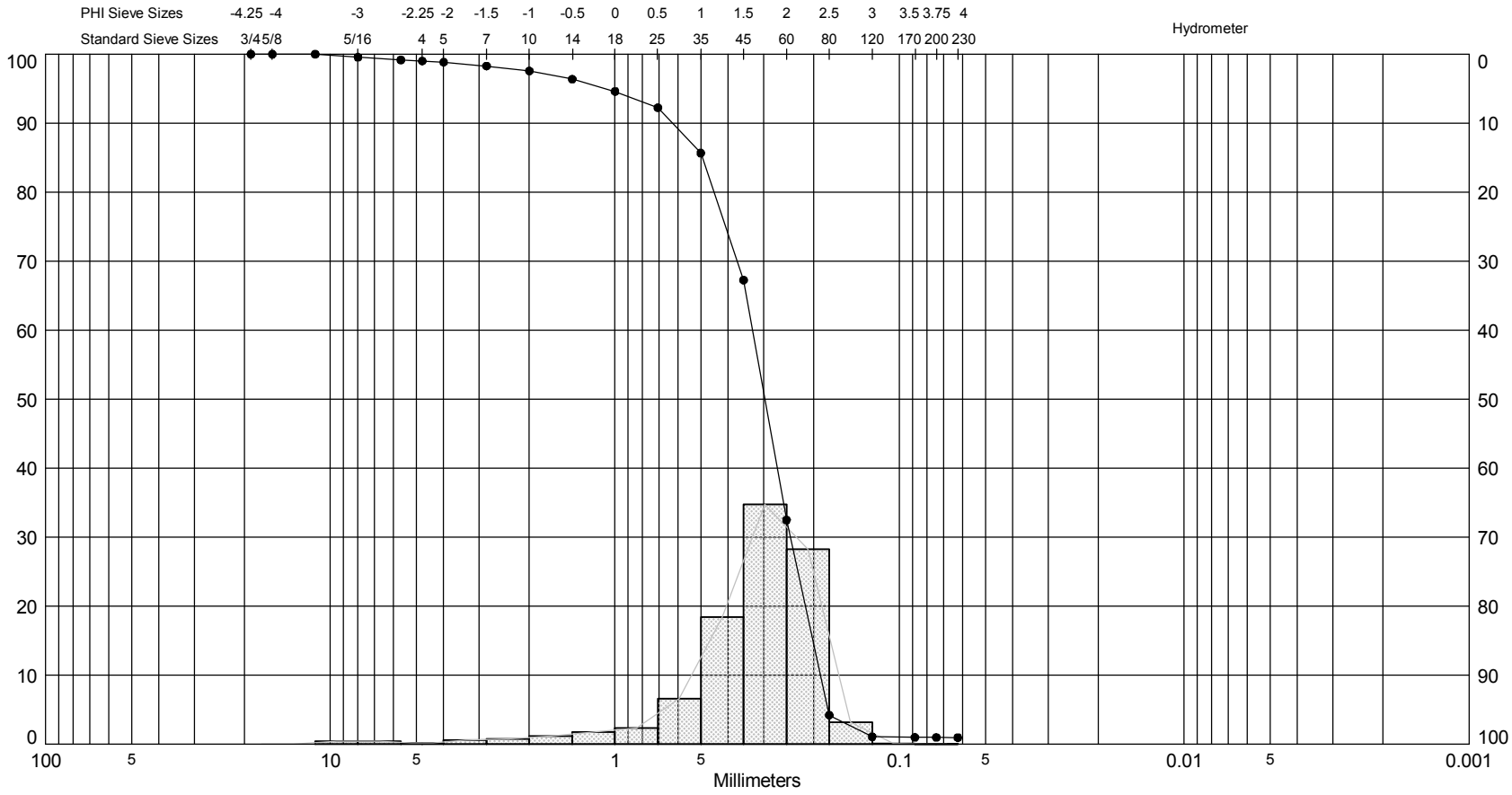
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-19-09
Analyzed By:	KW
Easting (X, ft):	2,388,477
Northing (Y, ft):	202,102
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-04A #3	—●—	-17.1	SW	#200 - 0.96 #230 - 0.95			1.75	1.57	-2.36	10.97	0.87

Comments:

Depths and elevations based on measured values

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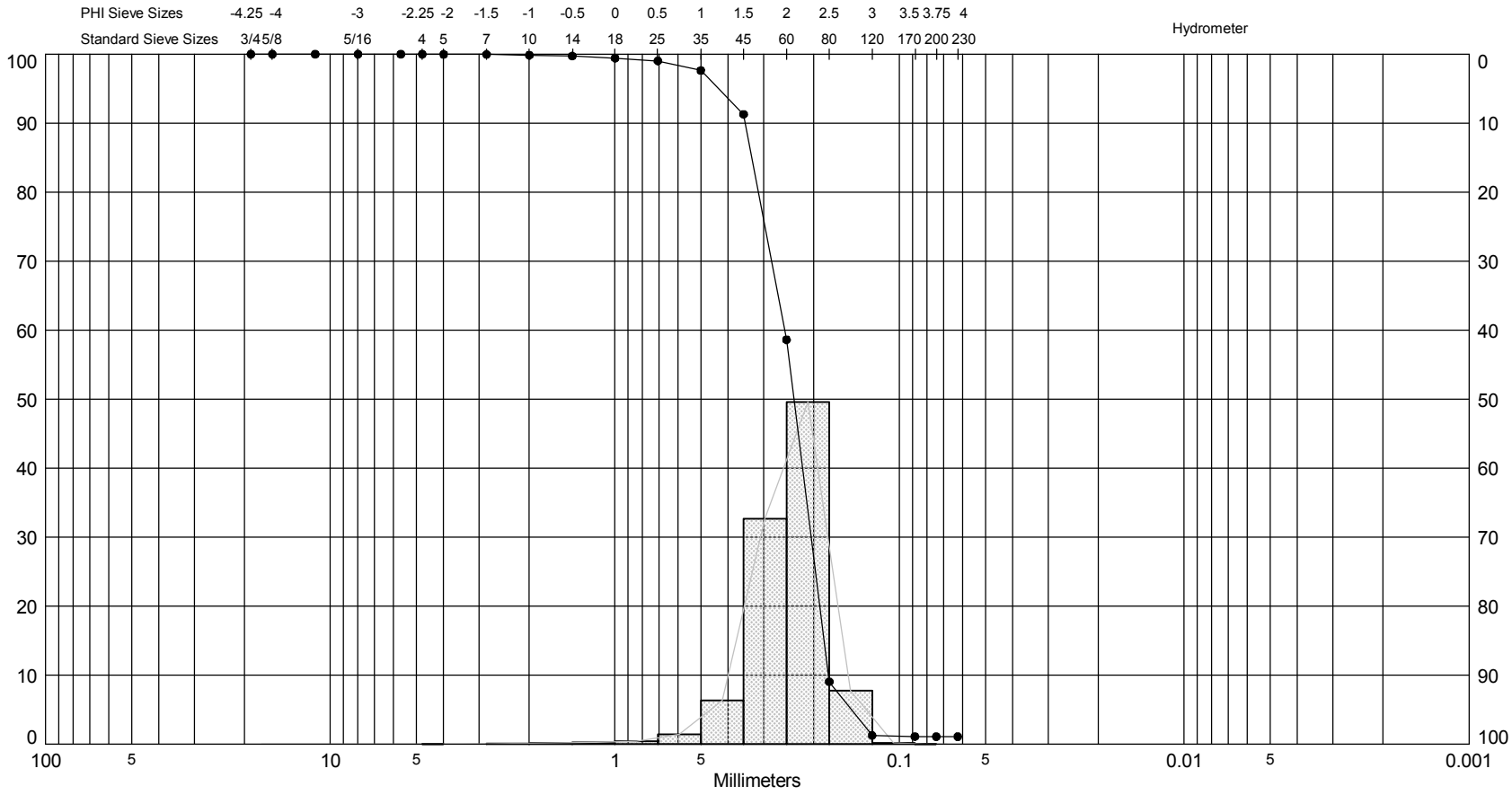
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-19-09
Analyzed By:	KW
Easting (X, ft):	2,388,477
Northing (Y, ft):	202,102
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-04A #4	—●—	-18.9	SP	#200 - 1.09 #230 - 1.09			2.09	2.02	-1.71	11.1	0.46

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-19-09
Analyzed By:	KW
Easting (X, ft):	2,388,477
Northing (Y, ft):	202,102
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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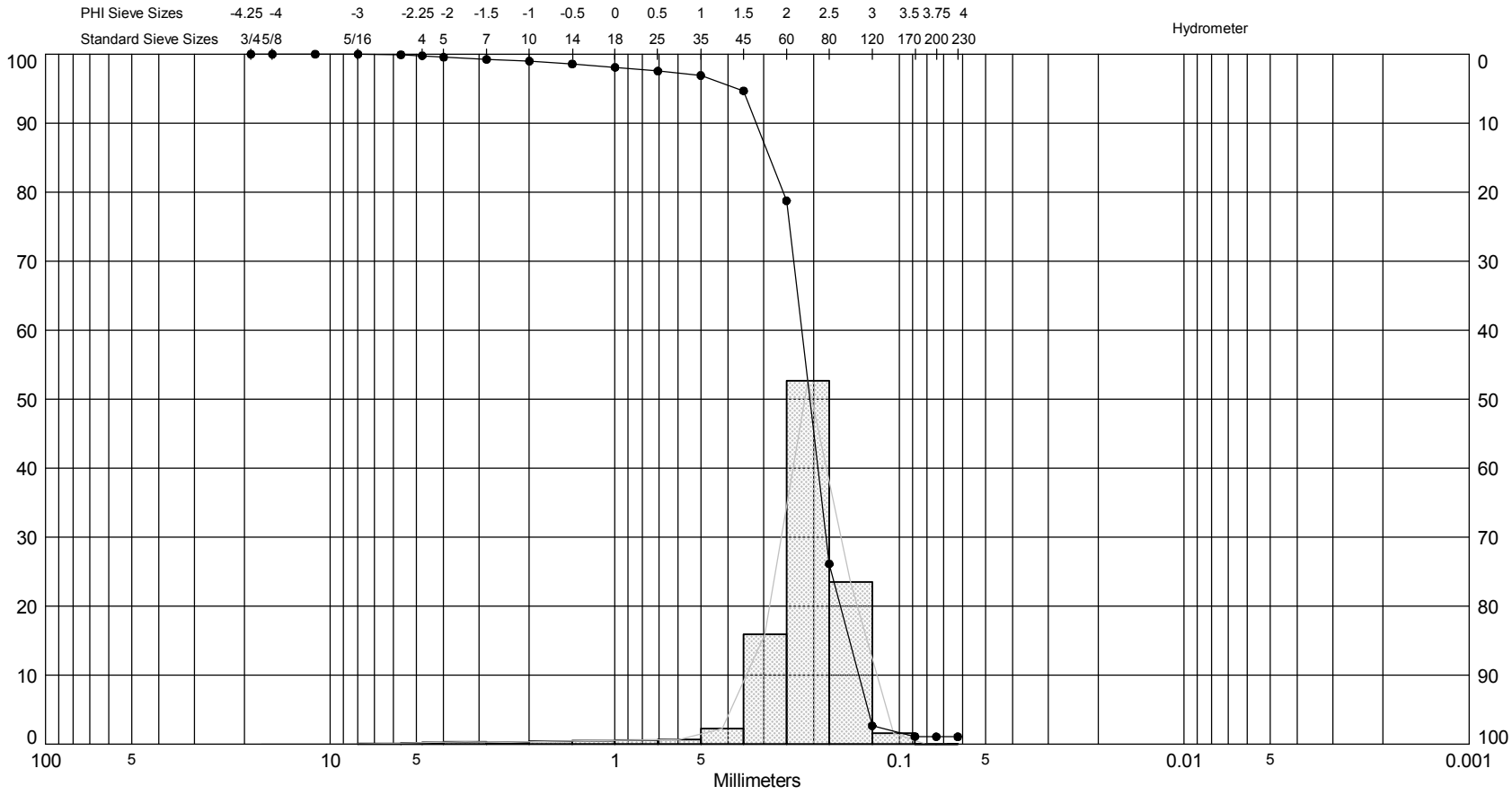

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-05 #1	—●—	-4.5	SP	#200 - 1.07 #230 - 1.06			2.27	2.19	-3.45	21.37	0.64

Comments:

Depths and elevations based on measured values

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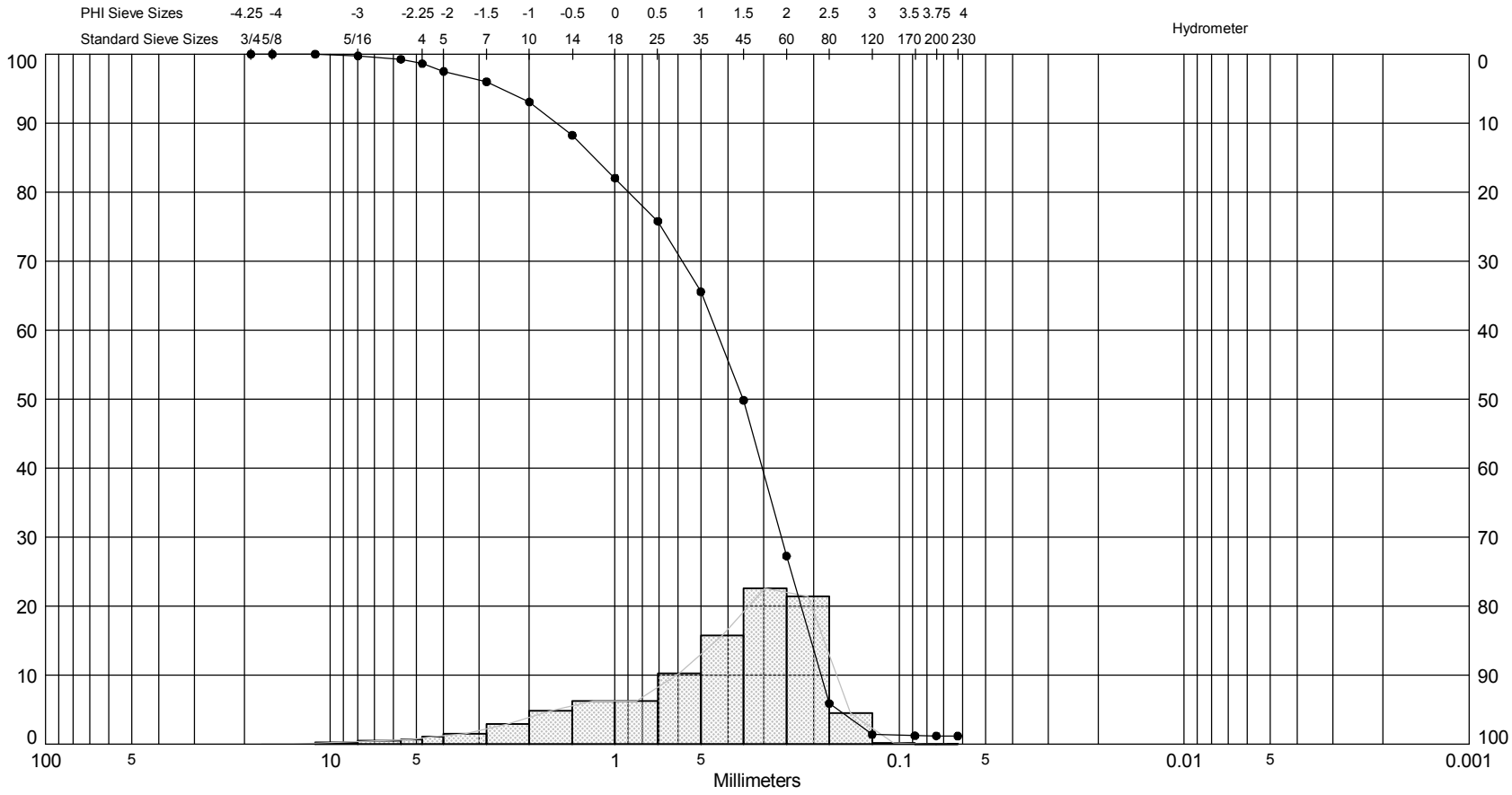
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-19-09
Analyzed By:	KW
Easting (X, ft):	2,388,173
Northing (Y, ft):	201,385
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-05 #2	—●—	-8.5	SW	#200 - 1.19 #230 - 1.17			1.49	1.13	-1.08	3.7	1.21

Comments:

Depths and elevations based on measured values

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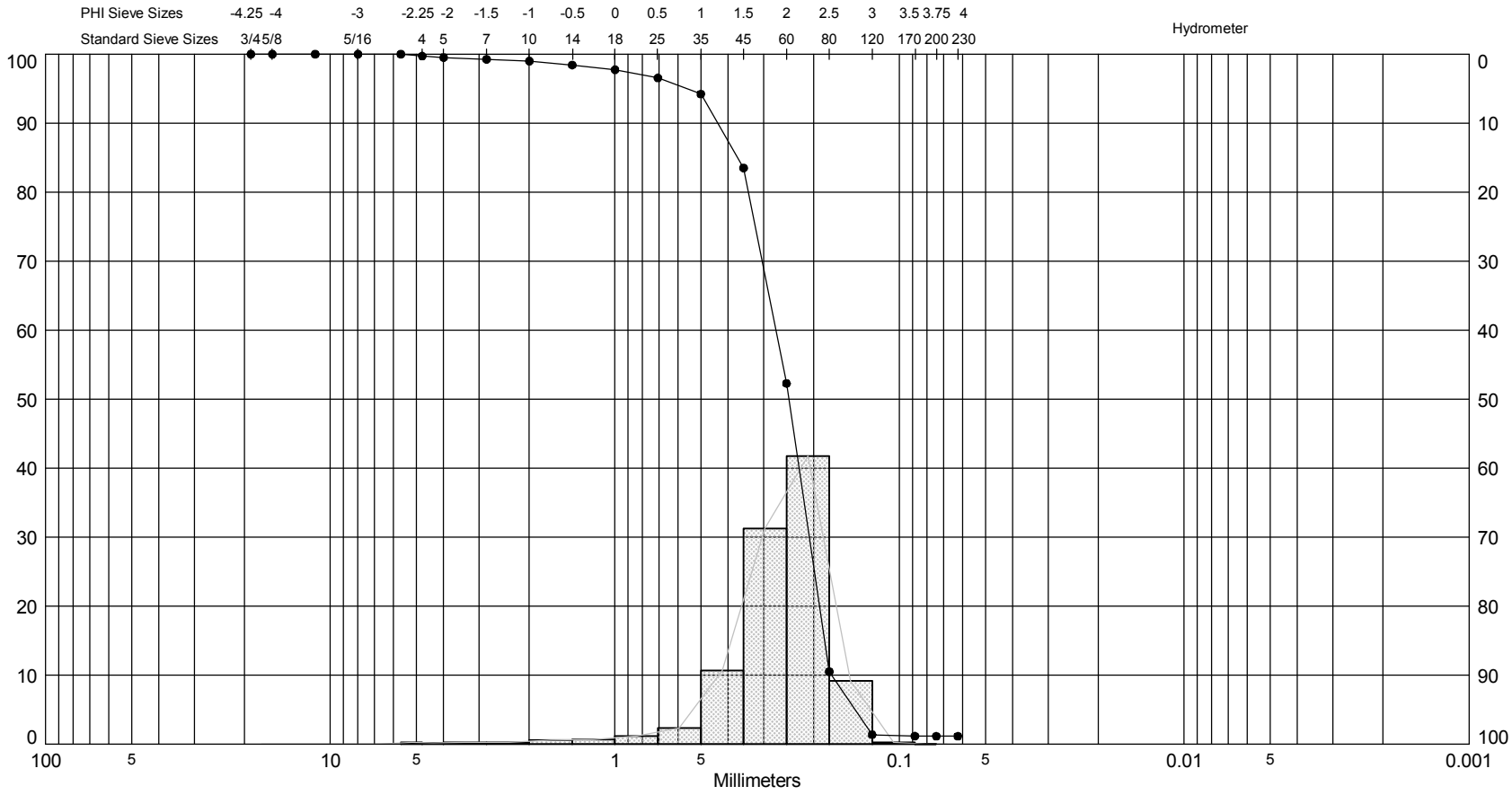
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-19-09
Analyzed By:	KW
Easting (X, ft):	2,388,173
Northing (Y, ft):	201,385
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-05 #3	—●—	-10.0	SP	#200 - 1.13 #230 - 1.13			2.03	1.9	-2.49	13.5	0.68

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-19-09
Analyzed By:	KW
Easting (X, ft):	2,388,173
Northing (Y, ft):	201,385
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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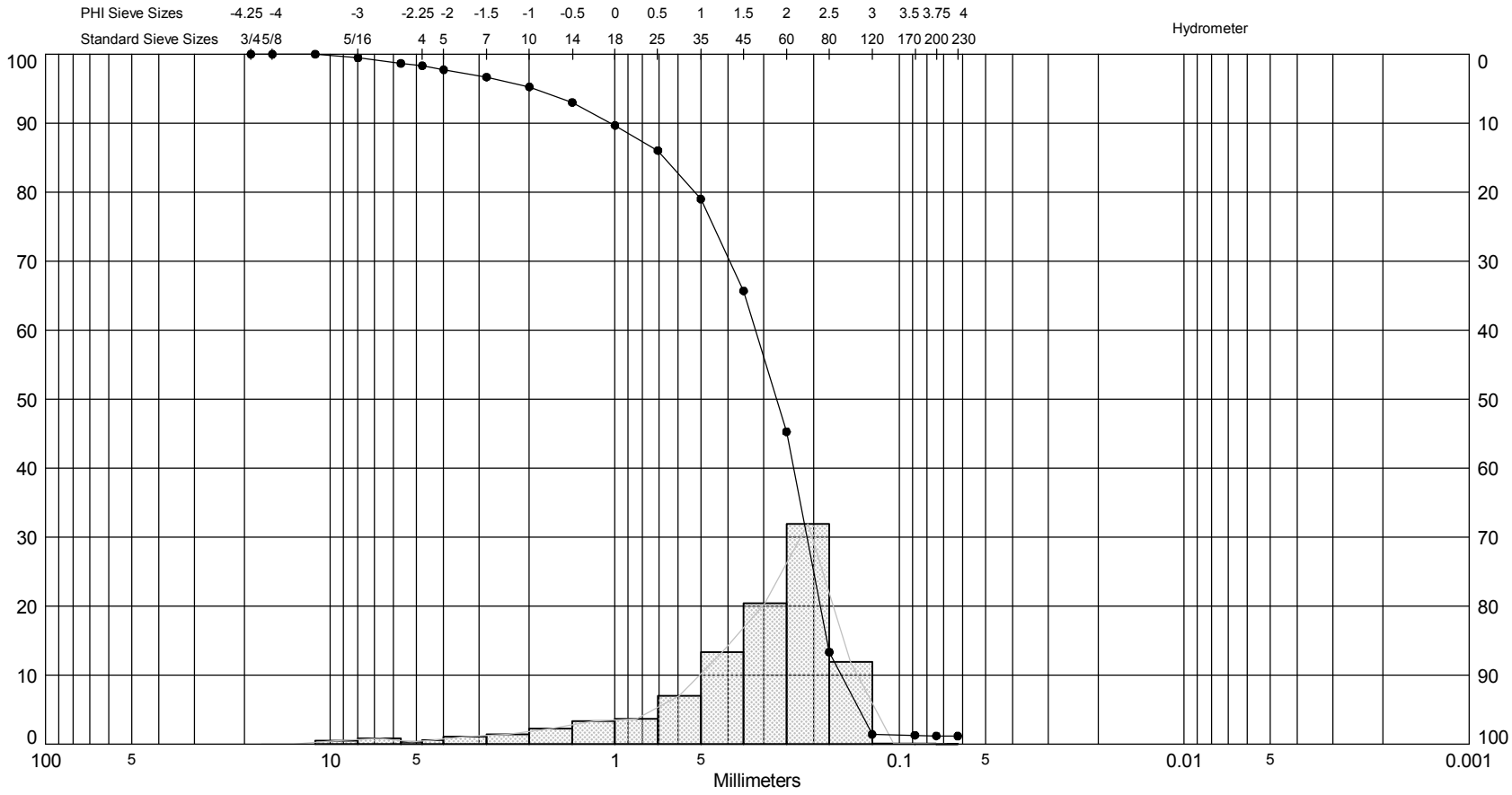

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-05 #4	—●—	-10.8	SW	#200 - 1.19 #230 - 1.16			1.88	1.54	-1.72	6.19	1.16

Comments:

Depths and elevations based on measured values

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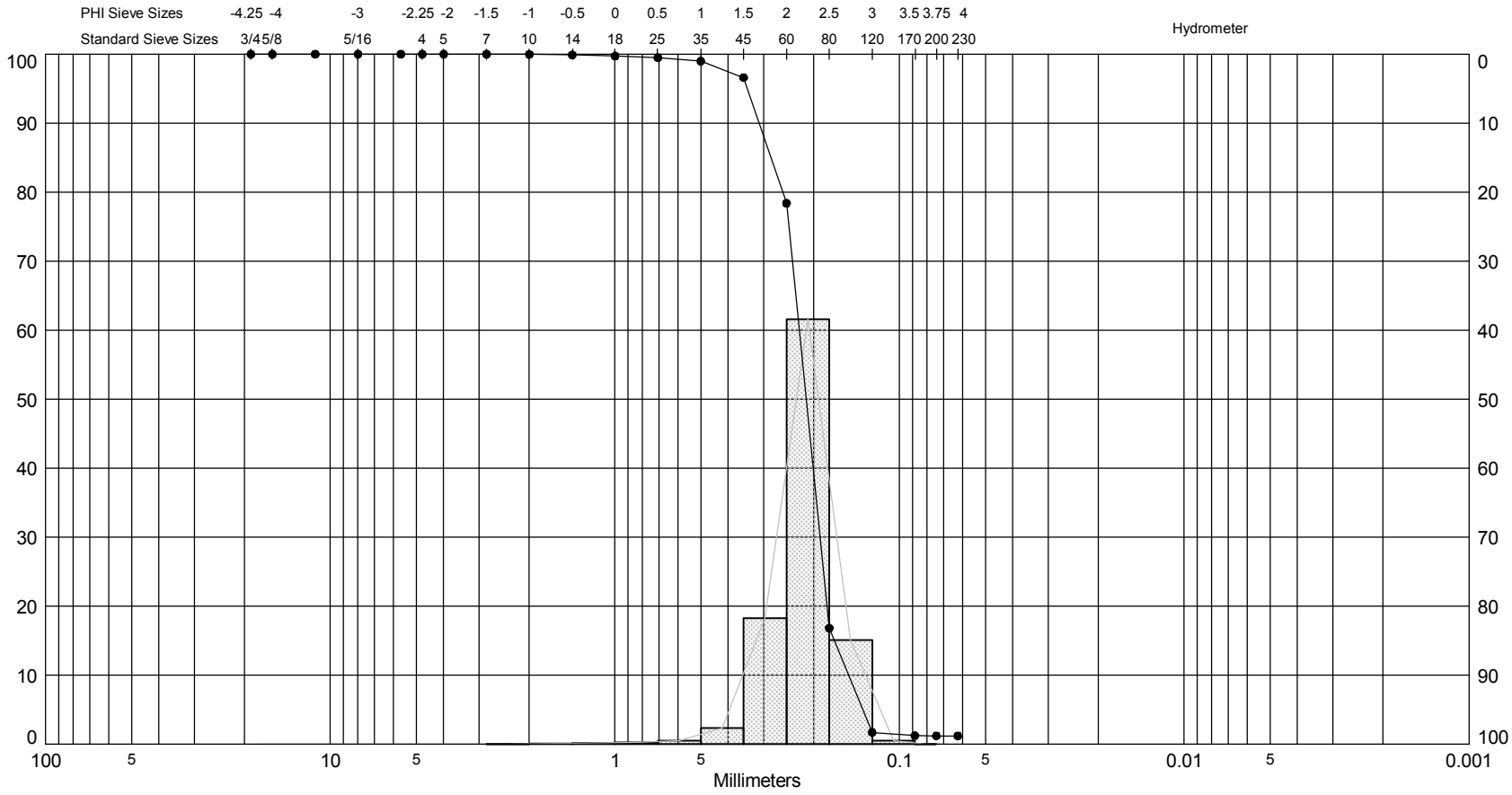
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-19-09
Analyzed By:	KW
Easting (X, ft):	2,388,173
Northing (Y, ft):	201,385
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-05 #5	—●—	-11.8	SP	#200 - 1.20 #230 - 1.20			2.23	2.2	-1.61	11.75	0.39

Comments:

Depths and elevations based on measured values

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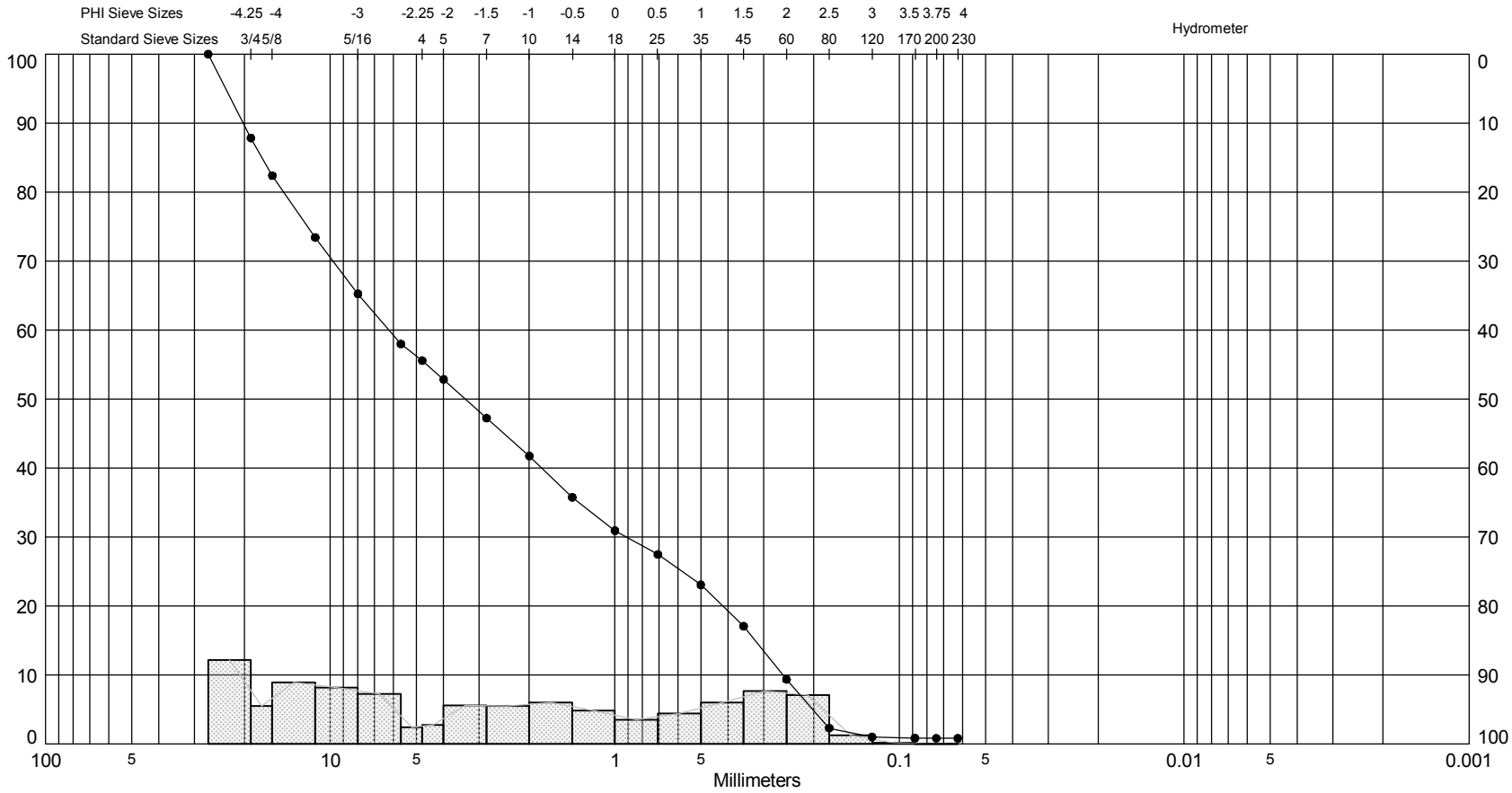
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-19-09
Analyzed By:	KW
Easting (X, ft):	2,388,173
Northing (Y, ft):	201,385
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Gravel		Sand			Silt and Clay
Coarse	Fine	Coarse	Medium	Fine	

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-05A #1	—●—	-11.0	SW	#200 - 0.82 #230 - 0.80				-1.47	0.27	1.7	2.31

Comments:

Depths and elevations based on measured values

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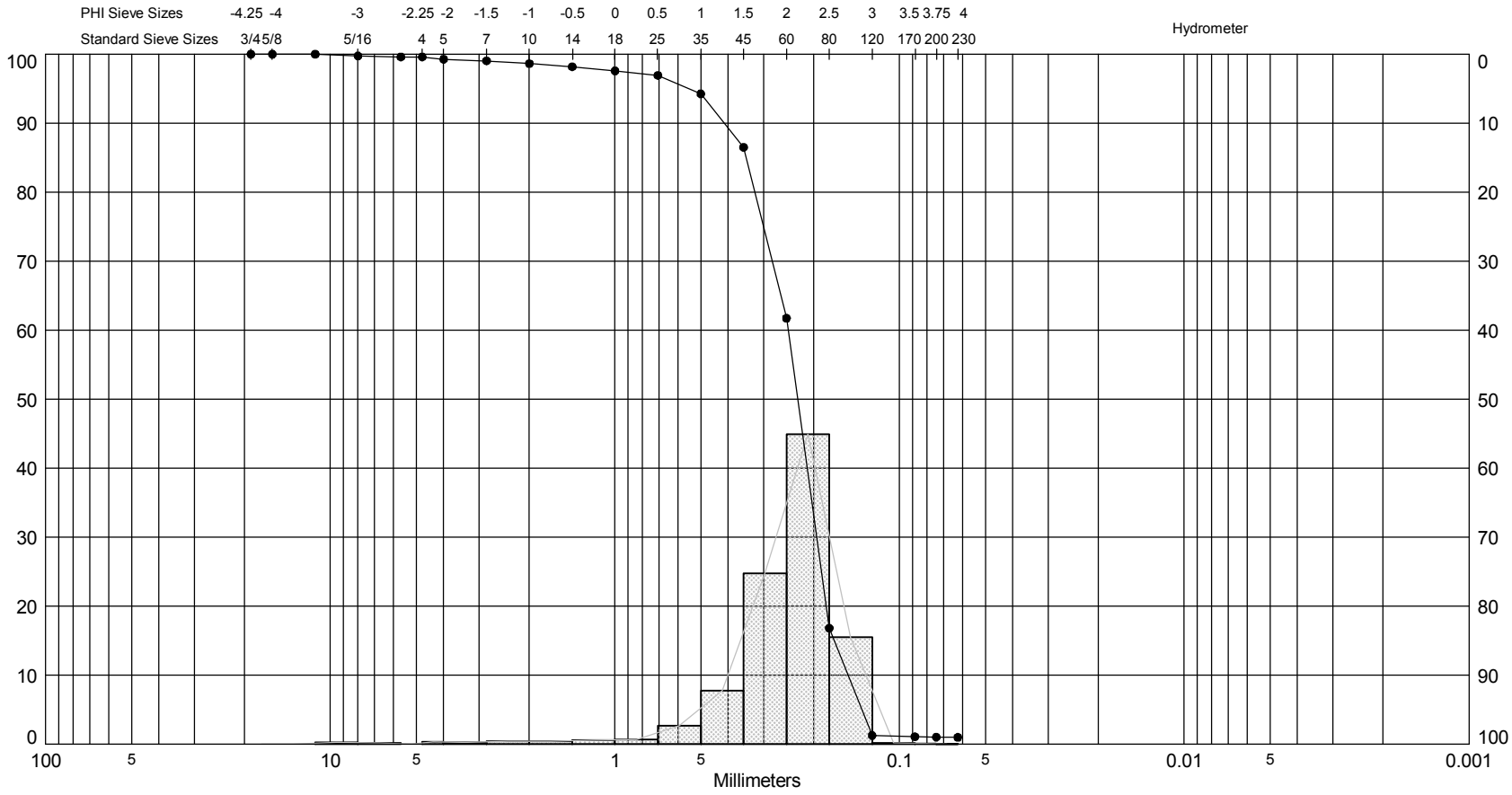
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-20-09
Analyzed By:	KW
Easting (X, ft):	2,388,174
Northing (Y, ft):	201,399
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-05A #2	—●—	-14.9	SP	#200 - 1.01 #230 - 0.97			2.13	1.99	-3	17.26	0.74

Comments:

Depths and elevations based on measured values

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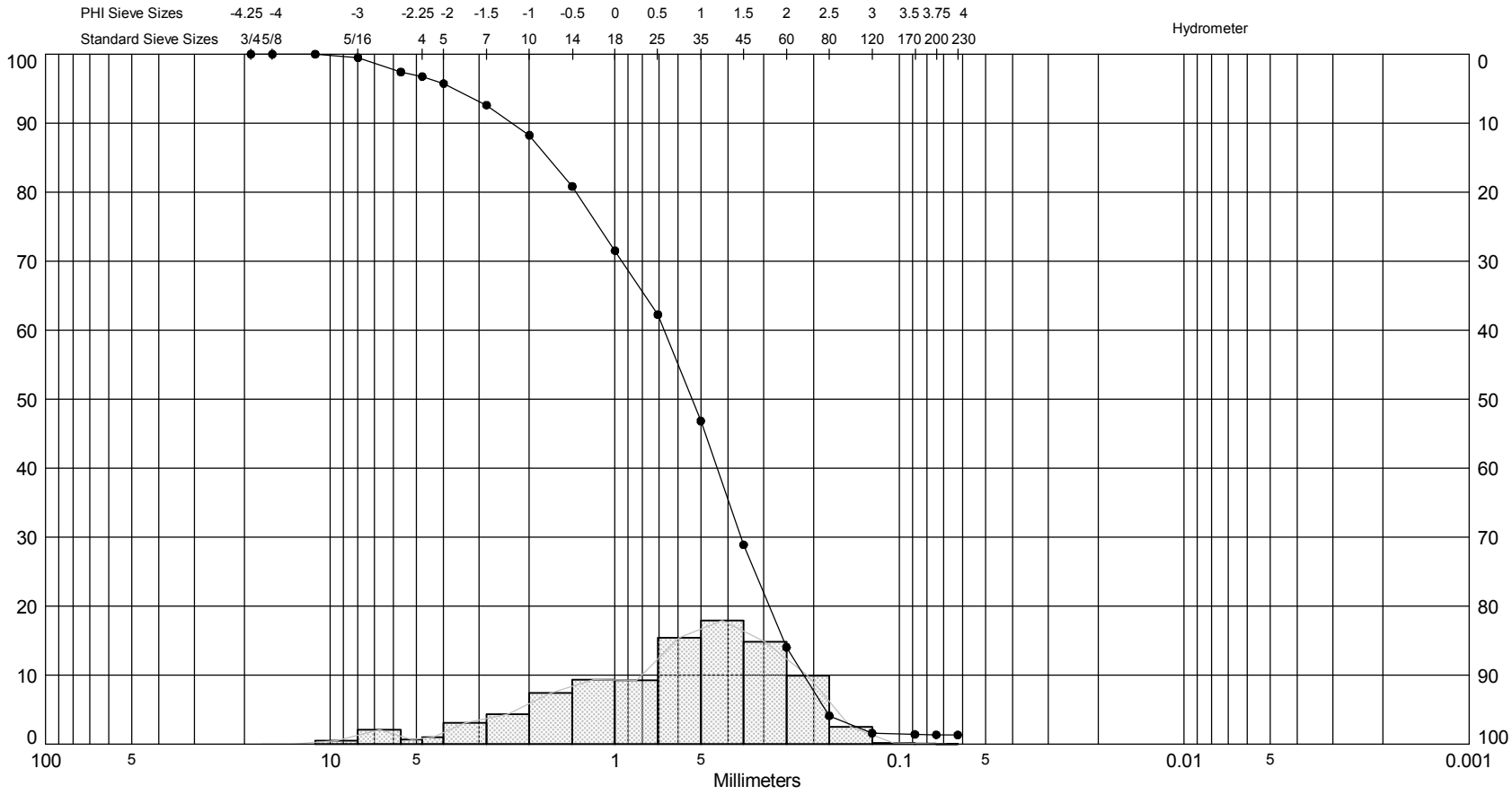
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-20-09
Analyzed By:	KW
Easting (X, ft):	2,388,174
Northing (Y, ft):	201,399
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-05A #3	—●—	-16.8	SW	#200 - 1.35 #230 - 1.32			0.9	0.63	-0.7	3.05	1.3

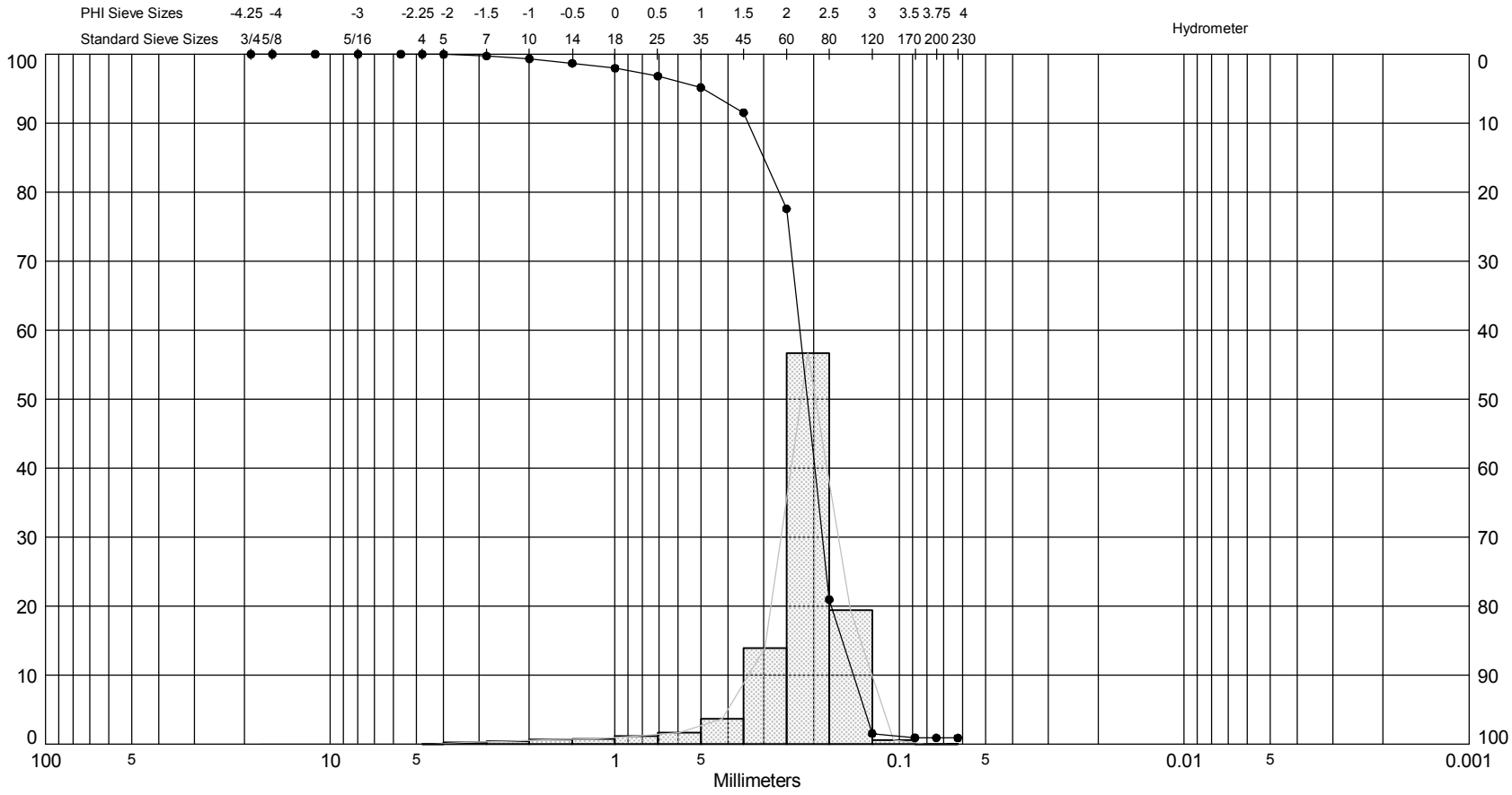
Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	09-01-09
Analyzed By:	KW
Easting (X, ft):	2,388,174
Northing (Y, ft):	201,399
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-05A #4	—●—	-17.8	SP	#200 - 0.90 #230 - 0.88			2.24	2.14	-2.72	13.66	0.63

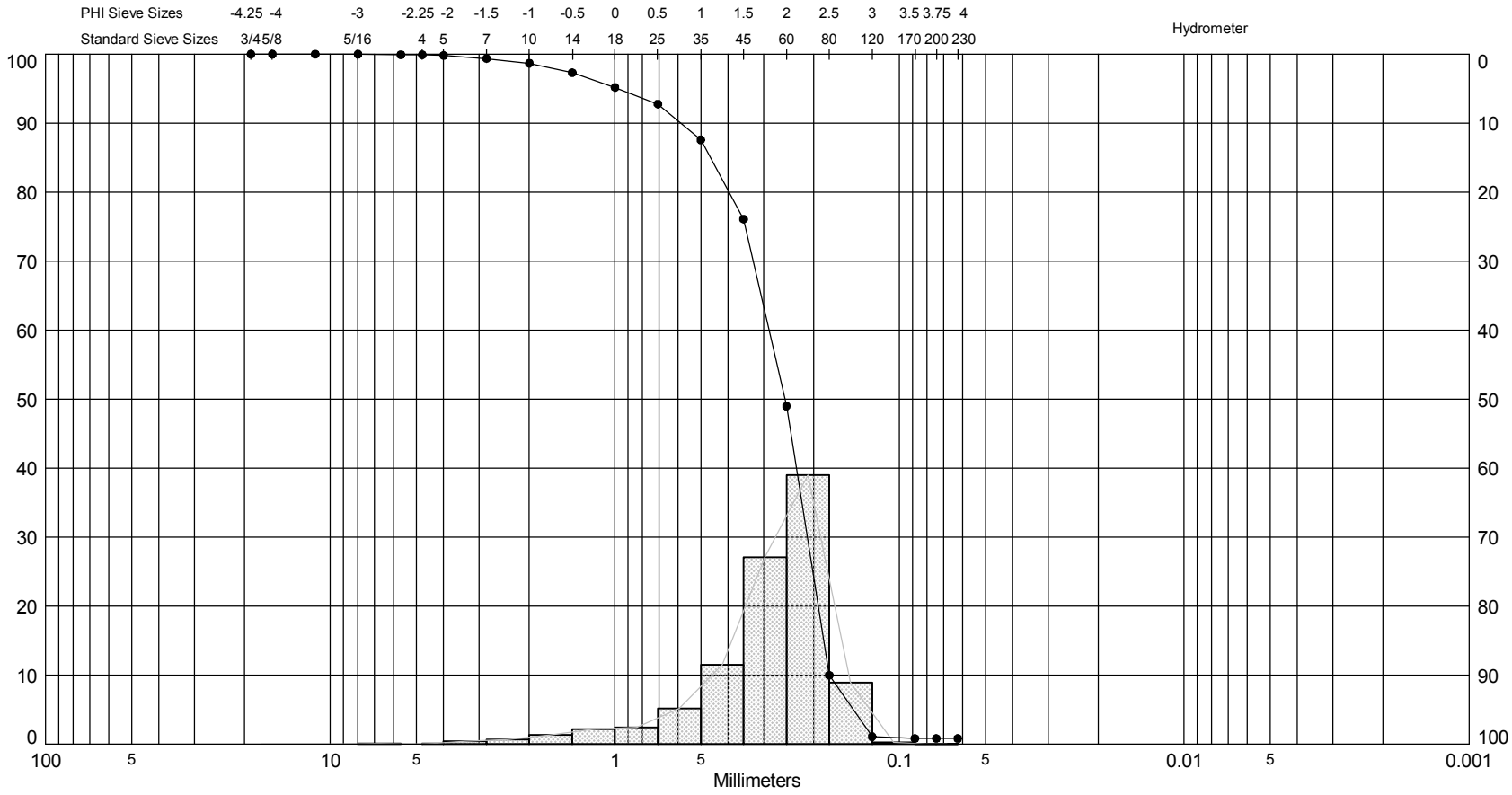
Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-20-09
Analyzed By:	KW
Easting (X, ft):	2,388,174
Northing (Y, ft):	201,399
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-05A #5	—●—	-19.0	SP	#200 - 0.81 #230 - 0.80			1.98	1.77	-1.8	7.32	0.81

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-20-09
Analyzed By:	KW
Easting (X, ft):	2,388,174
Northing (Y, ft):	201,399
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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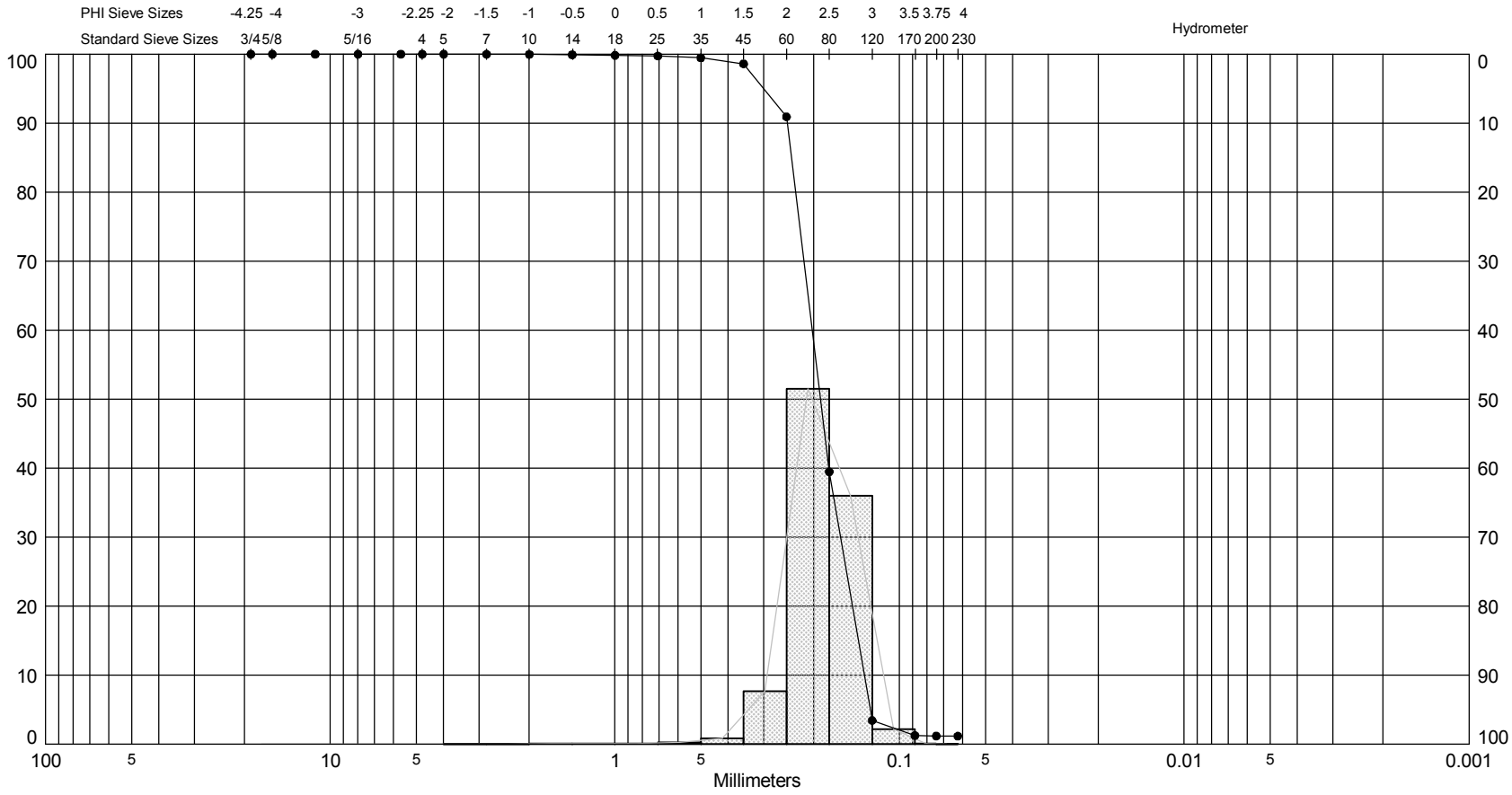
SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-06 #1	—●—	-3.1	SP	#200 - 1.17 #230 - 1.15			2.4	2.4	-1.42	12.31	0.38

Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
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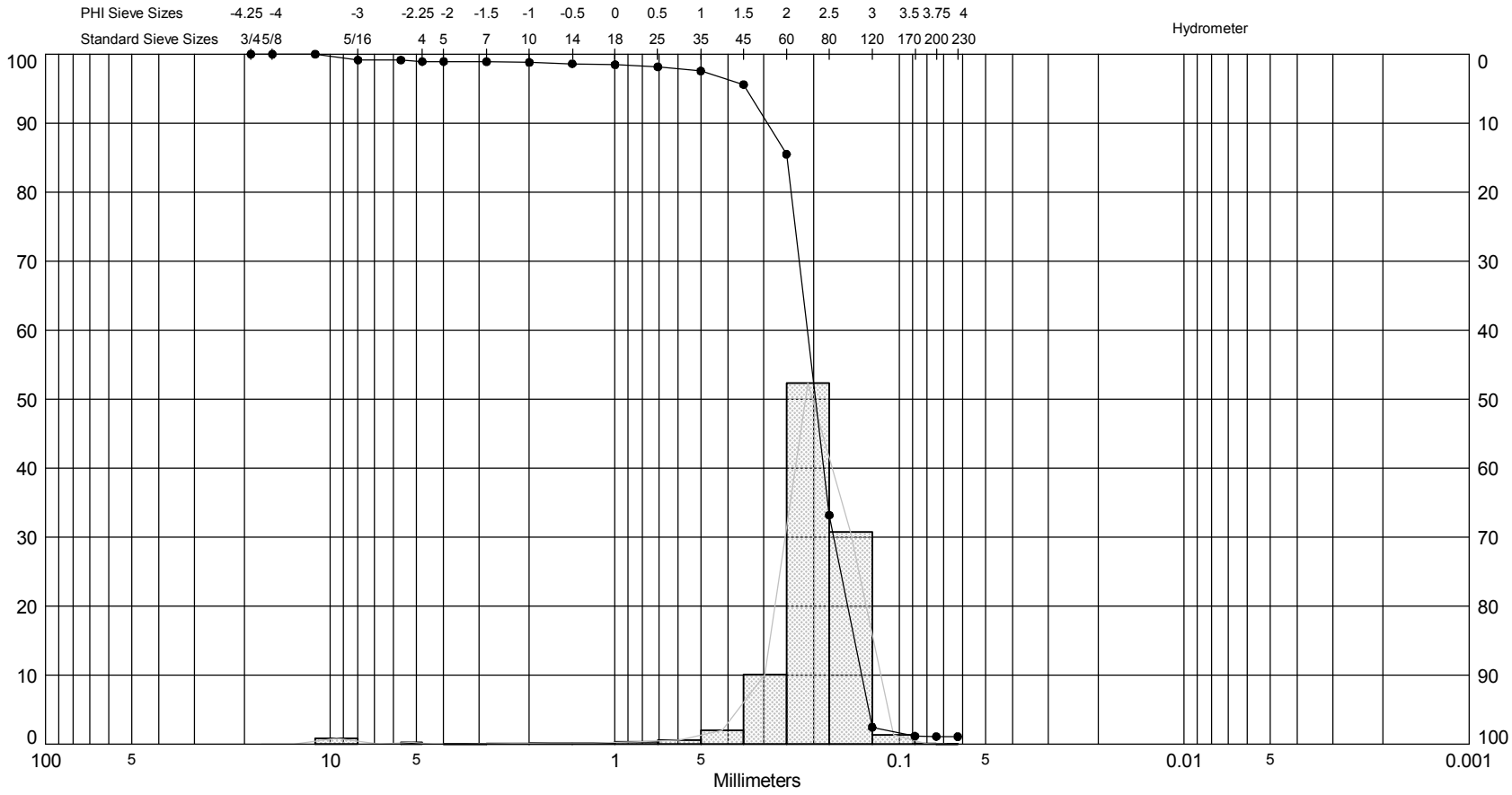
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-20-09
Analyzed By:	KW
Easting (X, ft):	2,386,618
Northing (Y, ft):	200,973
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-06 #2	—●—	-7.1	SP	#200 - 1.10 #230 - 1.09			2.34	2.26	-4.96	36.13	0.72

Comments:

Depths and elevations based on measured values

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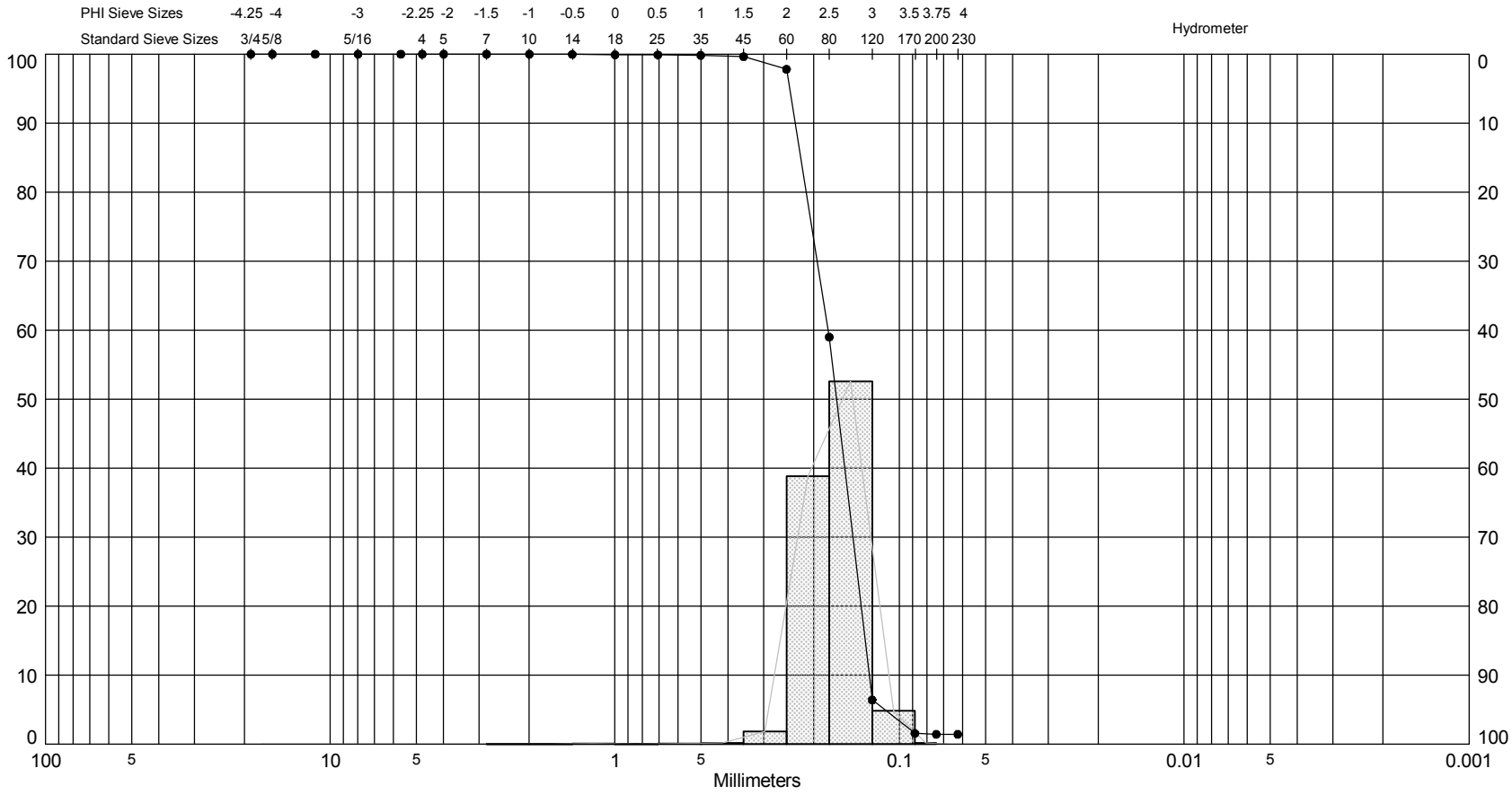
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-20-09
Analyzed By:	KW
Easting (X, ft):	2,386,618
Northing (Y, ft):	200,973
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-06 #3	—●—	-12.6	SP	#200 - 1.42 #230 - 1.42			2.59	2.55	-0.91	10.1	0.33

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-20-09
Analyzed By:	KW
Easting (X, ft):	2,386,618
Northing (Y, ft):	200,973
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
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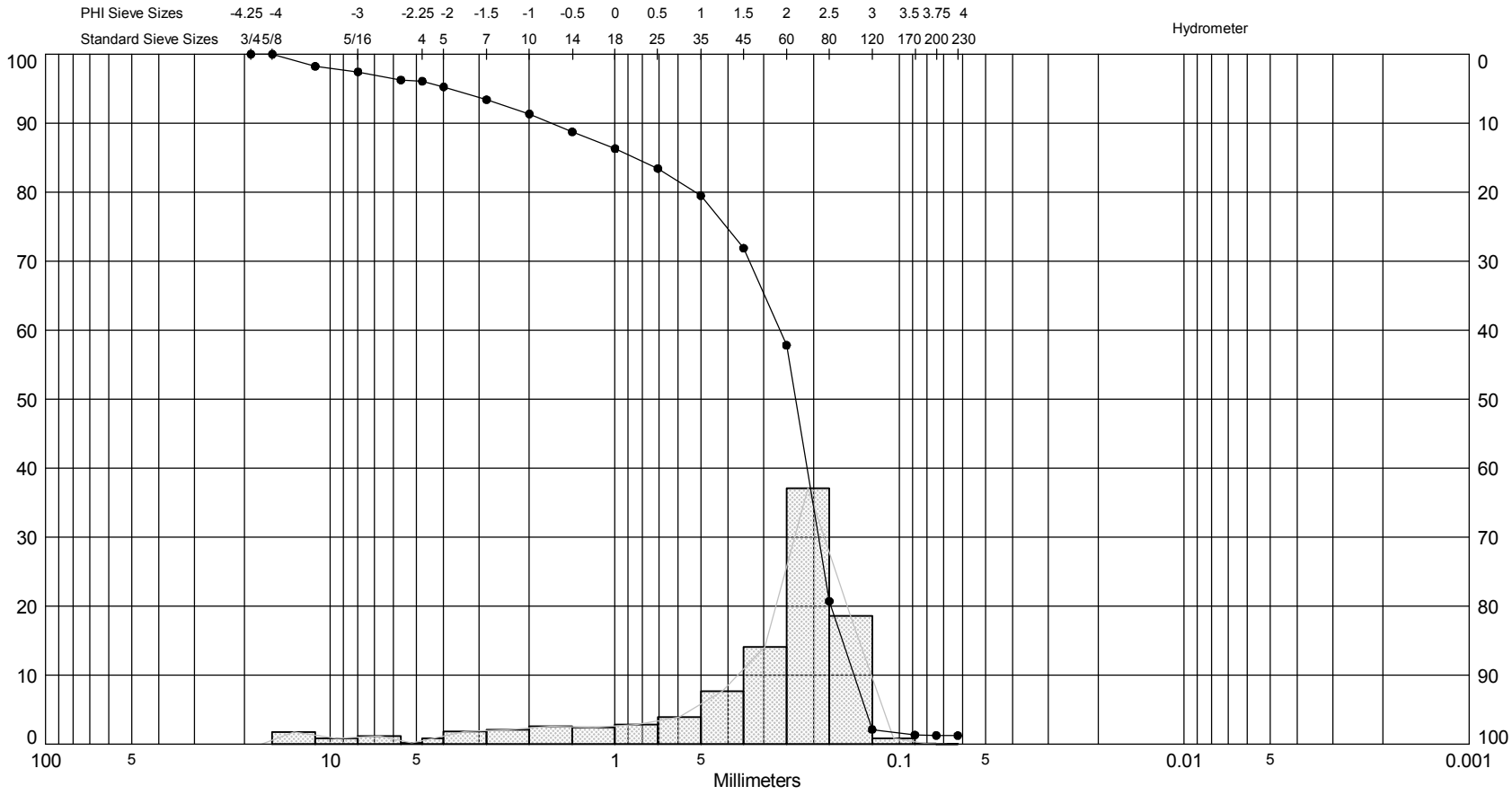
SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-06 #4	—●—	-14.9	SW	#200 - 1.25 #230 - 1.23			2.11	1.54	-1.88	6.04	1.48

Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
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FL 33431
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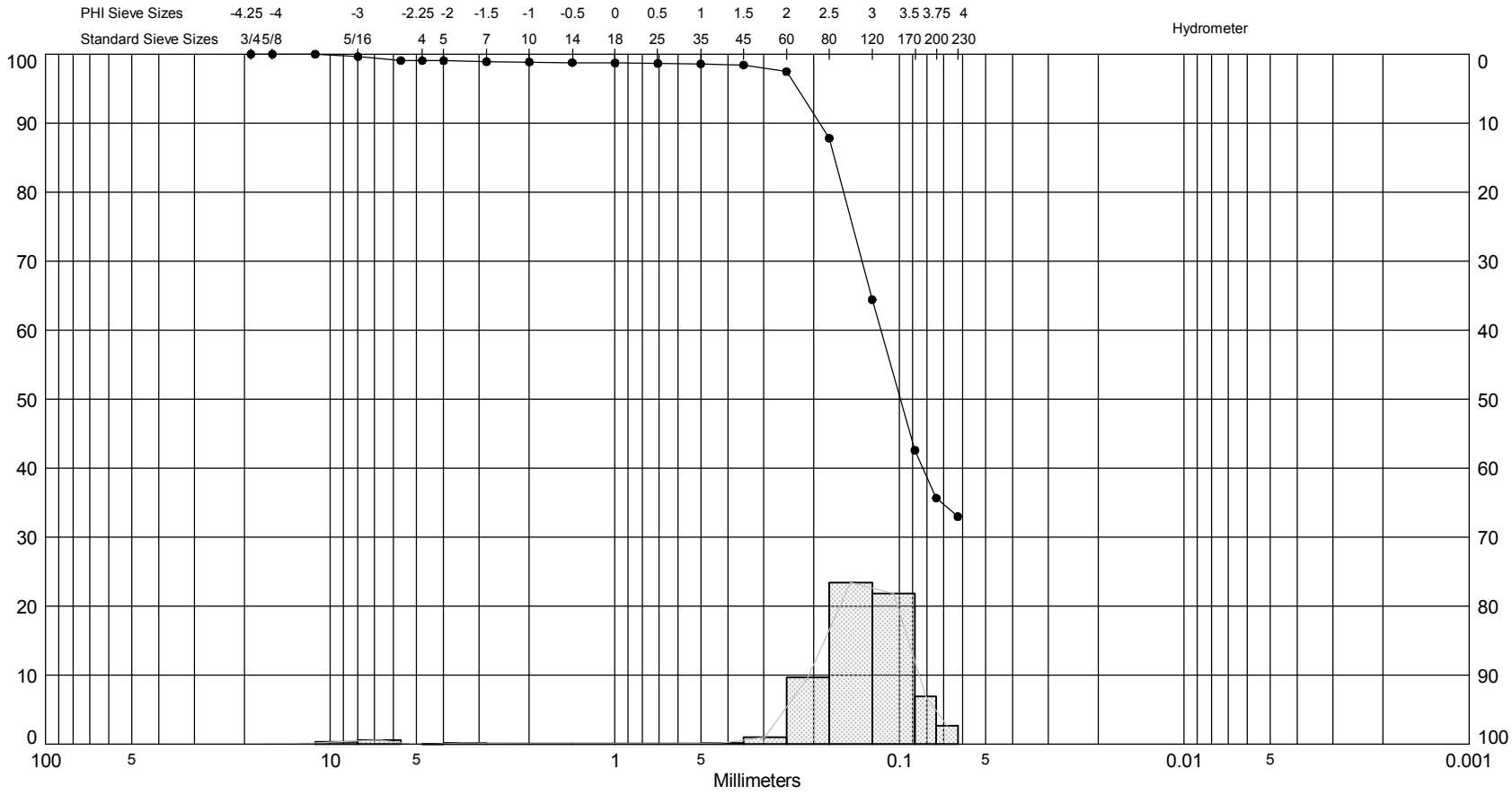
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-20-09
Analyzed By:	KW
Easting (X, ft):	2,386,618
Northing (Y, ft):	200,973
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-06 #5	—●—	-16.1	SC	#200 - 35.65 #230 - 32.97			3.33	2.85	-4.29	27.62	0.89

Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
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FL 33431
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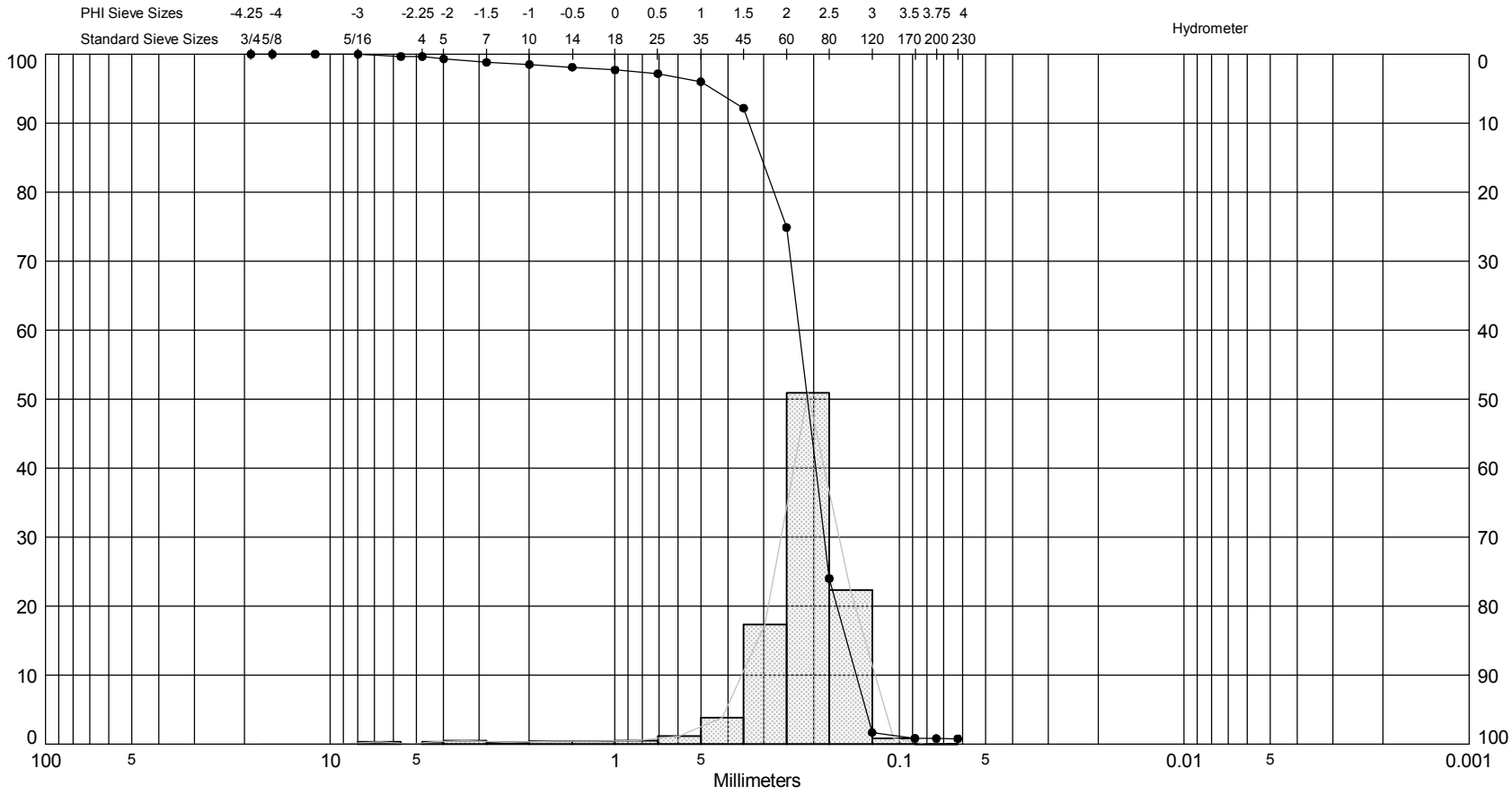
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-20-09
Analyzed By:	KW
Easting (X, ft):	2,386,618
Northing (Y, ft):	200,973
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-07 #1	—●—	-5.7	SP	#200 - 0.80 #230 - 0.79			2.24	2.13	-3.44	19.81	0.72

Comments:

Depths and elevations based on measured values

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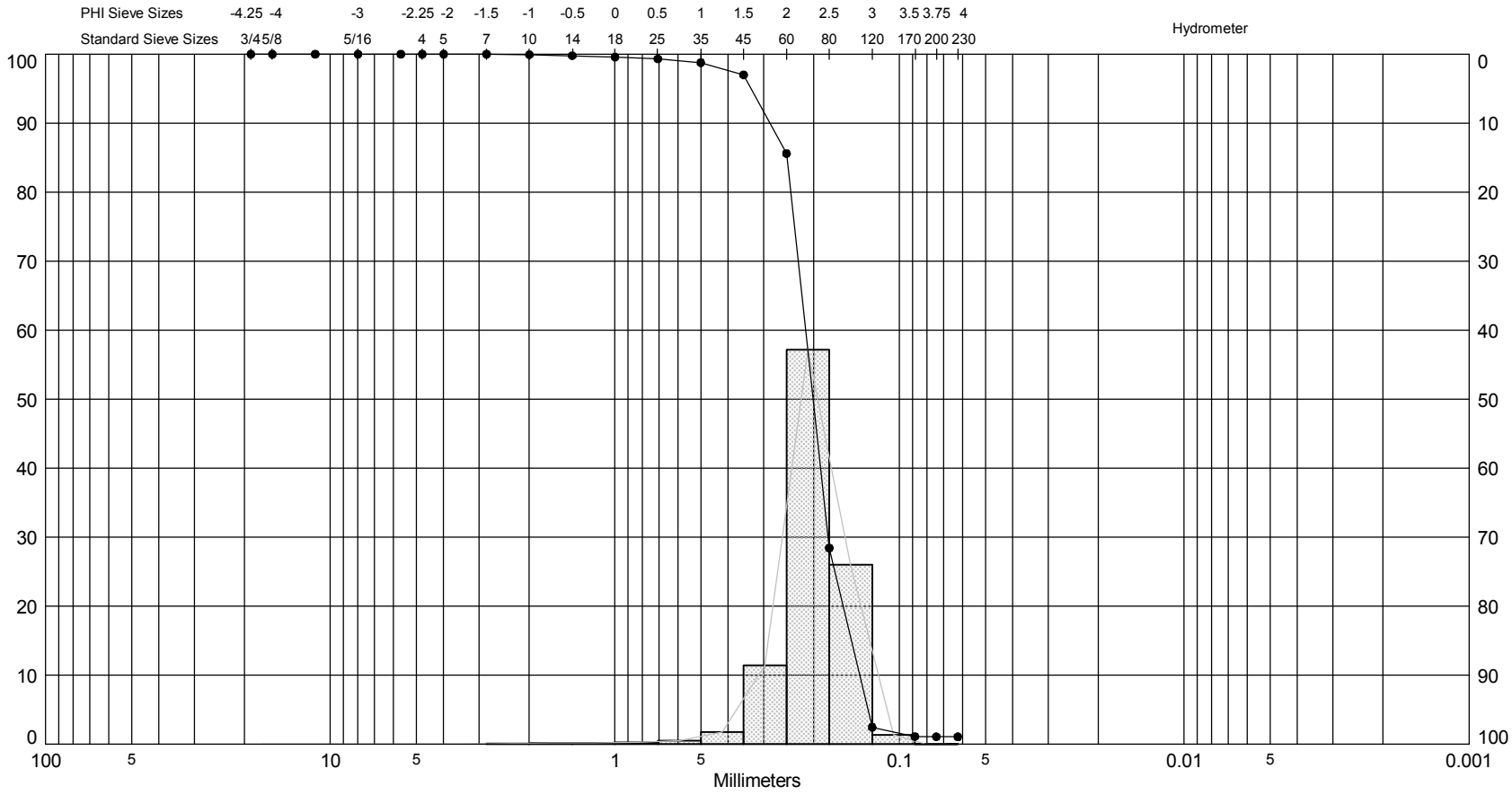
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-20-09
Analyzed By:	KW
Easting (X, ft):	2,388,723
Northing (Y, ft):	200,701
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-07 #2	—●—	-11.7	SP	#200 - 1.06 #230 - 1.05			2.31	2.29	-1.92	13.68	0.43

Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
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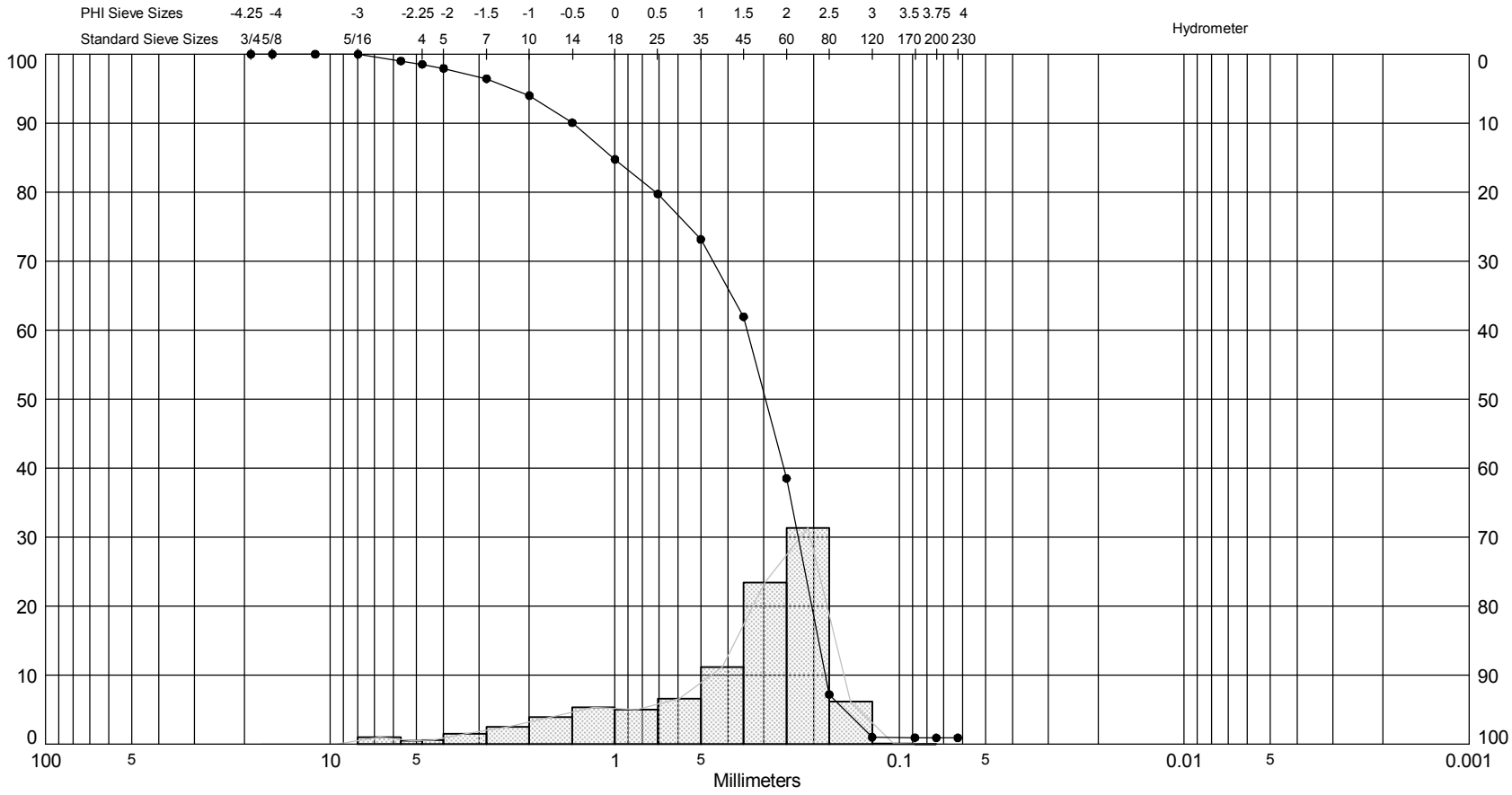
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-20-09
Analyzed By:	KW
Easting (X, ft):	2,388,723
Northing (Y, ft):	200,701
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-07 #3	—●—	-14.2	SW	#200 - 0.90 #230 - 0.90			1.76	1.35	-1.35	4.27	1.2

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-20-09
Analyzed By:	KW
Easting (X, ft):	2,388,723
Northing (Y, ft):	200,701
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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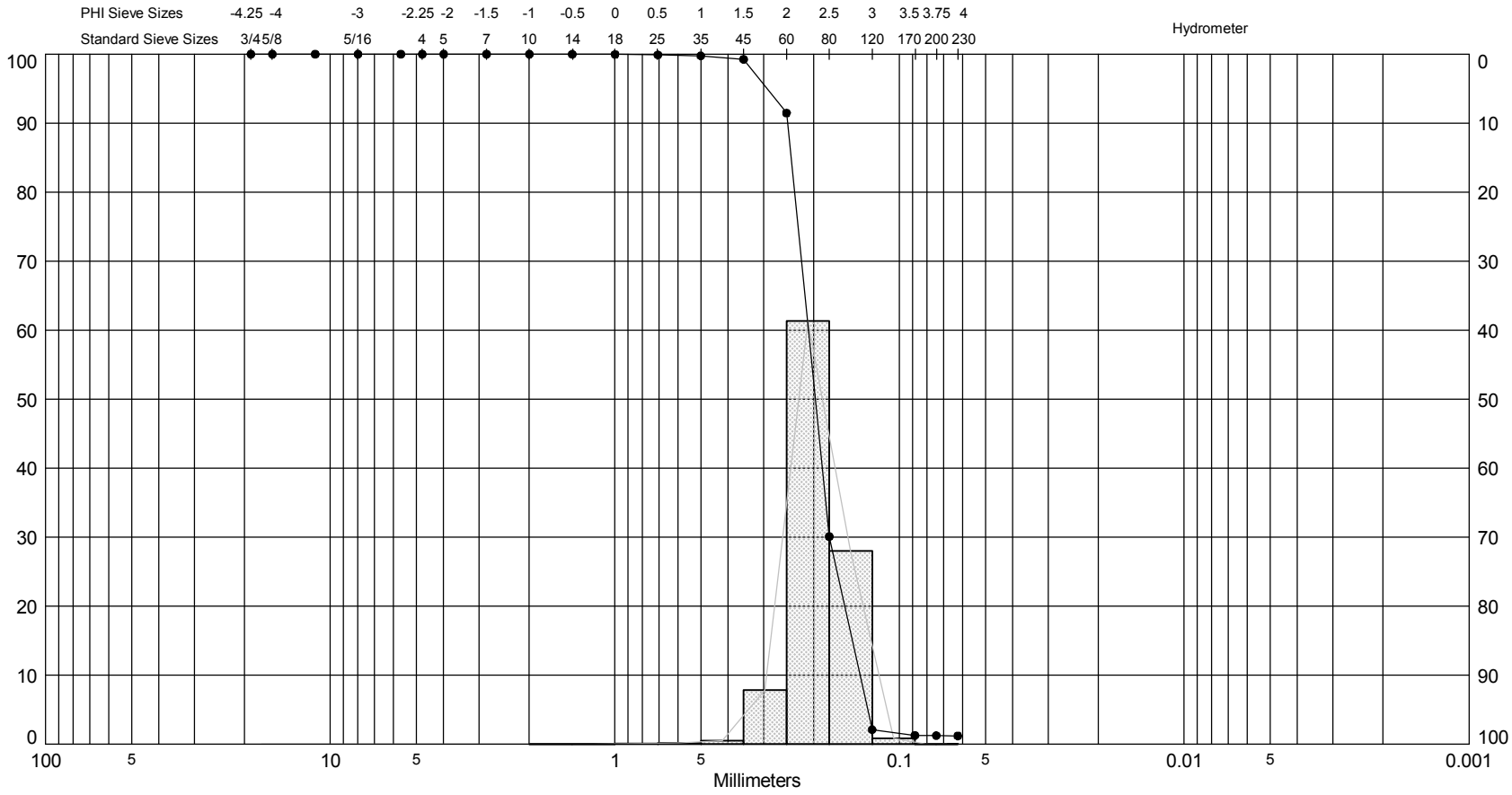
SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-07 #4	—●—	-16.0	SP	#200 - 1.23 #230 - 1.20			2.34	2.35	-0.56	7.21	0.32

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-20-09
Analyzed By:	KW
Easting (X, ft):	2,388,723
Northing (Y, ft):	200,701
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
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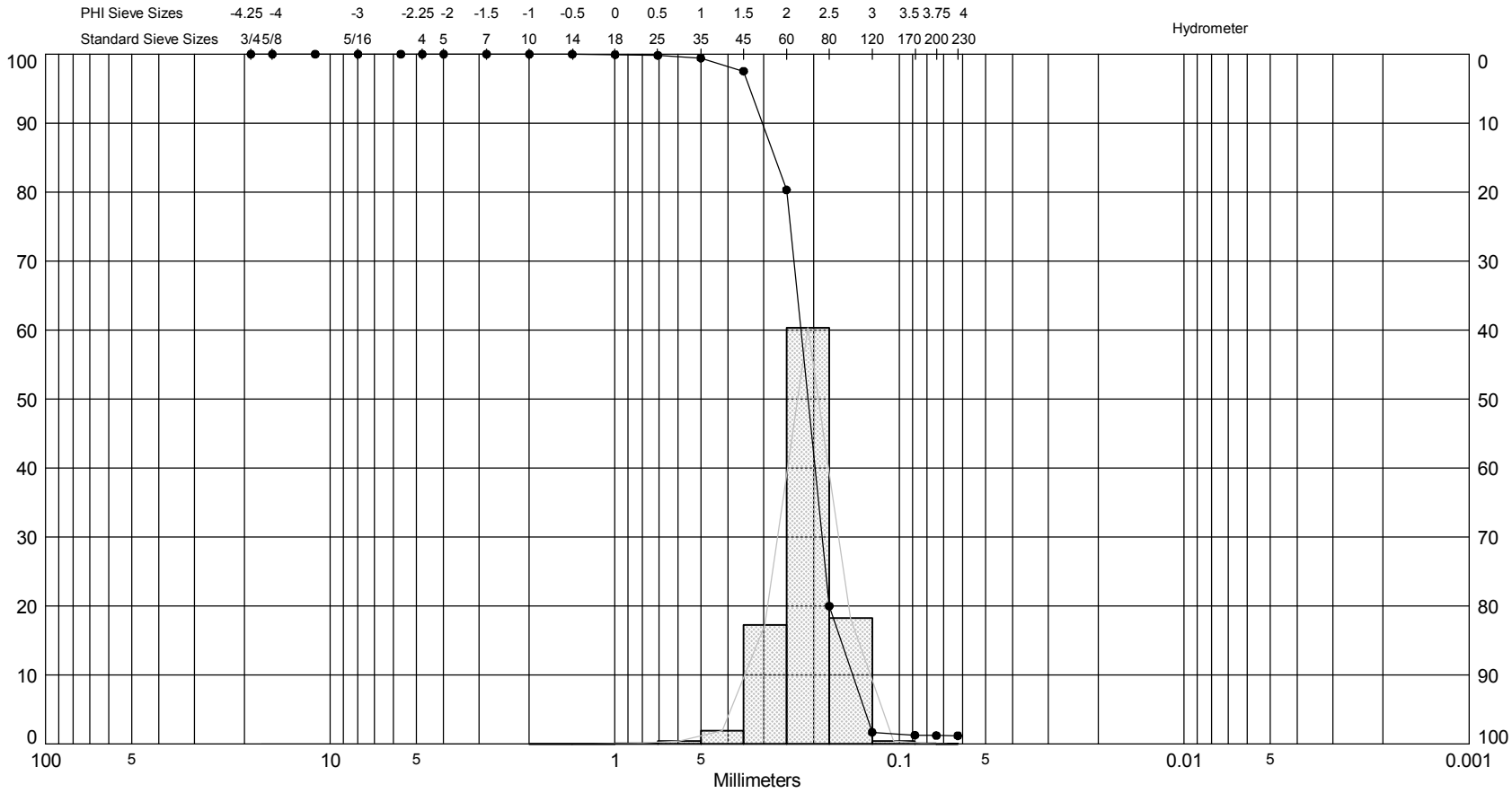
SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-07A #1	—●—	-18.7	SP	#200 - 1.21 #230 - 1.20			2.25	2.23	-0.76	6.3	0.36

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-23-09
Analyzed By:	KW
Easting (X, ft):	2,388,723
Northing (Y, ft):	200,701
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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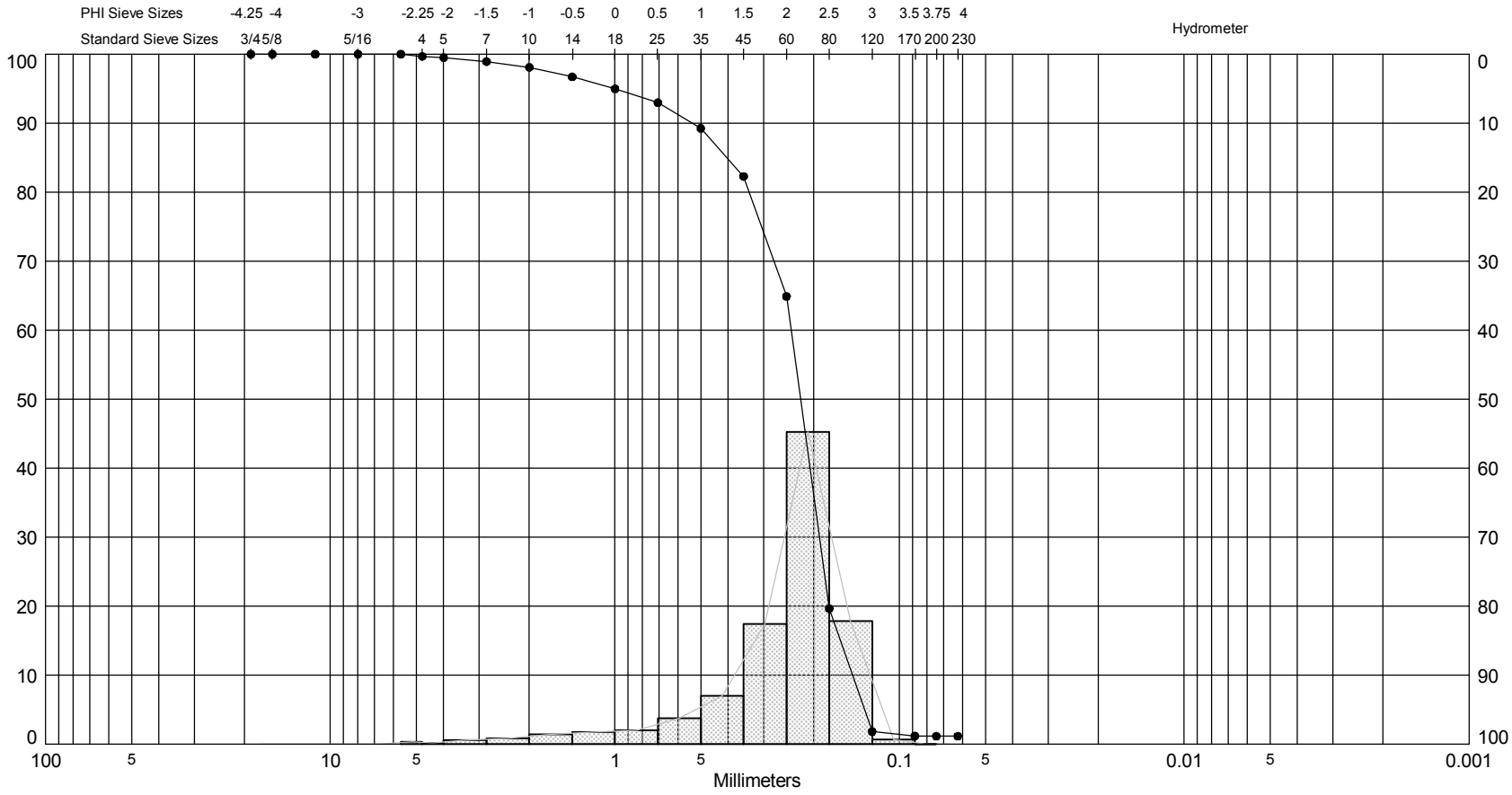
SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-08 #1	—●—	-9.0	SW	#200 - 1.13 #230 - 1.13			2.16	1.93	-2.15	8.54	0.88

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-23-09
Analyzed By:	KW
Easting (X, ft):	2,389,411
Northing (Y, ft):	200,087
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
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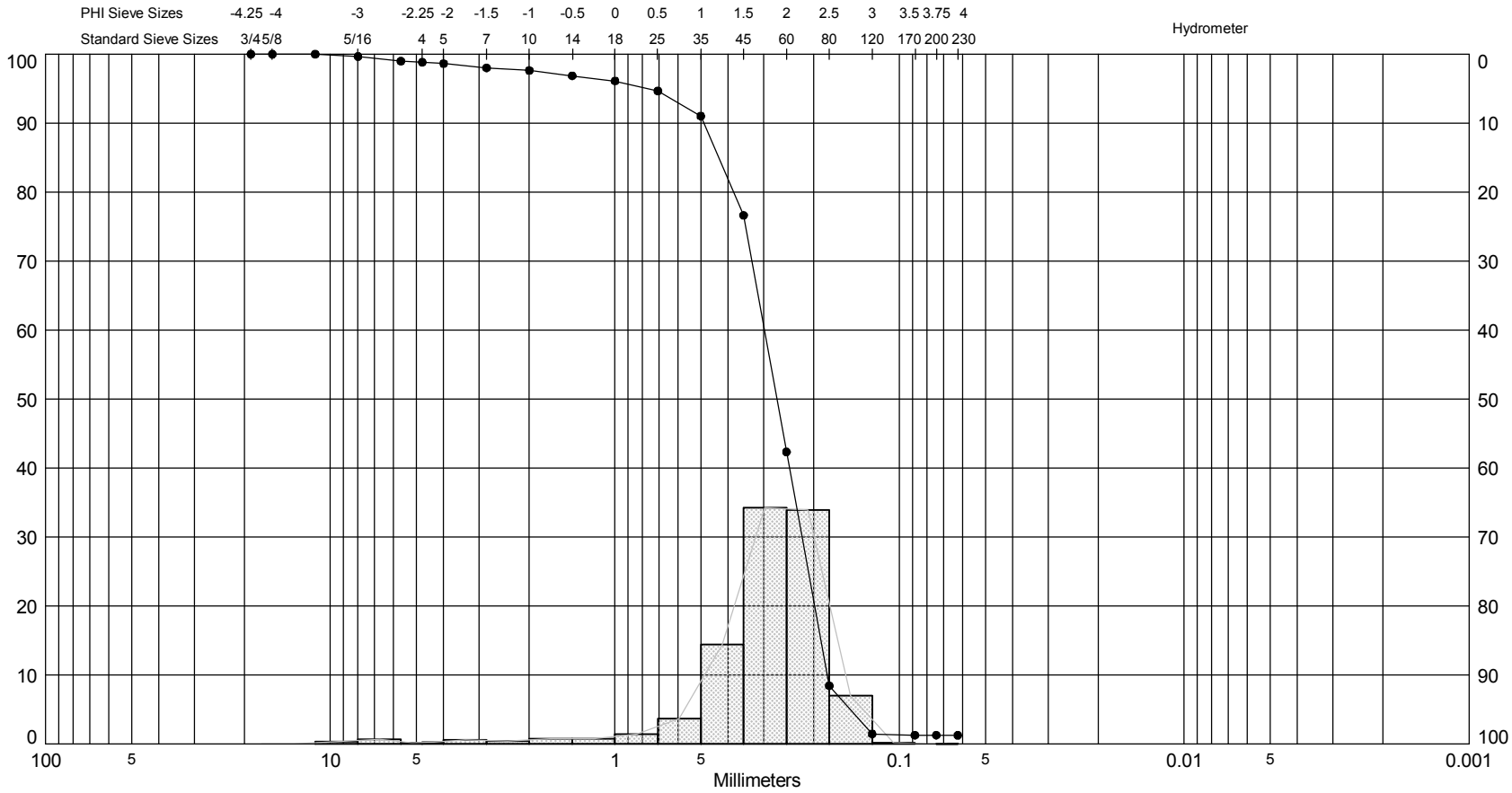
SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-08 #2	—●—	-14.2	SW	#200 - 1.27 #230 - 1.24			1.89	1.73	-2.8	13.98	0.86

Comments:

Depths and elevations based on measured values

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FL 33431
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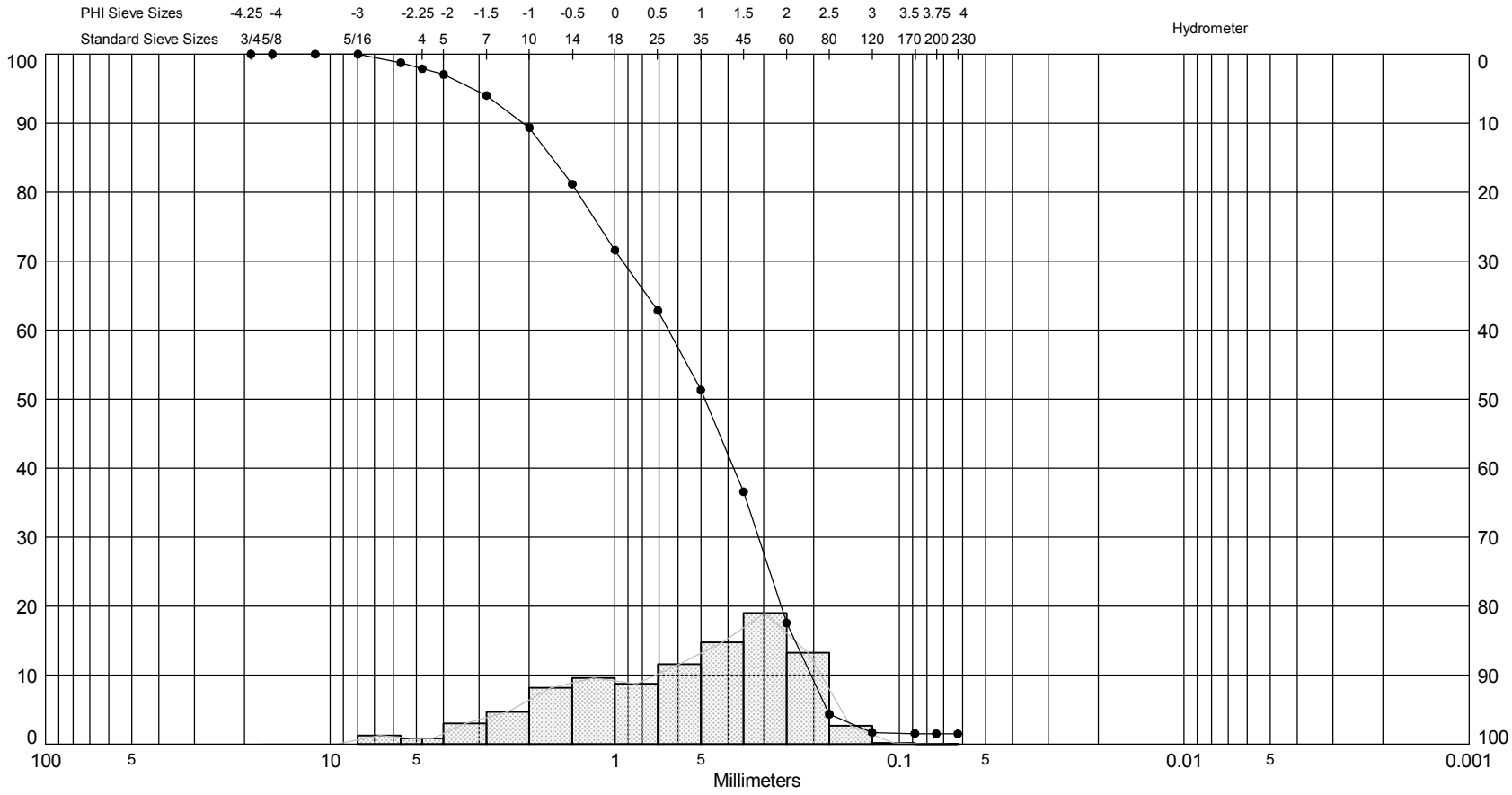
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-23-09
Analyzed By:	KW
Easting (X, ft):	2,389,411
Northing (Y, ft):	200,087
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-08 #3	—●—	-17.3	SW	#200 - 1.50 #230 - 1.48			1.04	0.74	-0.62	2.63	1.29

Comments:

Depths and elevations based on measured values

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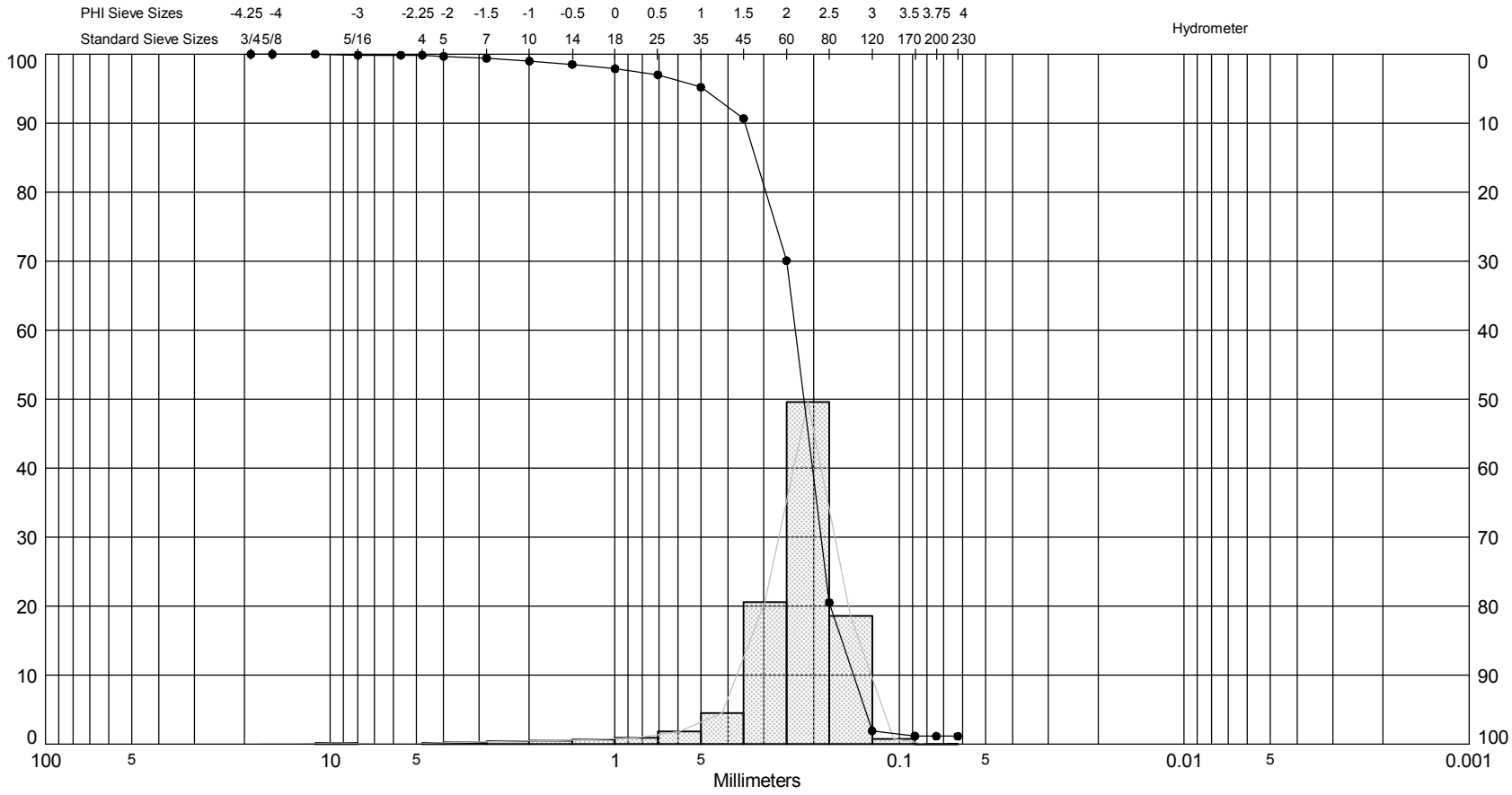
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-23-09
Analyzed By:	KW
Easting (X, ft):	2,389,411
Northing (Y, ft):	200,087
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-09 #1	—●—	-10.7	SP	#200 - 1.14 #230 - 1.13			2.2	2.09	-2.93	16.85	0.68

Comments:

Depths and elevations based on measured values

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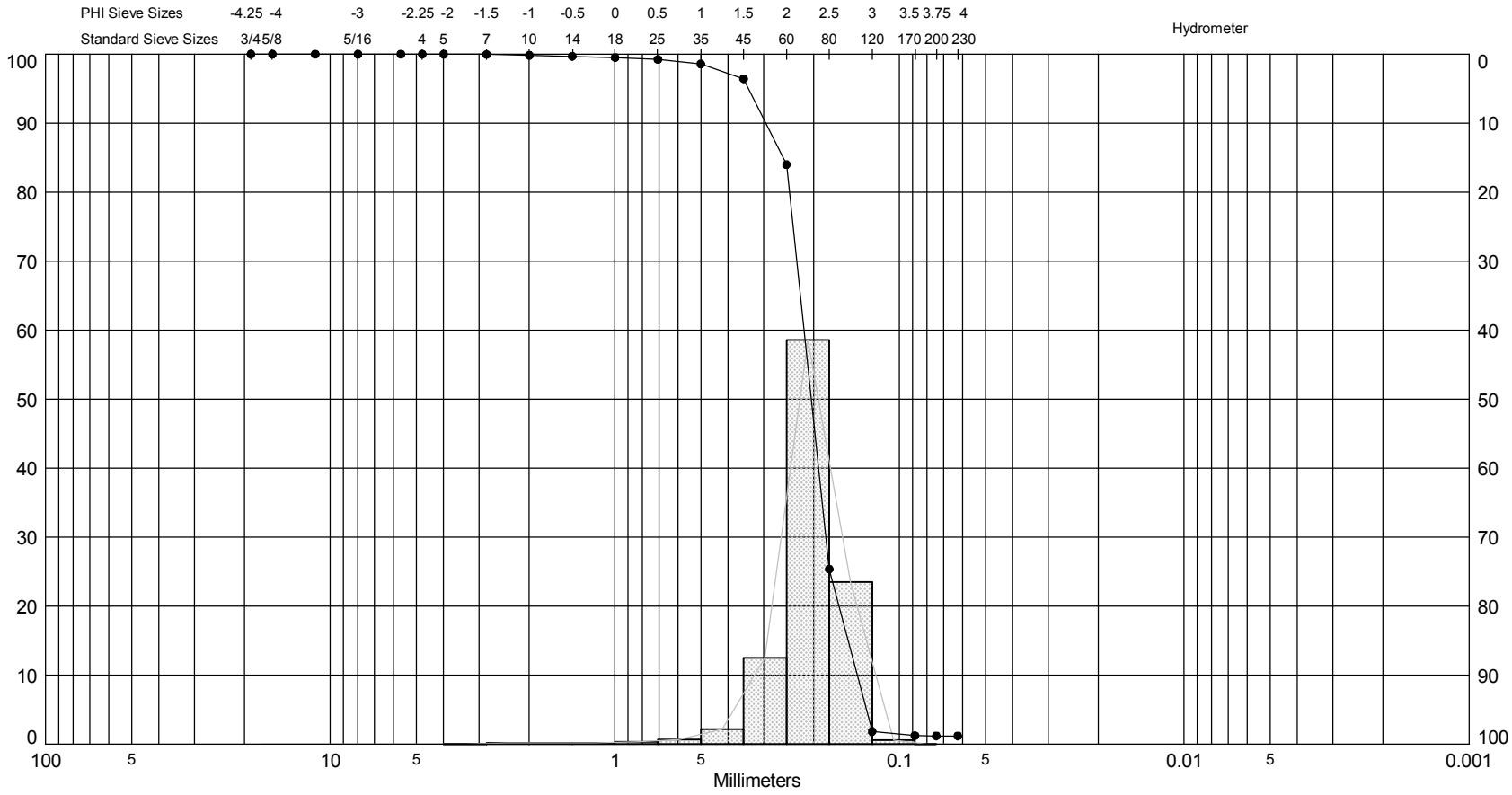
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-23-09
Analyzed By:	KW
Easting (X, ft):	2,389,900
Northing (Y, ft):	199,466
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-09 #2	—●—	-13.7	SP	#200 - 1.20 #230 - 1.20			2.29	2.26	-2.37	16.86	0.44

Comments:

Depths and elevations based on measured values

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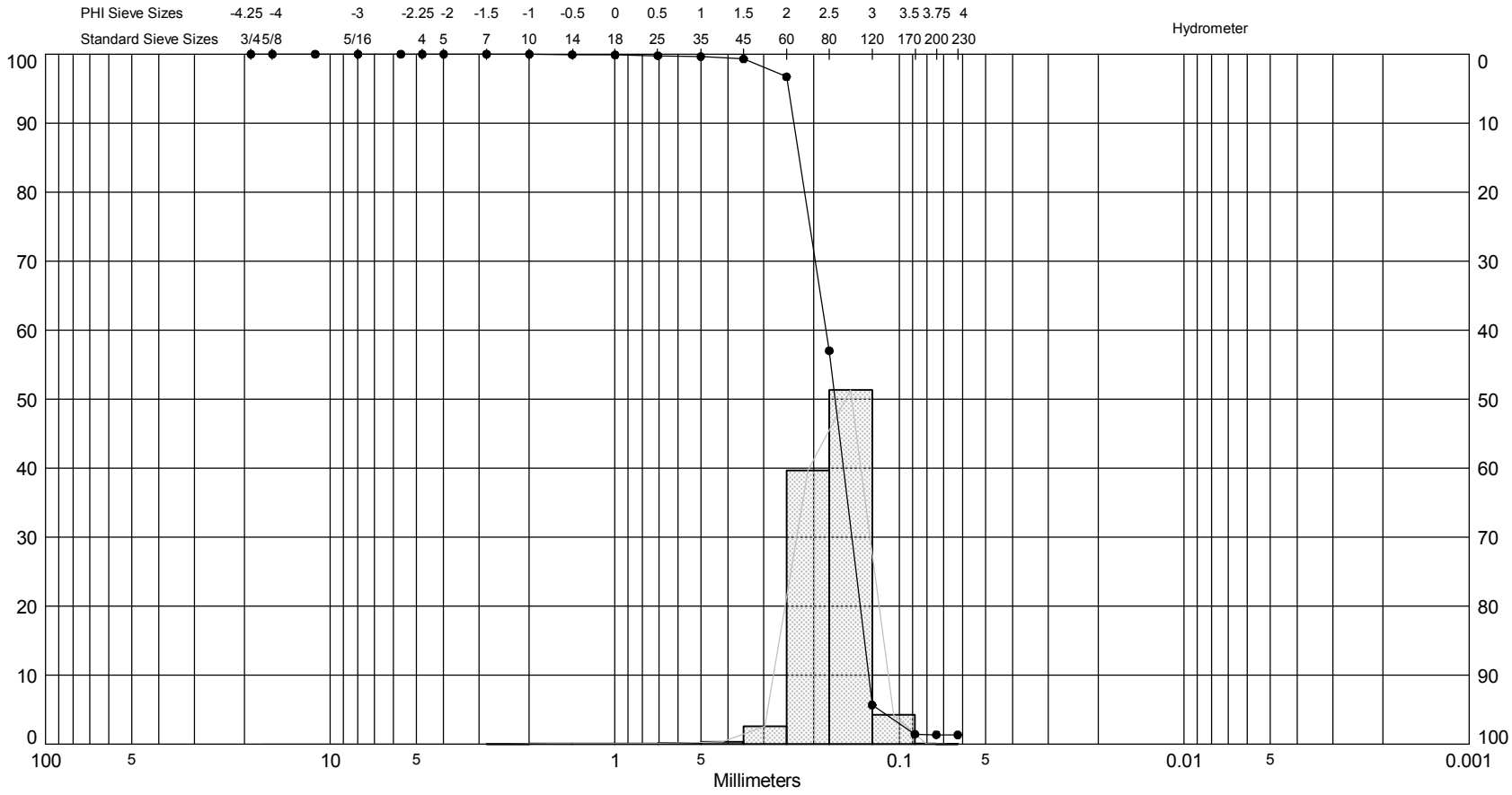
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-23-09
Analyzed By:	KW
Easting (X, ft):	2,389,900
Northing (Y, ft):	199,466
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-09 #3	—●—	-17.7	SP	#200 - 1.36 #230 - 1.34			2.57	2.53	-1.4	12.46	0.35

Comments:

Depths and elevations based on measured values

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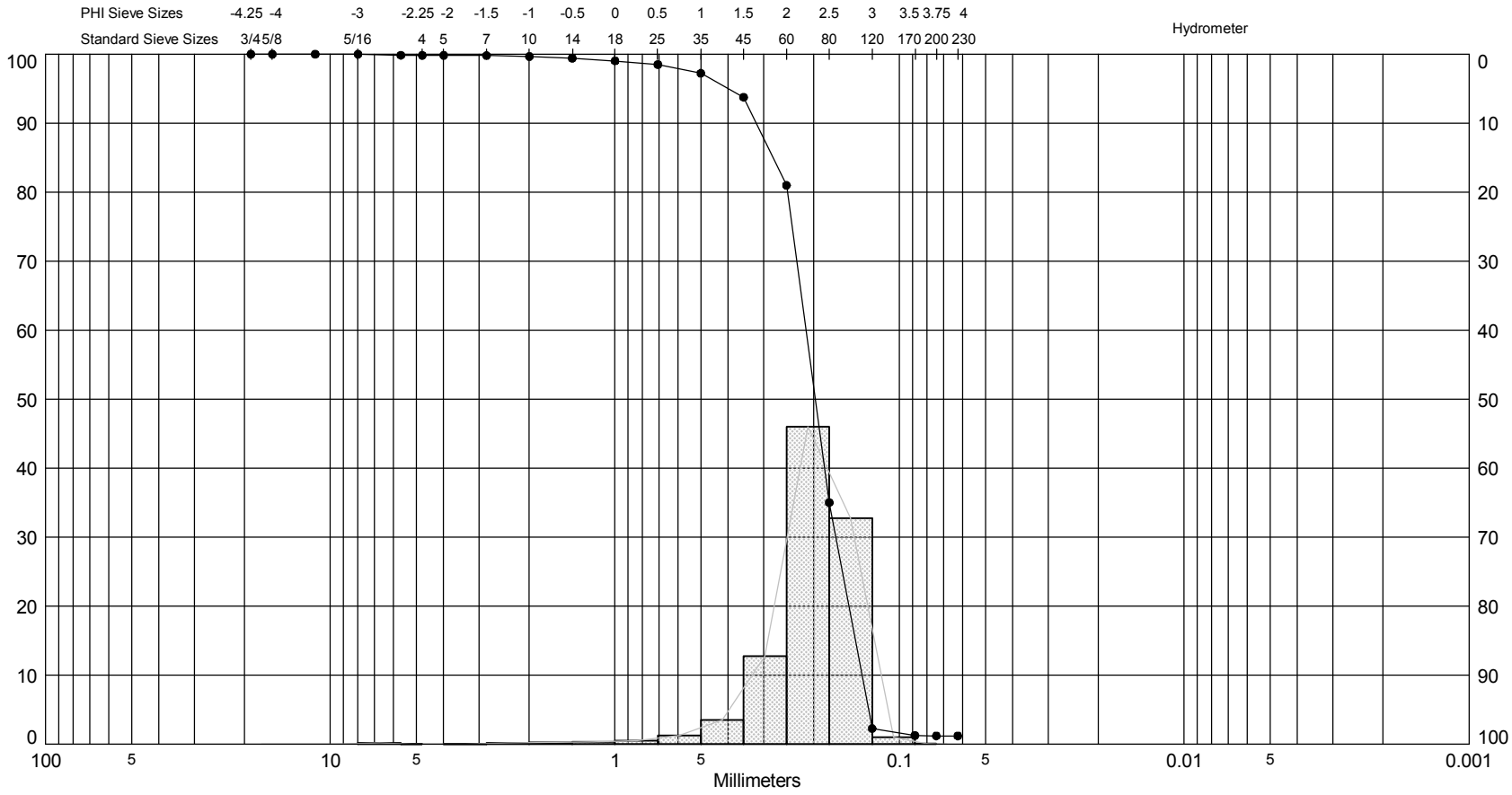
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-23-09
Analyzed By:	KW
Easting (X, ft):	2,389,900
Northing (Y, ft):	199,466
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-10 #1	—●—	-10.0	SP	#200 - 1.20 #230 - 1.20			2.34	2.26	-2.83	18.73	0.57

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-23-09
Analyzed By:	KW
Easting (X, ft):	2,389,697
Northing (Y, ft):	199,802
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
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ph (561) 391-8102
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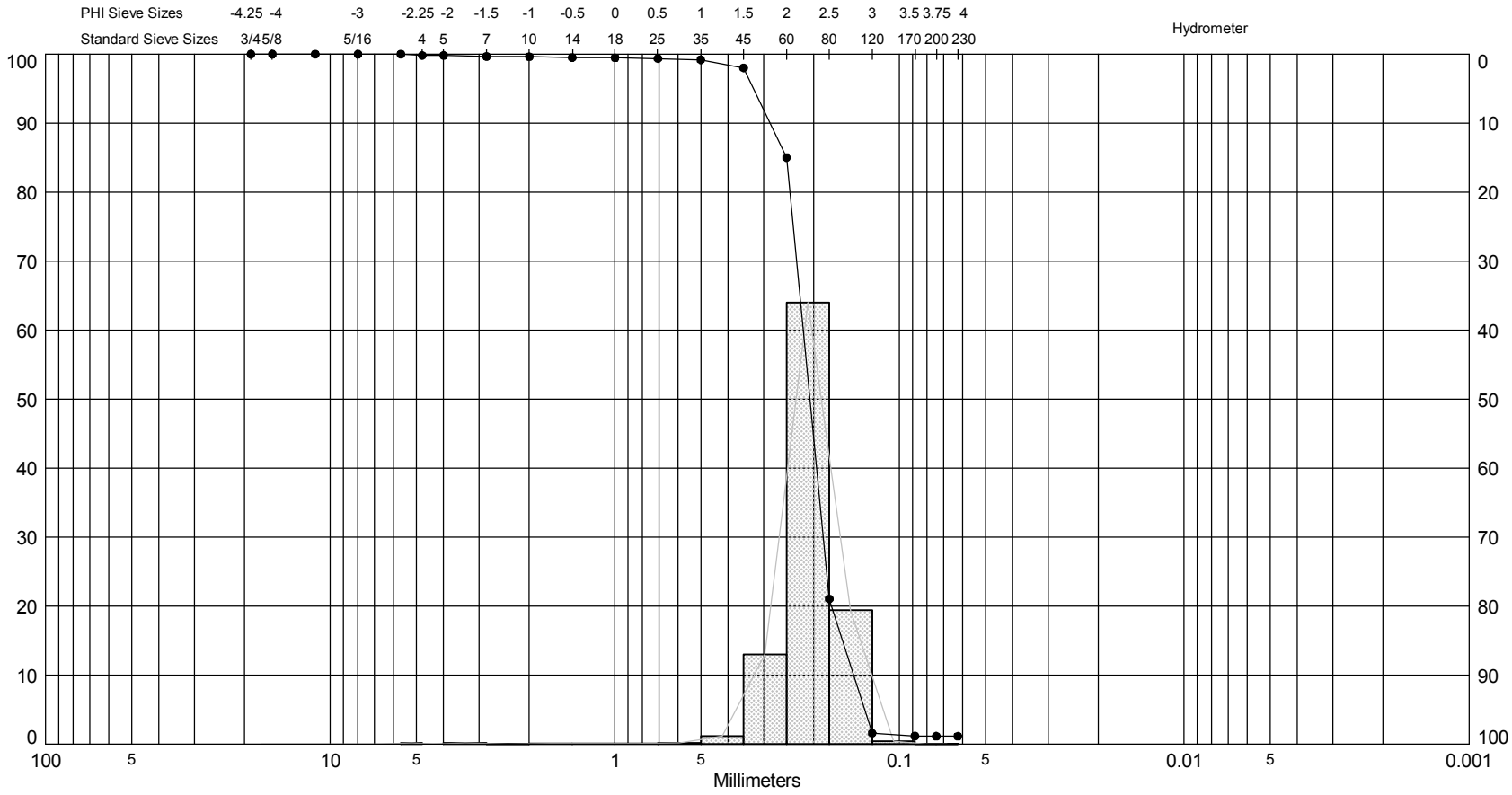
SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-10 #2	—●—	-12.5	SP	#200 - 1.14 #230 - 1.13			2.27	2.25	-4.25	41.42	0.43

Comments:

Depths and elevations based on measured values

Coastal Planning & Engineering
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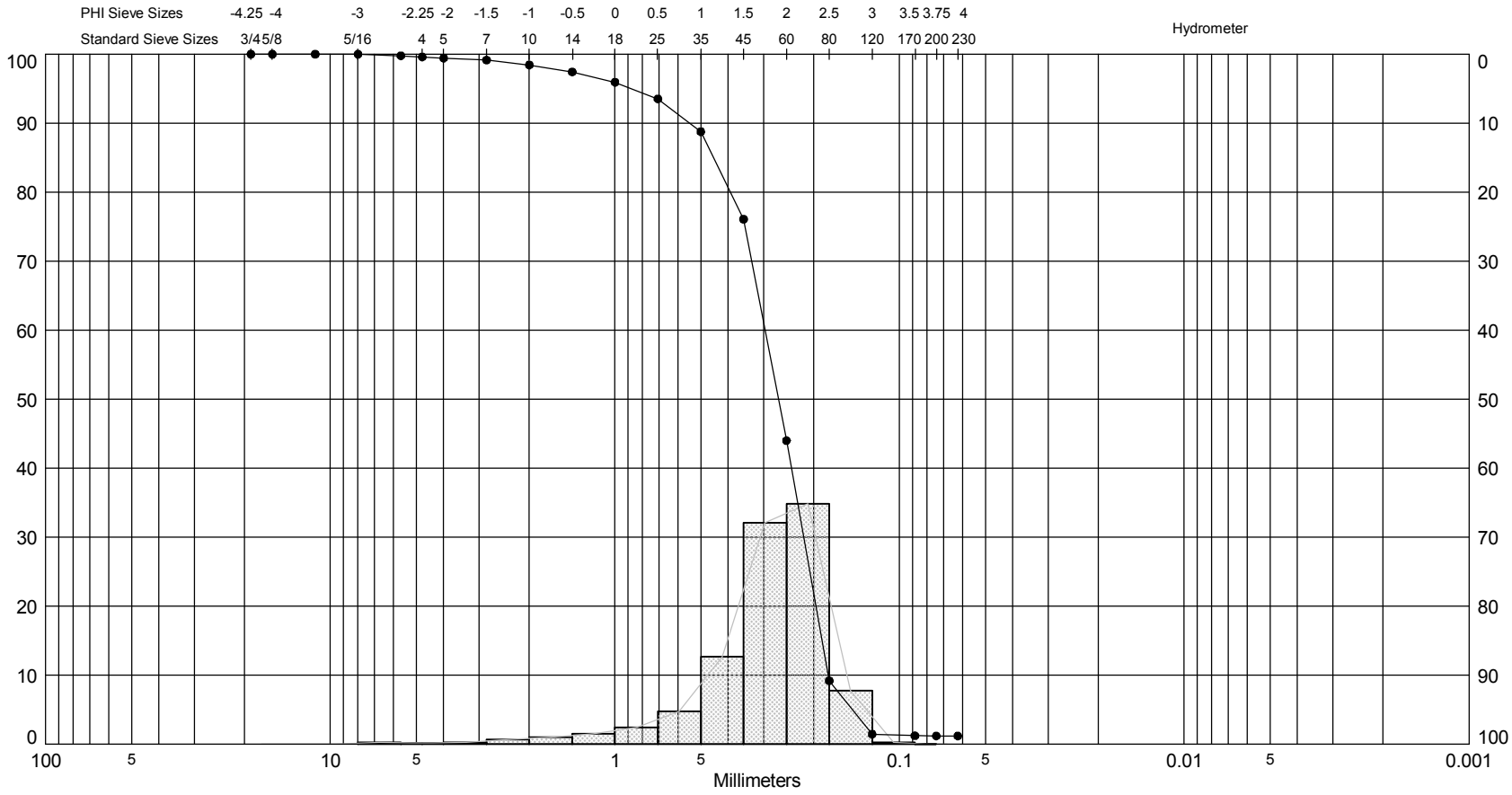
fax (561) 391-9116

Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-23-09
Analyzed By:	KW
Easting (X, ft):	2,389,697
Northing (Y, ft):	199,802
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-10 #3	—●—	-14.1	SP	#200 - 1.18 #230 - 1.18			1.91	1.75	-2.06	9.38	0.8

Comments:

Depths and elevations based on measured values

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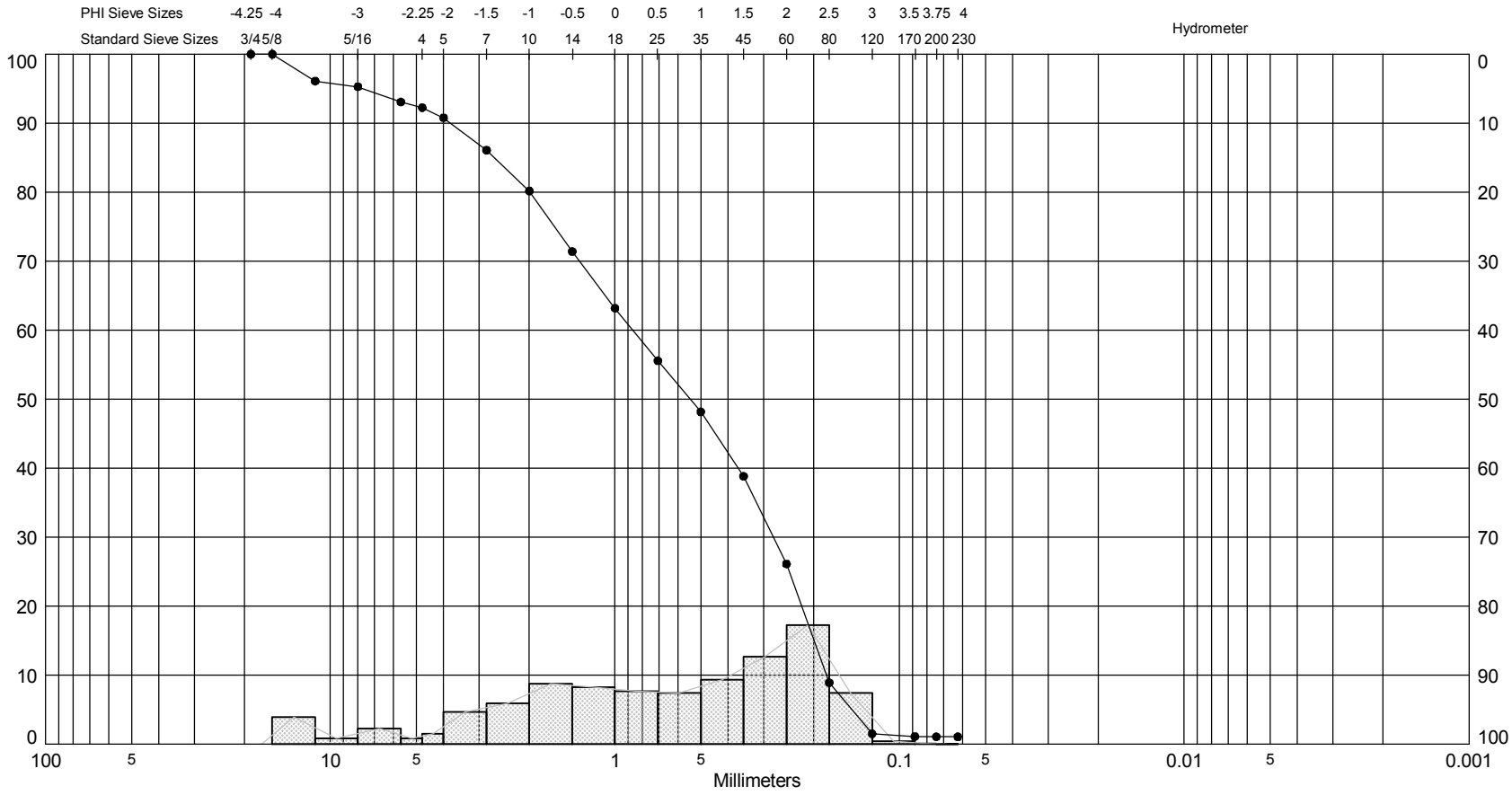
Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-23-09
Analyzed By:	KW
Easting (X, ft):	2,389,697
Northing (Y, ft):	199,802
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-10 #4	—●—	-16.1	SW	#200 - 1.06 #230 - 1.05			0.88	0.5	-0.67	2.62	1.75

Comments:

Depths and elevations based on measured values

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Sample Information	
Project Name:	Figure Eight Island / Rich Inlet 2008
Analysis Date:	03-23-09
Analyzed By:	KW
Easting (X, ft):	2,389,697
Northing (Y, ft):	199,802
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGUREEIGHT_2008_VIBRACORES.GPJ JPBRAZIL.GDT 10/19/09

APPENDIX 25

Native Beach Table of Results for Survey to Quantify Clasts Greater Than Three (3) Inches

SW	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	NW
A	1	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	
B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
C	4	2	1	0	0	0	0	0	0	3	1	0	1	0	0	0	0	0	3	0	
D	2	1	0	0	0	0	1	6	3	1	0	5	1	1	2	2	1	0	0	1	
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
F	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
G	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	3	0	
H	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	
I	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	
J	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
K	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	
L	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
N	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
O	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
P	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	
Q	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	1	0	0	
R	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	
S	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	
T	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
V	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
W	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Y	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
SE																					NE

Coordinates of Corner Points (North Carolina State Plane)		
Corner Point	**Easting**	**Northing**
Southwest	**2383643.2**	**195542.3**
Northwest	**2383467.4**	**195717.8**
Southeast	**2383785.7**	**195684.5**
Northeast	**2383609.6**	**195861.5**

Total # of Clasts Counted	**85**

APPENDIX 26

Alternative 3 Channel Corridor Composite Summary Table

COMPOSITE SUMMARY TABLE
FIGURE EIGHT VIBRACORES

SAMPLE I. D.	EFFECTIVE LENGTH (FT)	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	% CARBONATES
FEVC-08-01 Composite	8.4	0.19	2.38	0.49	1.43	6	7	9.9
FEVC-08-02 Composite	14.2	0.19	2.36	0.51	1.23	6	8	4.9
FEVC-08-03 Composite	15.4	0.22	2.17	0.99	1.20	6	7	8.9
FEVC-08-04 Composite	16.0	0.32	1.64	1.27	1.14	6	7	19.7
FEVC-08-05 Composite	17.0	0.27	1.87	0.92	1.08	6	7	13.9
FEVC-08-06 Composite	13.2	0.19	2.37	0.60	1.21	6	8	4.2
FEVC-08-07 Composite	15.3	0.23	2.12	0.71	0.98	6	7	10.1
FEVC-08-08 Composite	10.8	0.31	1.69	0.99	1.23	5	7	16.2
FEVC-08-09 Composite	9.3	0.20	2.31	0.52	1.23	6	7	6.8
FEVC-08-10 Composite	7.9	0.26	1.97	0.93	1.16	6	7	15.5
FEVC-07-01 Composite	3.5	0.18	2.46	0.52	0.88	6	7	5.1
FEVC-07-02 Composite	10.0	0.22	2.20	0.54	1.08	6	7	8.3
FEVC-07-05 Composite	6.1	0.20	2.34	0.51	1.07	6	7	6.0
FEVC-07-09 Composite	13.2	0.30	1.72	1.13	1.31	6	7	17.4
FEVC-07-10 Composite	9.7	0.22	2.19	0.54	1.24	6	7	9.7
FEVC-07-11 Composite	14.4	0.23	2.13	0.67	1.30	6	7	8.2
FEVC-07-12 Composite	6.8	0.20	2.33	0.37	1.41	6	7	4.6
FEVC-07-13 Composite	8.4	0.21	2.26	0.64	1.47	5	6	6.4
FEVC-07-15 Composite	13.7	0.21	2.27	0.46	1.08	6	7	4.8
FEVC-07-16 Composite	17.6	0.29	1.81	1.16	1.21	6	7	11.7
FEVC-07-17 Composite	16.0	0.30	1.75	1.03	1.05	6	7	0.3
FEVC-07-18 Composite	16.0	0.27	1.89	0.80	1.03	6	7	9.4
FEVC-07-19 Composite	15.0	0.23	2.13	0.44	1.16	6	7	5.3
Alternative 3 Composite	277.9	0.24	2.06	0.85	1.18	6	7	10.0

COMPOSITE DATA TABLE
FIGURE EIGHT VIBRACORES

SAMPLE I. D.	EFFECTIVE LENGTH (FT)	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	CUMULATIVE PERCENT RETAINED (SIEVES EXPRESSED IN PHI)																				% CARBONATE
								GRAVEL						GRANULAR						SAND								
								-4.25	-4.0	-3.50	-3.0	-2.50	-2.25	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	3.75	4.0	PAN	
FEVC-08-01 Composite	8.4	0.19	2.38	0.49	1.43	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.10	0.25	0.46	0.63	0.94	1.44	2.75	11.85	58.76	95.43	98.41	98.54	98.57	100.00	9.9
FEVC-08-02 Composite	14.2	0.19	2.36	0.51	1.23	6	8	0.00	0.00	0.00	0.00	0.19	0.19	0.20	0.23	0.39	0.45	0.60	0.80	1.37	3.19	12.96	59.46	96.04	98.67	98.75	98.77	99.95	4.9
FEVC-08-03 Composite	15.4	0.22	2.17	0.99	1.20	6	7	0.00	0.00	0.13	0.47	0.79	1.08	1.37	2.03	2.77	3.94	5.24	6.39	7.85	10.30	17.34	57.88	96.35	98.71	98.78	98.80	99.99	8.9
FEVC-08-04 Composite	16.0	0.32	1.64	1.27	1.14	6	7	0.00	0.28	1.01	1.32	1.99	2.38	3.04	4.50	6.23	8.53	10.79	13.07	16.46	23.31	43.18	86.84	98.48	98.83	98.85	98.86	99.98	19.7
FEVC-08-05 Composite	17.0	0.27	1.87	0.92	1.08	6	7	0.00	0.00	0.00	0.11	0.34	0.53	0.90	1.47	2.36	3.82	5.73	7.76	11.37	18.61	38.66	83.36	98.23	98.87	98.90	98.92	99.99	13.9
FEVC-08-06 Composite	13.2	0.19	2.37	0.60	1.21	6	8	0.00	0.00	0.05	0.39	0.42	0.50	0.53	0.60	0.71	0.88	1.05	1.28	1.72	2.98	9.97	57.47	96.07	98.70	98.78	98.79	100.00	4.2
FEVC-08-07 Composite	15.3	0.23	2.12	0.71	0.98	6	7	0.00	0.00	0.00	0.00	0.23	0.28	0.46	0.81	1.21	1.85	2.68	3.55	4.95	8.44	23.91	76.84	98.13	98.96	99.01	99.02	99.98	10.1
FEVC-08-08 Composite	10.8	0.31	1.69	0.99	1.23	5	7	0.00	0.00	0.00	0.17	0.66	0.96	1.24	2.12	3.19	5.08	7.26	9.79	14.41	26.10	52.30	87.90	98.39	98.74	98.75	98.77	99.97	16.2
FEVC-08-09 Composite	9.3	0.20	2.31	0.52	1.23	6	7	0.00	0.00	0.00	0.04	0.04	0.04	0.08	0.17	0.33	0.53	0.78	1.17	1.94	4.09	15.24	64.70	96.79	98.72	98.76	98.77	100.00	6.8
FEVC-08-10 Composite	7.9	0.26	1.97	0.93	1.16	6	7	0.00	0.00	0.34	0.42	0.73	0.91	1.08	1.63	2.40	3.57	4.84	6.37	8.79	14.56	32.54	78.24	98.21	98.80	98.84	98.84	99.98	15.5
FEVC-07-01 Composite	3.5	0.18	2.46	0.52	0.88	6	7	0.00	0.00	0.00	0.00	0.00	0.05	0.10	0.16	0.24	0.41	0.59	0.93	1.51	2.95	9.51	48.62	92.14	98.57	99.04	99.12	99.99	5.1
FEVC-07-02 Composite	10.0	0.22	2.20	0.54	1.08	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.07	0.22	0.50	0.89	1.61	2.99	6.82	23.29	72.45	97.94	98.89	98.91	98.92	99.99	8.3
FEVC-07-05 Composite	6.1	0.20	2.34	0.51	1.07	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.08	0.16	0.40	0.67	1.09	1.76	3.80	15.01	60.81	95.57	98.79	98.91	98.93	100.00	6.0
FEVC-07-09 Composite	13.2	0.30	1.72	1.13	1.31	6	7	0.00	0.00	0.00	0.51	1.12	1.37	1.89	2.82	4.26	6.65	9.31	12.57	16.45	22.91	39.89	84.85	98.06	98.63	98.68	98.69	99.98	17.4
FEVC-07-10 Composite	9.7	0.22	2.19	0.54	1.24	6	7	0.00	0.00	0.00	0.00	0.02	0.02	0.10	0.19	0.37	0.64	0.92	1.39	2.36	6.69	24.87	74.56	97.70	98.71	98.75	98.76	99.99	9.7
FEVC-07-11 Composite	14.4	0.23	2.13	0.67	1.30	6	7	0.00	0.00	0.00	0.00	0.07	0.13	0.22	0.58	0.94	1.55	2.29	3.22	4.63	8.12	23.96	77.52	97.56	98.65	98.69	98.70	99.99	8.2
FEVC-07-12 Composite	6.8	0.20	2.33	0.37	1.41	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.04	0.07	0.13	0.34	1.34	13.00	70.39	96.62	98.49	98.57	98.59	99.96	4.6
FEVC-07-13 Composite	8.4	0.21	2.26	0.64	1.47	5	6	0.00	0.00	0.00	0.13	0.14	0.17	0.21	0.32	0.58	0.99	1.53	2.30	3.60	7.27	18.03	63.73	95.76	98.38	98.49	98.53	99.98	6.4
FEVC-07-15 Composite	13.7	0.21	2.27	0.46	1.08	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.11	0.23	0.38	0.69	1.35	3.57	19.98	69.63	97.66	98.86	98.90	98.92	99.98	4.8
FEVC-07-16 Composite	17.6	0.29	1.81	1.16	1.21	6	7	0.00	0.00	1.64	1.70	2.12	2.24	2.59	3.23	4.05	5.37	6.83	8.91	11.77	17.46	35.56	84.60	98.24	98.73	98.78	98.79	99.80	11.7
FEVC-07-17 Composite	16.0	0.30	1.75	1.03	1.05	6	7	0.33	0.75	0.90	1.19	1.55	1.64	1.85	2.46	3.47	5.05	6.83	9.08	12.41	20.41	44.90	87.60	98.56	98.92	98.94	98.95	99.99	12.6
FEVC-07-18 Composite	16.0	0.27	1.89	0.80	1.03	6	7	0.00	0.00	0.00	0.28	0.50	0.58	0.76	1.01	1.49	2.21	3.11	4.72	8.17	18.45	44.28	85.12	98.41	98.95	98.96	98.97	99.92	9.4
FEVC-07-19 Composite	15.0	0.23	2.13	0.44	1.16	6	7	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.05	0.15	0.31	0.50	0.76	1.45	4.75	29.65	85.75	98.53	98.83	98.84	98.84	99.97	5.3
Alternative 3 Composite	277.9	0.24	2.06	0.85	1.18	6	7	0.02	0.06	0.23	0.37	0.58	0.69	0.88	1.28	1.84	2.71	3.70	4.92	6.88	11.61	28.22	75.10	97.49	98.76	98.81	98.82	99.97	10.0

CUMULATIVE PERCENTS AND COMPUTED DISTRIBUTIONS - FIGURE EIGHT VIBRACORES (1 OF 3)

SAMPLE I. D.	ELEVATION (NAVD88 FT)	EFFECTIVE LENGTH (FT)	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	CUMULATIVE PERCENT RETAINED (SIEVES EXPRESSED IN PHI)																				% CARBONATES
									GRAVEL						GRANULAR					SAND									FINES	
									-4.25	-4.0	-3.50	-3.0	-2.50	-2.25	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	3.75	4.0	PAN	
FEVC-08-01#1	-12.6	4.5	0.18	2.5	0.4	1.48	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.18	0.27	0.34	0.41	0.59	1.09	4.32	46.02	94.00	98.30	98.49	98.52	100.00	
FEVC-08-01#2	-17.6	3.9	0.21	2.23	0.53	1.37	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.16	0.34	0.67	0.97	1.55	2.41	4.66	20.54	73.46	97.08	98.54	98.60	98.63	100.00	9.9
FEVC-08-01#3	-21.1	0.0	0.57	0.82	1.75	1.76	6	7	0.00	0.00	6.63	6.96	9.37	9.62	10.40	12.08	14.09	17.35	21.62	27.47	36.05	52.66	73.65	92.46	97.67	98.14	98.19	98.24	99.88	ND
FEVC-08-01#4	-22.2	0.0	0.14	2.81	0.31	3.29	5	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.05	0.06	0.12	0.37	10.34	75.96	95.44	96.47	96.71	99.98	ND
Cut to -19.0																														
FEVC-08-01 Composite		**8.4**	**0.19**	**2.38**	**0.49**	**1.43**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.10**	**0.25**	**0.46**	**0.63**	**0.94**	**1.44**	**2.75**	**11.85**	**58.76**	**95.43**	**98.41**	**98.54**	**98.57**	**100.00**	**9.9**
FEVC-08-02#1	-6.8	4.5	0.23	2.11	0.70	1.30	6	8	0.00	0.00	0.00	0.00	0.59	0.59	0.62	0.73	1.22	1.36	1.78	2.33	3.99	9.12	30.47	75.99	97.25	98.63	98.69	98.70	99.83	
FEVC-08-02#2	-11.8	4.6	0.18	2.50	0.33	1.14	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.08	0.32	4.64	48.00	95.32	98.77	98.84	98.86	100.00	5.2
FEVC-08-02A#1	-15	3.6	0.18	2.45	0.35	1.25	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.05	0.07	0.14	0.24	0.59	5.35	56.25	95.74	98.62	98.72	98.75	100.00	
FEVC-08-02A#2	-20	1.5	0.18	2.48	0.34	1.29	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.07	0.10	0.17	0.46	4.21	52.69	95.31	98.57	98.70	98.71	100.00	4.4
Cut to -19.0																														
FEVC-08-02 Composite		**14.2**	**0.19**	**2.36**	**0.51**	**1.23**	**6**	**8**	**0.00**	**0.00**	**0.00**	**0.00**	**0.19**	**0.19**	**0.20**	**0.23**	**0.39**	**0.45**	**0.60**	**0.80**	**1.37**	**3.19**	**12.96**	**59.46**	**96.04**	**98.67**	**98.75**	**98.77**	**99.95**	**4.9**
FEVC-08-03#1	-5	2.1	0.35	1.53	1.43	0.93	6	8	0.00	0.00	0.54	1.85	3.22	4.18	4.84	6.02	7.82	10.44	13.72	17.47	22.12	30.20	45.75	79.02	97.86	98.92	99.06	99.07	99.95	
FEVC-08-03#2	-7.1	3.9	0.19	2.42	0.49	1.26	6	7	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.23	0.32	0.52	0.78	0.99	1.35	2.31	8.72	52.22	95.43	98.68	98.73	98.74	100.00	
FEVC-08-03#3	-12.1	5.7	0.17	2.53	0.35	1.30	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.07	0.09	0.21	0.29	0.47	0.77	2.08	43.32	95.56	98.59	98.66	98.70	100.00	8.9
FEVC-08-03#4	-16.2	1.5	0.60	0.74	1.59	0.93	6	7	0.00	0.00	0.56	2.24	3.58	5.05	6.92	11.57	16.32	24.05	31.66	37.37	44.01	53.48	73.65	93.31	98.86	99.06	99.07	99.07	100.00	
FEVC-08-03#5	-17.6	2.2	0.19	2.41	0.34	1.29	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.06	0.09	0.21	0.75	6.63	61.27	96.87	98.63	98.69	98.71	100.00	
FEVC-08-03#6	-20.6	0.0	0.20	2.32	0.35	1.16	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.06	0.17	0.28	0.39	0.51	0.88	9.29	73.54	98.14	98.79	98.84	98.84	100.00	ND
Cut to -19.0																														
FEVC-08-03 Composite		**15.4**	**0.22**	**2.17**	**0.99**	**1.2**	**6**	**7**	**0.00**	**0.00**	**0.13**	**0.47**	**0.79**	**1.08**	**1.37**	**2.03**	**2.77**	**3.94**	**5.24**	**6.39**	**7.85**	**10.30**	**17.34**	**57.88**	**96.35**	**98.71**	**98.78**	**98.80**	**99.99**	**8.9**
FEVC-08-04#1	-4.0	2.2	0.29	1.77	1.03	1.15	5	7	0.00	0.00	0.00	0.00	0.23	0.93	1.10	1.97	3.18	5.42	7.92	11.13	15.16	23.19	41.66	82.87	98.27	98.79	98.82	98.85	100.00	
FEVC-08-04#2	-6.0	1.8	1.09	-0.13	1.71	0.98	6	7	0.00	0.00	1.87	4.21	7.90	9.89	14.54	23.82	34.33	46.44	55.16	61.78	67.56	74.43	84.25	95.66	98.79	98.98	99.01	99.02	100.00	23.0
FEVC-08-04#3	-8.5	2.5	0.48	1.05	1.62	1.30	6	7	0.00	1.80	5.14	5.14	6.31	6.70	7.16	8.68	10.63	13.66	18.16	22.85	30.96	44.03	67.15	93.71	98.53	98.68	98.70	98.70	100.00	
FEVC-08-04#4	-11.0	3.9	0.23	2.14	0.42	1.14	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.11	0.12	0.24	0.41	0.80	1.48	3.89	26.47	88.05	98.63	98.84	98.86	98.86	99.96	
FEVC-08-04A#1	-11.9	0.0	0.22	2.19	0.34	0.98	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.11	0.41	2.44	22.05	86.15	98.77	99.01	99.02	99.02	99.99	ND
FEVC-08-04A#2	-14.9	2.8	0.19	2.36	0.32	1.24	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.09	0.22	0.83	7.65	69.78	97.84	98.72	98.76	98.76	99.99	
FEVC-08-04A#3	-17.1	1.5	0.34	1.57	0.87	0.95	6	7	0.00	0.00	0.00	0.45	0.84	0.98	1.15	1.71	2.43	3.62	5.39	7.76	14.33	32.74	67.53	95.80	98.95	99.03	99.04	99.05	99.99	13.6
FEVC-08-04A#4	-18.9	1.3	0.25	2.02	0.46	1.09	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.14	0.27	0.55	0.97	2.37	8.71	41.39	90.96	98.73	98.90	98.91	98.91	99.93	
Cut to -19.0																														
FEVC-08-04 Composite		**16.0**	**0.32**	**1.64**	**1.27**	**1.14**	**6**	**7**	**0.00**	**0.28**	**1.01**	**1.32**	**1.99**	**2.38**	**3.04**	**4.50**	**6.23**	**8.53**	**10.79**	**13.07**	**16.46**	**23.31**	**43.18**	**86.84**	**98.48**	**98.83**	**98.85**	**98.86**	**99.98**	**19.7**
FEVC-08-05#1	-4.5	4.7	0.22	2.19	0.64	1.06	6	8	0.00	0.00	0.00	0.00	0.08	0.22	0.44	0.76	1.01	1.41	1.90	2.45	3.09	5.32	21.24	73.88	97.35	98.90	98.93	98.94	100.00	
FEVC-08-05#2	-8.5	2.9	0.46	1.13	1.21	1.17	5	7	0.00	0.00	0.00	0.24	0.73	1.37	2.49	4.00	6.93	11.75	17.96	24.21	34.45	50.16	72.73	94.12	98.62	98.79	98.81	98.83	99.99	
FEVC-08-05#3	-10.0	0.9	0.27	1.90	0.68	1.13	5	7	0.00	0.00	0.00	0.00	0.00	0.28	0.47	0.74	1.00	1.56	2.26	3.45	5.79	16.49	47.71	89.50	98.63	98.85	98.87	98.87	100.00	11.1
FEVC-08-05#4	-10.8	0.7	0.34	1.54	1.16	1.16	5	7	0.00	0.00	0.00	0.54	1.34	1.66	2.26	3.31	4.73	6.99	10.32	13.96	20.99	34.30	54.72	86.67	98.59	98.71	98.81	98.84	100.00	
FEVC-08-05#5	-11.8	2.9	0.22	2.20	0.39	1.20	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.11	0.28	0.51	1.01	3.38	21.61	83.20	98.30	98.78	98.80	98.80	100.00	
FEVC-08-05A#1	-11.0	0.0	2.77	-1.47	2.31	0.80	6	8	12.14	17.62	26.57	34.74	42.02	44.44	47.15	52.77	58.26	64.24	69.08	72.54	76.95	82.93	90.63	97.71	99.00	99.16	99.18	99.20	99.95	ND
FEVC-08-05A#2	-14.9	2.4	0.25	1.99	0.74	0.97	6	7	0.00	0.00	0.00	0.26	0.39	0.39	0.72	0.96	1.37	1.81	2.42	3.07	5.74	13.49	38.28	83.20	98.74	98.93	98.99	99.03	100.00	
FEVC-08-05A#3	-16.8	0.5	0.65	0.63	1.30	1.32	5	6	0.00	0.00	0.00	0.51	2.59	3.24	4.27	7.38	11.75	19.17	28.48	37.75	53.17	71.12	85.97	95.89	98.42	98.60	98.65	98.68	99.83	20.6
FEVC-08-05A#4	-17.8	1.2	0.23	2.14	0.63	0.88	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.27	0.67	1.32	2.04	3.19	4.83	8.47	22.40	79.05	98.46	99.08	99.10	99.12	99.98	
FEVC-08-05A#5	-19.0	0.8	0.29	1.77	0.81	0.80	6	7	0.00	0.00	0.00	0.00	0.09	0.09	0.19	0.63	1.31	2.68	4.82	7.22	12.41	23.90	51.02	90.02	98.92	99.18	99.19	99.20	99.95	
Cut to -19.0																														
FEVC-08-05 Composite		**17.0**	**0.27**	**1.87**	**0.92**	**1.08**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.11**	**0.34**	**0.53**	**0.90**	**1.47**	**2.36**	**3.82**	**5.73**	**7.76**	**11.37**	**18.61**	**38.66**	**83.36**	**98.23**	**98.87**	**98.90**	**98.92**	**99.99**	**13.9**
FEVC-08-06#1	-3.1	4.0	0.19	2.4	0.38	1.15	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.09	0.17	0.27	0.54	1.39	9.07	60.53	96.57	98.76	98.83	98.85	100.00	
FEVC-08-06#2	-7.1	4.8	0.21	2.26	0.72	1.09	6	8	0.00	0.00	0.00	0.85	0.85	1.06	1.06	1.09	1.20	1.38	1.53	1.83	2.44	4.40	14.51	66.82	97.55	98.85	98.90	98.91	100.00	4.2
FEVC-08-06#3	-12.6	4.0	0.17	2.55	0.33	1.42	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.08	0.10	0.17	0.36	2.19	41.01	93.61	98.45	98.58	98.58	100.00	
FEVC-08-06#4	-14.9	0.4	0.34	1.54	1.48	1.23	6	7	0.00	0.00	1.76	2.56	3.74	3.91	4.73	6.60	8.67	11.26	13.70	16.56	20.49	28.12	42.20	79.29	97.88	98.69	98.75	98.77	99.84	
FEVC-08-06#5	-16.1	0.0	0.14	2.85	0.89	32.97	3	5	0.00	0.00	0.00	0.35	0.93	0.93	0.95	1.08	1.13	1.21	1.28	1.34	1.40	1.56	2.54	12.19	35.59	57.42	64.35	67.03	100.00	ND
Cut to -14.3																														
FEVC-08-06 Composite		**13.2**	**0.19**	**2.37**	**0.6**	**1.21**	**6**	**8**	**0.00**	**0.00**	**0.05**	**0.39**	**0.42**	**0.50**	**0.53**	**0.60**	**0.71**	**0.88**	**1.05**	**1.28**	**1.72**	**2.98**	**9.97**	**57.47**	**96.07**	**98.70**	**98.78**	**98.79**	**100.00**	**4.2**

CUMULATIVE PERCENTS AND COMPUTED DISTRIBUTIONS - FIGURE EIGHT VIBRACORES (2 OF 3)

SAMPLE I. D.	ELEVATION (NAVD88 FT)	EFFECTIVE LENGTH (FT)	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	CUMULATIVE PERCENT RETAINED (SIEVES EXPRESSED IN PHI)																		FINES PAN	% CARBONATES
									GRAVEL						GRANULAR						SAND							
									-4.25	-4.0	-3.50	-3.0	-2.50	-2.25	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	3.75	4.0		
FEVC-08-07#1	-5.7	5.0	0.23	2.13	0.72	0.79	7	7	0.00	0.00	0.00	0.00	0.34	0.34	0.68	1.19	1.48	1.88	2.29	2.81	3.98	7.81	25.12	76.00	98.32	99.16	99.20	99.21	99.95	
FEVC-08-07#2	-11.7	4.8	0.20	2.29	0.43	1.05	7	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.21	0.41	0.68	1.22	2.99	14.39	71.59	97.55	98.90	98.94	98.95	100.00	11.0
FEVC-08-07#3	-14.2	1.8	0.39	1.35	1.20	0.90	5	8	0.00	0.00	0.00	0.00	0.98	1.46	2.05	3.55	6.01	9.94	15.25	20.27	26.85	38.05	61.48	92.81	98.99	99.06	99.10	99.10	100.00	
FEVC-08-07#4	-16.0	1.1	0.20	2.35	0.32	1.20	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.10	0.23	0.74	8.54	69.91	97.90	98.74	98.77	98.80	100.00	
FEVC-08-07A#1	-18.7	2.6	0.21	2.23	0.36	1.20	5	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.17	0.55	2.46	19.68	80.02	98.31	98.73	98.79	98.80	100.00	5.7
Cut to -19.0																														
FEVC-08-07 Composite		**15.3**	**0.23**	**2.12**	**0.71**	**0.98**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.00**	**0.23**	**0.28**	**0.46**	**0.81**	**1.21**	**1.85**	**2.68**	**3.55**	**4.95**	**8.44**	**23.91**	**76.84**	**98.13**	**98.96**	**99.01**	**99.02**	**99.98**	**10.1**
FEVC-08-08#1	-9.0	4.0	0.26	1.93	0.88	1.13	6	7	0.00	0.00	0.00	0.00	0.00	0.32	0.51	1.06	1.90	3.29	5.03	7.03	10.75	17.71	35.12	80.35	98.20	98.84	98.87	98.87	100.00	
FEVC-08-08#2	-14.2	5.5	0.30	1.73	0.86	1.24	5	7	0.00	0.00	0.00	0.34	1.01	1.16	1.37	1.98	2.37	3.13	3.88	5.33	8.97	23.37	57.66	91.56	98.55	98.73	98.73	98.76	99.96	16.2
FEVC-08-08#3	-17.3	1.3	0.60	0.74	1.29	1.48	5	7	0.00	0.00	0.00	0.00	1.25	2.12	2.95	5.98	10.64	18.81	28.40	37.13	48.69	63.43	82.45	95.67	98.30	98.46	98.50	98.52	99.91	
Cut to -19.0																														
FEVC-08-08 Composite		**10.8**	**0.31**	**1.69**	**0.99**	**1.23**	**5**	**7**	**0.00**	**0.00**	**0.00**	**0.17**	**0.66**	**0.96**	**1.24**	**2.12**	**3.19**	**5.08**	**7.26**	**9.79**	**14.41**	**26.10**	**52.30**	**87.90**	**98.39**	**98.74**	**98.75**	**98.77**	**99.97**	**16.2**
FEVC-08-09#1	-10.7	2.5	0.23	2.09	0.68	1.13	6	8	0.00	0.00	0.00	0.14	0.14	0.14	0.31	0.58	0.99	1.48	2.11	2.99	4.79	9.31	29.93	79.48	98.09	98.84	98.86	98.87	100.00	
FEVC-08-09#2	-13.7	3.5	0.21	2.26	0.44	1.20	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.17	0.30	0.47	0.77	1.41	3.55	16.01	74.63	98.17	98.77	98.80	98.80	99.99	6.8
FEVC-08-09#3	-17.7	3.3	0.17	2.53	0.35	1.34	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.11	0.21	0.35	0.70	3.29	42.98	94.33	98.57	98.64	98.66	100.00	
Cut to -19.0																														
FEVC-08-09 Composite		**9.3**	**0.20**	**2.31**	**0.52**	**1.23**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.04**	**0.04**	**0.04**	**0.08**	**0.17**	**0.33**	**0.53**	**0.78**	**1.17**	**1.94**	**4.09**	**15.24**	**64.70**	**96.79**	**98.72**	**98.76**	**98.77**	**100.00**	**6.8**
FEVC-08-10#1	-10.0	2.8	0.21	2.26	0.57	1.20	6	7	0.00	0.00	0.00	0.00	0.15	0.17	0.17	0.20	0.34	0.59	0.96	1.50	2.77	6.23	19.02	64.99	97.73	98.75	98.80	98.80	100.00	
FEVC-08-10#2	-12.5	2.3	0.21	2.25	0.43	1.13	6	7	0.00	0.00	0.00	0.00	0.00	0.19	0.19	0.34	0.37	0.49	0.54	0.63	0.81	1.98	14.97	78.96	98.40	98.83	98.86	98.87	100.00	15.5
FEVC-08-10#3	-14.1	2.1	0.30	1.75	0.80	1.18	6	7	0.00	0.00	0.00	0.00	0.22	0.39	0.56	0.85	1.55	2.57	4.06	6.47	11.22	23.91	56.02	90.82	98.55	98.79	98.82	98.82	99.94	
FEVC-08-10#4	-16.1	0.7	0.71	0.50	1.75	1.05	5	7	0.00	0.00	3.89	4.71	6.93	7.74	9.21	13.91	19.83	28.61	36.82	44.45	51.85	61.19	73.88	91.10	98.50	98.89	98.94	98.95	100.00	
Cut to -19.0																														
FEVC-08-10 Composite		**7.9**	**0.26**	**1.97**	**0.93**	**1.16**	**6**	**7**	**0.00**	**0.00**	**0.34**	**0.42**	**0.73**	**0.91**	**1.08**	**1.63**	**2.40**	**3.57**	**4.84**	**6.37**	**8.79**	**14.56**	**32.54**	**78.24**	**98.21**	**98.80**	**98.84**	**98.84**	**99.98**	**15.5**
FEVC-07-01#1	-16.5	1.8	0.19	2.40	0.53	0.60	7	7	0.00	0.00	0.00	0.00	0.00	0.09	0.18	0.18	0.25	0.47	0.70	1.14	1.91	3.84	11.73	54.33	94.67	99.02	99.35	99.40	100.00	5.7
FEVC-07-01#2	-18.0	1.4	0.17	2.54	0.51	1.18	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.18	0.26	0.41	0.55	0.81	1.24	2.16	6.71	39.80	88.06	97.96	98.68	98.82	99.98	4.5
FEVC-07-01#3	-20.5	0.3	0.19	2.43	0.39	1.15	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.09	0.13	0.24	0.42	1.28	9.22	55.56	96.02	98.75	98.84	98.85	99.98	4.4
FEVC-07-01#4	-22.5	0.0	0.16	2.67	0.40	8.43	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.11	0.20	0.34	0.50	0.85	2.72	23.44	78.76	90.86	91.44	91.57	100.00	
Cut to -19.0																														
FEVC-07-01 Composite		**3.5**	**0.18**	**2.46**	**0.52**	**0.88**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.05**	**0.10**	**0.16**	**0.24**	**0.41**	**0.59**	**0.93**	**1.51**	**2.95**	**9.51**	**48.62**	**92.14**	**98.57**	**99.04**	**99.12**	**99.99**	**5.1**
FEVC-07-02#1	-10.0	2.5	0.26	1.94	0.70	0.98	6	6	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.25	0.73	1.54	2.74	4.59	7.68	15.59	43.87	83.86	98.35	98.99	99.01	99.02	99.99	11.3
FEVC-07-02#2	-16.0	6.5	0.21	2.28	0.46	1.09	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.17	0.31	0.70	1.61	4.37	17.69	68.34	97.78	98.88	98.90	98.91	99.99	7.7
FEVC-07-02#3	-20.0	1.0	0.20	2.35	0.31	1.24	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.21	0.79	8.23	70.65	97.92	98.72	98.75	98.76	100.00	4.3
Cut to -19.0																														
FEVC-07-02 Composite		**10.0**	**0.22**	**2.20**	**0.54**	**1.08**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.07**	**0.22**	**0.50**	**0.89**	**1.61**	**2.99**	**6.82**	**23.29**	**72.45**	**97.94**	**98.89**	**98.91**	**98.92**	**99.99**	**8.3**
FEVC-07-05#1	-13.9	3.8	0.19	2.40	0.47	1.13	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.07	0.18	0.37	0.66	1.28	3.20	12.86	54.23	95.31	98.74	98.85	98.87	100.00	6.2
FEVC-07-05#2	-19.4	2.3	0.21	2.25	0.55	0.98	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.12	0.30	0.77	1.17	1.80	2.55	4.80	18.55	71.67	96.01	98.86	99.00	99.02	100.00	5.8
Cut to -19.0																														
FEVC-07-05 Composite		**6.1**	**0.20**	**2.34**	**0.51**	**1.07**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.08**	**0.16**	**0.40**	**0.67**	**1.09**	**1.76**	**3.80**	**15.01**	**60.81**	**95.57**	**98.79**	**98.91**	**98.93**	**100.00**	**6.0**
FEVC-07-09#1	-6.8	2.3	0.39	1.35	1.22	1.10	6	7	0.00	0.00	0.00	1.60	2.10	2.10	2.70	3.95	5.55	8.66	12.59	17.72	25.40	40.71	66.60	89.51	98.30	98.87	98.89	98.90	99.99	23.1
FEVC-07-09#2	-11.3	6.2	0.21	2.28	0.32	1.38	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.13	0.76	13.94	78.50	97.83	98.56	98.61	98.62	99.98	8.9
FEVC-07-09#3	-14.8	1.8	0.29	1.80	1.04	1.35	6	7	0.00	0.00	0.00	0.00	0.33	1.26	1.84	2.92	4.17	5.94	7.65	9.70	12.49	17.80	39.04	86.29	98.06	98.59	98.63	98.65	99.99	11.8
FEVC-07-09#4	-17.7	2.9	0.58	0.78	1.44	1.29	5	6	0.00	0.00	0.00	1.04	3.23	3.80	5.31	7.87	12.39	19.70	27.59	37.06	46.70	59.34	74.71	93.82	98.38	98.63	98.69	98.71	99.96	34.5
Cut to -19.0																														
FEVC-07-09 Composite		**13.2**	**0.30**	**1.72**	**1.13**	**1.31**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.51**	**1.12**	**1.37**	**1.89**	**2.82**	**4.26**	**6.65**	**9.31**	**12.57**	**16.45**	**22.91**	**39.89**	**84.85**	**98.06**	**98.63**	**98.68**	**98.69**	**99.98**	**17.4**
FEVC-07-10#1	-10.00	2.6	0.28	1.82	0.68	0.92	6	7	0.00	0.00	0.00	0.00	0.06	0.06	0.34	0.66	1.18	1.82	2.43	3.64	6.37	19.42	57.49	91.37	98.79	99.06	99.07	99.08	100.00	4.9
FEVC-07-10#2	-13.80	5.8	0.20	2.30	0.42	1.34	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.09	0.25	0.43	0.67	1.04	2.35	14.73	69.80	97.63	98.61	98.65	98.66	99.99	13.1
FEVC-07-10#3	-20.30	1.3	0.19	2.42	0.33	1.43	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.06	0.11	0.21	0.57	4.89	62.18	95.83	98.42	98.56	98.57	100.00	3.8
FEVC-07-10#4	-23.20	0.0	0.25	1.98	1.09	2.48	6	7	0.00	0.00	1.69	1.69	1.69	1.69	1.74	2.27	3.04	4.37	5.60	7.23	9.31	12.42	24.35	76.50	95.93	97.35	97.47	97.52	99.99	
Cut to -19.0																														
FEVC-07-10 Composite		**9.7**	**0.22**	**2.19**	**0.54**	**1.24**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.02**	**0.10**	**0.19**	**0.37**	**0.64**	**0.92**	**1.39**	**2.36**	**6.69**	**24.87**	**74.56**	**97.70**	**98.71**	**98.75**	**98.76**	**99.99**	**9.7**

CUMULATIVE PERCENTS AND COMPUTED DISTRIBUTIONS - FIGURE EIGHT VIBRACORES (3 OF 3)

SAMPLE I. D.	ELEVATION (NAVD88 FT)	EFFECTIVE LENGTH (FT)	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	CUMULATIVE PERCENT RETAINED (SIEVES EXPRESSED IN PHI)																				FINES PAN	% CARBONATES
									GRAVEL						GRANULAR			SAND													
									-4.25	-4.0	-3.50	-3.0	-2.50	-2.25	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	3.75	4.0		
FEVC-07-11#1	-5.30	3.1	0.25	2.01	0.76	1.26	6	6	0.00	0.00	0.00	0.00	0.11	0.22	0.30	0.90	1.30	2.09	3.19	4.70	6.79	13.29	34.75	80.17	97.66	98.68	98.73	98.74	99.99	10.5
FEVC-07-11#2	-8.40	4.3	0.21	2.23	0.34	1.27	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.11	0.34	1.28	18.92	81.85	98.11	98.71	98.72	98.73	99.98	4.5
FEVC-07-11#3	-13.40	4.5	0.19	2.36	0.36	1.32	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.13	0.43	1.65	9.83	67.31	96.68	98.60	98.67	98.68	99.99	5.3
FEVC-07-11#4	-17.40	2.5	0.31	1.71	1.06	1.36	5	6	0.00	0.00	0.00	0.00	0.27	0.49	0.91	2.24	3.80	6.34	9.07	12.28	16.91	25.13	44.66	85.15	98.06	98.60	98.63	98.64	99.98	17.2
Cut to -19.0																														
FEVC-07-11 Composite		**14.4**	**0.23**	**2.13**	**0.67**	**1.30**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.00**	**0.07**	**0.13**	**0.22**	**0.58**	**0.94**	**1.55**	**2.29**	**3.22**	**4.63**	**8.12**	**23.96**	**77.52**	**97.56**	**98.65**	**98.69**	**98.70**	**99.99**	**8.2**
FEVC-07-12#1	-9.50	4.5	0.20	2.32	0.36	1.38	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.08	0.27	1.18	13.20	70.92	96.84	98.52	98.60	98.62	99.95	4.4
FEVC-07-12#2	-14.50	2.3	0.20	2.33	0.39	1.47	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.09	0.11	0.15	0.22	0.47	1.64	12.61	69.36	96.19	98.43	98.51	98.53	99.99	4.9
FEVC-07-12#3	-17.20	0.0	0.77	0.38	1.88	1.10	6	6	0.00	0.00	1.31	2.46	5.68	6.97	10.42	18.29	27.97	39.93	47.95	53.23	56.09	58.77	64.20	83.43	97.75	98.82	98.88	98.90	99.97	34.6
Cut to -14.3																														
FEVC-07-12 Composite		**6.8**	**0.20**	**2.33**	**0.37**	**1.41**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.03**	**0.04**	**0.07**	**0.13**	**0.34**	**1.34**	**13.00**	**70.39**	**96.62**	**98.49**	**98.57**	**98.59**	**99.96**	**4.6**
FEVC-07-13#1	-11.10	1.0	0.35	1.53	1.12	1.05	5	6	0.00	0.00	0.00	1.10	1.15	1.39	1.78	2.66	4.27	6.76	9.82	13.59	19.13	32.28	61.35	87.41	98.23	98.90	98.93	98.95	99.97	16.6
FEVC-07-13#2	-14.60	4.3	0.18	2.50	0.32	1.76	5	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.04	0.09	0.26	2.12	51.07	93.88	98.01	98.18	98.24	99.98	4.4
FEVC-07-13#3	-17.10	3.1	0.22	2.17	0.56	1.20	6	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.19	0.47	0.93	1.79	3.47	8.92	26.13	73.64	97.56	98.72	98.78	98.80	99.98	5.9
FEVC-07-13#4	-22.10	0.0	0.30	1.75	0.62	1.47	5	6	0.00	0.00	0.00	0.00	0.00	0.17	0.31	0.53	0.81	1.18	2.04	3.83	7.70	17.92	69.87	92.72	98.25	98.50	98.52	98.53	99.95	
FEVC-07-13#5	-23.60	0.0	0.72	0.47	2.31	1.67	5	6	0.00	0.00	5.24	11.69	18.11	19.58	22.83	27.66	31.27	35.26	38.16	40.35	42.02	45.05	54.74	78.04	96.66	98.16	98.29	98.33	99.98	
Cut to 19.0																														
FEVC-07-13 Composite		**8.4**	**0.21**	**2.26**	**0.64**	**1.47**	**5**	**6**	**0.00**	**0.00**	**0.00**	**0.13**	**0.14**	**0.17**	**0.21**	**0.32**	**0.58**	**0.99**	**1.53**	**2.30**	**3.60**	**7.27**	**18.03**	**63.73**	**95.76**	**98.38**	**98.49**	**98.53**	**99.98**	**6.4**
FEVC-07-15#1	-6.8	3.7	0.24	2.07	0.58	1.05	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.37	0.78	1.31	2.34	4.37	9.36	33.92	83.94	97.55	98.88	98.93	98.95	99.98	7.7
FEVC-07-15#2	-10.8	7.5	0.18	2.46	0.30	1.10	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.10	0.29	3.29	54.60	97.35	98.84	98.89	98.90	99.98	3.1
FEVC-07-15#3	-17.3	2.5	0.25	2.00	0.37	1.09	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.08	0.10	0.21	0.63	4.85	49.42	93.56	98.73	98.88	98.90	98.91	99.98	5.5
Cut to -19.0																														
FEVC-07-15 Composite		**13.7**	**0.21**	**2.27**	**0.46**	**1.08**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.05**	**0.11**	**0.23**	**0.38**	**0.69**	**1.35**	**3.57**	**19.98**	**69.63**	**97.66**	**98.86**	**98.90**	**98.92**	**99.98**	**4.8**
FEVC-07-16#1	-1.0	2.8	0.21	2.22	0.38	1.13	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.10	0.22	0.45	0.86	2.67	19.15	82.43	98.26	98.80	98.87	98.87	99.86	4.3
FEVC-07-16#2	-4.5	5.4	0.21	2.27	0.44	1.46	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.23	0.26	0.35	0.49	0.78	1.09	2.32	14.46	74.91	97.63	98.41	98.51	98.54	99.72	5.5
FEVC-07-16#3	-7.7	0.7	0.49	1.02	1.67	1.19	6	6	0.00	0.00	3.67	3.67	5.05	6.45	7.08	10.09	13.39	18.78	23.46	28.81	34.64	44.87	62.33	87.39	98.08	98.69	98.78	98.81	100.00	19.6
FEVC-07-16A#1	-7.8	0.0	0.27	1.87	1.01	1.13	5	7	0.00	0.00	0.00	0.00	0.00	0.26	0.51	1.18	2.54	5.27	8.10	11.14	14.31	19.92	34.49	77.06	97.98	98.79	98.86	98.87	99.96	
FEVC-07-16A#2	-10.3	3.8	0.59	0.77	1.71	0.85	5	6	0.00	0.00	6.90	7.18	8.42	8.69	9.84	11.63	13.99	17.84	22.51	29.35	38.81	54.58	76.17	96.02	98.86	99.14	99.15	99.15	99.83	29.1
FEVC-07-16A#3	-13.9	2.2	0.30	1.73	0.95	1.03	6	7	0.00	0.00	0.00	0.00	0.82	0.82	1.30	1.90	3.27	5.07	6.73	8.81	11.94	20.52	50.21	91.80	98.74	98.97	98.97	98.97	99.95	12.8
FEVC-07-16A#4	-16.5	2.7	0.21	2.22	0.33	1.45	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.06	0.08	0.12	0.30	1.21	18.77	83.56	98.20	98.53	98.55	98.55	99.69	4.3
Cut to -19.0																														
FEVC-07-16 Composite		**17.6**	**0.29**	**1.81**	**1.16**	**1.21**	**6**	**7**	**0.00**	**0.00**	**1.64**	**1.70**	**2.12**	**2.24**	**2.59**	**3.23**	**4.05**	**5.37**	**6.83**	**8.91**	**11.77**	**17.46**	**35.56**	**84.60**	**98.24**	**98.73**	**98.78**	**98.79**	**99.80**	**11.7**
FEVC-07-17#1	-5.00	4.7	0.22	2.18	0.44	0.99	6	7	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.32	0.52	0.89	1.45	3.84	23.85	82.71	98.35	98.97	99.00	99.01	100.00	5.3
FEVC-07-17#2	-8.10	0.7	0.68	0.56	2.25	1.15	6	6	8	8	11.01	12.89	15.06	15.61	16.35	18.85	21.73	25.61	30.13	34.43	39.25	46.36	61.94	89.32	98.50	98.80	98.83	98.85	100.00	24.5
FEVC-07-17#3	-10.00	3.4	0.24	2.03	0.59	1.17	6	7	0	0	0.00	0.00	0.15	0.15	0.15	0.33	0.55	0.92	1.36	2.15	4.01	10.94	35.86	85.57	98.53	98.82	98.82	98.83	100.00	9.1
FEVC-07-17#4	-13.10	1.9	0.55	0.85	1.61	0.91	5	6	0	4	3.56	4.78	5.42	5.61	6.50	8.56	12.01	17.91	23.96	30.78	38.61	51.95	76.19	94.31	98.87	99.07	99.08	99.09	100.00	27.9
FEVC-07-17#5	-14.50	1.2	0.26	1.93	0.63	1.20	6	7	0	0	0.00	0.00	0.27	0.27	0.27	0.42	0.83	1.43	2.02	2.88	4.55	11.46	48.15	90.05	98.44	98.78	98.79	98.80	99.97	8.8
FEVC-07-17A#1	-13.30	2.0	0.27	1.91	0.73	1.27	6	7	0	0	0.00	0.00	0.00	0.10	0.21	0.61	1.24	2.05	3.00	4.54	7.69	16.61	42.25	87.33	98.48	98.71	98.72	98.73	99.98	11.7
FEVC-07-17A#2	-15.60	2.1	0.41	1.28	1.14	0.80	6	6	0	0	0.00	0.47	1.52	1.76	2.13	3.39	5.36	8.79	12.91	18.40	26.89	44.38	73.31	94.05	98.94	99.18	99.19	99.20	99.98	20.0
Cut to -19.0																														
FEVC-07-17 Composite		**16.0**	**0.30**	**1.75**	**1.03**	**1.05**	**6**	**7**	**0**	**1**	**1**	**1**	**2**	**2**	**2**	**2**	**3**	**5**	**7**	**9**	**12**	**20**	**45**	**88**	**99**	**99**	**99**	**99**	**100**	**12.6**
FEVC-07-18#1	-5.0	5.9	0.27	1.91	0.71	1.01	5	7	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.36	0.81	1.54	2.27	3.79	7.71	20.12	45.32	84.79	98.32	98.95	98.98	98.99	99.98	10.6
FEVC-07-18#2	-7.5	4.0	0.34	1.55	1.09	1.12	6	7	0.00	0.00	0.00	1.13	1.94	2.26	2.49	3.24	4.34	5.79	7.87	11.17	16.82	30.24	59.67	92.70	98.72	98.87	98.87	98.88	99.77	13.0
FEVC-07-18#3	-16.0	6.1	0.23	2.1	0.54	1	6	7	0.00	0.00	0.00	0.00	0.04	0.04	0.05	0.18	0.29	0.51	0.80	1.38	2.94	9.10	33.19	80.48	98.30	98.99	99.00	99.00	99.95	5.8
Cut to -19.0																														
FEVC-07-18 Composite		**16.0**	**0.27**	**1.89**	**0.80**	**1.03**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.28**	**0.50**	**0.58**	**0.76**	**1.01**	**1.49**	**2.21**	**3.11**	**4.72**	**8.17**	**18.45**	**44.28**	**85.12**	**98.41**	**98.95**	**98.96**	**98.97**	**99.92**	**9.4**
FEVC-07-19#1	-6.0	4.7	0.21	2.22	0.43	1.00	7	7	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.06	0.09	0.30	0.46	0.69	1.32	3.70	19.07	79.20	98.67	98.99	99.00	99.00	100.00	5.8
FEVC-07-19#2	-11.3	9.8	0.23	2.10	0.39	1.23	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.15	0.23	0.32	0.72	4.03	33.64	88.88	98.47	98.76	98.77	98.77	99.95	4.3
FEVC-07-19#3	-18.9	0.5	0.31	1.71	0.92	1.27	6	6	0.00	0.00	0.00	0.00	0.14	0.26	0.39	0.97	1.88	3.59	6.25	10.04	17.07	28.72	50.90	85.93	98.26	98.69	98.72	98.73	100.00	19.7
Cut to -19.0																														
FEVC-07-19 Composite		**15.0**	**0.23**	**2.13**	**0.44**	**1.16**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.02**	**0.05**	**0.15**	**0.31**	**0.50**	**0.76**	**1.45**	**4.75**	**29.65**	**85.75**	**98.53**	**98.83**	**98.84**	**98.84**	**99.97**	**5.3**

PERCENTAGE OF MATERIAL BY SEDIMENT GRAIN SIZE CATEGORY
FIGURE EIGHT VIBRACORES (1 of 3)

SAMPLE I.D.	Fine % (<0.0625mm)	Sand % (0.0625mm-2.00mm)	Granular % (2mm-4.76mm)	Gravel % (4.76mm-76mm)
FEVC-08-01#1	0.18	2.50	0.40	1.48
FEVC-08-01#2	0.21	2.23	0.53	1.37
FEVC-08-01#3	0.57	0.82	1.75	1.76
FEVC-08-01#4	0.14	2.81	0.31	3.29
FEVC-08-01 Composite	**1.43**	**98.32**	**0.25**	**0.00**
FEVC-08-02#1	0.23	2.11	0.70	1.30
FEVC-08-02#2	0.18	2.50	0.33	1.14
FEVC-08-02A#1	0.18	2.45	0.35	1.25
FEVC-08-02A#2	0.18	2.48	0.34	1.29
FEVC-08-02 Composite	**1.23**	**98.37**	**0.20**	**0.19**
FEVC-08-03#1	0.35	1.53	1.43	0.93
FEVC-08-03#2	0.19	2.42	0.49	1.26
FEVC-08-03#3	0.17	2.53	0.35	1.30
FEVC-08-03#4	0.60	0.74	1.59	0.93
FEVC-08-03#5	0.19	2.41	0.34	1.29
FEVC-08-03#6	0.20	2.32	0.35	1.16
FEVC-08-03 Composite	**1.20**	**96.03**	**1.69**	**1.08**
FEVC-08-04#1	1.15	95.67	2.25	0.93
FEVC-08-04#2	0.98	64.69	24.44	9.89
FEVC-08-04#3	1.30	88.07	3.93	6.70
FEVC-08-04#4	1.14	98.74	0.12	0.00
FEVC-08-04A#1	0.98	99.02	0.00	0.00
FEVC-08-04A#2	1.24	98.76	0.00	0.00
FEVC-08-04A#3	0.95	96.62	1.45	0.98
FEVC-08-04A#4	1.09	98.77	0.14	0.00
FEVC-08-04 Composite	**1.14**	**92.63**	**3.85**	**2.38**
FEVC-08-05#1	1.06	97.93	0.79	0.22
FEVC-08-05#2	1.17	91.90	5.56	1.37
FEVC-08-05#3	1.13	97.87	0.72	0.28
FEVC-08-05#4	1.16	94.11	3.07	1.66
FEVC-08-05#5	1.20	98.76	0.04	0.00
FEVC-08-05A#1	0.80	40.94	13.82	44.44
FEVC-08-05A#2	0.97	97.66	0.98	0.39
FEVC-08-05A#3	1.32	86.93	8.51	3.24
FEVC-08-05A#4	0.88	98.45	0.67	0.00
FEVC-08-05A#5	0.80	97.89	1.22	0.09
FEVC-08-05 Composite	**1.08**	**96.56**	**1.83**	**0.53**

PERCENTAGE OF MATERIAL BY SEDIMENT GRAIN SIZE CATEGORY
FIGURE EIGHT VIBRACORES (2 of 3)

SAMPLE I.D.	Fine % (<0.0625mm)	Sand % (0.0625mm-2.00mm)	Granular % (2mm-4.76mm)	Gravel % (4.76mm-76mm)
FEVC-08-06#1	0.19	2.40	0.38	1.15
FEVC-08-06#2	0.21	2.26	0.72	1.09
FEVC-08-06#3	0.17	2.55	0.33	1.42
FEVC-08-06#4	0.34	1.54	1.48	1.23
FEVC-08-06#5	0.14	2.85	0.89	32.97
FEVC-08-06 Composite	**1.21**	**98.07**	**0.21**	**0.50**
FEVC-08-07#1	0.79	97.73	1.14	0.34
FEVC-08-07#2	1.05	98.88	0.07	0.00
FEVC-08-07#3	0.90	93.09	4.55	1.46
FEVC-08-07#4	1.20	98.80	0.00	0.00
FEVC-08-07A#1	1.20	98.80	0.00	0.00
FEVC-08-07 Composite	**0.98**	**97.80**	**0.93**	**0.28**
FEVC-08-08#1	1.13	96.97	1.58	0.32
FEVC-08-08#2	1.24	96.39	1.21	1.16
FEVC-08-08#3	1.48	87.88	8.52	2.12
FEVC-08-08 Composite	**1.23**	**95.58**	**2.23**	**0.96**
FEVC-08-09#1	1.13	97.88	0.85	0.14
FEVC-08-09#2	1.20	98.63	0.17	0.00
FEVC-08-09#3	1.34	98.65	0.01	0.00
FEVC-08-09 Composite	**1.23**	**98.44**	**0.30**	**0.04**
FEVC-08-10#1	1.20	98.46	0.17	0.17
FEVC-08-10#2	1.13	98.50	0.18	0.19
FEVC-08-10#3	1.18	97.27	1.16	0.39
FEVC-08-10#4	1.05	79.12	12.09	7.74
FEVC-08-10 Composite	**1.16**	**96.44**	**1.49**	**0.91**
FEVC-07-01#1	0.60	99.15	0.16	0.09
FEVC-07-01#2	1.18	98.56	0.26	0.00
FEVC-07-01#3	1.15	98.81	0.04	0.00
FEVC-07-01#4	8.43	91.52	0.05	0.00
FEVC-07-01 Composite	**0.88**	**98.88**	**0.19**	**0.05**
FEVC-07-02#1	0.98	98.29	0.73	0.00
FEVC-07-02#2	1.09	98.85	0.06	0.00
FEVC-07-02#3	1.24	98.76	0.00	0.00
FEVC-07-02 Composite	**1.08**	**98.70**	**0.22**	**0.00**

PERCENTAGE OF MATERIAL BY SEDIMENT GRAIN SIZE CATEGORY
FIGURE EIGHT VIBRACORES (3 of 3)

SAMPLE I.D.	Fine % (<0.0625mm)	Sand % (0.0625mm-2.00mm)	Granular % (2mm-4.76mm)	Gravel % (4.76mm-76mm)
FEVC-07-05#1	1.13	98.80	0.07	0.00
FEVC-07-05#2	0.98	98.72	0.30	0.00
FEVC-07-05 Composite	**1.07**	**98.77**	**0.16**	**0.00**
FEVC-07-09#1	1.10	93.35	3.45	2.10
FEVC-07-09#2	1.38	98.62	0.00	0.00
FEVC-07-09#3	1.35	94.48	2.91	1.26
FEVC-07-09#4	1.29	86.32	8.59	3.80
FEVC-07-09 Composite	**1.31**	**94.43**	**2.89**	**1.37**
FEVC-07-15#1	1.05	98.58	0.37	0.00
FEVC-07-15#2	1.10	98.90	0.00	0.00
FEVC-07-15#3	1.09	98.86	0.05	0.00
FEVC-07-15 Composite	**1.08**	**98.81**	**0.11**	**0.00**
FEVC-07-16#1	1.13	98.82	0.05	0.00
FEVC-07-16#2	1.46	98.28	0.26	0.00
FEVC-07-16#3	1.19	85.42	6.94	6.45
FEVC-07-16A#1	1.13	96.33	2.28	0.26
FEVC-07-16A#2	0.85	85.16	5.30	8.69
FEVC-07-16A#3	1.03	95.70	2.45	0.82
FEVC-07-16A#4	1.45	98.53	0.02	0.00
FEVC-07-16 Composite	**1.21**	**94.74**	**1.82**	**2.24**
FEVC-07-17#1	0.99	98.83	0.18	0.00
FEVC-07-17#2	1.15	77.12	6.12	15.61
FEVC-07-17#3	1.17	98.28	0.40	0.15
FEVC-07-17#4	0.91	87.08	6.40	5.61
FEVC-07-17#5	1.20	97.97	0.56	0.27
FEVC-07-17A#1	1.27	97.49	1.14	0.10
FEVC-07-17A#2	0.80	93.84	3.60	1.76
FEVC-07-17 Composite	**1.05**	**95.48**	**1.82**	**1.64**
FEVC-07-18#1	1.01	98.18	0.81	0.00
FEVC-07-18#2	1.12	94.54	2.08	2.26
FEVC-07-18#3	1.00	98.71	0.25	0.04
FEVC-07-18 Composite	**1.03**	**97.47**	**0.91**	**0.58**
FEVC-07-19#1	1.00	98.91	0.09	0.00
FEVC-07-19#2	1.23	98.68	0.09	0.00
FEVC-07-19#3	1.27	96.85	1.62	0.26
FEVC-07-19 Composite	**1.16**	**98.69**	**0.14**	**0.01**
Alternative 3 Composite	**1.18**	**96.98**	**1.15**	**0.69**

APPENDIX 27

Alternative 3 Channel Corridor Composite Vibracore Granularmetric Reports

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: Alternative 3 composite

Analysis Date: 10-30-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
		North Carolina State Plane	

USCS:	Munsell:	Comments:
		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.15	0.03	#200 - 1.19 #230 - 1.18		10	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.02	0.02	0.02	0.02
5/8"	-4.00	16.00	0.04	0.04	0.06	0.06
7/16"	-3.50	11.31	0.17	0.17	0.23	0.23
5/16"	-3.00	8.00	0.14	0.14	0.37	0.37
3.5	-2.50	5.66	0.21	0.21	0.58	0.58
4	-2.25	4.76	0.11	0.11	0.69	0.69
5	-2.00	4.00	0.19	0.19	0.88	0.88
7	-1.50	2.83	0.40	0.40	1.28	1.28
10	-1.00	2.00	0.56	0.56	1.84	1.84
14	-0.50	1.41	0.87	0.87	2.71	2.71
18	0.00	1.00	0.99	0.99	3.70	3.70
25	0.50	0.71	1.22	1.22	4.92	4.92
35	1.00	0.50	1.96	1.96	6.88	6.88
45	1.50	0.35	4.73	4.73	11.61	11.61
60	2.00	0.25	16.61	16.61	28.22	28.22
80	2.50	0.18	46.88	46.88	75.10	75.10
120	3.00	0.13	22.39	22.39	97.49	97.49
170	3.50	0.09	1.27	1.27	98.76	98.76
200	3.75	0.07	0.05	0.05	98.81	98.81
230	4.00	0.06	0.01	0.01	98.82	98.82

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.94	2.70	2.50	2.23	1.90	1.63	0.52

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.06	0.24	0.85	-3.07	15.95

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-07-01 Comp.

Analysis Date: 10-29-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,390,205	198,940	North Carolina State Plane	-15.5 NAVD 88

USCS:	Munsell:	Comments:
SP		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.87	0.01	#200 - 0.96 #230 - 0.88		5	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.05	0.05	0.05	0.05
5	-2.00	4.00	0.05	0.05	0.10	0.10
7	-1.50	2.83	0.06	0.06	0.16	0.16
10	-1.00	2.00	0.08	0.08	0.24	0.24
14	-0.50	1.41	0.17	0.17	0.41	0.41
18	0.00	1.00	0.18	0.18	0.59	0.59
25	0.50	0.71	0.34	0.34	0.93	0.93
35	1.00	0.50	0.58	0.58	1.51	1.51
45	1.50	0.35	1.44	1.44	2.95	2.95
60	2.00	0.25	6.56	6.56	9.51	9.51
80	2.50	0.18	39.11	39.11	48.62	48.62
120	3.00	0.13	43.52	43.52	92.14	92.14
170	3.50	0.09	6.43	6.43	98.57	98.57
200	3.75	0.07	0.47	0.47	99.04	99.04
230	4.00	0.06	0.08	0.08	99.12	99.12

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.22	2.91	2.80	2.52	2.20	2.08	1.66

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.46	0.18	0.52	-2.55	18.88

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-07-02 Comp.

Analysis Date: 10-29-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,733	202,440	North Carolina State Plane	-9.0 NAVD 88

USCS:	Munsell:	Comments:
SP		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.07	0.01	#200 - 1.09 #230 - 1.08		8	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.02	0.02	0.02	0.02
7	-1.50	2.83	0.05	0.05	0.07	0.07
10	-1.00	2.00	0.15	0.15	0.22	0.22
14	-0.50	1.41	0.28	0.28	0.50	0.50
18	0.00	1.00	0.39	0.39	0.89	0.89
25	0.50	0.71	0.72	0.72	1.61	1.61
35	1.00	0.50	1.38	1.38	2.99	2.99
45	1.50	0.35	3.83	3.83	6.82	6.82
60	2.00	0.25	16.47	16.47	23.29	23.29
80	2.50	0.18	49.16	49.16	72.45	72.45
120	3.00	0.13	25.49	25.49	97.94	97.94
170	3.50	0.09	0.95	0.95	98.89	98.89
200	3.75	0.07	0.02	0.02	98.91	98.91
230	4.00	0.06	0.01	0.01	98.92	98.92

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.94	2.73	2.55	2.27	2.02	1.78	1.26

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.2	0.22	0.54	-2.1	11.72

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-07-05 Comp.

Analysis Date: 10-29-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,867	199,037	North Carolina State Plane	-12.9 NAVD 88

USCS:	Munsell:	Comments:
SP		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.07	0.00	#200 - 1.09 #230 - 1.07		6	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.02	0.02	0.02	0.02
7	-1.50	2.83	0.06	0.06	0.08	0.08
10	-1.00	2.00	0.08	0.08	0.16	0.16
14	-0.50	1.41	0.24	0.24	0.40	0.40
18	0.00	1.00	0.27	0.27	0.67	0.67
25	0.50	0.71	0.42	0.42	1.09	1.09
35	1.00	0.50	0.67	0.67	1.76	1.76
45	1.50	0.35	2.04	2.04	3.80	3.80
60	2.00	0.25	11.21	11.21	15.01	15.01
80	2.50	0.18	45.80	45.80	60.81	60.81
120	3.00	0.13	34.76	34.76	95.57	95.57
170	3.50	0.09	3.22	3.22	98.79	98.79
200	3.75	0.07	0.12	0.12	98.91	98.91
230	4.00	0.06	0.02	0.02	98.93	98.93

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.99	2.83	2.70	2.38	2.11	2.01	1.55

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.34	0.20	0.51	-2.16	14.08

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-07-09 Comp.

Analysis Date: 10-29-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,776	201,051	North Carolina State Plane	-5.8 NAVD 88

USCS:	Munsell:	Comments:
SW		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.29	0.02	#200 - 1.32 #230 - 1.31		17	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.51	0.51	0.51	0.51
3.5	-2.50	5.66	0.61	0.61	1.12	1.12
4	-2.25	4.76	0.25	0.25	1.37	1.37
5	-2.00	4.00	0.52	0.52	1.89	1.89
7	-1.50	2.83	0.93	0.93	2.82	2.82
10	-1.00	2.00	1.44	1.44	4.26	4.26
14	-0.50	1.41	2.39	2.39	6.65	6.65
18	0.00	1.00	2.66	2.66	9.31	9.31
25	0.50	0.71	3.26	3.26	12.57	12.57
35	1.00	0.50	3.88	3.88	16.45	16.45
45	1.50	0.35	6.46	6.46	22.91	22.91
60	2.00	0.25	16.98	16.98	39.89	39.89
80	2.50	0.18	44.96	44.96	84.85	84.85
120	3.00	0.13	13.21	13.21	98.06	98.06
170	3.50	0.09	0.57	0.57	98.63	98.63
200	3.75	0.07	0.05	0.05	98.68	98.68
230	4.00	0.06	0.01	0.01	98.69	98.69

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.88	2.49	2.39	2.11	1.56	0.94	-0.85

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.72	0.30	1.13	-2.04	7.24

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-07-10 Comp.

Analysis Date: 10-30-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,385,121	200,150	North Carolina State Plane	-9.3 NAVD 88

USCS:	Munsell:	Comments:
SP		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.23	0.01	#200 - 1.25 #230 - 1.24		10	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.02	0.02	0.02	0.02
4	-2.25	4.76	0.00	0.00	0.02	0.02
5	-2.00	4.00	0.08	0.08	0.10	0.10
7	-1.50	2.83	0.09	0.09	0.19	0.19
10	-1.00	2.00	0.18	0.18	0.37	0.37
14	-0.50	1.41	0.27	0.27	0.64	0.64
18	0.00	1.00	0.28	0.28	0.92	0.92
25	0.50	0.71	0.47	0.47	1.39	1.39
35	1.00	0.50	0.97	0.97	2.36	2.36
45	1.50	0.35	4.33	4.33	6.69	6.69
60	2.00	0.25	18.18	18.18	24.87	24.87
80	2.50	0.18	49.69	49.69	74.56	74.56
120	3.00	0.13	23.14	23.14	97.70	97.70
170	3.50	0.09	1.01	1.01	98.71	98.71
200	3.75	0.07	0.04	0.04	98.75	98.75
230	4.00	0.06	0.01	0.01	98.76	98.76

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.94	2.70	2.51	2.25	2.00	1.76	1.30

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.19	0.22	0.54	-2.41	15.52

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-07-11 Comp.

Analysis Date: 10-30-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,946	201,018	North Carolina State Plane	-4.4 NAVD 88

USCS:	Munsell:	Comments:
SP		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.29	0.01	#200 - 1.31 #230 - 1.30		8	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.07	0.07	0.07	0.07
4	-2.25	4.76	0.06	0.06	0.13	0.13
5	-2.00	4.00	0.09	0.09	0.22	0.22
7	-1.50	2.83	0.36	0.36	0.58	0.58
10	-1.00	2.00	0.36	0.36	0.94	0.94
14	-0.50	1.41	0.61	0.61	1.55	1.55
18	0.00	1.00	0.74	0.74	2.29	2.29
25	0.50	0.71	0.93	0.93	3.22	3.22
35	1.00	0.50	1.41	1.41	4.63	4.63
45	1.50	0.35	3.49	3.49	8.12	8.12
60	2.00	0.25	15.84	15.84	23.96	23.96
80	2.50	0.18	53.56	53.56	77.52	77.52
120	3.00	0.13	20.04	20.04	97.56	97.56
170	3.50	0.09	1.09	1.09	98.65	98.65
200	3.75	0.07	0.04	0.04	98.69	98.69
230	4.00	0.06	0.01	0.01	98.70	98.70

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.94	2.66	2.48	2.24	2.01	1.75	1.05

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.13	0.23	0.67	-2.94	15.81

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-07-12 Comp.

Analysis Date: 10-30-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,433	200,711	North Carolina State Plane	-7.5 NAVD 88

USCS:	Munsell:	Comments:
SP		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.37	0.04	#200 - 1.43 #230 - 1.41		5	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.02	0.02	0.02	0.02
10	-1.00	2.00	0.01	0.01	0.03	0.03
14	-0.50	1.41	0.01	0.01	0.04	0.04
18	0.00	1.00	0.03	0.03	0.07	0.07
25	0.50	0.71	0.06	0.06	0.13	0.13
35	1.00	0.50	0.21	0.21	0.34	0.34
45	1.50	0.35	1.00	1.00	1.34	1.34
60	2.00	0.25	11.66	11.66	13.00	13.00
80	2.50	0.18	57.39	57.39	70.39	70.39
120	3.00	0.13	26.23	26.23	96.62	96.62
170	3.50	0.09	1.87	1.87	98.49	98.49
200	3.75	0.07	0.08	0.08	98.57	98.57
230	4.00	0.06	0.02	0.02	98.59	98.59

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.97	2.76	2.59	2.32	2.10	2.03	1.66

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.33	0.20	0.37	-0.77	9.34

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-07-13 Comp.

Analysis Date: 10-30-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,385,692	200,595	North Carolina State Plane	-10.6 NAVD 88

USCS:	Munsell:	Comments:
SP		Composite data. Average dry Munsell Value is 6.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.45	0.02	#200 - 1.51 #230 - 1.47		6	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.13	0.13	0.13	0.13
3.5	-2.50	5.66	0.01	0.01	0.14	0.14
4	-2.25	4.76	0.03	0.03	0.17	0.17
5	-2.00	4.00	0.04	0.04	0.21	0.21
7	-1.50	2.83	0.11	0.11	0.32	0.32
10	-1.00	2.00	0.26	0.26	0.58	0.58
14	-0.50	1.41	0.41	0.41	0.99	0.99
18	0.00	1.00	0.54	0.54	1.53	1.53
25	0.50	0.71	0.77	0.77	2.30	2.30
35	1.00	0.50	1.30	1.30	3.60	3.60
45	1.50	0.35	3.67	3.67	7.27	7.27
60	2.00	0.25	10.76	10.76	18.03	18.03
80	2.50	0.18	45.70	45.70	63.73	63.73
120	3.00	0.13	32.03	32.03	95.76	95.76
170	3.50	0.09	2.62	2.62	98.38	98.38
200	3.75	0.07	0.11	0.11	98.49	98.49
230	4.00	0.06	0.04	0.04	98.53	98.53

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.99	2.82	2.68	2.35	2.08	1.91	1.19

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.26	0.21	0.64	-2.92	18.13

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-07-15 Comp.

Analysis Date: 10-29-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,715	200,330	North Carolina State Plane	-5.3 NAVD 88

USCS:	Munsell:	Comments:
SP		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.06	0.02	#200 - 1.10 #230 - 1.08		5	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.01	0.01	0.01	0.01
7	-1.50	2.83	0.04	0.04	0.05	0.05
10	-1.00	2.00	0.06	0.06	0.11	0.11
14	-0.50	1.41	0.12	0.12	0.23	0.23
18	0.00	1.00	0.15	0.15	0.38	0.38
25	0.50	0.71	0.31	0.31	0.69	0.69
35	1.00	0.50	0.66	0.66	1.35	1.35
45	1.50	0.35	2.22	2.22	3.57	3.57
60	2.00	0.25	16.41	16.41	19.98	19.98
80	2.50	0.18	49.65	49.65	69.63	69.63
120	3.00	0.13	28.03	28.03	97.66	97.66
170	3.50	0.09	1.20	1.20	98.86	98.86
200	3.75	0.07	0.04	0.04	98.90	98.90
230	4.00	0.06	0.02	0.02	98.92	98.92

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.95	2.76	2.60	2.30	2.05	1.88	1.54

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.27	0.21	0.46	-1.77	12.35

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-07-16 Comp.

Analysis Date: 10-29-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,474	201,638	North Carolina State Plane	0.0 NAVD 88

USCS:	Munsell:	Comments:
SW		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.01	0.20	#200 - 1.22 #230 - 1.21		12	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	1.64	1.64	1.64	1.64
5/16"	-3.00	8.00	0.06	0.06	1.70	1.70
3.5	-2.50	5.66	0.42	0.42	2.12	2.12
4	-2.25	4.76	0.12	0.12	2.24	2.24
5	-2.00	4.00	0.35	0.35	2.59	2.59
7	-1.50	2.83	0.64	0.64	3.23	3.23
10	-1.00	2.00	0.82	0.82	4.05	4.05
14	-0.50	1.41	1.32	1.32	5.37	5.37
18	0.00	1.00	1.46	1.46	6.83	6.83
25	0.50	0.71	2.08	2.08	8.91	8.91
35	1.00	0.50	2.86	2.86	11.77	11.77
45	1.50	0.35	5.69	5.69	17.46	17.46
60	2.00	0.25	18.10	18.10	35.56	35.56
80	2.50	0.18	49.04	49.04	84.60	84.60
120	3.00	0.13	13.64	13.64	98.24	98.24
170	3.50	0.09	0.49	0.49	98.73	98.73
200	3.75	0.07	0.05	0.05	98.78	98.78
230	4.00	0.06	0.01	0.01	98.79	98.79

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.88	2.49	2.40	2.15	1.71	1.37	-0.64

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.81	0.29	1.16	-2.9	12.49

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-07-17 Comp.

Analysis Date: 10-30-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,728	201,394	North Carolina State Plane	-3.0 NAVD 88

USCS:	Munsell:	Comments:
SW		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.04	0.01	#200 - 1.06 #230 - 1.05		13	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
1"	-4.75	26.91	0.00	0.00	0.00	0.00
3/4"	-4.25	19.03	0.33	0.33	0.33	0.33
5/8"	-4.00	16.00	0.42	0.42	0.75	0.75
7/16"	-3.50	11.31	0.15	0.15	0.90	0.90
5/16"	-3.00	8.00	0.29	0.29	1.19	1.19
3.5	-2.50	5.66	0.36	0.36	1.55	1.55
4	-2.25	4.76	0.09	0.09	1.64	1.64
5	-2.00	4.00	0.21	0.21	1.85	1.85
7	-1.50	2.83	0.61	0.61	2.46	2.46
10	-1.00	2.00	1.01	1.01	3.47	3.47
14	-0.50	1.41	1.58	1.58	5.05	5.05
18	0.00	1.00	1.78	1.78	6.83	6.83
25	0.50	0.71	2.25	2.25	9.08	9.08
35	1.00	0.50	3.33	3.33	12.41	12.41
45	1.50	0.35	8.00	8.00	20.41	20.41
60	2.00	0.25	24.49	24.49	44.90	44.90
80	2.50	0.18	42.70	42.70	87.60	87.60
120	3.00	0.13	10.96	10.96	98.56	98.56
170	3.50	0.09	0.36	0.36	98.92	98.92
200	3.75	0.07	0.02	0.02	98.94	98.94
230	4.00	0.06	0.01	0.01	98.95	98.95

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.84	2.46	2.35	2.06	1.59	1.22	-0.52

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.75	0.30	1.09	-2.84	13.13

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-07-18 Comp.

Analysis Date: 10-29-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,894	201,815	North Carolina State Plane	-3.0 NAVD 88

USCS:	Munsell:	Comments:
SP		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.95	0.08	#200 - 1.04 #230 - 1.03		9	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.28	0.28	0.28	0.28
3.5	-2.50	5.66	0.22	0.22	0.50	0.50
4	-2.25	4.76	0.08	0.08	0.58	0.58
5	-2.00	4.00	0.18	0.18	0.76	0.76
7	-1.50	2.83	0.25	0.25	1.01	1.01
10	-1.00	2.00	0.48	0.48	1.49	1.49
14	-0.50	1.41	0.72	0.72	2.21	2.21
18	0.00	1.00	0.90	0.90	3.11	3.11
25	0.50	0.71	1.61	1.61	4.72	4.72
35	1.00	0.50	3.45	3.45	8.17	8.17
45	1.50	0.35	10.28	10.28	18.45	18.45
60	2.00	0.25	25.83	25.83	44.28	44.28
80	2.50	0.18	40.84	40.84	85.12	85.12
120	3.00	0.13	13.29	13.29	98.41	98.41
170	3.50	0.09	0.54	0.54	98.95	98.95
200	3.75	0.07	0.01	0.01	98.96	98.96
230	4.00	0.06	0.01	0.01	98.97	98.97

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.87	2.49	2.38	2.07	1.63	1.38	0.54

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.89	0.27	0.8	-2.58	13.45

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-07-19 Comp.

Analysis Date: 08-28-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,020	200,054	North Carolina State Plane	-4.0 NAVD 88

USCS:	Munsell:	Comments:
SP		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.13	0.03	#200 - 1.16 #230 - 1.16		5	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.01	0.01	0.01	0.01
5	-2.00	4.00	0.01	0.01	0.02	0.02
7	-1.50	2.83	0.03	0.03	0.05	0.05
10	-1.00	2.00	0.10	0.10	0.15	0.15
14	-0.50	1.41	0.16	0.16	0.31	0.31
18	0.00	1.00	0.19	0.19	0.50	0.50
25	0.50	0.71	0.26	0.26	0.76	0.76
35	1.00	0.50	0.69	0.69	1.45	1.45
45	1.50	0.35	3.30	3.30	4.75	4.75
60	2.00	0.25	24.90	24.90	29.65	29.65
80	2.50	0.18	56.10	56.10	85.75	85.75
120	3.00	0.13	12.78	12.78	98.53	98.53
170	3.50	0.09	0.30	0.30	98.83	98.83
200	3.75	0.07	0.01	0.01	98.84	98.84
230	4.00	0.06	0.00	0.00	98.84	98.84

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.86	2.48	2.40	2.18	1.91	1.73	1.51

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.13	0.23	0.44	-2.07	15.2

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-08-01 Comp.

Analysis Date: 10-30-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,385,534	200,207	North Carolina State Plane	-10.6 NAVD 88

USCS:	Munsell:	Comments:
SP		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.43	0.00	#200 - 1.46 #230 - 1.43		10	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.02	0.02	0.02	0.02
7	-1.50	2.83	0.08	0.08	0.10	0.10
10	-1.00	2.00	0.15	0.15	0.25	0.25
14	-0.50	1.41	0.21	0.21	0.46	0.46
18	0.00	1.00	0.17	0.17	0.63	0.63
25	0.50	0.71	0.31	0.31	0.94	0.94
35	1.00	0.50	0.50	0.50	1.44	1.44
45	1.50	0.35	1.31	1.31	2.75	2.75
60	2.00	0.25	9.10	9.10	11.85	11.85
80	2.50	0.18	46.91	46.91	58.76	58.76
120	3.00	0.13	36.67	36.67	95.43	95.43
170	3.50	0.09	2.98	2.98	98.41	98.41
200	3.75	0.07	0.13	0.13	98.54	98.54
230	4.00	0.06	0.03	0.03	98.57	98.57

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.99	2.84	2.72	2.41	2.14	2.04	1.62

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.38	0.19	0.49	-2.56	18.4

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-08-02 Comp.

Analysis Date: 10-30-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,109	200,498	North Carolina State Plane	-4.8 NAVD 88

USCS:	Munsell:	Comments:
SP		Composite data. Average dry Munsell Value is 8.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.18	0.05	#200 - 1.25 #230 - 1.23		5	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.19	0.19	0.19	0.19
4	-2.25	4.76	0.00	0.00	0.19	0.19
5	-2.00	4.00	0.01	0.01	0.20	0.20
7	-1.50	2.83	0.03	0.03	0.23	0.23
10	-1.00	2.00	0.16	0.16	0.39	0.39
14	-0.50	1.41	0.06	0.06	0.45	0.45
18	0.00	1.00	0.15	0.15	0.60	0.60
25	0.50	0.71	0.20	0.20	0.80	0.80
35	1.00	0.50	0.57	0.57	1.37	1.37
45	1.50	0.35	1.82	1.82	3.19	3.19
60	2.00	0.25	9.77	9.77	12.96	12.96
80	2.50	0.18	46.50	46.50	59.46	59.46
120	3.00	0.13	36.58	36.58	96.04	96.04
170	3.50	0.09	2.63	2.63	98.67	98.67
200	3.75	0.07	0.08	0.08	98.75	98.75
230	4.00	0.06	0.02	0.02	98.77	98.77

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.99	2.84	2.71	2.40	2.13	2.03	1.59

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.36	0.19	0.51	-3.38	28.76

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-08-03 Comp.

Analysis Date: 10-30-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,390	201,128	North Carolina State Plane	-3.6 NAVD 88

USCS:	Munsell:	Comments:
SW		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.19	0.01	#200 - 1.22 #230 - 1.20		9	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.13	0.13	0.13	0.13
5/16"	-3.00	8.00	0.34	0.34	0.47	0.47
3.5	-2.50	5.66	0.32	0.32	0.79	0.79
4	-2.25	4.76	0.29	0.29	1.08	1.08
5	-2.00	4.00	0.29	0.29	1.37	1.37
7	-1.50	2.83	0.66	0.66	2.03	2.03
10	-1.00	2.00	0.74	0.74	2.77	2.77
14	-0.50	1.41	1.17	1.17	3.94	3.94
18	0.00	1.00	1.30	1.30	5.24	5.24
25	0.50	0.71	1.15	1.15	6.39	6.39
35	1.00	0.50	1.46	1.46	7.85	7.85
45	1.50	0.35	2.45	2.45	10.30	10.30
60	2.00	0.25	7.04	7.04	17.34	17.34
80	2.50	0.18	40.54	40.54	57.88	57.88
120	3.00	0.13	38.47	38.47	96.35	96.35
170	3.50	0.09	2.36	2.36	98.71	98.71
200	3.75	0.07	0.07	0.07	98.78	98.78
230	4.00	0.06	0.02	0.02	98.80	98.80

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.98	2.84	2.72	2.40	2.09	1.90	-0.09

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.17	0.22	0.99	-3.05	13.59

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-08-04 Comp.

Analysis Date: 10-29-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,485	202,080	North Carolina State Plane	-3.0 NAVD 88

USCS:	Munsell:	Comments:
SW		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.12	0.02	#200 - 1.15 #230 - 1.14		20	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.28	0.28	0.28	0.28
7/16"	-3.50	11.31	0.73	0.73	1.01	1.01
5/16"	-3.00	8.00	0.31	0.31	1.32	1.32
3.5	-2.50	5.66	0.67	0.67	1.99	1.99
4	-2.25	4.76	0.39	0.39	2.38	2.38
5	-2.00	4.00	0.66	0.66	3.04	3.04
7	-1.50	2.83	1.46	1.46	4.50	4.50
10	-1.00	2.00	1.73	1.73	6.23	6.23
14	-0.50	1.41	2.30	2.30	8.53	8.53
18	0.00	1.00	2.26	2.26	10.79	10.79
25	0.50	0.71	2.28	2.28	13.07	13.07
35	1.00	0.50	3.39	3.39	16.46	16.46
45	1.50	0.35	6.85	6.85	23.31	23.31
60	2.00	0.25	19.87	19.87	43.18	43.18
80	2.50	0.18	43.66	43.66	86.84	86.84
120	3.00	0.13	11.64	11.64	98.48	98.48
170	3.50	0.09	0.35	0.35	98.83	98.83
200	3.75	0.07	0.02	0.02	98.85	98.85
230	4.00	0.06	0.01	0.01	98.86	98.86

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.85	2.47	2.36	2.08	1.54	0.93	-1.36

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.64	0.32	1.27	-2.22	7.97

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-08-05 Comp.

Analysis Date: 10-29-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,173	201,385	North Carolina State Plane	-2.0 NAVD 88

USCS:	Munsell:	Comments:
SW		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.07	0.01	#200 - 1.10 #230 - 1.08		14	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.11	0.11	0.11	0.11
3.5	-2.50	5.66	0.23	0.23	0.34	0.34
4	-2.25	4.76	0.19	0.19	0.53	0.53
5	-2.00	4.00	0.37	0.37	0.90	0.90
7	-1.50	2.83	0.57	0.57	1.47	1.47
10	-1.00	2.00	0.89	0.89	2.36	2.36
14	-0.50	1.41	1.46	1.46	3.82	3.82
18	0.00	1.00	1.91	1.91	5.73	5.73
25	0.50	0.71	2.03	2.03	7.76	7.76
35	1.00	0.50	3.61	3.61	11.37	11.37
45	1.50	0.35	7.24	7.24	18.61	18.61
60	2.00	0.25	20.05	20.05	38.66	38.66
80	2.50	0.18	44.70	44.70	83.36	83.36
120	3.00	0.13	14.87	14.87	98.23	98.23
170	3.50	0.09	0.64	0.64	98.87	98.87
200	3.75	0.07	0.03	0.03	98.90	98.90
230	4.00	0.06	0.02	0.02	98.92	98.92

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.89	2.52	2.41	2.13	1.66	1.32	-0.19

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.87	0.27	0.92	-2.26	9.23

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-08-06 Comp.

Analysis Date: 10-30-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,618	200,973	North Carolina State Plane	-1.1 NAVD 88

USCS:	Munsell:	Comments:
SP		Composite data. Average dry Munsell Value is 8.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.21	0.00	#200 - 1.22 #230 - 1.21		4	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.05	0.05	0.05	0.05
5/16"	-3.00	8.00	0.34	0.34	0.39	0.39
3.5	-2.50	5.66	0.03	0.03	0.42	0.42
4	-2.25	4.76	0.08	0.08	0.50	0.50
5	-2.00	4.00	0.03	0.03	0.53	0.53
7	-1.50	2.83	0.07	0.07	0.60	0.60
10	-1.00	2.00	0.11	0.11	0.71	0.71
14	-0.50	1.41	0.17	0.17	0.88	0.88
18	0.00	1.00	0.17	0.17	1.05	1.05
25	0.50	0.71	0.23	0.23	1.28	1.28
35	1.00	0.50	0.44	0.44	1.72	1.72
45	1.50	0.35	1.26	1.26	2.98	2.98
60	2.00	0.25	6.99	6.99	9.97	9.97
80	2.50	0.18	47.50	47.50	57.47	57.47
120	3.00	0.13	38.60	38.60	96.07	96.07
170	3.50	0.09	2.63	2.63	98.70	98.70
200	3.75	0.07	0.08	0.08	98.78	98.78
230	4.00	0.06	0.01	0.01	98.79	98.79

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.99	2.84	2.73	2.42	2.16	2.06	1.64

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.37	0.19	0.6	-4.97	42.23

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-08-07 Comp.

Analysis Date: 10-29-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,723	200,701	North Carolina State Plane	-3.7 NAVD 88

USCS:	Munsell:	Comments:
SP		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.96	0.02	#200 - 0.99 #230 - 0.98		10	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.23	0.23	0.23	0.23
4	-2.25	4.76	0.05	0.05	0.28	0.28
5	-2.00	4.00	0.18	0.18	0.46	0.46
7	-1.50	2.83	0.35	0.35	0.81	0.81
10	-1.00	2.00	0.40	0.40	1.21	1.21
14	-0.50	1.41	0.64	0.64	1.85	1.85
18	0.00	1.00	0.83	0.83	2.68	2.68
25	0.50	0.71	0.87	0.87	3.55	3.55
35	1.00	0.50	1.40	1.40	4.95	4.95
45	1.50	0.35	3.49	3.49	8.44	8.44
60	2.00	0.25	15.47	15.47	23.91	23.91
80	2.50	0.18	52.93	52.93	76.84	76.84
120	3.00	0.13	21.29	21.29	98.13	98.13
170	3.50	0.09	0.83	0.83	98.96	98.96
200	3.75	0.07	0.05	0.05	99.01	99.01
230	4.00	0.06	0.01	0.01	99.02	99.02

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.93	2.67	2.48	2.25	2.01	1.74	1.01

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.12	0.23	0.71	-3.14	16.87

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-08-08 Comp.

Analysis Date: 10-29-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,411	200,087	North Carolina State Plane	-7.0 NAVD 88

USCS:	Munsell:	Comments:
SW		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.20	0.03	#200 - 1.25 #230 - 1.23		16	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.17	0.17	0.17	0.17
3.5	-2.50	5.66	0.49	0.49	0.66	0.66
4	-2.25	4.76	0.30	0.30	0.96	0.96
5	-2.00	4.00	0.28	0.28	1.24	1.24
7	-1.50	2.83	0.88	0.88	2.12	2.12
10	-1.00	2.00	1.07	1.07	3.19	3.19
14	-0.50	1.41	1.89	1.89	5.08	5.08
18	0.00	1.00	2.18	2.18	7.26	7.26
25	0.50	0.71	2.53	2.53	9.79	9.79
35	1.00	0.50	4.62	4.62	14.41	14.41
45	1.50	0.35	11.69	11.69	26.10	26.10
60	2.00	0.25	26.20	26.20	52.30	52.30
80	2.50	0.18	35.60	35.60	87.90	87.90
120	3.00	0.13	10.49	10.49	98.39	98.39
170	3.50	0.09	0.35	0.35	98.74	98.74
200	3.75	0.07	0.01	0.01	98.75	98.75
230	4.00	0.06	0.02	0.02	98.77	98.77

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.84	2.45	2.32	1.96	1.45	1.07	-0.52

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.69	0.31	0.99	-2.03	7.95

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-08-09 Comp.

Analysis Date: 10-29-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,900	199,466	North Carolina State Plane	-9.7 NAVD 88

USCS:	Munsell:	Comments:
SP		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.23	0.00	#200 - 1.24 #230 - 1.23		7	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.04	0.04	0.04	0.04
3.5	-2.50	5.66	0.00	0.00	0.04	0.04
4	-2.25	4.76	0.00	0.00	0.04	0.04
5	-2.00	4.00	0.04	0.04	0.08	0.08
7	-1.50	2.83	0.09	0.09	0.17	0.17
10	-1.00	2.00	0.16	0.16	0.33	0.33
14	-0.50	1.41	0.20	0.20	0.53	0.53
18	0.00	1.00	0.25	0.25	0.78	0.78
25	0.50	0.71	0.39	0.39	1.17	1.17
35	1.00	0.50	0.77	0.77	1.94	1.94
45	1.50	0.35	2.15	2.15	4.09	4.09
60	2.00	0.25	11.15	11.15	15.24	15.24
80	2.50	0.18	49.46	49.46	64.70	64.70
120	3.00	0.13	32.09	32.09	96.79	96.79
170	3.50	0.09	1.93	1.93	98.72	98.72
200	3.75	0.07	0.04	0.04	98.76	98.76
230	4.00	0.06	0.01	0.01	98.77	98.77

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.97	2.80	2.66	2.35	2.10	2.01	1.54

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.31	0.20	0.52	-2.88	20.86

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 3

Sample Name: FEVC-08-10 Comp.

Analysis Date: 10-29-09

Analyzed By: PB

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,389,697	199,802	North Carolina State Plane	-8.5 NAVD 88

USCS:	Munsell:	Comments:
SW		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.14	0.02	#200 - 1.16 #230 - 1.16		16	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.34	0.34	0.34	0.34
5/16"	-3.00	8.00	0.08	0.08	0.42	0.42
3.5	-2.50	5.66	0.31	0.31	0.73	0.73
4	-2.25	4.76	0.18	0.18	0.91	0.91
5	-2.00	4.00	0.17	0.17	1.08	1.08
7	-1.50	2.83	0.55	0.55	1.63	1.63
10	-1.00	2.00	0.77	0.77	2.40	2.40
14	-0.50	1.41	1.17	1.17	3.57	3.57
18	0.00	1.00	1.27	1.27	4.84	4.84
25	0.50	0.71	1.53	1.53	6.37	6.37
35	1.00	0.50	2.42	2.42	8.79	8.79
45	1.50	0.35	5.77	5.77	14.56	14.56
60	2.00	0.25	17.98	17.98	32.54	32.54
80	2.50	0.18	45.70	45.70	78.24	78.24
120	3.00	0.13	19.97	19.97	98.21	98.21
170	3.50	0.09	0.59	0.59	98.80	98.80
200	3.75	0.07	0.04	0.04	98.84	98.84
230	4.00	0.06	0.00	0.00	98.84	98.84

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

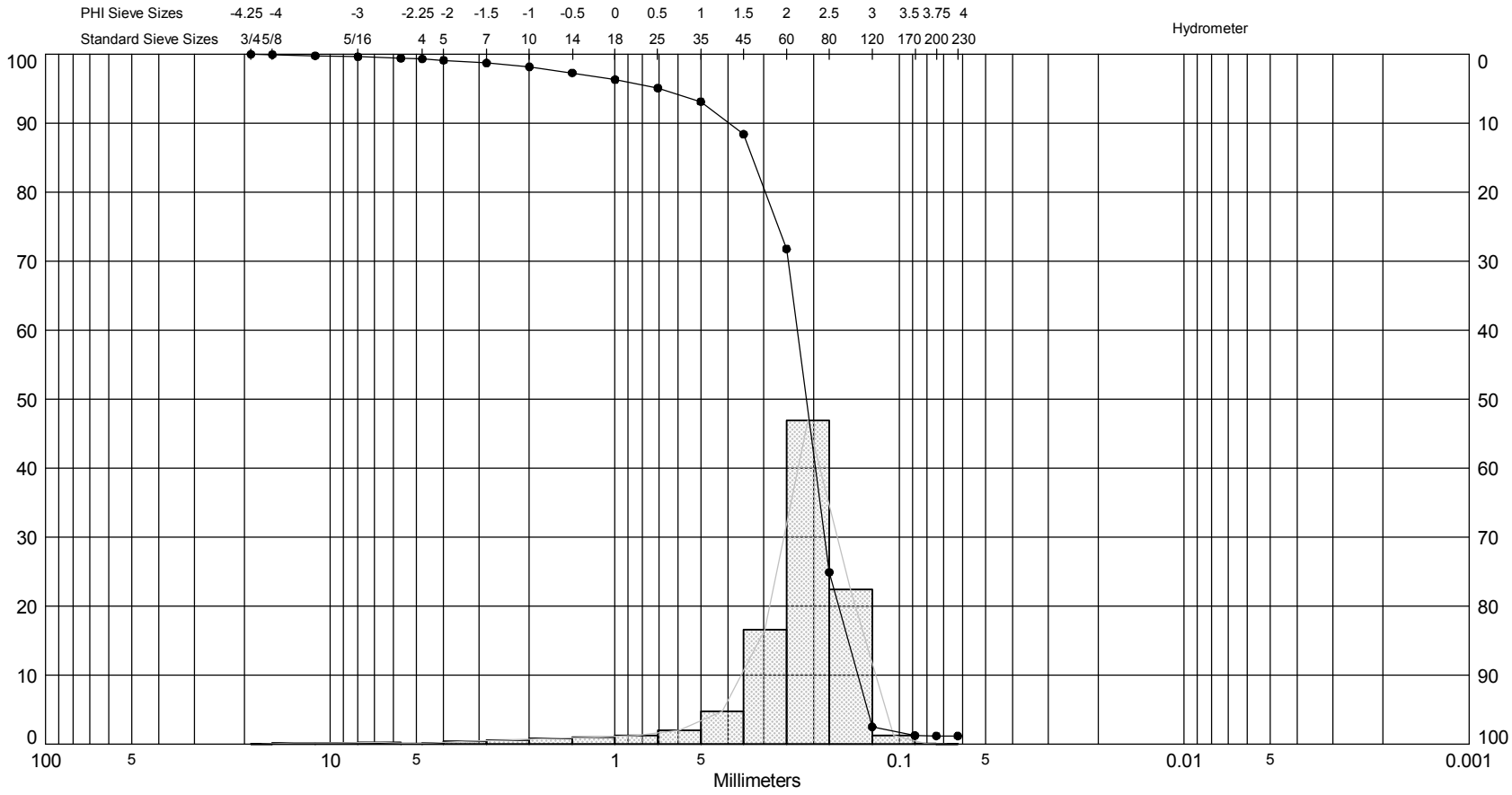
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.92	2.64	2.46	2.19	1.79	1.54	0.05

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.97	0.26	0.93	-2.84	13.42

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

APPENDIX 28

Alternative 3 Channel Corridor Composite Vibracore Grain Size Distribution Curves/Histograms



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
Alternative 3 composite	—●—			#200 - 1.19 #230 - 1.18		10	2.23	2.06	-3.07	15.95	0.85

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-30-09
Analyzed By:	PB
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
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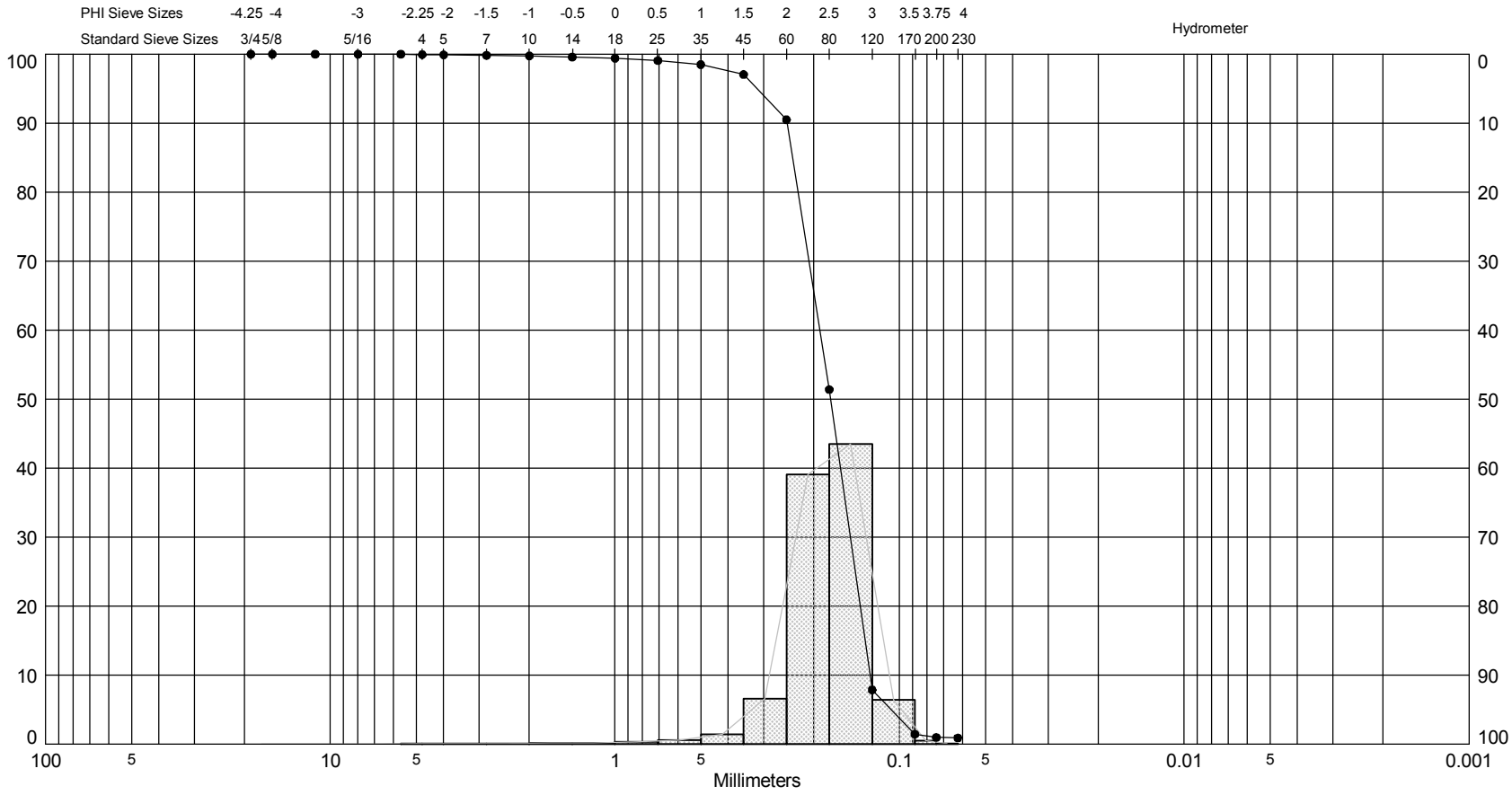
fax (561) 391-9116

SIEVE ANALYSIS FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-01 Comp.	—●—	-15.5	SP	#200 - 0.96 #230 - 0.88		5	2.52	2.46	-2.55	18.88	0.52

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-29-09
Analyzed By:	PB
Easting (X, ft):	2,390,205
Northing (Y, ft):	198,940
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
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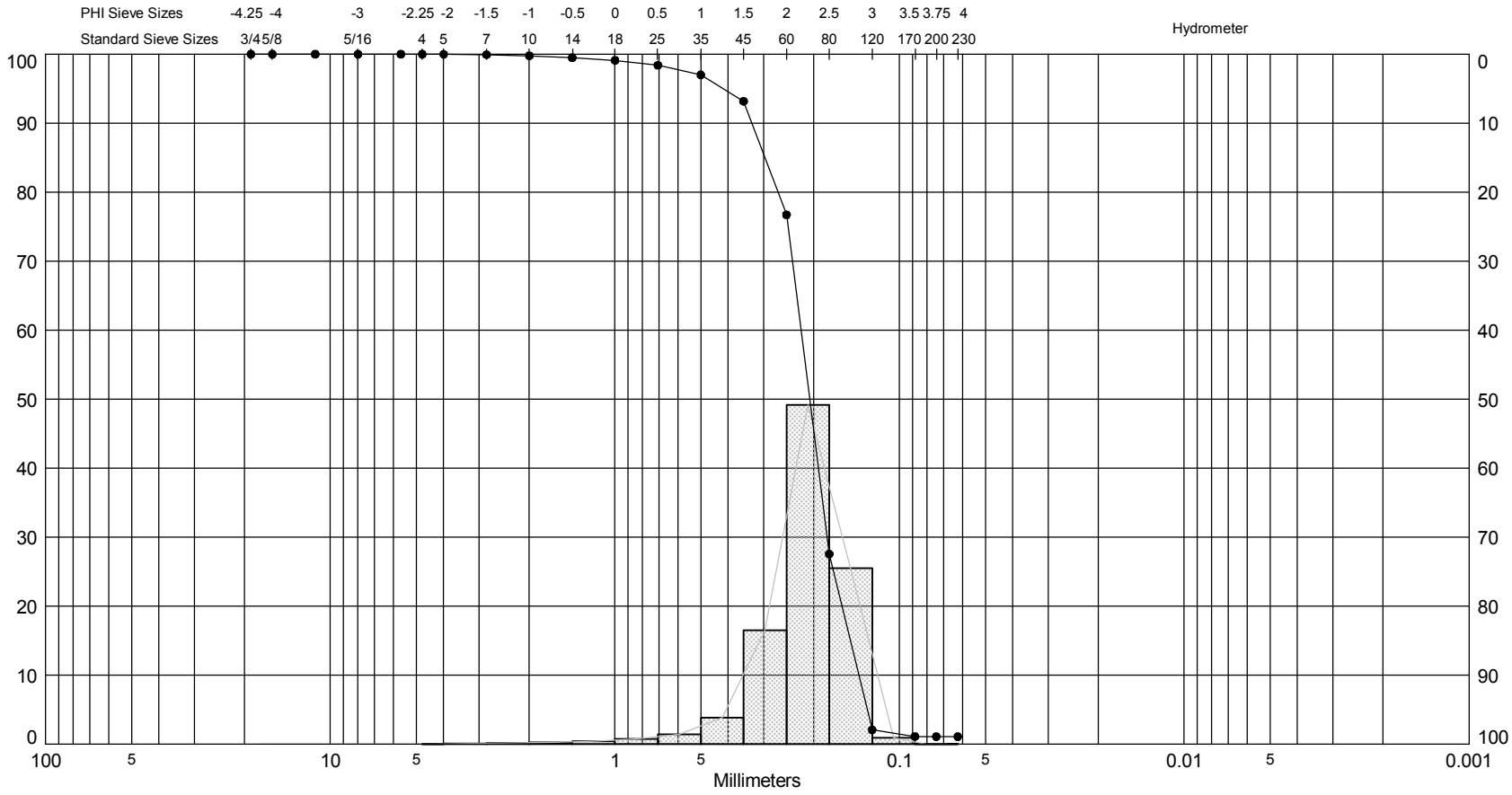
fax (561) 391-9116

SIEVE ANALYSIS FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-02 Comp.	—●—	-9.0	SP	#200 - 1.09 #230 - 1.08		8	2.27	2.2	-2.1	11.72	0.54

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-29-09
Analyzed By:	PB
Easting (X, ft):	2,388,733
Northing (Y, ft):	202,440
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
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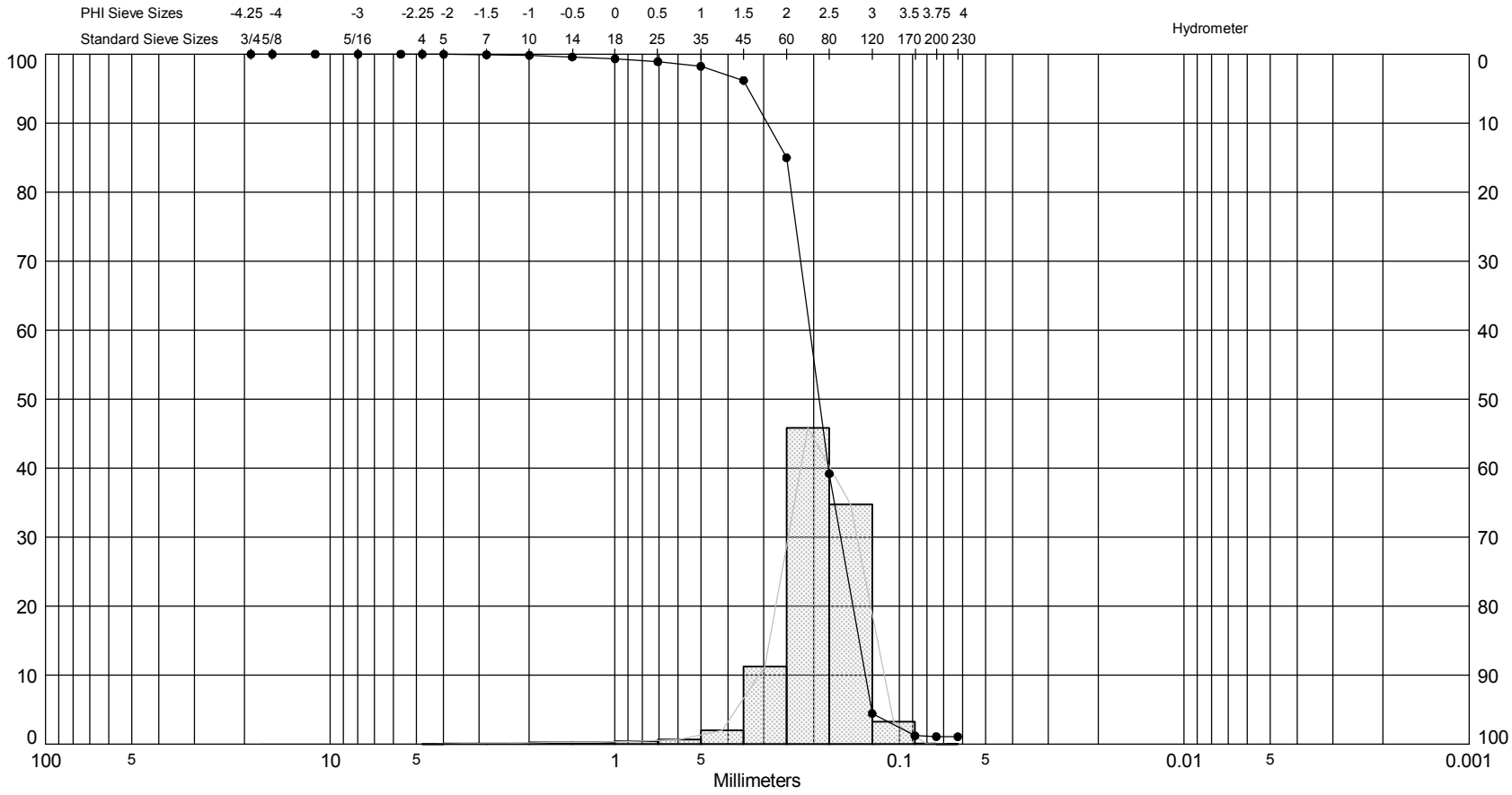
SIEVE ANALYSIS FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-05 Comp.	—●—	-12.9	SP	#200 - 1.09 #230 - 1.07		6	2.38	2.34	-2.16	14.08	0.51

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-29-09
Analyzed By:	PB
Easting (X, ft):	2,389,867
Northing (Y, ft):	199,037
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
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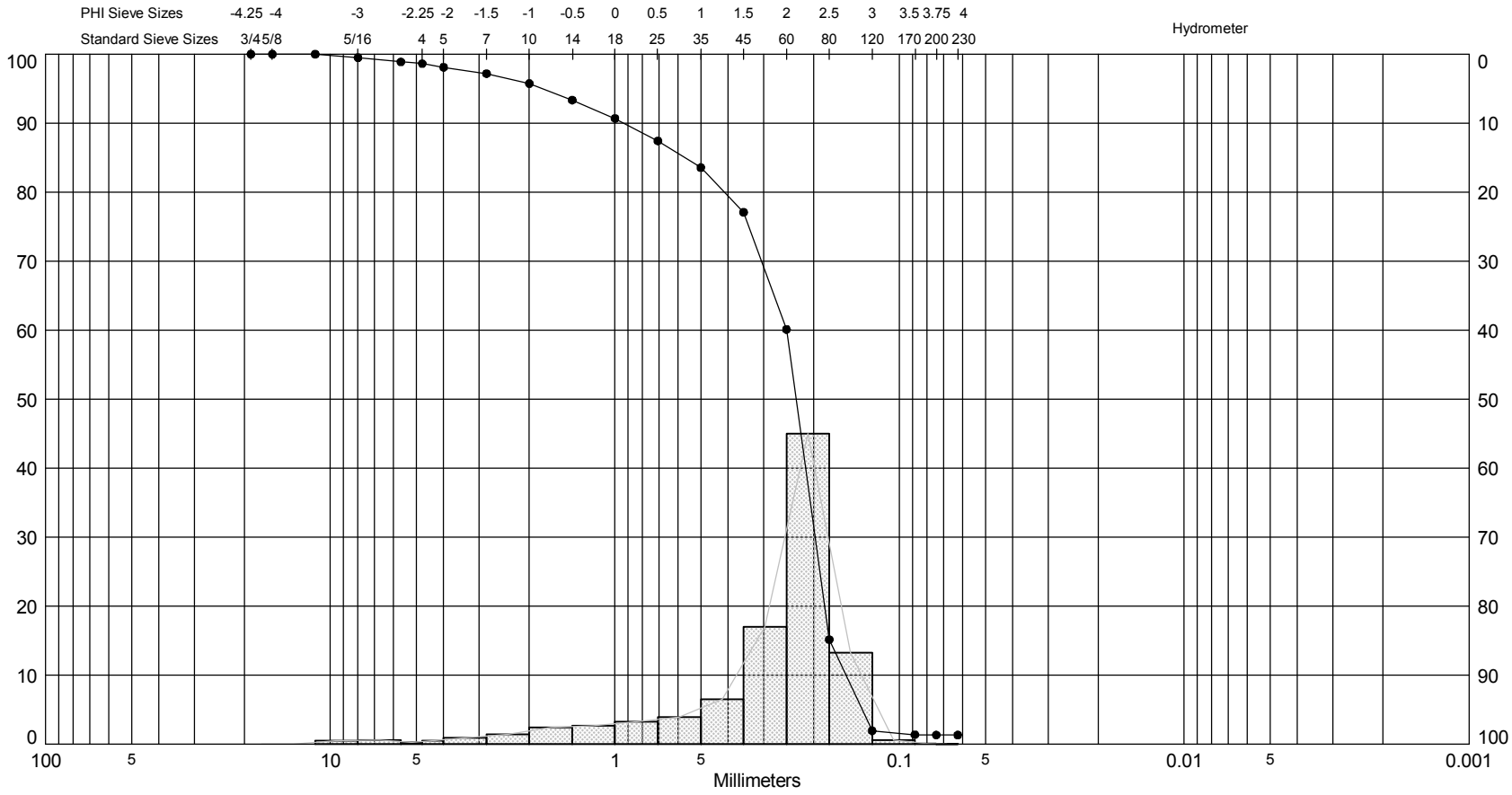
SIEVE ANALYSIS FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-09 Comp.	—●—	-5.8	SW	#200 - 1.32 #230 - 1.31		17	2.11	1.72	-2.04	7.24	1.13

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-29-09
Analyzed By:	PB
Easting (X, ft):	2,388,776
Northing (Y, ft):	201,051
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
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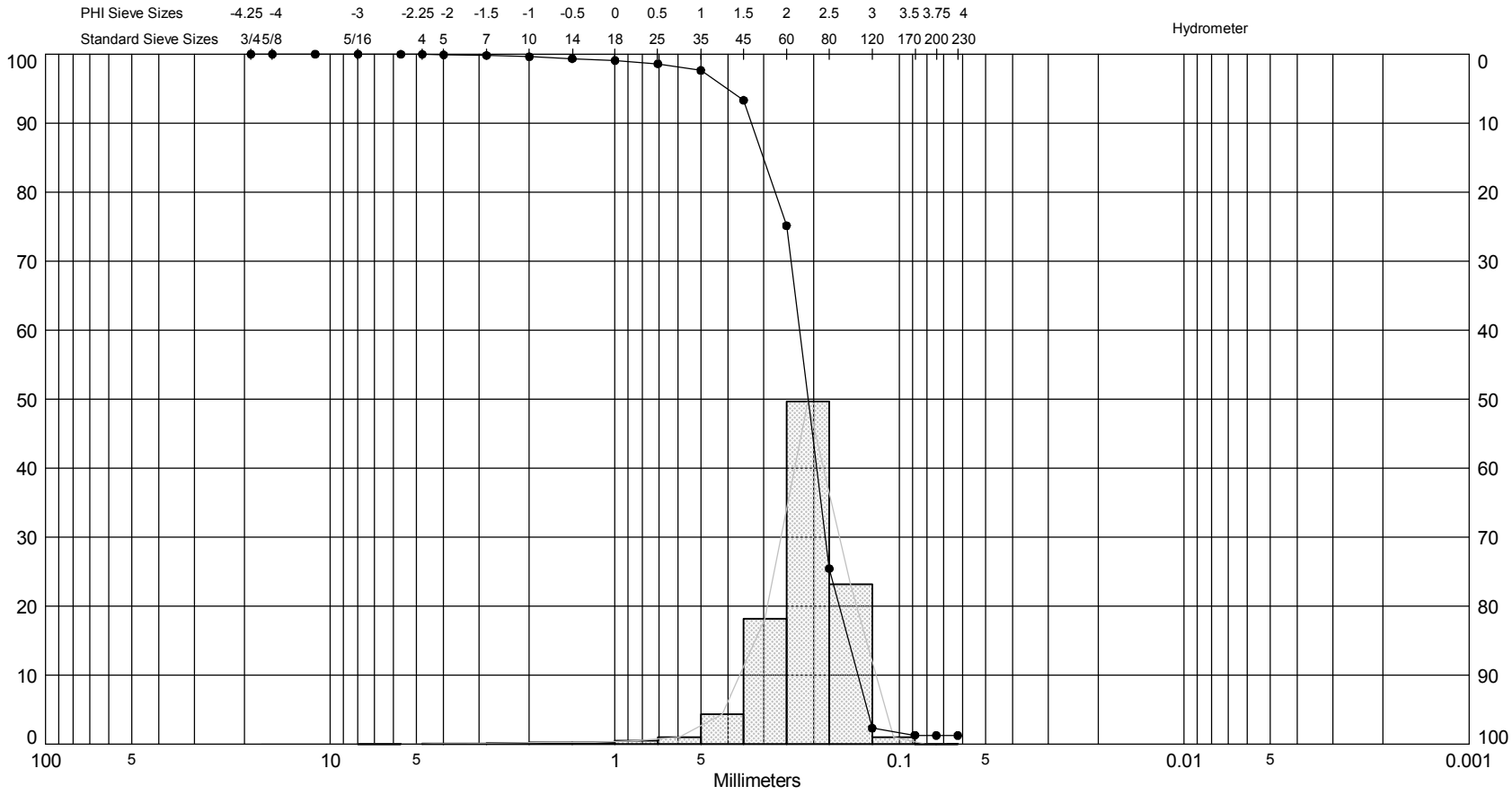
fax (561) 391-9116

SIEVE ANALYSIS FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-10 Comp.	—●—	-9.3	SP	#200 - 1.25 #230 - 1.24		10	2.25	2.19	-2.41	15.52	0.54

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-30-09
Analyzed By:	PB
Easting (X, ft):	2,385,121
Northing (Y, ft):	200,150
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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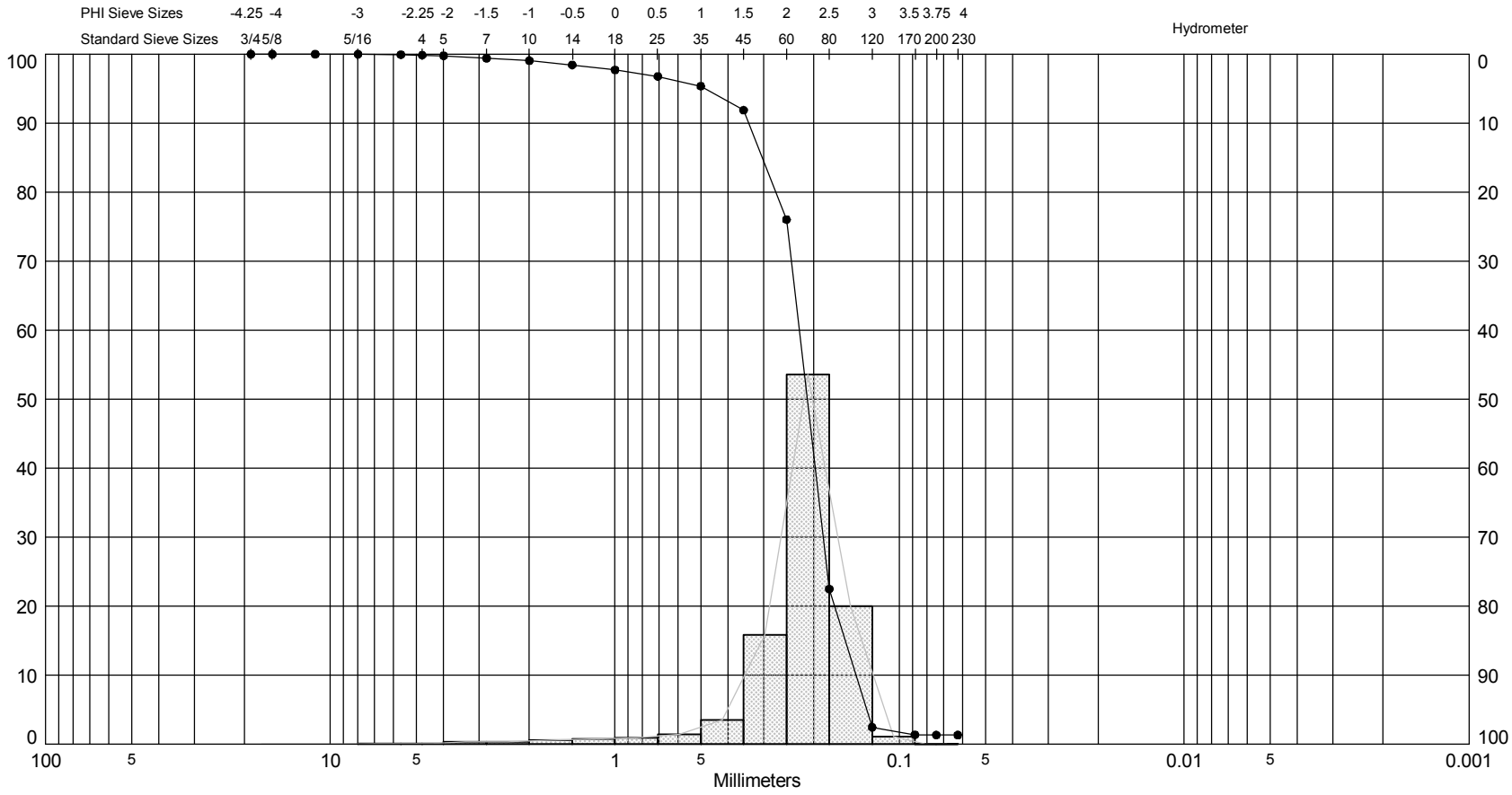

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-11 Comp.	—●—	-4.4	SP	#200 - 1.31 #230 - 1.30		8	2.24	2.13	-2.94	15.81	0.67

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-30-09
Analyzed By:	PB
Easting (X, ft):	2,386,946
Northing (Y, ft):	201,018
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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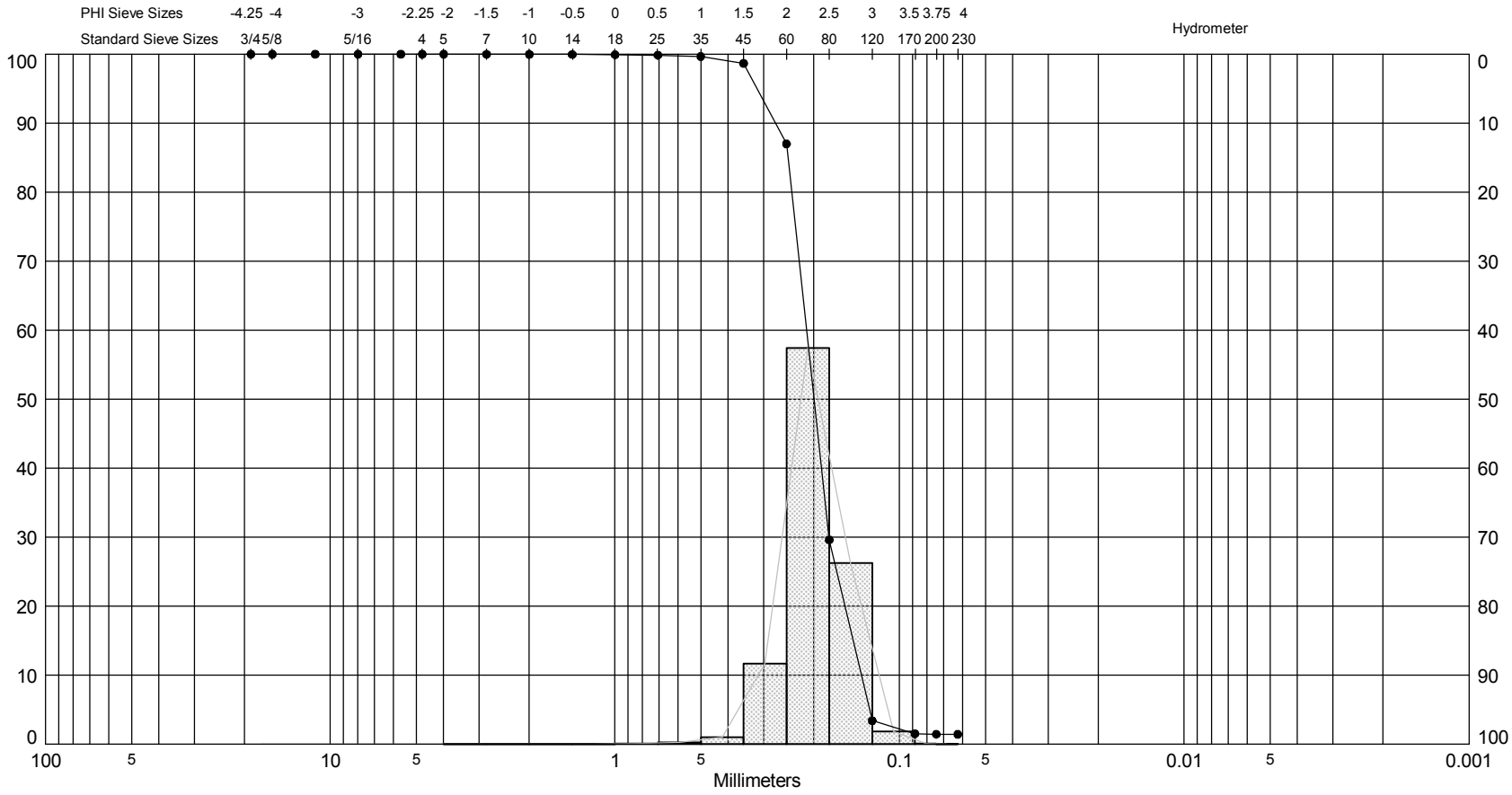

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-12 Comp.	—●—	-7.5	SP	#200 - 1.43 #230 - 1.41		5	2.32	2.33	-0.77	9.34	0.37

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-30-09
Analyzed By:	PB
Easting (X, ft):	2,386,433
Northing (Y, ft):	200,711
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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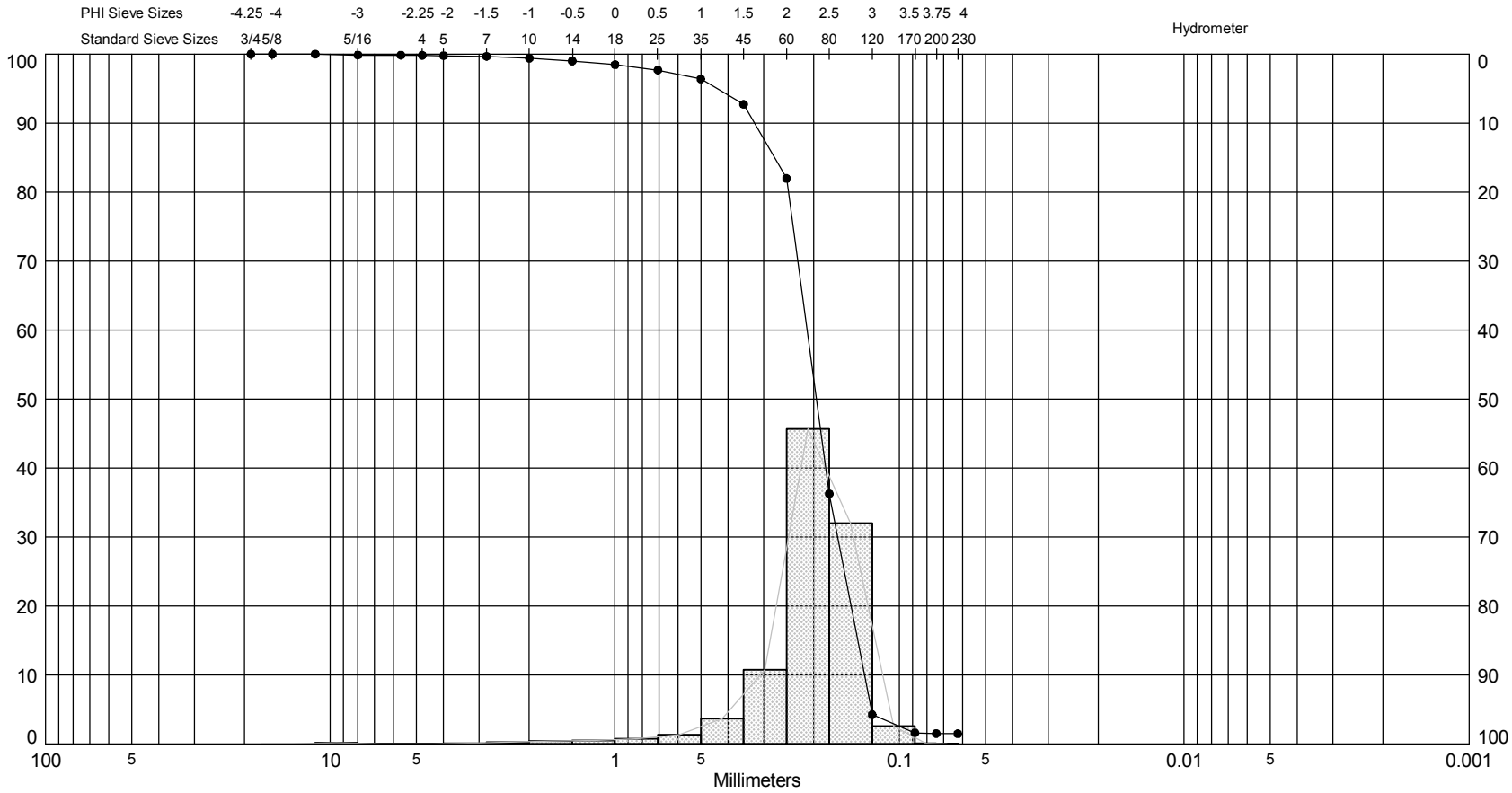

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-13 Comp.	—●—	-10.6	SP	#200 - 1.51 #230 - 1.47		6	2.35	2.26	-2.92	18.13	0.64

Comments: Composite data. Average dry Munsell Value is 6.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-30-09
Analyzed By:	PB
Easting (X, ft):	2,385,692
Northing (Y, ft):	200,595
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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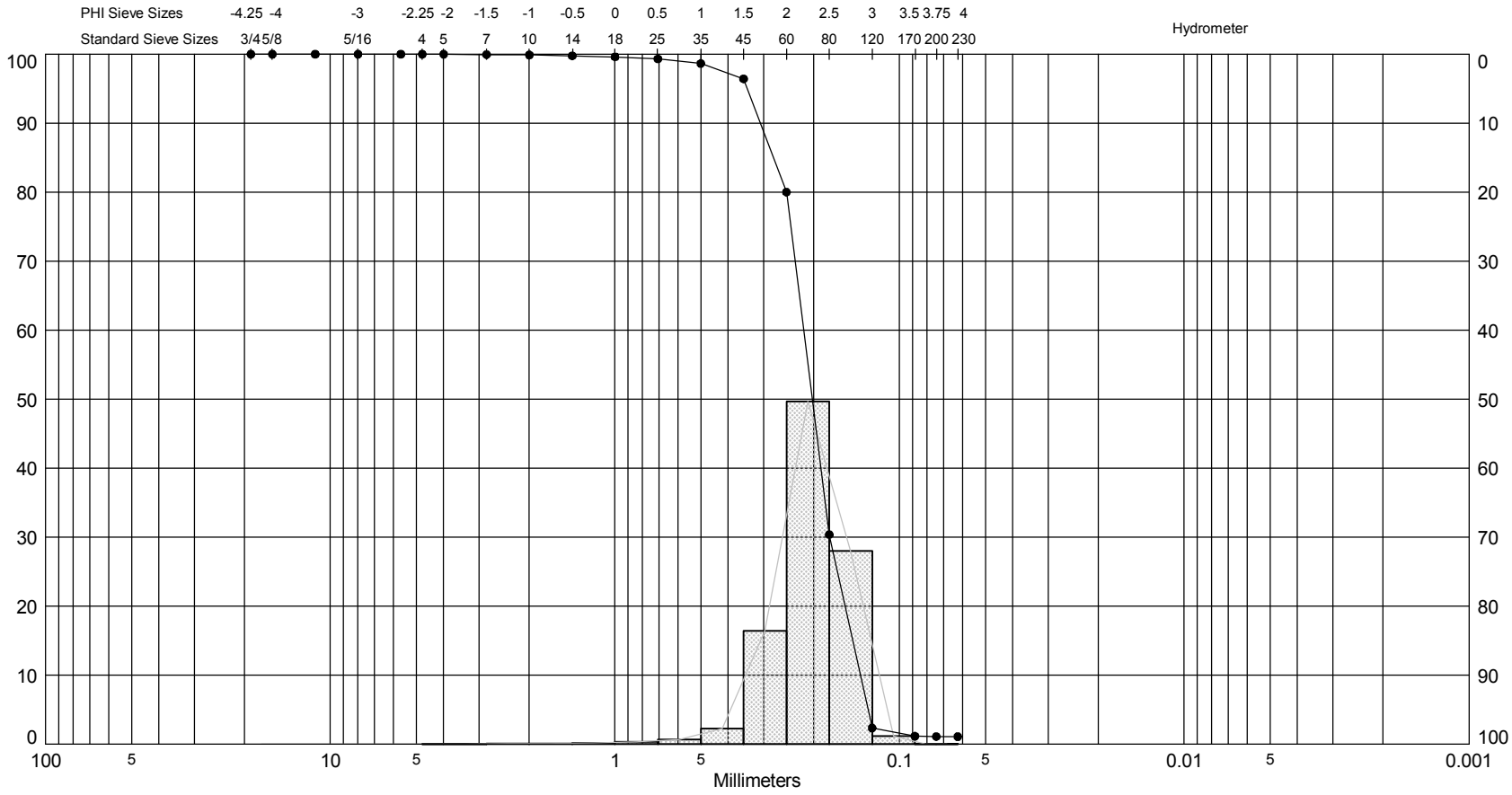

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-15 Comp.	—●—	-5.3	SP	#200 - 1.10 #230 - 1.08		5	2.3	2.27	-1.77	12.35	0.46

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-29-09
Analyzed By:	PB
Easting (X, ft):	2,388,715
Northing (Y, ft):	200,330
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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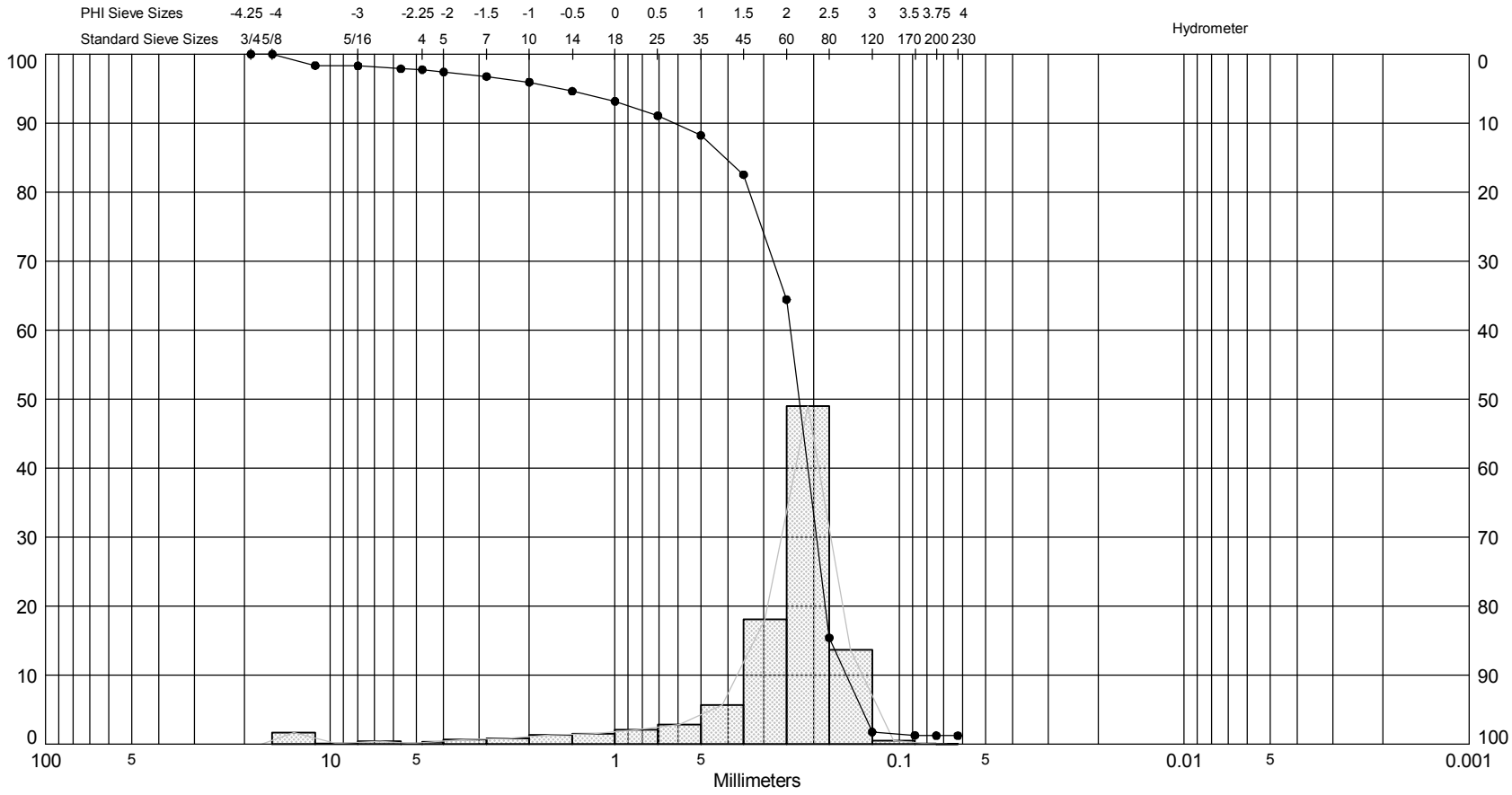

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-16 Comp.	—●—	0.0	SW	#200 - 1.22 #230 - 1.21		12	2.15	1.81	-2.9	12.49	1.16

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-29-09
Analyzed By:	PB
Easting (X, ft):	2,388,474
Northing (Y, ft):	201,638
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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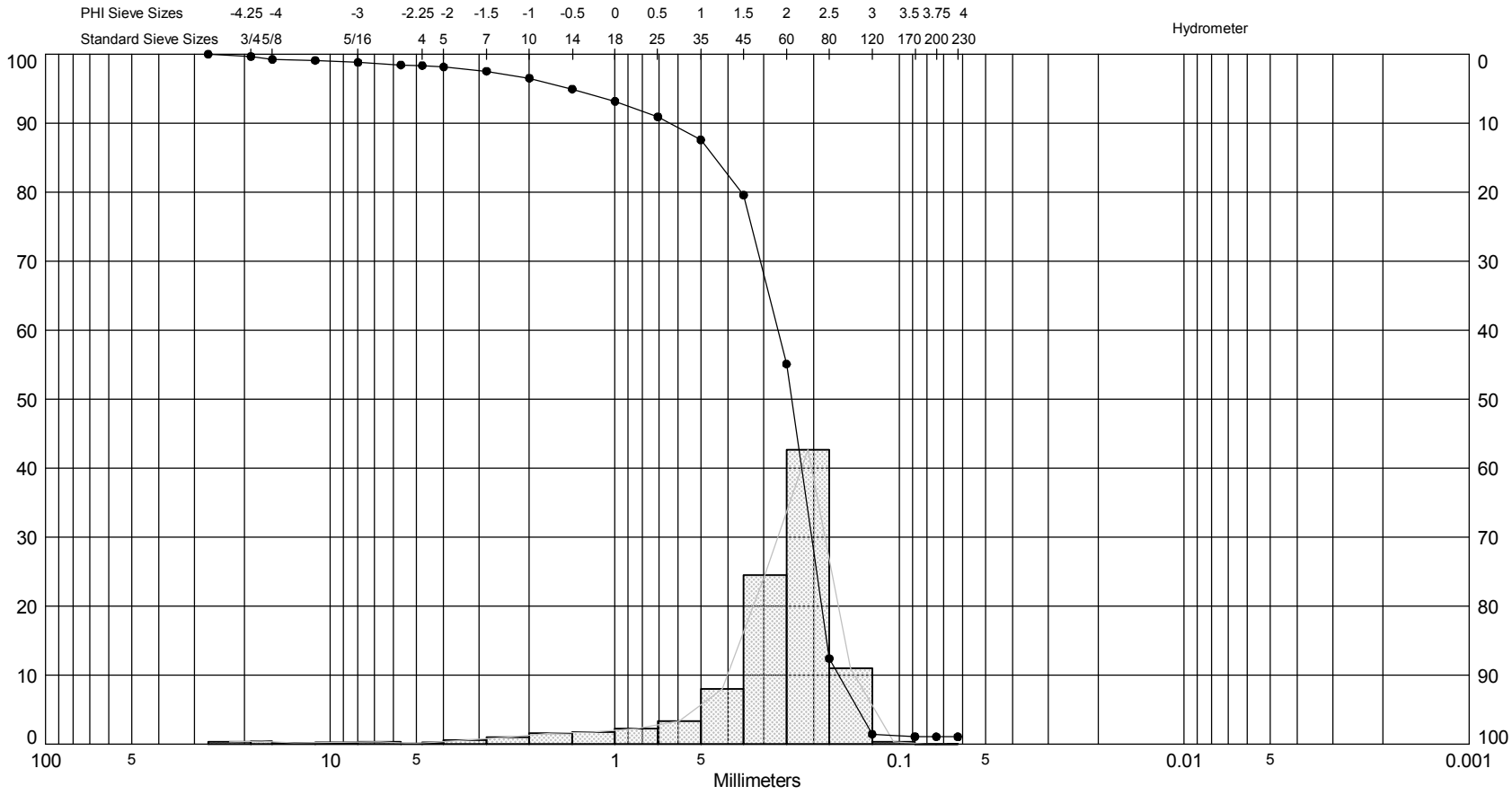

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-17 Comp.	—●—	-3.0	SW	#200 - 1.06 #230 - 1.05		13	2.06	1.75	-2.84	13.13	1.09

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-30-09
Analyzed By:	PB
Easting (X, ft):	2,387,728
Northing (Y, ft):	201,394
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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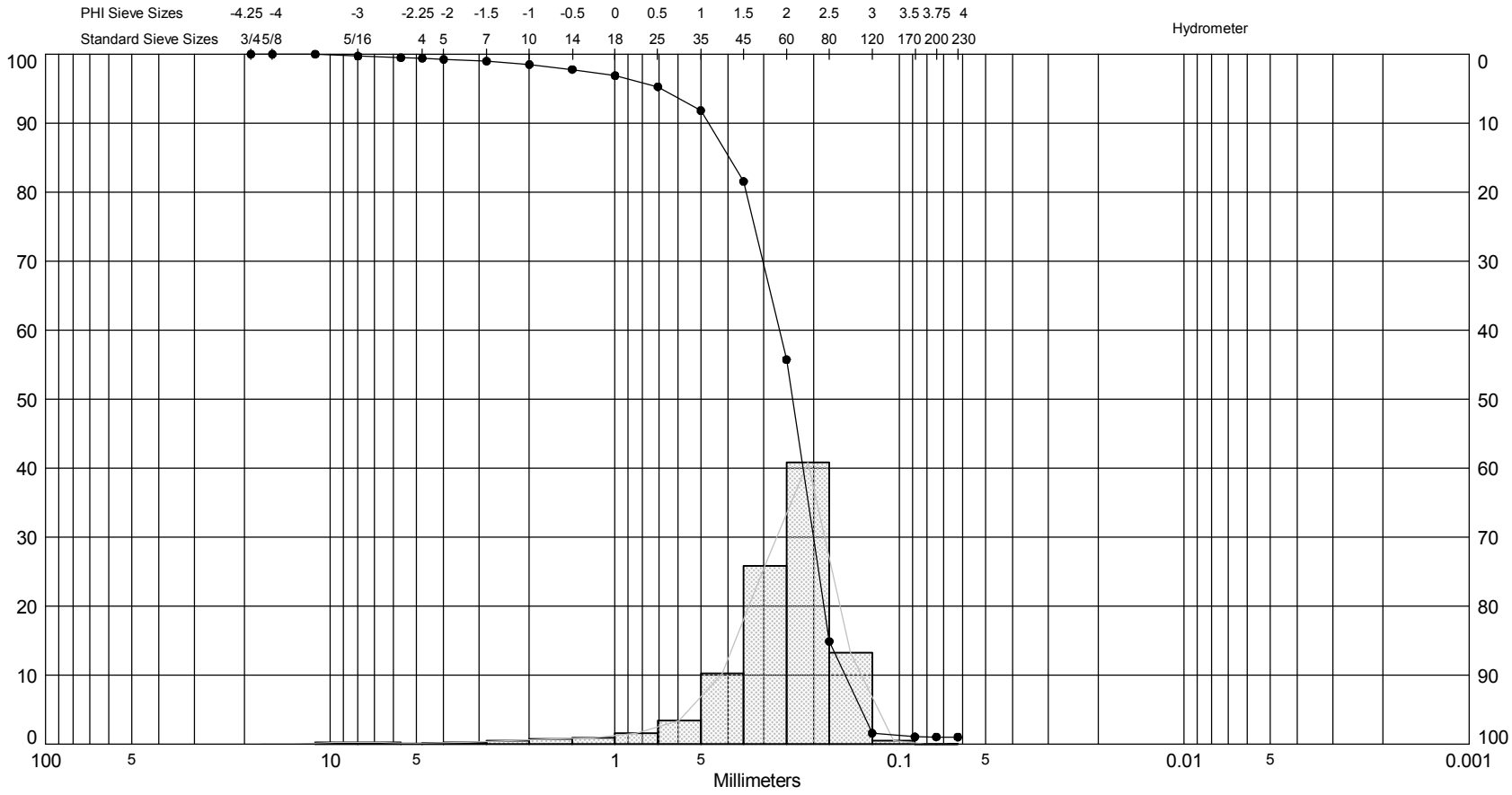

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-18 Comp.	—●—	-3.0	SP	#200 - 1.04 #230 - 1.03		9	2.07	1.89	-2.58	13.45	0.8

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-29-09
Analyzed By:	PB
Easting (X, ft):	2,387,894
Northing (Y, ft):	201,815
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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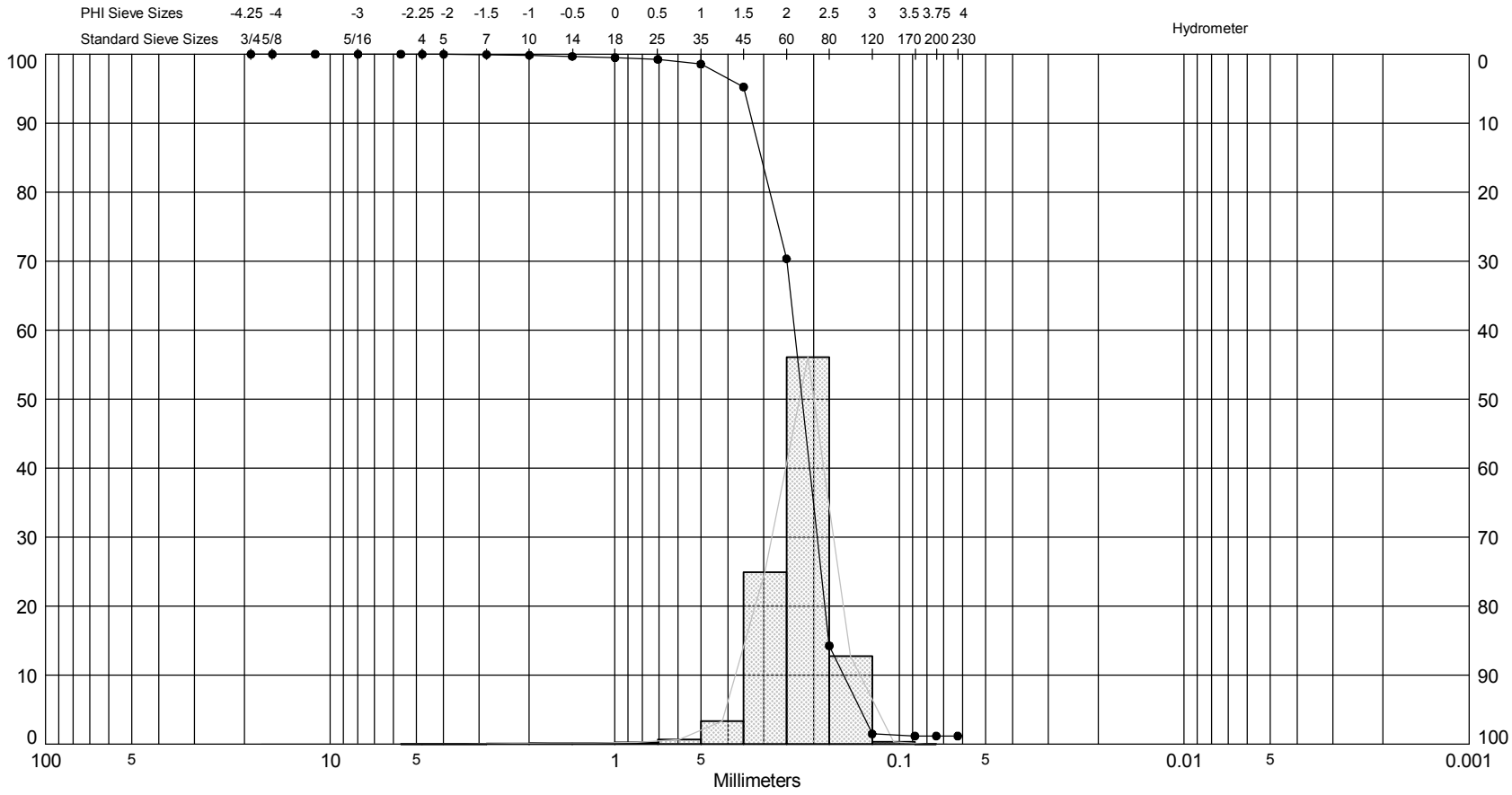

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-19 Comp.	—●—	-4.0	SP	#200 - 1.16 #230 - 1.16		5	2.18	2.13	-2.07	15.2	0.44

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	08-28-09
Analyzed By:	PB
Easting (X, ft):	2,389,020
Northing (Y, ft):	200,054
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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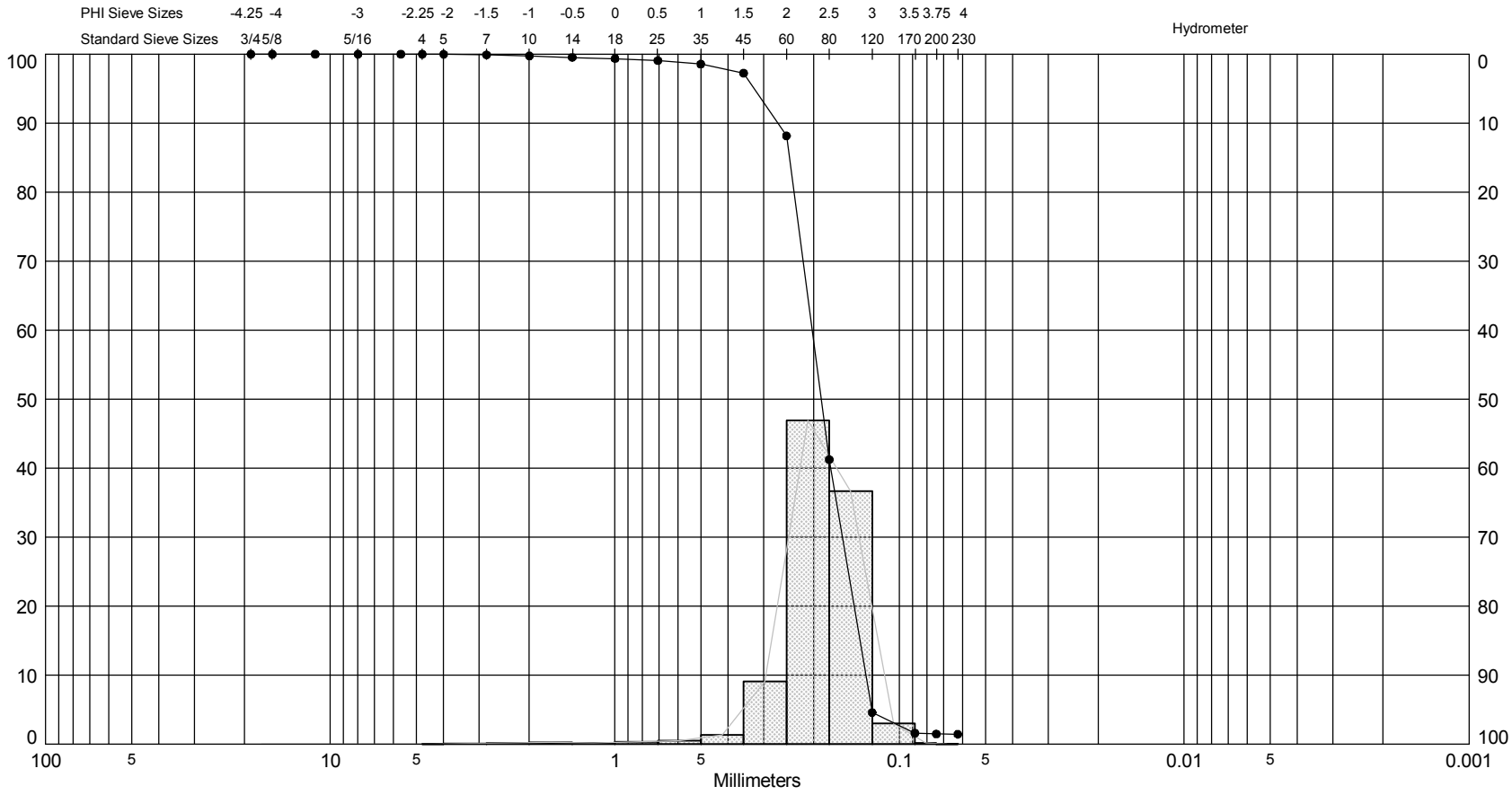

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-01 Comp.	—●—	-10.6	SP	#200 - 1.46 #230 - 1.43		10	2.41	2.38	-2.56	18.4	0.49

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-30-09
Analyzed By:	PB
Easting (X, ft):	2,385,534
Northing (Y, ft):	200,207
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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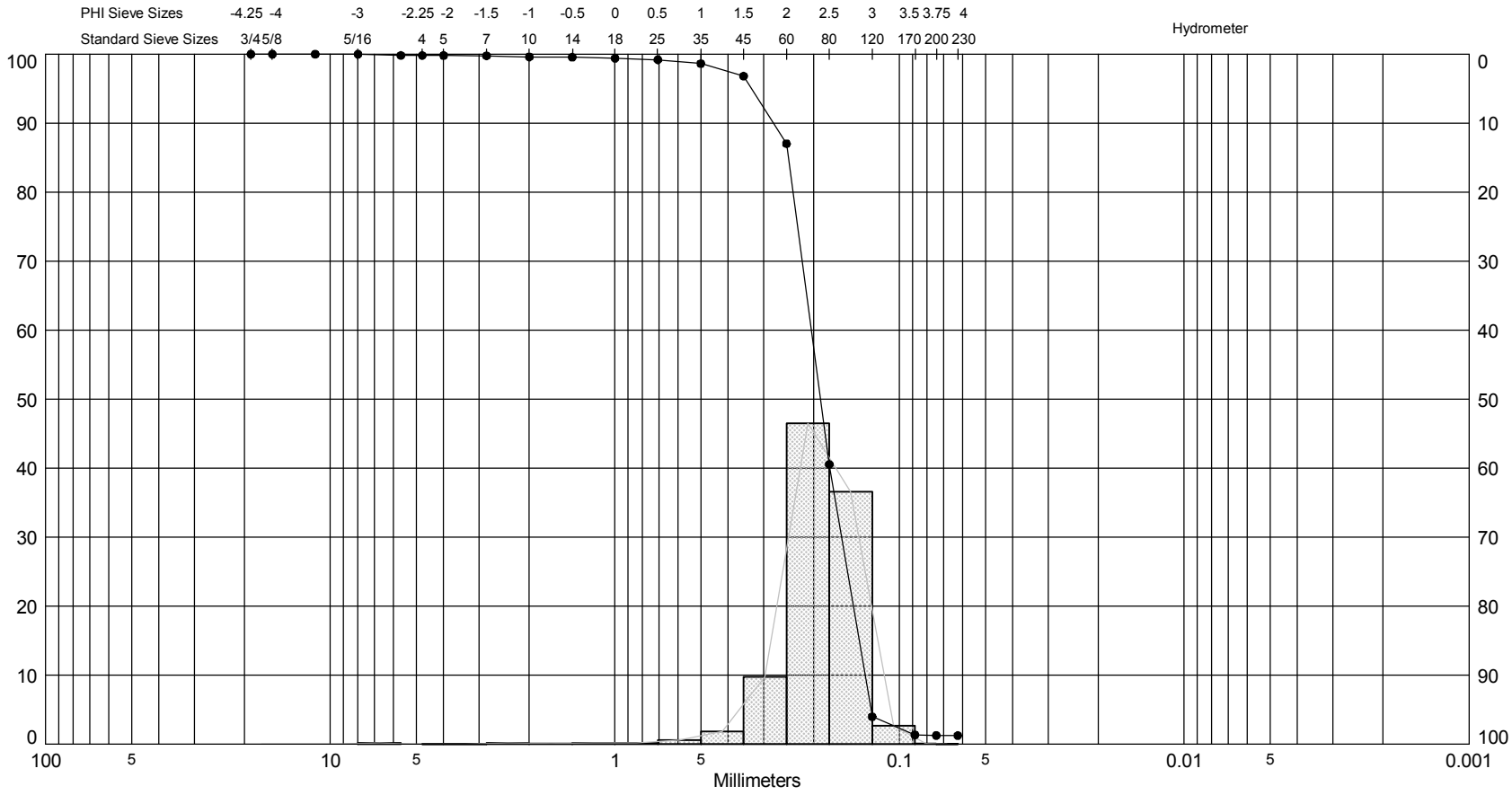

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-02 Comp.	—●—	-4.8	SP	#200 - 1.25 #230 - 1.23		5	2.4	2.36	-3.38	28.76	0.51

Comments: Composite data. Average dry Munsell Value is 8.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-30-09
Analyzed By:	PB
Easting (X, ft):	2,386,109
Northing (Y, ft):	200,498
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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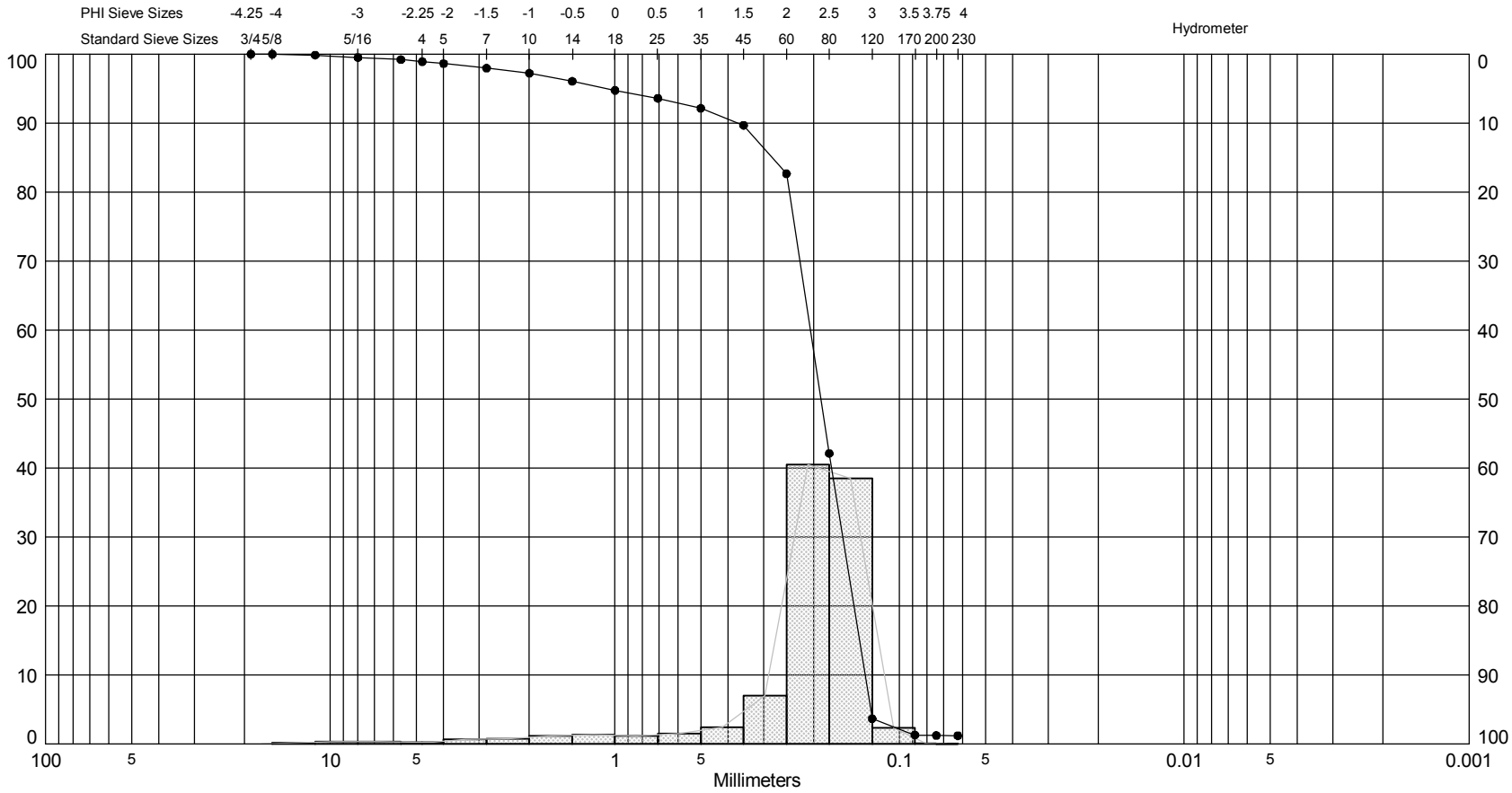

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-03 Comp.	—●—	-3.6	SW	#200 - 1.22 #230 - 1.20		9	2.4	2.17	-3.05	13.59	0.99

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-30-09
Analyzed By:	PB
Easting (X, ft):	2,387,390
Northing (Y, ft):	201,128
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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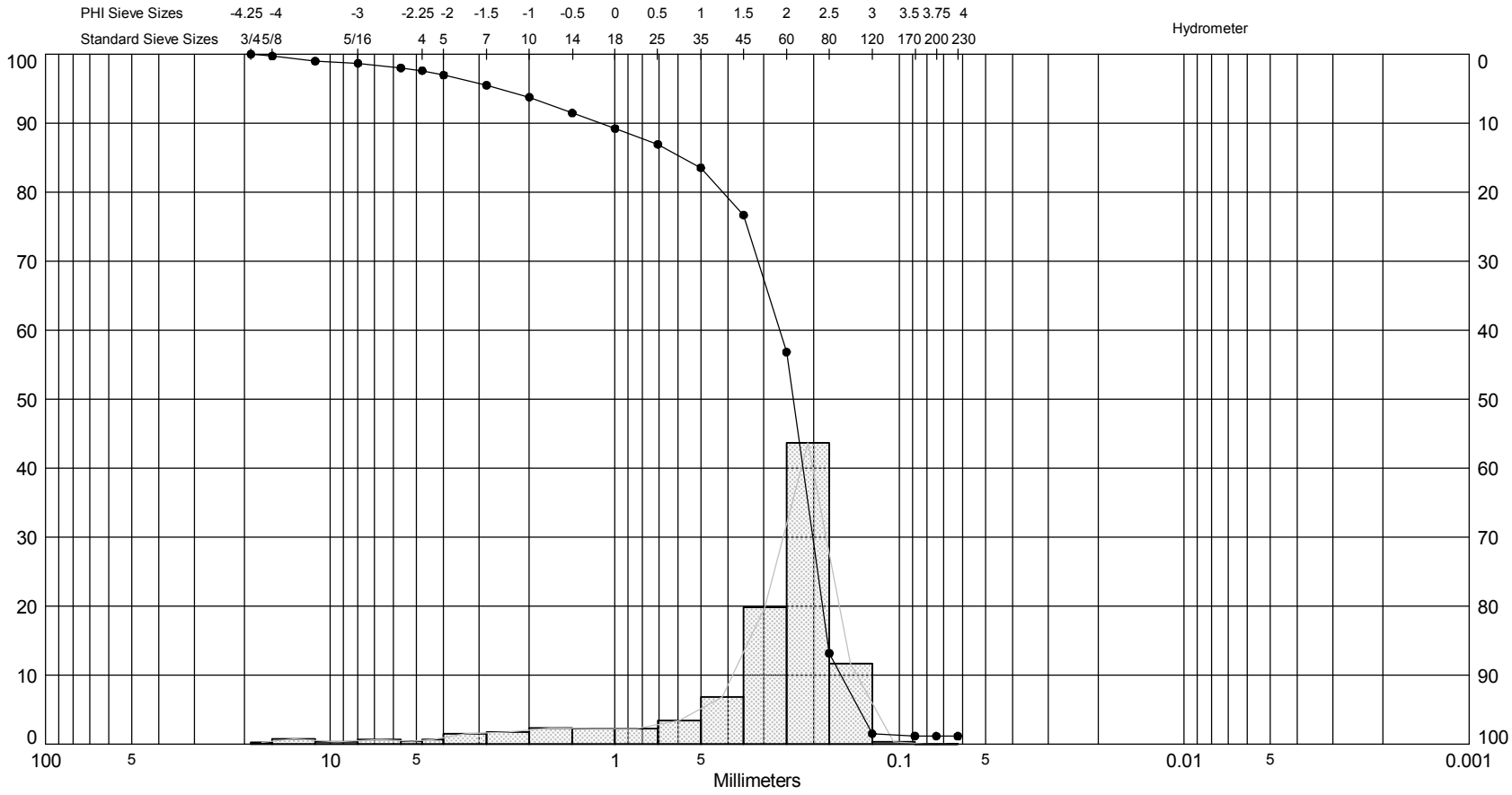

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-04 Comp.	—●—	-3.0	SW	#200 - 1.15 #230 - 1.14		20	2.08	1.64	-2.22	7.97	1.27

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-29-09
Analyzed By:	PB
Easting (X, ft):	2,388,485
Northing (Y, ft):	202,080
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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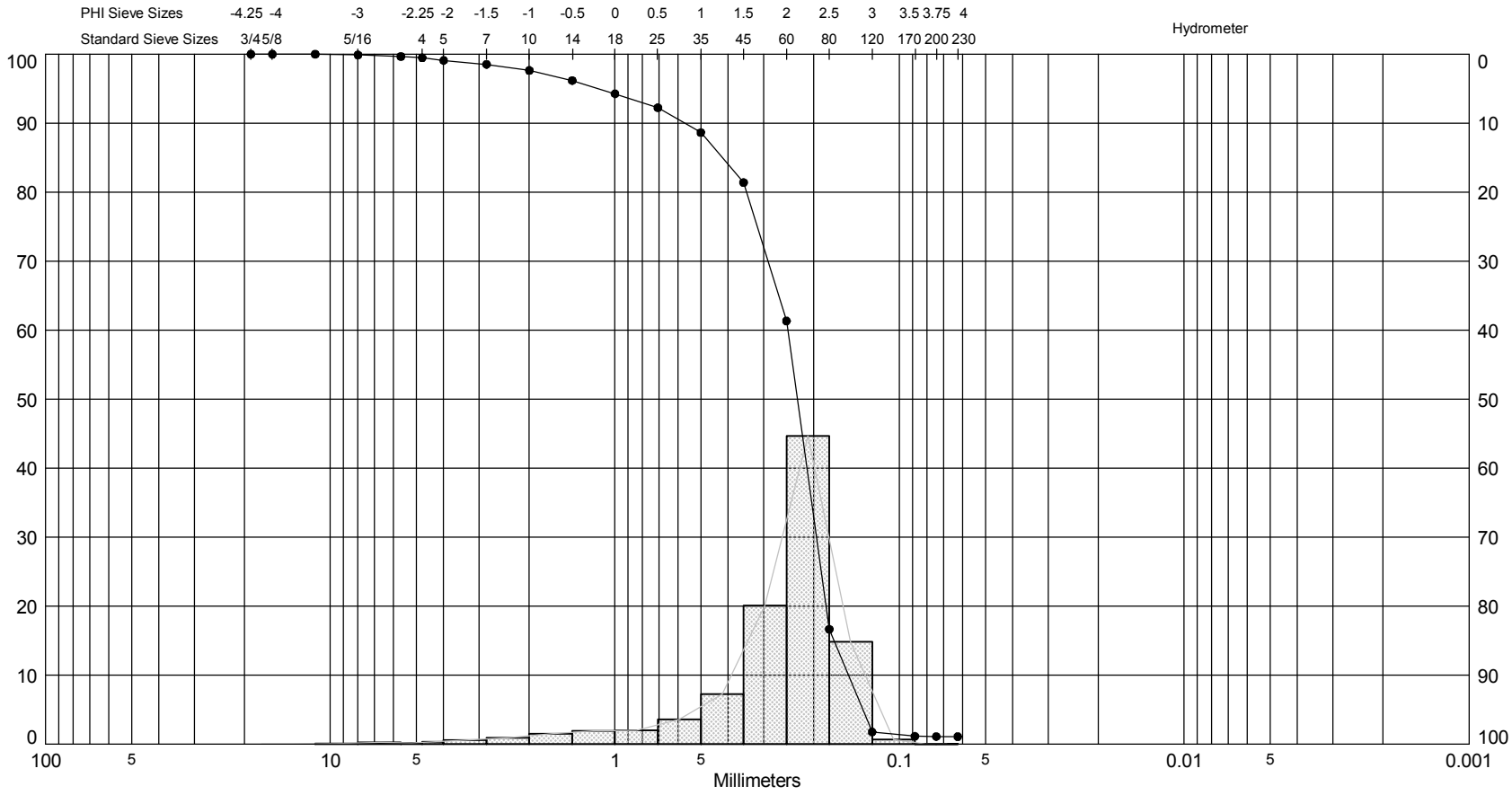

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-05 Comp.	—●—	-2.0	SW	#200 - 1.10 #230 - 1.08		14	2.13	1.87	-2.26	9.23	0.92

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-29-09
Analyzed By:	PB
Easting (X, ft):	2,388,173
Northing (Y, ft):	201,385
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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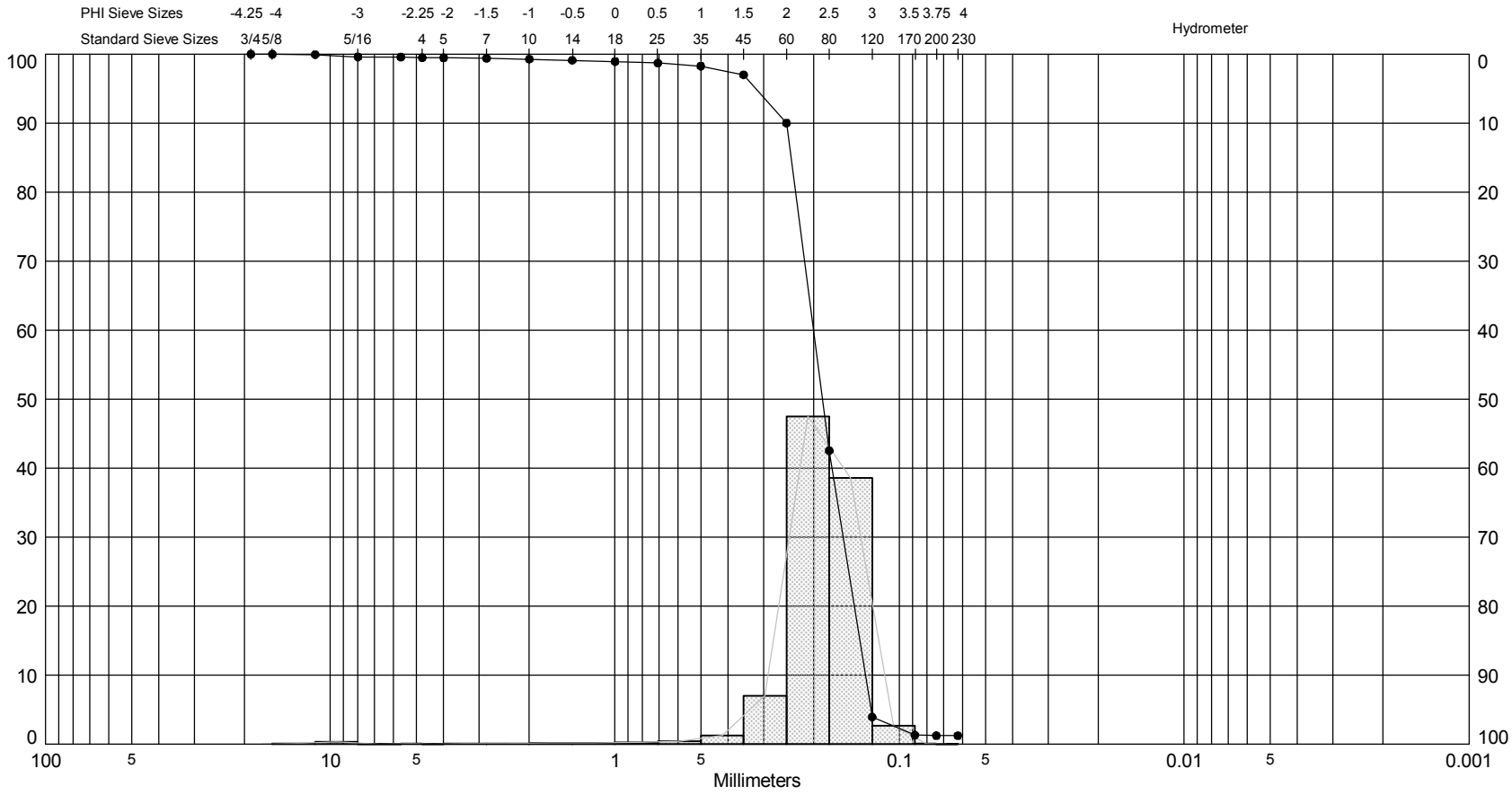

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-06 Comp.	—●—	-1.1	SP	#200 - 1.22 #230 - 1.21		4	2.42	2.37	-4.97	42.23	0.6

Comments: Composite data. Average dry Munsell Value is 8.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-30-09
Analyzed By:	PB
Easting (X, ft):	2,386,618
Northing (Y, ft):	200,973
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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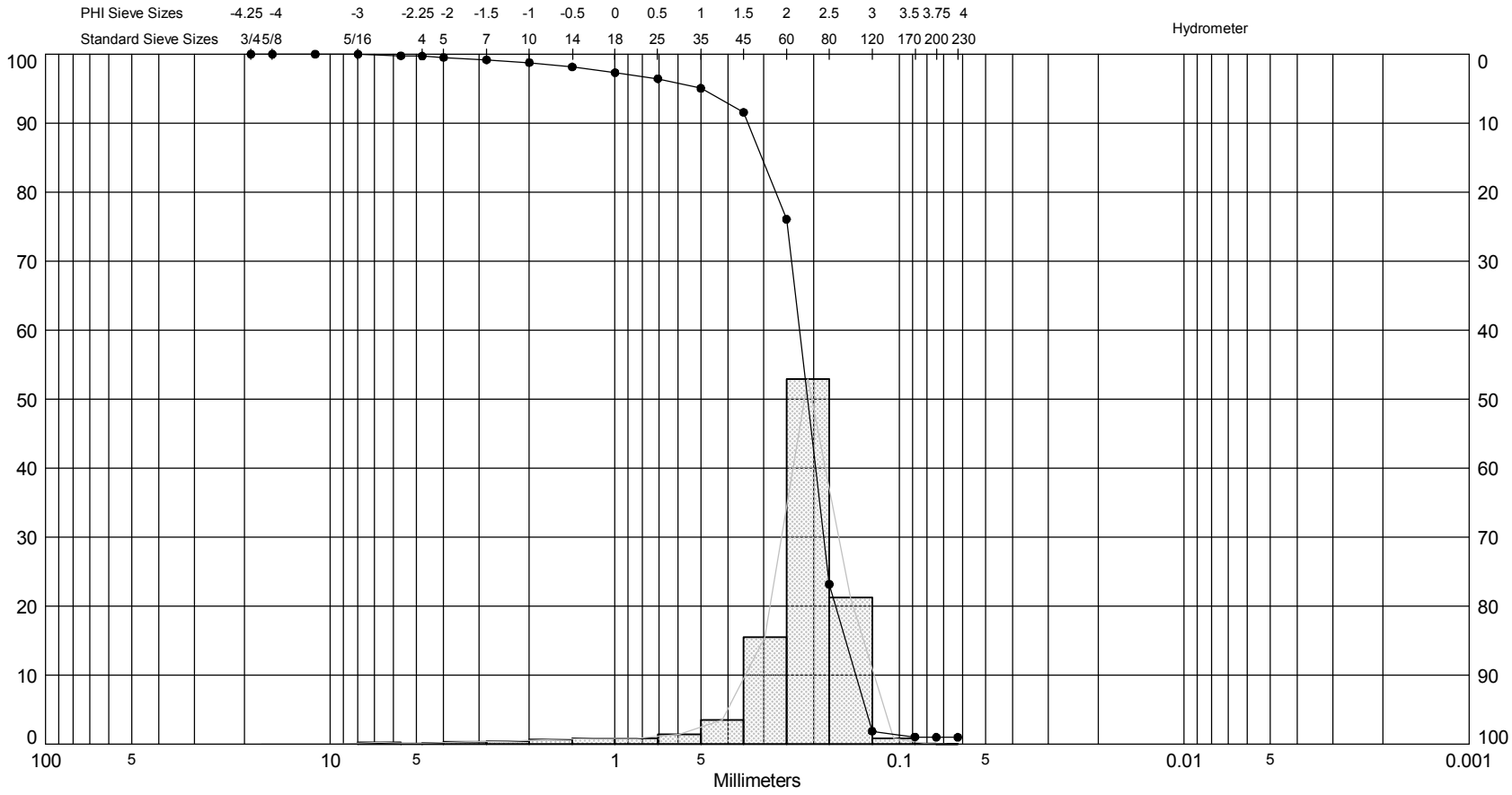

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-07 Comp.	—●—	-3.7	SP	#200 - 0.99 #230 - 0.98		10	2.25	2.12	-3.14	16.87	0.71

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-29-09
Analyzed By:	PB
Easting (X, ft):	2,388,723
Northing (Y, ft):	200,701
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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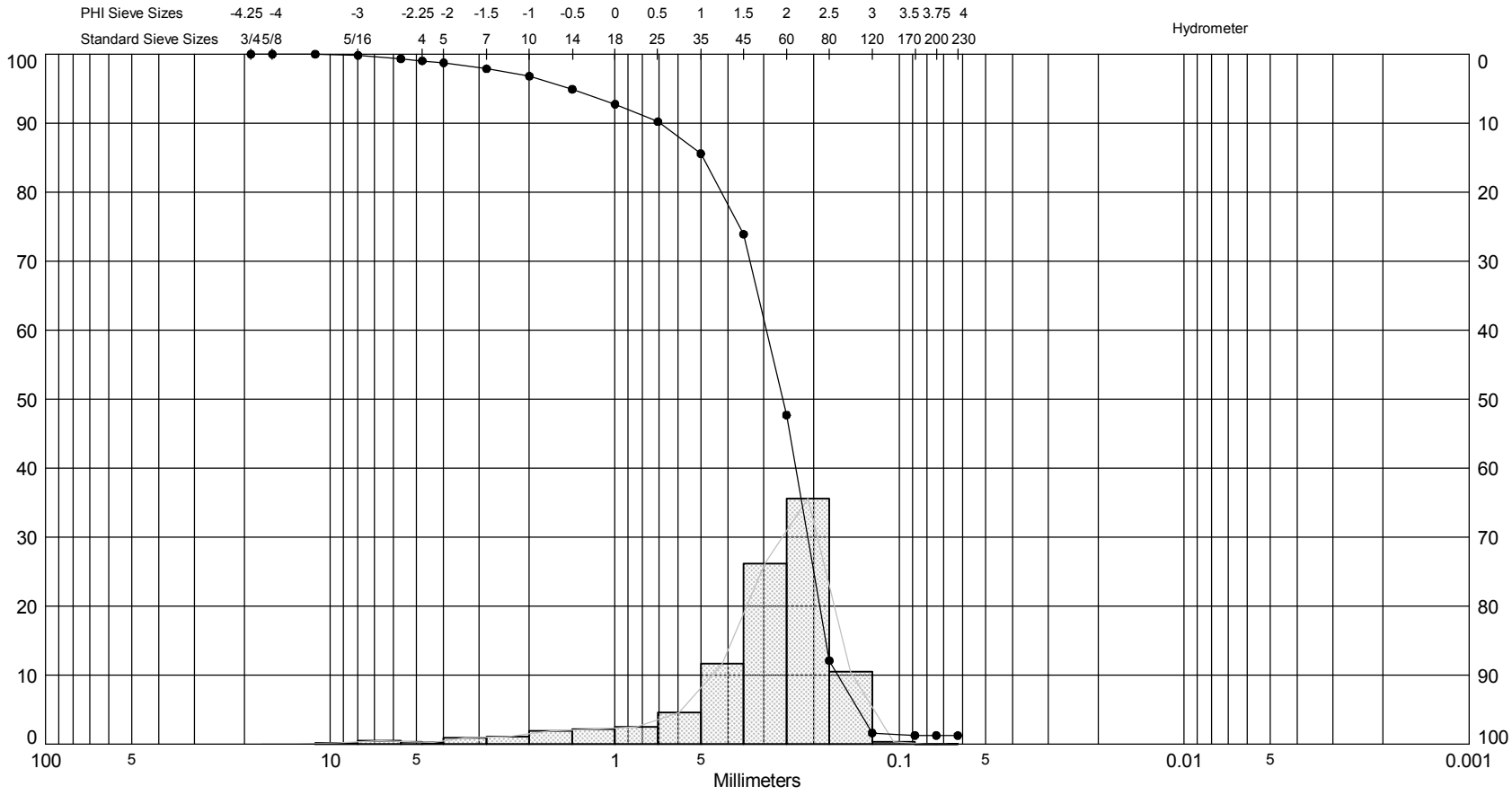

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-08 Comp.	—●—	-7.0	SW	#200 - 1.25 #230 - 1.23		16	1.96	1.69	-2.03	7.95	0.99

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-29-09
Analyzed By:	PB
Easting (X, ft):	2,389,411
Northing (Y, ft):	200,087
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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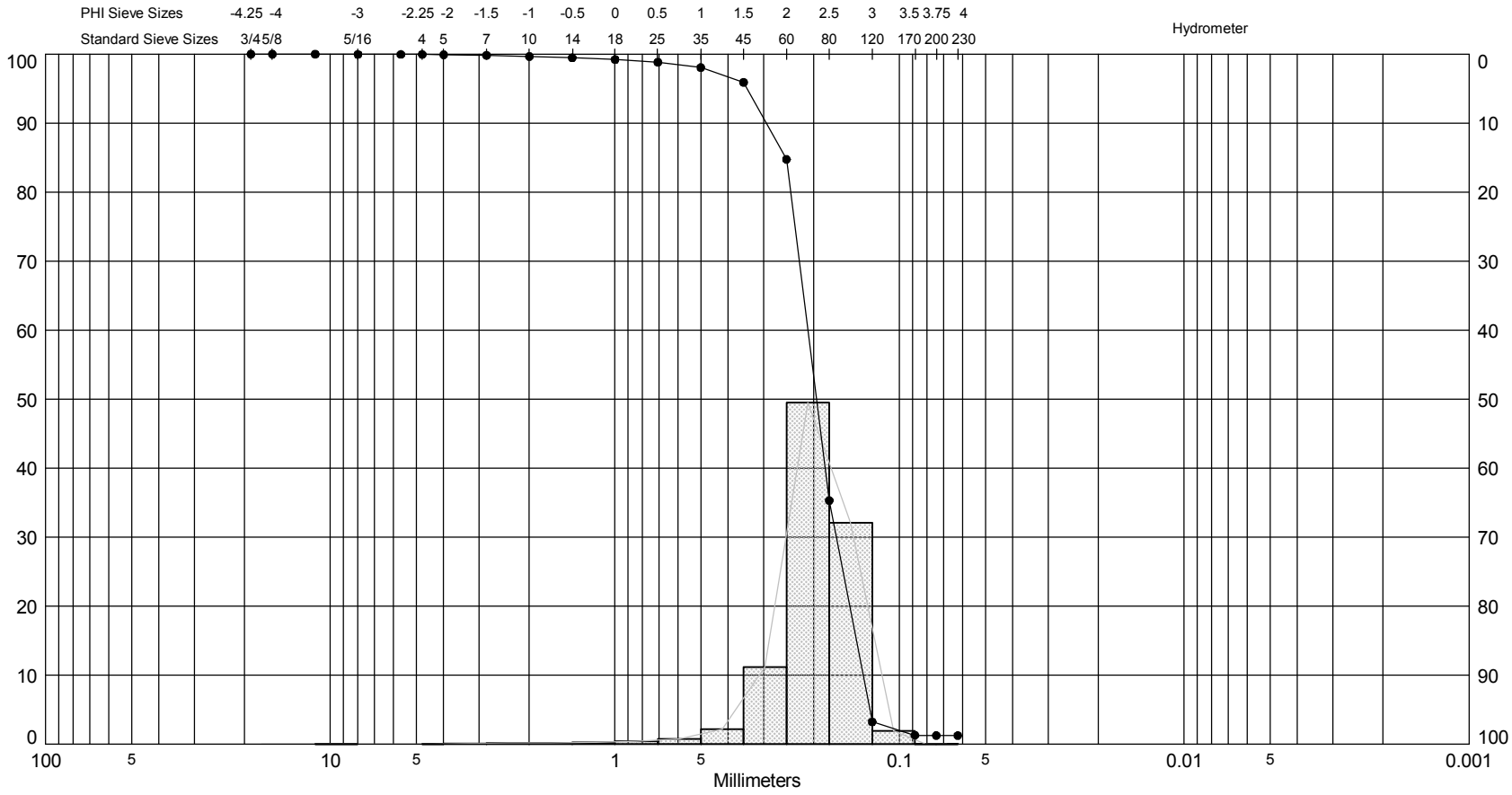

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-09 Comp.	—●—	-9.7	SP	#200 - 1.24 #230 - 1.23		7	2.35	2.31	-2.88	20.86	0.52

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-29-09
Analyzed By:	PB
Easting (X, ft):	2,389,900
Northing (Y, ft):	199,466
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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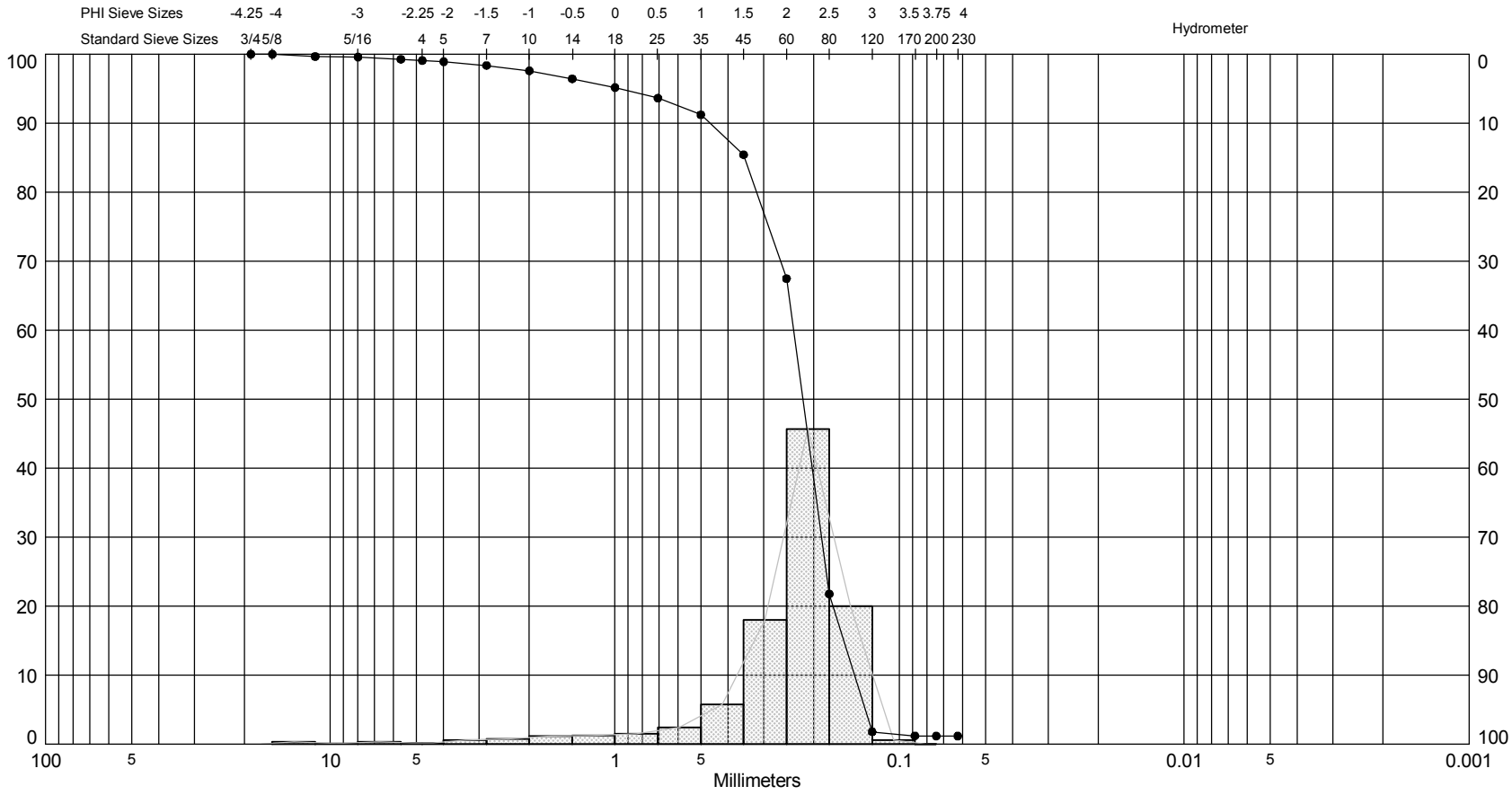

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-10 Comp.	—●—	-8.5	SW	#200 - 1.16 #230 - 1.16		16	2.19	1.97	-2.84	13.42	0.93

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 3
Analysis Date:	10-29-09
Analyzed By:	PB
Easting (X, ft):	2,389,697
Northing (Y, ft):	199,802
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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SIEVE ANALYSIS FIGURE_EIGHT_ALTERNATIVE_3_MERGED_COMPOSITE.GPJ JPBRAZIL.GDT 3/11/10

APPENDIX 29

Alternative 5 Channel Corridor Composite Summary Table

COMPOSITE SUMMARY TABLE
FIGURE EIGHT VIBRACORES

SAMPLE I. D.	EFFECTIVE LENGTH (FT)	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	% CARBONATES
FEVC-08-01 Composite	VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS							
FEVC-08-02 Composite	VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS							
FEVC-08-03 Composite	10.7	0.20	2.29	0.83	1.21	6	7	7.8
FEVC-08-04 Composite	11.3	0.36	1.48	1.42	1.16	6	7	22.1
FEVC-08-05 Composite	12.3	0.27	1.88	0.93	1.13	6	8	11.3
FEVC-08-06 Composite	13.2	0.19	2.37	0.60	1.21	6	8	4.2
FEVC-08-07 Composite	VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS							
FEVC-08-08 Composite	VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS							
FEVC-08-09 Composite	VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS							
FEVC-08-10 Composite	VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS							
FEVC-07-02 Composite	5.3	0.23	2.12	0.61	1.04	6	7	9.4
FEVC-07-11 Composite	9.9	0.22	2.19	0.53	1.28	6	7	6.6
FEVC-07-12 Composite	6.8	0.20	2.33	0.37	1.41	6	7	4.6
FEVC-07-16 Composite	14.3	0.30	1.74	1.24	1.17	6	7	13.0
FEVC-07-17 Composite	11.3	0.29	1.80	1.13	1.05	6	7	11.6
FEVC-07-18 Composite	11.3	0.29	1.81	0.87	1.05	5	7	10.9
Alternative 5 Composite	106.4	0.25	1.98	0.99	1.17	6	7	10.5

COMPOSITE DATA TABLE
FIGURE EIGHT VIBRACORES

SAMPLE I. D.	EFFECTIVE LENGTH (FT)	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	CUMULATIVE PERCENT RETAINED (SIEVES EXPRESSED IN PHI)																					% CARBONATE
								GRAVEL						GRANULAR						SAND									
								-4.25	-4.0	-3.50	-3.0	-2.50	-2.25	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	3.75	4.0	PAN	
FEVC-08-01 Composite	VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS																												
FEVC-08-02 Composite	VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS																												
FEVC-08-03 Composite	10.7	0.20	2.29	0.83	1.21	6	7	0.00	0.00	0.11	0.36	0.63	0.85	1.00	1.29	1.68	2.28	3.07	3.92	5.04	7.11	13.07	53.57	95.96	98.69	98.76	98.79	99.99	7.8
FEVC-08-04 Composite	11.3	0.36	1.48	1.42	1.16	6	7	0.00	0.40	1.44	1.81	2.70	3.24	4.15	6.14	8.48	11.56	14.49	17.35	21.09	27.52	46.13	88.05	98.50	98.81	98.83	98.84	99.99	22.1
FEVC-08-05 Composite	12.3	0.27	1.88	0.93	1.13	6	8	0.00	0.00	0.00	0.09	0.29	0.53	0.93	1.49	2.39	3.88	5.82	7.86	11.25	18.03	37.59	82.87	98.06	98.83	98.86	98.87	100.00	11.3
FEVC-08-06 Composite	13.2	0.19	2.37	0.60	1.21	6	8	0.00	0.00	0.05	0.39	0.42	0.50	0.53	0.60	0.71	0.88	1.05	1.28	1.72	2.98	9.97	57.47	96.07	98.70	98.78	98.79	100.00	4.2
FEVC-08-07 Composite	VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS																												
FEVC-08-08 Composite	VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS																												
FEVC-08-09 Composite	VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS																												
FEVC-08-10 Composite	VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS																												
FEVC-07-02 Composite	5.3	0.23	2.12	0.61	1.04	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.12	0.38	0.82	1.46	2.53	4.47	9.66	30.04	75.66	98.05	98.93	98.95	98.96	99.99	9.4
FEVC-07-11 Composite	9.9	0.22	2.19	0.53	1.28	6	7	0.00	0.00	0.00	0.00	0.03	0.07	0.09	0.28	0.41	0.66	1.02	1.55	2.38	5.13	21.58	77.65	97.61	98.67	98.71	98.72	99.99	6.6
FEVC-07-12 Composite	6.8	0.20	2.33	0.37	1.41	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.04	0.07	0.13	0.34	1.34	13.00	70.39	96.62	98.49	98.57	98.59	99.96	4.6
FEVC-07-16 Composite	14.3	0.30	1.74	1.24	1.17	6	7	0.00	0.00	2.01	2.09	2.58	2.72	3.13	3.89	4.85	6.38	8.11	10.58	13.92	20.40	38.12	84.49	98.23	98.76	98.82	98.83	99.82	13.0
FEVC-07-17 Composite	11.3	0.29	1.80	1.13	1.05	6	7	0.47	1.06	1.28	1.60	1.90	1.97	2.17	2.73	3.65	5.08	6.63	8.48	10.97	17.10	39.91	86.32	98.51	98.92	98.94	98.95	100.00	11.6
FEVC-07-18 Composite	11.3	0.29	1.81	0.87	1.05	5	7	0.00	0.00	0.00	0.40	0.69	0.80	1.05	1.36	2.00	2.92	4.07	6.10	10.34	22.34	48.90	87.06	98.46	98.93	98.94	98.95	99.90	10.9
Alternative 5 Composite	106.4	0.25	1.98	0.99	1.17	6	7	0.05	0.16	0.58	0.78	1.06	1.22	1.49	2.02	2.74	3.83	5.05	6.55	8.86	14.07	30.69	76.71	97.63	98.78	98.82	98.83	99.96	10.5

CUMULATIVE PERCENTS AND COMPUTED DISTRIBUTIONS - FIGURE EIGHT VIBRACORES (1 OF 3)

SAMPLE I. D.	ELEVATION (NAVD88 FT)	EFFECTIVE LENGTH (FT)	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	CUMULATIVE PERCENT RETAINED (SIEVES EXPRESSED IN PHI)																				FINES PAN	% CARBONATES
									GRAVEL						GRANULAR			SAND												
									-4.25	-4.0	-3.50	-3.0	-2.50	-2.25	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	3.75	4.0		
FEVC-08-01#1	-12.6	0.0	0.18	2.50	0.40	1.48	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.18	0.27	0.34	0.41	0.59	1.09	4.32	46.02	94.00	98.30	98.49	98.52	100.00	ND
FEVC-08-01#2	-17.6	0.0	0.21	2.23	0.53	1.37	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.16	0.34	0.67	0.97	1.55	2.41	4.66	20.54	73.46	97.08	98.54	98.60	98.63	100.00	ND
FEVC-08-01#3	-21.1	0.0	0.57	0.82	1.75	1.76	6	7	0.00	0.00	6.63	6.96	9.37	9.62	10.40	12.08	14.09	17.35	21.62	27.47	36.05	52.66	73.65	92.46	97.67	98.14	98.19	98.24	99.88	ND
FEVC-08-01#4	-22.2	0.0	0.14	2.81	0.31	3.29	5	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.05	0.06	0.12	0.37	10.34	75.96	95.44	96.47	96.71	99.98	ND
Cut to -14.3																														
FEVC-08-01 Composite									**VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS**																					
FEVC-08-02#1	-6.8	0.0	0.23	2.11	0.70	1.30	6	8	0.00	0.00	0.00	0.00	0.59	0.59	0.62	0.73	1.22	1.36	1.78	2.33	3.99	9.12	30.47	75.99	97.25	98.63	98.69	98.70	99.83	ND
FEVC-08-02#2	-11.8	0.0	0.18	2.50	0.33	1.14	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.08	0.32	4.64	48.00	95.32	98.77	98.84	98.86	100.00	ND
FEVC-08-02A#1	-15.0	0.0	0.18	2.45	0.35	1.25	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.05	0.07	0.14	0.24	0.59	5.35	56.25	95.74	98.62	98.72	98.75	100.00	ND
FEVC-08-02A#2	-20.0	0.0	0.18	2.48	0.34	1.29	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.07	0.10	0.17	0.46	4.21	52.69	95.31	98.57	98.70	98.71	100.00	ND
Cut to -14.3																														
FEVC-08-02 Composite									**VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS**																					
FEVC-08-03#1	-5.0	2.1	0.35	1.53	1.43	0.93	6	8	0.00	0.00	0.54	1.85	3.22	4.18	4.84	6.02	7.82	10.44	13.72	17.47	22.12	30.20	45.75	79.02	97.86	98.92	99.06	99.07	99.95	
FEVC-08-03#2	-7.1	3.9	0.19	2.42	0.49	1.26	6	7	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.23	0.32	0.52	0.78	0.99	1.35	2.31	8.72	52.22	95.43	98.68	98.73	98.74	100.00	7.8
FEVC-08-03#3	-12.1	4.7	0.17	2.53	0.35	1.30	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.07	0.09	0.21	0.29	0.47	0.77	2.08	43.32	95.56	98.59	98.66	98.70	100.00	
FEVC-08-03#4	-16.2	0.0	0.60	0.74	1.59	0.93	6	7	0.00	0.00	0.56	2.24	3.58	5.05	6.92	11.57	16.32	24.05	31.66	37.37	44.01	53.48	73.65	93.31	98.86	99.06	99.07	99.07	100.00	ND
FEVC-08-03#5	-17.6	0.0	0.19	2.41	0.34	1.29	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.06	0.09	0.21	0.75	6.63	61.27	96.87	98.63	98.69	98.71	100.00	ND
FEVC-08-03#6	-20.6	0.0	0.20	2.32	0.35	1.16	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.06	0.17	0.28	0.39	0.51	0.88	9.29	73.54	98.14	98.79	98.84	98.84	100.00	ND
Cut to -14.3																														
FEVC-08-03 Composite		**10.7**	**0.20**	**2.29**	**0.83**	**1.21**	**6**	**7**	**0.00**	**0.00**	**0.11**	**0.36**	**0.63**	**0.85**	**1.00**	**1.29**	**1.68**	**2.28**	**3.07**	**3.92**	**5.04**	**7.11**	**13.07**	**53.57**	**95.96**	**98.69**	**98.76**	**98.79**	**99.99**	**7.8**
FEVC-08-04#1	-4.0	2.2	0.29	1.77	1.03	1.15	5	7	0.00	0.00	0.00	0.00	0.23	0.93	1.10	1.97	3.18	5.42	7.92	11.13	15.16	23.19	41.66	82.87	98.27	98.79	98.82	98.85	100.00	
FEVC-08-04#2	-6.0	1.8	1.09	-0.13	1.71	0.98	6	7	0.00	0.00	1.87	4.21	7.90	9.89	14.54	23.82	34.33	46.44	55.16	61.78	67.56	74.43	84.25	95.66	98.79	98.98	99.01	99.02	100.00	23.0
FEVC-08-04#3	-8.5	2.5	0.48	1.05	1.62	1.30	6	7	0.00	1.80	5.14	5.14	6.31	6.70	7.16	8.68	10.63	13.66	18.16	22.85	30.96	44.03	67.15	93.71	98.53	98.68	98.70	98.70	100.00	
FEVC-08-04#4	-11.0	3.9	0.23	2.14	0.42	1.14	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.11	0.12	0.24	0.41	0.80	1.48	3.89	26.47	88.05	98.63	98.84	98.86	98.86	99.96	
FEVC-08-04A#1	-11.9	0.0	0.22	2.19	0.34	0.98	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.11	0.41	2.44	22.05	86.15	98.77	99.01	99.02	99.02	99.99	ND
FEVC-08-04A#2	-14.9	0.9	0.19	2.36	0.32	1.24	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.09	0.22	0.83	7.65	69.78	97.84	98.72	98.76	98.76	99.99	12.8
FEVC-08-04A#3	-17.1	0.0	0.34	1.57	0.87	0.95	6	7	0.00	0.00	0.00	0.45	0.84	0.98	1.15	1.71	2.43	3.62	5.39	7.76	14.33	32.74	67.53	95.80	98.95	99.03	99.04	99.05	99.99	ND
FEVC-08-04A#4	-18.9	0.0	0.25	2.02	0.46	1.09	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.14	0.27	0.55	0.97	2.37	8.71	41.39	90.96	98.73	98.90	98.91	98.91	99.93	ND
Cut to -14.3																														
FEVC-08-04 Composite		**11.3**	**0.36**	**1.48**	**1.42**	**1.16**	**6**	**7**	**0.00**	**0.40**	**1.44**	**1.81**	**2.70**	**3.24**	**4.15**	**6.14**	**8.48**	**11.56**	**14.49**	**17.35**	**21.09**	**27.52**	**46.13**	**88.05**	**98.50**	**98.81**	**98.83**	**98.84**	**99.99**	**22.1**
FEVC-08-05#1	-4.5	4.7	0.22	2.19	0.64	1.06	6	8	0.00	0.00	0.00	0.00	0.08	0.22	0.44	0.76	1.01	1.41	1.90	2.45	3.09	5.32	21.24	73.88	97.35	98.90	98.93	98.94	100.00	
FEVC-08-05#2	-8.5	2.9	0.46	1.13	1.21	1.17	5	7	0.00	0.00	0.00	0.24	0.73	1.37	2.49	4.00	6.93	11.75	17.96	24.21	34.45	50.16	72.73	94.12	98.62	98.79	98.81	98.83	99.99	
FEVC-08-05#3	-10.0	0.9	0.27	1.90	0.68	1.13	5	7	0.00	0.00	0.00	0.00	0.00	0.28	0.47	0.74	1.00	1.56	2.26	3.45	5.79	16.49	47.71	89.50	98.63	98.85	98.87	98.87	100.00	11.1
FEVC-08-05#4	-10.8	0.7	0.34	1.54	1.16	1.16	5	7	0.00	0.00	0.00	0.54	1.34	1.66	2.26	3.31	4.73	6.99	10.32	13.96	20.99	34.30	54.72	86.67	98.59	98.71	98.81	98.84	100.00	
FEVC-08-05#5	-11.8	2.9	0.22	2.20	0.39	1.20	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.11	0.28	0.51	1.01	3.38	21.61	83.20	98.30	98.78	98.80	98.80	100.00	
FEVC-08-05A#1	-11.0	0.0	2.77	-1.47	2.31	0.80	6	8	12.14	17.62	26.57	34.74	42.02	44.44	47.15	52.77	58.26	64.24	69.08	72.54	76.95	82.93	90.63	97.71	99.00	99.16	99.18	99.20	99.95	ND
FEVC-08-05A#2	-14.9	0.2	0.25	1.99	0.74	0.97	6	7	0.00	0.00	0.00	0.26	0.39	0.39	0.72	0.96	1.37	1.81	2.42	3.07	5.74	13.49	38.28	83.20	98.74	98.93	98.99	99.03	100.00	20.5
FEVC-08-05A#3	-16.8	0.0	0.65	0.63	1.30	1.32	5	6	0.00	0.00	0.00	0.51	2.59	3.24	4.27	7.38	11.75	19.17	28.48	37.75	53.17	71.12	85.97	95.89	98.42	98.60	98.65	98.68	99.83	ND
FEVC-08-05A#4	-17.8	0.0	0.23	2.14	0.63	0.88	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.27	0.67	1.32	2.04	3.19	4.83	8.47	22.40	79.05	98.46	99.08	99.10	99.12	99.98	ND
FEVC-08-05A#5	-19.0	0.0	0.29	1.77	0.81	0.80	6	7	0.00	0.00	0.00	0.00	0.09	0.09	0.19	0.63	1.31	2.68	4.82	7.22	12.41	23.90	51.02	90.02	98.92	99.18	99.19	99.20	99.95	ND
Cut to -14.3																														
FEVC-08-05 Composite		**12.3**	**0.27**	**1.88**	**0.93**	**1.13**	**6**	**8**	**0.00**	**0.00**	**0.00**	**0.09**	**0.29**	**0.53**	**0.93**	**1.49**	**2.39**	**3.88**	**5.82**	**7.86**	**11.25**	**18.03**	**37.59**	**82.87**	**98.06**	**98.83**	**98.86**	**98.87**	**100.00**	**11.3**

CUMULATIVE PERCENTS AND COMPUTED DISTRIBUTIONS - FIGURE EIGHT VIBRACORES (2 OF 3)

SAMPLE I. D.	ELEVATION (NAVD88 FT)	EFFECTIVE LENGTH (FT)	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	CUMULATIVE PERCENT RETAINED (SIEVES EXPRESSED IN PHI)																				% CARBONATES
									GRAVEL						GRANULAR			SAND									FINES PAN	
									-4.25	-4.0	-3.50	-3.0	-2.50	-2.25	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	3.75	4.0	
FEVC-08-06#1	-3.1	4.0	0.19	2.40	0.38	1.15	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.09	0.17	0.27	0.54	1.39	9.07	60.53	96.57	98.76	98.83	98.85	100.00	
FEVC-08-06#2	-7.1	4.8	0.21	2.26	0.72	1.09	6	8	0.00	0.00	0.00	0.85	0.85	1.06	1.06	1.09	1.20	1.38	1.53	1.83	2.44	4.40	14.51	66.82	97.55	98.85	98.90	98.91	100.00	4.2
FEVC-08-06#3	-12.6	4.0	0.17	2.55	0.33	1.42	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.08	0.10	0.17	0.36	2.19	41.01	93.61	98.45	98.58	98.58	100.00	
FEVC-08-06#4	-14.9	0.4	0.34	1.54	1.48	1.23	6	7	0.00	0.00	1.76	2.56	3.74	3.91	4.73	6.60	8.67	11.26	13.70	16.56	20.49	28.12	42.20	79.29	97.88	98.69	98.75	98.77	99.84	
FEVC-08-06#5	-16.1	0.0	0.14	2.85	0.89	32.97	3	5	0.00	0.00	0.00	0.35	0.93	0.93	0.95	1.08	1.13	1.21	1.28	1.34	1.40	1.56	2.54	12.19	35.59	57.42	64.35	67.03	100.00	ND
Cut to -14.3																														
FEVC-08-06 Composite		**13.2**	**0.19**	**2.37**	**0.60**	**1.21**	**6**	**8**	**0.00**	**0.00**	**0.05**	**0.39**	**0.42**	**0.50**	**0.53**	**0.60**	**0.71**	**0.88**	**1.05**	**1.28**	**1.72**	**2.98**	**9.97**	**57.47**	**96.07**	**98.70**	**98.78**	**98.79**	**100.00**	**4.2**
FEVC-08-07#1	-5.7	0.0	0.23	2.13	0.72	0.79	7	7	0.00	0.00	0.00	0.00	0.34	0.34	0.68	1.19	1.48	1.88	2.29	2.81	3.98	7.81	25.12	76.00	98.32	99.16	99.20	99.21	99.95	ND
FEVC-08-07#2	-11.7	0.0	0.20	2.29	0.43	1.05	7	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.21	0.41	0.68	1.22	2.99	14.39	71.59	97.55	98.90	98.94	98.95	100.00	ND
FEVC-08-07#3	-14.2	0.0	0.39	1.35	1.20	0.90	5	8	0.00	0.00	0.00	0.00	0.98	1.46	2.05	3.55	6.01	9.94	15.25	20.27	26.85	38.05	61.48	92.81	98.99	99.06	99.10	99.10	100.00	ND
FEVC-08-07#4	-16.0	0.0	0.20	2.35	0.32	1.20	6	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.10	0.23	0.74	8.54	69.91	97.90	98.74	98.77	98.80	100.00	ND
FEVC-08-07A#1	-18.7	0.0	0.21	2.23	0.36	1.20	5	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.17	0.55	2.46	19.68	80.02	98.31	98.73	98.79	98.80	100.00	ND
Cut to -14.3																														
FEVC-08-07 Composite									**VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS**																				
FEVC-08-08#1	-9.0	0.0	0.26	1.93	0.88	1.13	6	7	0.00	0.00	0.00	0.00	0.00	0.32	0.51	1.06	1.90	3.29	5.03	7.03	10.75	17.71	35.12	80.35	98.20	98.84	98.87	98.87	100.00	ND
FEVC-08-08#2	-14.2	0.0	0.30	1.73	0.86	1.24	5	7	0.00	0.00	0.00	0.34	1.01	1.16	1.37	1.98	2.37	3.13	3.88	5.33	8.97	23.37	57.66	91.56	98.55	98.73	98.73	98.76	99.96	ND
FEVC-08-08#3	-17.3	0.0	0.60	0.74	1.29	1.48	5	7	0.00	0.00	0.00	0.00	1.25	2.12	2.95	5.98	10.64	18.81	28.40	37.13	48.69	63.43	82.45	95.67	98.30	98.46	98.50	98.52	99.91	ND
Cut to -14.3																														
FEVC-08-08 Composite									**VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS**																				
FEVC-08-09#1	-10.7	0.0	0.23	2.09	0.68	1.13	6	8	0.00	0.00	0.00	0.14	0.14	0.14	0.31	0.58	0.99	1.48	2.11	2.99	4.79	9.31	29.93	79.48	98.09	98.84	98.86	98.87	100.00	ND
FEVC-08-09#2	-13.7	0.0	0.21	2.26	0.44	1.20	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.17	0.30	0.47	0.77	1.41	3.55	16.01	74.63	98.17	98.77	98.80	98.80	99.99	ND
FEVC-08-09#3	-17.7	0.0	0.17	2.53	0.35	1.34	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.11	0.21	0.35	0.70	3.29	42.98	94.33	98.57	98.64	98.66	100.00	ND
Cut to -14.3																														
FEVC-08-09 Composite									**VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS**																				
FEVC-08-10#1	-10.0	0.0	0.21	2.26	0.57	1.20	6	7	0.00	0.00	0.00	0.00	0.15	0.17	0.17	0.20	0.34	0.59	0.96	1.50	2.77	6.23	19.02	64.99	97.73	98.75	98.80	98.80	100.00	ND
FEVC-08-10#2	-12.5	0.0	0.21	2.25	0.43	1.13	6	7	0.00	0.00	0.00	0.00	0.00	0.19	0.19	0.34	0.37	0.49	0.54	0.63	0.81	1.98	14.97	78.96	98.40	98.83	98.86	98.87	100.00	ND
FEVC-08-10#3	-14.1	0.0	0.30	1.75	0.80	1.18	6	7	0.00	0.00	0.00	0.00	0.22	0.39	0.56	0.85	1.55	2.57	4.06	6.47	11.22	23.91	56.02	90.82	98.55	98.79	98.82	98.82	99.94	ND
FEVC-08-10#4	-16.1	0.0	0.71	0.50	1.75	1.05	5	7	0.00	0.00	3.89	4.71	6.93	7.74	9.21	13.91	19.83	28.61	36.82	44.45	51.85	61.19	73.88	91.10	98.50	98.89	98.94	98.95	100.00	ND
Cut to -14.3																														
FEVC-08-10 Composite									**VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS**																				

CUMULATIVE PERCENTS AND COMPUTED DISTRIBUTIONS - FIGURE EIGHT VIBRACORES (3 OF 3)

SAMPLE I. D.	ELEVATION (NAVD88 FT)	EFFECTIVE LENGTH (FT)	MEAN (mm)	PHI MEAN	PHI SORTING	% SILT	MUNSELL COLOR WET	MUNSELL COLOR DRY	CUMULATIVE PERCENT RETAINED (SIEVES EXPRESSED IN PHI)																					% CARBONATES
									GRAVEL						GRANULAR			SAND											FINES PAN	
									-4.25	-4.0	-3.50	-3.0	-2.50	-2.25	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	3.75	4.0		
FEVC-07-02#1	-10.0	2.5	0.26	1.94	0.70	0.98	6	6	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.25	0.73	1.54	2.74	4.59	7.68	15.59	43.87	83.86	98.35	98.99	99.01	99.02	99.99	11.3
FEVC-07-02#2	-16.0	2.8	0.21	2.28	0.46	1.09	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.17	0.31	0.70	1.61	4.37	17.69	68.34	97.78	98.88	98.90	98.91	99.99	7.7
FEVC-07-02#3	-20.0	0.0	0.20	2.35	0.31	1.24	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.21	0.79	8.23	70.65	97.92	98.72	98.75	98.76	100.00	4.3
Cut to -14.3																														
FEVC-07-02 Composite		**5.3**	**0.23**	**2.12**	**0.61**	**1.04**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.03**	**0.12**	**0.38**	**0.82**	**1.46**	**2.53**	**4.47**	**9.66**	**30.04**	**75.66**	**98.05**	**98.93**	**98.95**	**98.96**	**99.99**	**9.4**
FEVC-07-11#1	-5.3	3.1	0.25	2.01	0.76	1.26	6	6	0.00	0.00	0.00	0.00	0.11	0.22	0.30	0.90	1.30	2.09	3.19	4.70	6.79	13.29	34.75	80.17	97.66	98.68	98.73	98.74	99.99	10.5
FEVC-07-11#2	-8.4	4.3	0.21	2.23	0.34	1.27	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.11	0.34	1.28	18.92	81.85	98.11	98.71	98.72	98.73	99.98	4.5
FEVC-07-11#3	-13.4	2.5	0.19	2.36	0.36	1.32	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.13	0.43	1.65	9.83	67.31	96.68	98.60	98.67	98.68	99.99	5.3
FEVC-07-11#4	-17.4	0.0	0.31	1.71	1.06	1.36	5	6	0.00	0.00	0.00	0.00	0.27	0.49	0.91	2.24	3.80	6.34	9.07	12.28	16.91	25.13	44.66	85.15	98.06	98.60	98.63	98.64	99.98	17.2
Cut to -14.3																														
FEVC-07-11 Composite		**9.9**	**0.22**	**2.19**	**0.53**	**1.28**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.00**	**0.03**	**0.07**	**0.09**	**0.28**	**0.41**	**0.66**	**1.02**	**1.55**	**2.38**	**5.13**	**21.58**	**77.65**	**97.61**	**98.67**	**98.71**	**98.72**	**99.99**	**6.6**
FEVC-07-12#1	-9.5	4.5	0.20	2.32	0.36	1.38	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.08	0.27	1.18	13.20	70.92	96.84	98.52	98.60	98.62	99.95	4.4
FEVC-07-12#2	-14.5	2.3	0.20	2.33	0.39	1.47	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.09	0.11	0.15	0.22	0.47	1.64	12.61	69.36	96.19	98.43	98.51	98.53	99.99	4.9
FEVC-07-12#3	-17.2	0.0	0.77	0.38	1.88	1.10	6	6	0.00	0.00	1.31	2.46	5.68	6.97	10.42	18.29	27.97	39.93	47.95	53.23	56.09	58.77	64.20	83.43	97.75	98.82	98.88	98.90	99.97	34.6
Cut to -14.3																														
FEVC-07-12 Composite		**6.8**	**0.20**	**2.33**	**0.37**	**1.41**	**6**	**7**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.03**	**0.04**	**0.07**	**0.13**	**0.34**	**1.34**	**13.00**	**70.39**	**96.62**	**98.49**	**98.57**	**98.59**	**99.96**	**4.6**
FEVC-07-16#1	-1.0	2.8	0.21	2.22	0.38	1.13	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.10	0.22	0.45	0.86	2.67	19.15	82.43	98.26	98.80	98.87	98.87	99.86	4.3
FEVC-07-16#2	-4.5	5.4	0.21	2.27	0.44	1.46	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.23	0.26	0.35	0.49	0.78	1.09	2.32	14.46	74.91	97.63	98.41	98.51	98.54	99.72	5.5
FEVC-07-16#3	-7.7	0.7	0.49	1.02	1.67	1.19	6	6	0.00	0.00	3.67	3.67	5.05	6.45	7.08	10.09	13.39	18.78	23.46	28.81	34.64	44.87	62.33	87.39	98.08	98.69	98.78	98.81	100.00	19.6
FEVC-07-16A#1	-7.8	0.0	0.27	1.87	1.01	1.13	5	7	0.00	0.00	0.00	0.00	0.00	0.26	0.51	1.18	2.54	5.27	8.10	11.14	14.31	19.92	34.49	77.06	97.98	98.79	98.86	98.87	99.96	
FEVC-07-16A#2	-10.3	3.8	0.59	0.77	1.71	0.85	5	6	0.00	0.00	6.90	7.18	8.42	8.69	9.84	11.63	13.99	17.84	22.51	29.35	38.81	54.58	76.17	96.02	98.86	99.14	99.15	99.15	99.83	29.1
FEVC-07-16A#3	-13.9	1.6	0.30	1.73	0.95	1.03	6	7	0.00	0.00	0.00	0.00	0.82	0.82	1.30	1.90	3.27	5.07	6.73	8.81	11.94	20.52	50.21	91.80	98.74	98.97	98.97	98.97	99.95	12.8
FEVC-07-16A#4	-16.5	0.0	0.21	2.22	0.33	1.45	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.06	0.08	0.12	0.30	1.21	18.77	83.56	98.20	98.53	98.55	98.55	99.69	4.3
Cut to -14.3																														
FEVC-07-16 Composite		**14.3**	**0.30**	**1.74**	**1.24**	**1.17**	**6**	**7**	**0.00**	**0.00**	**2.01**	**2.09**	**2.58**	**2.72**	**3.13**	**3.89**	**4.85**	**6.38**	**8.11**	**10.58**	**13.92**	**20.40**	**38.12**	**84.49**	**98.23**	**98.76**	**98.82**	**98.83**	**99.82**	**13.0**
FEVC-07-17#1	-5.0	4.7	0.22	2.18	0.44	0.99	6	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.32	0.52	0.89	1.45	3.84	23.85	82.71	98.35	98.97	99.00	99.01	100.00	5.3
FEVC-07-17#2	-8.1	0.7	0.68	0.56	2.25	1.15	6	6	7.51	7.51	11.01	12.89	15.06	15.61	16.35	18.85	21.73	25.61	30.13	34.43	39.25	46.36	61.94	89.32	98.50	98.80	98.83	98.85	100.00	24.5
FEVC-07-17#3	-10.0	3.4	0.24	2.03	0.59	1.17	6	7	0.00	0.00	0.00	0.00	0.15	0.15	0.15	0.33	0.55	0.92	1.36	2.15	4.01	10.94	35.86	85.57	98.53	98.82	98.82	98.83	100.00	9.1
FEVC-07-17#4	-13.1	1.9	0.55	0.85	1.61	0.91	5	6	0.00	3.56	3.56	4.78	5.42	5.61	6.50	8.56	12.01	17.91	23.96	30.78	38.61	51.95	76.19	94.31	98.87	99.07	99.08	99.09	100.00	27.9
FEVC-07-17#5	-14.5	0.6	0.26	1.93	0.63	1.20	6	7	0.00	0.00	0.00	0.00	0.27	0.27	0.27	0.42	0.83	1.43	2.02	2.88	4.55	11.46	48.15	90.05	98.44	98.78	98.79	98.80	99.97	8.8
FEVC-07-17A#1	-13.3	0.0	0.27	1.91	0.73	1.27	6	7	0.00	0.00	0.00	0.00	0.00	0.10	0.21	0.61	1.24	2.05	3.00	4.54	7.69	16.61	42.25	87.33	98.48	98.71	98.72	98.73	99.98	11.7
FEVC-07-17A#2	-15.6	0.0	0.41	1.28	1.14	0.80	6	6	0.00	0.00	0.00	0.47	1.52	1.76	2.13	3.39	5.36	8.79	12.91	18.40	26.89	44.38	73.31	94.05	98.94	99.18	99.19	99.20	99.98	20.0
Cut to -14.3																														
FEVC-07-17 Composite		**11.3**	**0.29**	**1.80**	**1.13**	**1.05**	**6**	**7**	**0.47**	**1.06**	**1.28**	**1.60**	**1.90**	**1.97**	**2.17**	**2.73**	**3.65**	**5.08**	**6.63**	**8.48**	**10.97**	**17.10**	**39.91**	**86.32**	**98.51**	**98.92**	**98.94**	**98.95**	**100.00**	**11.6**
FEVC-07-18#1	-5.0	5.9	0.27	1.91	0.71	1.01	5	7	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.36	0.81	1.54	2.27	3.79	7.71	20.12	45.32	84.79	98.32	98.95	98.98	98.99	99.98	10.6
FEVC-07-18#2	-7.5	4.0	0.34	1.55	1.09	1.12	6	7	0.00	0.00	0.00	1.13	1.94	2.26	2.49	3.24	4.34	5.79	7.87	11.17	16.82	30.24	59.67	92.70	98.72	98.87	98.87	98.88	99.77	13.0
FEVC-07-18#3	-15.5	1.4	0.23	2.10	0.54	1.00	6	7	0.00	0.00	0.00	0.00	0.04	0.04	0.05	0.18	0.29	0.51	0.80	1.38	2.94	9.10	33.19	80.48	98.30	98.99	99.00	99.00	99.95	5.8
Cut to -14.3																														
FEVC-07-18 Composite		**11.3**	**0.29**	**1.81**	**0.87**	**1.05**	**5**	**7**	**0.00**	**0.00**	**0.00**	**0.40**	**0.69**	**0.80**	**1.05**	**1.36**	**2.00**	**2.92**	**4.07**	**6.10**	**10.34**	**22.34**	**48.90**	**87.06**	**98.46**	**98.93**	**98.94**	**98.95**	**99.90**	**10.9**

PERCENTAGE OF MATERIAL BY SEDIMENT GRAIN SIZE CATEGORY
FIGURE EIGHT VIBRACORES (1 of 3)

SAMPLE I.D.	Fine % (<0.0625mm)	Sand % (0.0625mm-2.00mm)	Granular % (2mm-4.76mm)	Gravel % (4.76mm-76mm)
FEVC-08-01#1	1.48	98.34	0.18	0.00
FEVC-08-01#2	1.37	98.29	0.34	0.00
FEVC-08-01#3	1.76	84.15	4.47	9.62
FEVC-08-01#4	3.29	96.69	0.02	0.00
FEVC-08-01 Composite	**VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS**			
FEVC-08-02#1	1.30	97.48	0.63	0.59
FEVC-08-02#2	1.14	98.86	0.00	0.00
FEVC-08-02A#1	1.25	98.73	0.02	0.00
FEVC-08-02A#2	1.29	98.71	0.00	0.00
FEVC-08-02 Composite	**VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS**			
FEVC-08-03#1	0.93	91.25	3.64	4.18
FEVC-08-03#2	1.26	98.42	0.25	0.07
FEVC-08-03#3	1.30	98.63	0.07	0.00
FEVC-08-03#4	0.93	82.75	11.27	5.05
FEVC-08-03#5	1.29	98.69	0.02	0.00
FEVC-08-03#6	1.16	98.78	0.06	0.00
FEVC-08-03 Composite	**1.21**	**97.11**	**0.84**	**0.85**
FEVC-08-04#1	1.15	95.67	2.25	0.93
FEVC-08-04#2	0.98	64.69	24.44	9.89
FEVC-08-04#3	1.30	88.07	3.93	6.70
FEVC-08-04#4	1.14	98.74	0.12	0.00
FEVC-08-04A#1	0.98	99.02	0.00	0.00
FEVC-08-04A#2	1.24	98.76	0.00	0.00
FEVC-08-04A#3	0.95	96.62	1.45	0.98
FEVC-08-04A#4	1.09	98.77	0.14	0.00
FEVC-08-04 Composite	**1.16**	**90.36**	**5.24**	**3.24**
FEVC-08-05#1	1.06	97.93	0.79	0.22
FEVC-08-05#2	1.17	91.90	5.56	1.37
FEVC-08-05#3	1.13	97.87	0.72	0.28
FEVC-08-05#4	1.16	94.11	3.07	1.66
FEVC-08-05#5	1.20	98.76	0.04	0.00
FEVC-08-05A#1	0.80	40.94	13.82	44.44
FEVC-08-05A#2	0.97	97.66	0.98	0.39
FEVC-08-05A#3	1.32	86.93	8.51	3.24
FEVC-08-05A#4	0.88	98.45	0.67	0.00
FEVC-08-05A#5	0.80	97.89	1.22	0.09
FEVC-08-05 Composite	**1.13**	**96.48**	**1.87**	**0.53**

PERCENTAGE OF MATERIAL BY SEDIMENT GRAIN SIZE CATEGORY
FIGURE EIGHT VIBRACORES (2 of 3)

SAMPLE I.D.	Fine % (<0.0625mm)	Sand % (0.0625mm-2.00mm)	Granular % (2mm-4.76mm)	Gravel % (4.76mm-76mm)
FEVC-08-06#1	1.15	98.81	0.04	0.00
FEVC-08-06#2	1.09	97.71	0.14	1.06
FEVC-08-06#3	1.42	98.57	0.01	0.00
FEVC-08-06#4	1.23	90.10	4.76	3.91
FEVC-08-06#5	32.97	65.90	0.20	0.93
FEVC-08-06 Composite	**1.21**	**98.07**	**0.21**	**0.50**
FEVC-08-07#1	0.79	97.73	1.14	0.34
FEVC-08-07#2	1.05	98.88	0.07	0.00
FEVC-08-07#3	0.90	93.09	4.55	1.46
FEVC-08-07#4	1.20	98.80	0.00	0.00
FEVC-08-07A#1	1.20	98.80	0.00	0.00
FEVC-08-07 Composite	**VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS**			
FEVC-08-08#1	1.13	96.97	1.58	0.32
FEVC-08-08#2	1.24	96.39	1.21	1.16
FEVC-08-08#3	1.48	87.88	8.52	2.12
FEVC-08-08 Composite	**VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS**			
FEVC-08-09#1	1.13	97.88	0.85	0.14
FEVC-08-09#2	1.20	98.63	0.17	0.00
FEVC-08-09#3	1.34	98.65	0.01	0.00
FEVC-08-09 Composite	**VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS**			
FEVC-08-10#1	1.20	98.46	0.17	0.17
FEVC-08-10#2	1.13	98.50	0.18	0.19
FEVC-08-10#3	1.18	97.27	1.16	0.39
FEVC-08-10#4	1.05	79.12	12.09	7.74
FEVC-08-10 Composite	**VIBRACORE NOT USED IN BORROW AREA COMPOSITE CALCULATIONS**			

PERCENTAGE OF MATERIAL BY SEDIMENT GRAIN SIZE CATEGORY
FIGURE EIGHT VIBRACORES (3 of 3)

SAMPLE I.D.	Fine % (<0.0625mm)	Sand % (0.0625mm-2.00mm)	Granular % (2mm-4.76mm)	Gravel % (4.76mm-76mm)
FEVC-07-02#1	0.98	98.29	0.73	0.00
FEVC-07-02#2	1.09	98.85	0.06	0.00
FEVC-07-02#3	1.24	98.76	0.00	0.00
FEVC-07-02 Composite	**1.04**	**98.59**	**0.38**	**0.00**
FEVC-07-11#1	1.26	97.44	1.08	0.22
FEVC-07-11#2	1.27	98.73	0.00	0.00
FEVC-07-11#3	1.32	98.68	0.00	0.00
FEVC-07-11#4	1.36	94.84	3.31	0.49
FEVC-07-11 Composite	**1.28**	**98.31**	**0.34**	**0.07**
FEVC-07-12#1	1.38	98.62	0.00	0.00
FEVC-07-12#2	1.47	98.44	0.09	0.00
FEVC-07-12#3	1.10	70.93	21.00	6.97
FEVC-07-12 Composite	**1.41**	**98.56**	**0.03**	**0.00**
FEVC-07-16#1	1.13	98.82	0.05	0.00
FEVC-07-16#2	1.46	98.28	0.26	0.00
FEVC-07-16#3	1.19	85.42	6.94	6.45
FEVC-07-16A#1	1.13	96.33	2.28	0.26
FEVC-07-16A#2	0.85	85.16	5.30	8.69
FEVC-07-16A#3	1.03	95.70	2.45	0.82
FEVC-07-16A#4	1.45	98.53	0.02	0.00
FEVC-07-16 Composite	**1.17**	**93.98**	**2.13**	**2.72**
FEVC-07-17#1	0.99	98.83	0.18	0.00
FEVC-07-17#2	1.15	77.12	6.12	15.61
FEVC-07-17#3	1.17	98.28	0.40	0.15
FEVC-07-17#4	0.91	87.08	6.40	5.61
FEVC-07-17#5	1.20	97.97	0.56	0.27
FEVC-07-17A#1	1.27	97.49	1.14	0.10
FEVC-07-17A#2	0.80	93.84	3.60	1.76
FEVC-07-17 Composite	**1.05**	**95.30**	**1.68**	**1.97**
FEVC-07-18#1	1.01	98.18	0.81	0.00
FEVC-07-18#2	1.12	94.54	2.08	2.26
FEVC-07-18#3	1.00	98.71	0.25	0.04
FEVC-07-18 Composite	**1.05**	**96.96**	**1.19**	**0.80**
Alternative 5 Composite	**1.17**	**96.09**	**1.53**	**1.22**

APPENDIX 30

Alternative 5 Channel Corridor Composite Vibracore Granularmetric Reports

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 5

Sample Name: Alternative 5 Comp.

Analysis Date: 10-30-09

Analyzed By: KD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
		North Carolina State Plane	

USCS:	Munsell:	Comments:
SW		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.13	0.04	#200 - 1.18 #230 - 1.17		10	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
1"	-4.75	26.91	0.00	0.00	0.00	0.00
3/4"	-4.25	19.03	0.05	0.05	0.05	0.05
5/8"	-4.00	16.00	0.11	0.11	0.16	0.16
7/16"	-3.50	11.31	0.42	0.42	0.58	0.58
5/16"	-3.00	8.00	0.20	0.20	0.78	0.78
3.5	-2.50	5.66	0.28	0.28	1.06	1.06
4	-2.25	4.76	0.16	0.16	1.22	1.22
5	-2.00	4.00	0.27	0.27	1.49	1.49
7	-1.50	2.83	0.53	0.53	2.02	2.02
10	-1.00	2.00	0.72	0.72	2.74	2.74
14	-0.50	1.41	1.09	1.09	3.83	3.83
18	0.00	1.00	1.22	1.22	5.05	5.05
25	0.50	0.71	1.50	1.50	6.55	6.55
35	1.00	0.50	2.31	2.31	8.86	8.86
45	1.50	0.35	5.21	5.21	14.07	14.07
60	2.00	0.25	16.62	16.62	30.69	30.69
80	2.50	0.18	46.02	46.02	76.71	76.71
120	3.00	0.13	20.92	20.92	97.63	97.63
170	3.50	0.09	1.15	1.15	98.78	98.78
200	3.75	0.07	0.04	0.04	98.82	98.82
230	4.00	0.06	0.01	0.01	98.83	98.83

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.94	2.67	2.48	2.21	1.83	1.56	-0.02

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.97	0.26	0.99	-3.03	14.62

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_5.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 5

Sample Name: FEVC-07-02 Comp.

Analysis Date: 08-28-09

Analyzed By: KD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,733	202,440	North Carolina State Plane	-9.0 NAVD 88

USCS:	Munsell:	Comments:
SP		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.03	0.01	#200 - 1.05 #230 - 1.04		9	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.03	0.03	0.03	0.03
7	-1.50	2.83	0.09	0.09	0.12	0.12
10	-1.00	2.00	0.26	0.26	0.38	0.38
14	-0.50	1.41	0.44	0.44	0.82	0.82
18	0.00	1.00	0.64	0.64	1.46	1.46
25	0.50	0.71	1.07	1.07	2.53	2.53
35	1.00	0.50	1.94	1.94	4.47	4.47
45	1.50	0.35	5.19	5.19	9.66	9.66
60	2.00	0.25	20.38	20.38	30.04	30.04
80	2.50	0.18	45.62	45.62	75.66	75.66
120	3.00	0.13	22.39	22.39	98.05	98.05
170	3.50	0.09	0.88	0.88	98.93	98.93
200	3.75	0.07	0.02	0.02	98.95	98.95
230	4.00	0.06	0.01	0.01	98.96	98.96

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.93	2.69	2.49	2.22	1.88	1.66	1.05

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.12	0.23	0.61	-2.03	10.28

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_5.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 5

Sample Name: FEVC-07-11 Comp.

Analysis Date: 08-28-09

Analyzed By: KD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,946	201,018	North Carolina State Plane	-4.4 NAVD 88

USCS:	Munsell:	Comments:
SP		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.27	0.01	#200 - 1.29 #230 - 1.28		7	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.03	0.03	0.03	0.03
4	-2.25	4.76	0.04	0.04	0.07	0.07
5	-2.00	4.00	0.02	0.02	0.09	0.09
7	-1.50	2.83	0.19	0.19	0.28	0.28
10	-1.00	2.00	0.13	0.13	0.41	0.41
14	-0.50	1.41	0.25	0.25	0.66	0.66
18	0.00	1.00	0.36	0.36	1.02	1.02
25	0.50	0.71	0.53	0.53	1.55	1.55
35	1.00	0.50	0.83	0.83	2.38	2.38
45	1.50	0.35	2.75	2.75	5.13	5.13
60	2.00	0.25	16.45	16.45	21.58	21.58
80	2.50	0.18	56.07	56.07	77.65	77.65
120	3.00	0.13	19.96	19.96	97.61	97.61
170	3.50	0.09	1.06	1.06	98.67	98.67
200	3.75	0.07	0.04	0.04	98.71	98.71
230	4.00	0.06	0.01	0.01	98.72	98.72

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.93	2.66	2.48	2.25	2.03	1.83	1.48

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.19	0.22	0.53	-2.91	19.87

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_5.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 5

Sample Name: FEVC-07-12 Comp.

Analysis Date: 08-28-09

Analyzed By: KD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,433	200,711	North Carolina State Plane	-7.5 NAVD 88

USCS:	Munsell:	Comments:
SP		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.37	0.04	#200 - 1.43 #230 - 1.41		5	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.02	0.02	0.02	0.02
10	-1.00	2.00	0.01	0.01	0.03	0.03
14	-0.50	1.41	0.01	0.01	0.04	0.04
18	0.00	1.00	0.03	0.03	0.07	0.07
25	0.50	0.71	0.06	0.06	0.13	0.13
35	1.00	0.50	0.21	0.21	0.34	0.34
45	1.50	0.35	1.00	1.00	1.34	1.34
60	2.00	0.25	11.66	11.66	13.00	13.00
80	2.50	0.18	57.39	57.39	70.39	70.39
120	3.00	0.13	26.23	26.23	96.62	96.62
170	3.50	0.09	1.87	1.87	98.49	98.49
200	3.75	0.07	0.08	0.08	98.57	98.57
230	4.00	0.06	0.02	0.02	98.59	98.59

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.97	2.76	2.59	2.32	2.10	2.03	1.66

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.33	0.20	0.37	-0.77	9.34

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_5.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 5

Sample Name: FEVC-07-16 Comp.

Analysis Date: 08-28-09

Analyzed By: KD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,474	201,638	North Carolina State Plane	0.0 NAVD 88

USCS:	Munsell:	Comments:
SW		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.99	0.18	#200 - 1.18 #230 - 1.17		13	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	2.01	2.01	2.01	2.01
5/16"	-3.00	8.00	0.08	0.08	2.09	2.09
3.5	-2.50	5.66	0.49	0.49	2.58	2.58
4	-2.25	4.76	0.14	0.14	2.72	2.72
5	-2.00	4.00	0.41	0.41	3.13	3.13
7	-1.50	2.83	0.76	0.76	3.89	3.89
10	-1.00	2.00	0.96	0.96	4.85	4.85
14	-0.50	1.41	1.53	1.53	6.38	6.38
18	0.00	1.00	1.73	1.73	8.11	8.11
25	0.50	0.71	2.47	2.47	10.58	10.58
35	1.00	0.50	3.34	3.34	13.92	13.92
45	1.50	0.35	6.48	6.48	20.40	20.40
60	2.00	0.25	17.72	17.72	38.12	38.12
80	2.50	0.18	46.37	46.37	84.49	84.49
120	3.00	0.13	13.74	13.74	98.23	98.23
170	3.50	0.09	0.53	0.53	98.76	98.76
200	3.75	0.07	0.06	0.06	98.82	98.82
230	4.00	0.06	0.01	0.01	98.83	98.83

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.88	2.49	2.40	2.13	1.63	1.16	-0.95

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.74	0.30	1.24	-2.65	10.63

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_5.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 5

Sample Name: FEVC-07-17 Comp.

Analysis Date: 08-28-09

Analyzed By: KD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,728	201,394	North Carolina State Plane	-3.0 NAVD 88

USCS:	Munsell:	Comments:
SW		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.05	0.00	#200 - 1.06 #230 - 1.05		12	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
1"	-4.75	26.91	0.00	0.00	0.00	0.00
3/4"	-4.25	19.03	0.47	0.47	0.47	0.47
5/8"	-4.00	16.00	0.59	0.59	1.06	1.06
7/16"	-3.50	11.31	0.22	0.22	1.28	1.28
5/16"	-3.00	8.00	0.32	0.32	1.60	1.60
3.5	-2.50	5.66	0.30	0.30	1.90	1.90
4	-2.25	4.76	0.07	0.07	1.97	1.97
5	-2.00	4.00	0.20	0.20	2.17	2.17
7	-1.50	2.83	0.56	0.56	2.73	2.73
10	-1.00	2.00	0.92	0.92	3.65	3.65
14	-0.50	1.41	1.43	1.43	5.08	5.08
18	0.00	1.00	1.55	1.55	6.63	6.63
25	0.50	0.71	1.85	1.85	8.48	8.48
35	1.00	0.50	2.49	2.49	10.97	10.97
45	1.50	0.35	6.13	6.13	17.10	17.10
60	2.00	0.25	22.81	22.81	39.91	39.91
80	2.50	0.18	46.41	46.41	86.32	86.32
120	3.00	0.13	12.19	12.19	98.51	98.51
170	3.50	0.09	0.41	0.41	98.92	98.92
200	3.75	0.07	0.02	0.02	98.94	98.94
230	4.00	0.06	0.01	0.01	98.95	98.95

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.86	2.48	2.38	2.11	1.67	1.41	-0.53

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.8	0.29	1.13	-3.11	14.56

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_5.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 5

Sample Name: FEVC-07-18 Comp.

Analysis Date: 08-28-09

Analyzed By: KD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,894	201,815	North Carolina State Plane	-3.0 NAVD 88

USCS:	Munsell:	Comments:
SW		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.95	0.10	#200 - 1.06 #230 - 1.05		11	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.40	0.40	0.40	0.40
3.5	-2.50	5.66	0.29	0.29	0.69	0.69
4	-2.25	4.76	0.11	0.11	0.80	0.80
5	-2.00	4.00	0.25	0.25	1.05	1.05
7	-1.50	2.83	0.31	0.31	1.36	1.36
10	-1.00	2.00	0.64	0.64	2.00	2.00
14	-0.50	1.41	0.92	0.92	2.92	2.92
18	0.00	1.00	1.15	1.15	4.07	4.07
25	0.50	0.71	2.03	2.03	6.10	6.10
35	1.00	0.50	4.24	4.24	10.34	10.34
45	1.50	0.35	12.00	12.00	22.34	22.34
60	2.00	0.25	26.56	26.56	48.90	48.90
80	2.50	0.18	38.16	38.16	87.06	87.06
120	3.00	0.13	11.40	11.40	98.46	98.46
170	3.50	0.09	0.47	0.47	98.93	98.93
200	3.75	0.07	0.01	0.01	98.94	98.94
230	4.00	0.06	0.01	0.01	98.95	98.95

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.85	2.46	2.34	2.01	1.55	1.24	0.23

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.81	0.29	0.87	-2.46	11.91

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_5.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 5

Sample Name: FEVC-08-03 Comp.

Analysis Date: 09-08-09

Analyzed By: KD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,387,390	201,128	North Carolina State Plane	-3.6 NAVD 88

USCS:	Munsell:	Comments:
SP		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.20	0.01	#200 - 1.24 #230 - 1.21		8	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.11	0.11	0.11	0.11
5/16"	-3.00	8.00	0.25	0.25	0.36	0.36
3.5	-2.50	5.66	0.27	0.27	0.63	0.63
4	-2.25	4.76	0.22	0.22	0.85	0.85
5	-2.00	4.00	0.15	0.15	1.00	1.00
7	-1.50	2.83	0.29	0.29	1.29	1.29
10	-1.00	2.00	0.39	0.39	1.68	1.68
14	-0.50	1.41	0.60	0.60	2.28	2.28
18	0.00	1.00	0.79	0.79	3.07	3.07
25	0.50	0.71	0.85	0.85	3.92	3.92
35	1.00	0.50	1.12	1.12	5.04	5.04
45	1.50	0.35	2.07	2.07	7.11	7.11
60	2.00	0.25	5.96	5.96	13.07	13.07
80	2.50	0.18	40.50	40.50	53.57	53.57
120	3.00	0.13	42.39	42.39	95.96	95.96
170	3.50	0.09	2.73	2.73	98.69	98.69
200	3.75	0.07	0.07	0.07	98.76	98.76
230	4.00	0.06	0.03	0.03	98.79	98.79

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.99	2.86	2.75	2.46	2.15	2.04	0.98

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.29	0.20	0.83	-3.71	20.49

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_5.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 5

Sample Name: FEVC-08-04 Comp.

Analysis Date: 10-30-09

Analyzed By: KD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,485	202,080	North Carolina State Plane	-3.0 NAVD 88

USCS:	Munsell:	Comments:
SW		Composite data. Average dry Munsell Value is 7.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.15	0.01	#200 - 1.17 #230 - 1.16		22	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.40	0.40	0.40	0.40
7/16"	-3.50	11.31	1.04	1.04	1.44	1.44
5/16"	-3.00	8.00	0.37	0.37	1.81	1.81
3.5	-2.50	5.66	0.89	0.89	2.70	2.70
4	-2.25	4.76	0.54	0.54	3.24	3.24
5	-2.00	4.00	0.91	0.91	4.15	4.15
7	-1.50	2.83	1.99	1.99	6.14	6.14
10	-1.00	2.00	2.34	2.34	8.48	8.48
14	-0.50	1.41	3.08	3.08	11.56	11.56
18	0.00	1.00	2.93	2.93	14.49	14.49
25	0.50	0.71	2.86	2.86	17.35	17.35
35	1.00	0.50	3.74	3.74	21.09	21.09
45	1.50	0.35	6.43	6.43	27.52	27.52
60	2.00	0.25	18.61	18.61	46.13	46.13
80	2.50	0.18	41.92	41.92	88.05	88.05
120	3.00	0.13	10.45	10.45	98.50	98.50
170	3.50	0.09	0.31	0.31	98.81	98.81
200	3.75	0.07	0.02	0.02	98.83	98.83
230	4.00	0.06	0.01	0.01	98.84	98.84

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.83	2.45	2.34	2.05	1.30	0.26	-1.79

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.48	0.36	1.42	-1.88	6.09

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_5.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 5

Sample Name: FEVC-08-05 Comp.

Analysis Date: 08-28-09

Analyzed By: KD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
ph (561) 391-8102
fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,388,173	201,385	North Carolina State Plane	-2.0 NAVD 88

USCS:	Munsell:	Comments:
SW		Composite data. Average dry Munsell Value is 8.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.13	0.00	#200 - 1.14 #230 - 1.13		11	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.09	0.09	0.09	0.09
3.5	-2.50	5.66	0.20	0.20	0.29	0.29
4	-2.25	4.76	0.24	0.24	0.53	0.53
5	-2.00	4.00	0.40	0.40	0.93	0.93
7	-1.50	2.83	0.56	0.56	1.49	1.49
10	-1.00	2.00	0.90	0.90	2.39	2.39
14	-0.50	1.41	1.49	1.49	3.88	3.88
18	0.00	1.00	1.94	1.94	5.82	5.82
25	0.50	0.71	2.04	2.04	7.86	7.86
35	1.00	0.50	3.39	3.39	11.25	11.25
45	1.50	0.35	6.78	6.78	18.03	18.03
60	2.00	0.25	19.56	19.56	37.59	37.59
80	2.50	0.18	45.28	45.28	82.87	82.87
120	3.00	0.13	15.19	15.19	98.06	98.06
170	3.50	0.09	0.77	0.77	98.83	98.83
200	3.75	0.07	0.03	0.03	98.86	98.86
230	4.00	0.06	0.01	0.01	98.87	98.87

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.90	2.54	2.41	2.14	1.68	1.35	-0.21

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.88	0.27	0.93	-2.27	9.16

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_5.GPJ JPBRAZIL.GDT 3/11/10

Granularmetric Report

Depths and elevations based on measured values

Project Name: Figure Eight Alternative 5

Sample Name: FEVC-08-06 Comp.

Analysis Date: 08-28-09

Analyzed By: KD

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
FL 33431
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fax (561) 391-9116

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
2,386,618	200,973	North Carolina State Plane	-1.1 NAVD 88

USCS:	Munsell:	Comments:
SP		Composite data. Average dry Munsell Value is 8.

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	1.21	0.00	#200 - 1.22 #230 - 1.21		4	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
7/16"	-3.50	11.31	0.05	0.05	0.05	0.05
5/16"	-3.00	8.00	0.34	0.34	0.39	0.39
3.5	-2.50	5.66	0.03	0.03	0.42	0.42
4	-2.25	4.76	0.08	0.08	0.50	0.50
5	-2.00	4.00	0.03	0.03	0.53	0.53
7	-1.50	2.83	0.07	0.07	0.60	0.60
10	-1.00	2.00	0.11	0.11	0.71	0.71
14	-0.50	1.41	0.17	0.17	0.88	0.88
18	0.00	1.00	0.17	0.17	1.05	1.05
25	0.50	0.71	0.23	0.23	1.28	1.28
35	1.00	0.50	0.44	0.44	1.72	1.72
45	1.50	0.35	1.26	1.26	2.98	2.98
60	2.00	0.25	6.99	6.99	9.97	9.97
80	2.50	0.18	47.50	47.50	57.47	57.47
120	3.00	0.13	38.60	38.60	96.07	96.07
170	3.50	0.09	2.63	2.63	98.70	98.70
200	3.75	0.07	0.08	0.08	98.78	98.78
230	4.00	0.06	0.01	0.01	98.79	98.79

Shell Hash calculated from visual estimate of shell <4.75mm and >2.8mm.

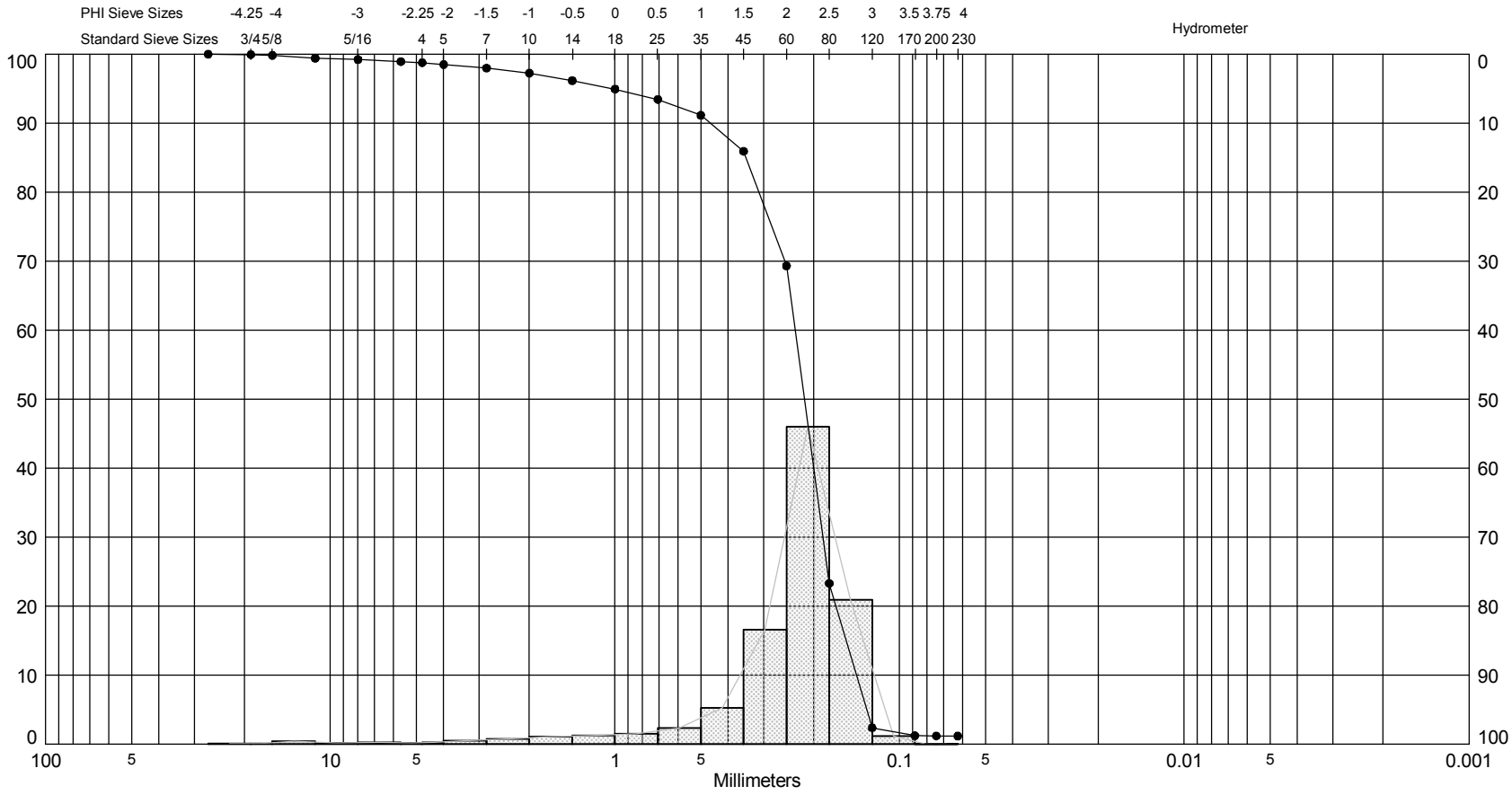
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.99	2.84	2.73	2.42	2.16	2.06	1.64

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.37	0.19	0.6	-4.97	42.23

GRANULARMETRIC REPORT FIGURE_EIGHT_ALTERNATIVE_5.GPJ JPBRAZIL.GDT 3/11/10

APPENDIX 31

Alternative 5 Channel Corridor Composite Vibracore Grain Size Distribution Curves/Histograms



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
Alternative 5 Comp.	—●—		SW	#200 - 1.18 #230 - 1.17		10	2.21	1.97	-3.03	14.62	0.99

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 5
Analysis Date:	10-30-09
Analyzed By:	KD
Easting (X, ft):	
Northing (Y, ft):	
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
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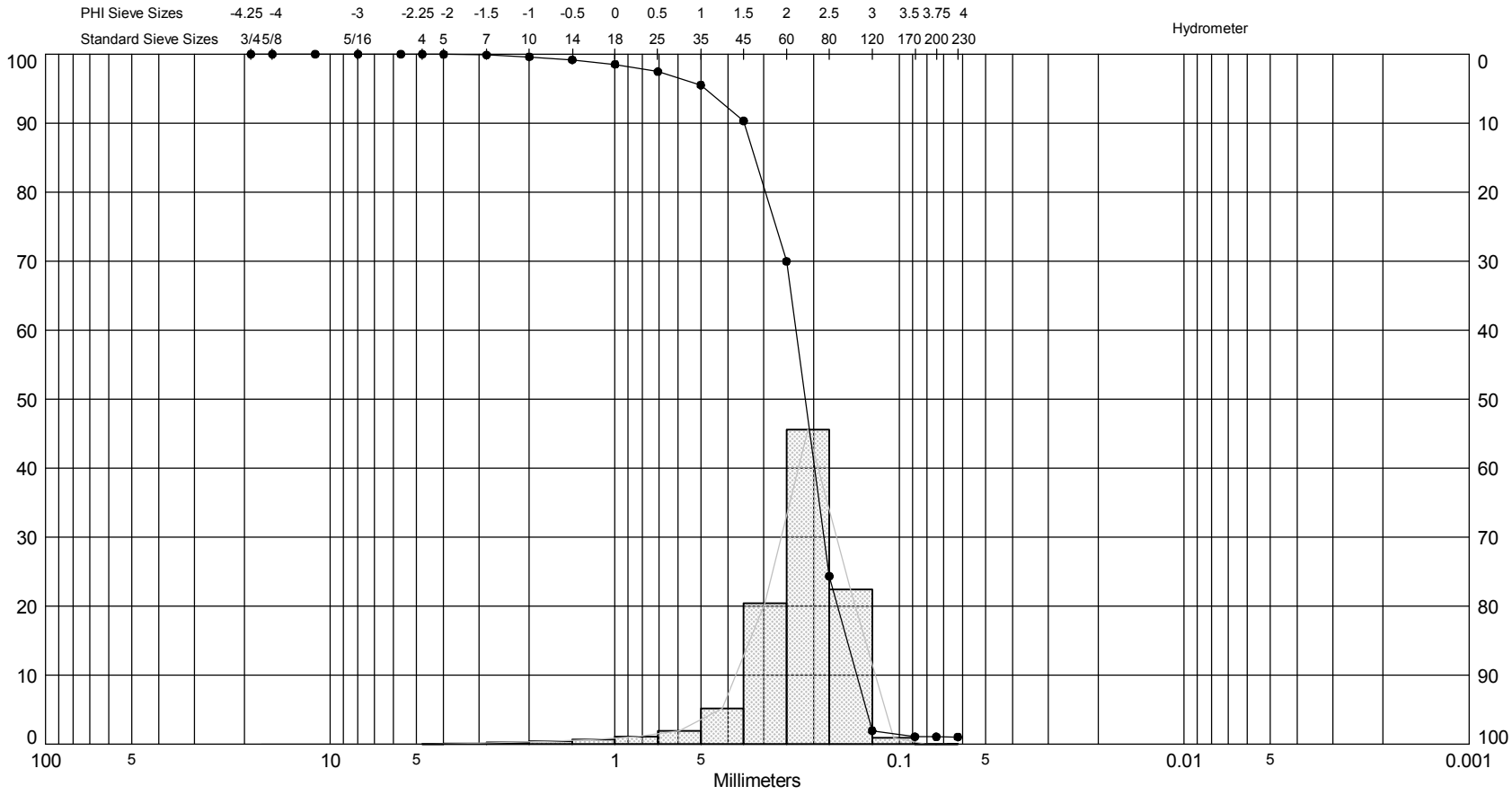
ph (561) 391-8102
fax (561) 391-9116

SIEVE ANALYSIS FIGURE_EIGHT_ALTERNATIVE_5.GPJ JPBRAZIL.GDT 3/11/10



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-02 Comp.	—●—	-9.0	SP	#200 - 1.05 #230 - 1.04		9	2.22	2.12	-2.03	10.28	0.61

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 5
Analysis Date:	08-28-09
Analyzed By:	KD
Easting (X, ft):	2,388,733
Northing (Y, ft):	202,440
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
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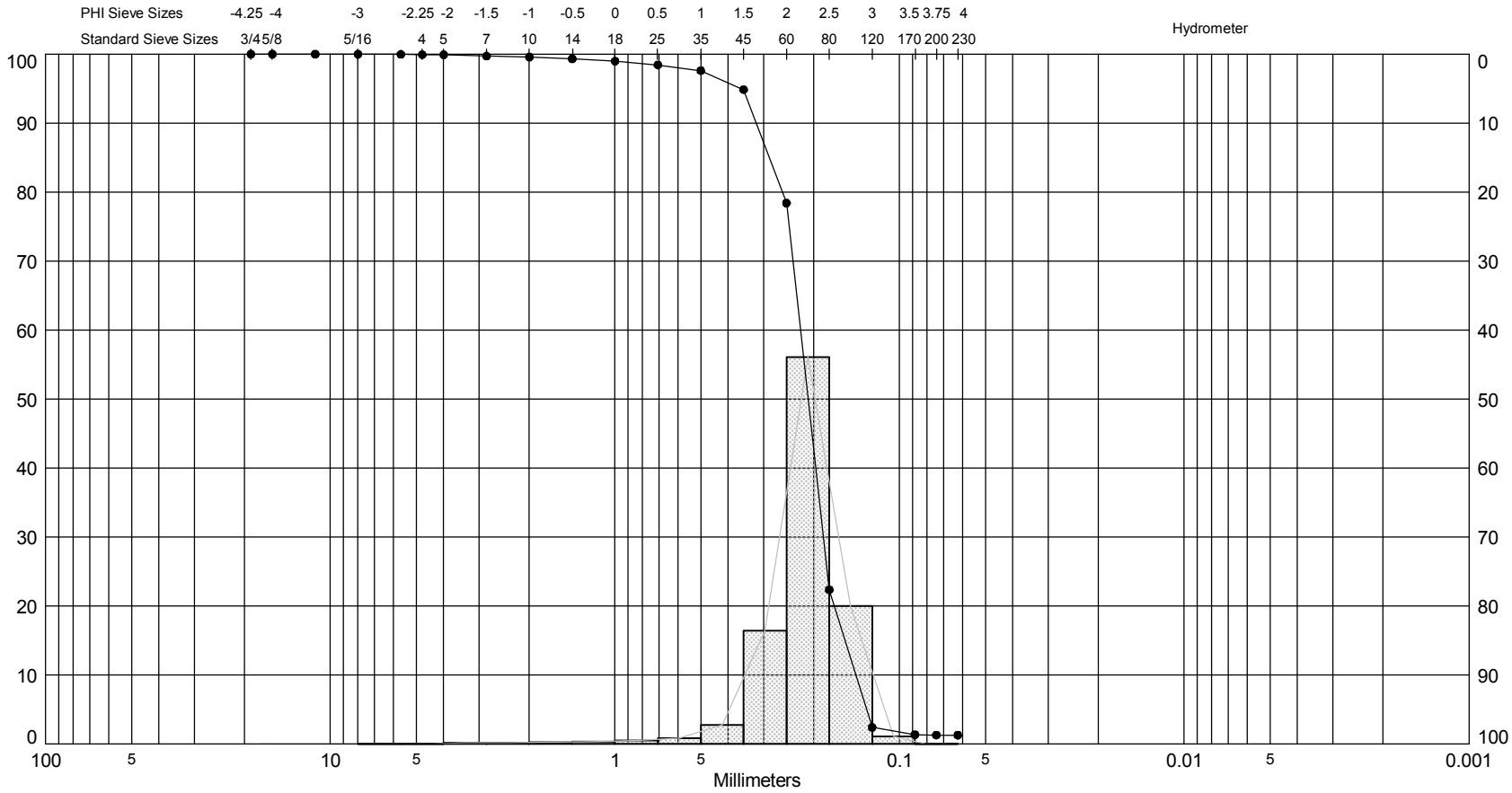
fax (561) 391-9116

SIEVE ANALYSIS FIGURE_EIGHT_ALTERNATIVE_5.GPJ JPBRAZIL.GDT 3/11/10



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-11 Comp.	—●—	-4.4	SP	#200 - 1.29 #230 - 1.28		7	2.25	2.19	-2.91	19.87	0.53

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 5
Analysis Date:	08-28-09
Analyzed By:	KD
Easting (X, ft):	2,386,946
Northing (Y, ft):	201,018
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
2481 NW Boca Raton Blvd, Boca Raton
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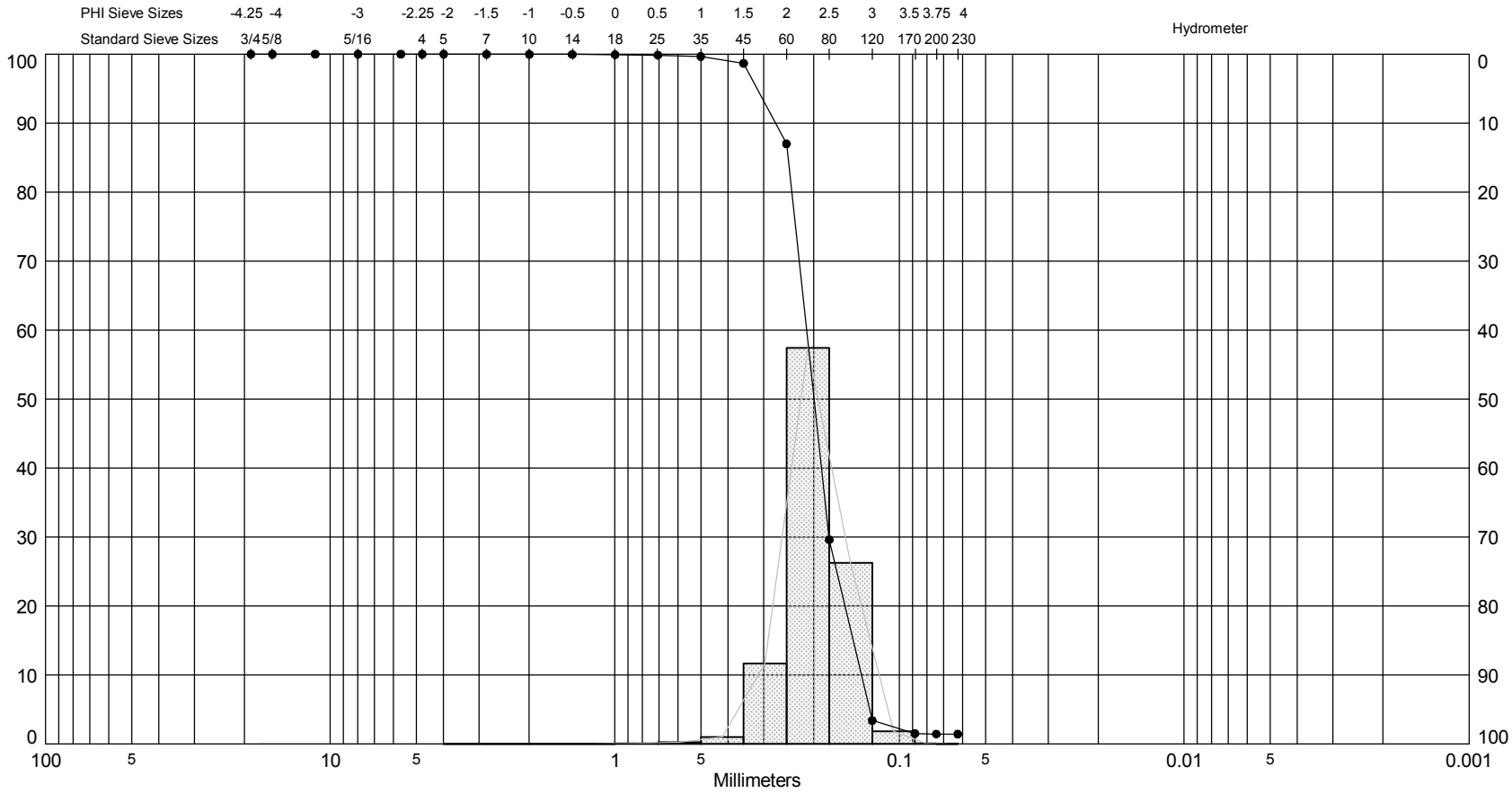
SIEVE ANALYSIS FIGURE_EIGHT_ALTERNATIVE_5.GPJ JPBRAZIL.GDT 3/11/10



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-12 Comp.	—●—	-7.5	SP	#200 - 1.43 #230 - 1.41		5	2.32	2.33	-0.77	9.34	0.37

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 5
Analysis Date:	08-28-09
Analyzed By:	KD
Easting (X, ft):	2,386,433
Northing (Y, ft):	200,711
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

Coastal Planning & Engineering
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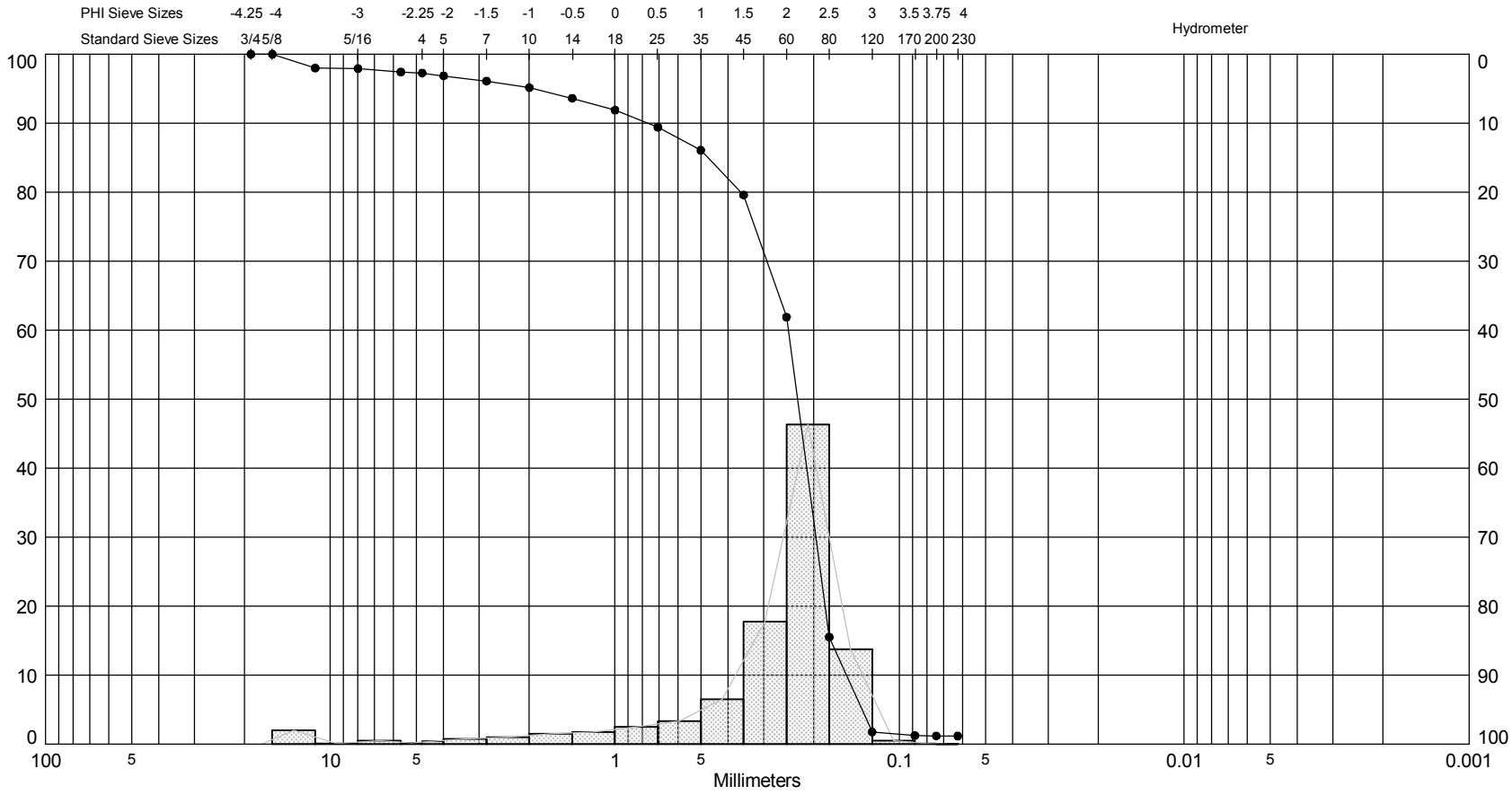
SIEVE ANALYSIS FIGURE_EIGHT_ALTERNATIVE_5.GPJ JPBRAZIL.GDT 3/11/10



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-16 Comp.	—●—	0.0	SW	#200 - 1.18 #230 - 1.17		13	2.13	1.74	-2.65	10.63	1.24

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Coastal Planning & Engineering
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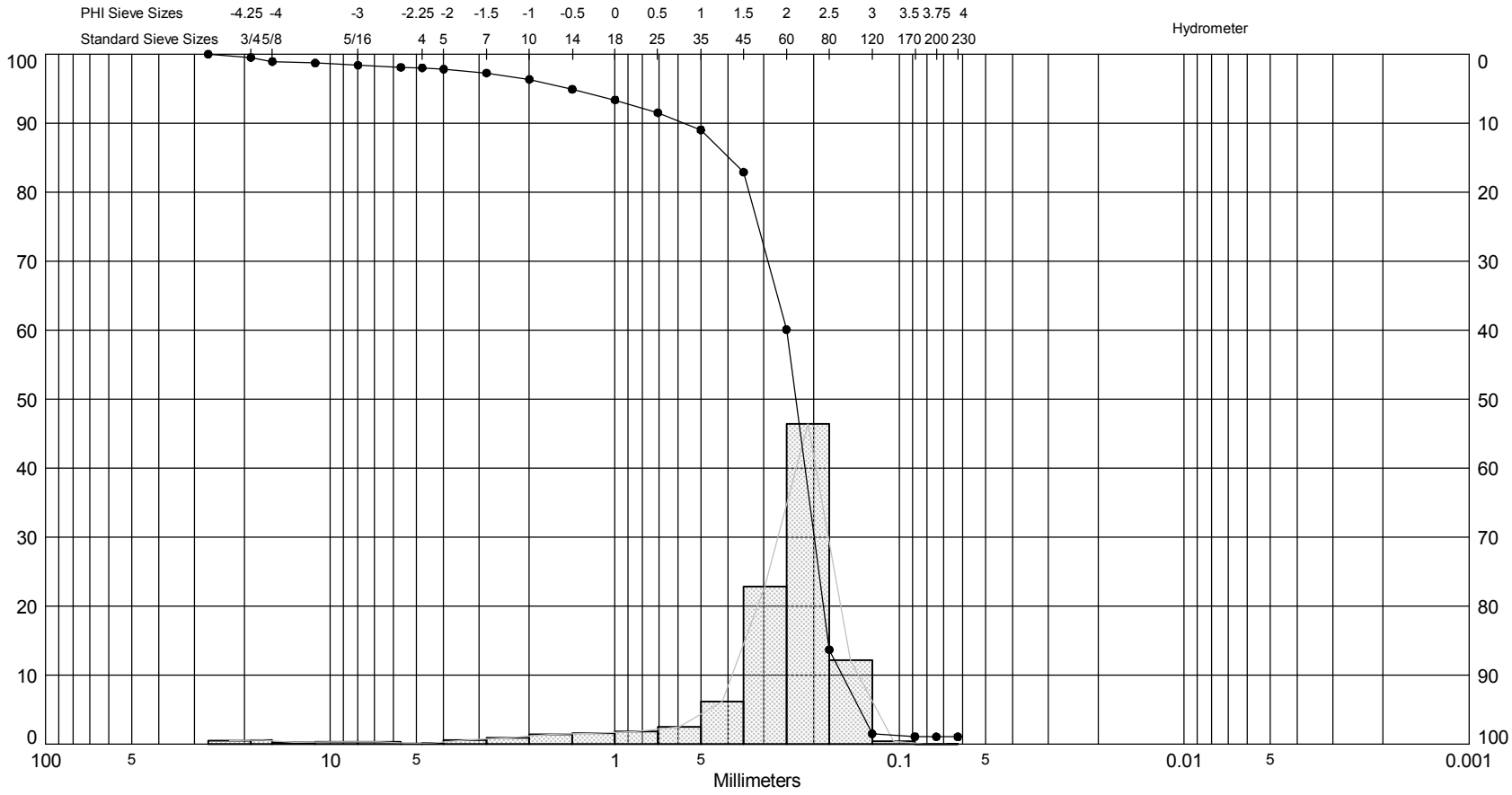
Sample Information	
Project Name:	Figure Eight Alternative 5
Analysis Date:	08-28-09
Analyzed By:	KD
Easting (X, ft):	2,388,474
Northing (Y, ft):	201,638
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

SIEVE ANALYSIS FIGURE_EIGHT_ALTERNATIVE_5.GPJ JPBRAZIL.GDT 3/11/10



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-17 Comp.	—●—	-3.0	SW	#200 - 1.06 #230 - 1.05		12	2.11	1.8	-3.11	14.56	1.13

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 5
Analysis Date:	08-28-09
Analyzed By:	KD
Easting (X, ft):	2,387,728
Northing (Y, ft):	201,394
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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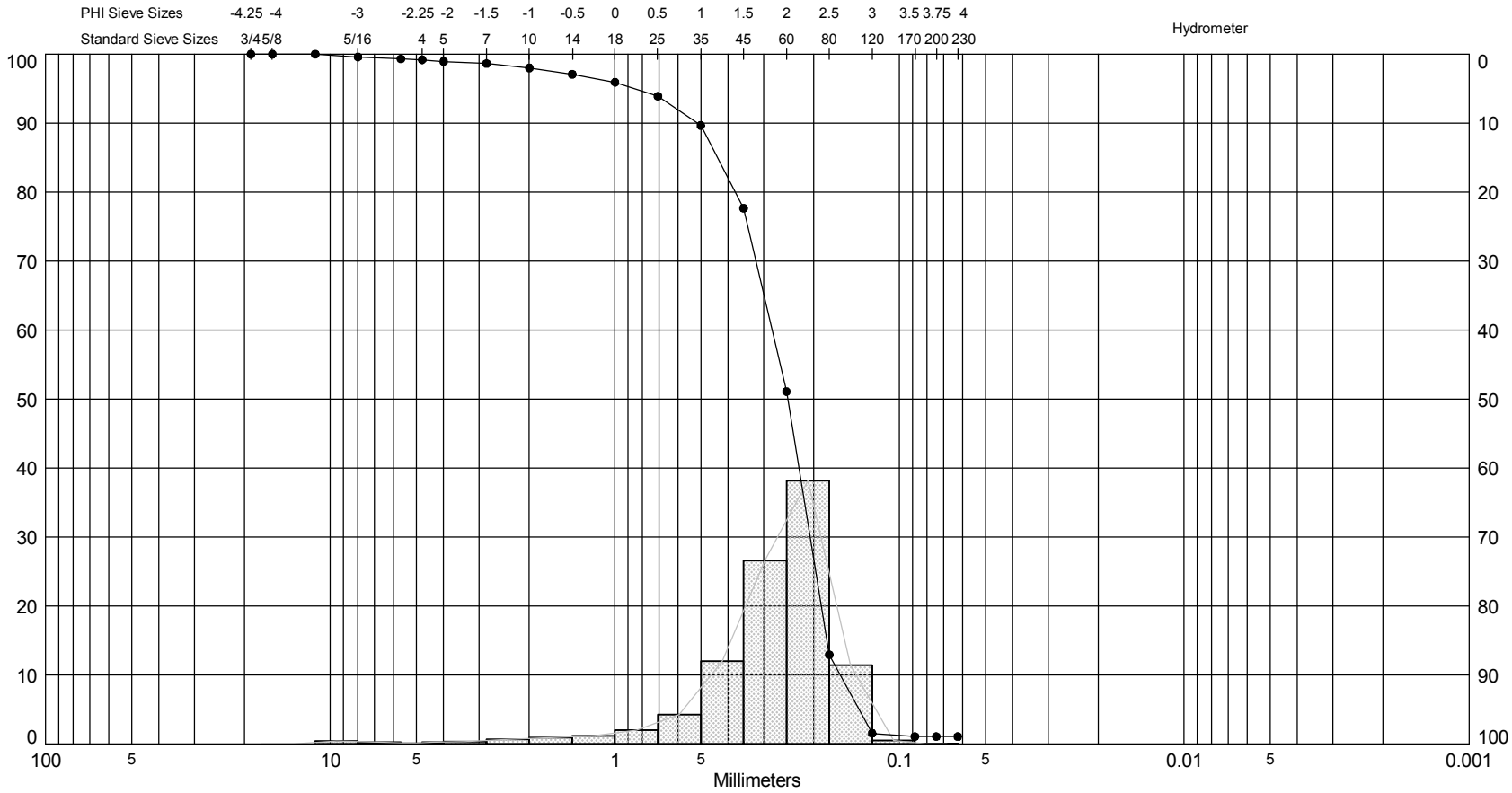

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-07-18 Comp.	—●—	-3.0	SW	#200 - 1.06 #230 - 1.05		11	2.01	1.81	-2.46	11.91	0.87

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 5
Analysis Date:	08-28-09
Analyzed By:	KD
Easting (X, ft):	2,387,894
Northing (Y, ft):	201,815
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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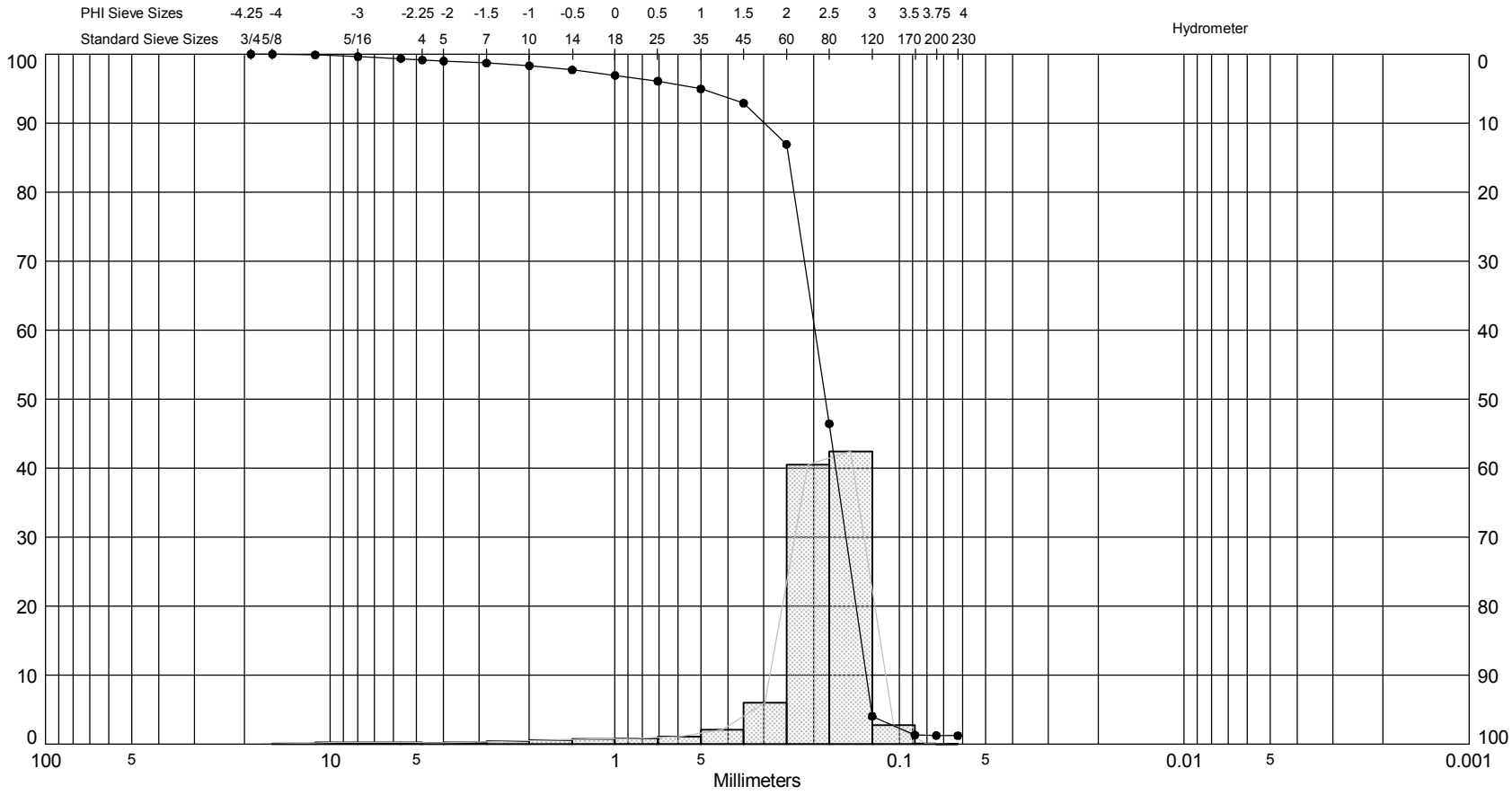

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-03 Comp.	—●—	-3.6	SP	#200 - 1.24 #230 - 1.21		8	2.46	2.29	-3.71	20.49	0.83

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 5
Analysis Date:	09-08-09
Analyzed By:	KD
Easting (X, ft):	2,387,390
Northing (Y, ft):	201,128
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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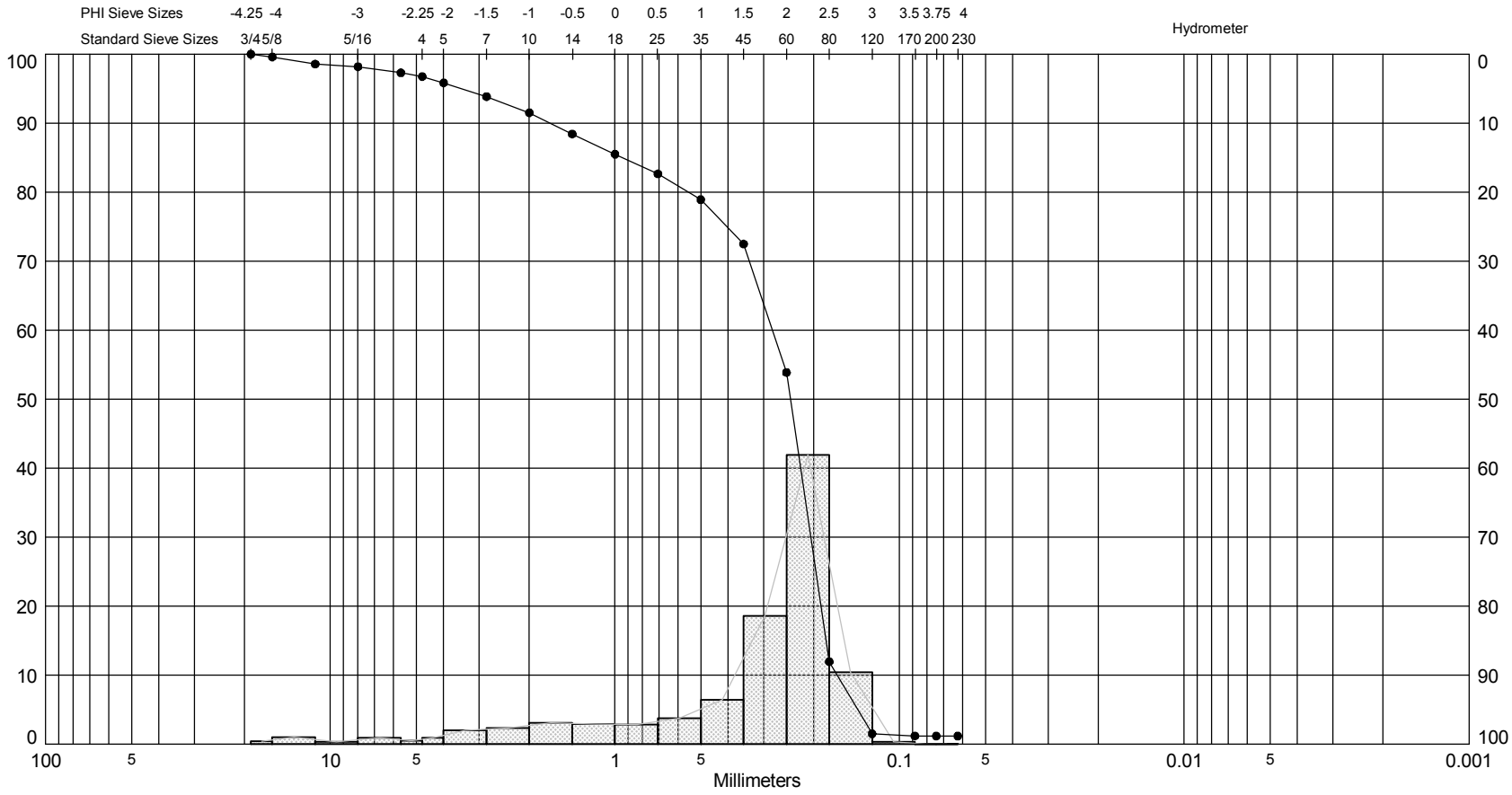

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-04 Comp.	—●—	-3.0	SW	#200 - 1.17 #230 - 1.16		22	2.05	1.48	-1.88	6.09	1.42

Comments: Composite data. Average dry Munsell Value is 7.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 5
Analysis Date:	10-30-09
Analyzed By:	KD
Easting (X, ft):	2,388,485
Northing (Y, ft):	202,080
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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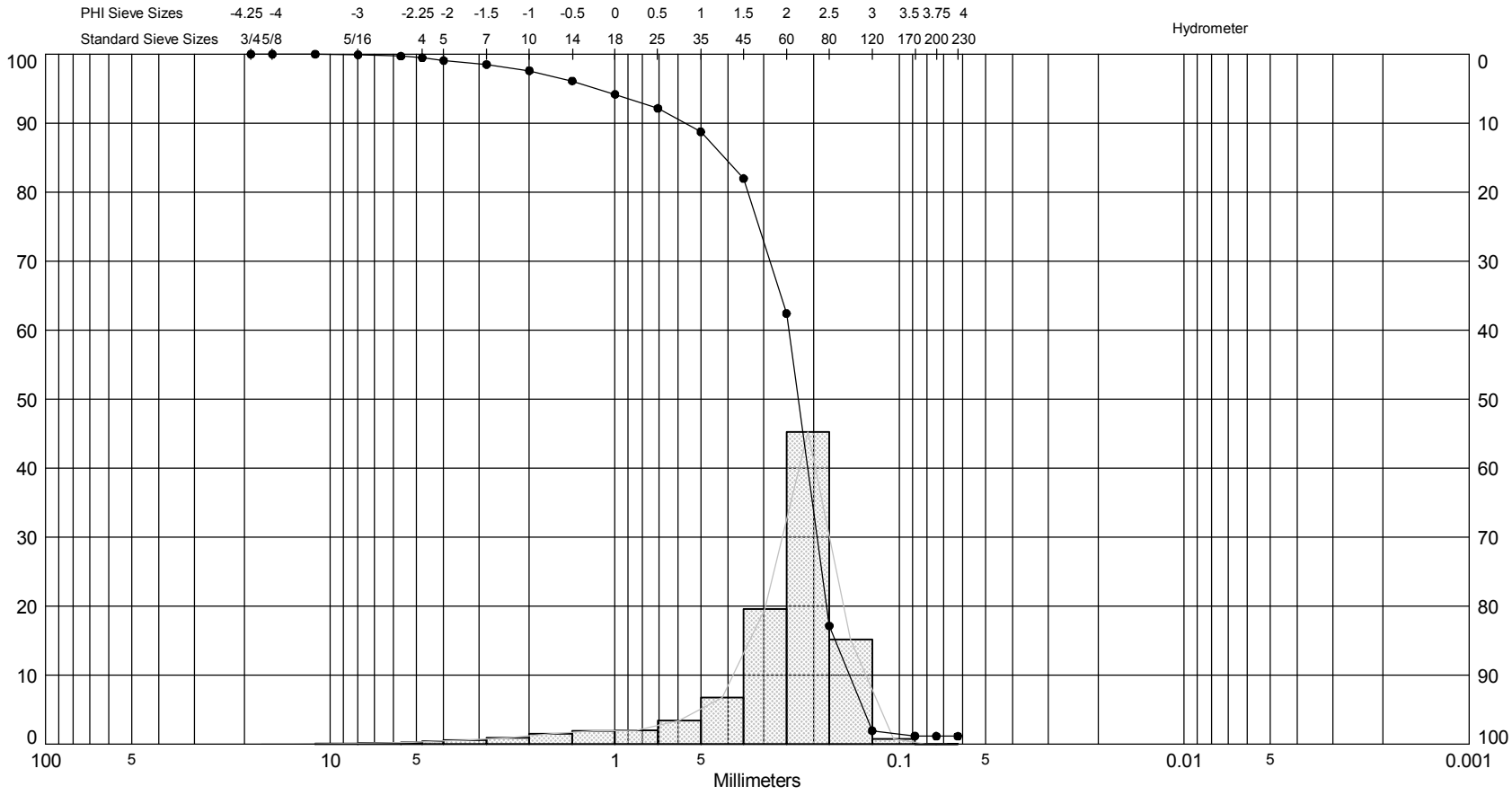

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-05 Comp.	—●—	-2.0	SW	#200 - 1.14 #230 - 1.13		11	2.14	1.88	-2.27	9.16	0.93

Comments: Composite data. Average dry Munsell Value is 8.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 5
Analysis Date:	08-28-09
Analyzed By:	KD
Easting (X, ft):	2,388,173
Northing (Y, ft):	201,385
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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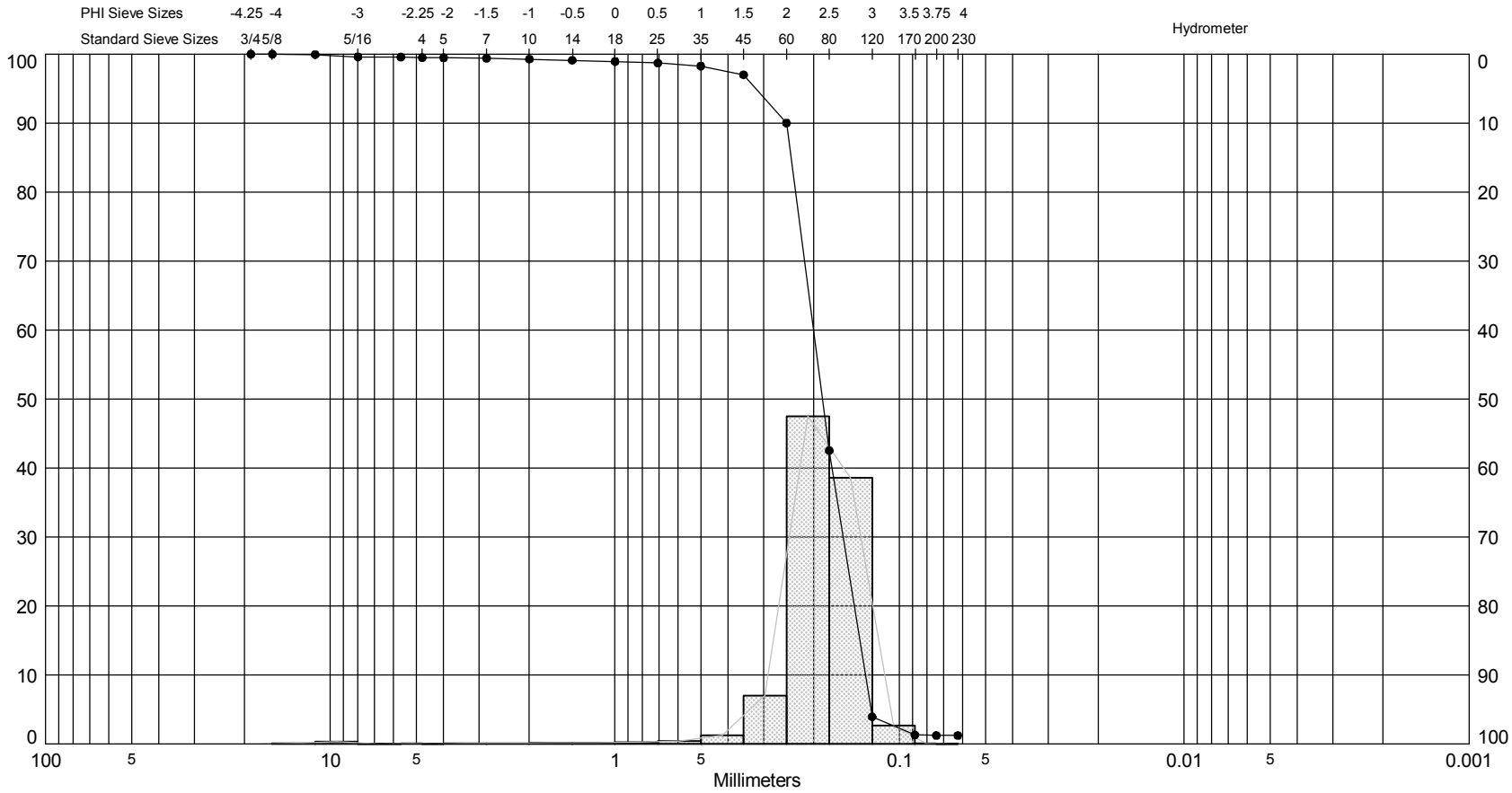

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
FEVC-08-06 Comp.	—●—	-1.1	SP	#200 - 1.22 #230 - 1.21		4	2.42	2.37	-4.97	42.23	0.6

Comments: Composite data. Average dry Munsell Value is 8.

Depths and elevations based on measured values

Sample Information	
Project Name:	Figure Eight Alternative 5
Analysis Date:	08-28-09
Analyzed By:	KD
Easting (X, ft):	2,386,618
Northing (Y, ft):	200,973
Horizontal System:	NAD 1983
Vertical System:	NAVD 88

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SIEVE ANALYSIS FIGURE_EIGHT_ALTERNATIVE_5.GPJ JPBRAZIL.GDT 3/11/10

Appendix E- Summary of Impacts Table

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5A	Alternative 5B	Alternative 5C	Alternative 5D
Salt Marsh	Both negative and positive direct impacts are anticipated as some areas of salt marsh are anticipated to develop while other areas may erode. No cumulative impacts are anticipated.	Same as Alt. 1	No indirect or direct impacts are anticipated. Cumulative impacts may be incurred as a result of reduced inorganic sediment transport through the inlet into the salt marsh resources.	Same as Alt. 3	0.7 acres of temporary direct impacts are expected as a result of construction of a portion of the terminal groin. No indirect or cumulative impacts are anticipated as the volume of material removed from the Nixon Channel navigation feature has not impacted salt marshes in the past.	Same as Alt. 5A	0.4 acres of temporary direct impacts are expected as a result of construction of a portion of the terminal groin. No permanent indirect or cumulative impacts are anticipated as the volume of material removed from the Nixon Channel navigation feature has not impacted salt marshes in the past.	Same as Alt. 5C
SAV	No direct, indirect, or cumulative impacts are expected due to the remote location of the SAV occurrences to the areas	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1

	experiencing erosion along Rich Inlet and Nixon Channel.							
Shellfish	No direct, indirect, or cumulative impacts are expected due to the remote location of the shellfish occurrences to the areas experiencing erosion along Rich Inlet and Nixon Channel.	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1
Upland Hammock	No direct or indirect impacts expected due to the remote location of the upland hammock habitat to the areas experiencing erosion along Rich Inlet and Nixon Channel. Cumulative	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1

	impacts include potential salt water intrusion attributed to sea level rise.							
Inlet Dunes and Dry Beaches	No impacts are anticipated.	Same as Alt. 1	The construction of the dike along with the placement of material along the Nixon Channel shoreline are expected to lead to the formation of 35-40 acres of inlet dunes and dry beach habitat. This will lead to the burial of infaunal species and disruption of nesting and foraging habitat as a result of the sporadic beach nourishment activities. The burial of	Alternative 4 encompasses the same fill footprint along the shoreline of Nixon Channel as Alternative 3. Approximately 57,000 cubic yards of material will cover approximately 0.6 acres of inlet dry beach under the 2006 shoreline conditions, but will create approximately 1.2 acres of that habitat. This results in a net gain of 0.6 acres. The expansion of this shoreline	Delft3D modeling results suggest that 0-5 acres of direct impact to the Inlet Dunes and Dry Beaches on Figure Eight Island with the implementation of Alternative 5A. Of this, 0.7 acres would be directly impacted as a result of the construction of the landward portion of the terminal groin. In addition, roughly 1.2 acres of beach fill would be	Same as Alt. 5A	Delft3D modeling results suggest that 0-5 acres of direct impact to the Inlet Dunes and Dry Beaches on Figure Eight Island with the implementation of Alternative 5C. Of this, 1.1 acres would be directly impacted as a result of the construction of the landward portion of the terminal groin. In addition, roughly 1.2 acres of beach fill would be	Same as Alt. 5C

			infaunal organisms could negatively indirectly affect the birds that forage on these organisms. These impacts would be incurred along the inlet beaches of Figure Eight Island and Hutaff Island (in response to the constructed dike). Positive indirect impacts are anticipated to the birds and sea turtles which utilize this habitat for nesting and foraging as the habitat increases. Due to the relocation of the inlet channel, much of the ebb tide	footprint will increase the dry beach and provide additional resting, and potential nesting, habitat for shorebirds, including the piping plover. Indirect impacts suggest that the sand spit projecting off the north end of Figure Eight Island into Rich Inlet initially elongated but stabilized by the end of Year 2 with some slight erosion occurring between Year 4 and 5 of the simulation. The initial elongation of the sand spit appeared to be	placed along the Nixon Channel shoreline. Several biological resources, including shorebirds, which utilize the inlet beaches and dunes for resting will be negatively impacted during and immediately following the placement of sand upon the beach. Indirect impacts suggest that the inlet dunes and beach habitats may be reduced on the Figure Eight Island side of Rich Inlet, the model results indicates the south end of Hutaff Island		placed along the Nixon Channel shoreline. Several biological resources, including shorebirds, which utilize the inlet beaches and dunes for resting will be negatively impacted during and immediately following the placement of sand upon the beach. Indirect impacts suggest that the inlet dunes and beach habitats may be reduced on the Figure Eight Island side of Rich Inlet, the model results indicates the south end of Hutaff Island	

			delta that currently provides protection to Hutaff Island's Inlet Dunes and Dry Beaches is expected to diminish as the ebb tide delta is expected to reorient southward. As shown by Delft3D model results, portions of the inlet beaches along Hutaff Island are expected to erode within 5 years.	due to sand transported to the north from the oceanfront beach fill. Under the 2006 shoreline conditions, these morphological changes to the inlet dunes and dry beaches indicated an net increase of approximately 4.1 acres of habitat over the 5-year period. This net gain includes the approximate net loss of approximately 0.8 acres of inlet dry beach that was initially created along the Nixon Channel shoreline.	will accrete in response to Alternative 5A between year 0 and year 5 leading to a net indirect impact of 0-5 acres.		will accrete in response to Alternative 5A between year 0 and year 5.	
Intertidal Flats and Shoals	No direct or cumulative	No direct impacts are	Direct impacts include the	Because the permitted	The activities associated	Because the permitted	Same as Alt. 5A	Same as Alt. 5B

	impacts are anticipated. Minimal indirect impacts may occur.	anticipated; however, an increase of material imported into the inlet complex may result in an increase of intertidal flats and shoals thereby resulting in the formation of 0-5 acres of intertidal flats and shoals. No cumulative impacts are anticipated.	removal of 20-25 acres of intertidal flats and shoals within the permit area. Indirect impacts include a reduction of 1.39M cubic yards of material available for the development of intertidal flats and shoals. No cumulative impacts are anticipated.	dredging area associated with Alternative 4 does not include intertidal areas, this alternative is not expected to have direct impacts on intertidal flats and shoals. Delft3D model estimated that an additional 180,200 cubic yards of material would be transported into the inlet as a result of Alternative 4. This influx of material was shown to occur mostly by Year 2, and then diminished for the remaining three years. This sediment	with Alternative 5A would directly impact approximately 25-30 acres of intertidal flats and shoals through direct excavation. There will likely be an overall net reduction of approximately 0-5 acres of intertidal flats and shoals within the project area due to the net deficit of approximately 224,000 cubic yards of material within the inlet system. No cumulative impacts are anticipated.	dredging area associated with Alternative 5B does not include intertidal areas, this alternative is not expected to have direct impacts on intertidal flats and shoals. Delft3D modeling suggests that the overall net change in volume compared to the baseline conditions of Alternative 2 was a decrease of 449,700 cubic yards of material in the system. Out of this amount, 289,500 cubic yards was artificially removed by dredging from		

				could result in the formation of approximately 0-5 acres of additional intertidal flats and shoals, especially in the middle shoal area of the inlet, or the flood tide delta.		the previously permitted area in Nixon Channel. This could lead to approximately 0-5 acres of indirect impacts. No cumulative impacts are anticipated.		
Oceanfront Dune Communities	Beach scraping will afford some positive direct impacts to the dunes along Figure Eight Island. However, continued erosion is expected to indirectly and cumulatively negatively impact dune vegetation, resulting in a degraded habitat used by several species of	No direct impacts are anticipated. Indirect and cumulative impacts would be expected along Figure Eight Island as the chronic erosion would threaten the existing dunes along the northern portion of the island. No impacts are anticipated along Hutaff Island as the	Positive direct and indirect impacts are anticipated due to the construction of 4.6 acres of dunes leading to increase habitat along the northern portion of Figure Eight Island. The protection of the ocean shoreline along the southern end of Hutaff Island currently provided by	Positive direct and indirect impacts are anticipated due to the construction of 4.6 acres of dunes leading to increase habitat along the northern portion of Figure Eight Island. No cumulative impacts are expected.	Same as Alternative 4.	Although the construction of dunes is not a part of the plan for Alternative 5B, the beach fill is intended to provide direct and indirect benefits to the coastal dune communities as it allows for growth and development of dune vegetation thereby providing habitat for	Same as Alternative 4.	Same as Alternative 4.

	roosting, foraging and nesting shorebirds and plant species, such as seabeach amaranth. The dune communities located on Hutaff Island are anticipated to naturally migrate westward through transgression, therefore no impacts are anticipated on Hutaff Island.	dunes are anticipated to naturally migrate westward through transgression.	the ebb tide delta will diminish and leave the dunes in this location more susceptible to storm-induced damage increasing the potential for overwash. Therefore, Alternative 3 may lead to cumulative impacts to the oceanfront dunes along Hutaff Island.			roosting, foraging and nesting shorebirds.		
Oceanfront Dry Beach Communities	The dry beach community along Figure Eight Island will be directly impacted during and following all beach nourishment, beach scraping events, and the utilization of	Indirect impacts include a reduction of coastal dry beach habitat by 0-5 acres resulting in a loss of adequate turtle nesting habitat, shorebird and water bird	Direct impacts will include the creation of 20-25 acres of dry beach habitat. Indirect impacts of 0-5 acres will be anticipated due to the increase of dry beach habitat for birds, turtles, and recreating	Direct impacts will include 15-20 acres of created dry beach habitat. Indirect impacts will be anticipated due to the increase of dry beach habitat for birds, turtles, and recreating	Direct impacts will include the creation of 15-20 acres of dry beach habitat. Indirect impacts will be anticipated due to the increase of dry beach habitat for birds, turtles, and	Direct impacts will include the creation of 0-5 acres of dry beach habitat. Indirect impacts will be anticipated due to the increase of dry beach habitat for birds, turtles, and	Same as Alt. 5A.	Same as Alt. 5B.

	sandbags. No direct impacts are anticipated to occur on Hutaff Island. Indirect impacts on Figure Eight Island will include habitat loss and lost recreational opportunities due to erosion. The dry beach community on Hutaff Island will be expected to experience positive indirect and cumulative impacts as the habitat accretes.	habitat, and recreational opportunities along the island.	humans along Figure Eight Island and southern Hutaff Island. No cumulative impacts are anticipated.	humans along Figure Eight Island and southern Hutaff Island. No cumulative impacts are anticipated.	recreating humans along Figure Eight Island and southern Hutaff Island. No cumulative impacts are anticipated.	recreating humans along Figure Eight Island and southern Hutaff Island. No cumulative impacts are anticipated.		
Wet Beach Communities	The marine intertidal community along Figure Eight Island will be directly impacted during and following all	No impacts are anticipated.	10-15 acres of the marine intertidal community along Figure Eight Island will be directly impacted during and following	Same as Alternative 3.	10-15 acres of the marine intertidal community along Figure Eight Island will be directly impacted during and	0-5 acres of the marine intertidal community along Figure Eight Island will be directly impacted during and	Same as Alt. 5A.	Same as Alt. 5B.

	beach nourishment and beach scraping events. Sandbags may also reduce wet beach habitat. Infaunal communities will be directly impacted due to burial; however, due to the resilient nature of these organisms, the impacts will be temporary. Indirect impacts to less than 5 acres will affect shorebird, crustacean and fish foraging. The marine intertidal community on Hutaff is not anticipated to be impacted.		beach nourishment events. Infaunal communities will be directly impacted due to burial, however due to the resilient nature of these organisms, the impacts will be temporary. Indirect impacts to 5-10 acres will affect shorebird, crustacean and fish foraging. No cumulative impacts are expected		following beach nourishment events. The construction of the terminal groin will impact approximately 0.3 acres of wet beach. Infaunal communities will be directly impacted due to burial, however due to the resilient nature of these organisms, the impacts will be temporary. Indirect impacts of 5-10 acres will affect shorebird, crustacean and fish foraging.	following beach nourishment events. The construction of the terminal groin will impact approximately 0.3 acres of wet beach. Infaunal communities will be directly impacted due to burial, however due to the resilient nature of these organisms, the impacts will be temporary. Indirect impacts of approximately 0-5 acres will affect shorebird, crustacean and fish foraging.		

Softbottom Communities	Direct impacts include increased levels of turbidity, direct removal, and burial of infaunal biota during dredging operations and following the disposal of the material during maintenance events within Banks Channel, Nixon Channel, and the AIWW. Negative indirect impacts include the temporary loss of prey for foraging fish and invertebrates from the dredged softbottom habitat. No	No impacts are anticipated.	Direct impacts include the direct removal and burial of infaunal biota during dredging operations and following the disposal of the material onto Figure Eight Island and construction of the closure dike. A total of 100-110 acres of softbottom will be directly impacted due to the dredging and construction of the closure dike. Negative indirect impacts include the temporary loss of prey for foraging fish and invertebrates from the dredged	Direct impacts of 25-30 acres of softbottom habitat include the direct removal and burial of infaunal biota during dredging operations and following the disposal of the material onto Figure Eight Island. Because the offshore borrow area has not been delineated, it is not possible to determine the acreage of disturbed softbottom habitat. Negative indirect impacts include the temporary loss of prey for foraging fish and invertebrates	Direct impacts include the direct removal and burial of infaunal biota during dredging operations and following the disposal of the material onto Figure Eight Island. A total of 80-90 acres of softbottom from Nixon Channel and the connector channel will be directly impacted due to the dredging activities. Negative indirect impacts include the temporary loss of prey for foraging fish and invertebrates from the dredged softbottom	Direct impacts include the direct removal and burial of infaunal biota during dredging operations and following the disposal of the material onto Figure Eight Island. A total of 25-30 acres of softbottom will be directly impacted due to the dredging activities. Negative indirect impacts include the temporary loss of prey for foraging fish and invertebrates from the dredged softbottom habitat. No cumulative	Same as Alt. 5A.	Same as Alt. 5B.

	cumulative impacts are anticipated.		softbottom habitat. No cumulative impacts are anticipated.	from the dredged softbottom habitat. No cumulative impacts are anticipated.	habitat. No cumulative impacts are anticipated.	impacts are anticipated.		
Turbidity and TSS	Direct impacts include temporary increases in suspended sediment and turbidity in the immediate area of dredge and fill operations within the nearshore environment. No indirect or direct impacts are anticipated.	Aside from a natural increase of turbidity in response to periodic storms, no impacts are anticipated.	Same as Alternative. 1	Same as Alternative. 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Hydrodynamics and Salinity	No direct, indirect, or cumulative impacts are anticipated.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Public Safety	Positive direct and indirect impacts include storm protection to	The activity associated with demolition of abandoned	Same as Alternative 1.	Same as Alternative 1.	Positive direct and indirect impacts include storm protection to	Same as Alternative 5A	Same as Alt. 5A.	Same as Alternative 5A.

	threatened homes and infrastructure in areas receiving beach fill. Negative direct, indirect, and cumulative impacts include the potential release of sewage and other hazardous materials onto the beach and into the coastal waters as well as closed areas of beach impeding recreation if storm damage occurs in areas not receiving protective beach fill.	homes could expose workers to risk of injury. There is also a strong possibility that some debris could fall into the nearshore that could pose health threats to swimmers or boaters. As the erosion undermines existing roads and sanitary systems, exposes electrical lines, and ruptures or requires the relocation and rerouting of the water supply system, the public would be exposed to increased risk of injury and/or infection.			threatened homes and infrastructure in areas receiving beach fill. Negative direct, indirect, and cumulative impacts include the potential release of sewage and other hazardous materials onto the beach and into the coastal waters as well as closed areas of beach impeding recreation if storm damage occurs in areas not receiving protective beach fill. The terminal groin will be anticipated to impose impacts to			

		This would result in negative direct, indirect, and cumulative impacts.			public safety as it will primarily be buried along the dry beach and will remain 3.5 ft NAVD above the water's surface.			
Aesthetic Resources	Direct impacts could include the presence of construction equipment which would temporarily detract from the aesthetics of the waterways and beach of Figure Eight Island. Indirect and cumulative impacts could include a significant loss of land, personal property and roads, which would negatively	Abandoned homes could directly and indirectly impact aesthetic resources. Continued erosion of the oceanfront shoreline along the northern portion of Figure Eight Island could also result in a significant loss of land, personal property, and roads causing cumulative impacts.	Temporary direct negative impacts to aesthetic resources will occur due to the usage of heavy machinery within Rich Inlet and on the oceanfront shoreline of Figure Eight Island. The removal of the sandbags along the northern portion of Figure Eight Island will improve the aesthetic quality of the island resulting in positive	Temporary direct negative impacts to aesthetic resources will occur due to the usage of heavy machinery within Nixon Channel and on the oceanfront shoreline of Figure Eight Island. The removal of the sandbags along the northern portion of Figure Eight Island will improve the aesthetic quality of the	Temporary direct negative impacts to aesthetic resources will occur due to the usage of heavy machinery within Nixon Channel and on the oceanfront shoreline of Figure Eight Island. The removal of the sandbags along the northern portion of Figure Eight Island will improve the aesthetic quality of the	Same as Alt. 5A	Same as Alt. 5A	Same as Alt. 5A

	affect the aesthetic quality of Figure Eight Island.		direct impacts. No indirect or cumulative impacts are anticipated.	island resulting in positive direct impacts. No indirect or cumulative impacts are anticipated.	island resulting in positive direct impacts. No indirect or cumulative impacts are anticipated as most of the landward portion of the groin will not be visible.			
Recreational Resources	Negative direct impacts will include the reduction of recreational opportunities during beach scraping and beach fill events. As the erosion continues along the effected stretch of shoreline on Figure Eight Island, recreational opportunities such and beachcombing , sunbathing,	Negative impacts are anticipated if homes and associated infrastructure are abandoned and fall into the water. If homes are relocated, these recreational resources will not be impacted.	Negative direct impacts will include the reduction of recreational opportunities during dredging and beach fill events. Positive indirect and cumulative impacts are expected due to the increased size of the dry beach.	Same as Alternative 3.	Negative direct impacts will include the reduction of recreational opportunities during construction of the terminal groin as well as dredging and beach fill events. Positive indirect and cumulative impacts are expected due to the increased size of the dry beach and fishing and	Same as Alt. 5A	Same as Alt. 5A	Same as Alt. 5A.

	surf fishing, and walking along the beach may be negatively impacted.				snorkeling opportunities afforded by the terminal groin.			
Navigation	Dredging in Nixon Channel will benefit navigation due to a maintained depth. During the dredging, however, navigation will be temporarily directly impacted due to the presence of pipelines within the waterway. At no time will complete restriction of navigation occur in Nixon Channel during dredge operations.	Negative impacts include considerable shoaling within the channel connecting Nixon Channel to the inlet gorge and the mouth of Green Channel. Shoaling could lead to the eventual navigable closure of the channel connecting Nixon Channel with the inlet gorge, which would render the channel impassible to most	Navigation will be directly negatively impacted due to the presence of the dredge and pipeline during the implementation of Alternative 3. No indirect or cumulative impacts are anticipated.	Dredging in Nixon Channel will benefit navigation due to a maintained depth. During the dredging, however, navigation will be temporarily directly impacted due to the presence of pipelines within the waterway. At no time will complete restriction of navigation occur in Nixon Channel during dredge operations. Navigation will also be temporarily	Dredging in Nixon Channel and the connector channel will benefit navigation due to a maintained depth. During the dredging, however, navigation will be temporarily directly impacted due to the presence of pipelines within the waterway. At no time will complete restriction of navigation occur in Nixon Channel during dredge	Dredging in Nixon Channel will benefit navigation due to a maintained depth. During the dredging, however, navigation will be temporarily directly impacted due to the presence of pipelines within the waterway. At no time will complete restriction of navigation occur in Nixon Channel during dredge operations. The terminal	Same as Alt. 5A.	Same as Alt. 5B.

		recreational craft that normally use Rich Inlet and the connecting channels.		restricted within the areas between the offshore borrow area and the disposal areas along the oceanfront shoreline and Nixon Channel shoreline.	operations. The terminal groin will be clearly marked; therefore it should not pose a threat to boats.	groin will be clearly marked; therefore it should not pose a threat to boats.		
Infrastructure	Alternative 1 is expected to have a positive direct and indirect impact on existing infrastructure located on Figure Eight Island due to the short-term protection provided by beach nourishment and beach scraping projects. Cumulative impacts are anticipated to be negative as	Alternative 2 would likely have a negative direct, indirect and cumulative impact on existing infrastructure located on Figure Eight Island due to the abandonment or retreat of homes and infrastructure.	Alternative 3 is expected to and positively impact the infrastructure on Figure Eight Island due to the long-term protection from erosion.	Same as Alt. 3	Same as Alt. 3	Same as Alt. 3	Same as Alt. 3	Same as Alt. 3

	the threatened homes and infrastructure will not be protected in the long term.							
Solid Waste	No direct impacts will be anticipated due to the short-term protection provided by beach nourishment and beach scraping. The debris generated from the demolition of homes and infrastructure could indirectly and cumulatively impact the amount of solid waste deposited in local sanitary landfills.	If threatened structures are not relocated, they may ultimately need to be demolished with the debris deposited in local sanitary landfills causing direct impacts. The cumulative effect of demolition and removal of homes and infrastructure debris could reduce the amount of space available at the local landfill over the next ten (10) years.	Both short and long-term benefits are expected from the reduction of solid waste. This alternative will provide protection along portions of Figure Eight Island thereby decreasing the risk of damage to residential buildings and infrastructure. This would alleviate the potential of increased amount of solid waste through demolition.	Same as Alt. 3	Same as Alt. 3	Same as Alt. 3	Same as Alt. 3	Same as Alt. 3

Noise Pollution	Dredge and fill operations would temporarily raise noise level in the area; however, no indirect or cumulative impacts pertaining to noise pollution are anticipated.	The demolition or relocation of homes on Figure Eight Island would temporarily raise the noise level in the areas due to the use of heavy machinery, however no indirect or cumulative impacts pertaining to noise pollution are anticipated.	The relocation of Rich Inlet, dredging of the connector channels, construction of the closure dike, and the placement of beach compatible material on the oceanfront and backbarrier shoreline would temporarily raise the noise level in the areas due to the use of heavy machinery. No indirect or cumulative impacts pertaining to noise pollution are anticipated.	Dredging within Nixon Channel and the offshore borrow areas along with the utilization of material from within the upland dredge disposal sites would temporarily raise the noise level in the areas. No indirect or cumulative impacts pertaining to noise pollution are anticipated.	The dredging of the Nixon Channel and the connector channel, the placement of beach compatible material on the oceanfront and estuarine shoreline, and construction of the terminal groin would temporarily raise the noise level in the areas. No indirect or cumulative impacts pertaining to noise pollution are anticipated.	The dredging of the Nixon Channel, the transport of material from the upland dredge disposal sites, the placement of beach compatible material on the oceanfront and estuarine shoreline, and the construction of the terminal groin would temporarily raise the noise level in the areas. No indirect or cumulative impacts pertaining to noise pollution are anticipated.	Same as Alt. 5A.	Same as Alt. 5B
Economics	Over the 30-year analysis period, the total cost associated	Over the 30-year analysis period, the total cost associated	Over the thirty year planning period, the total implementatio	Over the thirty year planning period, the total implementatio	Over the 30-year planning period, the total cost for Alternative 5A	Over the 30-year planning period, the total cost for Alternative 5B	Over the 30-year planning period, the total implementatio	Over the 30-year planning period, the total cost for Alternative 5D

	with Alternative 1 would be about $92.5 million.	with Alternative 2 would be about $63.7 million.	n cost for Alternative 3 would be about $63.3 million in current dollars.	n cost for Alternative 4 would be about $69.0 million in current dollars.	in current dollars would be about $43.7 million.	in current dollars would be approximately $24.8 million.	n cost for Alternative 5C in current dollars would be approximately $43.8 million.	in current dollars would be approximately $26.2 million under 2006 conditions.

APPENDIX F

CUMULATIVE EFFECTS ASSESSMENT

FIGURE EIGHT ISLAND SHORELINE MANAGEMENT PROJECT
CUMULATIVE EFFECTS ASSESSMENT

Prepared for:
The Figure Eight Beach Homeowners Association

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June 2015

FIGURE EIGHT ISLAND SHORELINE MANAGEMENT PROJECT
DRAFT CUMULATIVE EFFECTS ASSESSMENT

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The Council on Environmental Quality (CEQ) defines cumulative effects as *the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other action* (40 CFR 1508.7). The following report describes the methods, rationale, and results of the Cumulative Effects Assessment for the proposed Figure Eight Island Shoreline Management Project, Alternative 5D (Terminal Groin at a More Northerly Location with Beach Fill from Nixon Channel and Other Sources), in terms of the eleven (11) step process identified by the CEQ (CEQ, 1997).

Table 1. Steps included in the Cumulative Effects Analysis

Environmental Impact Assessment Components	**Cumulative Effects Analysis Steps**
Scoping	1. Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals.
	2. Establish the geographic scope for the analysis.
	3. Establish the time frame for the analysis.
	4. Identify other actions affecting the resources, ecosystems, and human communities of concern.
Describing the Affected Environment	5. Characterize the resources, ecosystems, and human communities identified in scoping in terms of their response to change and capacity to withstand stresses.
	6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds.
	7. Define a baseline condition for the resources, ecosystems, and human communities.
Determining the Environmental Consequences	8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities.
	9. Determine the magnitude and significance of cumulative effects.
	10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects.
	11. Monitor the cumulative effects of the selected alternative and adapt management.

As suggested by the CEQ, it is the goal of this report to "tease from the complex networks of possible interactions those that substantially affect the resources" (CEQ, 1997).

1. Significant Cumulative Effects Issues and the Assessment Goals

The goal of the National Environmental Policy Act (NEPA) process is to reduce adverse environmental effects, including cumulative effects. Cumulative effects analysis is an iterative process in which consequences are assessed repeatedly following incorporation of avoidance, minimization, and mitigation measures into the alternatives considered Monitoring is the last step in determining the cumulative effects that ultimately results from the action. The significance of cumulative effects depends upon the ecosystem, resource baseline conditions, and relevant resource stress thresholds (CEQ, 1997).

Cumulative impacts result from spatial (concentration of a multiple impacts in a given area) and temporal (repeated occurrence of impacts in a given area) crowding of environmental perturbations. In general, many environmental effects could be considered as cumulative and almost all systems have already been modified, degraded or enhanced, through anthropogenic forces.

Resource Issues and Assessment

The proposed project, in addition to past projects and any reasonable foreseeable future actions (RFFA), primarily affects the following resources: human community, beach, infaunal species, shorebirds, sea turtles, intertidal flats and shoals, salt marshes, the water column, hardened structures, and cultural resources

Human Community Resource

In general, shoreline protection projects involving beach nourishment and the construction of hardened structures have intermediate to long-term impacts on the human community. These projects interrupt natural and anthropogenic induced erosion and recession of the shoreline. They provide storm protection to dwellings and infrastructure while increasing coastal recreational such as fishing, boating, and sunbathing. These projects facilitate development of the coast where it is permitted. These positive impacts for the human community can have negative impacts on other resources whose habitats or life stage activities are directly or indirectly impacted through human activity.

Beach Resource and Associated Shorebird, Infaunal, and Sea Turtle Resources

The beachfront shoreline is comprised of three main systems: dune, dry beach, and wet beach. Sand dunes and vegetation that comprise the dune system provide protection to structures from storm surge, and habitat for wildlife. The dry beach, located between the toe of dune or scarp and the Mean High Water Line (MHWL) provides recreational areas for humans and nesting sites for sea turtles and shorebirds. The wet beach (between Mean Low Water Line (MLWL) and MHWL provides recreational areas for humans, habitat for infauna and foraging areas for shorebirds, crustaceans and fish.

Inlet Intertidal Flats and Shoals Resource

The intertidal flats and shoals found within inlet complexes provide habitat for migratory shorebirds, colonial waterbirds, marine mammals, sea turtles, crustaceans and fish. These habitats represent a dynamic ecosystem to which the above species have adapted and in some cases depend on. These habitats will be directly impacted (through removal) and indirectly by the proposed project and other current and foreseeable future projects (including maintenance dredging every five years). Of the 21 inlets found along the North Carolina coast, 11 are federally maintained for navigational purposes. The intertidal flats and shoals located within the 10 inlets that are not federally maintained do not experience the same level of direct impacts.

Water Column Resource

Natural conditions support fluctuating turbidity and total suspended solids (TSS) levels in the nearshore and offshore water columns, especially with inlets and along the oceanfront intertidal swash zones. Frequent storm events are known to increase these levels due to resuspension of sand and fine materials from strengthened wind, wave, and current actions. However, these increase levels generally occur in short durations during storm events. Anthroprogenic activities, such as dredging and beach fill activities have increased the frequencies of higher turbidity and TSS levels where those activities are taking place and tend to be a longer duration, ranging from 2-4 months depending on the size of the project. Impacts to the water column associated with these activities tend to be localized at the cutterhead or hopper dredge operating locations and at the fill disposal sites. With the increase need to provide oceanfront shoreline protection, the implementation of beach nourishment projects have been the primary means of protective measures.

The dredging of Nixon Channel and the transport of material from the dredge disposal sites along with the placement of this material on the ocean and estuarine shoreline as well as the construction of the terminal groin would result in the suspension of silt and fine fractions in the water column. The low sit/clay content of the material within the areas being dredged would result in relatively low concentrations of suspended sediment outside the immediate area of deposition. The low concentration of suspended sediment indicates that turbidities are likely to remain low during dredging and placement of material on the beaches. Turbidity and TSS measurements were recorded in association with previous beach nourishment projects on Figure Eight Island. In 2001, a permit was issued for nourishment on the north end of the island. A condition of this permit required the implementation of a monitoring program to track the impact of nourishment-induced changes in surf zone water quality during the project's duration. The turbidity concentration and the amount of TSS were determined weekly at five sites along the project area during a ten-week period. The effects of fill operations on short-term turbidity appeared to be limited to a narrow zone in the vicinity of the sediment slurry discharge point (Cleary and Knierim, 2001). Eight of the fifty turbidity measurements exceeded the State's standard for turbidity. The discharge site was the only site where an elevated average reading was recorded that exceeded the standard. Measured TSS concentrations were highest for the discharge site. The TSS values ranged from 1.0-

301.0mg/l with an average of 73.1mg/l (Cleary and Knierim, 2001) at the discharge site. The State standard for turbidity is 25 NTU while TSS does not have a defined standard.

During the Bogue Inlet Channel Erosion Response Project, turbidity levels were shown to remain within ambient conditions (9.7 to 35.2 NTUs) during the dredging operations. Any increase in turbidity associated with the excavation of the channels to the oceanfront shoreline should be of short duration. Natural conditions support fluctuating turbidity levels in the nearshore and offshore water column of the Permit Area. Storm events are known to increase these levels due to the resuspension of sand and fine materials. These fluctuating turbidity levels would continue with or without the dredging efforts proposed with these alternatives.

Many species of fish and crustaceans utilize the water column to migrate through inlets in North Carolina as part of their reproductive strategy. Penaeid shrimp, for example, are reported to spawn offshore, moving into estuaries during post-larval stage during the early spring. As the shrimp grow larger in size, they migrate to higher salinity environments. In late summer and fall, they return to the ocean to spawn (NCDMF, 2005). While the planned dredging activity may have some impact on flows in Nixon Channel, dredging within Nixon Channel would not significantly alter the hydrology of the inlet complex. Furthermore, the tidal flow through Nixon and Green Channels are anticipated to maintain their relative proportional amounts as predicted by Delft3D modeling for existing conditions. The relatively small changes in tidal prism will allow for the tidal exchange to continue within Rich Inlet, Nixon Channel, and Green Channel thereby maintaining baseline.

Hardened Structure Resources

Hardened structures constructed along the marine and estuarine shorelines are often used to help stabilize a discrete length of shoreline and protect the landward side of the structure from erosion. Currently there are several major hardened structures in place in the ocean and inlet marine environment within North Carolina. These include the rock revetment at Fort Fisher, the north and south jetties at Masonboro Inlet, the terminal groin at Pea Island, the terminal groin at Fort Macon, the Cape Lookout harbor of refuge breakwater, the Carolina Beach revetment, and the geo-tube groin field on Bald Head Island. Most recently, an unnamed inlet that was opened following Hurricane Irene in 2012 has been armored with rip-rap. Of the approximate 320 miles of ocean coastline in North Carolina, the deployment of these structures has impacted approximately 16 miles of shoreline in proximity to the 5 inlets with hardened structures. This constitutes approximately 5% of the entire North Carolina coastline. During the initial construction of these structures, several biological resources were directly impacted including the wet and dry beach which serves as roosting, nesting, and foraging grounds for a wide variety of water birds and shore birds. The dry beach is also an important nesting habitat for sea turtles. The infaunal communities, which are often a prey source for foraging birds, are directly impacted within the wet beach during the construction. Following construction, the width of the shorelines adjacent to the structures have been maintained or widened resulting in increased recreational opportunities, additional dry beach habitat for nesting sea turtles, and roosting areas for birds. In the foreseeable future, an additional 4 terminal

groins may be built in North Carolina as a result of the passage of Senate Bill 110. This includes the structure proposed at Figure Eight Island.

2. Geographic Scope

This analysis will focus on the applicable geographic range per resource. The North Carolina oceanfront and inlets have been defined as the geographic range per resource. This delineation is derived from the predominant migratory routes; habitat ranges of species' potentially affected by the proposed project, oceanic circulation patterns and demographics.

Human Community Resource

The United Nations Atlas of the Oceans reports that "In the United States, around 53% of the population lives near the coast and since 1970 there have been 2000 homes per day erected in coastal areas." (UN, 2006). The primary objective of the proposed project is coastal protection of the northern portion of the Figure Eight Island shoreline. The cumulative effects of past, present and reasonable foreseeable future projects (RFFPs) are to facilitate human coastal habitation, recreation, and commerce. The geographic scope for this resource (humans) is the North Carolina oceanfront coastal shoreline.

Beach Resource and Infaunal Species Resource

The geographic scope for the beach resource (dune, dry beach and wet beach) and affiliated organisms is the North Carolina oceanfront coast, including all inlets.

The geographic scope for breeding, overwintering and/or foraging areas for federally threatened (piping plover (*Charadrius melodus*) and endangered roseate tern (*Sterna dougallii*) shorebirds and for State designated threatened species (gull-billed tern [*Sterna nilotica*]) or species of special concern in North Carolina, (Wilson's plover [*Charadrius wilsonia*], eastern painted bunting [*Passerina ciris ciris*], common tern *[Sterna hirundo*], American oystercatcher [*Haematopus palliates]*, and black skimmer [*Rynchops niger*]) is the oceanfront coast of North Carolina, including all inlets, and migratory coastal routes north and south of the State.

Five species of sea turtles utilize the waters of North Carolina for breeding, feeding, and development. These species include: the loggerhead sea turtle (*Caretta caretta*); green sea turtle (*Chelonia mydas*); hawksbill sea turtle (*Eretmochelys imbricata*); Kemp's Ridley sea turtle (*Lepidochelys kempii*); and the leatherback sea turtle (*Dermochelys coriacea*) (Epperly *et al*., 1990; USFWS, 2003a). The USFWS North Carolina Office reports that the presence of hawksbill and Kemp's ridley sea turtles along the North Carolina coast is rare (USFWS, 2008a); therefore these species are not expected to be present in the study area. The geographic scope for nesting sites for these sea turtle resources is coastal North Carolina.

Inlet Intertidal Flats and Shoals Resource

The geographic scope for the intertidal flats and shoals resource is the inlet complexes along the North Carolina coast.

Water Column Resource
The geographic scope for the water column resource is the nearshore and offshore waters in the vicinity of developed beaches along the North Carolina oceanfront coastline.

Hardened Structure Resources
The geographic scope for the hardened structure resources is developed coastal beaches and inlets along the North Carolina oceanfront coastline.

3. Time Frame

This CEA considers known past, present and RFFP dredge and fill projects that have, may, or will occur in the geographic scopes. For this CEA, our timeframe, with the exception of the Hardened Structure Resources, will consist of actions occurring within the past 50 years, current projects, and projects that may be implemented over the next 50 years. For Hardened Structure Resources, all existing structures regardless of when they were constructed were included in the assessment. This approach was taken due to the relatively low number and to adequately address their cumulative effects on the shorelines of North Carolina. For other actions, the past 50-year time period was chosen as it covers the initial nourishment of Wrightsville Beach in 1965. Since that time, numerous dredge and fill projects have occurred within the geographic scope of this proposed project. A CEA time frame extending within the next 50 years would capture current Federal projects where planning and implementation includes a 50 year period. For most private projects, it is considered immoderately speculative when extending beyond a 10 year period due to the availability of suitable nourishment and renourishment material, cost of projects, and demographics. For the purposes of this analysis, the lengths of beaches nourished along the North Carolina oceanfront coastline were analyzed. In areas where initial nourishment and subsequent renourishments have occurred, the greatest length of beach affected was considered for this CEA.

4. Other Actions Affecting Resources of Concern

Anthropogenic actions affecting resources of concern are inlet management and maintenance, maintenance of navigation channels, beach (re)nourishment projects, beach scraping, dune enhancement, placement of hard structures along shoreline, placement of soft structures along shoreline, population increase, continued residential, commercial, and light industry development on barrier islands, and commercial and recreational fishing activity.

Natural actions affecting resources of concern are seasonal and sea level rise, and natural barrier island and inlet processes influenced by wind, currents and tidal energy. The potential for the increase in the rate of damaging storms and hurricanes in light of global climate change has been the source of debate within the scientific community. The International Panel on Climate Change (IPCC, 2007) concluded that global mean sea level rose at an average rate of about 1.7 ± 0.5 mm/year during the twentieth century. Recent climate research has documented global warming during the twentieth century,

and has predicted either continued or accelerated global warming for the twenty-first century and possibly beyond (IPCC, 2007). This rate is anticipated to increase over the next 100 years. Rahmstorf (2007) predicts that global sea level in 2100 may rise 0.5 m (1.6 ft) to 1.4 m (4.6 ft) above the 1990 level. According to www.tidesandcurrents.noaa.com, the regional trends in North Carolina show an increase of 0 to 3 mm/yr (0 to 0.00984 ft/yr), or a 0 to 1 ft/century. With measured rates of shoreline change ranging between 2 and 5 ft per year, sea level has very little impact on shoreline change. In 2012, the State of North Carolina passed legislation (House Bill 819) declaring that only "historic rates of sea-level rise may be extrapolated to estimate future rates of rise but shall not include scenarios of accelerated rates of sea-level rise unless such rates are from statistically significant, peer-reviewed data and are consistent with historic trends." As such, the State of North Carolina has not adopted a planning benchmark for sea level rise, and no such benchmark is currently under consideration.

The minimal impact of increased sea level rise has been noted through the performance of the Wrightsville Beach and Carolina Beach federal storm damage reduction projects. Both of these projects have been in existence since 1965 and have been subjected to the same rate of sea level rise applicable to Figure Eight Island. A review of the nourishment rates for these two projects shows no significant changes in the volume or frequency of periodic nourishment needed to maintain the projects.

The following is a summary of activities that have or potentially could impose cumulative impacts on Rich Inlet and the oceanfront shoreline of Figure Eight Island and the adjacent islands.

Relocation and Maintenance of Mason Inlet

Mason Inlet is a tidal inlet connecting the Atlantic Ocean and Mason Creek between Wrightsville Beach and Figure Eight Island. The relocation project involved the excavation of a new inlet through Figure Eight Island and the maintenance of the new location for 30 years in order to protect threatened properties. The relocation of the inlet approximately 3,500 feet to the northeast was completed on March 7, 2002 and the old channel was closed on March 14, 2002. In addition to channel relocation, the project also involved nourishing portions of Figure Eight Island and Wrightsville Beaches with portions of the dredged material as well as opening up Mason Creek for increased tidal flushing. The relocation of the inlet and enhancement of the tidal creek resulted in saltmarsh habitat loss in the area and a mitigation plan for saltmarsh impacts was implemented to compensate for those loses. Inlet maintenance is scheduled every three years and includes dredging and placing the material along the southern half of the beach on Figure Eight Island and the north end of Wrightsville Beach. Thus far, Mason Inlet has been dredged for maintenance purposes in the fall of 2005 and the spring of 2009. Mason Creek and a portion of the AIWW were also dredged in the spring of 2006.

Maintenance of the AIWW

The USACE is responsible for maintaining the AIWW to an authorized depth of 12 feet below MLW over a width of 90 feet. Generally, the material removed to maintain the channel is deposited in existing upland disposal sites. As a result of agreements reached

between the USACE, New Hanover County, and the Figure "8" HOA through the permitting process for the Mason Inlet Relocation Project, beach compatible material shoaling at that location is stored in Cameron Island, a disposal island owned by the Figure "8" HOA, located adjacent to the intersection. On one occasion, the Figure "8" HOA removed this stored material and deposited it along the southern half of Figure Eight Island.

Maintenance of Banks Channel

In 1969, during the early development of Figure Eight Island, Banks Channel was dredged to a depth of -5.5 m (-18 ft.), a width of 91.4 m (300 ft.), and length of 457.3 m (1500 ft) with most of the 1.3 million cubic yards removed used to elevate the southern half of the island (Cleary & Jackson, 2004). Maintenance of the navigation channel in Banks Channel since 1985 has removed approximately 2.16 million cubic yards of shoal material with the majority of the material placed on the Figure Eight Island shoreline south of Bridge Road. The equivalent annual rate of disposal of the Banks Channel material is around 108,100 cubic yards per year or about 9.8 cubic yards/lineal foot of beach/year.

Nixon Channel Maintenance

The dredging footprint within Nixon Channel is 7.4 acres and is located behind the northern tip of Figure Eight Island. The six (6) dredging events carried out in Nixon Channel since 1993 removed a total of 1,748,000 cubic yards. The volume of material for each event was generally limited to less than 300,000 by the Figure 8 HOA in order to avoid the establishment of a static vegetation line.

5. Resource Response to Change and Capacity to Withstand Stresses

Human Community Resource

For some coastal stakeholders (residences, businesses), a response to the loss of coastal frontage (beach system) is demonstrated by instituting protection measures ranging from placement of engineered walls made of riprap, groins, revetments, beach nourishment projects, beach scraping, and inlet channel management. Very few have demonstrated a willingness to abandon or relocate dwellings or businesses. In some cases, parts of North Topsail Beach, Holden Beach, the Outer Banks, and Ocean Isle Beach, structures have been condemned and demolished and have been prohibited from rebuilding. Currently, approximately 160 miles, or 50% of the North Carolina oceanfront coastline remains undeveloped while the other 50% is developed with residential homes and other associated infrastructure. Coastal visitors/customers will seek out alternative coastal communities having beaches suitable for recreational activity when coastal amenities are preserved.

Beach Resource and Associated Shorebird, Infaunal, and Sea Turtle Resources

The beach system will respond to sediment starvation, potential sea level rise and the destruction of dune binding vegetation by retreating. The system's capacity to withstand destabilization and erosional stresses is limited to the system's ability to reposition available sediment. The placement of engineered walls made of riprap, groins, and

revetments do not provide replacement sediment required to mitigate erosional stress. Beach nourishment and certain inlet management activities may increase the beach system's ability to withstand erosional stress through the transfer of sand into the active beach system and via erosional abatement. With the presence of approximately 160 miles of undeveloped beaches and 7 unmanaged inlets, some of the more mobile biological resources are able to adapt and find other suitable habitat for foraging, resting, and nesting.

Shorebirds utilize wetlands, beaches, overwash features, and intertidal flats and shoals for breeding, foraging and overwintering. Coastal development and human activity have reduced the availability of these habitat areas. This resource's response has historically been lead to a decrease in population size and a withdrawal to habitat in less impacted areas such as designated National Seashores and Wildlife Refuges, where development is not permitted.

Infaunal species inhabit a highly dynamic environment. Infaunal species respond to shoreline erosion and accretion by migrating with shoreline spatial fluctuations. When hard structures (i.e. seawalls, revetments) prevent further shoreline retreat, the infaunal species' habitat is reduced or eliminated. Beach nourishment buries infaunal species, however, research indicates beach nourishment results "in short-term declines in abundance, biomass, and taxa richness" (Burlas, *et al.*, 2001). Infaunal organisms that reside in intertidal zones are more adaptable to fluctuations in their environment, including high sediment transport and turbidity levels (Nelson, 1985). Other studies reported by Maurer (National Research Council, 1995) supported the burial capabilities of nearshore species, which found that these species were capable of burrowing through sand up to 40 cm. Recovery of infauna occurs within 2 to 6.5 months after completion of nourishment projects (Burlas *et al*., 2001), which occur, in most cases, during winter months when populations are at their lowest or are located further offshore.

Sea turtle world-wide populations have been declining in response to over-harvesting (eggs and adults), bycatch, ingestion of and/or entanglement with manmade products and pollutant induced disease. As settlement of coastal areas increased, harvesting of nesting turtles and eggs also increased until legislation and education were implemented and a sense of stewardship developed. Placement of some types of coastal protection structures along eroding, developed shorelines reduced or eliminated nesting habitat. Sand nourishment of eroding shorelines has restored nesting habitat along developed coastlines. Considering the relatively low fecundity of these species and their vulnerability to bycatch and manmade products and pollutants, it is probable that even with enhancement and protection of nesting habitat these species will remain threatened.

Inlet Intertidal Flats and Shoals Resource

Intertidal flats and shoals are dynamic features within the inlet complex. This resource responds to changes imposed by anthropogenic and natural forces by altering composition (volume, grain size, infauna, vegetative cover) and spatial location. Of the 21 inlets in North Carolina, 11 are periodically maintained for navigational purposes. Federal authorization requires that maintenance occur within the deepest water of the

channel, so realignment of the ebb tidal channel is not authorized. This requirement reduces direct impacts to intertidal flats and shoals. Each channel has its own authorized dimensions and range from 6-feet to 40-feet in depth and delegated widths ranging from 90-feet to 600-feet. The maintenance of these channels is generally annual, pending available funds. Species which utilize this habitat have generally adapted to the natural range of environmental conditions experienced in this habitat. This resource continually seeks to achieve dynamic equilibrium with the natural or man-induced forces affecting it. The construction of a terminal groin along the northern portion of Figure Eight Island is expected to allow for the continuation of sand bypassing into the inlet thereby allowing for the formation of additional flats and shoals.

Shorebirds that utilize the intertidal flats and shoals within the inlet complex have demonstrated the ability to respond to disturbances. In 2002, Mason Inlet was relocated approximately 3,000 ft. to the north. Piping plover spring migrants (but not winter residents) in the Mason Inlet area were disrupted by the construction phase of the relocation project, but these birds apparently continued on to Rich Inlet before stopping to rest and forage. Migrants appeared to have an aversion to the Mason Inlet area the following autumn (four months later), but numbers then returned to preconstruction levels by the beginning of winter (eight months later). By 2003, Mason Inlet had become an important foraging and resting site for migrating and over-wintering piping plovers (Webster, 2005).

The benthic organisms which reside in the intertidal and subtidal areas in proximity to the inlets demonstrate the ability to recover following dredging operations. Nelson (1985) indicates that organisms that reside in intertidal zones are more adaptable to fluctuations in their environment, including high sediment transport and turbidity levels. Dredging from the inlet borrow area will result in a direct mortality of all organisms present within the dredged material (Posey and Alphin, 2002). Although the recruitment pattern is altered, the recovery of species after sediment removal is relatively quick, depending upon the opportunistic nature of the species (Street *et al*., 2005; Posey and Alphin, 2002). This rapid recovery is important as foraging fin fish utilize these resources as prey.

At this time, there is limited research regarding impacts to fish passage through inlets during maintenance events. Anecdotally, recreational fishing opportunities remain viable following maintenance activity and therefore there is a high likelihood that these fish continue to utilize inlets during and after maintenance events.

Water Column Resource

The water column resource is a dynamic and complex system; the quality of which is influenced by anthropogenic and natural inputs. In the nearshore environment and within inlets, this resource's quality is affected by nutrient loading, suspended sediment, and pollutant inputs. The capacity of the water column to accommodate inputs is related to the rates of flushing, exchange, and mixing. Within the inlets, a tidal prism functions to transport suspended sediment and turbidity originating from dredging events and other stresses. The relatively large sediment size of the material suspended by dredging

operations within the inlet reduces the duration of the material in the water column and therefore reduces the duration of suspended material and turbidity.

Water column within inlet systems and along the ocean shoreline swash zone do experience frequent seasonal storms, along with routine strong winds, that constantly elevate TSS levels and increase turbidity. These environments are accustomed to higher ranges and are adaptable to natural increases, but these events have shorter duration periods than dredge and fill activities associated with channel maintenance and beach nourishment activities. Even with these activities, which operate as long as a 4-month period, sediment has shown to settle quickly due to the coarser material generally found in these environments and turbidity tends to be of short duration.

Hardened Structure Resources

The potential rise in sea level over time may impact the effectiveness of the proposed terminal groin. According to www.tidesandcurrents.noaa.com, the regional trends in North Carolina show an increase of 0 to 3 mm/yr. (0 to 0.00984 ft./yr.), or a 0 to 1 ft/century. Several monitoring stations within proximity to Figure Eight Island contain this level of data including stations located in Beaufort, Wilmington, and Southport. The rate of increase in sea level rise in Beaufort is 0.84 ft./century while the rate in Wilmington and Southport are both 0.68 ft/century. The first 400 feet of the proposed terminal groin is designed with a top elevation of +6 feet NAVD and would slope down to a top elevation of +3.5 feet on the seaward end. Therefore, the elevation of the structure would be sufficient as to remain above the sea level for the foreseeable future regardless of anticipated sea level changes. The rubble mound structure is expected to uphold its structural integrity through storm conditions. The closest hardened structure to Figure Eight Island is approximately 9 miles south and is the jetty at Masonboro Inlet which is also rubble mound designs on both sides of the inlet. These structures have remained structurally sound since constructed in 1966 and 1980. The same can be stated with the terminal groin structure at Beaufort Inlet which is approximately 65 miles north of Figure Eight Island.

6. Stresses in Relation to Regulatory Thresholds

The Coastal Barrier Resource System (CBRS) was established in 1982 with the Coastal Barrier Resource Act (CBRA) and modified in 1990 with the Coastal Barrier Improvement Act (CBIA) in order to prevent the Federal Government from taking any action that could ultimately encourage or facilitate development on barrier island segments located within the CBRS. The Acts do not prevent private actions by municipalities or individuals. Coastal areas are considered desirable places to inhabit. As population continues to increase it is anticipated that the demand for coastal development will increase.

The North Carolina Coastal Area Management Act (CAMA) (§ 113A-100) was implemented to preserve the physical, aesthetic, cultural and recreational values, including the management of land and water resources in North Carolina's 20 coastal counties. Under CAMA, permits are necessary for development type projects proposing

work in any Areas of Environmental Concern (AEC) established by the Coastal Resources Commission. An AEC includes areas of natural importance such as 1) estuarine and ocean systems, 2) ocean hazard system, 3) public water supplies, and 4) natural and cultural resource areas. Under CAMA, the proposed work cannot cause significant damage to one or more of the historic, cultural, scientific, environmental or scenic values or natural systems identified in the AECs listed. In addition, significant cumulative effects cannot result from a development project (NCDCM, 2003).

7. Resource Baseline Conditions

Human Community Resource

The population in North Carolina increased substantially over recent decades. Between 2000 and 2010, North Carolina grew at rate of 18.5% from 8,049,313 to 9,535,483. New Hanover County experienced a rapid rate of growth during the same time frame as the population has increased by 26.4% (US Census Bureau, 2012). The rate of population increase has reduced, however, over the recent years. Tourism continues to remain at high levels within New Hanover County as reflected by increases in the county's Room Occupancy Tax. Many tourists visiting the county visit beach communities and utilize the area beaches for recreational activities. Tourists and residents alike utilize the inlets within the state to access the Atlantic Ocean for fishing, SCUBA diving, and other recreational opportunities.

The project area is considered a developed coastline comprised primarily of residential dwellings. With the exception of temporary sandbags protecting 20 homes, no hard shoreline protection structures are currently present along the coastline of the project area. At least 31 shoreline protection projects have occurred along Figure Eight Island since 1977 either by Figure Eight Island Homeowners Association or individual homeowners. These projects have included beach nourishment events, beach scraping (bulldozing to form protective berms and dunes), bulkheading, and the installation of sandbags. The material utilized for the majority of the beach nourishment projects was acquired from the maintenance of Mason Inlet, Nixon Channel, the Intracoastal Waterway (AIWW), and Banks Channel.

Nourishment activities have increased since the mid to late 1990's due to changes to Mason and Rich Inlet systems, the frequency of storm activity, and the increase of home construction on the island. However, the change to the orientation of Rich Inlet and frequency of recent storm activity has exasperated the long-term chronic erosion occurring on the island. Specifically, these erosional areas are located along the northern extremity of the developed oceanfront downdrift of Rich Inlet, the southern 2,500 ft of developed shoreline updrift of Mason Inlet, and the 1,000 ft long developed estuarine shoreline fronting Nixon Channel (Cleary and Jackson, 2004).

In response to the accelerated erosion rates, the Figure Eight HOA nourished the area north of Bridge Road six (6) times between 1993 and 2011, with the cumulative volume of all six (6) fills totaling approximately 1.8 million cubic yards utilizing material

obtained from a portion of Nixon Channel. The timeframe of these recent events corresponds with the start of the increased erosion rate associated with the shifting of the ebb tide channel to a more northerly direction. Due to the extremely high erosion rates just south of Rich Inlet, the beach fills placed in this area did not provide long-lasting protection and eventually forced the ocean front property owners on Surf Court, Inlet Hook Road, and Comber Road to install temporary sandbag revetments. Based on the permit conditions, all of the temporary sandbag revetments were to be removed by April 2008; however, legal challenges to the permit condition have delayed their removal.

Beach Resource and Associated Shorebird, Infaunal, and Sea Turtle Resources

In developed areas along the North Carolina coastal shorelines, the stability of some of the dunes and native vegetative cover has been compromised through the building of structures. In some areas dune formations have been destroyed to permit construction of buildings. However, due to CAMA regulatory restrictions, these problems have been reduced over time, and present and future pressures from development to the oceanfront dune systems should continue to decline with restrictions in place. In other areas, nourishment, renourishment, dune protection and management programs have been implemented for shoreline protection and have enhanced or helped sustain dunes and vegetative cover. It is outside the scope of this CEA to quantify the extent these conditions are present along the Atlantic east coast and Gulf coast shorelines. In undeveloped areas where anthropogenic activity is prohibited, limited or controlled, natural dune systems exist in dynamic equilibrium and support various flora and fauna dependent on these systems. Management, protection, and restoration measures have achieved varying degrees of stability for this resource along most developed shorelines. As shown in Table 2, approximately 131 of the 320 miles of North Carolina oceanfront shoreline have been or are expected to be nourished in the foreseeable future to help protect the dune system.

Table 2. Summary of cumulative mileage of North Carolina Ocean beach that could be impacted by beach nourishment and/or navigation disposal activities.

Project Type	Total Miles Impacted	% NC Beach
Federal and Non-Federal Beach Nourishment	112	35
Federal Authorized Beach Disposal	19	6
TOTAL	**131**	**41**

The aforementioned 31 shoreline protection projects constructed along Figure Eight Island since 1977 have placed well over 4 million cubic yards of material along the oceanfront shoreline along Figure Eight Island. Along with these activities, the placement of sandbags and beach scraping events has served to protect or augment the existing dunes along portions of the northern part of the island. Much of the primary dune system and associated vegetation remains intact.

Seabeach amaranth (*Amaranthus pumilus*), a Federal and State threatened species, is a 'fugitive' species which grows on barrier island beaches in areas recently disturbed by storms or beach nourishment. Historically, seabeach amaranth occurred in 31 counties in nine states from Massachusetts to South Carolina. The species is currently found in New York, New Jersey, Delaware, Maryland, Virginia, North Carolina, and South Carolina. It prefers overwash flats at accreting ends of islands and lower foredunes and upper strands of noneroding beaches. It does not compete well with other dune vegetation which supports a positive association with beach nourishment projects (NCFWS, 2006; Nash, 2002).

There are 55 known plant populations, of which 34 are found within North Carolina with the remaining smaller plant populations outside of North Carolina. North Carolina is considered to be the only State to have large populations of seabeach amaranth and although the North Carolina populations reached historic lows in 2000 (Jolls *et al*., 2003), the Endangered Species Bulletin (Randall, 2002) reported that the numbers of seabeach amaranth are increasing. This has been shown through post-construction monitoring efforts on Bogue Banks, Brunswick County Beaches, as well as Figure Eight Island.

Seabeach amaranth is frequently found in large numbers on Figure Eight Island and Hutaff Island. Between 2002 and 2010, 1,505 and 1,130 plants were found on Figure Eight Island and Hutaff Island, respectively. Seabeach amaranth experiences a great deal of natural population variability from one year to the next, as evidence by annual survey results on both islands. In 2008 and 2009, no plants were observed on Figure Eight Island while 656 and 768 plants were observed during 2004 and 2005, respectively.

Multiple assessments of infaunal abundance, biomass and taxa richness from Maine to Florida suggest that infaunal abundance will be similar to that reported from other Atlantic coast beaches (Burlas *et al*., 2001). On oceanfront beaches, most benthic organisms in the intertidal zone consist of infaunal burrowing forms, particularly polychaete worms (Phylum ANNELIDA), coquina clams (*Donax variabilis*) and mole crabs (*Emerita talpoida*) (USFWS, 2002).

While several species of amphipods and polychaetes populate the intertidal and shallow subtidal beaches of North Carolina, their contribution to the total biomass of benthic infauna is low due to their small body size. Therefore, mole crabs and coquina clams dominate the benthic infaunal community due to their biomass (Peterson *et al.*, 2000).

Baseline data depicting the infaunal species populations occurring within the specific project area is unavailable; however the information regarding pre-construction and post-construction monitoring at Bogue Inlet is applicable. Prior to the relocation of the channel within Bogue Inlet, infaunal species were dominated by various worms, crustaceans, snails, intertidal insects, and bivalves. Overall, the species richness and abundance increased during post-construction sampling events. Results showed that natural disturbances in the area may have equaled project related effects as the inlet environment remains dominated by physical stress (Carter, 2008). Similar results were

found following the monitoring of infaunal communities in proximity to Mason Inlet, Topsail Island, and Bald Head Island beach nourishment activities.

Piping Plover (Charadrius melodus)

The piping plover Atlantic coast population is federally listed as threatened with a population estimated at less than 1,400 pairs (USFWS, 2004). This species is ranked globally as G3, considered rare throughout its range (NCNHP, 2006) and listed as threatened throughout their wintering range (USFWS, 1996). Critical Habitat designation for North Carolina wintering piping plover includes a total of 18 distinct units. These include:

Unit NC-1: Oregon Inlet
Unit NC-2: Cape Hatteras Point
Unit NC-3: Clam Shoals
Unit NC-4: Hatteras Inlet
Unit NC-5: Ocracoke Island
Unit NC-6: Portsmouth Island-Cape Lookout
Unit NC-7: South Core Banks
Unit NC-8: Shackleford Banks
Unit NC-9: Rachel Carson
Unit NC-10: Bogue Inlet
Unit NC-11: Topsail
Unit NC-12: Figure Eight Island
Unit NC-13: Masonboro
Unit NC-14: Carolina Beach Inlet
Unit NC-15: Ft. Fisher
Unit NC-16: Lockwood Folly Inlet
Unit NC-17: Shallotte Inlet
Unit NC-18: Mad Inlet

Rich Inlet in Unit NC-11, which is described by the USFWS as follows (USFWS, 2001):

> *The entire area is privately owned. This unit extends southwest from 1.0 km (0.65 mi) northeast of MLLW of New Topsail Inlet on Topsail Island to 0.53 km (0.33 mi) southwest of MLLW of Rich Inlet on Figure Eight Island. It includes both Rich Inlet and New Topsail Inlet and the former Old Topsail Inlet. All land, including emergent sandbars, from MLLW on Atlantic Ocean and sound side to where densely vegetated habitat, not used by the piping plover, begins and where the constituent elements no longer occur. In Topsail Sound, the unit stops as the entrance to tidal creeks become narrow and channelized.*

Eight of these critical habitat units include inlets that are federally managed with maintenance dredging occurring on a regular basis, pending available monies: Oregon Inlet, Hatteras Inlet, Bogue Inlet, New Topsail Inlet, Masonboro Inlet, Carolina Beach Inlet, Lockwood Folly Inlet, and Beaufort Inlet. Oregon and Beaufort Inlets have terminal groin structures and Masonboro has a jetty structure.

The southern subpopulation of the U.S. Atlantic Coast Population includes Delaware, Maryland, Virginia, South Carolina and North Carolina. The North Carolina coastline is important to piping plovers since it provides habitat for wintering, breeding, and migration. In 1996, the USFWS (2006g) counted 1,348 breeding pairs in the Atlantic Coast population. In 2001, U.S. breeding pair populations showed a 10% gain with a total pair count of 1,280, while the total U.S. Atlantic Coast population had increased by 13% to 1,525 breeding pairs (USFWS, 2007b). The 2002 Atlantic Coast population had 1,690 nesting pairs of piping plovers, while nesting pairs in North Carolina totaled 23 (USFWS, 2007b). These numbers were comparable to the 2000 to 2001 Annual Status Update for the U.S. Atlantic Coast Piping Plover Population (USFWS, 2002a). Nesting pair estimates for the Atlantic Coast population as reported to the USFWS were: 1,660 in 2004, 1,632 in 2005, and 1,743 in 2006 (USFWS 2007; 2007a; 2007c). The 2006 abundance estimate illustrates a 29% increase from 1996 to 2006 in the number of breeding pairs of the Atlantic Coast population.

Wilson's Plover (Charadrius wilsonia)
The Wilson's plover is designated by the State of North Carolina as Significantly Rare. This is a peripheral species (North Carolina lies at the periphery of this species range) requiring monitoring by the North Carolina Natural Heritage Program. There is no federal status for this species, and it is considered globally secure (G5 rank) (NCNHP, 2006). Wilson's plover breed in eastern and southern coastal areas of the United States and overwinter along the Florida Atlantic coast and Gulf coasts to northern South America (GAMNH, 2000).

Gull-Billed Tern (Sterna nilotica), Common Tern (Sterna hirundo), and American oystercatcher (Haematopus palliatus)
The gull-billed tern, common tern, and American oystercatcher are designated by the State of North Carolina as threatened. There is no federal status for these species, and they are considered globally secure (G5 rank).

Common terns seem to be undergoing a decline in the southeast and are therefore listed as a species of regional concern (Hunter et al., 2001). They have been observed on Figure Eight Island and Hutaff Island on a semi-regular basis. American oystercatchers have also been observed in or near the Permit Area during the April to June breeding period (Cameron, pers. comm., 2007). An average of two (2) American oystercatchers were observed during each of the daily surveys conducted along the northern portion of Figure Eight Island in April, 2011 (Webster, pers. com., 2011).

Eastern Painted Bunting (Passerina ciris ciris) and Black Skimmer (Rynchops niger)
The Eastern painted bunting and black skimmer are State-listed as a Species of Special Concern. The eastern population of painted bunting breeds in a restricted range within the Atlantic Coastal Plain, from North and South Carolina to Georgia and Florida. In North Carolina, eastern painted bunting breeding habitats are found in a narrow range along marine coasts and waterways (Audubon North Carolina, 2007b). There is no

federal status for these species, although the both species are considered globally secure (G5 rank) (Kushlan et al., 2002).

Red Knot (Calidris canutus)

The red knot was designated as a candidate species in 2006. At nine to ten inches long, the red knot is a large, bulky sandpiper with a short, straight, black bill. Large numbers of red knots rely on Atlantic stopover habitats during the spring and fall migration periods. Red knots winter at the southern tip of South America and breed above the Arctic Circle. These small shorebirds fly more than 9,300 miles from south to north every spring and reverse the trip every autumn, making the red knot one of the longest-distance migrating animals. Migrating red knots break their spring migration into non-stop segments of 1,500 miles or more, converging on just a few critical stopover areas along the way. Large flocks of red knots arrive at stopover areas along the Atlantic coast each spring, with many of the birds having flown directly from northern Brazil. Red knots are faithful to these specific sites, stopping at the same locations year after year. Mole crabs (*Emerita talpoida*) and coquina clams (*Donax sp.*) are an important food source for migrating knots in North Carolina. Birds arrive at stopover areas with depleted energy reserves and must quickly rebuild their body fat to complete their migration to Arctic breeding areas. During their brief 10 to 14-day stay in the mid-Atlantic, red knots typically double their body weight.

Red knots do utilize habitat within and around the Permit Area during their migration. Surveys conducted during 2007 by Audubon North Carolina revealed a total of 878 red knot individuals observed along Mason Inlet, Rich Inlet, Lea Island, and Hutaff Island. The maximum counts at each location on an individual survey was 188, 258, 6, and 20, respectively at each location (Mangiameli, pers. comm. 2008).

Sea Turtles

The leatherback sea turtle and the green sea turtle are listed as Federally endangered, while the loggerhead sea turtle is listed as threatened. "The estimated world population of nesting leatherbacks is 35,860; nesting greens is 88,520 (CCC, 2003); and nesting loggerheads is 44,560. There are approximately 320 miles of ocean-facing sandy beaches in North Carolina that provide suitable nesting habitat for sea turtles. To date, loggerheads, green turtles, leatherbacks and rarely Kemp's ridleys sea turtle nests have been recorded on North Carolina beaches. By far the most common nesting species is the loggerhead. In 2010 and 2011, there was a total of 967 and 883 loggerhead sea turtle nests observed along the North Carolina oceanfront coastline, respectively (NCWRC, 2012). The vast majority of sea turtle nests observed in North Carolina occur below Cape Lookout. According to data supplied by Dr. Webster of UNCW and Mr. Golder of the Audubon Society, no green sea turtle nests have been observed in the study area on either Figure Eight Island or Hutaff Island (Webster, pers. comm., 2011; Golder, pers. comm., 2008). The NCWRC reported a leatherback false crawl in North Carolina in 2007 (Everhart, 2007). Loggerhead sea turtles, however, do actively nest within the Permit Area. Nesting data for the study area on Figure Eight Island and Hutaff Island has been recorded since 2001. Between 2001 and 2010, there has been an average of 11.7 nests

per year for the study area located on Figure Eight Island and Hutaff Island (Webster, pers. comm., 2011; Godfrey, pers. comm., 2011; Golder, pers. comm., 2008).

On July 10, 2014, the USFWS designated 1,102 km. of the western Atlantic and Gulf of Mexico coastlines as terrestrial critical habitat for the Northwest Atlantic Ocean Distinct Population Segment (NWA DPS) of loggerhead sea turtles. Critical habitat is designated on sandy beaches capable of supporting a high density of nests in North Carolina (Brunswick, Carteret, New Hanover, Onslow and Pender counties), South Carolina (Beaufort, Charleston, Colleton, and Georgetown counties), Georgia (Camden, Chatham, Liberty, and McIntosh counties), and Florida (Bay, Brevard, Broward, Charlotte, Collier, Duval, Escambia, Flagler, Franklin, Gulf, Indian River, Lee, Manatee, Martin, Monroe, Palm Beach, Sarasota, St. Johns, St. Lucie, and Volusia counties). The designation also includes non-continuous sections of coastline from Alabama and Mississippi. Department of Defense lands are exempt from critical habitat designation. Maps of the specific terrestrial critical habitat locations may be found in the FWS Final Rule (79 FR 39756). Loggerhead sea turtle critical habitat unit LOGG-T-NC-01 includes all of Hutaff Island which lies within the Permit Area of the proposed project.

Additionally, on July 10, 2014 the National Marine Fisheries Service (NMFS) designated marine critical habitat within the Atlantic Ocean and the Gulf of Mexico for the NWA DPS of the loggerhead sea turtle. Open water critical habitat was designated for nearshore reproductive habitat, breeding habitat, migratory habitat, and winter habitat and is located along the U.S. Atlantic coast from North Carolina south to Florida and into the Gulf of Mexico. Critical habitat is designated offshore of the U.S. Atlantic coast coincident with the Gulf Stream to the edge of the U.S. Exclusive Economic Zone (EEZ) stretching from approximately 38° North latitude, 71° West longitude south to the Gulf of Mexico-Atlantic border. Detailed descriptions and maps may be found in the NMFS Final Rule for critical habitat designation (79 FR 39856). Unit LOGG-N-02 is the critical habitat unit closest to Figure Eight Island.

Intertidal Flats and Shoals Resource

Along developed and undeveloped Atlantic and Gulf coast beaches adjacent to inlets, this resource changes spatially and temporally in response to forcing functions (tide, current, and weather conditions). In developed areas this resource is influenced by anthropogenic activities including dredging. Most of the inlet complexes in North Carolina include a vast network of intertidal flats and shoals. One exception would be Masonboro Inlet, a federal navigational channel. This inlet is bound by a jetty for the purpose of reducing shoaling by limiting the amount of sediment entering the inlet. For Rich Inlet and other non-structural inlets, the tidal prism provides a means for material to be transported into the inlets and allows for the development of dynamic intertidal flats and shoals.

Water Column Resource

The quality of the water column resource is related to the presence or absence of inputs (anthropogenic or natural). Natural conditions support fluctuating turbidity levels in the nearshore and offshore water column within the state of North Carolina. Storm events

are known to increase these levels due to the resuspension of sand and fine materials. These fluctuating turbidity levels would continue with or without the dredging efforts.

Ambient TSS and turbidity levels have been monitored within several inlets in North Carolina. Cleary and Knierim (2001) monitored the turbidity and TSS from several sites in conjunction with a beach nourishment project. The effort included two control sites, which were located several hundred meters from the margins of the beach fill project. The turbidity levels averaged 7.8 and 7.6 NTUs respectively at the two sites which is well below the North Carolina state standard of 25 NTUs. The TSS values measured at the two control sites ranged from 33.1 to 124.2mg/l. There is no state standard for TSS in North Carolina.

The tidal prism within the inlets of North Carolina varies primarily as a function of inlet dimensions. For example, Beaufort Inlet has a tidal prism of approximately 1.4×10^8 m^3 (Jarrett, 1976) while the tidal prism in Rich Inlet has been estimated to be 1.8×10^7 m^3 (Cleary, 2009). Fish passage and larval transport utilize the flow of water through the inlets.

Hardened Structure Resources

The ocean front shoreline of North Carolina contains relatively few major structures. This is partly due to a 1985 State law prohibiting hardened structures along the entire oceanfront and inlet shorelines. The only exception in this law was the installation of structures for navigational purposes. Structures in North Carolina include the Fort Fisher Revetment, the Carolina Beach Revetment, the jetties at Masonboro Inlet, the Fort Macon State Park terminal groin and revetment, the Pea Island/Oregon Inlet terminal groin, the Bald Head Island geo-tube groin field, and the Cape Lookout harbor of refuge breakwater. In total, these structures impact approximately 7.7 miles of shoreline, or 0.02% of the approximate 320 miles of oceanfront shoreline in North Carolina.

The Fort fisher revetment was constructed in 1996 and spans 3,040 feet of shoreline. This structure was constructed to provide erosion protection to a civil war-era earthenmound fortification originally built to guard one of the entrances into the Cape Fear River. This revetment was constructed with stone and STA-POD® units along the toe of the structure.

The Carolina Beach revetment was constructed to provide erosion protection for upland development on the north end of island. This structure was constructed in two stages beginning in 1971 and completed in 1974. This 2,075 foot-long structure is constructed of stone.

The jetties at Masonboro Inlet were constructed to stabilize the federal navigation channel within the inlet. The north side of the jetty was completed in 1966 while the south side was completed in 1980. The northern structure contains a landward portion extending 1,739 feet and is constructed of concrete sheet pile with a 1,900-foot rubblemound seaward portion. The 3,450-foot long southern section is comprised of a shore anchorage section and a seaward portion. The 800-foot long shore anchorage

section is constructed of concrete sheet pile with stone protection. The 2,650-foot long seaward portion was constructed with a concrete sheet pile core covered by a rubblemound. The jetty serves to stabilize the channel by maintaining the southern 7,000 feet of shoreline along Wrightsville Beach and 2,500 feet of shoreline along the northern portion of Masonboro Island. Portions of Masonboro Island have been affected by the southern jetty.

The Fort Macon State Park terminal groin was initially constructed in 1961 with subsequent construction in 1968 and 1970. This structure was designed to protect Fort Macon against erosion caused by the westward migration of Shackleford Point. The total length of the stone structure is 2,280 feet including a 750-foot sloping revetment on the landward end and a 1,500-foot rubblemound portion on the seaward end. The accretion fillet formed by the terminal groin extends approximately 2,500 feet west of the structure.

The Village of Bald Head Island installed a series of sixteen soft groins constructed of geotextile material and sand fill (geotube-style structures) along western South Beach in 1996. These groins extend seaward and range in length from 200'-350'.

The Cape Lookout harbor of refuge breakwater was constructed in 1917 to provide sailing vessels protection from coastal storms. It is a 4,800-foot long rubblemound structure.

The 3,125-foot long Pea Island/Oregon Inlet terminal groin was constructed between 1989 and 1991. This stone structure was designed to prevent the continued southward migration of Oregon Inlet and provide protection for the south end of the Bonner Bridge. The accretion fillet formed by the terminal groin extends approximately 4,500 feet to the south of the structure along the Pea Island shoreline.

8. Identification of Important Cause and Effect Relationships

The proposed action is a shoreline protection project incorporating the construction of a terminal groin and associate beach nourishment utilizing material from Nixon Channel and three dredged material disposal sites. The proposed project is scheduled for winter construction.

Human Community Resource

This and similar nourishment projects, which have occurred since 1962, and those which are scheduled to occur in the reasonable foreseeable future, facilitate the occupation and development of the coastal shoreline. Shoreline protective measures have provided stabilization and protection of properties on barrier islands from minor and severe storm events. With protective shorelines, private, local, state and federal infrastructure (roads, bridges, houses, utilities, etc.) will continue to be in place to facilitate access to and use of the coastal environment and to help sustain the local and state economies. Out of the 160 miles of developed oceanfront shoreline in North Carolina, no new widespread oceanfront development is expected. Most of North Carolina's barrier islands have been developed for residential and/or commercial use. With some exceptions, few of the

islands have untouched or undeveloped properties in their natural state. The majority of the undeveloped properties consist of individual lots. Outside of the municipality controlled islands, many miles of oceanfront shoreline is protected from development within the foreseeable future due to its ownership by Federal, state, and non-profit organizations. Most of these oceanfront shorelines are expected to remain or be managed in their natural state. For inlet areas, boating traffic and use of adjacent shoreline is expected to continue, but with only a slight increase in use due to limited and reducing boat launching access points.

Beach Resource and Associated Shorebird, Infaunal, and Sea Turtle Resources

This and similar projects compensate for retreat of the shoreline as a result of sediment starvation and sea level rise if it occurs at predicted rates. This and other projects have the potential to create suitable habitat for dune vegetation and provide shoreline protection. The proposed project will cause the sandy beach to be widened seaward of existing structures

The increasing demand for coastal dwellings and recreation areas by the migration and increase in the human population is and will continue to impose additional stresses on the coastal ecosystem, including the infaunal communities, fishery resources, and bird species.

Infaunal communities are negatively impacted by repeated beach nourishment projects and the maintenance of inlet channels and the construction of hardened structures. With the implementation of the State Sediment Criteria, material used for present and future nourishment projects are expected to be compatible with native beach material. The utilization of fill material that closely mimics the natural beach sediment will reduce recovery times for infauna in the nearshore and intertidal zones. Impacts will be short-term in nature, and as long as beach projects continue to be scheduled with spatial and temporal breaks between them and during times when biological activity is at its lowest, the infaunal communities will likely recover due to migration from other areas and by larval recruitment. The temporary loss of infaunal communities does have the potential to limit food sources for fish species that may be present during the period of benthic recovery.

For bird resources, hunters were considered to be the primary cause for the population decline in all three geographic breeding regions for the piping plover (Atlantic Coast population, Northern Great Plains population, Great Lakes population) until the Migratory Bird Treaty Act was implemented in 1918. From the 1940's until now, habitat loss, increased predation, and disturbance from humans and pets has been cited as major contributing factors for the decline of the Atlantic Coast population (USFWS, 1996). These factors have also been the contributing cause of decline for other shorebird species that utilized oceanfront and inlet habitats.

Along the Atlantic Coast, the loss of bird migration habitats in the coastal zone has been extensive. Shoreline armoring has reduced intertidal habitats used by piping plovers and other shorebirds for foraging, roosting and nesting. The loss of Atlantic Coast piping

plover habitat has largely been attributed to the development of permanent structures, which can alter natural beach processes and prevent natural overwash events. Structures that have been identified as having significant effect on nesting habitat include seawalls, jetties, piers, homes, parking lots, and other interfering structures. Animal and human disturbances, depending upon duration and proximity of perceived threat, may result in adults leaving eggs or chicks exposed to predators or inclement weather and may result in disruption of nesting, foraging, and roosting behaviors.

Adult mortality has been identified as a key determinant in population trends, while nest sites and clutch size were not found to cause early populations to decline (Burger, 1987; 1991). Juvenile mortality may not have as strong of an effect on populations as adult mortality; however reproductive success is lower in areas with high human disturbance (Burger, 1987; 1991). While piping plovers illustrate acclimation to human disturbances via flexible habitat use (i.e., the ability to forage in a different habitat e.g. backbay or ocean) abandonment of native habitats often results (Burger, 1994).

While the numbers of breeding pairs have increased nationally, the North Carolina breeding population had experienced a decline through the 1990's. The number of piping plover breeding pairs decreased from 55 pairs in 1989 to 20 pairs in 2004 (USFWS, 2005) (Figure 1). However, since that time, the number of observed breeding pairs has steadily increased to over 60 within recent years (Schweitzer, pers. comm., 2012). In 2011, a total of 59 breeding pairs were observed during the State's annual breeding pair monitoring effort conducted along 21 islands between June 1 and June 9. Of these, 41 pairs were observed on the Cape Lookout National Seashore and 13 were observed along the Cape Hatteras National Seashore (Schweitzer, pers. comm., 2012). The majority of all nesting pairs were observed near the ends of the islands in proximity to their foraging grounds near an inlet. It should be noted that maintenance dredging operations occur within most inlets in North Carolina on a sporadic basis. Hatteras Inlet, which is part of the Cape Lookout National Seashore, however, is not maintained. Despite this recent increase in nesting pairs within the state, this relatively low productivity rate leaves North Carolina vulnerable to problems associated with very small, sparsely distributed populations (e.g., difficulties finding mates) (USFWS, 2004).

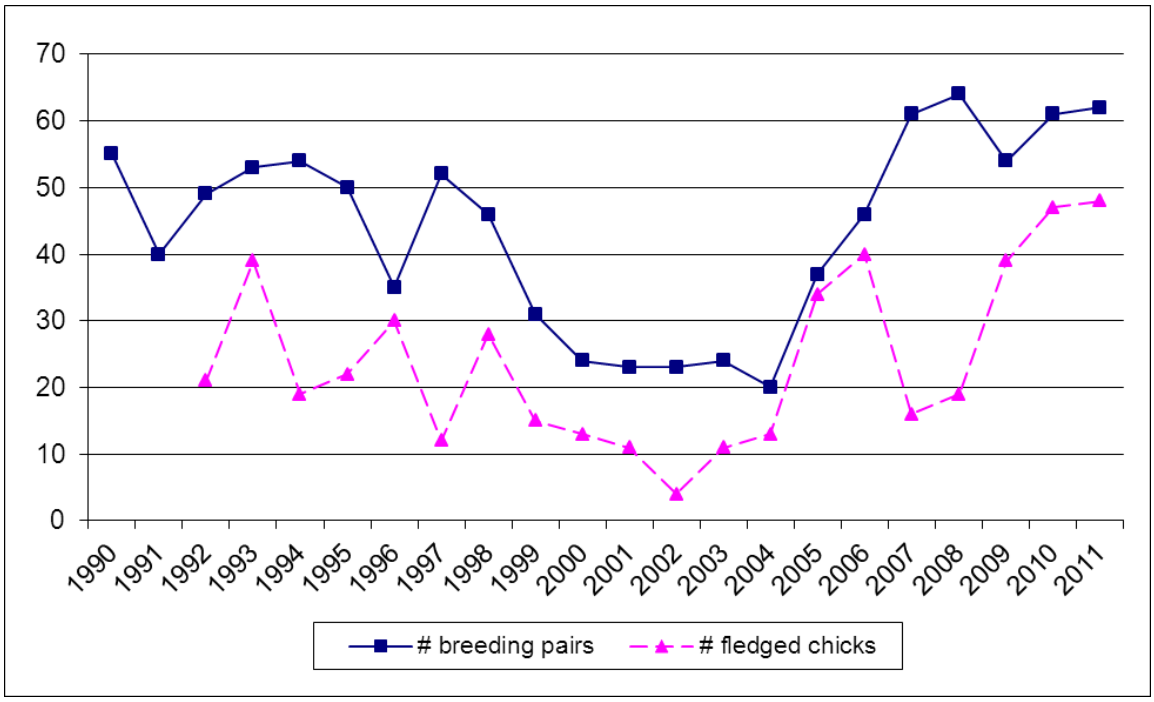

Figure 1- Numbers of Piping Plover breeding pairs and fledged chicks in North Carolina from 1990 to 2011.

For sea turtle nesting, beach nourishment projects generally widen the beach seaward of existing dune system, which increase the area available for sea turtle nesting activity. Sediment compatibility standards, wintertime dredging, and other minimization and avoidance measures have and are expected to reduce impacts to nesting sea turtles. Sea turtles are most vulnerable during dredging operations, whether associated with navigation and/or beach fill projects. Deaths tend to occur when dredging is conducted by hopper plants, which are mobile dredges and work offshore or within inlet channels. While hopper dredges are periodically used, most maintenance and beach nourishment activities are conducted by cutterhead dredges. These plants are anchored and stationary, mainly working at a single location within the inlet or nearshore. Although no sea turtle takes have been reported with the use of a cutterhead dredge, the risk for potential takes remains. While sea turtles have been incidentally taken during dredging operations, these takes have been low in number along North Carolina and have had little impact on populations.

<u>Intertidal Flats and Shoals Resource</u>

It is difficult to determine how activities in the past 50 years have affected this resource. For earlier projects, particularly for navigational purposes, it can be presumed that the removal or preventing the movement, of intertidal flats and shoals were considered the objective for improving recreational and commercial navigation. For present and future projects, these habitats are more carefully considered when designing or planning work within an inlet and along adjacent shorelines in order to reduce their impacts. Most current projects, as well as future actions, are expected to be conducted in a way not to modify the tidal prism. Also, it is generally not the intention to remove material from the littoral system that may result in a depletion or reduction in the sediment budget.

Dredging work or the construction of terminal groin structures does have the potential to indirectly affect intertidal flats and shoals by shifting them within inlet complexes over time. This has the potential to impact foraging birds and fin fish which rely on infaunal and benthic organisms that inhabit these areas. The proposed project will not have any direct impacts to these resources, but is expected to impact these intertidal areas closer to the groin structure. Even with this loss, the habitat is expected to shift and redevelop northward along Hutaff side of the inlet.

Water Column Resource

Turbidity and TSS levels naturally fluctuate throughout the year within the inlet and along the ocean shoreline swash zone; and this fluctuate can at times be dramatic. However, beach nourishment and dredging activities are known to have increased these levels during project operations. These higher turbidity and TSS levels tend to be concentrated and localized within the dredging area and the beach discharge location, but can be more widespread if onsite weather conditions are not optimal. Elevated turbidity levels could potentially lead to the clogging of fish gills or disrupt larval transport, especially if operations are being conducted during peak biological activity.

Hardened Structures

Hardened structures along the North Carolina coastline have been used in the past to alleviate shoreline erosion to protect property, infrastructure, navigation, and recreational opportunities. The effect of placing these hardened structures, including rock revetments and terminal groins, have helped accomplish these goals. In some cases, these structures have been shown to increase shoreline erosion in other areas while protecting their intended target area. There has not been any data to suggest that the terminal groins located on Pea Island and at Fort Macon have impeded the influx of larvae through the inlets nor has research suggested that fish passage has been reduced.

9. Determine the Magnitude and Significance of Cumulative Effects

This section describes a qualitative assessment of factors associated with positive, negative or neutral (not discernible) effects related to the resource.

Human Community Resource

The proposed project as well as past and future nourishment/renourishment projects and the construction of hardened structures facilitates continuing human occupation (dwelling, recreation, and development) of coastal areas. With local, county, and State governments understanding the need, sometimes collectively, to protect properties, infrastructure, and the commerce value along the oceanfront beaches, dredging and beach nourishment activities have dramatically increased over the last decade. This understanding is also expected to result in an increased rate of these type projects in the foreseeable future. Beach shoreline protection and navigational improvement projects have occurred recently, and are being planned, all along the developed sections of North Carolina oceanfront; from Nags Head to Holden Beach. Even during times where government budgets have had shortfalls and/or have reduced spending, government entities in North Carolina have continued to finance and implement these types of

projects to protect oceanfront shoreline beaches and to maintain navigational channels. Recently, the State has expanded its desire to protect shorelines by changing a long standing prohibition on oceanfront hardened structures. This would potentially allow up to four (4) terminal groin structures in North Carolina. With the local, county, and State's overall awareness and recognized need for shoreline and inlet projects, the human community is expected to be maintained, and in some circumstances, improved as it pertains to protection of property, recreational beaches, local and State commerce, and recreational and commercial boat use. Other human resource use, such as bird watching, aesthetics, and undisturbed vistas, may temporarily be interrupted by dredging and beach nourishment projects, but this interruption will tend to be localized and short-term.

Even with their continuation, dredging, inlet, and beach nourishment activities are generally not conducted on an annual basis for each beach or barrier island and/or inlet. Nor are these activities occurring along the North Carolina coastline simultaneously. Project cost and essential planning tend to keep the number of implemented actions low and on an as-needed basis, pending storm activities and beach conditions. Also, due to cost and funding constraints, it is generally expected that only projects with crucial needs will likely be constructed. As discussed earlier, most of North Carolina barrier islands, under a local or county municipalities' jurisdiction, have been developed for residential and/or commercial use, especially oceanfront properties. Outside of the municipality controlled islands, approximately 57 miles, or 18% of North Carolina's oceanfront shoreline is protected from development within the foreseeable future due to its ownership by Federal, state, and non-profit organizations. Most of these oceanfront shorelines are expected to remain or be managed in their natural state.

The number of past, present, and future projects overall have and are expected to greatly enhance and maintain human resource uses along the oceanfront shoreline and within inlets. These benefits will significantly impact individual, local, county, and State entities. Other human resource uses that may be temporarily affected are expected to be maintained for future generations due to the amount of undeveloped and long-term protected North Carolina oceanfront shoreline.

Beach Resource and Associated Shorebird, Infaunal, and Sea Turtle Resources

Adding sand to the shoreline system and retaining it enhances the beachfront resource's ability to sustain itself. As explained above, oceanfront shoreline protection measures will likely continue to be implemented. These measures, by their very design, are expected to protect and maintain the physical conditions of the beach shoreline: dune, dry beach, and wet beach. The identified biological resources within these habitats, such as infaunal species, fin fish, shorebirds, nesting sea turtles, and dune vegetation, have shown to be adaptable to nourishment and renourishment projects and to the presence of the human community in the following ways:

Infaunal communities: Although oceanfront projects (beach fill and groin structures) directly increase infaunal mortality via burial, most of these shoreline activities are conducted during winter months when the biological activity is lowest and/or at the time infaunal tend to migrate offshore. The timing of these actions and the long periods

between beach renourishment events on a single stretch of beach serves to reduce the impacts and allows potential affected infaunal resources to fully recovery.

Research indicates that infaunal species populations recover within 2 to 6.5 months after completion of nourishment projects. Recovery rate is influenced by temporal and spatial recruitment parameters such as distance to adjacent populations and season of project activity (Burlas *et al*., 2001). Nelson (1985) indicates that organisms that reside in intertidal zones are more adaptable to fluctuations in their environment, including high sediment transport and turbidity levels. This supports the observation that some organisms withstand burial up to 10 cm (3.9 in). Other studies reported by Maurer (NRC, 1995) supported the burial tolerance of nearshore species, which found that these species are capable of burrowing through sand up to 40 cm (15.8 in). Rakocinski *et al.* (1996) found that the mole crab population density exhibited a pattern of initial depression after sedimentation but fully recovered in less than one (1) year after beach nourishment. Outside of emergency situations or as a result of a tropical storm, the frequency of most beach fill activities generally occur no more than one event per four years on any single stretch on beach. It is not anticipated that a single action, as with Figure Eight's proposal, or simultaneous beach nourishment actions up and down the North Carolina oceanfront will cumulatively impact infaunal resources for long durations or over a wide geospatial landscape.

Shorebird Resources: The cumulative effect of beach nourishment projects on shorebird resources is related to the species' ability to adapt to displacement or avoid disturbance associated with developed shorelines. All shorebirds considered for the purpose of this CEA, with the exception of the piping plover, are globally ranked as G4 (apparently globally secure) or G5 (globally secure).

The limited populations of the shorebirds described in the Resource Baseline Conditions section is likely attributable to being on the periphery of their global range or an inability to adapt to habitat displacement and disturbance associated with coastal development. Shorebirds utilize the oceanfront beaches for nesting, resting and feeding on the infaunal species within the wet beach, with most bird activity occurring between early April and late November. The oceanfront areas for shorebird use also include the beachfront shorelines closest to inlets. There are 15 (out of 18) designated Critical Habitat Areas for piping plover along the North Carolina coastline that encompass beachfront habitat adjacent to inlets. Out of the 15, only five inlet areas include federally maintained inlet channels that have active oceanfront beach disposal within or adjacent to Critical Habitat Areas. The beginning point for beach placement of the dredged material is a minimum 1,000 linear feet from the inlet and excludes the more heavily used areas for piping plover as well as other shorebirds. With some exceptions, this disposal boundary is generally outside the Critical Habitat area.

For oceanfront structures, 2 terminal groins and 1 jetty have been constructed within or adjacent to Critical Habitats; and 3 additional terminal groins being proposed. The existing structures have been in place for several decades, with Oregon Inlet groin being the most recent at 23 years old. As explained earlier, the installation of these structures

are for the purpose of building up the oceanfront shoreline and can be effective for protecting the targeted area. The magnitude of cumulative oceanfront impacts on bird resources are difficult to document due to impacts from other non-beach, inland related activities. On-going monitoring along the North Carolina coastline by private, local, and State entities has shown the presence of shorebirds continuing to use the oceanfront beach resources. This is occurring even with more recent beach fill activities and the presence of existing structures. Much of this can be attributed to more public awareness of the species, an expected shortened recovery time for their benthic community food source, the presence of adjacent undisturbed protected beaches, and the inclusion of beach fill moratoriums. These factors are also part of the Figure Eight proposal and if implemented, should reduce any potential cumulative impacts on shorebird resources.

Nesting Sea Turtles: The proposed project, as well as past and future nourishment/renourishment and terminal groin projects, has the cumulative effect of countering the erosive effects of more frequent intensive storms, and if occurs as predicted, the long-term impacts from sea level rise. Along the developed barrier islands in North Carolina, approximately 37% of the oceanfront properties (not including the CBRA shorelines) have been built-out containing residential and commercial structures. With the presence of these structures, it is likely that protective measures will continue to be implemented. General means of protection consist of promoting a wider beach berm and maintaining the dune system. Beaches where width is maintained or widened appear to facilitate turtle nesting. Nesting data trends reported by the Fish and Wildlife Research Institute for Florida indicate "Regression of log-transformed nest numbers show no trend in annual loggerhead nesting ($r = 0.41$)" for the period 1989 to 2005. "A regression of log-transformed nesting in combined two-year groups 1990 to 2005 reveals a significant upward nesting trend ($r = 0.97$)" for green turtle nests. "A regression of log-transformed nest numbers reveals a significant increase in leatherback nesting over the 17 years period ($r = 0.92$)" for the period 1989 to 2005 (FWRI, 2006). Preceding and during this period, Florida, where significant turtle nesting occurs, has constructed the greatest number and length of beach nourishment/renourishment projects along the Atlantic east coast and Gulf coast shorelines (Finkl *et al*., 2006 data set).

The study of the effects of beach renourishment on sea turtle nesting was examined on the 24-mile long barrier island of Bogue Banks, which has received sand frequently from beach nourishment events over the past decade. Between 2002 and 2007, there were 349 nesting activities (nests and false crawls), or an average of 58 nests per year on Bogue Banks. There were a total of 167 nests (an average of 28 per year), and all but three were laid by loggerhead sea turtles. In 2005, there were 2 leatherback nests and one green turtle nest observed on Bogue Banks. Between 1996 and 1999, prior to the implementation of the County's large scale beach nourishment project, these nesting numbers were slightly reduced. A total of 195 nesting events were documented during this period (an average of 49 nesting events) with a total of 114 successful nests (an average of 29 per year). When examining the nesting rates along nourished and unnourished beaches, results showed that there was no discernible impact of nourishment on nesting behavior or hatching success for loggerhead sea turtles (Holloman and Godfrey, 2008). For Figure Eight Island, there has been an average of 11 loggerhead sea

turtle nests along the island since 2001. During this time, at least seven nourishment events of various size and locations have occurred on the island.

Based on indications from the State of Florida where (1) significant turtle nesting occurs; (2) extensive nourishment/renourishment projects have taken place for several decades and (3) stewardship of this resource is encouraged through research, education, and volunteer activities, it appears that the cumulative effect of these activities is neutral to significantly positive. Considering the magnitude of nesting by this resource in North Carolina, the cumulative effect of similar activities is likely to be neutral or positive since turtles have appeared to adapt to man-made beach berms and their nesting habitat area will be maintained or increased through future nourishment and renourishment projects. Furthermore, dredging and fill placement activities will be conducted during winter months when sea turtle nesting does not occur. Other factors that influence successful nesting is the use of beach compatible material. With the requirements identified in State Sediment Criteria, probability of incompatible material placed on the beaches is lowered, which is expected to ensure continuation of successful nesting.

The human community must be aware of and willing to accommodate the habitat requirements of all these resources. The cumulative effects of beach nourishment and terminal groin projects are maintaining and sustaining the beach resource, creating additional area of dry beach habitat, creating the potential for dune vegetation habitat and sustaining wet beach habitat. As previously stated, although approximately 41% of North Carolina's oceanfront shoreline has been or is scheduled for nourishment, the temporal and geographic spacing of these projects is likely that adjacent un-impacted and/or recovered portions of beach will be available to support the dependent species (i.e. surf zone fish, shore birds, etc.) and facilitate recovery of individual project sites to pre-project conditions.

As depicted in Table 3, approximately 41%, or 131 miles of oceanfront shoreline in North Carolina has been or will be nourished in the foreseeable future. Relevant activities such as inlet maintenance by the U.S. Army Corps of Engineers has occurred within numerous inlets including Shallotte Inlet, Lockwood Folly Inlet, Cape Fear River, Carolina Beach Inlet, New Topsail Beach Inlet, New River Inlet, Beaufort Inlet, and Oregon Inlet. The vast majority of beach nourishment and inlet maintenance activities have occurred from the proximity of the South Carolina/North Carolina border to Cape Lookout (or central North Carolina). The spatial and temporal separation of these projects (Refer to Table 3 and Table 4) can be expected to permit recovery of beach and borrow area infaunal species. Accordingly, the magnitude and significance of the cumulative environmental consequences of the proposed Figure Eight beach nourishment project are considered to be localized, short-term, and minimal. The temporal spacing of at least five years between renourishment events for this project will allow for the recovery of these resources at the dredged area and beach fill placement locations.

Table 3. Summary of federal and non-federal beach nourishment projects in North Carolina that have recently occurred, are currently underway, or will occur in the reasonably foreseeable future. (This list is not entirely comprehensive and does not include all small scale beach fill activities (i.e. dune restoration, beach scraping, etc.). (* - federal or non-federal projects which may utilize the same borrow sources and/or overlap beach placement locations).

Federal / Non-Federal	Project	Source of Sand for Nourishment	Beachfront Nourished	Approximate Length of Shoreline (miles)	Approximate Distance From the Figure Eight Island Project Area (miles)
Federal	*Dare County Beaches, NC Bodie Island (Coastal Storm Damage Reduction)	Offshore Borrow Areas	Kitty Hawk and Nags Head Beaches	14	180
	Dare County Beaches, NC Hatteras to Ocracoke Portion	NA	Hatteras and Ocracoke Island (Hot Spots)	10	160
	Cape Lookout National Seashore -East Side of Cape Lookout Lighthouse	Channel	East Side of Cape Lookout Lighthouse	1	80
	*Beaufort Inlet Dredging - Section 933 Project (Outer Harbor)	Beaufort Inlet Outer Harbor	Indian Beach, Salter Path, and Portions of Pine Knoll Shores	7	65
	*Beaufort Inlet and Brandt Island Pumpout - Section 933 (Dredge Disposal to Eastern Bogue Banks)	Beaufort Inlet Inner Harbor and Brandt Island Pumpout	Fort Macon and Atlantic Beach	4	70
	*Bogue Banks, NC (Coastal Storm Damage Reduction)	Offshore Borrow Areas	Communities of Bogue Banks	24	65
	Surf City and North Topsail Beach - (Coastal Storm Damage Reduction)	Offshore Borrow Areas	Surf City and North Topsail Beach	10	30
	*West Onslow Beach New River Inlet (Topsail Beach) (Coastal Storm Damage Reduction)	Offshore Borrow Areas	North Topsail Beach	6	40
	Wrightsville Beach (Coastal Storm Damage Reduction)	Masonboro Inlet and Banks Channel	Wrightsville Beach	3	10
	Carolina Beach and Vicinity, NC Carolina Beach Portion (Coastal Storm Damage Reduction)	Carolina Beach Inlet	Carolina Beach	2	20
	Carolina Beach and Vicinity, NC Kure Beach Portion (Coastal Storm Damage Reduction)	Wilmington Harbor Confined Disposal Area 4 and an Offshore Borrow Area	Kure Beach	2	25

	*Brunswick County Beaches, NC - Oak Island, Caswell, and Holden Beaches (Coastal Storm Damage Reduction)	Frying Pan Shoals	Caswell Beach, Yaupon Beach, Long Beach, Holden Beach	30	40
	*Wilmington Harbor Deepening (Section 933 Project) - Sand Management Plan	Wilmington Harbor Ocean Entrance Channels	Bald Head Island, Caswell Beach, Oak Island	4	35
	*Holden Beach (Section 933 Project)	Wilmington Harbor Ocean Entrance Channels	Holden Beach	2	40
	*Oak Island Section 1135 - Sea Turtle Habitat Restoration	Upland Borrow Area - Yellow Banks	Oak Island	2	40
	Ocean Isle Beach, NC (Coastal Storm Damage Reduction)	Shallotte Inlet	Ocean Isle Beach	2	40
Non-Federal	*Town of Nags Head - Beach Nourishment Project	Offshore Borrow Areas	Nags Head	10	180
	*Emerald Isle FEMA Project	Offshore Borrow Areas - Morehead City Port Shipping Channel (ODMDS)	Emerald Isle	4	60
	*Bogue Banks FEMA Project	Offshore Borrow Areas – Morehead City Port Shipping Channel (ODMDS)	Emerald Isle (2 segments), Indian Beach, Salter Path, Pine Knoll Shores	13	65
	*Bogue Banks Restoration Project – Phase I – Pine Knoll Shores and Indian Beach Joint Restoration	Offshore Borrow Areas	Pine Knoll Shores and Indian Beach	7	65
	*Bogue Banks Restoration Project – Phase II – Eastern Emerald Isle	Offshore Borrow Areas	Indian Beach and Emerald Isle	6	60
	*Bogue Banks Restoration Project – Phase III– Bogue Inlet Channel Realignment Project	Bogue Inlet Channel	Western Emerald Isle	5	60
	*North Topsail Dune Restoration (Town of North Topsail Beach)	Upland borrow source near Town of Wallace, NC	North Topsail Beach	NA	30

	*North Topsail Beach Shoreline Protection Project	New River Inlet Realignment and Offshore Borrow Area	North Topsail Beach	11	30
	*Topsail Beach - Beach Nourishment Project	New Topsail Inlet Ebb Shoal and Offshore Borrow areas	Topsail Beach	6	20
	Figure Eight Island	Banks Channel and Nixon Channel	North & South Sections of Figure Eight Island	3	0
	Rich Inlet Management Project	Relocation of Rich Inlet	Figure Eight Island	NA	0
	Mason Inlet Relocation Project	Mason Inlet (new channel) and Mason Creek	North end of Wrightsville Beach and south end of Figure Eight Island	2	5
	Bald Head Island Creek Project	Bald Head Creek	South Beach	0.34	35
	Bald Head Island - Beach Nourishment	Offshore Borrow Area - Jay Bird Shoals	West and South Beach of Bald Head Island	4	35
	*Holden Beach East & West	Upland Borrow Source (Truck Haul)	Extension of 933 Project	3	40
	*Holden Beach East & West	Upland Borrow Source (Truck Haul)	Extension of 933 Project	3	40

Table 4. Summary of dredged material disposal activities on the ocean front beach associated with navigation dredging. Projects listed and associated disposal locations and quantities may not be all encompassing and represent an estimate of navigation disposal activities for the purposes of this cumulative impacts assessment. (* - Navigation disposal sites which may overlap with existing Federal or Non-Federal beach nourishment projects).

PROJECT		DISPOSAL LOCATION	APPROVED DISPOSAL LIMITS	ESTIMATED ACTUAL DISPOSAL LIMITS	ESTIMATED QUANTITY (CY)
Outer Banks	**Avon**	Begins at a point 1.15 miles south of Avon Harbor and extends north 3.1 miles	3.1 miles (16,368 lf)	0.4 miles or 2,000 linear feet	<50,000 every 6 yrs
	Rodanthe	Extends from rd to Rodanthe Harbor south 700' to south end of beach disposal area (straight out from existing dirt road). North end at Wildlife Refuge Boundary (PINWR)	.91 miles (4,800 lf)	0.4 miles or 2,000 linear feet	<100,000 every 6 yrs
	Ocracoke Island	Begins at a point 5,000 linear feet south of Hatteras Inlet and extends southward about 3,000 linear feet.	0.6 mile (3,000 lf)	0.4 mile or 2,000 linear feet	<100,000 every 2 to 3 years
	Rollinson (Hatteras)	Begins at a point 0.85 miles south of Hatteras Harbor and extends north 5.85 miles to a point north of Frisco, NC	5.85 miles (30,888 lf)	0.4 miles or 2,000 linear feet	<60,000 every 2 years
	Silver Lake (Teaches Hole/Ocracoke)	From a point 2,000' NE of inlet and extending approximately 2,000 linear feet (0.4 miles) to the NE (Ocracoke Island)	0.4 miles (2,000 lf)	0.4 miles or 2,000 linear feet	<50,000 every 2 yrs
	Oregon Inlet	Pea Island National Wildlife Refuge (PINWR)	3 miles(15,840 lf)	1.5 miles or 7,920 linear feet	300,000 Annually

	Drum Inlet	Core Banks. From a point 2,000 feet on either side of inlet extending for 1 mile in either direction	2 miles (10,560 lf)	1 mile or 5,280 linear feet	298,000 initial, 100,000 maint. (Assume 8 year cycle)
Beaufort	***Morehead City (Brandt Island)**	2,000 ft west of inlet, Fort Macon and Atlantic Beach to Coral Bay Club, Pine Knoll Shores	7.3 miles (38,300 lf)	5.2 miles or 27,800 linear feet	3.5 million every 8 yrs
	***AIWW Section I, Tangent B**	Pine Knoll Shores, vicinity of Coral Bay	2 miles (10,500 lf)	0.4 miles or 2,000 linear feet	<50,000 every 5 yrs
Swansboro	***AIWW Bogue Inlet Crossing Section I, Tangent-H through F**	Approx. 2,000 feet from inlet going east to Emerald Point Villas, Emerald Isle (Bogue Banks)	1mile (5,280 lf)	0.4 miles or 2,000 linear feet	<100,000 annually
Browns Inlet	**AIWW Section II, Tangents-F,G,H**	Camp Lejeune, 3,000 feet west of Browns Inlet extending westward	1.58 miles (6,000 lf)	1 mile or 5,280 linear feet	<200,000 every 2 yrs
New River Inlet	***AIWW, New River Inlet Crossing Section II, Tangents I & J, Channel to Jax. Section III, tangents 1&2**	N. Topsail Beach, 3,000 feet west of inlet extending westward to Maritime Way (Galleon Bay area)	1.5 miles (8,000 lf)	0.8 miles or 4,000 linear feet	<200,000 annually
New Topsail Inlet	***AIWW, Sect. III**	Topsail Island, Queens Grant	0.6 miles (2,500 lf)	0.6 miles or 2,500 lf	<50,000 every 6 yrs

(Hampstead)	***AIWW, Topsail Inlet Crossing & Topsail Creek**	Topsail Beach, from a point 2,000 feet north of Topsail Inlet	1 mile (5,280 lf)	0.4 mi or 2,000 ft	<75,000 annualy
Wrightsville Beach	**AIWW Sect. III,Tang 11&12 Mason Inlet Crossing**	Shell Island (north end of Wrightsville Beach from a point 2,000 feet from Mason Inlet	0.4 miles (2,000 lf)	0.4 mi. or 2,000 lf	<100,000
	***Masonboro Sand Bypassing**	At a point 9,000 feet from jetty extending southward midway of island	1.2 miles (6,000 lf)	1 mile 5,280 lf	500,000 every 4 years
Carolina Beach	**AIWW, Section IV, Tangent 1**	Southern end of Masonboro Island at a point 2,000 linear feet from Carolina Beach Inlet extending northward to Johns Bay area	1.3 miles (7,000 lf)	0.4 miles (2,000 linear feet)	<50,000 annualy
	AIWW, Section IV, Tangent 1	North end of Carolina Beach at Freeman Park			
Caswell Beach	***Caswell Beach**	Beachfront on eastern end of island	4.7 miles (25,000 lf)	4.7 miles or (25,000 linear feet)	1.1 million every 6 years
Bald Head	***Bald Head**	Beach front on eastern and western shoreline	3.0 miles (16,000 lf)	3.0 miles or 16,000 lf	1.1 million every 2 years (except every 6th when it goes to Caswell)
Holden Beach	**AIWW**	Beach front on eastern end of the shoreline			

Ocean Isle	**AIWW**	Beachfront on eastern end of the island within the vicinity of Shallotte Blvd			

Inlet Intertidal Flats and Shoals: Many Inlets along North Carolina coastline have been deepened and widened to improve navigation, and in some incidence for flushing. As previously stated, 12 of the 21inlets in North Carolina are federally authorized for maintenance to improve both recreational and commercial navigation. Maintenance operations are conducted by cutterhead plants, which are stationary, and sidecast dredges, which suction the bottom sediment and disposes it approximately 100-150 feet to the side via on deck discharge arm or pipe. Within these 12 inlets, Bogue Inlet has had its ebb tide channel realigned over 1,000 feet away, via authorized permit action for the Town of Emerald Isle; New River Inlet may have its ebb channel realigned in the near future, via authorized permit action for the Town of North Topsail Beach; and Lockwood Folly Inlet is currently being evaluated for the installation of a terminal groin structure by the Town of Holden Beach. For the remaining nine inlets, four have never been dredged and five have been dredged however not within the past 15 or more years. It is unlikely that intertidal flats or shoals will be directly impacted by federal channel maintenance. To reiterate a previous discussion, authorized federal channels are allowed to only follow the deepest part, or thalweg, of the channel. Indirect and cumulative effects by these activities to intertidal flats and shoals are less discernible for each inlet, and even more so when all inlets are considered, especially for the inlets where dredging has taken place over several decades. For more recent projects, like Bogue Inlet Ebb Channel Relocation and Mason Inlet Relocation, a slightly better affects determination could be made, but even with these projects, overall impacts were somewhat inconclusive. Through aerial habitat mapping, results showed some acreage losses occurring at Bogue Inlet during the inlet adjustment period, but leveling off around two years. It was inconclusive to how much loss was attributed to the project and how much was related to seasonal storms and the breakthrough of a side channel. During that period, Hurricane Ophelia had passed through the area and it was difficult to determine with the available information to what extent affected the habitat. For Mason Inlet, long-term monitoring results and the inclusion of mitigation has shown that the overall impact to intertidal flats and shoals were minimal.

With the five inlets containing hardened structures, only the most recent terminal groin at Oregon Inlet has included monitoring. This monitoring effort's main focus was on erosion rates for oceanfront shorelines along Bodie Island and Peas Island. Inlet intertidal flats and shoals were not part of the monitoring effort. For the proposed Figure Eight terminal groin, models do show some loss of intertidal flats and shoals on the south side of Rich Inlet while the north and west areas are expected to redevelop these habitats over a 5-year period. It appears that the influence of sediment transport around inlets, which help form and reform intertidal flats and shoals, depends largely on the size and design of the structure. Jetty structures and groins extending greater seaward distances would tend to capture more sediment and disrupt movement into the inlet gorge or throat. These structures, like Masonboro Inlet and Beaufort Inlet, were constructed for navigational purposes to keep sediment out of the inlet, thus reducing the development of inlet intertidal flats and/or shoals. Of the five inlets with hardened structures in North Carolina, only one of those includes a jetty and one a geo-tube field. However, four additional inlets, including Figure Eight proposal at Rich Inlet, could be constructed in the foreseeable future. Although it is difficult to discern the overall cumulative effects of

the current structures, with the exception of the Masonboro jetty, the potential future terminal groin structures will likely require detailed monitoring and a full assessment of any impacts to intertidal flats and shoal areas.

In assessing the inlet dredging activity and inlet structure features, impacts to fishery resources and birds using intertidal flats and shoals appear to be on a small scale, short-term, and localized. While habitat may be indirectly affected in a certain area of an inlet complex, it tends to redevelop or expand in other areas of the inlet. At this time and with the current available information, it is difficult to quantify and qualify cumulative effects on these habitats from all past, present, and potential future projects, including the Figure Eight proposal.

Water Column: It has been demonstrated that inlet dredging and beach fill activities do increase turbidity and TSS levels. These elevated levels are expected to continue with current dredging projects and any future maintenance events, including this proposed project. Many factors contribute to the levels of turbidity and TSS for each project and are the following: the type of material being dredged, type of equipment used, site location, time of dredging and beach fill, weather and tide conditions, and duration of the dredging event. Any impacts to fishery resources associated with dredge and fill work will also be depended on the factors above, especially the time of year. Many of these events, particularly beach nourishment actions, occur during the winter months when the biological activity, including fish passage and larval transport, is at their lowest or absent.

With the exception of duration, the increased levels of past, current, and future projects would not be considered outside the natural range of effects associated with high wave energy and storm events. Most turbidity and TSS levels are localized, settle to the bottom, and are generally dispersed and reduced quickly in the currents or tidal cycle.

For dredging in inlets and structure placement along inlet shorelines, tidal flows may be affected by disrupting the amount of current exchange during tidal events. Some inlets, like Masonboro Inlet, have been dramatically altered by past actions, and it can be assumed that the tidal prism has been altered. Some inlets, like Old Topsail and Madd Inlets, naturally open and close periodically as result of storm events. It is not known to what extent, if any, past and current inlet maintenance dredging has had on inlet tidal prisms. It is expected to be minimal since these events following the existing channel thalweg. In most cases, the channels refill to pre-maintenance conditions within 6 months to a year. For ebb tide channel relocation projects, reference to post construction tidal change can be made to the former Bogue Inlet Channel Relocation Project and future New River Inlet Channel Relocation Projects, which both are also federally authorized navigation channels. Both were modeled and analyzed for tidal prism changes and whether relocating the ebb tide channel within the inlets would disrupt the flows. Targeted new channel depths were -18 & -19 feet, respectively. Results from the modeling showed minimal change to the tidal prism. For Figure Eight's proposal, the tidal exchange within Rich Inlet was also modeled and analyzed. No significant changes in the tidal flow through Rich Inlet were predicted. Also, Delft3D model results indicate that the distribution of flow through Nixon Channel and Green Channel with a terminal

groin in place on the north end of Figure Eight Island was essentially the same as those for existing conditions with between 47% and 49% of the flow passing through Nixon Channel and 38% and 39% of the flow passing through Green Channel compared to 49% through Nixon and 39% through Green for existing conditions.

The magnitude and significance of any impacts to the Water Column are difficult to discern, especially for older projects. Considering all the factors stated above, it is expected that the magnitude and significance of environmental consequences associated with the more recent, current, and foreseeable future projects are considered to be neutral or unappreciable. Although turbidity and TSS levels can and have been measured, effects of those levels are considered minor due to the time of year most actions are conducted. Also as shown above, the tidal prism within the inlet Water Column will generally not be modified, and if some changes do occur, the extent of those changes are not expected to be significant.

Hardened Structures

As described in the baseline conditions of Step 7, there are nine hardened structures along the North Carolina oceanfront that have an effect on approximately 7.7 miles of shoreline. Of the nine, three are terminal groins, one is a jetty, and one is a groin field that is in proximity of the mouth of the Cape Fear River. Recent State Legislation has lifted the ban on oceanfront hardened structures by allowing four future terminal groins, which the current Figure Eight is proceeding to be one of those four. Prior to the law change, the North Carolina State Legislators mandated a study to determine the full extent of consequences on the shorelines of adjacent properties and the surrounding environment. In early 2010, the State of North Carolina explored the environmental impacts attributable to a series of five (5) terminal groins located in Florida and North Carolina within the "North Carolina Terminal Groin Study Final Report" (NCDENR, 2010). This report included a review of past scientific, engineering, and publicly accessible information and data related to the five terminal groin projects. Environmental natural resources evaluated included benthic resources, shorebirds and waterbirds, fisheries, coastal habitats and associated biota, and federally protected species, such as sea turtles and piping plovers. Amongst the conclusions drawn from the report, it stated that "the environmental effects of a terminal groin structure alone could not be assessed for the sites without considering the associated beach nourishment activity" (NCDENR, 2010).

Of the five terminal groins presented in the NCDENR report, the Oregon Inlet structure had the most comprehensive data for evaluating shoreline effects of a terminal groin structure over the longest period of time. Initial construction of the 3,125-foot long groin took place in 1989 to provide protection from erosion occurring along the base of the Herbert C. Bonner Bridge, which spans the Oregon Inlet and connects Hatteras Island to the mainland, in Dare County. Permit stipulations required regular monitoring of the physical conditions to determine shoreline changes along a six mile segment of the shoreline extending south from the terminal groin. This post-monitoring was initiated after the completion of the terminal groin in 1991. As of June 2, 2011, results have shown that the project erosion rates are much less than historical rates in the first four miles of the study area (Overton, 2011). There are sections were the rates are closer to the historical

rate; however, they do not exceed the historical rate at any point. Overton (2011) points out that the construction of the groin has not appeared to have caused adverse impacts to the shoreline over the six-mile study area. It should be noted that since 1991, a total of 4.3 million cubic yards of material from the dredging of Oregon Inlet by the USACE has been placed on the beach or immediately offshore of the beach within the study area. It is presumed that the placement of the terminal groin has help retain a net of 18.7 million cubic yards of material on the beaches within the study area (Overton, pers. comm.). In summary, as stated above, the construction of the groin does not appear to have caused an adverse impact on the shoreline over the six mile study area (Overton, pers. comm.; Overton, 2011). Also, it may be presumed that some of this decrease of erosion can be attributed to the placement of the material along this stretch of shoreline. Even though biological monitoring was not included in the Oregon Inlet study, bird monitoring was conducted at the site by the North Carolina Wildlife Resource Commission. Results showed that piping plover nesting activity increased following the construction of the terminal groin. This was most likely associated with the development of an ephemeral pool created by NCDOT at the site, which provided foraging habitat. Once much of this ephemeral pool filled in and became vegetated, the piping plover numbers returned to pre-construction levels (Cameron, pers. comm., 2007).

Three (3) potential terminal groin structures, including Figure Eight's proposal, that may be constructed in the foreseeable future are currently being evaluated for State and Federal authorization. One (1) terminal groin structure is currently being built at Bald Head Island. State law automatically requires each of these structures to be monitored and assessed to determine if significant physical impacts to the adjacent shorelines are occurring. Additionally, the State law mandates that each groin structure must be supplemented with beach nourishment, which is the case with Figure Eight's proposal. By this same law, the removal of each structure will be required if significant impacts are verified. With the long-term data from the Oregon Inlet groin study coupled with the State law requirements, cumulative impacts from Figure Eight are not anticipated and should be minimal. If not, measurements are in place to mitigate for those impacts, which again may include removal. Also, the proposed structural length of each will be much shorter than the current groin and jetty structures in place which should reduce further potential effects.

10. Modify or Add Alternatives to Avoid, Minimize, or Mitigate Significant Cumulative Effects

The private shoreline protection projects (beach nourishment, ebb tide channel relocation, and/or channel dredging) that have occurred in the last decade or are planned for the foreseeable future include avoidance and minimization strategies. These actions incorporate measures to protect the natural resources through various measures including limiting the timing of construction to the winter months when biological activity is at its lowest, improved dredge and construction methods designed to avoid or minimize environmental impacts, implementation of species conservation measures, and the use of compatible beach nourishment material. These practices, along with educating dredge operators, utilizing marine mammal and turtle observers, and modifying equipment, have

improved over the past decade or so and are expected to continue to improve as technology advances. These improvements have served to further the avoidance and minimization of adverse impacts to the natural resources found along the coastline of North Carolina. Chapter 6 of the Environmental Impact Statement describes these actions and measures in greater detail.

11. Monitor the Cumulative Effects of the Selected Alternative and Adaptive Management

As stated in Step 10, private beach nourishment projects that have recently occurred or are planned for the foreseeable future include avoidance and minimization strategies which include biological monitoring efforts. This section identifies existing monitoring programs that include surveys of significant resources within the impact area. While several potential monitoring components have been discussed for the proposed Figure Eight Island Shoreline Management Project, a monitoring plan continues to be developed as consultation with State and Federal agencies is initiated.

Human Resources and Hardened Structures

The legislation passed by the NC General Assembly in June 2011 authorizing the permitting of terminal groins at 4 inlets in North Carolina carried with it the requirement to provide a plan for managing inlet and the estuarine and ocean shorelines likely to be under the influence of the inlet. The legislation requires the management plan to include the following:

1. A monitoring plan.
2. A baseline for assessing adverse impacts and thresholds for when adverse impact must be mitigated.
3. A description of mitigation measures to address adverse impacts.
4. A plan to modify or remove the terminal groin if adverse impacts cannot be mitigated.

Chapter 6 of the EIS includes technical details of this shoreline monitoring plan.

Beach Resource and Associated Shorebird, Infaunal, Sea Turtle Resources, Intertidal Flats and Shoals, Salt Marsh and Water Column Resources

The monitoring programs described below include surveys of significant resources within the impact area.

Bird Monitoring

The North Carolina Wildlife Resource Commission and North Carolina Audubon Society (NCAS) have performed breeding surveys for colonial nesting waterbirds within proximity of the Permit Area on a regular basis since 1977. Specifically, surveys have been conducted within the northside of Mason's Inlet and the Southside of Rich Inlet, flanking Figure Eight Island (Mangiameli, pers. comm.). Surveys have also been conducted along Hutaff Island (including the northside of Rich Inlet) as well as the

southside of New Topsail Inlet, and Old Topsail Inlet. Surveys for breeding piping plovers have been conducted since 1989 at the same locations. Opportunistic surveys for non-breeding piping plovers have been conducted in more recent years. These ongoing surveys include observations from breeding and non-breeding seasons for several listed bird species as well as other shorebirds and waterbirds.

Along with the effort described above, the University of North Carolina at Wilmington (UNCW), under the direction of Dr. David Webster, conducts shorebird and colonial waterbird monitoring throughout the year along the beachfront of Figure Eight Island and the areas surrounding Mason and Rich Inlet. This monitoring is expected to continue for the foreseeable future (Webster, pers. comm.).

Seabeach Amaranth (Amaranthus pumilus)
Since 2002, UNCW has conducted regular monitoring along the entire beachfront of Figure Eight Island for the presence of seabeach amaranth. This monitoring is anticipated to continue for the foreseeable future (Webster, pers. comm.). NCAS also reports upon the occurrence of seabeach amaranth along the beachfront on Hutaff Island (Mangiameli, pers. comm., 2008).

Sea Turtles
Since 2001, sea turtle nesting activity has been monitored on a daily basis throughout the nesting season along the Figure Eight Island beachfront by UNCW under the direction of Dr. David Webster (Godfrey, pers. comm.). This monitoring begins on approximately May 1 and continues through the last hatch date each year. NCAS performs a similar monitoring effort throughout nesting season on Hutaff Island, however this monitoring is not conducted on a daily basis.

Habitat Mapping
It is anticipated that the implementation of the proposed project has the potential to impact a number of biological resources found within the inlet complex. These include resources such as submerged aquatic vegetation (SAV), shellfish habitat, salt marsh and supratidal, intertidal, and subtidal habitats. Determining the baseline conditions of these resources prior to construction is a fundamental step in quantifying changes in response to the implementation of the inlet management plan. Existing data and newly acquired data were utilized to delineate and characterize habitats and select species within the inlet complex. Data gathered from these activities provided the baseline conditions of a number of biological resources. A report, entitled “Baseline Assessment of Biological Resources” was submitted to the USACE in April 2009. The purpose of the baseline habitat mapping effort was to identify the current extent of the biological resources within the area prior to the construction of the ocean bar channel and will serve as the baseline assessment of these resources. Subsequent habitat mapping efforts will be utilized to assess the extent of change to these habitats following construction activities. This plan was developed in response to the concerns expressed by the USACE, USFWS, NMFS and the NCDENR. See Chapter 6 of the EIS for technical details of the mapping plan.

Construction Observations

Several initiatives will be undertaken by F8 HOA, the Engineer, or his duly authorized representative to monitor construction practices. Construction observation and contract administration will be periodically performed during periods of active construction. Most observations will be during daylight hours; however, random nighttime observations may be conducted. The F8 HOA, the Engineer, or his duly authorized representative will provide onsite observation by an individual with training or experience in beach nourishment and construction observation and testing, and that is knowledgeable of the project design and permit conditions. The project manager, a coastal engineer, will coordinate with the field observer. Multiple daily observations of the pumpout location will be made by the F8 HOA, the Engineer, or his duly authorized representative for QA/QC of the material being placed on the beach. Information pertaining to the quality of the material will periodically be submitted to the USACE and NC DCM for verification. If incompatible material is placed on the beach, the USACE and NC DCM will be contacted immediately to determine appropriate actions.

Material Color- The F8 HOA, the Engineer, or their duly authorized representative, will collect a representative sub-surface (6 in below grade) grab sediment sample from each 100-ft long (along the shoreline) section of the constructed beach to visually assess grain size, wet Munsell color, granular, gravel, and silt content. Each sample will be archived with the date, time, and location of the sample. Samples will be collected during beach observations. The sample will be visually compared to the acceptable sand criteria (Table 6.1). If determined necessary by the Engineer, or his duly authorized representative, quantitative assessments of the sand will be conducted for grain size, wet Munsell color, and content of gravel, granular and silt. A record of these sand evaluations will be provided within the Engineer's daily inspection reports and submitted to USACE and NC DCM for verification.

Escarpments- Visual surveys of escarpments will be made along the beach fill area immediately after completion of construction. Escarpments in the newly placed beach fill that exceed 18 inches for greater than 100 ft shall be graded to match adjacent grades on the beach. The decision for escarpment removal will be determined upon consultation with USACE and NC DCM. Removal of any escarpments during the sea turtle hatching season (May 1 through November 15) shall be coordinated with the North Carolina Wildlife Resources Commission (NCWRC), USFWS, and the USACE – Wilmington District.

Water Quality- Turbidity monitoring during construction will be managed by the contractor. The contractor will be responsible for notifying the construction engineer in the event that turbidity levels exceed the State water quality standards.

See Chapter 6 of the EIS for technical details of the construction observation plans.

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Appendix G- Economic Assessment

Potential Scope of Economic Costs and Benefits Associated with Alternative Actions Related to the Figure Eight Island Inlet and Shoreline Management Project

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1.0 Introduction

Alternative actions for the Figure Eight Island Inlet and Shoreline Management Project each create a unique array of costs and benefits. These include market costs, such as any construction or engineering costs associated with active mitigation, potential economic losses associated with upland damage to coastal real estate and infrastructure, as well as non-market costs and benefits, such as those associated with effects on the natural environment, aesthetic appeal, habitats and species.

The purpose of this section is to describe the potential scope of these values for each of the six alternative actions under consideration for the Figure Eight Island Inlet and Shoreline Management Project. We provide monetary measures for values that are readily identifiable and measurable based on existing data, such as construction and maintenance costs for the alternatives that involve nourishment or a terminal groin as well as assessed tax values of at-risk properties. These values should not be considered definitive and should not be used as the sole basis for choice or ranking of alternatives.

It is important to note that this section should not be considered a formal cost-benefit analysis. We do not attempt to monetize all aspects of the range of non-market costs and benefits that are associated with alternative actions such as those associated with aesthetics, opportunities for recreation or services provided by the natural environment. Based on results in the literature, these values are known to be substantial. However, in the absence of formal valuation efforts, their precise magnitude remains unknown. As such, the select monetary values that are provided herein should not be considered to be a representation of the true economic worth associated with the alternatives. Given the lack of formal valuation and the inherent uncertainties regarding specific performance of alternatives over a 30-year project horizon, providing an estimate of total costs, total benefits or net gains is not possible. Further, ranking of the alternatives based on their relative economic values is not possible.

In many cases, the benefits associated with alternatives that mitigate the effects of erosion can be considered costs of alternatives that do not mitigate erosion. For example, the benefits of shoreline stabilization via nourishment or hardened structures include maintaining the integrity of the Figure Eight Island shoreline and the associated real estate. These economic values may be partially or wholly sacrificed in the absence of active mitigation. Hence, the costs of no action or retreat should account for declinations in the economic value of associated real estate due to lost shoreline integrity as well as losses associated with effects on use and non-use values associated with recreation and tourism on Figure Eight Island. It is important to note that in the case of Figure Eight Island, it is likely that inaction or retreat may have the greatest effect on environmental conditions. That is, strategies that do not protect the shoreline from continued erosion are not expected to maintain environmental conditions in the study area.

Cost and benefit values described below include explicit and implicit values. Affected stakeholders include property owners, business owners, visitors, taxpayers of North Carolina and individuals who value coastal species and ecosystems and the existence of the current character of Figure Eight Island. The incidence of costs and benefits across these stakeholder groups will vary across the alternatives. As noted in Landry and Hindsley (2011), stakeholders can be expected to have different perceptions of the effectiveness of natural and man-made storm and erosion buffers and variable evaluations of beach characteristics in terms of aesthetics, recreation, and leisure. Hence, the alternative actions can be expected to convey net economic gains to some user groups and impose economic losses on others.

Explicit costs associated with alternative actions include physical construction costs associated with shoreline nourishment activities, construction of a terminal groin, and costs associated with destruction and/or removal of existing properties and infrastructure. Implicit costs include losses to the economic value to coastal property and public infrastructure associated with degradation of the character of the shoreline and proximate coastal and marine ecosystems, as well as reductions in use and non-use values associated with recreation, aesthetics and changes in the quantity and quality of habitats and species. These estimates are based on modeling of shoreline change under project alternatives provided by Tom Jarrett of Coastal Planning and Engineering, Inc.

Construction and maintenance costs detailed herein are those incurred by Figure Eight Island Home Owners Association and are based on estimates provided by Tom Jarrett of Coastal

Planning and Engineering, Inc. as part of an engineering analysis of project alternatives (Appendix B). These estimates were constructed using a 30-year time horizon beginning in year 2015. Discounting is applied to current dollar value expenditures in order to provide cost estimates in present value terms. The discount rate used in analyzing public projects should reflect the opportunity cost of public funds. Lower discount rates result in higher estimated present values for future expenditures, and cause alternatives that involve higher future expenses to appear less favorable. Likewise, higher discount rates result in lower present values for future expenditures. At the time of this writing, long-term rates on U.S. Treasury Bills were approximately 2.5 percent. Because the public is generally risk-averse with regard to spending on projects with uncertain outcomes, it can be argued that higher discount rates are more appropriate. For this analysis, the present value of future expenditures associated with the alternatives are examined using discount rates of 2.5 percent, 4.125 percent and 6 percent.

Applying a 4.125 percent discount rate is standard practice for civil works projects by the USACE; hence by using rates above and below 4.125 we provide sensitivity analysis for this important parameter. Shoreline management alternatives that include the construction of a terminal groin involve large initial costs associated with construction, but considerably lower costs associated with future beach nourishment. This future cost saving is due to smaller quantities of sand that would be placed during each episode, a decreased frequency of nourishment episodes or both. Because these alternatives involve larger up-front costs and lower future costs, they will appear more favorable when lower discount rates are employed. For the range of estimates for the present value of future expenditures associated with the project alternatives higher estimates correspond to a 2 percent discount rate and lower estimates correspond to a 6 percent discount rate.

In the case of alternatives that are projected to provide some level of shoreline stabilization relative to the status quo (i.e. Alternative Nos. 3, 4, 5C and 5D), economic benefits include the maintenance/protection or enhancement of coastal real estate, which may include values associated with residential, commercial and infrastructure assets. These values can also be interpreted as representing potential costs of Alternative 2, which involves a projection of upland losses to erosion.

To understand the relative scope of potential impacts on coastal property, we use most recent (2012) assessed tax values for at-risk properties. It is important to note that the current

assessed tax values may not be reflective of current market values. To the extent that risk of future erosion is known to market participants, market values could be considerably lower than assessed tax value. Given the dynamic nature of the shoreline in recent years and uncertainty regarding the potential for mitigating action, it seems logical that current market values for at-risk properties on Figure Eight Island, especially those protected by sandbag revetments, will have capitalized a sense of future risk. Whether or not such risks are incorporated into value assessments is unknown. More generally, changes in the real estate market that have transpired since the most recent assessment may affect market values. These changes include general market trends as well as modifications to insurance rates specific to properties in the coastal zone. While the general real estate market trend since 2012 seems upward, such enhancements are not homogenous across locations and may not be conferred upon properties at risk to erosion. Recent trends in insurance rates as part of the N.C. Beach Plan have been generally unfavorable for properties in the coastal zone. Expected or realized additional costs may decrease demand for coastal properties offsetting some of the general market improvements experienced in recent months. Moreover, it can be argued that the appropriate values to be used in understanding the possible effects of alternative shoreline management actions are the values that exist at the time of the associated environmental change. As noted above, and with the important exception of acute change due to damage from storms, anticipated changes in coastal environments are likely to be capitalized into the market value of real estate far in advance of actual change (Landry and Hindsley, 2011; Landry, 2011).

In the absence of contemporaneous sales data for at risk properties and without a formal hedonic pricing analysis for the properties in the subject area, we lack an appropriate means of determining the true market value of at-risk real estate or the changes in value that might result from changes to the shoreline. The assessed tax values of at-risk properties should therefore be used only as a means of appreciating the relative magnitude of the management alternatives, rather than the absolute value that is at risk. Even in terms of relative magnitudes, these values should be used with caution. As noted in Landry and Hindsley (2011), if active mitigation creates an expectation of improved conditions over time, value estimates should be interpreted as lower bounds on true value. If instead, conditions are expected to degrade, value estimates should be interpreted as upper bounds on true value.

It should also be noted that impending property loss due to erosion may result in some structures being demolished and some being moved further inland. We do not attempt to monetize the value of the transition losses associated with destruction or location of property, nor do we attempt to monetize the gains in value that will be realized by currently unimproved parcels that are subsequently improved when structures are relocated. While it is important to acknowledge that such effects are very likely to transpire in the case of some alternatives, forecasting the magnitude, timing and location of such transitions is beyond the scope of this report.

The direct cost to demolish a structure, as determined by CPE, was computed as $12/square foot while relocation cost were computed at $50/square foot plus $50,000 for new foundation piles, utilities, driveways, permits, etc.

To the extent that the alternatives also induce long term enhancements to beach width, volume or quality, there will be additional benefits associated with tourism, recreation and aesthetics conferred upon residents and visitors of Figure Eight Island. Stabilized shorelines may also convey additional use and non-use values associated with protecting coastal habitats and species. Such values may be conferred upon the public at large, regardless of past or present experience with the study site. Existence values, option values and bequest values (see Sub-Appendix A for discussion) may also accrue to past and potential visitors to Figure Eight Island who derive benefits from maintenance of favorable conditions at the site. Actions that involve the construction of a terminal groin (i.e. Alternatives 5C and 5D) may create economic benefits in terms of enhanced recreational fishing opportunities, though these gains may be more than offset by diminished aesthetic appeal and/or any unforeseen environmental effects produced by permanent physical alteration of the shoreline. Alternatives that maintain the existing sand bag revetments (i.e. Alternatives 1, 3, and 4) are also likely to involve loss of aesthetic appeal as well as diminished recreation value due to the physical constraints that the structures impose on beach activities, especially at high tide. However, there is a possibility the sandbags could be ordered removed by NC DCM. If implementation of Alternative 3 or 4 results in semi-permanent improvement of the shoreline, DCM could order their removal.

Alternative 2 (retreat) may produce economic benefits to a set of individuals who place economic value on unimpeded ecosystem function and change. These values are probably best described as non-use values, though some use value losses may also transpire, and can be

expected to accrue to some portion of the general public. A critical assumption with regard to these values is that baseline environmental conditions are naturally occurring, which may not be the case for Figure Eight Island given the lengthy history of shoreline protection projects. Without formal valuation studies directed at estimating these values, it is not possible to form conclusions regarding net gains or losses in economic value.

2.0 Costs and Benefits of Alternative Actions

2.1 No Action (Alternative 1)

Under the "No Action" alternative, the Figure Eight Island HOA and individual home owners would continue to respond to erosion threats through the creation or repair of damaged dunes via beach scraping and/or bulldozing, intermittent sand placement, and maintenance and/or placement of sandbag revetments. The resultant condition at the north end of Figure Eight Island can be characterized as a narrow and unstable beach profile prone to continued shoreline recession and acute episodic sand losses. There are currently 20 properties in this area that are protected by sandbag revetments, 19 of which are improved. The home that was built on the remaining property (13 Comber Rd.) was removed in 2010. The most recent (2012) assessed tax values for the improved properties (land and structure only) range from $520,300 to $1.53 million, with an average value of approximately $744,000. The one unimproved parcel is currently valued for tax purposes at $50,100. The total assessed value of all properties currently protected by sandbags is roughly $14.185 million. Detailed information on these properties is shown in Table 1. Because the sandbag revetments have been in place for over 10 years (Cleary & Jackson, 2004), it seems reasonable to assume that the current tax values for these properties includes a substantial amount of capitalized risk, though the extent to which assessed values differ from market values with regard to perceived or anticipated risk it is not known.

To model the potential conditions and impacts of this alternative, historic shoreline change rates for Alternative 2 were adjusted for beach nourishment activities at the northern end of Figure Eight Island. Shorelines of Figure Eight Island and Hutaff Island are expected to behave as in the past, which involves losses of up to 16.8 feet per year at the northern end of Figure Eight fronting the current sandbag revetments, and erratic movement with a tendency toward accretion at the southern portion of Hutaff Island.

2.1.1 Costs

The timing of when sandbags would be installed was based on when the erosion scarp would come within 20 feet of the front of the structure. Demolishing or removing the structure was assumed to occur 2 years after the installation of the sandbags. Given the current condition on the north end of Figure Eight Island in which the bar channel of Rich Inlet has assumed an alignment toward Figure Eight resulting in some shoreline accretion, the minimum amount of time that would elapse before some action would be taken was assumed to be 5 years.

Under Alternative 1, 11 homes currently protected by sandbag revetments would have to be demolished or relocated within 5 years. Another home is expected to be impacted in such a manner within 8 years. The average 2012 assessed value for these homes is approximately $590,900 and their combined assessed value is approximately $7.68 million. The remaining 7 homes currently protected by sandbags would have to be demolished or relocated within 10 to 17 years.[1] The average 2012 assessed value for these homes is approximately $.93 million and their combined assessed value is approximately $6.50 million. Assuming the main channel of Rich Inlet will assume an alignment back toward Hutaff Island within the next 5 years, this alternative is expected to affect the market value of several other properties near the north end of Figure Eight Island. Up to 5 improved parcels are projected to be threatened within 11 years (numbers 4, 5, 7, 8 and 9 Surf Court) to such an extent that the installation of sandbag revetments will be required. An additional 16 improved parcels projected to be similarly threatened within 12 to 26 years. With regard to the properties that are expected to be threatened within 11 years, most recent (2012) assessed tax values for these properties range from approximately $1.43 million to $2.82 million with an average assessed value of $219 million. The total assessed tax value of these four properties is approximately $10.97 million. With regard to the properties that are expected to be threatened to a condition requiring sandbag protection within 12 to 26 years, most recent (2012) assessed tax values for these properties range from approximately $1.41 million to $3.23 million with an average assessed value of $1.96 million. The total assessed tax value of these four properties is approximately $31.29 million. Details of these properties are shown in Table 2. It is important to note that the actual timing prior to demolition or removal may be shorter for these properties, as 5 years was the minimum value permitted for this parameter in the

modeling exercise given the current condition of the inlet and shoreline on the north end of Figure Eight Island.

We do not attempt to estimate the monetary value of the transition costs associated with the relocation or demolition and removal of existing properties. While it may seem reasonable to assume that the timing of such transition costs for each structure will be coincident with imminent acute loss to erosion, the actual timing of transition will be determined by individual property owners and may occur well in advance of impending losses. Likewise, some property owners may relocate threatened structures to other locations on Figure Eight Island while others will opt for demolition. In either case, these costs will be nontrivial, given the size and value of the properties in question and the associated difficulties with either demolition or relocation. In addition to physical costs associated with the removal and transport of materials, costs will also be associated with loss of aesthetic appeal due to noise, equipment and congestion during the transition process. These additional costs will temporarily impact specific locations, largely concentrated around the northern segment of Figure Eight Island, as individual structures are removed. Generally, these effects can be expected to persist for the duration of the landward shift of the shoreline.

As the Figure Eight Island shoreline recedes landward, a portion of the market value of threatened properties can be expected to transfer to properties currently located further inland as newly beachfront properties realize improvements in market value. However, to the extent that this alternative conveys a sense of future erosion risk to market participants, this value transfer may be limited to temporary proximity value rather than long term improvements in market value. Even with partial or complete relocation of all physical property, the loss or degradation of these parcels can be expected to have an effect on the tax base of the Island, *all else equal*.

Construction and maintenance costs associated with sand placement of this alternative are expected to total $29.04 million over a 30-year planning horizon. Assuming continued nourishment of the area north of Bridge Road with approximately 300,000 cubic yards every 3 years, the discounted present values of these expenditures are approximately $14.16 million under a 6 percent discount rate, $17.03 million using a 4.125 percent discount rate and $20.61 million using a 2.5 percent discount rate.

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The installation of sandbag revetments associated with future protection needs under this alternative will involve costs of approximately $41,500 per home or roughly $461 per linear foot of protected shoreline (Yogi Harper, owner, Erosion Control Specialist of NC Inc. personal communication, 2013). Given the nature and timing of the anticipated need for protection via sandbag revetments and assuming that sandbags are not installed until the associated coastal assets are threatened, over the 30-year planning period the discounted present value of future costs associated with the installation of sandbag revetments is approximately $1.05 million assuming a 6 percent discount rate, approximately $1.28 million using a 4.125 percent discount rate and $1.60 million using a 2.5 percent discount rate. Details of anticipated sandbag revetment installation are shown in Table 3.

Assuming that sandbag revetment permits expire after 5 years, the anticipated landward shift of the shoreline associated with Alternative 1 may also result in loss of existing subgrade infrastructure, including roadways, water lines, sewer lines, fire suppression, power and communications. If shoreline change rates continued to occur as measured between 1999 and 2007, approximately 4,275 linear feet of road, water, sewer and power lines (including portions of Comber Road, Inlet Hook Road, Surf Court and Beach Road North) will be lost over the 30 year planning period. It is reasonable to assume that a portion of the economic value associated with this infrastructure has been capitalized into the value of the properties that rely on it for support. As such, providing a separate estimate of the value of at risk infrastructure independent of the value of adjacent properties creates the possibility for double counting. Some of the infrastructure value, however, accrues to the public that uses the roads to gain access to beaches and other properties. Moreover, the at-risk infrastructure that runs below Beach Road North provides utility service that is distributed throughout other areas of the Island. Hence, relocation of the physical capital that provides these service flows may be necessary in the case of loss as predicted under this alternative. A lower bound[2] on the value of this infrastructure can be

[2] We consider such estimates a lower bound on value. First, as noted in Sub-Appendix A, the cost associated with new construction will be lower than the discounted present value of the benefits flowing from intact infrastructure over its lifetime. Second, additional costs associated with the physical removed and off-site transport of the materials that comprise the at-risk infrastructure will create additional transition costs.

provided using the replacement cost method.[3] We follow the estimation used by NCCRC (2010), and value at risk infrastructure using construction costs of $568 per foot for roads, $55 per foot for water lines and $150 per foot for sewer lines, assuming that the length of affected water and sewer lines is coincident with affected length of road.[4] Applying these values to the 4,275 linear feet of anticipated infrastructure impact under Alternative 1, and accounting for the expecting timing of impact, the discounted present value of the expected infrastructure replacement cost ranges from approximately $1.48 million assuming a 6 percent discount rate to $2.32 million assuming a 2.5 percent discount rate. This estimate does not include infrastructure associated with power and communications and does not include costs associated with land acquisition for ROW. Details of anticipated costs associated with infrastructure loss are shown in Table 4.

Continued near term losses of beach volume near the northern end of Figure Eight Island and the preventative actions taken by homeowners and the Figure Eight Island HOA will continue to have an impact on aesthetics and recreation opportunities in the area. Given that these conditions have existed for many years, the total welfare derived from recreationists under Alternative 1 might be described as status quo conditions. It is important to note that these conditions can be characterized as limited and degrading, especially during high tides, with the exception of time periods immediately following nourishment events, when conditions are relatively stable and improved. The "status quo" situation is therefore not a steady state condition, which hinders straightforward comparison. Additional potential loss of beach width and/or volume in the case of progressive sandbag revetment failure or expiration of existing permits complicates matters further; as such events would induce additional losses of recreation and aesthetic values.

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[3] As discussed in Sub-Appendix B, using the replacement cost method to estimate the value of assets that have no prospect for being replaced is counterintuitive. The economic damages associated with losing existing assets that have no potential for recovery are probably best characterized as unrecoverable sunk costs. Estimating the extent to which new infrastructure will be constructed to replace damaged roads and subgrade utilities on Figure Eight Island is beyond the scope of this report. As such, the values presented here should only be used as a proxy for the potential scope of damage.

[4] The replacement cost estimate for roads is based North Carolina Department of Transportation Construction Cost Estimates for 2008. Water and sewer construction costs are based on estimates from the Cape Fear Public Utility Authority and Wrightsville Beach public works department (NCCRC, 2011). It is not known whether acquisition, engineering, permitting costs are accounted for in the NCCRC estimation.

In terms of environmental values, active mitigation measures notwithstanding, Alternative 1 is expected to have continued (status quo) impacts on dry beach, dunes and interdunal wetland habitats. In addition to a reduction in the storm protection function of dunes, several federally and state listed species that utilize these habitats may be affected, including sea turtles and seabeach amaranth. Understanding the economic value of these changes is beyond the scope of this report, but it should be noted that use and non-use values associated with species preservation have been shown to be large, as highlighted in Sub-Appendix A.

2.1.2 Benefits

The benefits of Alternative 1 can be construed as maintenance of the current stock and flow of market and non-market goods and services, subject to multiple caveats noted above.

2.2 Retreat (Alternative 2)

The "Retreat" alternative involves no action by the Figure Eight HOA or individual property owners to slow erosion or pursue a long-term beach nourishment project or inlet channel relocation project. The timing of when property owners would either move or demolish their structures was based on the time the erosion scarp would reach a point 10 feet past the front of the structure or following the removal of existing sandbags. In this regard, existing sandbag revetments would eventually fail or be removed, at which point coastal properties at imminent risk to erosion damage would be demolished or moved to new locations. Under this alternative, shoreline recession is expected to occur at a more rapid pace, with an expected loss of 66,000 cubic yards per year along the 12,500 feet of Figure Eight Island situated between Bridge Road and Rich Inlet based on the 5-year simulation period. Specifically, the volume changes include 18,000 cubic yards/year of accretion between stations F90+00 and 60+00 and a loss of 84,000 cubic yards/year between stations 60+00 and 105+00. Dune habitat losses are expected in the northern segment (See Table 5.2). In contrast to losses of beach volume and width along the northern reaches of Figure Eight Island, the southern portion of Hutaff Island is expected to accrete at a rate of 53,000 cubic yards per year.

2.2.1 Costs

Excluding transition costs associated with relocation of structures and infrastructure (discussed below), construction and maintenance costs associated with this alternative are expected to be negligible, as there will be no active mitigation by the Figure Eight Island HOA or individual homeowners. Near term costs associated with removal of the sandbag revetments are expected to be nominal.

The expected reconfiguration of Figure Eight Island's northern shorefront associated with this alternative involves a shift landward, with upland impacts on existing properties and infrastructure. Specifically, assuming current rates of erosion, twenty-one (21) oceanfront homes (located on Surf Court, Comber Road, and Inlet Hook Road) would have to be demolished or moved within five (5) years. The current (2012) assessed tax values for these properties range from approximately $520,000 to $2.83 million, with an average value of $0.994 million and a total value of approximately $20.88 million.

An additional nine (8) homes (located on Beach Road North immediately south of Surf Court) will be threatened within the next eleven (11) to fifteen (15) years and eight (8) homes (located on Beach Road North) are expected to be threatened within 25 years. The current (2012) assessed tax values for these properties range from approximately $1.41 million to $3.23 million. The average value of these 16 homes is approximately $1.96 million and their combined value is roughly $29.84 million. Details of these properties are shown in Table 2.

As noted in Landry (2011), as the market capitalizes the expectation of continued shoreline erosion into the value of these properties, market values may be driven toward zero. Inland relocation of structures may offset some of these losses but will involve transition costs. Again, it is reasonable to expect that a portion of the lost market value will transfer to properties currently located further inland. However, a strategy of retreat is likely to convey an expectation of risk from future erosion losses to shoreline properties. Newly beachfront properties might reasonably be considered newly at-risk properties. The market capitalization of this additional risk may offset gains in amenity value. While proximity benefits associated with recreation and aesthetics will likely accrue to some property owners in the near term, it seems unlikely that such values will be capitalized into market values due to long term uncertainty and risk of future losses.

As with Alternative 1, we do not attempt to estimate the monetary value of the transition costs associated with the relocation or demolition and removal of existing properties as the

timing and nature of the transition will be determined by individual property owners and may occur in advance of imminent loss. In addition to physical transition costs, this alternative can be expected to generate loss of aesthetic appeal due to noise, equipment and congestion during the transition process, which can be expected to persist for the duration of the landward shift of the shoreline.

As with Alternative 1, the landward shift of the Figure Eight Island shoreline associated with Alternative 2 will result in loss of existing Island subgrade infrastructure, including roadways, water lines, sewer lines, fire suppression, power and communications. Resumption of shoreline change rates observed between 1999 and 2007 suggests that approximately 6,105 linear feet of road, water, sewer and power lines will be lost. It is reasonable to assume that a portion of the economic value associated with this infrastructure has been capitalized into the value of the properties that rely on it for support. Some of the infrastructure value, however, accrues to the public that uses the roads to gain access to beaches and other properties. Moreover, the at-risk infrastructure that runs below Beach Road North provides utility service that is distributed throughout other areas of the Island. Hence, relocation of the physical capital that provides these service flows will be necessary in the case of loss as predicted under this alternative. Applying the replacement cost values detailed in the description of losses associated with Alternative 1 above to the anticipated timing of infrastructure impact under Alternative 2 suggests a discounted present value of total replacement costs ranging from approximately $1.91 million using a 6 percent discount rate to $3.11 million using a 2.5 percent discount rate. This estimate does not include infrastructure associated with power and communications and does not include costs associated with land acquisition for ROW. Details of anticipated costs associated with infrastructure loss are shown in Table 5.

As a result of the extent of shoreline recession and deflation associated with this alternative, effects on natural habitats are expected. These include effects on inlet dunes, oceanfront dunes, intertidal flats and dry beach. Existing oceanfront dune habitat in the area from Surf Court north to Rich Inlet is expected to be impacted. Because this area is currently covered by sandbag revetments, change from existing degraded conditions may be considered marginal. It is important to again note that this area of dune habitat is not expected to naturally relocate or regenerate in the near term under this alternative. In addition to delayed regeneration

of dune habitat function, the protection service provided by dunes will also be delayed under Alternative 2.

In addition to receding shorelines in the area adjacent to existing properties, Delft3D model simulations indicate that the spit area projecting off the north end of Figure Eight Island into Rich Inlet would be eroded and converted to a submerged sand flat by the end of the 5-year simulation period. This loss of accessible beach area may have an effect on recreation on the northernmost segment of Figure Eight Island.

Market losses expected under this alternative include land loss, capital (structure) loss, proximity loss, and transition loss affecting privately held real estate as well as reduction of the municipal tax base. Non-market losses include the use and non-use values associated with affected species and habitats, non-use value losses to those who hold the existence of Figure Eight Island in high regard, as well as declinations in aesthetic appeal and recreation opportunities to residents and visitors.

2.2.2 Benefits

The retreat alternative can be construed as the alternative where "natural processes" are permitted to continue unimpeded by human activity or intervention. As noted in Judge, Osborne and Smith (1995), some individuals have preference for non-intervention approaches that allow unimpeded erosion to take place. These individuals may derive real economic value from the existence of unfettered coastal ecosystems. As noted above, a critical assumption with regard to these values is that baseline environmental conditions are naturally occurring. This assumption seems unlikely in this case, given the modified conditions of the study area that have resulted from long-term maintenance of the northern section of the Figure Eight shoreline and adjacent channel. Without a thorough (non-market) valuation study directed at understanding the scope and magnitude of these benefits it is difficult to characterize their nature or extent. We do note that in a sample of North Carolina beachgoers, Whitehead et al. (2008) found that a majority of respondents favored beach nourishment as a means of maintaining beach width, and 18 percent felt that beach width should not be altered by people.

Under this alternative, the southern portion of Hutaff Island is predicted to accrete at a rate potentially in excess of 53,000 cubic yards per year. This additional beach volume and width may provide additional recreational benefits to boaters who utilize the area. Because this

alternative involves the removal of existing sandbag revetments, improved aesthetic appeal as well as enhanced recreation value may also be generated on Figure Eight Island after transition losses to coastal properties have run their course and the shoreline has returned to a natural state. However, it is unknown whether removal of the aesthetic disamenity and physical constraints associated with the sandbag revetments will be offset by losses associated with reduced beach width.

2.3 Rich Inlet Management with Beach Fill (Alternative 3)

Alternative 3 entails relocation of the main bar (entrance) channel of Rich Inlet from its current location immediately adjacent to the south end of Hutaff Island to a position closer to the north end of Figure Eight Island and perpendicular to the adjacent shorelines. The relocation of the main channel would be accompanied by the creation of two new channels connecting the main ebb channel with Nixon Channel and Green Channel as described in Chapter 3 and shown in Figure 3.2. Material removed for channel relocation and construction would be used to construct a closure dike across the existing ebb channel, provide beach fill along 1,400 feet of the Nixon Channel shoreline on the backside of Figure Eight Island just south of Rich Inlet, and nourish 12,500 feet of ocean shoreline extending from Rich Inlet south to Bridge Road. The purpose of the closure dike would be to concentrate most of the tidal flow through the new channel. This alternative also involves periodic entrance channel dredging and beach nourishment, projected to take place every five years.

Delft3D model simulations of the associated effects over a 5-year period suggest that Over the southern 8,000 feet of the fill (stations F90+00 to 60+00) almost 98% of the initial fill volume remained at the end of the 5-year simulation as losses were shown to be only 2,000 cubic yards/year (Table 5.4). For the area between stations 60+00 and 105+00, losses were shown to be 99,000 cubic yards/year. At the end of the 5-year simulation, 24.5% of the fill remained in this beach segment. Approximately 43% of the fill remained in this area after 4 years but with the migration of the channel back to a position closer to Hutaff Island indicated by the model results between years 4 and 5 of the simulation, erosion of the fill accelerated.

Delft3D model results for this alternative also suggest growth of the sand spit off the north end of Figure Eight Island, toward Rich Inlet. The new bar channel is expected to experience shoaling of up to 60 percent and migrate toward the southwest with notable build-up

of the ebb tide delta off the north end of Figure Eight Island within the first four years. The bar channel is expected to migrate back toward Hutaff Island by the fifth year, which suggests that bar channel dredging will be required every five years. As a result of the shifting location of the ebb tide delta, the model indicated that the south end of Hutaff Island would experience a net loss in volume.

Within the first two years of the project, the constructed sand dike is projected to erode and evolve into a sand spit projecting off the south end of Hutaff Island, the majority of which will become sub tidal. Shoaling of the Green Channel connector is expected to be associated with this erosion, but is anticipated to stabilize by the third year. The Nixon Channel connector is also expected to experience shoaling, especially during the first year of the project, with relative stabilization following in subsequent years. Subsequent maintenance of Nixon and Green Channel connectors is not projected to be necessary unless future monitoring surveys find that maintenance is required to restore flow volumes or divert flow from eroding shorelines.

2.3.1 Costs

Alternative No. 3 is expected to involve initial (first year) construction costs totaling $17.25 million, which includes roughly $13.19 million associated with channel dredging and beach fill activities $3.79million associated with dike construction. Channel dredging and beach nourishment activities are expected to involve $7.705 million in costs every five years, or $63.50 million over a 30-year planning horizon. The discounted present value of these dredging and beach nourishment costs is approximately $36.06 million assuming a 6 percent discount rate, $41.42 million assuming a 4.125 percent discount rate and $47.93 million using a 2.5% discount rate.

Public recreational values will be affected under this alternative to the extent that the activities associated with channel relocation and maintenance physically impede and diminish the aesthetic appeal of the channel area and southern end of Hutaff Island. These effects can be expected to be temporary, occurring during the period channel maintenance. Recreation opportunities are also expected to be similarly impacted on the northern end of Figure Eight Island. Associated impacts should be expected for approximately two and a half months in year one and for similar durations during dredging and nourishment events every subsequent five years. The net loss of beach volume on the southern end of Hutaff Island is also expected to

negatively impact beach recreation by boaters who utilize in the area, though these costs may be offset by improved channel navigation through and around area inlets.

Dredging associated with obtaining sand for nourishment events may result in effects on habitats as well as direct mortality to benthic species at the borrow site. These effects may result in economic losses associated with diminished use and non-use values and may have effects on ecosystem service values in terms of provisioning and regulating services provided by the affected species and habitats.

2.3.2 Benefits

The principle benefit of Alternative 3 is the stabilization of the northern sections of the Figure Eight Island shoreline. Such stabilization is expected to confer benefits in the form of improved property values in the immediate vicinity. Improvements in property values can be expected for properties that would otherwise be imminently threatened. The Figure Eight Island tax base should improve as a result. We do not attempt to monetize the magnitude of these effects.

The reduced frequency of nourishment required under this alternative is expected to result in less frequent environmental disturbance at dredge sites and nourishment sites. Estimating the economic value of associated impacts on commercial and recreational fisheries, ecosystem services or non-use values is beyond the scope of this report. Improved navigation through and around area channels may also confer benefits on commercial and recreational boaters as dredging activities are projected to allow for wider and deeper navigation channels relative to current conditions. These benefits are likely to be most apparent in Nixon and Green Channels after the initial shoaling subsides and the character of these channels is relatively stable and predictable. Improved boating conditions in the entrance channel are likely to be most apparent in years immediately following its maintenance (i.e. years 1, 5, 10, etc.).

2.4 Beach Nourishment without Inlet Management (Alternative 4)

Alternative 4 involves the placement of fill material along the oceanfront and Nixon Channel shorelines. Because this alternative does not include accompanying inlet management measures, other borrow sites will be used as beach fill sources. Due to high rates of projected loss of fill particularly in the area between stations 80+00 and 105+00, the beach fill design for

Alternative 4 includes periodic nourishment of 788,000 cubic yards that would occur every 4 years.

Potential borrow sources for this alternative include a previously permitted site in Nixon Channel (with an estimated minimum of 400,000 cubic yards available for initial construction and subsequent periodic nourishment), three sources located between 3 and 4 miles directly offshore of Figure Eight Island and three upland dredged material disposal sites located adjacent to the AIWW behind Figure Eight Island near the confluence of Nixon Channel with the AIWW. The relatively high rate of periodic nourishment required under this alternative would necessitate the continued use of the offshore borrow sites as shoaling of the previously permitted area in Nixon Channel would not satisfy periodic beach nourishment requirements under Alternative 4. The AIWW disposal sites contain substantially less fill material and would be used only for periodic nourishment in emergency situations such as following coastal storms. These upland sites could also be used if the volume of material available from the previously permitted area within Nixon Channel is insufficient.

The Alternative 4 beach fill performed better compared to Alternative 3 between F90 and 60, actually gaining 58% more material than was initially placed. However, between stations 60+00 and 105+00, the Alternative 4 fill performed poorly losing essentially all of the fill placed in this segment by the end of year 4 of the simulation. The difference of the performance of the fills between Alternatives 3 and 4 in the area from station 60+00 to 105+00 can be attributed to the changes in the configuration of the ebb tide delta induced by the repositioned channel associated with Alternative 3. In this regard, the model indicated changes in Rich Inlet under Alternative 4 were very similar to the model results for Alternative 2 hence the shoreline responses on both Figure Eight Island south of station 60+00 and on Hutaff Island for Alternative 4 were also similar to Alternative 2.

The simulated performance of the fill between 60+00 and 105+00 mimics what has been observed following 6 pervious beach nourishment attempts on the north end of Figure Eight Island since 1993-94, some of which are documented by Dr. Cleary in Sub-Appendix A of Appendix B. While the 6 previous beach fills were relatively small (less than 300,000 cy) compared to the beach fill volume simulated for Alternative 4, all of the fill material included in these 6 beach fills was lost from the area fronting the sandbag revetments within a matter of months following placement.

Given the loss of all of the fill material between stations 60+00 and 105+00 by the end of year 4, periodic nourishment under Alternative 4 would need to be accomplished every 4 years in order to prevent encroachment into the pre-nourished beach profile.

Because this alternative does not involve modifications to Rich Inlet or the connecting channels, the south end of Hutaff Island is expected to accrete at a rate comparable to existing conditions (i.e. roughly 86,000 cubic yards per year on average).

2.4.1 Costs

Costs associated with this alternative pertain to construction and maintenance of periodic beach nourishment, risk to property owners associated with unstable shorelines, loss of recreation opportunities due to beach erosion and environmental impacts caused by dredging activities at offshore and channel borrow sites.

Alternative 4 is expected to involve initial construction cost of $13.69 million associated with beach nourishment and disposal along Nixon channel and the northern ocean front of sections of Figure Eight Island, $1.0 million for geotechnical investigations and permitting offshore borrow area, and additional costs of approximately $10.94 million associated with nourishment that will be incurred every four years. Total costs are therefore approximately $90.30 million for the 30-year planning horizon. The discounted present value of the total costs associated with this alternative is $47.21 million, $55.92 million and $66.28 million using discount rates of 6 percent, 4.125 percent and 2.5 percent respectively.

A strategy involving nourishment without channel maintenance is likely to convey an expectation of additional future risk of loss from erosion. To the extent that projected future shoreline erosion is anticipated by market participants, the near term market value of properties on the northern segments of Figure Eight Island is likely to be affected. This is especially true for properties north of station 80+00, which are expected to experience reduced beach width and volume within two years after nourishment events. Because erosion of shorelines adjacent to these properties is not expected to be of sufficient magnitude to necessitate destruction or relocation of these homes, it is not anticipated that any of the lost market value will transfer to properties located further inland. Indeed, the lack of a perceived long-term strategy to control

erosion on the northern end of Figure Eight Island may confer risk on properties that are not threatened in the short term.

Beyond direct effects to the market value of shoreline real estate, the loss of fill in the years subsequent to nourishment events is also expected to have an impact on recreation opportunities and aesthetics on the northern sections of Figure Eight Island. The sand spit on the north end of Figure Eight Island is expected to disappear and be converted into a submerged sand flat prior to the next scheduled nourishment event. Monetizing the timing and extent of the associated losses in economic value is beyond the scope of this report, and would require appraisal via non-market valuation methods such as the travel cost method and/or hedonics (Sub-Appendix A has more information on these methods as well as estimates of their potential economic value in other locations).

Public recreational values will also be affected under this alternative to the extent that the activities associated with beach nourishment activities physically impede and diminish the aesthetic appeal of the north Figure Eight area and southern end of Hutaff Island. Associated impacts should be expected for approximately two and a half months in year one and for similar durations during dredging and nourishment events every subsequent three years.

In terms of costs associated with impacts on natural habitats, this alternative is expected to affect dry beach, wet beach, dunes and soft bottom habitats. In addition to the potential reduction in the storm protection function of dunes, several federally and state listed species that utilize these habitats may be affected, including sea turtles and seabeach amaranth. The frequency of nourishment events necessitated by this alternative is expected to have additional effects at nourishment borrow sites. These effects are likely to reduce economic values associated with direct and indirect uses as well as non-use values associated with these species and habitats. Dredging associated with obtaining sand for nourishment events may result in habitat effects as well as direct mortality to benthic species at the offshore borrow sites. These effects may result in economic losses associated with diminished use and non-use values and may have effects on ecosystem service values in terms of provisioning and regulating services provided by the affected species and habitats. Understanding the economic value of these changes is beyond the scope of this report, but it should be noted that use and non-use values associated with species preservation have been shown to be large, as highlighted in Sub-Appendix A.

2.4.2 Benefits

The principle benefit of Alternative 4 is the stabilization of the northern sections of the Figure Eight Island shoreline, as well as continued accretion on the southern portion of Hutaff Island. Such stabilization is expected to confer benefits in the form of improved property values in the immediate vicinity. Improvements in property values can be expected for properties that would otherwise be imminently threatened. The Figure Eight Island tax base should improve, however we do not attempt to monetize the magnitude of these effects.

Under this alternative, the southern portion of Hutaff Island is predicted to continue to accrete as under existing conditions. This additional beach volume and width may provide additional recreational benefits to boaters who utilize the area via reduced crowding effects and/or ease of access to Hutaff Island.

2.5 Modified Terminal Groin (more northerly position) with Beach Fill from Maintenance of the Nixon Channel Navigation Channel and Connector Channel (Alternative 5C)

Alternative 5C includes a 1,300-foot long terminal groin, 305 feet of which would extend seaward of the 2007 mean high water shoreline, constructed at the extreme north end of Figure Eight Island. The terminal groin would include a 995-foot shore anchorage section. The purpose of the seaward section of the terminal groin is to stabilize the shoreline immediately south of Rich Inlet by reorienting it to an alignment comparable to the shoreline further south. The purpose of the anchorage section is to protect against flanking of water around the landward "dry" end of the terminal groin. This alternative also involves the construction of a 600 foot wide channel connector between the previously permitted area within Nixon Channel with the inlet gorge, which should serve to concentrate flows away from the eroding portion of the Nixon Channel shoreline. This construction would involve the excavation of 1,077,100 cubic yards of material, including 375,200 cubic yards from the previously permitted area in Nixon Channel and 701,900 cubic yards excavated to construct the connector.

Under this alternative, nourishment of the oceanfront side of Figure Eight Island and the Nixon Channel shorefront would take place every five years, with material derived from maintenance of the previously permitted area in Nixon Channel and the new channel connecting Nixon Channel to the inlet gorge. Assuming maintenance of the previously permitted area in

Nixon Channel and the proposed connecting channel every five years, the nourishment requirements would be 495,000 cubic yards, with 465,000 cubic yards for the ocean shoreline and 30,000 cubic yards for the Nixon Channel fill area. It is expected that maintenance of the channels in Nixon Channel will provide sufficient fill to satisfy periodic beach nourishment requirements for this alternative. Indeed, the beach fill design associated with Alternative 5C was based on the optimal utilization of the material removed to construct the new channel connector from the inlet gorge into Nixon Channel, rather than the beach fill volume needed to protect against shoreline erosion.

Analysis of the Delft3D model results for Alternative 5C suggest that the initial beach fill may be excessive, particularly along the segment of the oceanfront shoreline south of station 80+00. Delft3D model five-year simulation results for this alternative also suggest a steady rate of shoaling in the previously permitted area of Nixon Channel. Rapid shoaling of the proposed channel connector is predicted over the first two years, with moderation of the rate of shoaling between years 3 and 4. Simulation results suggest that the Rich Inlet ocean bar channel is expected to migrate toward Hutaff Island. The south end of Hutaff Island is expected to elongate. A portion of the sand spit projecting off the north end of Figure Eight Island is also expected to erode and convert to a submerged sand flat within five years. The northernmost 1,500 feet of the sand fillet south of the terminal groin is expected to experience initial losses and stabilize by the end of year 5. The shoreline area immediately south of the terminal groin is expected to be characterized by a seaward bulge of dry sand beach that is expected to provide a wide and stable protective beach on the northern section of Figure Eight Island.

With regard to individual beach segments, the beach area between F90+00 and 60+00 is expected to accrete and would not require periodic nourishment. Volume losses averaging 93,000 cubic yards per year are indicated between stations 60+00 and 105+00.

2.5.1 Costs

Initial (first year) costs associated with Alternative 5C are expected to total approximately $13.03 million, which includes $9.62 million for channel dredging and nourishment of the ocean and Nixon Channel shorefronts and $3.41 million for construction of the terminal groin. This latter cost estimate includes expenses associated with engineering and design and construction oversight. Additional costs associated with channel maintenance and

nourishment activities are expected to be approximately $5.16 million every five years. Maintenance of the terminal groin would average $15,000 per year. Over a 30 year planning horizon, construction and maintenance costs associated with Alternative 5C are expected to total approximately $44.43 million. The discounted present values of these costs are $25.63 million using a 6 percent discount rate, $29.22 million using a 4.125 percent discount rate and $33.58 million using a 2.5 percent discount rate.

4.5 The initial construction of Alternative 5C is expected to take approximately 6 to 6.5 months. Construction of the terminal groin would require about 2 to 3 months, however, removal the material from Nixon Channel and the new channel connector and distributing the material along the Nixon Channel shoreline and the ocean shoreline would require about 4 months. In this regard, construction of portions of the terminal groin could occur concurrently with the dredging operation.

Construction activities are expected to take place on existing dry sand beaches and near shore waters for the former of these two periods. During construction of the structure, reduced recreation value and aesthetic appeal on the northern segments of Figure Eight Island is anticipated due to the presence of construction equipment and associated noise and disruption. To the extent that the terminal structure itself may be viewed as aesthetically lacking, properties with views of the associated area may have reduced amenity value. In the case of Figure Eight Island, it seems logical that an aesthetically lacking but stable shoreline will be seen as preferable relative to an unstable shoreline. Further, to the extent that the structure serves to attract recreationists (i.e. fishers) or inhibits movement along the shoreline, property owners in the vicinity may suffer economic losses due to inconvenience, crowding and reduced aesthetic appeal. Shoreward-facing visual impacts should also be anticipated.

Construction of the terminal groin and accompanying nourishment has the potential to create short-term and long-term impacts on the natural environment, including effects caused by dredging, sediment transfer, physical contact, physical barriers and placement of material (NCCRC, 2010). Negative effects are to be expected for some species and habitats, while other species and habitats may be promoted or restored. Negative impacts will include those induced by volumetric losses to beaches north of the structure and benthic habitat losses in the footprint of the structure and from the introduction of rocky bottom material (NCCRC, 2010). Disturbance

to the nesting habitat of sea turtles may result during construction of the groin. Groin Installation is also expected to temporarily influence the behavior of foraging birds, including federally and state-listed species. Dredging associated with obtaining sand for nourishment events may result in habitat effects as well as direct mortality to benthic species at the borrow sites. These effects may result in economic losses associated with diminished use and non-use values as well as ecosystem service values.

The use of a hardened structure to mitigate erosion will confer economic losses on the segment of the population that values unfettered ecosystem function. Even if harmful effects on proximate or adjacent coastlines are never realized, it is safe to conclude that some people may remain opposed to the use of hardened structures for shoreline erosion control. In the case of the proposed terminal groin on Figure Eight Island, such sentiments may be partially mitigated by the understanding that the projected need to engage in beach nourishment will be reduced, resulting in fewer of the environmental consequences associated with dredging and sand placement in general.

With regard to potential effects on proximate shorelines, it is important to note that while such effects are suggested as possible by NCCRC (2010), their analysis of terminal groins in North Carolina found that shorelines on the side of the inlet opposite a terminal groin did not display a clear trend (i.e. mixed accretion and erosion) after construction of the terminal groin. Shorelines on the structure side of the inlet were found to be generally accreting. Delft3D model results do not support the notion that the adjacent Figure Eight or Hutaff Island shorelines would be negatively impacted in the case of the proposed Figure Eight Island terminal groin. Model results indicate that reorienting and stabilizing the shoreline on the north end of the island with the proposed terminal groin would reduce erosion rates south of station 60+00 to Bridge Road obviating the need for beach nourishment for this area in the near future. Model results also indicate that the south end of Hutaff Island could experience some erosion under Alternative 5C.

In the event of unanticipated negative impacts to the coastal and marine environment, removal of the groin structure may be necessary. Initial estimates for the physical costs associated with groin removal are $2.0 million. In this event, additional costs will include reduced recreation, diminished aesthetic appeal and habitat disturbance during the removal process. It should be noted that 100 percent removal of the proposed rock structure may not be feasible given the nature of the marine environment and substrate (NCCRC, 2010).

2.5.2 Benefits

As noted in NCCRC (2010) the use of a terminal groin in concert with a shoreline protection plan may provide a host of benefits, including long-term infrastructure protection, enhanced beach width and volume, and enhanced recreation opportunities for the public. The principle benefit associated with Alternative 5C is the anticipated stability and reduced erosion potential along the ocean and Nixon Channel shorelines located on the northern sections of Figure Eight Island.

To the extent that the public views the terminal structure as reducing the risk of future erosion, this added stability should serve to enhance property values along these stretches of Figure Eight Island. We do not attempt to estimate the magnitude of these benefits, but based on the associated literature it is reasonable to expect that properties as far as 300 meters inland from the shoreline will realize improvements in market value. Associated benefits are likely to include increased rental revenues (when applicable) and higher municipal tax revenues.

As noted in Parsons and Powell (2001), active mitigation efforts such as beach armoring may also serve to encourage additional use and/or development. Such additional development can reasonably be anticipated in the case of the 93 undeveloped residential lots on the island, especially the 31 lots that are oceanfront. Provided that such development does not compromise the integrity and value of the adjacent beaches, it is expected to generate additional economic impacts in the form of increased municipal tax revenues as well as temporary construction employment and spending.

The terminal groin may create enhanced recreation values as a result of (predicted) gains in beach width and stability on the northern stretches of Figure Eight Island as well as the creation of rocky bottom area that may increase species diversity and enhance the quality of recreational fishing near the structure. Because dune and beach habitats in the project area will not be subject to loss from erosion, indirect and non-use values may also be created, enhanced or preserved. In particular, the more stable dry beach habitat southward of the groin would be expected to create conditions considered more favorable for sea turtle nesting (footprint of the structure notwithstanding). It is important to note that the effects on the proposed terminal groin on the approach of nesting female turtles or the egress (or predation) of hatchlings are unknown at this time.

2.6 Terminal Groin at a More Northerly Location with Beach Fill from the Previously Permitted Area in Nixon Channel and Other Sources (Alternative 5D)

Alternative 5D also includes the same beach fill along the Nixon Channel as Alternative 5C but would provide a much smaller beach fill along the ocean shoreline. In this regard, the ocean shoreline beach fill for Alternative 5D would begin at the terminal groin and extend south to station 60+00, effectively filling the area generally referred to as the accretion fillet. Based on the modeled shoreline behavior for Alternative 5C as well as the fill performance associated with Alternatives 3 and 4, no initial beach fill would be needed south of station 60+00 to Bridge Road. However, this area would be included in the shoreline monitoring program and could be nourished in the future should conditions warrant.

Based on the results of the Delft3D simulation of Alternative 5D, between Years 4 and 5 of the simulation, essentially all of the fill out to the depth of closure (-24 feet NAVD) would be lost and would need to be nourished. A closer inspection of the fill performance, however, found 27.5% of the fill placed above the -6-foot NAVD contour remained on the beach after 5 years. That is, the terminal groin appeared to be effective in retaining the fill placed on the upper portions of the beach profile. The fill retained above -6 feet NAVD would continue to prevent encroachment into the pre-nourished upland areas in this segment. Under this alternative it is expected that the most of the sand spit on the north end of Figure Eight Island would be converted to a submerged sand flat within 5 years. The southern portion of Hutaff Island is expected to accrete in a manner similar to Alternative 2.

2.6.1 Costs

Initial (first year) costs associated with Alternative 5D are expected to total approximately $7.44 million, which includes approximately $2.88 million for channel dredging and nourishment of the ocean and Nixon Channel shorefronts and $4.56 million for construction of the terminal groin. This latter cost estimate includes expenses associated with engineering and design and construction oversight. Additional costs associated with channel maintenance and nourishment activities are expected to be approximately $2.99 million every five years. Over a 30 year planning horizon, construction and maintenance costs associated with Alternative 5D are expected to total approximately $26.07 million. The discounted present values of these costs are

$14.73 million using a 6 percent discount rate, $16.80 million using a 4.125 percent discount rate and $19.33 million using a 2.5 percent discount rate.

The construction associated with Alternative 5D is expected to take approximately 4 to 5 months, with 2 months required for construction of the shore anchorage section and an additional 4 months for the construction of the rubblemound section. Reduced recreation value and aesthetic appeal is anticipated on the northern segments of Figure Eight Island during this period. Properties with views of the associated area may have reduced amenity value relative to that which would exist with a natural and stable shoreline to the extent that the terminal structure itself may be viewed as aesthetically lacking. In the case of Figure Eight Island, it seems logical that an aesthetically lacking but stable shoreline will be seen as highly preferable relative to status quo conditions. Crowding around the structure associated with recreational fishing may impose economic costs on property owners in the vicinity. Shoreward-facing visual impacts should also be anticipated.

Environmental impacts of this alternative are expected to include those caused by dredging, sediment transfer, physical contact, physical barriers and placement of material (NCCRC, 2010). Negative effects are to be expected for some species and habitats, while other species and habitats may be promoted or restored. Impacts will include those induced by volumetric losses to beaches north of the structure and benthic habitat losses in the footprint of the structure and from the introduction of rocky bottom material (NCCRC, 2010). Disturbance to the nesting habitat of sea turtles may result during construction of the groin. Groin installation is also expected to temporarily influence the behavior of foraging birds, including federally and state-listed species. Dredging associated with obtaining sand for nourishment events may result in habitat effects as well as direct mortality to benthic species at the borrow site. These effects may result in economic losses associated with diminished use and non-use values.

The use of a hardened structure to mitigate erosion may confer economic losses on the segment of the population that values unfettered ecosystem function. Even if harmful effects on proximate or adjacent coastlines are never realized, it is safe to conclude that some people may remain opposed to the use of hardened structures for shoreline erosion control. In the case of the proposed terminal groin on Figure Eight Island, such sentiments may be partially mitigated by the understanding that the projected need to engage in beach nourishment will be reduced,

resulting in fewer of the environmental consequences associated with dredging and sand placement in general.

If unanticipated impacts to the coastal and marine environment necessitate groin removal, physical costs will total approximately $3.2 million. Additional temporary costs due to reduced recreation and aesthetic appeal should also be anticipated.

2.6.2 Benefits

The use of a terminal groin coupled with a shoreline nourishment plan is expected to provide long-term infrastructure protection, enhanced beach width and volume, enhanced recreation opportunities, and increased tax revenues. The principle benefit associated with Alternative 5D is the anticipated stability and reduced erosion potential along the ocean and Nixon Channel shorelines located on the northern sections of Figure Eight Island.

To the extent that the public views the terminal structure as reducing the risk of future erosion, this added stability should serve to enhance property values along these stretches of Figure Eight Island. We do not attempt to estimate the magnitude of these benefits, but based on the associated literature it is reasonable to expect that properties as far as 300 meters inland from the shoreline will realize improvements in market value. Associated benefits are likely to include increased rental revenues (when applicable) and higher municipal tax revenues.

Active mitigation efforts such as beach armoring may also serve to encourage additional use and/or development (Parsons and Powell, 2001). Such additional development can reasonably be anticipated in the case of the 93 undeveloped residential lots on the island, especially the 31 lots that are oceanfront. Provided that such development does not seriously compromise the integrity and value of the adjacent beaches, it is expected to generate additional economic impacts in the form of increased municipal tax revenues as well as temporary construction employment and spending.

The terminal groin may create enhanced recreation values as a result of (indicated) gains in beach width and stability on the northern stretches of Figure Eight Island as well as the creation of rocky bottom area that may increase species diversity and enhance the quality of recreational fishing near the structure. Because dune and beach habitats in the project area will not be subject to loss from erosion, indirect and non-use values may also be created, enhanced or preserved. In particular, the more stable dry beach habitat southward of the groin would be

expected to create conditions considered more favorable for sea turtle nesting (footprint of the structure notwithstanding). It is important to note that the effects on the proposed terminal groin on the approach of nesting female turtles or the egress (or predation) of hatchlings are unknown at this time.

3.0 Conclusion

This report has outlined the nature, scope and complexities associated with the costs and benefits of the proposed alternatives for the Figure Eight Island Inlet and Shoreline Management Project. Table 6 below provides a conceptual framework for understanding the scope of the costs and benefits of the alternatives and a general assessment of their relative magnitudes.

Each alternative action creates a unique set of costs and benefits. Consideration of these values conveys an obvious sense that no matter which alternative is chosen, tradeoffs are unavoidable. Complicating the analysis of the available alternatives is the fact that many important outcomes are uncertain and inherently unpredictable.

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Table 1: Properties currently protected by sandbag revetments

Address	station	2012 assessed value	stories	square ft
3 Comber Road	88+20	$582,000	2.0	3635
4 Comber Road	89+10	$690,100	2.0	3090
9 Comber Road	80+00	$587,100	2.0	2758
10 Comber Road	81+00	$682,700	2.0	3548
11 Comber Road	81+90	$738,300	2.0	3336
12 Comber Road	82+80	$676,500	1.7	3234
13 Comber Road	83+70	$50,100	2.0	5379
14 Comber Road	84+60	$655,500	2.0	3260
15 Comber Road	85+50	$563,500	2.0	2848
16 Comber Road	86+40	$645,500	3.0	2638
17 Comber Road	87+30	$520,300	2.0	2432
5 Inlet Hook Rd	90+00	$700,900	2.0	3156
6 Inlet Hook Rd	91+00	$709,000	2.0	3635
7 Inlet Hook Rd	92+00	$718,800	2.0	2816
8 Inlet Hook Rd	93+00	$733,400	2.0	2820
9 Inlet Hook Rd	94+00	$1,291,100	2.2	3761
5 Surf Court	76+40	$707,500	3.0	3838
6 Surf Court	77+30	$813,300	2.0	2503
8 Surf Court	79+10	$589,000	2.0	2592
11 Surf Court	74+60	$1,531,100	2.0	3044
Average		**$709,285**		
Total		**$14,185,700**		

Table 2: Properties at risk within 30 year planning horizon under Alternatives 1 and 2

Address	Approx. station	Years until sandbags (Alt 1)	Years until relocation or demolition		2012 Assessed value
			Alt 1	Alt 2	
13 Comber Road	83+70	existing	5	5	$50,100
17 Comber Road	87+30	existing	5	5	$520,300
15 Comber Road	85+50	existing	5	5	$563,500
3 Inlet Hook Rd	88+20	existing	5	5	$582,000
9 Comber Road	80+00	existing	5	5	$587,100
8 Comber Road	79+10	existing	5	5	$589,000
16 Comber Road	86+40	existing	5	5	$645,500
14 Comber Road	84+60	existing	5	5	$655,500
12 Comber Road	82+80	existing	5	5	$676,500
10 Comber Road	81+00	existing	5	5	$682,700
4 Inlet Hook Rd	89+10	existing	5	5	$690,100
5 Inlet Hook Rd	90+00	existing	8	5	$700,900
5 Comber Road	76+40	existing	10	5	$707,500
6 Inlet Hook Rd	91+00	existing	11	5	$709,000
7 Inlet Hook Rd	92+00	existing	14	8	$718,800
8 Inlet Hook Rd	93+00	existing	14	8	$733,400
11 Comber Road	81+90	existing	5	5	$738,300
6 Comber Road	77+30	existing	10	5	$813,300
9 Inlet Hook Rd	94+00	existing	17	11	$1,291,100
11 Surf Court	74+60	existing	14	7	$1,531,100
9 Surf Court	72+80	3	11	5	$1,980,500
8 Surf Court	71+90	3	11	5	$2,537,900
7 Surf Court	71+00	3	11	5	$2,827,700
5 Surf Court	70+00	3	11	5	$2,198,200
4 Surf Court	69+10	7	11	5	$1,425,600
3 Surf Court	68+20	9	12	11	$1,517,900
2 Surf Court	67+30	9	12	11	$1,928,800
1 Surf Court	66+40	10	14	12	$2,776,300
332 North Beach Road	64+60	11	14	13	$1,889,800
330 North Beach Road	63+70	11	14	13	$1,570,900
328 North Beach Road	62+80	11	14	13	$2,206,600
324 North Beach Road	61+00	12	16	14	$1,900,100
326 North Beach Road	61+90	13	16	15	$1,886,800
314 North Beach Road	56+00	18	22	21	$1,992,400
316 North Beach Road	57+00	19	23	22	$1,407,600

312 North Beach Road	55+00	19	23	22	$3,229,400
318 North Beach Road	58+00	19	23	22	$1,558,000
304 North Beach Road	51+00	20	24	23	$1,827,200
302 North Beach Road	50+00	20	24	23	$2,076,800
310 North Beach Road	54+00	21	25	24	$2,073,800
308 North Beach Road	53+00	22	26	25	$1,452,100
Average					$1,376,832
Total					**$56,450,100**

Table 3: Expected costs associated with sandbag revetments under Alternative 1

Road & Lot Numbers	Year sandbags installed[(1)]	Sandbag cost	Present Value Sandbag Cost 6%	Present Value Sandbag Cost 4.125%	Present Value Sandbag Cost 2.5%
Inlet Hook 3 to 9	7	$179,800	$90,780	$102,860	$114,833
Beach Rd N behind Inlet Hook 3 to 9	17	$230,500	$64,989	$88,024	$115,009
Comber Rd. 4 to 16	2	$610,800	$412,780	$427,780	$441,452
Beach Rd N behind Comber Rd 4 to 16	14	$610,800	$205,139	$263,367	$328,208
Surf Court 1 to 11	13	$338,800	$120,632	$152,133	$186,614
Beach Rd N behind Surf Court 1 to 11	29	$537,100	$75,262	$126,285	$199,252
Beach Rd N 322 to 334	26	$461,000	$76,934	$122,359	$184,182
Total		**$2,254,200**	**$1,046,517**	**$1,282,809**	**$1,569,550**

[(1)]Bags installed when scarp comes within 20 feet of the road.

Table 4: Expected costs associated with infrastructure loss under Alternative 1

Road & Lot Numbers	Length of road (ft)	Year Road Lost[(1)]	Infrastructure replacement cost	Present Value Infrastructure replacement cost (6%)	Present Value Infrastructure replacement cost (4.125%)	Present Value Infrastructure replacement cost (2.5%)
Inlet Hook 3 to 9	390	12	$301,470	$149,821	$185,603	$224,160
Beach Rd N behind Inlet Hook 3 to 9	500	22	$386,500	$107,256	$158,832	$224,504
Comber Rd. 4 to 16	1325	7	$1,024,225	$681,168	$771,810	$861,645
Beach Rd N behind Comber Rd 4 to 16	1325	19	$1,024,225	$338,520	$475,171	$640,681
Surf Court 1 to 11	735	18	$568,155	$199,050	$274,458	$364,282
Total	**4275**		**$3,304,575**	**$1,475,814**	**$1,865,874**	**$2,315,272**

[(1)]Assumes sandbag permit good for 5 years.

Table 5: Expected costs associated with infrastructure loss under Alternative 2

Road	Lot Numbers	Length (ft)	Year Road Lost[(1)]	Infrastructure replacement cost	Present Value Infrastructure replacement cost (6%)	Present Value Infrastructure replacement cost (4.125%)	Present Value Infrastructure replacement cost (2.5%)
Inlet Hook	3 to 9	320	8	$247,360	$155,197	$179,015	$203,020
Beach Rd N behind Inlet Hook	3 to 9	500	18	$386,500	$135,408	$186,706	$247,811
Comber Rd.	4 to 16	1,087	5	$840,251	$705,491	$744,293	$780,257
Beach Rd N behind Comber Rd	4 to 16	1,310	15	$1,012,630	$422,535	$552,237	$699,186
Surf Court	1 to 11	723	14	$558,879	$247,193	$317,357	$395,534
Beach Rd N behind Surf Court	1 to 11	1,165	30	$900,545	$156,794	$267,827	$429,328
Beach Rd N	322 to 334	1,000	27	$773,000	$160,295	$259,534	$396,858
Total		6105		$4,719,165	$1,905,306	$2,449,166	$3,114,396

Table 6: Scope of Costs and Benefits by Alternative

Costs (*ceteris paribus*)						
Alternative	1	2	3	4	5C	5D
Construction and Maintenance (NPV)	$16.58 M - $24.53 M	$1.98 M - $3.15 M	$36.06 M - $47.93 M	$47.21 M - $66.28 M	$25.63 M - $33.58 M	$14.73 M - $19.33 M
Potential reduction in tax base	High	Highest	Intermediate	Intermediate	None	None
Parcels affected	41	41	0	0	0	0
Transition costs	High	Highest	Low	Low	None	None
Diminished recreation value	High[a]	Highest[b]	Intermediate[a,c]	High[b]	Low	Low
Diminished aesthetic value	Intermediate[d]	High	Intermediate[d]	High[b]	Intermediate[e]	Intermediate[e]
Environmental damage						
Public non-use value losses (nature)	Low	Low	Intermediate	High	High	High
Public non-use value losses (Figure Eight Island)	High	Highest	Intermediate	Intermediate	Low	Low
Benefits (*ceteris paribus*)						
Alternative	1	2	3	4	5	5B
Reduction in future nourishment expense	Intermediate	N/A	Intermediate	Low	High	High
Enhanced property value	None	None	Intermediate	Intermediate	High	High
Enhanced Recreation value	Low[f]	Moderate[f]	Moderate	Moderate[f]	High	High
Environmental improvement	See Chapter 5 of EIS					
Public non-use value (nature)	Intermediate	Highest	Intermediate	High	Low	Low
Public non-use value (Figure Eight Island)	Low	None	Intermediate	Intermediate	High	High

[a] Recreation losses are associated with the presence of the sandbag revetments.
[b] Some losses are expected to be temporary, and associated with the presence of construction equipment.
[c] Erosion of southern end of Hutaff Island
[d] Aesthetic losses associated with sandbag revetments.
[e] Aesthetic losses associated with terminal groin.
[f] Accretion at Hutaff Island

Sub-Appendix A: Understanding the Costs and Benefits of Shoreline Change

1.0 Introduction

Actions associated with mitigating the effects of shoreline change are expected to create an array of costs and benefits. These include market costs, such as any physical or engineering costs associated with active mitigation, as well as non-market costs and benefits, such as those associated with changes in the quality of recreational experiences and effects on the natural environment. Shoreline nourishment, armoring via hardened structures, or retreat each entail costs and benefits that accrue to different groups of stakeholders and over different time periods. As noted in Landry (2011), nourishing shorelines by adding sand may protect coastal habitats and real estate as well as the possibilities for recreation, but without maintenance, the duration of such benefits can be expected to be temporary. Armoring the shoreline may likewise protect coastal property, but may have adverse impacts on habitats and proximate shorelines. Shoreline retreat will involve relocation or demolition of existing buildings and infrastructure and can be expected to impose substantial costs and burdens on coastal property owners. Local governments may also be opposed to shoreline retreat for reasons related to the potential infrastructure losses, diminished property tax revenues, and impacts on coastal tourism, or real estate sales (Landry, 2011).

As a result of these disparate costs and benefits, alternative efforts to mitigate shoreline erosion can be expected to be valued differently by different groups of people. Direct and indirect economic impacts from alternative shoreline management strategies will vary across a given population, as will preferences for maintaining, preserving or allowing natural change (Judge, Osborne and Smith, 1995). As noted in Judge, Osborne and Smith (1995), some individuals will have preference for non-interventionist approaches that allow natural erosion to take place. These individuals may derive real economic value from the existence of unfettered coastal ecosystems. While such "retreat" options will likely have an adverse impact on the value of beaches and beach front property at eroding sites, they may also induce positive or negative value changes at proximate sites via changes in crowding or changes in aesthetic appeal. For example, as noted in Parsons and Powell (2001), the amenity value of beachfront properties lost to erosion may not be lost in the aggregate, but rather transferred to properties further inland. Further, in the absence of land use controls active mitigation efforts such as beach armoring or

renourishment may serve to encourage additional use and/or development, which may in turn compromise the integrity and value of the beach that such efforts were designed to protect or create a situation where continued mitigation is necessary to protect value. With regard to this latter point, Gopalakrishnan et al. (2011) find that beach replenishment activities are likely to occur more frequently in communities where baseline property values are higher.

Finally, certain groups of stakeholders may have different and contrasting values related to natural or anthropogenic changes to the shoreline. For example, as noted in Landry, Keeler and Kriesel (2003), property owners may desire shoreline proximity for recreational and aesthetic reasons and also value shoreline distance for protection from erosion. Huang et al. (2007) also note that anthropogenic modifications to beaches involve multiple positive and negative impacts on individual stakeholders. They find that erosion control measures are less valued when there are adverse impacts on wildlife, water quality and erosion at neighboring beaches.

In light of diverse impacts and preferences, economic analysis of the potential gains and losses from proposed shoreline management actions can be a useful input for policy makers who are confronted with the need to balance conflicting objectives while conforming to budgetary limitations. However, as alluded to above, understanding the economic values associated with shoreline management alternatives is a complex and multifaceted undertaking. Determining which strategy makes the most economic sense for a given coastal community is an empirical question, requiring detailed consideration of an array of natural, physical and socioeconomic characteristics (Parsons and Powell, 2001) and forecasting potential impacts into the future. Coupling these complexities with the inherently dynamic nature of marine coastlines suggests that the effects of shoreline management alternatives will vary according to myriad factors such as preferences for recreation, the degree of shoreline development, the characteristics of proximate and substitute sites and the bio-physical character of affected coastal ecosystems. As such, quantitative forecasting of the economic impacts of shoreline management alternatives is fraught with difficulty. Such analysis is beyond the scope of this report.

2.0 Limitations

The purpose of this report is to review the extant literature regarding economic considerations that are pertinent to the proposed management alternatives for the Figure Eight

Island Inlet and Shoreline Management Project and to summarize available evidence in the literature so as to frame and characterize the potential scope of economic costs and benefits associated with the proposed alternatives. This report does not provide an itemization or explicit estimation of economic values associated with the management alternatives, nor does this report provide a ranking of alternatives based on relative economic values or any other criteria. This report should not be considered a substitute for a monetary cost-benefit analysis, but rather should be taken as a framework for understanding the potential scope of economic impacts associated with the range of project alternatives evaluated in the Environmental Impact Statement (EIS).

3.0 Economic Value and Valuation

Economists define the value of a particular good or service as what it is *worth* to people, in terms of the contribution of the good or service to well-being (Bockstael et al., 2000). Value is best measured by what people are *willing and able to pay* (WTP) for a good or service. Value should not be confused with the *cost* or expenditure required to obtain a good or service, because cost may differ greatly from what something is worth. For example, a beach renourishment project may involve $5 million in physical and engineering costs, but may generate considerably more (or less) in actual economic value.

It should also be recognized that economic value extends to goods and services that are not explicitly traded in markets such as clean beaches and healthy habitats, and may include benefits not directly associated with use such as the benefits resulting from the knowledge that particular species or ecosystems exist ("existence values), are available for potential future use ("option values") or are available for future generations ("bequest values"). The measurement of non-market values is detailed in later sections of this report. Evidence in support of "non-use values" includes the willingness of people to give up time and other resources (including money) for goods and services that they never interact with in any tangible fashion. While relatively unknown outside the economics profession, the consideration of non-use values is germane to any analysis of beach management alternatives due to their explicit mention in the Water Resource Council Principles and Guidelines (P&G) for federal projects (USACE, 2000 as noted in Landry, 2011).

More generally, it is clear that coastal ecosystems provide a variety of goods and services that create economic value via contributions to human well-being. These include services that affect the value of goods that are traded in markets such as the protection of coastal real estate and tourism as well as services that impact non-market goods and services such as aesthetics, habitat provision and opportunities for recreation. Quantifying the associated benefits to people from these goods and services is the domain of economic valuation. Valuation simply means empirical estimation of what something is worth, typically in monetary terms.

3.1 Valuation Methods

Because humans interact with the environment in many ways, approaches to valuation take a variety of forms. The choice of method is most often a function of what is being valued and the intended use or policy purpose of the values. A common point of demarcation for valuation methods pertains to whether the economic values in question are market-based or "non-market" values. Market values are often readily observed using applicable prices and quantities. Measuring and monetizing the costs and benefits associated with changes that are not revealed in market transactions requires the application of empirical techniques that fall under the category of non-market valuation. Examples of non-market values include changes in human wellbeing associated with aesthetics, opportunities for recreation and changes to the natural environment. Non-market valuation techniques are well-established in the academic and practitioner literature.

Examples of market-based valuation methods include the market price method, the replacement cost method and the damage avoidance method. Non-market valuation methods include the travel cost method, hedonic pricing and the contingent valuation method. A variety of sources are available for detailed reviews of these methods (e.g. Smith, 1996; Bockstael, et al., 2000; Schuhmann, 2012). For the purposes of this report, we only review those methods that are pertinent to the valuation of changes to coastal systems. Much of the review below is based upon Schuhmann (2012).

3.1.1 The Replacement Cost Approach

Some goods and services provided by the natural environment can be replaced by manmade goods and services. This basic idea is the foundation of the *replacement cost approach*

(RC) to valuation, which uses the *costs* associated with providing replacement services as the value of the associated natural services. As such, this approach fits into the category of market-based valuation methods. As an example, artificial breakwaters may provide some of the shoreline protection services afforded by barrier islands or reefs. The costs of constructing breakwaters may therefore be used as an estimate of the economic value that stands to be lost if the natural service was to be degraded. The replacement cost approach is appealing in its ease of calculation and interpretation – the method typically relies on readily available market data and represents the opportunity costs associated with the degradation of natural assets in terms of costs that would have to be incurred in the absence of protection.

The replacement cost approach should be used with caution, however, as it does not deliver a true measure of the value of natural goods and services in the sense of net gains to society. In short, the replacement cost method provides a measurement of *costs*, which may not reflect the benefits gained from natural resources. For example, the cost of widening a beach via sand management may be entirely unrelated to the benefits derived from naturally wide beaches. Moreover, this method should only be applied when certain conditions are met (Bockstael et al., 2000; EPA, 2009; WRI, 2009). First, the manmade alternatives must provide an effective replacement for natural services. While it is unlikely that manmade alternatives can provide the full range of benefits provided by natural assets, there must be at least some service flows that can be attained via substitution of manmade alternatives. Further, the costs of that substitute must be known or estimable and must represent the least-cost means of providing the service in question. Finally, society must be willing and able to incur the costs associated with the replacement. These latter two points may require extensive research to confirm, as the scope of economic costs associated with habitat modification likely extends beyond monetary or market-based expenses. Only when these non-market costs are understood, measured and conveyed to the public can society's willingness to accept them be established.

3.1.2 The Cost (Damage) Avoidance Approach

Related to the replacement cost approach, the *cost (damage) avoidance approach* (CA) is based on the idea that manmade services may be able to offset or prevent harm caused by natural or anthropogenic change. The cost avoidance approach relies on market-based estimates of the costs associated with potential damage to manmade assets as an estimate of the value of the

natural services that prevent those damages from occurring. For example, the cost of replacing coastal property may be used as an estimate of the benefits derived from beach nourishment activities that mitigate damage from storms. As noted in Landry (2011), this is the approach employed by the US Army Corps of Engineers when defining benefits in P&G. As is the case with the replacement cost approach, this method ascribes estimates of *costs* to notions of *value*, which may be an inherently flawed means of understanding the *benefits* derived from changes in natural resources. Using the value of coastal real estate as an estimate for the value of beach width may lead to the conclusion that highly developed beaches are worth more than undeveloped beaches. While this may seem logical from a private landowner's perspective, the opposite may be true from the perspective of society. That is, undeveloped beaches may confer larger economic gains to society than developed ones. Landry (2011) provides additional discussion of this important issue.

3.1.3 Revealed Preference Methods

In terms of understanding the economic value of beach width and shoreline amenities, the most commonly employed non-market valuation methods are the revealed preference approaches of *hedonic pricing* method and the *travel cost method*. These approaches are based on establishing empirical links between changes in natural resources and market behaviors. For example, beach width may affect sales prices of coastal real estate or influence the number of tourists that visit a particular destination. By collecting data on real estate sales or travel to the coast, the associated value of beach width can be estimated. Specifically, the hedonic pricing method uses data on house characteristics (size, age, neighborhood characteristics, etc.), associated environmental amenities (e.g. proximity to the coast or beach width near the house) and selling prices. To estimate the contribution of those environmental amenities to the market value of the house, regression analysis is used where price serves as the dependent variable and independent variables are house characteristics, including environmental amenities. The estimated regression coefficient on the environmental characteristic represents the marginal change in average selling price for a change in that characteristic, and can be interpreted as the implicit price of the characteristic. Because this method relies on actual transactions, value results are difficult to critique, provided that proper methodology was employed and that the environmental characteristics of interest were accurately quantified and have not undergone

meaningful change since the time of the real estate transactions. The literature contains several applications of the hedonic pricing method to value coastal attributes, many of which are reviewed herein.

The travel cost method is another revealed preference approach that is commonly employed to value natural resources associated with recreation. Site visitation data, including travel costs and the number of trips taken to a particular destination are collected and used to estimate a trip demand curve, where explicit and implicit travel expenses serve as a proxy for price. The net benefits of a particular site or the value of the resources within each site can then be estimated by integrating under the estimated demand curve at a particular price point (e.g. mean or median price). Numerous examples of recreation demand models applied to value beach visitation appear in the published literature. Pertinent applications are reviewed later in this report.

3.1.4 Stated Preference Methods

The above methods are useful for understanding the economic value associated with property and recreation aspects of coastal quality and amenities, but they are not amenable to the valuation of benefits that are not associated with direct use. When people derive values from simply knowing that natural resources are preserved or maintained in a particular state, s*tated preference methods* such as the Contingent Valuation Method (CVM) and Choice Modeling (CM) must be employed. These methods, which rely on surveys to elicit values, are well-accepted approaches for valuing non-market goods and services. CVM has been adopted by the U.S. Department of Interior to measure non-market values associated with damages under CERCLA 1980 (US DOI 1986), while NOAA has endorsed the use of this method for damage assessment under the Oil Pollution Act of 1990 (Arrow et al. 1993). The CM approach appears to be gaining favor in the economics literature as it avoids many of the difficulties associated with CVM and allows multidimensional attribute changes to be valued simultaneously (Huybers, 2004). As is the case with all valuation approaches, estimates of value are subject to an array of biases and caveats, hence care must be taken with regard to proper methodology and interpretation.

3.1.4 Economic Impact Analysis

In addition to estimating changes in economic value to users, property owners and other direct stakeholders, analysts may be interested in understanding the effects of changes in natural resource quantity or quality on the broader economy. Such impacts might include additional revenues, incomes and employment realized by local, regional and national economies. *Economic impact analysis* is the process concerned with such estimation, and recognizes that a portion of each dollar spent by a consumer or producer represents revenue earned by someone else in the economy. As the new revenue earner spends that income, each transaction creates additional income that ripples through businesses and households creating "economic multiplier effects". These impacts are estimable, and are typically categorized into *direct* effects, *indirect* effects and *induced* effects. *Direct effects* are market contributions to the economy, and are typically measured by gross total revenues, total employment or gross incomes. *Indirect effects* are impacts on the incomes and wages of the suppliers of inputs used in the industry in question when those earnings are subsequently spent on other goods and services. *Induced effects* are the economic impacts of spending of generated income by households who are either directly or indirectly employed in the industry. Indirect and induced effects taken together are often referred to as *value added effects* (Fedler, 2010).

Economic impact analysis relies on the use of input-output models which delineate forward and backward linkages in earnings and spending between economic sectors of interest and the rest of the economy. An empirical understanding of these linkages allows for the estimation of *multipliers* which quantify the extent to which a given economic activity (direct effect) generates other economic activity. Value added multipliers convert direct expenditures into total economic impact (Fedler, 2010). For example, if the estimated value added multiplier for tourism spending is 1.5, then each $1 of direct spending by tourists results in an additional $1.50 of indirect and induced effects, for a total economic impact of $2.50. Because economic impact analysis does not calculate net economic gains to market participants and does not account for non-market values, economic impact analysis and the use of input-output models should be considered a complement rather than a substitute for the calculation of economic value using other methods described above (Hoagland, et al, 2005).

4.0 Beach Nourishment as a Dynamic Optimization Problem

A recent branch of economics research has examined beach management decisions as a dynamic optimization problem where the timing and rate of renourishment that maximizes the discounted present value of net gains (benefits less costs) is derived (Landry, 2011). Required inputs for such modeling efforts include a rate of natural erosion or decay, the economic costs of beach nourishment, a parameter that converts sand volume to beach width, and a function representing aggregate benefits from beach width. The principle outputs are an optimal schedule of renourishment, the optimal quantity of sand that should be applied during each operation, and a measurement of how these values are affected by changes in the inputs (Landry, 2011). An obvious benefit of this approach is the ability to determine, *a priori*, the potential economic value of beach management actions under a range of hypothetical conditions. A downside is the time, effort and expertise required to conduct the modeling. While it is beyond the scope of this report to apply dynamic optimization models for coastlines in North Carolina, some notable results can be gleaned from prior work in the literature.

5.0 Categories of Potential Impacts from Coastal Management Alternatives

The economic costs and benefits associated with shoreline management projects will include changes in market values and non-market values. Affected market values may include with the physical costs of active mitigation efforts (e.g. construction and maintenance costs associated with hardened structures, acquisition of beach nourishment material, destruction and/or relocation of coastal real estate), and the change in economic value to coastal property and public infrastructure. Non-market values include those associated with changes to the size and integrity of beaches and dunes, inlets and their associated functions, including provision of public recreational opportunities, aesthetics and wildlife habitat. Effects on coastal property values will materialize in market values, and likely entail elements of both market and non-market values. These include changes in the storm protection benefits from beaches and dunes as well as values associated with recreation and aesthetics.

When comparing management alternatives, it is important to note that in many cases the benefits of active mitigation efforts can be considered costs of inaction. For example, the benefits of shoreline stabilization via nourishment or hardened structures include maintaining the integrity of the shoreline and the associated real estate. These economic values are likely to be

partially or wholly sacrificed in the absence of active mitigation. Hence, an analysis of the costs of inaction (e.g. retreat) would include lost shoreline integrity and declinations in the economic value of associated real estate. Likewise, the benefits of inaction may include the value associated with maintaining natural environmental conditions in a state unaltered by active mitigation.

A deep body of literature exists examining the nature, scope and measurement of these economic values. Below, we provide a brief overview of this literature so as to provide a context for the potential scope of changes in economic value that might be associated with alternative shoreline management projects under consideration in North Carolina.

5.1 Values Associated with Coastal Property and Physical Capital

Natural and anthropogenic changes to shorelines can be expected to affect the value of coastal real estate. The value of at-risk property can be viewed as a potential economic cost associated with inaction (e.g. retreat) or an economic benefit of protection via active management (e.g. nourishment, armoring). Hence, an appraisal of coastal property values and/or derivation of the effect of beach characteristics on property values via the hedonic pricing method can serve as a valuable input in terms of understanding the costs and benefits of management alternatives.

However, caution must be exercised when conducting such appraisals for a number of reasons. First, property values can fluctuate with local and national economic conditions. Available sales, tax assessment or appraisal data may be reflective of market that may no longer be applicable to contemporaneous or future valuations. Further, natural characteristics of coastlines the associated economic benefits are inherently dynamic, which may create empirical difficulties when attempting to quantify the association between those characteristics and property values. For example, even with periodic renourishment, sand volume and beach width can be expected to vary over time. As such, explorations of the relationship between beach characteristics and property values that rely on measurements of those characteristics at a particular point in time may not properly account for anticipated future change or the flow of benefits from average quality metrics (Gopalakrishnan et al., 2011). Indeed, market participants' understanding of shoreline dynamics and expectations regarding shoreline management interventions will likely be capitalized into market values (Landry and Hindsley, 2011; Landry,

2011). For example, if a strategy of retreat is reasonably anticipated, the value of threatened properties could be driven toward zero (Landry, 2011). Likewise, uncertainty regarding legislative or budgetary conditions may confer a perception of investment risk, which can also be expected to be capitalized into market values. To the extent that shoreline characteristics at the time and location of data collection do not reflect those expectations, value estimates will be compromised.

An additional complication arises from the potential endogeneity between property values and shoreline characteristics. While it is clear that property values will depend on the characteristics of proximate shorelines (additional discussion below), shoreline characteristics may also depend on property values. As noted in Gopalakrishnan et al. (2011), shoreline management decisions may depend on the benefits from changing the natural character of the shoreline. For example, beach nourishment might occur on a larger scale or more frequent interval where beaches protect valuable real estate. This bi-directional causality may confound empirical estimation of the effect of beach width on property values.

To summarize, the value of at-risk property and assets that stand to be lost or protected can and should be considered when appraising the costs and benefits associated with alternative actions for shoreline management. The hedonic pricing method is the most commonly employed approach to understanding the relationship between shoreline characteristics and the market value of such assets, but such analysis should be exercised with careful consideration of the above cautions and caveats.

5.1.1 Categories of Value

Parsons and Powell (2001) categorize the costs of shoreline retreat as land loss, capital (structure) loss, proximity loss, and transition loss. The economic value of land loss is the difference between the value of affected land in the absence of beach erosion and the value of the same land with beach erosion. Because there will always be a given area of land that is beach front, value lost to erosion is associated with diminished land availability inshore rather than the loss of beachfront land. Capital loss is the difference between the asset value of housing, commercial buildings, and public infrastructure in the absence of beach erosion and the value of those same assets with beach erosion, including any loss of use and additional maintenance costs associated with retreat.

Proximity loss is the decrease in human welfare associated with adjusting the pattern of coastal development in response to an unstable shoreline. For example, Parsons and Powell (2001) note that in the face of an unstable shoreline, permanent structures may be rebuilt further from the shore or temporary structures may be built close to the shore. Either case confers less economic welfare associated with proximity than permanent structures built close to the shore, which is the presumed pattern of coastal development when shorelines are stable. Finally, transition loss is the economic costs associated with removal of housing, commercial buildings, and public infrastructure and includes costs of labor, capital and materials. It is important to note that the costs associated with replacing coastal real estate may not be an appropriate proxy for the benefits of avoiding replacement, as the latter entails the value associated with occupying a property, which may or may not be related to construction costs (Landry, 2011).

5.1.2 Examples from the literature

A deep body of literature examines the relationship between the value of coastal real estate and environmental amenities such as views, distance to shorelines, beach width and water quality. Each of these amenities is found to enhance property values as reflected in market prices. The contribution of amenities such as views and beach width is found to diminish with distance from the ocean.

With regard to ocean views, Benson et al. (1997) and Benson et al. (1998) use the Hedonic Pricing approach to estimate the value of scenic views to single family homes in Washington. Both studies find that homes with ocean views are associated with statistically significant price premiums. The 1997 study suggests that ocean frontage adds up to 147 percent to the market price of a home. Views of the ocean add between 10 and 32 percent to market prices, with lower values corresponding to partial views. The richer dataset used in the 1998 study allows for detailed characterization of view quality and distance from the water, and suggests that prices of homes with high quality (unobstructed) views of the ocean are 59 percent higher than prices of otherwise comparable homes on average. Lower quality ocean views convey lower price premiums, ranging between 8 and 31 percent. Not unexpectedly, while controlling for the quality of view, the value of ocean views is found to be inversely related to distance from the water. Prices of homes that are a very short distance from the water with unobstructed views may be more than 68 percent higher than otherwise similar homes.

Pompe and Rinehart (1999) also find that property buyers value ocean views. These authors apply the hedonic pricing approach to home sales in South Carolina and find that views of the ocean add approximately 45 percent to the value of developed lots and 83 percent to the value of vacant (undeveloped) lots.

Numerous studies explore the economic value of beach width to property owners. Pompe and Rinehart (1995) and Pompe and Rinehart (1999) find that property buyers value wider beaches. These two studies - applications of the Hedonic Pricing approach to data from coastal property sales in South Carolina – show that the marginal value of beach width varies with distance from the beach and differs for developed and undeveloped lots. Specifically, Pompe and Rinehart (1995) find that an additional foot of beach width is estimated to increase the value of developed and undeveloped oceanfront lots by $554 and $754 respectively. At a distance of one-half mile from the beach, the price premium for an additional foot of width is found to be considerably lower, roughly $254 and $165 for developed and undeveloped lots respectively. In Pompe and Rinehart (1999), an additional foot of beach width is found to add $194.09 and $310.84 to the market value of developed and undeveloped oceanfront lots, respectively. The authors caution that these latter estimates are based on a relatively small number of oceanfront parcels. Smaller price premiums are found for properties that are not oceanfront with ocean views, and even smaller (but still statistically significant) premiums are found for properties near the beach, but without ocean views.

With regard to loss of beach width to erosion, Parsons and Powell (2001) use a hedonic price regression to estimate the costs of shoreline retreat in Delaware. Specifically, using a range of estimates for average erosion rates at seven different beach communities along the Delaware coast, they approximate the expected location of the shoreline in the absence of active management actions and predict which specific houses would be lost as the shoreline migrates. For each structure that is predicted to be lost, value is predicted using a hedonic price regression based on market data. It is important to note the reason why the hedonic approach is employed rather than simply relying on market values of at-risk real estate: The hedonic approach allows the estimation of the coastal amenity value associated with each structure. This coastal amenity value is subtracted from this anticipated loss under the assumption that such value is simply transferred to other structures that are now closer to the shoreline. The costs associated with removal of the structure (i.e. the transition loss) are assumed to be $25,000 per structure and are

added to create an estimate of the total loss associated with losing that property to retreat. Commercial structure losses are approximated using Marshall and Swift's property appraisal method. It is important to note that the authors assume that the majority of the value associated with infrastructure is capitalized into the value of residential structures, and as such the associated losses are captured in the hedonic estimation. To the extent that such infrastructure conveys economic benefits to the public at large (e.g. tourists, or nearby residents), this assumption results in an underestimate of the true costs of retreat. Further, while the authors mention the costs of infrastructure removal and/or relocation, it is not clear that these costs are explicitly accounted for. The authors also do not attempt to estimate proximity losses, which are assumed to be small. Finally, the authors do not account for unstable beach conditions and the effect of such future risk on values of homes that are now closer to the shoreline.

Their results suggest that over a 50-year period, the costs of active beach renourishment are expected to be substantially less than the lost value associated with retreat. The authors suggest that the costs of renourishment would have to increase by a factor of four for retreat to be an economically preferable alternative, though they caution that cost estimates may vary greatly with assumed rates of erosion. Because of the characteristics of the study area, the majority of losses from retreat are those associated with residential real estate. Transition losses and losses associated with commercial structures are found to account for about 15% of total losses. Importantly, the coastal amenity value is found to be a statistically significant component of the economic value of at-risk property. For example, for an ocean-front house valued at $300,000, the ocean-front amenity is found to account for nearly $132,000 of the value. A bay-front house of similar value would owe $24,000 to its proximity to water and canal frontage appears to be worth $63,000. The authors also suggest that for houses less than a half-mile from the beach, each 25 feet of distance from the coast is worth about $1200 for a representative $300,000 house. Because these amenity values can be assumed to transfer to properties further inland as a result of retreat, these results suggest that a simple subtraction of the current market value of at-risk real estate will grossly overestimate the costs of retreat and unimpeded shoreline recession. That is, while retreat can be expected to diminish or eliminate the market value of beachfront properties, the beachfront itself will always exist. Hence, properties that were once "one row back" will now be beachfront, and can be expected to increase in value. Nonetheless, given the

current costs and technology associated with shoreline renourishment, retreat appears to be an unfavorable option from a market costs perspective.

Landry, Keeler and Kriesel (2003) explore the desirability of shoreline management alternatives by quantifying the economic impacts on coastal property owners who face risk of economic loss from erosion, the change in value of recreational uses of coastal areas that may be impacted by shoreline management and the costs of management. Effects on the natural environment (e.g. habitat loss or change) are not considered. Specifically, the incremental value of improved beach widths for coastal residents is estimated using hedonic analysis applied to a sample of 318 property sales on Tybee Island, GA. Including among the set of sales price determinants in the hedonic regression are beach width, distance from the beach, erosion risk, and the presence of erosion control structures. The measure of erosion risk was an indicator variable for property proximity to known high risk areas on the island. Beach width is found to be a statistically significant determinant of property value, with each one-meter increase adding $233 to property value. Ocean-front and inlet-front amenity values are estimated to be of $34,068 and $87,620 respectively. Property values in high risk areas were estimated to be reduced by $9,269.

Landry and Hindsley (2011) also apply the hedonic pricing method to real estate transactions for single-family residences in Tybee Island, GA, and measure the value of high- and low-tide beach and dune widths at nearby beaches, adjusted for changes in beach width due to sand replenishment activities. They find that beach and dune width have a statistically significant influence property value for properties located within 300 meters from the shore, but find no relationship for properties located further from the shore. Specifically, Landry and Hindsley estimate marginal willingness-to-pay for beach width for houses within 300 meters from the beach ranges from $421 to $487 for an additional meter of high-tide beach, or $272 to $465 for an additional meter of low-tide beach. The incremental value of dune width ranges from $212 to $383 per meter for houses within the 300 meter distance. When the estimation is extended to properties beyond the 300 meter distance, marginal values decrease. These authors also find that the value of ocean frontage is estimated to be between $39,000 and $75,000 and between $121,000 and $128,000 inlet frontage.

Gopalakrishnan et al. (2011) estimate the value of beach width to coastal property in ten coastal towns in North Carolina[5] using hedonic pricing models. When beach width is treated as an exogenous characteristic, the average increase in oceanfront property value is approximately $1,440 per additional foot of beach width. This value approaches zero for properties that are located more than 330 feet from the beach. When beach width is treated as endogenously determined[6] (i.e. property values are function of beach width and beach width, via nourishment activity, is a function of property value), the authors find that beach width likely accounts for a larger portion of coastal property value. Specifically, the coefficient on the (fitted) beach width variable is five times larger than in the exogenous specification, suggesting that the average increase in oceanfront property value is approximately $8,800 per additional foot of beach width, or a roughly 0.5 percent increase in value per 1 percent increase in beach width. The authors suggest that their results indicate that property values will be more sensitive to beach width when there is severe erosion and beach replenishment is used to stabilize the shoreline. Notably, unlike Landry and Hindsley (2011), Gopalakrishnan et al. (2011) find that the presence of dunes does not impact property values.

5.1.3 Summary

There is a preponderance of evidence that property owners place considerable economic value on beach width. This value declines with distance from the shore. While some literature suggests that the existence of dunes has a positive impact on property values, the evidence to date is not clear. It is important to note, as articulated by Landry and Hindsley (2011), interpretation of specific value estimates such as those detailed above depends on individual perceptions of future resource quality. If conditions are expected to improve over time, value estimates should be interpreted as lower bounds on true value. If instead, conditions are expected to degrade, value estimates should be interpreted as upper bounds on true value.

5.2 Coastal Infrastructure

[5] The sample of towns includes Carolina Beach, Kure Beach and Wrightsville Beach in New Hanover County. All other towns in the sample are in Carteret County or Dare County.

[6] This model is estimated via two-stage least squares, where geomorphological variables are used to instrument for beach width in the first stage, and fitted values of beach width are used in the price hedonic in the second stage.

In addition to privately owned residential properties, coastal areas also contain physical capital in the form of public infrastructure (e.g. roads, water, electric, sewer). As with privately held capital, this public capital conveys economic benefits to society. Again, the value of these benefits to society can be considered a benefit of erosion control measures, or a cost associated with the failure to control erosion. It is important to note, as expressed in Parsons and Powell (2001), that some of the benefits associated with public capital accrue directly to property owners and will be capitalized into market values for associated real estate (e.g. water and sewer services), and thus included as part of damage avoidance estimates if the value of privately held coastal property is assessed. Yet, other aspects of value for these public assets are not amenable to market valuation, because the benefits derived from their use are not for sale (e.g. the value of public roads adjacent to public beaches). The only readily available market measure of value is that pertaining to new construction costs. That is, while there is no observable market value of what infrastructure is worth in terms of benefits conveyed to the public, we can observe or estimate the cost associated with its construction. As a case in point, in order to measure the potential value of terminal groins in terms of protecting public assets, the cost of constructing public infrastructure was used in NCCRC (2010).

While the procedural endorsement of the RC and CA approaches is understandable in light of the lack of an alternative proxy for value, as noted in the discussion above, the monetary estimates derived from these approaches should not be used without careful consideration. In particular, infrastructure replacement costs seem a tenuous measure of the value of protecting in-situ infrastructure in situations where a lack of protection induces sufficient erosion to eliminate any possibility of replacing that infrastructure. In circumstances where inundation (conversion of land habitat to water) removes the possibility of replacement, the cost of constructing infrastructure might best be considered an unrecoverable sunk cost. Costs that are germane to these situations would include expenses associated with physical removal of the infrastructure. However, when inundation necessitates replacement of lost infrastructure at an alternative location services in order to maintain service flows to properties that remain unaffected by erosion, replacement costs may be an appropriate estimate of at-risk value provided that they account for costs associated with right-of-way acquisition, engineering, permitting, and construction costs (in addition to removal of infrastructure).

5.3 Values Associated with Recreation and Tourism

5.3.1 Categories of value

Alternative actions for mitigating the effects of shoreline change are expected to impact the quantity and quality of recreation and tourism opportunities at the site of interest. Management action or inaction may also create effects on proximate sites or sites that are considered substitutes. These effects may include changes in beach area, the quality of sand, ease of access, the quality of the marine environment, the quality of scenery and the quantity or quality of habitats and species. Changes in economic values will be manifested in changes in the quantity or quality of extractive direct uses (e.g. catch-and-keep fishing), non-extractive direct uses (e.g. sunbathing, bird watching, walking/running, surfing, catch-and-release fishing), and passive uses (e.g. enjoying the aesthetics of a coastal area). In the case of beach nourishment and/or armoring, perhaps the most obvious of these changes is that associated with the amount of physical space available for recreation. Landry (2011) categorizes the economic value of changes in beach area as associated with improvements in scenery and aesthetics, allowing space for more users and decreasing congestion for existing users.

These categories of value are not mutually exclusive. Indeed, a single user can derive economic value from all of the above activities. Further, due to the non-rival and non-excludable characteristics of many of these uses, value derived by one individual does not preclude others from enjoying benefits as well. The most widely applied methodology for estimation of the economic value of changes in coastal quality as it pertains to recreation is the travel cost method, or its close cousin, random utility modeling. Applications of these revealed preference approaches are detailed in an extensive body of literature, some of which is reviewed below. Stated preference approaches such as the contingent valuation method and choice modeling may be appropriate in cases where benefits extend to aspects of value associated with more passive uses.

In addition to value accruing to direct users, additional economic impacts from changes in coastal quality may be realized by local businesses via changes in tourism demand and by governments via changes in tax revenues. Estimation of such economic impacts requires the use of economic impact analysis (input-output models) described earlier in this report. While the estimation of tourism multipliers and the economic impacts of discrete tourism-related events have received attention in the literature (e.g Dwyer et al., 2004; Frechtling and Horvath, 1999;

Hodur and Leistritz, 2007), a recent review of the economics of coastal erosion by Landry (2011) finds a dearth of research regarding the economic benefits accruing to local businesses from beach management.

Finally, it is important to note that management alternatives involving shoreline retreat may not create losses in terms of foregone recreation and tourism opportunities. As discussed in Parsons and Powell (2001), if the shoreline is simply relocated further inland, with no changes to other beach characteristics, the welfare derived from recreationists can be assumed to be unchanged. More generally, to the extent that shoreline change does have an adverse effect on the quantity or quality of recreational opportunities, the degree of economic loss to users and associated businesses will depend upon the availability of substitute locations for such activities (Landry, 2011). If alternative sites are available, proximate and of similar quality, the economic losses associated with diminished quality at one site may be mitigated via substitution.

Clearly, the economic value from coastal recreation and tourism is multi-faceted and involves numerous user groups. A comprehensive empirical estimation of quality-induced changes in values associated with recreation is not straightforward, and should be site-specific entailing multiple valuation approaches.

5.3.2 Examples from the literature

The literature pertaining to the economic value of coastal recreation is vast. This literature includes estimates of the value of access, typically addressed via revealed preference methods, as well as the value associated with changes in site quality, which is more commonly assessed via stated preference techniques. We do not attempt to provide a comprehensive review of this literature, but rather try to highlight particular studies that may be germane to the issues at hand.

Bin et al. (2005) apply the travel cost method to estimate the economic value of beach recreation in North Carolina. Data were collected at seven beach sites in the state, including Topsail Island and Wrightsville Beach. Value estimates range from $11 to $80 for day trips and between $11 and $41 for overnight trips. There is notable variation in value estimates across sites, with higher values found for beaches that are inaccessible by automobile or are not as well-known as other beaches in the sample. The authors speculate that the perception of exclusivity

may influence the recreational value of beaches and suggest that unique site characteristics and user preferences for different types of experiences are important determinants of value.

In a contingent valuation analysis of beach renourishment in the Cape Hatteras National Seashore, N.C., Judge, Osborne and Smith (1995) find that average willingness to pay for beach renourishment is approximately $178 per person per year. This value was a positive function of anticipated future visitation and is inversely related to prior experience at the site. Willingness to pay also decreases with distance from the site for those users with no prior experience visiting Cape Hatteras and is a positive function of education level and the attitude that beach towns suffering from storm erosion should receive additional federal assistance.

Whitehead et al. (2008) use the travel cost method and a combination of revealed preference and stated preference data to estimate changes in recreation demand at 17 beaches in southeastern North Carolina that would occur with improved parking and beach nourishment. The study area included numerous beaches in Carteret, Pender, Onslow, New Hanover and Brunswick Counties. Regarding beach nourishment, respondents were informed that beach nourishment projects would be performed at least once every 3 to 5 years for a 50-year term for the purpose of shore protection and enhanced recreation opportunities, and average beach width would increase by 100 feet. A majority of respondents (58%) expressed support for the beach nourishment policy, and most respondents (85%) felt that the stated beach nourishment policy would be effective in maintaining beach width. Yet, some respondents (21%) were satisfied with current beach widths and some (18%) felt that beach width should not be altered by people. Enhanced beach width was found to increase total net gains to beach visitors by approximately $7 per person per trip and roughly $68 per person per year.

5.4 Values Associated with Coastal Species and Habitats

As is the case with empirical explorations regarding the economic value associated with coastal recreation, the literature on the economic value of species and habitats is extensive. Howarth and Farber (2002) provide important background reading regarding the economic valuation of ecosystem services, and note the importance of constructing monetary measures of economic wellbeing that account for non-market values held by people. These non-market values include existence values pertaining to species and ecosystems. The authors also highlight the importance of accounting for values held by a range of stakeholder groups rather than value

held by a "representative" individual. A review of the literature provided by Spurgeon (1999) suggests that use and non-use benefits derived from coastal ecosystems are substantial. These ecosystems provide an array of valuable services that result in economic benefits to the public at large. Barbier et al. (2008) note the importance of considering nonlinearities when accounting for changes in coastal ecosystem service flows. Specifically, they note that changes in coastal ecosystem services do not necessarily respond linearly to changes in habitat size. This implies that valuation of coastal ecosystem services should not be based on simple linear extrapolations of lost habitat to point estimates of monetary value.

In the case of wetlands, ecosystem services include filtration, storage, and detoxification of residential and agricultural wastes and mitigation of pollution and nutrient-laden runoff into receiving water bodies (Stedman and Dahl, 2008). Wetland preservation can be viewed as a cost-saving measure for communities as these water-quality services can involve considerably lower costs than community or municipal water treatment alternatives (US EPA, 2006). By absorbing and storing flood waters, wetlands can also serve as a natural buffer protecting adjacent real estate from the effects of rising surface waters during storms. Similarly, dune habitats provide important storm-protection services for coastal land and property. Wetlands and dunes also provide important transitional habitat between aquatic and terrestrial environments for resident and migratory wildlife. Wetlands serve as critical nursing areas for marine organisms, including the majority of fish and shellfish species harvested in the U.S. (US EPA, 2006). The quality and abundance of coastal ecosystems are therefore directly related to the health of fish and wildlife stocks (Stedman and Dahl, 2008).

The existence of dunes and wetlands in a community may enhance property values for storm protection benefits, aesthetics and through improved opportunities for recreation activities such as hiking, bird watching, and photography. Wetlands may be considered a disamenity if they are associated with odors, insects or undesirable wildlife interactions.

Several studies have attempted to estimate the economic impact of proximate wetlands on land values using the hedonic pricing method. Generally, these studies suggest that the effect of wetlands on property values depends on the type and character of the wetland. For example, in an examination of property values in rural Florida, Reynolds and Regalado (1998) find that proximity to scrub-shrub and shallow pond wetlands has a positive impact on property values, while proximity to emergent palustrine wetlands may have an adverse effect. In mainland North

Carolina, Bin and Polasky (2003) find that the open and sparsely vegetated nature of coastal wetlands provide a value-enhancing amenity while more densely forested inland wetlands do not, and may in fact decrease property values.

Numerous studies employing stated preference methods find substantial economic value associated with recreation, wildlife habitat, flood control, and improved water quality from wetland services (McConnell and Walls, 2005). Woodward and Wui (2001) review the results from 39 empirical studies, and find that type of wetland and method of analysis has substantial effect on estimated wetland values, noting that only imprecise estimates of wetland values can be garnered from the literature. Hence, it is reasonable to conclude that wetlands are an important source of economic value to surrounding areas, but without case-specific empirical analysis, a reasonable approximate of the magnitude or distribution of that value is not feasible.

Spurgeon (1999) provides an overview of the economics associated with coastal habitat rehabilitation and creation, including a review of the relevant literature. The author notes that the costs associated with habitat rehabilitation or creation costs vary widely between and within ecosystems. The two studies that pertain to dune habitats suggest that rehabilitation costs may range from approximately $19,000 to $25,000 per hectare.[7]

Numerous studies are available that pertain to the economic value of species and species protection. Shogren et al. (1999) provide useful background reading. Loomis and White (1996) provide results from a meta-analysis of the economic benefits of rare and endangered species. Whitehead (1993) estimates willingness to pay for preservation of coastal non-game habitat and loggerhead sea turtle nesting habitat in North Carolina using the contingent valuation method and a sample of 600 North Carolina residents. Average annual willingness to pay is approximately $11 for the loggerhead sea turtle program and $15 for the coastal nongame wildlife program. In addition to generating estimates of the economic value of coastal habitat associated with species protection, this work highlights the importance of accounting for uncertainty when estimating the economic value associated with threatened or endangered wildlife populations. The author notes that failure to account for uncertainty with regard to the

[7] The latter value pertains to a 2.5 ha dune rehabilitation project in Scotland and includes costs associated with replanting dune grass, providing fencing for trapping sand and installing gabion revetments. Additional maintenance costs for the project are noted as less than $1,000 per year. The former value pertains to a 17.8 ha dune rehabilitation project in Monterey, CA.

continued existence of the resource as well as uncertainty pertaining to demand and preferences may result in inappropriate benefits estimates.

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APPENDIX H

STATE AND FEDERAL COMMENTS FROM SEIS

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
http://sero.nmfs.noaa.gov

September 18, 2015 F/SER47:FR/pw

(Sent via Electronic Mail)

Colonel Kevin P. Landers, Sr., Commander
U.S. Army Corps of Engineers Wilmington District
69 Darlington Avenue
Wilmington, North Carolina 28403-1398

Attention: Mickey Sugg

Dear Colonel Landers:

NOAA's National Marine Fisheries Service (NMFS) has reviewed Action ID No. SAW-2006-41158, dated July 9, 2015, and the *Supplemental Environmental Impact Statement, Figure Eight Island Shoreline Management Project, Figure Eight Island, North Carolina* (SEIS), dated July 2015. The Figure Eight Beach Homeowners Association proposes to construct a terminal groin at the northern end of Figure Eight Island adjacent to Rich Inlet in New Hanover County. On June 29, 2012, the NMFS provided the Wilmington District with comments on the Draft SEIS. As the nation's federal trustee for the conservation and management of marine, estuarine and diadromous fishery resources, the following comments are provided pursuant to authorities of the Fish and Wildlife Coordination Act and the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act).

Description of the Proposed Project
Chronic erosion along the northern sections of Figure Eight Island is linked to changes in the orientation and position of the main ebb channel through Rich Inlet. In addition to erosion issues along the ocean shoreline, erosion is also prevalent along 1,800 feet of the Nixon Channel shoreline extending from Rich Inlet northwest to the entrance to Nixon Creek.

The applicant's initial preferred alternative was relocation of the main channel within Rich Inlet. The passage of Session Law 2011-387, Senate Bill 110, by the North Carolina Legislature in 2011 allowed for consideration of construction of terminal groins near tidal inlets. The applicant's preferred alternative in the Draft SEIS included construction of a terminal groin 700 feet in length with a 900-foot shore anchorage section to protect against flanking of the landward end of the structure. Following further extensive alternative analysis, the applicant's preferred alternative now includes construction of a terminal groin 505 feet in length with a 995-foot shore anchorage section. The applicant expects the design of the groin to allow littoral transport of sand over, around, and through the structure by leaving large voids between the rocks. In addition to the groin, the applicant would nourish several areas of shoreline with material excavated from the previously permitted borrow area within Nixon Channel. The Nixon Channel beach fill would be placed along 1,400 feet of the Channel and the ocean beach fill would nourish 4,500 feet of ocean shoreline. The previously permitted area in Nixon Channel would be dredged to its previously permitted depth of -9.0 feet mean low water (MLW). Periodic nourishment would occur approximately every five years.

General Comment on SEIS
The SEIS in Chapter 4 does a good job characterizing the estuarine and marine habitats in the project area. Comments/corrections made by the NMFS on the Draft SEIS have been incorporated. More than

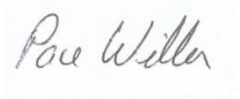
75 percent of the species important to commercial and recreational fisheries off the southeastern Atlantic coast have estuarine life stages (Fox 1992). The common life-history strategy for the majority of these fishes involves fall-winter spawning on the continental shelf followed by larval transport to nearshore habitats (i.e., surf zone) or through tidal inlets where they enter and settle into the shallow estuarine nursery habitats (Miller 1988; Ortner et al. 1999). A critical stage is the passage through inlets, such as Rich Inlet and the connecting Nixon Channel. The SEIS on page 267 states "Dredging is scheduled to occur between November 16th and March 31st. The timing of construction activities was specifically scheduled to occur outside of the sea turtle nesting season, the West Indian Manatee summer occurrence in North Carolina, the Piping Plover (and other shorebirds) migratory and breeding seasons, and the Seabeach Amaranth flowering period." Scientific literature shows this dredging schedule would minimize many of the impacts to larval fish migrating through the inlet. In later sections, the SEIS states "Fish and larval biota which utilize the channel within the inlet are not anticipated to be significantly impacted during dredging because the dredge will be positioned outside the main channel" and "limited mortality of fish" would occur. No justification or documentation is supporting these statements is provided. The NMFS requests amendment of the SEIS to include this information.

Need for an Essential Fish Habitat Assessment

The Wilmington District indicates in the SEIS an Essential Fish Habitat (EFH) Assessment will be prepared for this project separate from the SEIS. In the comments dated June 29, 2012, the NMFS summarized the value of surf zone habitat and recommended studies for the EFH Assessment. The summary and recommended studies do not require augmenting based on the SEIS. Given the importance of surf zone habitat and tidal inlets to federally-managed fishery species and to state-managed fishery species, the NMFS recommends the focal species for the EFH Assessment include: white shrimp, brown shrimp, pink shrimp, Atlantic sharpnose shark and other small coastal sharks, smooth dogfish, bluefish, black sea bass, gag, Spanish mackerel, king mackerel, cobia, and summer flounder. In addition to these federally-managed species, this area also provides habitat for blue crab, Atlantic menhaden, Florida pompano, Gulf kingfish, red drum, black drum, and sheepshead, which are important prey for federally-managed species and should be included in the assessment.

Thank you for the opportunity to provide these comments in the SEIS, and the NMFS looks forward to reviewing the EFH Assessment for this important project. Please direct related questions, comments, or requests for assistance with the EFH Assessment to the attention of Mr. Fritz Rohde at our Beaufort Field Office, 101 Pivers Island Road, Beaufort, North Carolina 28516 or at (252) 838-0828.

Sincerely,



/ for

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

cc: COE, Mickey.Sugg@usace.army.mil
USFWS, Pete_Benjamin@fws.gov
NCDCM, Doug.Huggett@ncmail.net
NCDCM, Gregg.bodnar@ncdenr.gov
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F/SER47, Fritz.Rohde@noaa.gov

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

September 14, 2015

US Army Corps of Engineers, Wilmington District
Regulatory Field Office
69 Darlington Avenue
Wilmington, NC 28403

Attn: Mr. Mickey T. Sugg

Subject: **Draft Supplemental Environmental Impact Statement (DSEIS) for Figure Eight Island Shoreline Management Project, Figure Eight Island, NC; CEQ Number: 20150185**

Dear Mr. Sugg:

Pursuant to Section 309 of the Clean Air Act and Section 102(2)(C) of the National Environmental Policy Act (NEPA), the U.S. Environmental Protection Agency (EPA) Region 4 Office has reviewed the Draft Supplemental Environmental Impact Statement (DSEIS) for the Figure Eight Island Shoreline Management Project. This DSEIS features an evaluation of the environmental consequences of a proposed management plan which includes the installation of a terminal groin structure and to conduct supplemental beach nourishment on approximately 4,500 linear feet of oceanfront beach and 1,400 linear feet of back barrier shoreline on Figure Eight Island, N.C. EPA understands that the Figure Eight Beach Homeowners Association is seeking Federal and State permits to allow development of this management plan.

The EPA reviewed the DEIS for this proposed action and provided formal comments to the USACE on June 28, 2012, by letter to the Wilmington District Corps (USACE). Our comments on the previous EIS were related to proposed disposal areas, protection of hard bottom areas, and compliance with State water quality standards, water quality monitoring, threatened and endangered species consultation, and avoidance of the Wild Dayrell ship wreck. Since this review, two new alternatives have been added to the DSEIS by the USACE, which analyze multiple terminal going orientations and multiple sources of fill material. The alternatives considered in this DSEIS include:

- Alternative 1 – No Action
- Alternative 2 – Abandon/Retreat
- Alternative 3 – Rich Inlet Management with Beach Fill
- Alternative 4 – Beach Nourishment without Inlet Management
- Alternative 5A – Terminal Groin with Beach Fill from Nixon Channel and a New Connector Channel
- Alternative 5B – Terminal Groin with Beach Fill from Nixon Channel and Other

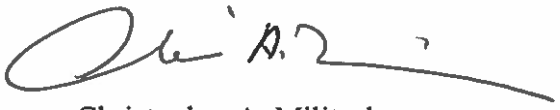
Sources

- Alternative 5C – Terminal Groin at a More Northerly Location with Beach Fill from Nixon Channel and a New Connector Channel
- Alternative 5D – Terminal Groin at a More Northerly Location with Beach Fill from Nixon Channel and Other Sources

Alternative 5D (Terminal Groin at a More Northerly Location with Beach Fill from Nixon Channel and Other Sources) has been identified in the DSEIS as the "Applicant's Preferred Alternative," which differs from the original "Applicant Preferred Alternative" of 5B – Terminal Groin with Beach Fill from Other Sources.

The attachment to this letter outlines our detailed comments (See Attachment). Based upon the EPA's review, a NEPA rating of EC- 2 has been assigned to this DSEIS, meaning we have environmental concerns and have requested that the FEIS include updated information (where available) on a number of areas and issues. The EPA's primary environmental concerns relate to potential impacts to water quality, wetlands, threatened and endangered species and essential fish habitat. The EPA requests that you provide specific responses to our comments in a dedicated section of the FEIS. If we can be of further assistance, please contact Mr. Dan Holliman at (404) 562-9531 or at Holliman.Daniel@epa.gov.

Sincerely,



Christopher A. Militscher
Chief, NEPA Program Office
Resource Conservation and Restoration

Attachment: Detailed Comments

Attachment: EPA Detailed Comments
Figure Eight Island Shoreline Management Plan DSEIS

1. The public notice and introduction of the EIS do not adequately describe why a supplemental EIS is needed. Section 1502.9 of NEPA states that an Agency shall prepare supplements if:

   > (i) *The agency makes substantial changes in the proposed action that are relevant to environmental concerns; or*
   > (ii) *There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.*

   The reasoning for preparing a supplement should be clearly stated in the EIS. EPA recommends providing additional clarification in the FEIS as to why a supplement was prepared by the USACE.

2. The EPA notes that specific responses to EPA's comments on the DEIS were not provided in the DSEIS. It is also noted that Appendix A – did not have a copy of the EPA DEIS comment letter. Because these are formal Agency comments and part of the public record, please include these comments in the FEIS and provide a dedicated section that specifically responds to the EPA's past comments.

3. The EPA notes that the property tax total for the island (Figure Eight Island) is stated in the EIS as $907,352,900. However, this is not the value of the property that is being directly impacted by coastal erosion. The EPA notes that both figures are provided in the EIS, but to avoid confusion, it is recommended only using the relevant property value of the endangered properties.

4. Page 23 – Several examples are provided of potential impacts to road infrastructure if erosion remains unchecked on the island. Please provide citations, model results, or other evidence in the FEIS of how these potential impacts were derived.

5. Page 33 – It is stated, "*At the present time (2015), the shoreline along the north end of Figure Eight Island is responding positively to the orientation of the ocean bar channel of Rich Inlet and as long at the channel maintains this favorable orientation, immediate efforts to abandon and/or relocate structures from the ocean shoreline will not be necessary. In this regard, the position of the shoreline north of the intersection of Comber Road and Dunes Point Road (approximately baseline station 80+00) are now between 160 and 350 feet seaward of the 2006 shoreline position.*" If the shoreline is currently accreting and there is not an immediate need for relocation/abandonment, it is unclear to the EPA if the purpose and need of the project is met. Please clarify in the FEIS.

6. Alternative 2 – Abandon/Retreat – Under this alternative no additional measures would be employed to prevent coastal erosion. Certain endangered properties would either be relocated or demolished. The DSEIS states that 30 structures would be demolished and

10 would be relocated. It is not clear how the number of structures to be demolished/relocated was developed. Additional clarification is needed in the FEIS.

7. Alternatives 5C and 5D were not analyzed in the original DEIS. The terminal groin position in 5C and 5D is a more northerly position than Alternatives 5A and 5B. It is stated in the DSEIS that the decision to add 5C and 5D was due to "*potential complications in obtaining the necessary easements for constructing 5A and 5B...*" This issue is key to adding the new alternatives and most likely the reasoning for developing the supplemental EIS. The EPA is concerned that this issue is not fully developed/discussed in the DSEIS. In addition, the EPA remains unclear on why the same easement issues would not exist for the new groin alignments presented for 5C and 5D. The EPA recommends clarification in the FEIS.

8. Page 27 – It is stated that: "*Alternatives 5A and 5B were not modeled using the 2012 conditions (Table 3.1) since this position of the terminal groin was not favored by a majority of the northernmost property owners and would not likely be approved by the Figure "8" Beach HOA. Alternative 5C was also excluded from the 2012 model setup due to the Figure "8" Beach HOA designating Alternative 5D as its preferred alternative prior to the initiation of the 2012 model simulations. Although not modeled using 2012 conditions, quantities and cost estimates to construct these three alternatives, given the 2012 conditions, were computed using actual 2012 survey data*". The EPA is unclear on why these alternatives were not fully evaluated / considered but carried forward in the analysis. We understand that the applicant has a preferred alternative (5D), however, if Alternatives 5A and 5B meet the project purpose and need, they should be fully evaluated in the EIS. The EPA recommends the FEIS include updated modeling (using 2012 conditions) for all alternatives (including Alternatives 5A and 5B).

9. Figure 3.12 depicts coastal wetlands being impacted by the anchor section of Alternative 5D which includes construction of sheet pile and a 50ft construction buffer. It is unclear to the EPA if these wetlands are jurisdictional, requiring Section 404 permit coverage. In addition, Chapter 5 (environmental consequences) also does not clearly state the impacts to "jurisdictional" wetlands for Alternative 5D. The EPA recommends that the FEIS provide a clear description of potential impacts to jurisdictional wetlands (including delineations) and any proposed mitigation for those impacts, if applicable.

10. Pages 264-265 - It's not clear from the DSEIS if the Sea Level Rise (SLR) discussion in the DSEIS follows internal USACE regulations/guidance for predicting SLR and addressing coastal risk reduction/resilience. Please see the references:

    - *ETL 1100-2-1*
      Procedures to Evaluate Sea Level Change: Impacts, Responses, and Adaption (2014)
      http://www.publications.usace.army.mil/Portals/76/Publications/EngineerTechnicalLetters/ETL_1100-2-1.pdf

    - *Coastal Risk Reduction and Resilience: Using the Full Array of Measures (2013)*

http://www.corpsclimate.us/docs/USACE_Coastal_Risk_Reduction_final_CWTS_2013-3.pdf

The EPA recommends that these references be evaluated in the FEIS in the context of how SLR and other options for coastal risk reduction were considered when selecting the preferred alternative.

11. The EPA continues to recommend that all project construction and dredging operations avoid the Civil War era shipwreck, the 'Wild Dayrell', and that follow-up geophysical investigations continue to keep this cultural resource accurately mapped in order to protect it during all construction activities, as well as future maintenance operations (including dredging and periodic nourishment). The EPA further recommends coordination and consultation with the State Historic Preservation Office prior to construction activities.

12. The EPA notes that construction of the terminal groin and beach nourishment activities may impact nesting activities of shoreline birds such as the piping plover. The EPA is concerned about these potential impacts to threatened and endangered (T&E) species but defers to the US Fish and Wildlife Service. The EPA recommends that the USACE continue consultation with the USFWS regarding species listed under the Endangered Species Act (ESA). In addition, the EPA also recommends that the USACE consult with the National Marine Fisheries Service (NMFS) regarding potential impacts to essential fish habitat, if NMFS has not already been consulted. Additional information relating to consultations with USFWS and/or NMFS between the release of the DSEIS and FEIS should be included in the FEIS.

13. Because the NEPA process includes an assessment of potential water quality impacts pursuant to Section 401 of the Clean Water Act, the EPA recommends the USACE to continue to coordinate with the North Carolina Division of Water Quality (DWQ) and seek a DWQ Section 410 water quality certification. Further, the EPA recommends that the USACE to continue to coordinate with the North Carolina Division of Coastal Management (DCM) to ensure the full compliance with all State Environmental Policy Act (SEPA) requirements and to determine consistency with the Coastal Zone Management Act (CZMA). The EPA recommends that the FEIS document all of these efforts at coordination and include in the appendices all relevant and required certifications.

14. The DSEIS did not include any analysis or information pertaining to the Council on Environmental Quality's (CEQ's) final draft guidance on Greenhouse Gas (GHG) Emissions and Climate Change Impacts (See: https://www.whitehouse.gov/administration/eop/ceq/initiatives/nepa/ghg-guidance). The USACE did not provide a discussion as to why this guidance is not applicable to the proposed project. The FEIS should provide an assessment of potential GHG emissions and what contribution to climate change may be anticipated from the proposed project, as appropriate.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

September 9, 2015

Mickey T. Sugg
Wilmington Regulatory Field Office
U. S. Army Corps of Engineers
69 Darlington Ave.
Wilmington, North Carolina 28403

Subject: Figure "8" Beach Homeowners Association, Inc., New Hanover County
USACE Action ID #SAW-2006-41158

Dear Mr. Sugg:

This is in response to your July 31, 2015 and July 9, 2015 Public Notices, requesting comments on the Supplemental Environmental Impact Statement (SEIS) for the Figure Eight Island Shoreline Management Project. Figure "8" Beach Homeowners Association, Inc. has applied for Department of Army (DA) authorization to construct a terminal groin and conduct beach nourishment along approximately 4,500 linear feet (lf) of oceanfront beach and 1,400 lf of back barrier shoreline on Figure Eight Island, in New Hanover County, North Carolina. The U.S. Fish and Wildlife Service, Raleigh Ecological Services office (Service) has reviewed the public notice and SEIS for the project and our comments are listed below. These comments are submitted in accordance with the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661-667d). Comments related to the FWCA are to be used in your determination of compliance with 404(b)(1) guidelines (40 CFR 230) and in your public interest review (33 CFR 320.4) in relation to the protection of fish and wildlife resources. Additional comments are provided regarding the District Engineer's determination of project impacts pursuant to Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531-1543). The Service previously provided comments to the 2012 Draft EIS for this project by letter dated July 3, 2012.

Project Area, Proposed Activities, and Anticipated Impacts

The project area is the northern end of Figure Eight Island and the adjacent Atlantic Ocean, Rich Inlet, and Nixon Channel. The purposes and needs stated in the SEIS for the project include: 1) to reduce or mitigate erosion along 3.77 km (2.34 mi) of the Figure Eight Island oceanfront and 427 m (1,400 lf) of back barrier shoreline along Nixon Channel; 2) to provide reasonable short-term protection to residential structures in response to any unpredicted shoreline change within the next five years; 3) to provide long-term protection to Figure Eight Island homes and infrastructure over the next 30 years; 4) to acquire compatible beach material in compliance with

the North Carolina State Sediment Criteria for shore protection projects; 5) to maintain navigation conditions within Rich Inlet and Nixon Channel; 6) to balance the needs of the human environment with the protection of existing natural resources; 7) to maintain existing recreational resources; and 8) to maintain the tax value of the homes and infrastructure on Figure Eight Island.

Eight alternatives are proposed: (1) No Action, (2) Abandon/ Retreat, (3) Rich Inlet Management with Beach Fill, (4) Beach Nourishment without Inlet Management, (5A) Terminal Groin with Beach Fill from Nixon Channel and a New Connector Channel, (5B) Terminal Groin with Beach Fill from Nixon Channel and Other Sources, (5C) Terminal Groin at a More Northerly Location with Beach Fill from Nixon Channel and a New Connector Channel, and (5D) Terminal Groin at a More Northerly Location with Beach Fill from Nixon Channel and Other Sources. The applicant's preferred alternative is Alternative 5D, which involves the construction of a 1,500-foot long terminal groin at the extreme north end of Figure Eight Island (south of Rich Inlet).

The Applicant's preferred alternative has been modified since the issuance of the 2012 DEIS. It currently includes the construction of a 505 lf terminal groin with a 995 lf shore anchorage section. The preferred alternative 5D also proposes beach nourishment along approximately 4,500 lf of oceanfront, and along 1,400 linear feet of back barrier shoreline. Borrow materials would be derived from the maintenance of the existing permitted area in Nixon Channel. Three AIWW upland disposal sites would serve as contingency sediment sources if needed. The SEIS states that the project is proposed to be constructed between November 16 and March 31.

Federal Protected Species

The SEIS lists the following Federal listed species (under the authority of the Service) within the project area: West Indian manatee (*Trichechus manatus*), piping plover (*Charadrius melodus*), seabeach amaranth (*Amaranthus pumilus*), and the Kemp's Ridley (*Lepidochelys kempi*), hawksbill (*Eretmochelys imbricata*), leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*), and green (*Chelonia mydas*) sea turtles. Of the five sea turtle species, the loggerhead, green, Kemp's ridley, and leatherback sea turtle may nest in the project area. The ESA Section 7 evaluation can be limited to these four turtle species. Whales, shortnose sturgeon (*Acipenser brevisrostrum*), Atlantic sturgeon (*Acipenser oxyrinchus*), and sea turtles in the water are under the jurisdiction of NOAA Fisheries' Protected Species Division. The Service is pleased that piping plover, seabeach amaranth, and sea turtle monitoring efforts have consistently been conducted over the past several years on Figure Eight Island and Hutaff Island, and we recommend that the monitoring efforts be required to continue. The Service understands that a Biological Assessment (BA) is forthcoming.

The species occurrence data in the SEIS are not up-to-date. For sea turtles and seabeach amaranth, no data is provided after 2010. For shorebirds, including piping plover, the tables provide data to 2007, although some of the text includes more recent information. The species data should be updated in the final EIS, with all currently available data summarized and analyzed (up to and including summer of 2015 if possible).

West Indian Manatee

Manatees, designated as federally endangered, move along the Atlantic Coast during summer months and are seasonal transients in North Carolina, primarily from June through October. Manatees may be found in water over one meter (3.3 feet) deep. Individuals move extensively when in North Carolina waters and past occurrence records cannot be used to precisely determine the likelihood that a manatee will be present at a particular construction site. Manatees may migrate through the project area during the warmer month of the year, primarily from June through October.

Piping Plover

Piping plovers, designated as federally threatened, are known to occur in the project area. North Carolina is the only state where the piping plover's breeding and wintering ranges overlap and the birds are present year-round. Plovers may nest in the project area during the summer months, and overwinter in the project area during the winter months. The project area includes portions of Critical Habitat Unit NC-11 for wintering piping plovers, as described in 50 CFR Part 17 (66 FR 36038). Piping plovers from the federally endangered Great Lakes population as well birds from the threatened populations of the Atlantic Coast and Northern Great Plains overwinter on North Carolina beaches and have been recorded on Figure 8 Island (NCWRC shorebird database). Overwintering plovers may arrive as early as July, although most individuals arrive in early to mid-fall. Studies of wintering piping plovers indicate that they spend most of their time foraging on worms, fly larvae, beetles, crustaceans, molluscs, and other invertebrates (Bent 1929, Nicholls and Baldassarre 1990). In late February, piping plovers begin leaving the wintering grounds to migrate back to breeding sites. Northward migration peaks in late March, and by late May most birds have left the wintering grounds.

Piping plovers nest above the high tide line on coastal beaches; on sand flats at the ends of sand spits and barrier islands; on gently sloping foredunes; in blowout areas behind primary dunes (overwashes); in sparsely vegetated dunes; and in overwash areas cut into or between dunes. The species requires broad, open, sand flats for feeding, and undisturbed flats with low dunes and sparse dune grasses for nesting. Piping plovers arrive on their breeding grounds in late March or early April. Following establishment of nesting territories and courtship rituals, the pair forms a depression in the sand, where the female lays her eggs. By early September both

adults and young depart for their wintering areas. In the summer of 2014, a piping plover nest was recorded on the north end of Figure 8 Island, within a few hundred feet of the proposed groin location.

As proposed in the SEIS, the initial construction of the preferred alternative is proposed to take place during the winter months (November 15 to March 31), which may adversely affect overwintering piping plovers and the critical habitat unit. Little discussion of potential impacts to designated critical habitat is provided in the SEIS, although portions of Chapter 5 discuss the erosion of sand in areas downdrift of the terminal groin. In addition, the figures showing the outcomes of various model runs in the Engineering Report (Appendix B and sub-parts) indicate potentially severe erosion of the shoreline downdrift of the terminal groin within the first five years. The Service has concerns for the potential losses of nesting and foraging habitat due to both direct and indirect impacts, particularly within the Critical Habitat Unit. The BA and final EIS should address the potential loss of designated critical habitat over time, as a result of the construction of the terminal groin. Groins can act as barriers to longshore sand transport and cause downdrift erosion (Hayes and Michel 2008), which prevents piping plover habitat creation by limiting sediment deposition and accretion. Potential losses and degradation of critical habitat would include erosion or loss of unvegetated sand habitats above MLLW in the area downdrift of the groin (potentially including shoals and sandbars in Rich Inlet and Green Channel), and stabilization and increase in vegetation in the area updrift of the groin structure.

Seabeach Amaranth

Seabeach amaranth is an annual plant that exists adjacent to inlets, along beaches between dunes and the high tide line, and in areas of extreme overwash. The plant helps to trap sand and build dunes. Suitable habitat for this plant occurs in the project area. Seabeach amaranth begins to flower as soon as plants have reached sufficient size, sometimes as early as June, but more typically commencing in July and continuing until the death of the plant in late fall. Seed production begins in July or August and peaks in September during most years, but continues until the death of the plant. Under favorable circumstances, the reproductive season may extend until January or sometimes later (Radford et al. 1968; Bucher and Weakley 1990; Weakley and Bucher1992). The Service recommends that sediment be placed during the winter months (after the first frost), when only seeds are present. Sediment placement may bury seeds on the beach and delay germination the following year, but the seeds are likely to remain viable and may germinate when the imported sand washes away. The main long-term threat to this plant on Figure Eight Island would be stabilization of the shoreline and an increased frequency of large-scale sediment placements. As sea level continues to rise, major portions of the beach may need additional sand on an annual basis. If buried seeds are not given an opportunity to germinate and produce seeds, the population of the threatened plant on Figure Eight Island could be reduced in the future.

Similar to concerns for the piping plover, the construction timing for the landward portion of terminal groin is a concern for the seabeach amaranth. The ESA Section 7 evaluation should address the potential for affects from the construction timing, and also the potential effects of long-term stabilization of the shoreline.

Sea Turtles

Sea turtle nesting habitat is present within the proposed project area. While all five Atlantic sea turtles are protected by the ESA and may occur in the coastal waters of North Carolina, the Section 7 evaluation can be limited to a consideration of loggerhead, Kemp's Ridley, leatherback, and green sea turtles.

Terminal groins and their construction can cause several adverse impacts to sea turtles. These in-water structures have profound effects on adjacent beaches (Kaufman and Pilkey 1979). Jetties and groins placed to stabilize a beach or inlet prevent normal sand transport, resulting in accretion of sand on updrift beaches and acceleration of beach erosion downdrift of the structures (Komar 1983; Pilkey et al. 1984). Witherington et al. (2005) found a significant negative relationship between loggerhead nesting density and distance from the nearest of 17 ocean inlets on the Atlantic coast of Florida. The effect of inlets in lowering nesting density was observed both updrift and downdrift of the inlets, leading researchers to propose that beach instability from both erosion and accretion may discourage sea turtle nesting.

Following construction, the presence of groins and jetties may interfere with nesting turtle access to the beach, result in a change in beach profile and width (downdrift erosion, loss of sandy berms, and escarpment formation), trap hatchlings, and concentrate predatory fishes, resulting in higher probabilities of hatchling predation. In addition to decreasing nesting habitat suitability, construction or repair of groins and jetties during the nesting season may result in the destruction of nests, disturbance of females attempting to nest, and disorientation of emerging hatchlings from project lighting.

Sand placement on the beach may also have both direct and indirect impacts on sea turtle reproduction. Changes in sediment quality could result in adverse impacts on sea turtle nest site selection, digging behavior, clutch viability, and hatchling emergence (Nelson and Dickerson 1987; Nelson 1988). A change in sediment color on a beach could change the natural incubation temperatures of sea turtle nests in an area, which, in turn, could alter natural sex ratios.

Beach nourishment projects create an elevated, wider, and unnatural flat slope berm. Sea turtles nest closer to the water the first few years after nourishment because of the altered profile (and perhaps unnatural sediment grain size distribution) (Ernest and Martin 1999; Trindell 2005).

General Comments

Alternatives Analysis

On page 7 of the SEIS (Chapter 1 - Introduction), the applicant states that the Rich Inlet management with beach fill alternative (Alternative 3) meets the purpose and needs of the project, and that it is practicable. It also appears from some of the modeling discussion in the Engineering Report (Appendix B, page 206) that Alternative 4 may provide adequate protection of homes from erosion even under the high-erosion scenario. However, the applicant believes that the terminal groin alternative (preferred alternative 5D) will result in improved economic benefits and reduced environmental impacts. Because of the Service's concerns for potential impacts to piping plover, Critical Habitat Unit NC-11, seabeach amaranth, and sea turtles, it currently appears that Alternative 5D may have greater impacts to our trust resources than Alternatives 3 or 4.

Economic Costs and Benefits

The SEIS discusses the assessed tax value of several properties on Figure Eight Island. The SEIS states that there are 40 homes that are or may be imminently threatened over the next 30 years, and assumes that 30 homes will need to be demolished under both Alternatives 1 and 2 (pages 31, 33, 34) and only 10 would be relocated. According to Page 33 of the SEIS, there are currently 80 empty lots on Figure Eight Island. There does not appear to be a justification given for the estimated number of homes that will be demolished.

Sea Level Rise and Nourishment Intervals

The SEIS uses historic rates of sea level rise (SLR) in Wilmington, Southport, and Beaufort, North Carolina (approximately 0.84feet/century and 0.68 feet per century, respectively) as a basis for analysis. Page 17 of Appendix B states that the rate of shoreline erosion associated with the average rate of SLR is 0.5 ft/year. The SEIS also refers to historic rates of nourishment and Federal Storm Damage Reduction Project schedules for Wrightsville and Carolina Beaches, to establish that erosion of the shoreline has not accelerated over time. However, no data or detail is provided for the reader to consider. Wrightsville Beach is nourished every four years based on funding schedules from the Corps, while Carolina Beach is nourished every three years. It is not clear in the SEIS whether the Corps would provide nourishment at a shorter interval than provided in the funding schedule, if erosion rates warranted it. Further, portions of Wrightsville Beach have also recently been nourished by dredge spoil from Mason Inlet, as mentioned in the Cumulative Effects Assessment, and by at least one privately-funded activity in 2005. Carolina Beach has a rock revetment on the northern end to protect homes from beach erosion, which may effectively allow for a longer interval between nourishment events. Based on information

provided in the SEIS (Table 6-2 of the Engineering Report), most northern sections of beach on Figure Eight Island have been nourished every two-four years, with other sand management activities (such as beach scraping) occurring almost every year in between. We note that Table 6-2 is not current, as it leaves out the 2012-2013 Mason Inlet dredging and sand placement. In addition, the model runs in the Engineering Report (Appendix B, page 214), indicate that the preferred alternative (5D) may result in erosion-related damage in Year 4 or 5 to four oceanfront homes near the south end of Inlet Hook Road. Under a high-erosion scenario, it is not explained how a nourishment interval of 5 years will protect these currently sand-bagged homes from potential damage.

However, a nourishment schedule of five years is proposed for this preferred alternative. The Service would be concerned with the acceleration of nourishment schedules based upon increased storm surge or sea level rise, or other factors. The Service recommends that any permit for this project include conditions requiring that beach nourishment be conducted no more often than once every five years.

Summary of Service Recommendations

1. Based upon our concerns outlined above for potential impacts to trust resources, at this time the Service continues to recommend denial of the Corps permit for the project as proposed. We look forward to working with the Corps and the applicant to address our concerns, which are listed below.

2. Species occurrence data should be updated in the Final EIS and BA. All available data for years up to 2015 should be provided for sea turtles, seabeach amaranth, and shorebirds.

3. The BA and final EIS should address the potential loss of designated critical habitat over time, as a result of the construction of the terminal groin. As the landward end of the terminal groin is proposed to be located within Critical Habitat Unit NC-11 for the piping plover, the proposed timing, triggers, construction methods, and potential effects should be discussed in the BA.

4. The BA and Final EIS should address the potential for affects to seabeach amaranth from the construction timing, and also the potential effects of long-term stabilization of the shoreline.

5. The SEIS states that Alternative 3 is practicable, but the applicant believes that the terminal groin alternative (preferred alternative 5D) will result in improved economic benefits and reduced environmental impacts. Because of the Service's concerns for potential impacts to piping plover, Critical Habitat Unit NC-11, seabeach amaranth, and sea turtles, it currently appears that Alternative 5D may have greater impacts to our trust resources than Alternative 3.

6. The final EIS should include more discussion of whether the proposed five-year nourishment schedule will be adequate to protect this area. The Service would be concerned with the acceleration of nourishment schedules based upon increased storm surge or sea level rise, or other factors. The Service recommends that any permit for this project include conditions requiring that beach nourishment be conducted no more often than once every five years.

Thank you for the opportunity to comment on this project. We look forward to the ESA Section 7 evaluation process. If you have any questions or comments, please contact Kathy Matthews at 919-856-4520, x27.

Sincerely yours,

for Tom Augspurger

Pete Benjamin
Field Supervisor
Raleigh Ecological Services Office

cc: Fritz Rohde, NMFS, Beaufort, NC
Maria Dunn, NCWRC, Washington, NC
Doug Huggett, NCDCM, Morehead City, NC
Dan Holliman, USEPA
Todd Bowers, USEPA

References:

Bent, A.C. 1929. Life Histories of North American Shorebirds, Part Two. Smithsonian Institution United States National Museum Bulletin 146.

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NCDENR
North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

September 16, 2015

U.S. Army Corps of Engineers - Wilmington District
c/o Mickey Sugg, Project Manager
69 Darlington Avenue
Wilmington NC 28403-1343

Dear Sirs:

The Division of Coastal Management (DCM) has completed our review of the Supplemental Environmental Impact Statement (SEIS) for the proposed **Figure Eight Island Shoreline Management Project** located in New Hanover County, North Carolina. As you are aware, in 2011 the General Assembly of North Carolina enacted Senate Bill 110 (SB 110), that amended the Coastal Area Management Act (CAMA) to allow for the permitting of up to four terminal groins in North Carolina. For communities pursuing a terminal groin project, SB 110 set out several specific requirements that must be met before a CAMA permit can be issued. SB 110 was modified in 2012 (SB 151) to further clarify certain requirements originally set forth in SB 110. DCM staff have therefore reviewed the DEIS with the requirements of these bills in mind, and provide the following comments for your consideration.

Page 20
The document does not indicate the long term erosion rates for the project area. Per the DCM Long Term Annual Erosion Rate Map update of 2011, the rate is currently 2' per year in the project location.

Page 20
The document does not indicate the current conditions of the sand bags along the properties on the north end of the island (i.e. covered with sand and vegetation).

Page 20
The document does not indicate if structures on these properties could currently be re-built due to the location of the first line of stable natural vegetation in relation to existing structures.

Page 23-24, and Table 2.2
The tax information summarized on page 23 references tax values as of 2008, yet it appears that the dollar values referenced on this page and in Table 2.2 utilize tax data from the most recent (2012) parcel valuations. Please update the language on page 23 (and elsewhere in the document) to reflect that these tax values reflect the 2012 tax information, and not 2007 or 2008 New Hanover County tax data.

Page 21 and 22 and Table 2.1
The document does not appear to provide the properties and dates of sand bag permitting along the north end of the island, which should include a variance granted from the Coastal Resources Commission (CRC). The structures located on the properties with existing sandbags were approximately 200' to 300' from the approx. low water boundary based upon a January 6, 2015 site visit. The table also does not include the recent authorization to Figure Eight Island HOA to allow for beach scraping along the shoreline adjacent to existing structures and the last beach nourishment project in the winter of 2013.

Page 23
The document does not reference what the shoreline location is in relation to the existing roads (Surf Court, Comber and Inlet Hook Roads) in the project location (i.e. MHW, first line of stable natural vegetation).

Page 25 - Figure 2.7
The figure indicates the location of imminently threatened residential structures with sand bags. However, some of these properties currently do not meet the criteria for imminently threatened structures (i.e. foundation of structure greater than 20' from the erosion escarpment). This Figure should read "Current and/or Previously Threatened Structures and Properties".

Pages 58-60
The document indicates that there are three existing spoil islands along the AIWW that were tested to determine sand quantity and quality to utilize for beach fill. This Section should indicate when these analyses were accomplished. For example, Spoil Island No. 1 along the south side of Nixon Channel, which is privately owned, has been utilized for multiple dredging events in the past few years as a designated spoil site. If the sediment analysis on this site was done before these additional spoil deposition events, a previously-conducted sediment analysis may now be insufficient.

Page 63-64 and Figure 3.9, and Page 67 – Figure 3.12
These Figures indicate the location of coastal wetlands, which were verified by DCM Staff on April 16, 2013. However, based upon additional site visits in the location of the proposed anchor for the terminal groin, it appears that the coastal wetlands boundary has expanded. The Figure should be revised to reflect the expanded area of coastal wetlands. Further, the Figure should also include the property boundaries/owner names and the location of the mean high water (MHW) and mean low water (MLW) boundaries in relation to the proposed groin alternatives.

Page 67 - Figure 3.10
The 2014 existing beach profile is incomplete from approximately 1600' to 2000' (as measured from baseline).

Pages 182-184
Our 2012 comments on the original DEIS requested significant expansions of the Recreational Resources and Navigation Sections. Our comments were based in large part on comments received during the June 7th, 2012 public hearing on the proposed project. We still recommend

that these sections be revised to provide more quantitative data on the public usage of these resources.

Page 450
Under Escarpments it reads: Escarpments in the newly placed beach fill that exceed 18 inches or greater than 100 ft. shall be graded. Should this section read "exceeds 18 inches for greater than 100 ft."?

Page 475
Under Response Triggers, this section proposes implementation of mitigative measures if surveys indicate that shoreline erosion is exceeding the lower 90% confidence levels for two consecutive years for two or more adjacent transects. It appears that this proposed criterion, especially the proposed timeframe, may not be sufficient to identify and offset potential adverse impacts to individual properties or structures. It appears that by the time mitigation may be formally triggered, loss of individual structures or property may have already occurred. The response trigger proposal should be modified, or additional components added, that would minimize the risk of such property or structural loss occurring.

Page 491
This section states that maintenance of the terminal groin is not anticipated. However, SB 151 requires that the applicant for a terminal groin must plan for maintenance and modification of the terminal groin structure. Therefore, the potential maintenance and modification of the groin must be addressed, including the estimated cost necessary to implement the maintenance and/or modifications.

Page 491
This section states that no mitigation is proposed at all for Hutaff Island due to the lack of private property and structures. This does not appear to meet the requirements of SB 151. The fact that no structures exist on Hutaff Island would not preclude the need to implement mitigation, possibly in the form of beach nourishment, if mitigation triggers are exceeded. This section should be updated accordingly, and the associated cost estimates modified to address that possibility.

Inlet Management Plan

The document still appears to use data collected in 2007 regarding shoreline change thresholds. The Division's July 20, 2012 comment letter on the original Draft Environmental Impact Statement requested that the plan utilize more current data to in the development of the shoreline change thresholds. This issue remains a concern to the Division, and we would like to see this issue addressed.

Additionally, the document does briefly address the monitoring and mitigation requirements for certain biological resources (Chapter 6 beginning on page 459). However, the document does not appear to include any mitigation measures to offset any potential adverse impacts to the

biological resources. The document should address potential mitigative measures for any adverse impacts to biological resources within the permit area.

Fisheries Resource Concerns

As a part of the review of the document, the Division's Fisheries Resource Specialist provided comments relating to the protection of fisheries resources within the project area. Specifically, these comments addressed the following points:

- A recommendation that existing sandbags, which can have impacts on biotic communities, be removed concurrent with the construction of the terminal groin and initial beach-fill activities.
- A significant concern that the alternatives that will involve the nourishment along Nixon Channel (Alternatives 3, 4, and 5(a-d) could impact the Primary Nursery Area (PNA) that is associated with the coastal wetlands that exist along the back side of Figure 8 Island. PNA's are estuarine waters where initial post-larval development occurs. Species within this area are early post-larval to juvenile and include finfish, crabs, and shrimp. Species inhabit PNA's because they afford food and protection during vulnerable periods of their life history. Coastal wetlands are a productive detritus-based system that trap nutrients and sediment, aids in shoreline erosion control, dissipates wave and storm action, and provide a barrier to flood damage. In addition, coastal wetlands are important to waterfowl feeding and nesting activities, and numerous estuarine-dependent species such as shrimp, flounder, oysters, crabs, and menhaden.
- The need to apply an in-water work moratorium (necessary to protect aquatic resources) from April 1 to September 30. This moratorium reduces the negative effects on critical fish life history activities, to include spawning migrations and nursery functions. Additionally, a concern was raised that potential mitigative actions (i.e. beach fill if certain shoreline change thresholds are met) may result in proposed in-water work during the moratorium period. The application of the moratorium to any such mitigative actions should be addressed.

Financial Assurance

Senate Bill 151 (Session Law 2013-384) requires that the applicant for a terminal groin project address certain financial obligations for the project, including long-term maintenance. In order to ensure that the required financial information is provided in an acceptable fashion, the financial costs associated with the requirements of Senate Bill 151 (Session Law 2013-384) should be included in the DEIS in as detailed a manner as is possible at this stage in the project development process. The Division would therefore request more detailed cost information in the Final EIS, preferably in a standalone or summary section. Items of specific interest include:

- Costs associated with any additional monitoring initiatives.
- Cost estimates for the full removal of the terminal groin structure should be stated if it is determined that the structure is not functioning as intended, and groin modifications are deemed ineffective in minimizing or eliminating these negative impacts.
- The inclusion of the above-listed financial information into the cost analysis of the terminal groin portions of the alternatives section of the DEIS.
- With regards to verification of the final financial assurance package, 113A-115.1(e)(6) requires that a financial assurance plan be verified either by the Secretary of the Department of Environment and Natural Resources (DENR) or by the Coastal Resources Commission (CRC). DCM and the Department have taken the position that the choice of verification pathway (DENR Secretary or CRC) should fall to the discretion of the applicant. Therefore, as the financial assurance package becomes more detailed and refined, and the project moves closer to the permit application stage, the Division suggests a meeting between the applicant and the Division to determine which of the two verification pathways are preferred by the applicant.

The Division of Coastal Management appreciates the opportunity to comment on this project, and we look forward to further discussions on the issues raised in this letter. Please note that internal consistency throughout the document should be verified following any revisions made subject to the above comments. If you have any questions concerning any of these comments, please feel free to contact me at (252) 808-2808 ext. 211.

Sincerely,

Doug Huggett

Doug Huggett
Major Permits Coordinator

Cc: Braxton Davis, DCM
Debbie Wilson, DCM
Robb Mairs, DCM
Heather Coats, DCM
Lynn Hardison, DENR

North Carolina Wildlife Resources Commission

Gordon Myers, Executive Director

MEMORANDUM

TO: Mickey Sugg
US Army Corps of Engineers

FROM: Maria T. Dunn, Coastal Coordinator
Habitat Conservation

DATE: September 14, 2015

SUBJECT: Figure Eight Island Shoreline Management Project Supplemental Environmental Impact Statement (SEIS), Figure Eight Island, New Hanover County, North Carolina.
SAW-2006-41158

Biologists with the NC Wildlife Resources Commission (NCWRC) have reviewed this Supplemental Environmental Impact Statement (SEIS) with regards to potential impacts to fish and wildlife resources. Our comments are provided in accordance with provisions of the Coastal Area Management Act (G.S. 113A-100 through 113A-128), as amended, and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

The Figure Eight Beach Homeowners Association, Inc. has submitted a SEIS stating plans to install a terminal groin structure along the southern shoulder of Rich Inlet and to conduct supplement beach nourishment on approximately 4,500' of oceanfront beach and 1,400' of back barrier shoreline on Figure Eight Island. The preferred alternative, Alternative 5D, moves the location of the groin approximately 420' north of the initial location described in the DEIS, published on May 18, 2012. The total length is approximately 1,500', of which 505' will project seaward of the 2007 mean high water shoreline. The landward 995' anchor section would extend across the island and terminate near the Nixon Channel Shoreline. The crest height of the ocean section of groin is estimated to be +6' NAVD for the first 400' and slope to a top elevation of +3' NAVD on the seaward end. Material for the project would be obtained from dredging designated borrow sites within Nixon Channel. Additional material may be obtained from three upland disposal islands if necessary. Engineering models estimate periodic nourishment will be required approximately every five years or six seperate maintenance events for 30 years.

The SEIS updates and outlines the purpose and need for the proposed terminal groin and associated work as "to reduce and/or mitigate for erosion along 2.3 miles of oceanfront shoreline south of Rich Inlet and 0.34 miles of back barrier shorelines along Nixon Channel; provide reasonable short-term protection to imminently threatened residential structures over the next five years; provide long term protection to F8

Mailing Address: Division of Inland Fisheries • 1721 Mail Service Center • Raleigh, NC 27699-1721
Telephone: (919) 707-0220 • **Fax:** (919) 707-0028

homes and infrastructure over the next 30 years; maintain the tax value of the homes and infrastructure on Figure Eight Island.acquire compatible beach material in compliance with North Carolina State sediment criteria for shore protection project; maintain navigation conditions within Rich Inlet and Nixon Channel; balance the needs of the human environment with the protection of existing natural resources; maintain existing recreational resources;"

Projects that affect oceanfront beaches and natural inlet processes such as beach nourishment, inlet dredging, inlet relocation and the construction of hardened structures on or along beaches may adversely affect nesting sea turtles and shorebird foraging and nesting areas. Due to the scope of this project and the documented use of the beaches by sea turtles and shorebirds, the NCWRC has the following comments and recommendations:

- The NCWRC has an established sea turtle nesting moratorium that reduces the potential for unintended impacts to nesting sea turtle species that frequent the coast of North Carolina. To avoid impacts to these species, all work on the oceanfront shoreline, including mobilization and demobilization for all beach nourishment events and the construction of the terminal groin structure, should be conducted outside of the sea turtle nesting season which runs from May 1 until November 15, or until the last known sea turtle nest has hatched.

- Inlet areas provide suitable nesting, foraging and roosting areas for multiple shorebird species. Nesting birds are sensitive to increased human activity and other disturbances around their nesting areas. To limit unintended impacts to nesting bird species in and near the project area, please avoid all work during the shorebird nesting period which runs from April 1 to August 31.

- Preconstruction monitoring should be incorporated for overwintering birds to better establish the use of the inlet area by these species. This information is beneficial in evaluating any impacts to the use by these bird species post construction during seasons that may not have been previously monitored by the applicant outside of the breeding season.

- The NCWRC is concerned that building a structure that is dependent upon regular nourishment events could potentially impact benthic invertebrate populations found in intertidal habitats. Benthic invertebrates are an important food source for foraging birds, both resident and migratory, during both the breeding and nonbreeding seasons. Regular beach nourishment events, such as every five years, can reduce benthic populations when populations are not given appropriate time for recovery.

- The NCWRC is concerned that the construction of a terminal groin may lead to a possible increase in requests to conduct emergency beach nourishment during ecologically sensitive times of the year, i.e. the nesting shorebird and nesting sea turtle moratoriums, due to potential increases in erosion rates around the groin structure.

- The NCWRC is concerned about permanent, cumulative habitat loss and changes to the Rich Inlet complex, the northern end of Figure Eight Island, and Hutaff Island. Species of special concern include piping plover, red knot, and American oystercatcher. Some numbers of these species were included in the SEIS, but it appears some of the data could be updated or statements made as to the cummlimation of data from different sources. "Coastal engineering projects can potentially create, enhance, degrade, or destroy foraging and nesting habitat at important coastal bird breeding, stopover, or wintering sites" (Harrington 2008). Senate Bill 110 (e)(5)(c) states the plan must provide for mitigation measures to be implemented if adverse impacts reach the

thresholds defined in the plan. Mitigation would need to create or protect a similar habitat type that would offset the loss of this inlet area.

- Biological and physical post-project monitoring should be conducted for a long enough period of time to determine the effect a terminal groin structure has on the immediate and surrounding areas. Due to the dynamic nature of barrier islands, ocean facing beaches, and inlets, this period of time should be long enough to capture a "normal" period of time. Monitoring reports should be provided to the appropriate parties and consultation should be done with regulatory and resources agencies prior to ceasing any monitoring activity. If it is determined during this period of time the project has had a significant adverse impact or is not performing as intended, mitigation may have to be implemented.

Thank you for the opportunity to review and comment on the SEIS for this project. Please feel free to contact me at (252) 948-3916 or at maria.dunn@ncwildlife.org

Works Cited

Harrington, B. R. 2008. *Coastal inlets as strategic habitat for shorebirds in the southeastern United States*. DOER Technical Notes Collection. ERDC TN-DOER-E25. Vicksburg, MS: U.S. Army Engineer Research and Development Center. http://el.erdc.usace.army.mil/dots/doer/.

North Carolina
Department of Administration

Pat McCrory, Governor

Bill Daughtridge, Jr., Secretary

September 3, 2015

Mr. Mickey Sugg
U. S. Army Corps of Engineers
Wilmington District
69 Darlington Avenue
Wilmington, North Carolina 28403

Re: SCH File # 16-E-0000-0013; DEIS; Supplemental EIS for the Figure Eight Island Shoreline Management Project - project will install a terminal groin structure along the southern shoulder of Rich Inlet and conduct supplemental beach nourishment.

Dear Mr. Sugg:

The above referenced environmental impact information has been submitted to the State Clearinghouse under the provisions of the National Environmental Policy Act. According to G.S. 113A-10, when a state agency is required to prepare an environmental document under the provisions of federal law, the environmental document meets the provisions of the State Environmental Policy Act. Attached to this letter for your consideration are the comments made by agencies in the course of this review.

If any further environmental review documents are prepared for this project, they should be forwarded to this office for intergovernmental review.

Should you have any questions, please do not hesitate to call.

Sincerely,

Crystal Best
State Environmental Review Clearinghouse

Attachments

cc: Region O

Mailing Address:
1301 Mail Service Center
Raleigh, NC 27699-1301

Telephone: (919)807-2425
Fax (919)733-9571
State Courier #51-01-00
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Location Address:
116 West Jones Street
Raleigh, North Carolina

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North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

MEMORANDUM

TO: Crystal Best
State Clearinghouse

FROM: Lyn Hardison
Division of Environmental Assistance and Customer Service
Permit Assistance & Project Review Coordinator

RE: 16-0013
Draft Environmental Impact Statement
Supplemental EIS for the Figure Eight Island Shoreline Management Project to include the installation of a terminal groin structure along the southern shoulder of Rich Inlet and conduct supplemental beach nourishment
New Hanover County

Date: September 2, 2015

The Department of Environment and Natural Resources has reviewed the environmental document. North Carolina Natural Heritage Program has offered specific information pertaining to rare species and natural communities located in and around the project area. The comments are attached for the applicant review.

The Department appreciates the cooperative efforts and open communication the applicant has with our agencies and we encourage these efforts to continue.

Thank you for the opportunity to respond.

Attachment

North Carolina Department of Environment and Natural Resources
Office of Land and Water Stewardship

Pat McCrory
Governor

Bryan Gossage
Director

Donald R. van der Vaart
Secretary

August 10, 2015

TO: Lyn Hardison, NCDENR State Clearinghouse Coordinator

FROM: Allison (Schwarz) Weakley, North Carolina Natural Heritage Program Allison Weakley

SUBJECT: Draft Environmental Impact Statement (EIS) – Supplemental EIS for Figure Eight Island Shoreline Management Project, including installation of a terminal groin structure along the southern shoulder of Rich Inlet and supplemental beach nourishment, New Hanover County, North Carolina

REFERENCE: Project No. 16-0013

Thank you for the opportunity to provide information from the North Carolina Natural Heritage Program (NCNHP) database for the proposed project referenced above. The NCNHP database shows numerous records for rare species and important natural communities, as well as two natural areas - Figure Eight Island Marsh and Lea Island/Hutaffs Beach - within the proposed project area. The database also shows that a portion of the Figure Eight Island Marsh natural area is a Registered Natural Heritage Area (RHA) under agreement between the Northeast New Hanover Conservancy and the Department of Environment and Natural Resources.

Attached are tables showing records from the NCNHP database for element occurrences (rare species and natural communities), natural areas, and conservation/managed areas that have been documented within the project area as estimated from EIS Figure 1.1, as well as records documented within a one-mile radius. Also attached is a map that shows natural heritage resources documented within the project area and within a one-mile radius of the project area. The locations of natural areas and conservation/managed areas may be viewed by accessing the Natural Heritage Data Explorer (NHDE) online map viewer, or by downloading and using GIS data; both options are available from the NCNHP Data Services webpage (see www.ncnhp.org).

Please note that the use of Natural Heritage Program data should not be substituted for actual field surveys if needed, particularly if the project area contains suitable habitat for rare species.

Feel free to contact me at Allison.Weakley@ncdenr.gov or 919-707-8629 if you there are questions or additional information is needed.

Natural Heritage Element Occurrences, Natural Areas, and Managed Areas Intersecting the Project Area
Figure Eight Island Shoreline Management Project
Project No. 16-0013
August 10, 2015
NCNHDE-578

Element Occurrences Documented Within Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Status	Accuracy	Federal Status	State Status	Global Rank	State Rank
Animal Assemblage	5782	Gull-Tern-Skimmer Colony	---	1976	Historical	3-Medium	---	---	G5	S3
Bird	7507	Charadrius melodus melodus	Piping Plover - Atlantic Coast subspecies	2014-05-26	Current	3-Medium	Threatened	Threatened	G3T3	S1B,S1N
Bird	27209	Charadrius wilsonia	Wilson's Plover	2007	Current	3-Medium	---	Special Concern	G5	S2B
Bird	27205	Charadrius wilsonia	Wilson's Plover	2007	Current	2-High	---	Special Concern	G5	S2B
Bird	27220	Haematopus palliatus	American Oystercatcher	2007	Current	3-Medium	---	Special Concern	G5	S2S3B, S3N
Bird	26009	Haematopus palliatus	American Oystercatcher	2007	Current	2-High	---	Special Concern	G5	S2S3B, S3N
Bird	26008	Haematopus palliatus	American Oystercatcher	2007	Current	3-Medium	---	Special Concern	G5	S2S3B, S3N
Bird	6958	Rynchops niger	Black Skimmer	2011	Current	3-Medium	---	Special Concern	G5	S2B,S3N
Natural Community	31528	Dune Grass (Southern Subtype)	---	2011-08-24	Current	3-Medium	---	---	G3	S2
Natural Community	31529	Maritime Dry Grassland (Typic Subtype)	---	2011-08-24	Current	3-Medium	---	---	G2G3	S2
Natural Community	20098	Maritime Evergreen Forest (Mid Atlantic Subtype)	---	2010	Current	2-High	---	---	G2	S2
Natural Community	31534	Salt Flat	---	2011-08-24	Current	3-Medium	---	---	G5	S4
Natural Community	31533	Salt Marsh (Carolinian Subtype)	---	2011-08-24	Current	2-High	---	---	G5	S4
Reptile	16294	Caretta caretta	Loggerhead Seaturtle	2012	Current	2-High	Threatened	Threatened	G3	S3B,S3N

Element Occurrences Documented Within Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Status	Accuracy	Federal Status	State Status	Global Rank	State Rank
Reptile	1733	Caretta caretta	Loggerhead Seaturtle	2012	Current	2-High	Threatened	Threatened	G3	S3B,S3N
Reptile	19499	Malaclemys terrapin	Diamondback Terrapin	2014-05-18	Current	3-Medium	FSC, in part	Special Concern	G4	S3
Vascular Plant	14273	Amaranthus pumilus	Seabeach Amaranth	2013	Current	3-Medium	Threatened	Threatened	G2	S1S2
Vascular Plant	19187	Amaranthus pumilus	Seabeach Amaranth	2010-08-05	Current	3-Medium	Threatened	Threatened	G2	S1S2
Vascular Plant	22043	Sesuvium portulacastrum	Shoreline Sea-purslane	2002-05-15	Current	3-Medium	---	Significantly Rare Peripheral	G5	S1
Vascular Plant	19964	Yucca gloriosa	Moundlily Yucca	1999-10-31	Current	3-Medium	---	Significantly Rare Peripheral	G4?	S2?

Natural Areas Documented Within Project Area

Site Name	Representational Rating	Collective Rating
Figure Eight Island Marsh	R2 (Very High)	C3 (High)
Lea Island/Hutaffs Beach	R2 (Very High)	C2 (Very High)

Managed Areas Documented Within Project Area*

Managed Area Name	Owner	Owner Type
Figure Eight Island Marsh RHA	Northeast New Hanover Conservancy	Private

*NOTE: If the proposed project intersects with a conservation/managed area, please contact the landowner directly for additional information. If the project intersects with a Dedicated Nature Preserve (DNP), Registered Natural Heritage Area (RHA), or Federally-listed species, NCNHP staff may provide additional correspondence regarding the project.

Definitions and an explanation of status designations and codes can be found at https://ncnhde.natureserve.org/content/help. Data query generated on August 10, 2015; source: NCNHP, Q3 July 2015. Please resubmit your information request if more than one year elapses before project initiation as new information is continually added to the NCNHP database.

Natural Heritage Element Occurrences, Natural Areas, and Managed Areas Within a One-mile Radius of the Project Area
Figure Eight Island Shoreline Management Project
Project No. 16-0013
August 10, 2015
NCNHDE-578

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Status	Accuracy	Federal Status	State Status	Global Rank	State Rank
Animal Assemblage	11649	Gull-Tern-Skimmer Colony	---	2011	Current	5-Very Low	---	---	G5	S3
Animal Assemblage	11648	Gull-Tern-Skimmer Colony	---	1977	Historical	4-Low	---	---	G5	S3
Animal Assemblage	15820	Gull-Tern-Skimmer Colony	---	1983-06	Historical	4-Low	---	---	G5	S3
Animal Assemblage	1168	Gull-Tern-Skimmer Colony	---	2001	Current	4-Low	---	---	G5	S3
Animal Assemblage	505	Gull-Tern-Skimmer Colony	---	1983-06	Historical	4-Low	---	---	G5	S3
Animal Assemblage	18729	Gull-Tern-Skimmer Colony	---	2011	Current	4-Low	---	---	G5	S3
Animal Assemblage	5782	Gull-Tern-Skimmer Colony	---	1976	Historical	3-Medium	---	---	G5	S3
Animal Assemblage	15294	Gull-Tern-Skimmer Colony	---	2011	Current	4-Low	---	---	G5	S3
Bird	15574	Charadrius melodus melodus	Piping Plover - Atlantic Coast subspecies	2013-06	Current	4-Low	Threatened	Threatened	G3T3	S1B,S1N
Bird	7507	Charadrius melodus melodus	Piping Plover - Atlantic Coast subspecies	2014-05-26	Current	3-Medium	Threatened	Threatened	G3T3	S1B,S1N
Bird	27209	Charadrius wilsonia	Wilson's Plover	2007	Current	3-Medium	---	Special Concern	G5	S2B
Bird	27208	Charadrius wilsonia	Wilson's Plover	2007	Current	3-Medium	---	Special Concern	G5	S2B
Bird	27205	Charadrius wilsonia	Wilson's Plover	2007	Current	2-High	---	Special Concern	G5	S2B
Bird	27220	Haematopus palliatus	American Oystercatcher	2007	Current	3-Medium	---	Special Concern	G5	S2S3B, S3N
Bird	26009	Haematopus palliatus	American Oystercatcher	2007	Current	2-High	---	Special Concern	G5	S2S3B, S3N

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Status	Accuracy	Federal Status	State Status	Global Rank	State Rank
Bird	26008	Haematopus palliatus	American Oystercatcher	2007	Current	3-Medium	---	Special Concern	G5	S2S3B, S3N
Bird	1777	Passerina ciris ciris	Eastern Painted Bunting	1999	Current	5-Very Low	Species of Concern	Special Concern	G5T3T4	S3B
Bird	19936	Passerina ciris ciris	Eastern Painted Bunting	1997	Current	4-Low	Species of Concern	Special Concern	G5T3T4	S3B
Bird	3264	Passerina ciris ciris	Eastern Painted Bunting	2002-05-12	Current	3-Medium	Species of Concern	Special Concern	G5T3T4	S3B
Bird	17486	Passerina ciris ciris	Eastern Painted Bunting	2002-04-13	Current	3-Medium	Species of Concern	Special Concern	G5T3T4	S3B
Bird	6958	Rynchops niger	Black Skimmer	2011	Current	3-Medium	---	Special Concern	G5	S2B,S3N
Bird	5383	Sterna hirundo	Common Tern	2001	Current	4-Low	---	Special Concern	G5	S2B
Bird	1804	Sterna hirundo	Common Tern	2011	Current	4-Low	---	Special Concern	G5	S2B
Bird	10083	Sterna hirundo	Common Tern	2001	Current	3-Medium	---	Special Concern	G5	S2B
Bird	19274	Sternula antillarum	Least Tern	2011	Current	4-Low	---	Special Concern	G4	S3B
Bird	18783	Sternula antillarum	Least Tern	2007	Current	3-Medium	---	Special Concern	G4	S3B
Bird	11554	Sternula antillarum	Least Tern	2011	Current	4-Low	---	Special Concern	G4	S3B
Butterfly	13643	Papilio cresphontes	Giant Swallowtail	2002-04-21	Current	4-Low	---	Significantly Rare	G5	S2S3
Dragonfly or Damselfly	33765	Somatochlora georgiana	Coppery Emerald	2004-PRE	Historical	5-Very Low	---	Significantly Rare	G3G4	S2?
Freshwater Fish	32417	Acipenser oxyrinchus	Atlantic Sturgeon	2012-04-04	Current	4-Low	Endangered	Special Concern	G3	S3
Mammal	24390	Corynorhinus rafinesquii macrotis	Rafinesque's Big-eared Bat - Coastal Plain subspecies	2006-PRE	Current	5-Very Low	Species of Concern	Special Concern	G3G4T3	S3
Mammal	32126	Myotis septentrionalis	Northern Long-eared Bat	1994-POST	Current	5-Very Low	T-4(d)	Significantly Rare	G2G3	S2

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Status	Accuracy	Federal Status	State Status	Global Rank	State Rank
Mammal	13380	Neotoma floridana floridana	Florida Eastern Woodrat	1986	Historical	4-Low	---	Threatened	G5T5	S1
Mammal	17664	Trichechus manatus	West Indian Manatee	2012-08-18	Current	5-Very Low	Endangered	Endangered	G2	S1N
Natural Community	29543	Brackish Marsh (Needlerush Subtype)	---	2002-10-21	Current	4-Low	---	---	G5	S5
Natural Community	29544	Brackish Marsh (Needlerush Subtype)	---	2002-02-28	Current	3-Medium	---	---	G5	S5
Natural Community	31528	Dune Grass (Southern Subtype)	---	2011-08-24	Current	3-Medium	---	---	G3	S2
Natural Community	31529	Maritime Dry Grassland (Typic Subtype)	---	2011-08-24	Current	3-Medium	---	---	G2G3	S2
Natural Community	20098	Maritime Evergreen Forest (Mid Atlantic Subtype)	---	2010	Current	2-High	---	---	G2	S2
Natural Community	31530	Maritime Shrub (Stunted Tree Subtype)	---	2011-08-24	Current	2-High	---	---	G3	S2
Natural Community	31534	Salt Flat	---	2011-08-24	Current	3-Medium	---	---	G5	S4
Natural Community	10733	Salt Marsh (Carolinian Subtype)	---	2002-05-15	Current	6-Unknown	---	---	G5	S4
Natural Community	31533	Salt Marsh (Carolinian Subtype)	---	2011-08-24	Current	2-High	---	---	G5	S4
Natural Community	29538	Salt Marsh (Carolinian Subtype)	---	2002-10-21	Current	3-Medium	---	---	G5	S4
Natural Community	29539	Salt Marsh (Carolinian Subtype)	---	2002-02-28	Current	3-Medium	---	---	G5	S4
Reptile	16294	Caretta caretta	Loggerhead Seaturtle	2012	Current	2-High	Threatened	Threatened	G3	S3B,S3N
Reptile	1733	Caretta caretta	Loggerhead Seaturtle	2012	Current	2-High	Threatened	Threatened	G3	S3B,S3N
Reptile	31881	Lepidochelys kempii	Kemp's Ridley Seaturtle	2010	Current	4-Low	Endangered	Endangered	G1	S1B,SUN
Reptile	19499	Malaclemys terrapin	Diamondback Terrapin	2014-05-18	Current	3-Medium	FSC, in part	Special Concern	G4	S3

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Status	Accuracy	Federal Status	State Status	Global Rank	State Rank
Reptile	10471	Malaclemys terrapin	Diamondback Terrapin	1981-07	Historical	5-Very Low	FSC, in part	Special Concern	G4	S3
Vascular Plant	14273	Amaranthus pumilus	Seabeach Amaranth	2013	Current	3-Medium	Threatened	Threatened	G2	S1S2
Vascular Plant	19187	Amaranthus pumilus	Seabeach Amaranth	2010-08-05	Current	3-Medium	Threatened	Threatened	G2	S1S2
Vascular Plant	23233	Ditrysinia fruticosa	Sebastian-bush	1961-06	Historical	3-Medium	---	Special Concern Vulnerable	G5	S2
Vascular Plant	22043	Sesuvium portulacastrum	Shoreline Sea-purslane	2002-05-15	Current	3-Medium	---	Significantly Rare Peripheral	G5	S1
Vascular Plant	19390	Yucca gloriosa	Moundlily Yucca	2002-05-15	Current	3-Medium	---	Significantly Rare Peripheral	G4?	S2?
Vascular Plant	19964	Yucca gloriosa	Moundlily Yucca	1999-10-31	Current	3-Medium	---	Significantly Rare Peripheral	G4?	S2?

Natural Areas Documented Within a One-mile Radius of the Project Area

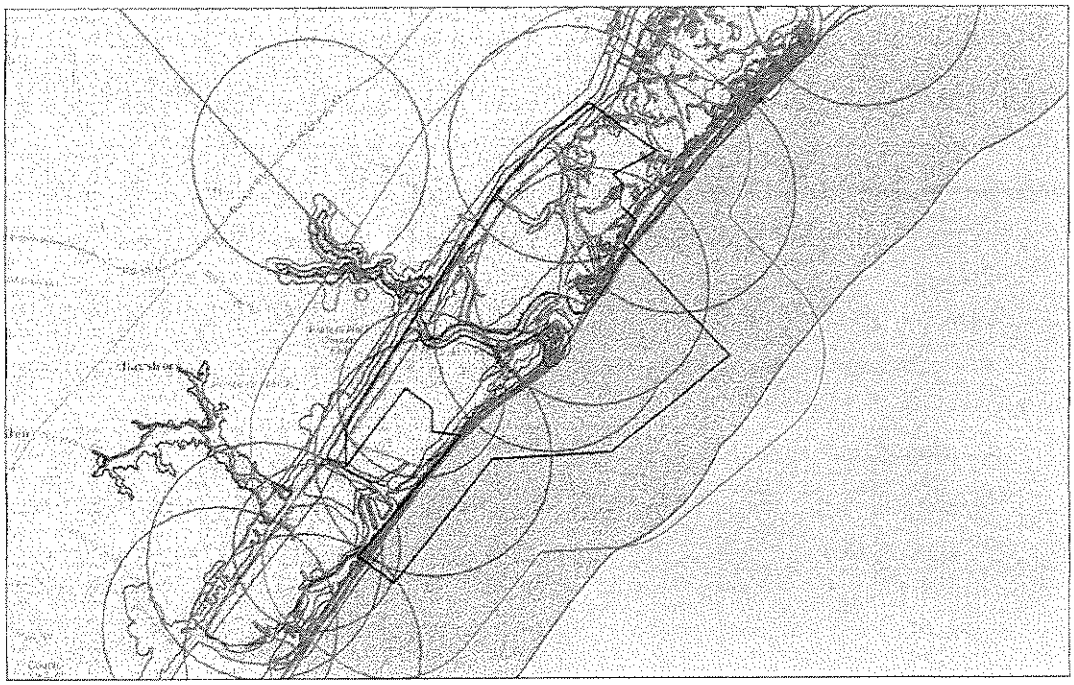
Site Name	Representational Rating	Collective Rating
Figure Eight Island Marsh	R2 (Very High)	C3 (High)
Futch and Foy Creeks Natural Area	R5 (General)	C5 (General)
Lea Island/Hutaffs Beach	R2 (Very High)	C2 (Very High)
Pages Creek Natural Area	R2 (Very High)	C4 (Moderate)

Managed Areas Documented Within a One-mile Radius of the Project Area

Managed Area Name	Owner	Owner Type
NC Submerged Lands	NC Department of Administration	State
NC Submerged Lands	NC Department of Administration	State
NC Submerged Lands	NC Department of Administration	State
NC Clean Water Management Trust Fund Easement	NC DENR, Clean Water Management Trust Fund	State
North Carolina Coastal Land Trust Easement	North Carolina Coastal Land Trust	Private
Figure Eight Island Marsh RHA	Northeast New Hanover Conservancy	Private

Definitions and an explanation of status designations and codes can be found at https://ncnhde.natureserve.org/content/help. Data query generated on August 10, 2015; source: NCNHP, Q3 July 2015. Please resubmit your information request if more than one year elapses before project initiation as new information is continually added to the NCNHP database.

NCNHDE-578: Figure Eight Island Shoreline Management Project



August 10, 2015

- Project Boundary
- Buffered Project Boundary
- Natural Heritage Element Occurrence (NHEO)
- NHP Natural Area (NHNA)
- Managed Area (MAREA)

1:71,145

0 0.5 1 2 mi

0 1 2 4 km

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey,

State of North Carolina
Department of Environment and Natural Resources
INTERGOVERNMENTAL REVIEW - PROJECT COMMENTS

Reviewing Office: WIRO

Project Number 16-0013 Due Date: 8/10/2015
County New Hanover

After review of this project it has been determined that the ENR permit(s) and/or approvals indicated may need to be obtained in order for this project to comply with North Carolina Law. Questions regarding these permits should be addressed to the Regional Office indicated on the reverse of the form. All applications, information and guidelines relative to these plans and permits are available from the same Regional Office.

	PERMITS	SPECIAL APPLICATION PROCEDURES or REQUIREMENTS	Normal Process Time (statutory time limit)
☐	Permit to construct & operate wastewater treatment facilities, sewer system extensions & sewer systems not discharging into state surface waters.	Application 90 days before begin construction or award of construction contracts. On-site inspection. Post-application technical conference usual.	30 days (90 days)
☐	NPDES - permit to discharge into surface water and/or permit to operate and construct wastewater facilities discharging into state surface waters.	Application 180 days before begin activity. On-site inspection. Pre-application conference usual. Additionally, obtain permit to construct wastewater treatment facility-granted after NPDES. Reply time, 30 days after receipt of plans or issue of NPDES permit-whichever is later.	90-120 days (N/A)
☐	Water Use Permit	Pre-application technical conference usually necessary	30 days (N/A)
☐	Well Construction Permit	Complete application must be received and permit issued prior to the installation of a well.	7 days (15 days)
☐	Dredge and Fill Permit	Application copy must be served on each adjacent riparian property owner. On-site inspection. Pre-application conference usual. Filling may require Easement to Fill from N.C. Department of Administration and Federal Dredge and Fill Permit.	55 days (90 days)
☐	Permit to construct & operate Air Pollution Abatement facilities and/or Emission Sources as per 15 A NCAC (2Q.0100 thru 2Q.0300)	Application must be submitted and permit received prior to construction and operation of the source. If a permit is required in an area without local zoning, then there are additional requirements and timelines (2Q.0113).	90 days
☐	Permit to construct & operate Transportation Facility as per 15 A NCAC (2D.0800, 2Q.0601)	Application must be submitted at least 90 days prior to construction or modification of the source.	90 days
☐	Any open burning associated with subject proposal must be in compliance with 15 A NCAC 2D.1900	N/A	60 days (90 days)
☐	Demolition or renovations of structures containing asbestos material must be in compliance with 15 A NCAC 20.1110 (a) (1) which requires notification and removal prior to demolition. Contact Asbestos Control Group 919-707-5950.		
☐	Complex Source Permit required under 15 A NCAC 2D.0800		
☐	The Sedimentation Pollution Control Act of 1973 must be properly addressed for any land disturbing activity. An erosion & sedimentation control plan will be required if one or more acres to be disturbed. Plan filed with proper Regional Office (Land Quality Section) At least 30 days before beginning activity. A fee of **$65** for the first acre or any part of an acre. An express review option is available with additional fees.		20 days (30 days)
☐	Sedimentation and erosion control must be addressed in accordance with NCDOT's approved program. Particular attention should be given to design and installation of appropriate perimeter sediment trapping devices as well as stable stormwater conveyances and outlets.		(30 days)
☐	Mining Permit	On-site inspection usual. Surety bond filed with ENR Bond amount varies with type mine and number of acres of affected land. Any arc mined greater than one acre must be permitted. The appropriate bond must be received before the permit can be issued.	30 days (60 days)
☐	North Carolina Burning permit	On-site inspection by N.C. Division Forest Resources if permit exceeds 4 days	1 day (N/A)
☐	Special Ground Clearance Burning Permit - 22 counties in coastal N.C. with organic soils	On-site inspection by N.C. Division Forest Resources required "if more than five acres of ground clearing activities are involved. Inspections should be requested at least ten days before actual burn is planned."	1 day (N/A)
☐	Oil Refining Facilities	N/A	90-120 days (N/A)
☐	Dam Safety Permit	If permit required, application 60 days before begin construction. Applicant must hire N.C. qualified engineer to: prepare plans, inspect construction. certify construction is according to ENR approved plans. May also require permit under mosquito control program. And a 404 permit from Corps of Engineers. An inspection of site is necessary to verify Hazard Classification. A minimum fee of $200.00 must accompany the application. An additional processing fee based on a percentage or the total project cost will be required upon completion.	30 days (60 days)

Project Number: 16-0013 Due Date: 8/10/2015			Normal Process Time (statutory time limit)
	PERMITS	SPECIAL APPLICATION PROCEDURES or REQUIREMENTS	
☐	Permit to drill exploratory oil or gas well	File surety bond of $5,000 with ENR running to State of NC conditional that any well opened by drill operator shall, upon abandonment, be plugged according to ENR rules and regulations.	10 days N/A
☐	Geophysical Exploration Permit	Application filed with ENR at least 10 days prior to issue of permit. Application by letter. No standard application form.	10 days N/A
☐	State Lakes Construction Permit	Application fee based on structure size is charged. Must include descriptions & drawings of structure & proof of ownership of riparian property.	15-20 days N/A
☐	401 Water Quality Certification	N/A	60 days (130 days)
☐	CAMA Permit for MAJOR development	$250.00 fee must accompany application	55 days (150 days)
☐	CAMA Permit for MINOR development	$50.00 fee must accompany application	22 days (25 days)
☐	Several geodetic monuments are located in or near the project area. If any monument needs to be moved or destroyed, please notify: N.C. Geodetic Survey, Box 27687 Raleigh, NC 27611		
☐	Abandonment of any wells, if required must be in accordance with Title 15A. Subchapter 2C.0100.		
☐	Notification of the proper regional office is requested if "orphan" underground storage tanks (USTS) are discovered during any excavation operation.		
☐	Compliance with 15A NCAC 2H 1000 (Coastal Stormwater Rules) is required.		45 days (N/A)
☐	Tar Pamlico or Neuse Riparian Buffer Rules required.		
☒	Plans and specifications for the construction, expansion, or alteration of a public water system must be approved by the Division of Water Resources/Public Water Supply Section prior to the award of a contract or the initiation of construction as per 15A NCAC 18C .0300 et. seq. Plans and specifications should be submitted to 1634 Mail Service Center, Raleigh, North Carolina 27699-1634. All public water supply systems must comply with state and federal drinking water monitoring requirements. For more information, contact the Public Water Supply Section, (919) 707-9100.		30 days
☒	If existing water lines will be relocated during the construction, plans for the water line relocation must be submitted to the Division of Water Resources/Public Water Supply Section at 1634 Mail Service Center, Raleigh, North Carolina 27699-1634. For more information, contact the Public Water Supply Section, (919) 707-9100.		30 days

Other comments (attach additional pages as necessary, being certain to cite comment authority)

Division	Initials	No comment	Comments	Date Review
DAQ	DAC	☒		8/10/15
DWR-WQROS (Aquifer & Surface)		☐		/ /
DWR-PWS	hlc	☐	Please be advised that there are 2 public water supply wells located within the project boundary. The 100' radius around each of these wells must be protected from any potential sources of pollution. Also, see noted comments above.	8/6/15
DEMLR (LQ & SW)	des	☒		7/27/15
DWM - UST	n/a	☐		/ /

REGIONAL OFFICES

Questions regarding these permits should be addressed to the Regional Office marked below.

☐ **Asheville Regional Office**
2090 US Highway 70
Swannanoa, NC 28778
(828) 296-4500

☐ **Mooresville Regional Office**
610 East Center Avenue, Suite 301
Mooresville, NC 28115
(704) 663-1699

☒ **Wilmington Regional Office**
127 Cardinal Drive Extension
Wilmington, NC 28405
(910) 796-7215

☐ **Fayetteville Regional Office**
225 North Green Street, Suite 714
Fayetteville, NC 28301-5043
(910) 433-3300

☐ **Raleigh Regional Office**
3800 Barrett Drive, Suite 101
Raleigh, NC 27609
(919) 791-4200

☐ **Winston-Salem Regional Office**
585 Waughtown Street
Winston-Salem, NC 27107
(336) 771-5000

☐ **Washington Regional Office**
943 Washington Square Mall
Washington, NC 27889

NORTH CAROLINA STATE CLEARINGHOUSE
DEPARTMENT OF ADMINISTRATION
INTERGOVERNMENTAL REVIEW

COUNTY: NEW HANOVER **H12:** OTHER

STATE NUMBER: 16-E-0000-0013
DATE RECEIVED: 07/14/2015
AGENCY RESPONSE: 08/10/2015
REVIEW CLOSED: 08/13/2015

MS CAROLYN PENNY
CLEARINGHOUSE COORDINATOR
DPS - DIV OF EMERGENCY MANAGEMENT
FLOODPLAIN MANAGEMENT PROGRAM
MSC # 4218
RALEIGH NC

JUL 20 2015

REVIEW DISTRIBUTION

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DENR - COASTAL MGT
DENR LEGISLATIVE AFFAIRS
DEPT OF CULTURAL RESOURCES
DEPT OF TRANSPORTATION
DPS - DIV OF EMERGENCY MANAGEMENT

PROJECT INFORMATION

APPLICANT: U. S. Army Corps of Engineers
TYPE: National Environmental Policy Act
Draft Environmental Impact Statement

DESC: Supplemental EIS for the Figure Eight Island Shoreline Management Project - project will install a terminal groin structure along the southern shoulder of Rich Inlet and conduct supplemental beach nourishment. - view documents at: http://www.saw.usace.army.mil/Missions/RegulatoryPermitProgram/MajorProjects

CROSS-REFERENCE NUMBER: 13-E-0000-0010

The attached project has been submitted to the N. C. State Clearinghouse for intergovernmental review. Please review and submit your response by the above indicated date to 1301 Mail Service Center, Raleigh NC 27699-1301.

If additional review time is needed, please contact this office at (919)807-2425.

AS A RESULT OF THIS REVIEW THE FOLLOWING IS SUBMITTED: [X] NO COMMENT [ ] COMMENTS ATTACHED

SIGNED BY: John D Bardoka DATE: 12 Aug 2015

NORTH CAROLINA STATE CLEARINGHOUSE
DEPARTMENT OF ADMINISTRATION
INTERGOVERNMENTAL REVIEW

Natasha Earle

COUNTY: NEW HANOVER

H12: OTHER

STATE NUMBER: 16-E-0000-0013
DATE RECEIVED: 07/14/2015
AGENCY RESPONSE: 08/10/2015
REVIEW CLOSED: 08/13/2015

MS CARRIE ATKINSON
CLEARINGHOUSE COORDINATOR
DEPT OF TRANSPORTATION
STATEWIDE PLANNING - MSC #1554
RALEIGH NC

REVIEW DISTRIBUTION

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DENR - COASTAL MGT
DENR LEGISLATIVE AFFAIRS
DEPT OF CULTURAL RESOURCES
DEPT OF TRANSPORTATION
DPS - DIV OF EMERGENCY MANAGEMENT

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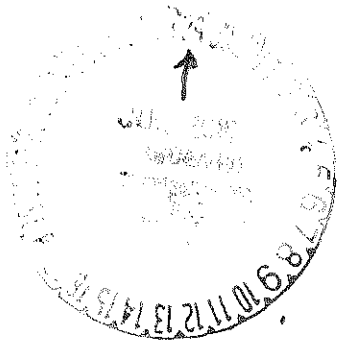
AS A RESULT OF THIS REVIEW THE FOLLOWING IS SUBMITTED: [✓] NO COMMENT [ ] COMMENTS ATTACHED

SIGNED BY: Natasha Earle DATE: 7/23/2015

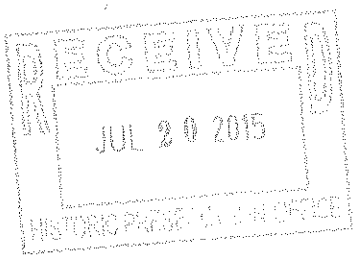


NORTH CAROLINA STATE CLEARINGHOUSE
DEPARTMENT OF ADMINISTRATION
INTERGOVERNMENTAL REVIEW

COUNTY: NEW HANOVER

H12: OTHER

STATE NUMBER: 16-E-0000-0013
DATE RECEIVED: 07/14/2015
AGENCY RESPONSE: 08/10/2015
REVIEW CLOSED: 08/13/2015



MS RENEE GLEDHILL-EARLEY
CLEARINGHOUSE COORDINATOR
DEPT OF CULTURAL RESOURCES
STATE HISTORIC PRESERVATION OFFICE
MSC 4617 - ARCHIVES BUILDING
RALEIGH NC

EZ 12-0937

REVIEW DISTRIBUTION

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DENR LEGISLATIVE AFFAIRS
DEPT OF CULTURAL RESOURCES
DEPT OF TRANSPORTATION
DPS - DIV OF EMERGENCY MANAGEMENT

Draft letter
to JCS/BJS 7-28-15

PROJECT INFORMATION

APPLICANT: U. S. Army Corps of Engineers
TYPE: National Environmental Policy Act
Draft Environmental Impact Statement

Due 7/27/15

DESC: Supplemental EIS for the Figure Eight Island Shoreline Management Project - project will install a terminal groin structure along the southern shoulder of Rich Inlet and conduct supplemental beach nourishment. - view documents at: http://www.saw.usace.army.mil/Missions/RegulatoryPermitProgram/MajorProjects

CROSS-REFERENCE NUMBER: 13-E-0000-0010

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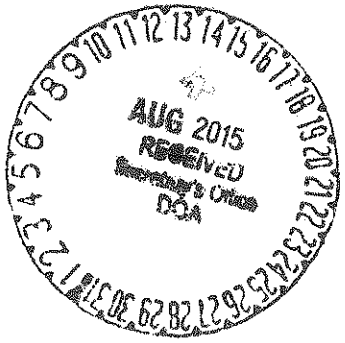
If additional review time is needed, please contact this office at (919)807-2425.

AS A RESULT OF THIS REVIEW THE FOLLOWING IS SUBMITTED: ☐ NO COMMENT ☒ COMMENTS ATTACHED

SIGNED BY: Renee Gledhill-Earley DATE: 8.11.15



JUL 24 2015

North Carolina Department of Cultural Resources

State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Pat McCrory
Secretary Susan Kluttz

Office of Archives and History
Deputy Secretary Kevin Cherry

August 7, 2015

Mickey Sugg
US Army Corps of Engineers
69 Darlington Avenue
Wilmington, NC 28403

Re: Figure Eight Island Shoreline Management Project, Install Terminal Groin along Rich Inlet and Beach Nourishment, New Hanover County, ER 12-0927

Dear Mr. Sugg:

We have reviewed the above public notice and Supplemental Environmental Impact Statement (SEIS) concerning Figure "8" Beach Homeowners Association's proposal to perform dredging, beach nourishment and construct a terminal groin and would like to comment.

The Office of State Archaeology underwater research files have references to extensive maritime activities and shipwreck losses in the general project vicinity; therefore, much of the project area holds a high potential for containing submerged cultural resources. Two reports cited in the SEIS identify and address some of these resources: "Location of the Remains of the *Wild Dayrell* in Rich Inlet, Pender County, North Carolina" and "Terrestrial and Submerged Cultural Resource Survey Rich Inlet, Figure Eight Island, North Carolina," both submitted by Tidewater Atlantic Research (TAR).

The remote sensing survey identified five targets that contain characteristics suggestive of potentially significant cultural material. These anomalies identified as RI-1 through RI-5 in the above mentioned report must be avoided with the recommended 100 foot and/or 150 foot buffers. If these areas cannot be avoided, additional investigations are required prior to disturbance. Of particular concern is target RI-1 (150-foot buffer) that is approximately 300 feet from the end of the proposed offload pier. The wreck of the *Wild Dayrell* (0001RII) is also located in the inlet and must be avoided with the recommended 400 foot by 600 foot buffer zone.

Our office also has concerns regarding how the placement of a terminal groin may affect the dynamics of the inlet. The resulting changes in water and sediment movement could adversely impact the unassessed targets and the stability of the *Wild Dayrell* which has been identified as culturally significant by its direct association with the American Civil War.

Additionally, we would like your agency, its affiliates, and all equipment operators to be aware that the possibility exists that the beach nourishment work may unearth an unknown beached shipwreck which may have been washed up on Figure 8 Island and buried over the last 450 years. In the event that such occurs, work should move to another area and the Underwater Archaeology Branch be contacted immediately (910.458.9042). A staff member will be sent to assess the wreckage and determine the proper course of action.

This caution also applies to the two areas of Rich Inlet inaccessible for TAR's survey. If during dredging operations submerged archaeological materials are encountered, such as shipwreck remains, it is the responsibility of the Army Corps of Engineers-Wilmington District to notify us immediately, pursuant to Section 106 of the National Historic Preservation Act of 1966. In addition, the area is protected by North Carolina legislation G.S. 121-22 to 28, Article 3, supported by the Abandoned Shipwreck Act of 1987 (P.L. 100-298)

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-807-6579 or environmental.review@ncdcr.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

Renee Gledhill-Earley

for Ramona M. Bartos

cc: State Clearinghouse

APPENDIX I

RESPONSE TO COMMENTS TABLE

	Nature of Comment (Summary)*	Agency/ Entity	Category	Section Where Comment Applies	Notes/Comments
1	The document does not indicate the long term erosion rates for the project area. Per the DCM Long Term Annual Erosion Rate Map update of 2011, the rate is currently 2' per year in the project location.	NC DCM	Engineering	Chapter 2, Shoreline Protection History	Text has been amended.
2	The document does not indicate the current conditions of the sand bags along the properties on the north end of the island (i.e. covered with sand and vegetation).	NC DCM	Engineering	Chapter 2, Shoreline Protection History	Text has been amended.
3	The document does not indicate if structures on these properties could currently be re-built due to the location of the first line of stable natural vegetation in relation to existing structures.	NC DCM	Engineering	Chapter 2, Shoreline Protection History	Text has been amended.
4	The tax information summarized on page 23 references tax values as of 2008, yet it appears that the dollar values referenced on this page and in Table 2.2 utilize tax data from the most recent (2012) parcel valuations. Please update the language on page 23 (and elsewhere in the document) to reflect that these tax values reflect the 2012 tax information, and not 2007 or 2008 New Hanover County tax data.	NC DCM	General	Chapter 2, Shoreline Protection History	Text has been amended.
5	The document does not appear to provide the properties and dates of sand bag permitting along the north end of the island, which should include a variance granted from the Coastal Resources Commission (CRC). The structures located on the properties with existing sandbags were approximately 200' to 300' from the	NC DCM	General	Chapter 2, Shoreline Protection History	Modified Table 2.2 accordingly.

	approx. low water boundary based upon a January 6, 2015 site visit. The table also does not include the recent authorization to Figure Eight Island HOA to allow for beach scraping along the shoreline adjacent to existing structures and the last beach nourishment project in the winter of 2013.				
6	The document does not reference what the shoreline location is in relation to the existing roads (Surf Court, Comber and Inlet Hook Roads) in the project location (i.e. MHW, first line of stable natural vegetation).	NC DCM	Engineering	Chapter 2, Shoreline Protection History	Text has been amended.
7	The figure indicates the location of imminently threatened residential structures with sand bags. However, some of these properties currently do not meet the criteria for imminently threatened structures (i.e. foundation of structure greater than 20' from the erosion escarpment). This Figure should read "Current and/or Previously Threatened Structures and Properties".	NC DCM	General	Chapter 2, Shoreline Protection History	Title of figure has been modified accordingly
8	The document indicates that there are three existing spoil islands along the AIWW that were tested to determine sand quantity and quality to utilize for beach fill. This Section should indicate when these analyses were accomplished. For example, Spoil Island No. 1 along the south side of Nixon Channel, which is privately owned, has been utilized for multiple dredging events in the past few years as a designated spoil site. If the sediment analysis on this site was done before these additional spoil deposition events, a previously-conducted sediment analysis may now be insufficient.	NC DCM	Geotechnical	Chapter 3, Alternative 4	Geotechnical investigations were performed in 2010. Text has been modified to reflect that additional studies may be required.
9	These Figures indicate the location of coastal wetlands, which were verified by DCM Staff on April 16, 2013. However, based upon additional site visits in the	NC DCM	Wetlands	Chapter 3, Alternative 5	Figures have been modified.

	location of the proposed anchor for the terminal groin, it appears that the coastal wetlands boundary has expanded. The Figure should be revised to reflect the expanded area of coastal wetlands. Further, the Figure should also include the property boundaries/owner names and the location of the mean high water (MHW) and mean low water (MLW) boundaries in relation to the proposed groin alternatives.				
10	The 2014 existing beach profile is incomplete from approximately 1600' to 2000' (as measured from baseline).	NC DCM	Engineering	Chapter 3, Alternative 5	No data was obtained for that area as the profile survey only extended seaward to wading depth.
11	Our 2012 comments on the original DEIS requested significant expansions of the Recreational Resources and Navigation Sections. Our comments were based in large part on comments received during the June 71 2012 public hearing on the proposed project. We still recommend that these sections be revised to provide more quantitative data on the public usage of these resources.	NC DCM	Recreational Resources and Navigation	Chapter 4, Recreational Resources	A significant expansion of the recreational resources section was included in the SEIS. Please refer to pages 182 and Table 4.14 that describes the usage of recreational boaters within the Rich Inlet Complex. No additional information is being provided at this time.
12	Under Escarpments it reads: Escarpments in the newly placed beach fill that exceed 18 inches or greater than 100 ft. shall be graded. Should this section read "exceeds 18 inches for greater than 100 ft."?	NC DCM	Conservation Measures	Chapter 6, Question 2: What are the Monitoring Initatives Being Developed?	Text has been corrected accordingly.

13	Under Response Triggers, this section proposes implementation of mitigative measures if surveys indicate that shoreline erosion is exceeding the lower 90% confidence levels for two consecutive years for two or more adjacent transects. It appears that this proposed criterion, especially the proposed timeframe, may not be sufficient to identify and offset potential adverse impacts to individual properties or structures. It appears that by the time mitigation may be formally triggered, loss of individual structures or propertymay have already occurred. The response trigger proposal should be modified, or additional components added, that would minimize the risk of such property or structural loss occurring.	NC DCM	Inlet Management Plan	Chapter 6, Question 2: What are the Monitoring Initatives Being Developed?	Another component has been added to the inlet management plan that would require consideration of mitigation if the shoreline comes within 40 feet of ocean front structures or infrastructure on Figure 8 Island. Since no structures exists on Hutaff Island and due to the relative consistency of shoreline changes beginning at a point 1,500 feet north of Rich Inlet during both the 1938-2007 time period and the 1974-2007 time period, the shoreline change thresholds as presented in the document for Hutaff Island are sufficient to identify possible project related shoreline impacts and the need to provide mitigation in the form of beach nourishment, to restore the shorelines.
14	This section states that maintenance of the terminal groin is not anticipated. However, SB 151 requires that the applicant for a terminal groin must plan for maintenance and modification of the terminal groin structure. Therefore, the potential maintenance and modification of the groin must be addressed, including the estimated cost necessary to implement the maintenance and/or modifications.	NC DCM	Conservation Measures	Chapter 6, Question 2: What are the Monitoring Initiatives Being Developed?	Maintenance of the terminal groin would depend on the number of times the design conditions for the structure would be exceeded over the 30-year planning period. Since this cannot be predicted with any degree of certainty, maintenance of the structure was based on an assumption that an average of 1% of the armor stone would have to be replaced every year. Given this assumption, maintenance of the Alternative 5D terminal groin would average $25,000 per year. Note this does not mean maintenance of the structure would be needed every year. Over the course of the 30-year evaluation period, maintenance of the structure may only be needed two or three times with the average annual equivalent cost of these future repairs equal to $25,000 per year.

15	This section states that no mitigation is proposed at all for Hutaff Island due to the lack of private property and structures. This does not appear to meet the requirements of SB 151. The fact that no structures exist on Hutaff Island would not preclude the need to implement mitigation, possibly in the form of beach nourishment, if mitigation triggers are exceeded. This section should be updated accordingly, and the associated cost estimates modified to address that possibility.	NC DCM	Inlet Management Plan	Chapter 6, Question 2: What are the Monitoring Initiatives Being Developed?	See response to Comment # 13. There is no basis on which to estimate possible future cost to mitigate erosion on Hutaff Island. In this regard, predictions are difficult to make where mitigation beach nourishment might be needed, how much material would be required, and the frequency at which it would be needed. The FEIS simply identifies this as a future possibility. Final cost estimates will be provided in the NC DCM CAMA permit application.
16	The document still appears to use data collected in 2007 regarding shoreline change thresholds. The Division's July 20, 2012 comment letter on the original Draft Environmental Impact Statement requested that the plan utilize more current data to in the development of the shoreline change thresholds. This issue remains a concern to the Division, and we would like to see this issue addressed.	NC DCM	Inlet Management Plan	Chapter 6, Question 2: What are the Monitoring Initiatives Being Developed?	Shoreline change thresholds developed to determine if the terminal groin is negatively impacting adjacent shorelines were based on shoreline changes measured during the 1974 to 2007 time period as reported in Chapter 6. A longer time period extending from 1938 to 2007 was also evaluated, however, the 1974-2007 data provided a more contemporary history of shoreline changes and represented the time when major development was occurring on Figure Eight Island. In addition to the construction of homes and infrastructure on the island, measures were being implemented to respond to threats posed by shoreline erosion along portions of the island. These erosion response measures had an impact on shoreline behavior and these impacts taken into account in the development of the shoreline thresholds. While shoreline changes along the extreme north end of Figure Eight Island have changed from erosion to accretion around 2010, this change in shoreline behavior is not unlike similar episodes observed between 1974 and 2007. For example, the north end of Figure Eight Island experienced accretion up until 1993 at which time the trend was reversed and the shoreline began to erode at an accelerated rate. While the north end of Figure Eight Island has again experienced accretion

					beginning around 2010, this trend is expected to reverse as the Rich Inlet bar channel alignment swings back toward Hutaff Island. Accordingly, including shoreline changes since 2007 in the threshold development would bias the trends toward accretion which would not represent shoreline changes indicated by the total record.
17	The document does briefly address the monitoring and mitigation requirements for certain biological resources (Chapter 6 beginning on page 459). However, the document does not appear to include any mitigation measures to offset any potential adverse impacts to the biological resources. The document should address potential mitigative measures for any adverse impacts to biological resources within the permit area.	NC DCM	Conservation Measures	Chapter 6, Question 2: What are the Monitoring Initatives Being Developed? and Question 3 (relating to SB 110 & 151)	At this time, potential mitigative measures will be based on whether the monitoring efforts disclose any adverse impacts. Any mitigation measures will be determined by the USACE and DCM in coordination with the Resource Agencies. It is also acknowledged that mitigation measures may be required as the result of the ESA formal consultation with USFWS and NMFS and/or EFH consultation with NMFS. See referenced sections.
18	A recommendation that existing sandbags, which can have impacts on biotic communities, be removed concurrent with the construction of the terminal groin and initial beach-fill activities.	NC DCM Fisheries Resources	General	N/A	Noted.

19	A significant concern that the alternatives that will involve the nourishment along Nixon Channel (Alternatives 3, 4, and 5(a-d) could impact the Primary Nursery Area (PNA) that is associated with the coastal wetlands that exist along the back side of Figure 8 Island. PNA's are estuarine waters where initial post-larval development occurs. Species within this area are early post-larval to juvenile and include finfish, crabs, and shrimp. Species inhabit PNA's because they afford food and protection during vulnerable periods of their life history. Coastal wetlands are a productive detritus-based system that trap nutrients and sediment, aids in shoreline erosion control, dissipates wave and storm action, and provide a barrier to flood damage. In addition, coastal wetlands are important to waterfowl feeding and nesting activities, and numerous estuarine-dependent species such as shrimp, flounder, oysters, crabs, and menhaden.	NC DCM Fisheries Resources	Wetlands	Chapter 4, Question 1: What is the Environmental Setting of this Project; Chapter 5, General Environmental Consequences Related to Beach Fill.	Noted. See referenced sections.
20	The need to apply an in-water work moratorium (necessary to protect aquatic resources) from April 1 to September 30. This moratorium reduces the negative effects on critical fish life history activities, to include spawning migrations and nursery functions. Additionally, a concern was raised that potential mitigative actions (i.e. beach fill if certain shoreline change thresholds are met) may result in proposed in-water work during the moratorium period. The application of the moratorium to any such mitigative actions should be addressed.	NC DCM Fisheries Resources	Wetlands	Chapter 5, Construction Schedule	Noted. The EIS acknowledges this by stating the dredge work is proposed within the Nov. 16-March31 window.

21	Senate Bill 151 (Session Law 20 13-384) requires that the applicant for a terminal groin project address certain financial obligations for the project, including long-term maintenance. In order to ensure that the required financial information is provided in an acceptable fashion, the financial costs associated with the requirements of Senate Bil1151 (Session Law 2013-384) should be included in the DEIS in as detailed a manner as is possible at this stage in the project development process. The Division would therefore request more detailed cost information in the Final EIS, preferably in a standalone or summary section. (see comment for specific items to include in Financial Assurance Package)	NC DCM	Financial Assurance	Chapter 3, Alternative 5D Implementation Cost; Chapter 5, Question: How Does the Construction of the Terminal Groin Relate to SB 110 and SB 151?	Noted. A financial assurance package will be provided as a stand-alone document and submitted to DCM in the CAMA permit application. Meanwhile, costs associated with the construction, maintenance, and removal of the groin along with any monitoring costs are included in the EIS. See referenced sections.
22	The public notice and introduction of the EIS do not adequately describe why a supplemental EIS is needed. Section 1502.9 of NEPA states that an Agency shall prepare supplements if: (i) The agency makes substantial changes in the proposed action that are relevant to environmental concerns; or (ii) There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.	EPA	General	Chapter 1, Question 2: What is the NEPA EIS process and how does it relate to Figure "8" Beach Homeowners Association's proposed project?	Text has been added, see referenced section.
23	The EPA notes that specific responses to EPA's comments on the DEIS were not provided in the DSEIS. It is also noted that Appendix A - did not have a copy of the EPA DEIS comment letter. Because these are formal Agency comments and part of the public record, please include these comments in the FE IS and provide a	EPA	General	N/A	Noted and comments are included. EPA's Comment #3 requested updated water quality data from a number of NCDENR sampling sites. These sites were discontinued after 2007 and therefore updated data is not available. EPA's Comment #4 requests updated water quality data from a series of 13 sites from within the permit area. These 13 sites were monitored by CPE-NC on two dates in

	dedicated section that specifically responds to the EPA's past comments.				2007 (not the State, as indicated in the EPA's comment) and have not been monitored since that time.
24	The EPA notes that the property tax total for the island (Figure Eight Island) is stated in the EIS as $907,352,900. However, this is not the value of the property that is being directly impacted by coastal erosion. The EPA notes that both figures are provided in the EIS, but to avoid confusion, it is recommended only using the relevant property value of the endangered properties.	EPA	General	Chapter 2	Text changed accordingly.
25	Several examples are provided of potential impacts to road infrastructure if erosion remains unchecked on the island. Please provide citations, model results, or other evidence in the FEIS of how these potential impacts were derived.	EPA	Engineering	Appendix B, Tables 6.1 and 6.3	The potential impacts to roads and infrastructure were based on the continued landward movement of the shoreline at the same rates as measured during the 1999 to 2007 time period and reported in Table 6.1 and 6.3 in Appendix B for Figure Eight Island and Hutaff Island, respectively. These measured rates were obtained from an analysis of beach profile survey data.
26	Page 33 - It is stated, "At the present time (2015), the shoreline along the north end of Figure Eight Island is responding positively to the orientation of the ocean bar channel of Rich Inlet and as long at the channel maintains this favorable orientation, immediate efforts to abandon and/or relocate structures from the ocean shoreline will not be necessary. In this regard, the position of the shoreline north of the intersection of Comber Road and Dunes Point Road (approximately baseline station 80+00) are now between 160 and 350 feet seaward of the 2006 shoreline position." If the shoreline is currently accreting and there is not an	EPA	General	Chapter 2, Question 1: What are the Purpose and Needs of this Project?; Chapter 3, Alternative 2 Description.	The applicant's stated purpose and need includes both short and long-term protection based on the cyclical nature of the experienced erosion resulting from the shifting of the bar channel. Text has been updated in attempt to further describe current conditions. See referenced sections.

	immediate need for relocation/abandonment, it is unclear to the EPA if the purpose and need of the project is met. Please clarify in the FEIS.				
27	Alternative 2 - Abandon/Retreat -Under this alternative no additional measures would be employed to prevent coastal erosion. Certain endangered properties would either be relocated or demolished. The DSEIS states that 30 structures would be demolished and 10 would be relocated. It is not clear how the number of structures to be demolished/relocated was developed. Additional clarification is needed in the FEIS.	EPA	Engineering	Chapter 3, Alternative 2.	Text has been amended.
28	Alternatives 5C and 5D were not analyzed in the original DEIS. The terminal groin position in 5C and 5D is a more northerly position than Alternatives 5A and 5B. It is stated in the DSEIS that the decision to add 5C and 5D was due to "potential complications in obtaining the necessary easements for constructing 5A and 5B." This issue is key to adding the new alternatives and most likely the reasoning for developing the supplemental EIS. The EPA is concerned that this issue is not fully developed/discussed in the DSEIS. In addition, the EPA remains unclear on why the same easement issues would not exist for the new groin alignments presented for 5C and 5D. The EPA recommends clarification in the FEIS.	EPA	Easements	Chapter 1, Question 2: What is the NEPA EIS process and how does it relate to Figure “8” Beach Homeowners Association's proposed project?	See response to Comment #22 above.
29	Page 27 - It is stated that: "Alternatives 5A and 5B were not modeled using the 2012 conditions (Table 3.1) since this position of the terminal groin was not favored by a majority of the northernmost property owners and would not likely be approved by the Figure "8" Beach HOA. Alternative 5C was also excluded from the 2012	EPA	Modeling	Chapter 5, Question 6: What are the environmental and economic impacts	All reasonable alternatives, with the exception of Alternative 1, were fully evaluated using the 2006 shoreline conditions and simulated via the Delft3D model. See discussion in referenced sections for the explanation for using the 2006 shoreline conditions and the use of the modeling for comparison purposes.

	model setup due to the Figure "8"Beach HOA designating Alternative 5D as its preferred alternative prior to the initiation of the 2012 model simulations. Although not modeled using 2012 conditions, quantities and cost estimates to construct these three alternatives, given the 2012 conditions, were computed using actual 2012 survey data". The EPA is unclear on why these alternatives were not fully evaluated I considered but carried forward in the analysis. We understand that the applicant has a preferred alternative (5D), however, if Alternatives 5A and 5B meet the project purpose and need, they should be fully evaluated in the EIS. The EPA recommends the FEIS include updated modeling (using 2012 conditions) for all alternatives (including Alternatives 5A and 5B).			associated with each specific alternatives?; Chapter 5,How were the environmental impacts analyzed?; Chapter 3, Question 1: What alternatives are evaluated in this EIS?	
30	Figure 3.12 depicts coastal wetlands being impacted by the anchor section of Alternative 5D which includes construction of sheet pile and a 50ft construction buffer. It is unclear to the EPA if these wetlands are jurisdictional, requiring Section 404 permit coverage. In addition, Chapter 5 (environmental consequences) also does not clearly state the impacts to 'jurisdictional" wetlands for Alternative 5D. The EPA recommends that the FEIS provide a clear description of potential impacts to jurisdictional wetlands (including delineations) and any proposed mitigation for those impacts, if applicable.	EPA	Wetlands	Chapter 3, Terminal Groin Construction Methodology; Chapter 4, Salt Marsh Communities; Chapter 5, Alternatives 5A-5D- Salt Marsh Communities	Text has been amended.

31	It's not clear from the DSEIS if the Sea Level Rise (SLR) discussion in the DSEIS follows internal USACE regulations/guidance for predicting SLR and addressing coastal risk reduction/resilience. Please see the references: -ETL 1100-2-1 Procedures to Evaluate Sea Level Change: Impacts, Responses, and Adaption (2014) http://www.publications .usace.army.millPortalsi761Publications/EngincerTechni c alLettcrsiETL 1100-2-l.pdf -Coastal Risk Reduction and Resilience: Using the Full Array of Measures (2013) http://www.comsclimate.us /docs/ USACE Coastal Risk Reduction final CWTS 2013-3.pdf	EPA	Sea Level Rise	Chapter 5, Sea Level Rise section.	The referenced publication was developed for Corps Civil Works projects and not with Regulatory projects in mind. See referenced pages for addressing SLR.
32	The EPA continues to recommend that all project construction and dredging operations avoid the Civil War era shipwreck, the 'Wild Dayrell', and that follow-up geophysical investigations continue to keep this cultural resource accurately mapped in order to protect it during all construction activities, as well as future maintenance operations (including dredging and periodic nourishment). The EPA further recommends coordination and consultation with the State Historic Preservation Office prior to construction activities.	EPA	Cultural Resources	Appendix H	Noted. Coordination has been initiated with NC State Historic Preservation Office.

33	The EPA notes that construction of the terminal groin and beach nourishment activities may impact nesting activities of shoreline birds such as the piping plover. The EPA is concerned about these potential impacts to threatened and endangered (T&E) species but defers to the US Fish and Wildlife Service. The EPA recommends that the USACE continue consultation with the USFWS regarding species listed under the Endangered Species Act (ESA). In addition, the EPA also recommends that the USACE consult with the National Marine Fisheries Service (NMFS) regarding potential impacts to essential fish habitat, ifNMFS has not already been consulted. Additional information relating to consultations with USFWS and/or NMFS between the release of the DSEIS and FEIS should be included in the FEIS.	EPA	Consultation	N/A	Noted. ESA Consultation with NMFS and USFWS has been initiated and is on-going. EFH Consultation with NMFS has been initiated and is on-going.
34	Because the NEPA process includes an assessment of potential water quality impacts pursuant to Section 401 of the Clean Water Act, the EPA recommends the USACE to continue to coordinate with the North Carolina Division of Water Quality (DWQ) and seek a DWQ Section 410 water quality certification. Further, the EPA recommends that the USACE to continue to coordinate with the North Carolina Division of Coastal Management (DCM) to ensure the full compliance with all State Environmental Policy Act (SEPA) requirements and to determine consistency with the Coastal Zone Management Act (CZMA). The EPA recommends that the FEIS document all of these efforts at coordination and include in the appendices all relevant and required certifications.	EPA	Consultation		Noted. Coordination with NC DWR and DCM has been initiated and is on-going. Corps Record of Decision (ROD) will include all relevant and required State certifications.

35	The DSEIS did not include any analysis or information pertaining to the Council on Environmental Quality's (CEQ's) final draft guidance on Greenhouse Gas (GHG) Emissions and Climate Change Impacts (See: https://www.whitehousc.gov /administration /cop/ccg/initiativcs/ncpa/ghg-guidancc). The USACE did not provide a discussion as to why this guidance is not applicable to the proposed project. The FEIS should provide an assessment of potential GHG emissions and what contribution to climate change may be anticipated from the proposed project, as appropriate.	EPA	Air Quality	Chapter 4, Non-Relevant Resources- Air Pollution.	Noted.
36	The SEIS on page 267 states “Dredging is scheduled to occur between November 16th and March 31st. The timing of construction activities was specifically scheduled to occur outside of the sea turtle nesting season, the West Indian Manatee summer occurrence in North Carolina, the Piping Plover (and other shorebirds) migratory and breeding seasons, and the Seabeach Amaranth flowering period.” Scientific literature shows this dredging schedule would minimize many of the impacts to larval fish migrating through the inlet. In later sections, the SEIS states “Fish and larval biota which utilize the channel within the inlet are not anticipated to be significantly impacted during dredging because the dredge will be positioned outside the main channel” and “limited mortality of fish” would occur. No justification or documentation is supporting these statements is provided. The NMFS requests amendment of the SEIS to include this information.	NMFS	Larval Transport	Chapter 5, General Environmental Consequences Related to Dredging	Text has been amended.

37	The Wilmington District indicates in the SEIS an Essential Fish Habitat (EFH) Assessment will be prepared for this project separate from the SEIS. NMFS recommends the focal species for the EFH Assessment include: white shrimp, brown shrimp, pink shrimp, Atlantic sharpnose shark and other small coastal sharks, smooth dogfish, bluefish, black sea bass, gag, Spanish mackerel, king mackerel, cobia, and summer flounder. In addition to these federally-managed species, this area also provides habitat for blue crab, Atlantic menhaden, Florida pompano, Gulf kingfish, red drum, black drum, and sheepshead, which are important prey for federally-managed species and should be included in the assessment.	NMFS	EFH Assessment	N/A	Noted.
38	The species occurrence data in the SEIS are not up-to-date. For sea turtles and seabeach amaranth, no data is provided after 2010. For shorebirds, including piping plover, the tables provide data to 2007, although some of the text includes more recent information. The species data should be updated in the final EIS, with all currently available data summarized and analyzed (up to and including summer of 2015 if possible).	USFWS	Biological Resources	Chapter 4, Sea Turtles, Seabeach Amaranth, Piping Plovers, and Red Knots	Text has been updated accordingly.
39	Little discussion of potential impacts to designated piping plover critical habitat is provided in the SEIS, although portions of Chapter 5 discuss the erosion of sand in areas downdrift of the terminal groin. In addition, the figures showing the outcomes of various model runs in the Engineering Report (Appendix B and sub-parts} indicate potentially severe erosion of the shoreline downdrift of the terminal groin within the first five years. The Service has concerns for the potential losses of nesting and foraging habitat due to both direct and indirect impacts, particularly within the	USFWS	Piping Plover	Chapter 5, Alternatives 5A-5D Inlet Dry Beaches, Intertidal Flats and Shoals.	Text has been amended accordingly.

	Critical Habitat Unit. The BA and final EIS should address the potential loss of designated critical habitat over time, as a result of the construction of the terminal groin.				
40	The construction timing for the landward portion of terminal groin is a concern for the seabeach amaranth. The ESA Section 7 evaluation should address the potential for affects from the construction timing, and also the potential effects of long-term stabilization of the shoreline.	USFWS	Seabeach Amaranth	Chbapter 5, Alternaitves 5A-5D- Inlet Dunes and Dry Beaches	Text has been amended accordingly.
41	On page 7 of the SEIS (Chapter 1 - Introduction), the applicant states that the Rich Inlet management with beach fill alternative (Alternative 3) meets the purpose and needs of the project, and that it is practicable. It also appears from some of the modeling discussion in the Engineering Report (Appendix B, page 206) that Alternative 4 may provide adequate protection of homes from erosion even under the high-erosion scenario. However, the applicant believes that the terminal groin·alternative (preferred alternative 5D) will result in improved economic benefits and reduced environmental impacts. Because of the Service's concerns for potential impacts to piping plover, Critical Habitat Unit NC-11, seabeach amaranth, and sea turtles, it currently appears that Alternative SD may have greater impacts to our trust resources than Alternatives 3 or 4.	USFWS	Impacts Analysis	N/A	Noted.

42	The SEIS discusses the assessed tax value of several properties on Figure Eight Island. The SEIS states that there are 40 homes that are or may be imminently threatened over the next 30 years, and assumes that 30 homes will need to be demolished under both Alternatives 1 and 2 (pages 31, 33, 34) and only 10 would be relocated. According to Page 33 of the SEIS, there are currently 80 empty lots on Figure Eight Island. There does not appear to be ajustification given for the estimated number of homes that will be demolished.	USFWS	Economics	Chapter 3, Alternative 2 Description	The determination of which threatened structures would be moved or demolished is subjective as there is no way to determine which individual property owner would choose to move a threatened structure or have it demolished. On Figure Eight Island, one property owner on the north end elected to move his structure to a lot that was immediately landward of the structure. On the east end of Ocean Isle Beach, the town has lost 6 homes since 2001. Of the six that were lost, 2 were relocated and 4 demolished. In terms of the cost of damages, relocation carries a higher cost. Therefore, a conservative assumption was made that 25% of the threatened homes on Figure Eight Island would be moved and 75% demolished.
43	Page 17of Appendix B states that the rate of shoreline erosion associated with the average rate of SLR is 0.5 ft/year. The SEIS also refers to historic rates of nourishment and Federal Storm Damage Reduction Project schedules for Wrightsville and Carolina Beaches, to establish that erosion of the shoreline has not accelerated over time. However, no data or detail is provided for the reader to consider.	USFWS	Sea Level Rise	Appendix B, Section 4.7 Relative Sea Level Rise	The discussion of sea level changes in Appendix B does not include a discussion of historic beach nourishment activities at Carolina Beach and Wrightsville Beach. That discussion is in Chapter 5. Figures showing the cumulative nourishment volumes for both Carolina Beach and Wrightsville Beach projects have been added to Chapter 5 as Figures 5.47a and 5.47b for Carolina Beach and Wrightsville Beach, respectively. These two curves show there has not been any incremental increase in the average annual nourishment volume needed to maintain the projects during the 50-year recorded history. The discussion in Appendix B does indicate if sea level continued to rise at a rate of 0.0078 ft./year, which is the average of the observed rates at Beaufort, NC and Wilmington, NC, the impact on shoreline change would be around 0.5 feet/year. The discussion also includes possible sea level rise impacts on shoreline change associated with sea level change rates of between 0.0161 ft./yr. and 0.0189 ft./year projected by the NC Coastal Hazards Science Panel. Based on these projected rates,

					changes on the shoreline could range from 1.1 to 1.3 feet of recession per year.
44	Wrightsville Beach is nourished every four years based on funding schedules from the Corps, while Carolina Beach is nourished every three years. It is not clear in the SEIS whether the Corps would provide nourishment at a shorter interval than provided in the funding schedule, if erosion rates warranted it.	USFWS	Downdrift Effects	Chapter 3, Alternative Descriptions	The nourishment of Wrightsville Beach and Carolina Beach are based on the navigational needs of Masonboro and Carolina Beach Inlets. The stated purpose of the proposed project is for shoreline protection and not for navigation, and the nourishment cycle projections are only based on shoreline beach fill needs.
45	We note that Table 6-2 in Appendix B is not current, as it leaves out the 2012-2013 Mason Inlet dredging - and sand placement.	USFWS	General	Table 6.2, Appendix B, Table 2.1 Chapter 2.	Tables updated accordingly.

46	The model runs in the Engineering Report (Appendix B, page 214), indicate that the preferred alternative (5D) may result in erosion-related damage in Year 4 or 5 to four oceanfront homes near the south end of Inlet Hook Road. Under a high-erosion scenario, it is not explained how a nourishment interval of 5 years will protect these currently sand-bagged homes from potential damage. However, a nourishment schedule of five years is proposed for this preferred alternative. The Service would be concerned with the acceleration of nourishment schedules based upon increased storm surge or sea level rise, or other factors. The Service recommends that any permit for this project include conditions requiring that beach nourishment be conducted no more often than once every five years.	USFWS	Engineering	Appendix B, Section 12.5.5 Alternative 5D-1	Noted. The cited appendix and page is in reference to the results obtained by the GENESIS model. The GENESIS model was not the model used to evaluate the difference between the various alternatives, rather, that assessment was based on the Delft3D results. As stated in the document, the GENESIS model was only used to get a generalized "second opinion" of the results obtained by the Delft3D model. GENESIS is a simple "one-line" shoreline model that only accounts for the impacts of changes in the magnitude of longshore transport resulting from various man-made changes and does not have the ability to replicate sediment transport due to tide generated currents. Sediment transport due to tide induced currents are prevalent near Rich Inlet.
47	The NCNHP database shows numerous records for rare species and important natural communities, as well as two natural areas- Figure Eight Island Marsh and Lea/Hutaff Island Beach- within the proposed project area. The database also shows that a portion of the Figure Eight Island Marsh natural area is a Registered Natural Heritage Area (RHA) under agreement between the Northeast New Hanover Conservancy and NCDENR.	NC Natural Heritage Program	Biological Resources	Chapter 4, Question 1: What is the Environmental Setting of this Project	Text updated accordingly.
48	The remote sensing survey identified 5 targets that contain characterisics suggestive of potentially significant cultural material. These anomalies identified as R-1 through R-15 in the CR report must be avoided with the recommended 100' and/or 150' buffers. If these areas cannot be avoided, additional investigations are required prior to disturbance. Of particular concern is Target R-1 (150' buffer) that is approximately 300' from the endi of the end of hte proposed offloading pier. The wreck of the Wild	NC SHPO	Cultural Resources	N/A	Noted.

	Dayrell (ooo1R11) is also located in the inlet and must be avoided with the recommended 400' by 600' buffer zone.				
49	Our office has concern regarding how the placement of a terminal groin may affect the dynamics of the inlet. The resulting changes in water and sediment movement could adversely impact the unassessed targets and the stability of the Wild Dayrell.	NC SHPO	Cultural Resources	Chapter 5, Alternatives 5A-5D Inlet Dunes and Dry Beaches	Noted. See referenced discussion on Inlet Dunes and Dry Beaches in regards to shoreline change.
50	The NCWRC has an established sea turtle nesting moratorium that reduces the potential for unintended impacts to nesting sea turtle species that frequent the coast of North Carolina. To avoid impacts to these species, all work on the oceanfront shoreline, including mobilization and demobilization for all beach nourishment events and the construction of the terminal groin structure, should be conducted outside of the sea turtle nesting season which runs from May 1 until November 15, or until the last known sea turtle nest has hatched.	NC WRC	Sea Turtles	Chapter 5 and Chapter 6.	Noted. The project has been planned to include construction during the recommended window.
51	Inlet areas provide suitable nesting, foraging and roosting areas for multiple shorebird species. Nesting birds are sensitive to increased human activity and other disturbances around their nesting areas. To limit unintended impacts to nesting bird species in and near the project area, please avoid all work during the shorebird nesting period which runs from April 1 to August 31.	NC WRC	Birds	Chapter 5 and Chapter 6.	Noted. The project has been planned to include construction during the recommended window.

52	Preconstruction monitoring should be incorporated for overwintering birds to better establish the use of the inlet area by these species. This information is beneficial in evaluating any impacts to the use by these bird species post construction during seasons that may not have been previously monitored by the applicant outside of the breeding season.	NC WRC	Monitoring	Chapter 6, Question 2: What are the monitoring initiatives being developed?	Bird monitoring is currently on-going and is projected to continue. See referenced section.
53	The NCWRC is concerned that building a structure that is dependent upon regular nourishment events could potentially impact benthic invertebrate populations found in intertidal habitats. Benthic invertebrates are an important food source for foraging birds, both resident and migratory, during both the breeding and nonbreeding seasons. Regular beach nourishment events, such as every five years, can reduce benthic populations when populations are not given appropriate time for recovery.	NC WRC	Benthic Invertebrates	Chapter 5, General Environmental Consequences Related to Dredging	Noted. The EIS document addresses impacts to the benthic community for each alternative, and also see the referenced text for the general discussion on activity effects to the benthic community.
54	The NCWRC is concerned that the construction of a terminal groin may lead to a possible increase in requests to conduct emergency beach nourishment during ecologically sensitive times of the year, i.e. the nesting shorebird and nesting sea turtle moratoriums, due to potential increases in erosion rates around the groin structure.	NC WRC	General	N/A	Noted.

55	The NCWRC is concerned about permanent, cumulative habitat loss and changes to the Rich Inlet complex, the northern end of Figure Eight Island, and Hutaff Island. Species of special concern include piping plover, red knot, and American oystercatcher. Some numbers of these species were included in the SEIS, but it appears some of the data could be updated or statements made as to the culmination of data from different sources. "Coastal engineering projects can potentially create, enhance, degrade, or destroy foraging and nesting habitat at important coastal bird breeding, stopover, or wintering sites" (Harrington 2008). Senate Bill 110 (e)(5)(c) states the plan must provide for mitigation measures to be implemented if adverse impacts reach the thresholds defined in the plan. Mitigation would need to create or protect a similar habitat type that would offset the loss of this inlet area.	NC WRC	Cumulative Impacts	Chapter 6, Question 2: What are the Monitoring Initiatives Being Developed?	Noted. See response in Comment #17.
56	Biological and physical post-project monitoring should be conducted for a long enough period of time to determine the effect a terminal groin structure has on the immediate and surrounding areas. Due to the dynamic nature of barrier islands, ocean facing beaches, and inlets, this period of time should be long enough to capture a "normal" period of time. Monitoring reports should be provided to the appropriate parties and consultation should be done with regulatory and resources agencies prior to ceasing any monitoring activity. If it is determined during this period of time the project has had a significant adverse impact or is not performing as intended, mitigation may have to be implemented.	NC WRC	Monitoring	Chapter 6	Noted. Chapter 6 includes all conservation and monitoring measures proposed by the applicant at this time.

57	Stakeholder meetings were not held to inform/discuss the New EIS. This is a new EIS and Stake Holder Meetings should be mandatory for full disclosure as the process is developing. Renaming a previous EIS as a Supplemental EIS without New Stake Holder input is flawed and not justified.	Bob Parr/PDT Member	General	Chapter 1	The purpose of the "stakeholders" meetings were fulfilled after the release of the Draft EIS. See Chapter 1 for the reasons of the Project Delivery Team meetings.
58	The Supplemental EIS erroneously assumes that intense and repeated Sand Mining of ORW (Mason's Inlet, Banks Channel, and Nixon's Channel) has no long term environmental, recreational, financial or cultural impacts for the public at large.	Bob Parr/PDT Member	General	Chapter 5, General Environmental Consequences Related to Dredging	Throughout Chapter 5, in the General environmental consequences related to dredging found on page 266 and in all alternatives except Alternative 2, the document includes discussion on resource impacts related to the initial and maintenance dredging.
59	There is no discussion of the legal and environmental impacts of codifying and permitting the regular, 30 year maintenance dredging of Nixon's Channel (ORW).	Bob Parr/PDT Member	General	Chapter 5, General Environmental Consequences Related to Dredging	Throughout Chapter 5, the EIS addresses cumulative impacts to the environment for maintenance events over the 30-year period for all the alternatives, except 2.
60	The Supplemental EIS does repeatedly refer to "previously permitted" dredging of Nixon's Channel but does not openly discuss the negative impacts of regular, long term sand mining in public trust waters. This same discussion was not included in the "previously permitted" permits.	Bob Parr/PDT Member	General	Chapter 5, General Environmental Consequences Related to Dredging	See response to comment #58 above
61	The Supplemental EIS does include language and mechanisms which trigger sand mining events but fails to include similar considerations for halting sand mining in the future.	Bob Parr/PDT Member	General	Chapter 6, Shoreline Management Plan	Current proposed triggers for the ceasing of Nixon Channel dredging is tied to the monitoring of shoreline changes and effects from the proposed terminal groin as discussed in the Shoreline Management Plan of Chapter 6.

62	In the SEIS the Corps fails to: (a) establish a realistic purpose and need for this project; (b) rigorously explore and objectively evaluate all alternatives; (c) provide clear and concise information; and (d) provide an objective analysis rather than justify already made decisions.	NCCF	General	N/A	The EIS has fulfilled all the requirements pursuant to 40 CFR 1502.
63	The need to "mitigate chronic erosion on the northern portion of Figure Eight Island to preserve the integrity of its infrastructure, provide protection to existing development, and ensure the continued use of the oceanfront beach along the northernmost three miles of its oceanfront shoreline"1 is invalid given that the north end of the island has been accreting.	NCCF	Purpose and Need	Chapter 2, Question 1: What are the purpose and needs of this project; Appendix B, Sub-Appendix A.	In Chapter 2, one of the stated purpose and needs is to provide long-term protection during periods of erosional conditions. Historical information has been provided, via the geomorphological analysis in the Engineer Report (Appendix B), which indicate that the bar channel migrates overtime and shows erosional periods during certain conditions.
64	In describing the treatment of project alternatives as the heart of the Environmental Impact Statement (EIS), 40 CFR 1502.14 requires the agencies to: (1) rigorously explore and objectively evaluate all alternatives; (2) dedicate substantial treatment to each alternative to allow evaluation of their comparative merits. The Corps fails to comply with both of these legal requirements.	NCCF	General	N/A	During the scoping process, a range of reasonable alternatives were evaluated and thoroughly considered. The EIS has fulfilled all the requirements pursuant to 40 CFR 1502.
65	The Corps does not provide evidence for the stated reason underlying the entire study: that the inlet bar channel has started shifting toward Huttaff Island thus making the erosion at Figure Eight Island imminent. As evidence of this erosion the Corps references only an aerial image which is not included in the document. Hence this assumption is unsupported. If indeed the channel has started shifting, the Corps needs to provide ample evidence of the channel's imminent shift. Without this evidence this study has no merit.	NCCF	General	Chapter 2, Figure 2.4.	Additional information has been provided.

66	The Corps unreasonably assumes that even if the bar channel started moving and it caused erosion on Figure Eight Island, the rates of erosion would mimic those of 2006. Thus, the Corps arbitrarily choses the 2006 shoreline position as the worst case scenario and uses it as a baseline for the entire study. The Corps does not provide any data to support this claim. In fact, the Corps cannot provide evidence for this assumption because according to Dr. Clary's report 2006 was not when the island experienced the worst erosion rates.	NCCF	General	N/A	The term "worst-case" has been deleted when using 2006 shoreline conditions and is acknowledged as a shoreline that is indicative of erosive conditions. Future erosion rates are not assumed to exactly mimic those of 2006. As stated in the beginning of Chapter 5, the model results under the 2006 shoreline conditions were used to compare all the alternatives under the same conditions. It is acknowledged that making future predictions is difficult with modeling and it is not assumed that future erosional and/or accretion rates will always be the same during any shifting of the bar channel.
67	The Corps does not provide information on modeling of Alternative 1, instead stating that Alternative 2 will be used as its proxy. This is unacceptable given that the two alternatives are intrinsically different: Alternative 1 assumes the continuation of current inlet management practices such as dredging and nourishment, while Alternative 2 assumes taking no action at all. However, the economic assessment in Appendix G provides modeling results for Alternative 1. This shows that this alternative has been modeled, but the results have not been included in the main document for comparative study of alternatives.	NCCF	Modeling	Appendix G	The Economic Appendix (Appendix G) has been corrected to indicate future damages under Alternative 1 were based on the continuation of the erosion rates measured between 1999 and 2007 not on the results of the Delft3D model. While the costs of future beach nourishment activities under Alternative 1 are included in the economic impact analysis, these future costs were based on the assumption that future nourishment costs would be equal to the average annual costs of nourishment activities that have occurred sporadically since 1997.

68	On page 30, the Corps states that if the inlet realigns toward Hutaff Island, "erosion rates along the north end of Figure Eight Island are expected to accelerate and attain rates comparable to those measured between 1993 and 2007." On that same page, the Corps states that "the economic assessment assumed the shoreline would erode into the existing development at rates comparable to those measured between 1999 and 2007." Similar statements are made on page 33, then followed with "if erosion rates continue at their current level, nine (9) homes on Beach Road North located immediately south of Surf Court are expected to become threatened within the next ten (10) years with an additional eight (8) homes on Beach Road North threatened within the next 25 years." Yet, on page 33, the Corps states "At the present time (2015), the shoreline along the north end of Figure Eight Island is responding positively to the orientation of the ocean bar channel at Rich Inlet" -- i.e. accreting. Thus, the "current level" of shoreline change is accretion, not erosion.	NCCF	Modeling	Chapter 2, Rich Inlet History.	The economic assessment for Alternatives 1 and 2 were based on the rate of shoreline change along the north end of Figure Eight Island observed between 1999 and 2007 and the distance between the structure and infrastructure element from the 2007 shoreline. The document also acknowledges conditions have change since the migration of the Rich Inlet bar channel back toward Figure Eight Island which occurred around 2010. The recent channel reorientation notwithstanding, future changes along the north end are expected to again revert back to erosion rates comparable to the 1999-2007 time period with the movement of the bar channel back toward Hutaff Island. Aerial photographs of Rich Inlet taken in 2010 and 2015 were added to Chapter 2 to show the recent change in channel position and alignment which supports the apparent initiation of the channel migration back toward Hutaff Island.
69	On page 203, the Corps describes shoreline change rates from 1974 to 2007 as ranging "from +1.1 feet/year just north of Bridge Road to --16.8 feet/year in the northern area fronting the sandbags" in its description of Alternative 1. In describing Alternative 2, the Corps uses a different time period and a different set of rates. It states that "for the northernmost area of Figure Eight Island, shoreline change rates have varied from --12.6 feet/year to --92.8 feet/year during the 1996 to 2007 time period." The same page references erosion and accretion rates from 1998 to 2007.	NCCF	Engineering	Chapter 5, Question 3: What impacts would each alternative have on the shorelines of Figure Eight Island and Hutaff Island over a 5-year period?	The document has been modified to remove ambiguity with regard to time periods used for shoreline changes. In this regard, the rate of shoreline change used in the assessment of impacts associated with both Alternatives 1 and 2 were based on the worst-case shoreline change rates observed between 1999 to 2007. The shoreline change rates used in the analyses are provided in Tables 6.1 and 6.3 in Appendix B for Figure Eight Island and Hutaff Island, respectively.

70	Despite the outlined modeling deficiencies, if the Corps still determines that the modeling tools used in this study comprise a good basis for decision--making then it should apply the results obtained by the modeling runs. Instead the Corps completely ignores the results obtained for the 2012 modeling. These modeling data show that Alternative 2 meets the needs of the applicant and is the LEDPA.	NCCF	Modeling	Chapter 5, Question 3: What impacts would each alternative have on the shorelines of Figure Eight Island and Hutaff Island over a 5-year period?; Question 6: What are the environmental and economic impacts associated with each specific alternative?; Chapter 3, Question 1: What alternatives are evaluated in this EIS?	Model runs for the 2006 shoreline conditions provided a full dataset in order to conduct an comparative analysis equally for the environmental and economic impacts for all alternatives. The results of the model runs simulated under the 2012 shoreline conditions are included in the EIS and the changes of shoreline conditions over a five year period are shown and discussed in the referenced sections.

71	In its attempt to comply with the Inlet Management Plan requirement, the Corps egregiously bases the entire analysis of this section on obsolete data that skew the results presented in the document. The Corps describes that it will use past shoreline changes to establish the basis for development of expected future shoreline trends. The Corps cites Dr. Cleary's 2007 report as the underlying source of data to establish past shoreline trends. The data used in the report end in 2007 excluding the most recent period of accretion that the island has experienced. As stated in the SEIS, in recent years the shoreline accreted from 165 ft. – 360 ft. Including this most recent shoreline change would affect all figures and results of the study and in turn impact the expected future shoreline changes as presented in the SEIS. In the application of past shoreline change trends to the determination of future expected shoreline changes, the SEIS only uses data from 1974--2007 even though data for a period between 1938 and 2007 are available. As stated in the study, the reason for choosing this shorter time segment is "the recent tendency for the inlet's ocean bar channel to be situated near the south end of Hutaff Island. This stated reasoning is invalid because: (1) the stated tendency of the bar channel is incorrect. The channel has recently been located near the Figure Eight Island causing the positive shoreline change; also, Figures 9 and 10 of Appendix B, Sub--appendix A do not support the stated reasoning; and (2) there is no logical explanation or support for the statement that the bar channel's tendency to be situated near the Hutaff Island, even if true, warrants the application of a shorter rather than longer time period. In choosing to apply only the shorter time segment (1974--2007) to the projection of future shoreline changes the Corps	NCCF	Inlet Management Plan	Chapter 6, Shoreline Management Plan	The purpose of developing shoreline change thresholds was to pre-establish shoreline change conditions that could reasonably be attributed to a dramatic change in shoreline behavior following the installation of the terminal groin. The analysis looked at shoreline trends for both the 1938-2007 and 1974-2007 time periods. As indicated by the cumulative shoreline change curves for Hutaff Island (Figures 6.13 to 6.16), the only shoreline segment on Hutaff Island that displayed significantly different behavior over the two time periods was the segment closest to Rich Inlet (transects 21 to 25 shown on Figure 6.13). The other three segments on Hutaff Island displayed essentially the same behavior over both time periods, therefore, the use of the 1974-2007 trends to establish the thresholds was completely appropriate. On the Figure Eight Island side of Rich Inlet the behavior of the shoreline has been more erratic. The Rich Inlet channel assumed an alignment toward Figure Eight Island around 2010 but recent photos, added on page 31 of Chapter 3, seem to indicate the channel has again begun to swing back toward Hutaff Island. The channel alignment notwithstanding, as evident by inspection of Figures 6.9 through 6.12, major changes in the behavior of the shoreline along the north end of Figure Eight Island began around the mid 1970's or about the time the major development of the island was initiated. Given the erratic behavior of the shoreline, particularly near Rich Inlet, establishing statistically significant trends for the entire period (1938-2007) would be meaningless.

	contradicts its own statement that “the linear regression rates developed for each transect group do not adequately represent the highly variable nature of the behavior of the shorelines over short time intervals.				

72	Future expected shoreline trends are skewed by arbitrary calculation of past shoreline trends: The dataset (1938--2007) used in the calculation of past shoreline trends is limited and incomplete because it omits the recent accretion trend (165 ft. – 360 ft.)	NCCF	Inlet Management Plan	Chapter 2, Rich Inlet History.	The dynamic nature of the shoreline changes on Figure Eight Island is closely linked to the behavior of Rich Inlet. The accretion noted during the July 2006 to January 2013 time period was directly related to the shift of the Rich Inlet bar channel to an alignment toward the north end of Figure Eight Island. As noted in the document, the change in shoreline behavior may have been short-lived. Evidence in the form of two aerial photographs, dated October 2010 and January 2015, were added on page 31 in Chapter 3 to demonstrate the bar channel of Rich Inlet is again beginning to swing toward Hutaff Island. Based on the long history of channel behavior presented in the document, the change in channel alignment is anticipated to produce another period of rapid erosion on the north end of Figure Eight. Given the variability of the behavior of the shoreline and its dependence on Rich Inlet, the Inlet Management Plan was revised to include a shoreline proximity factor that would initiate mitigation planning once the shoreline encroaches within 40 feet of ocean front development or infrastructure. Note the use of 40 feet is double the distance used by NCDCM to identify when a structure becomes imminently threatened.

73	The Corps arbitrarily determines that if a threshold is met, a two-year period of observation is necessary before mitigation takes place. The Corps does not provide any evidence to support the two-year waiting period. In this case if the erosion rates reach 700 ft. per year compared to the past average shoreline change at the north end (T20) of the Figure Eight Island there would be a two year observation period before any mitigation would take place. Put into reality this means that the shoreline approximately between 60+00 and 105+00 (T16--19 in Dr. Cleary's study) would have to erode all the way between the Beach Road N and the Oyster Catcher Road and stay there for two years before any mitigation took place. In other words the new shoreline would be in the middle of the current island.	NCCF	Inlet Management Plan	Chapter 6, Shoreline Manangement Plan	An additional element to the inlet management plan was added in Chapter 6 to take into account the proximity of post-construction shorelines to ocean front development and infrastructure on Figure Eight Island. If the shoreline encroaches within 40 feet of ocean front development or infrastructure on Figure Eight Island, preparations to mitigate the erosion threat would be proposed by the Figure 8 HOA immediately. Since there are no structures or infrastructure on Hutaff Island, the need to mitigate for possible project related impacts would be based on the shoreline change thresholds as described in the document. Use of the shoreline change thresholds on Hutaff Island is appropriate due to the relative consistent nature of shoreline trends during both the 1938-2007 and 1974-2007 time periods. Again the primary mode of mitigation would be in the form of beach nourishment. The two-year verification period has been generally applied to other projects in which shoreline change thresholds have been adopted to determine if and/or when a project produces negative impacts. For example, a similar verification period was used for the Pea Island terminal groin and the Fort Fisher revetment. In general, the two year period is associated with observed post-storm behavior of beaches along the NC coast.
74	The Corps completely fails in the analysis of the effects of the environment, because it does not even make an attempt to analyze the effects on existing habitat. Instead, the Corps (a) repeats the same flawed analysis presented in the DEIS using the obsolete 2007 aerial map (Figure 4.1) for delineating habitat areas upon which it analyzes direct and indirect habitat impacts. The Corps admits it will update this map closer to the	NCCF	Biological Resources	Chapter 4, Question 1: What is the environmental setting of this project?	See Comment # 70 above and referenced sections. Figure has been updated in Chapter 4.

	construction date. This blatant omission of the current habitat map violates the essence of the NEPA.				
75	The indirect impacts are only evaluated for the beach habitats on the oceanfront, and upland habitats are omitted. In fact, the table of impacts provided in the SEIS is completely useless given that it does not distinguish among positive, negative or both of these effects. In that sense it is for example unclear whether the 0-5 acres of inlet dunes and dry beaches that will be impacted under Alternative 5D will be a positive or negative impact, or both.	NCCF	Impacts Analysis	Chapter 5, Question 2 and Table 5.1; and Chapter 5 Question 5 & 6.	Table 5.1 has been modified and it only estimates the change to habitats in acre amounts and does not distinguish whether the change is detrimental, beneficial, or neutral since the resources respond to changes differently. Qualifying those habitat changes are disclosed in the discussion points for each alternative in Chapter 5.
76	The SEIS requires the Corps to consult with expert agencies U.S. Fish and Wildlife Service and National Marine Fishery Service. The SEIS fails to provide documents to show that the Consultation has occurred and to supply the Biological Opinion of expert agencies. Without the Biological Opinion the public is cannot know what the response of the expert agencies is on the Corps' assessment of the effects.	NCCF	Consultation	Chapter 1, Question 4: How has government agencies been involved?	Chapter 1 discloses the scoping efforts, particularly the PDT meetings, that have taken place, which the USFWS and NMFS have been involved. Additionally, the EIS acknowledges the need to consult with both Federal agencies regarding Endangered Species Act. Formal Consultation had been initiated with USFWS and NMFS for listed species and critical habitat and a separate Biological Assessment has both submitted to their offices for evaluation. Biological Opinions are not expected prior to the release of the Final EIS.

77	The Corps states that the construction period of the groin would occur during winter months, avoiding nesting periods for piping plovers and turtles, among others. However, the Corps fails to account for wintering grounds of threatened populations of piping plover, such as those from the Great Lakes. By building a groin during winter months wintering critical habitats that are crucial for the continued existence of this threatened species would be threatened, or "taken" under the ESA.	NCCF	Biological Resources	Chapter 5, Alternatives 5A-5D: Inlet dunes and dry beaches.	Text has been amended accordingly.
78	Delineated wetlands (Fig 6.1) 34 are located in the upland areas of the north end of Figure Eight Island. According to the construction plans the land portion of the groin would cut across these wetlands, impacting them. Table 5.1 of the SEIS shows a direct "positive, negative or both" impact of 0.4 acres to the salt marsh with a disclaimer that these impacts are associated with the construction of the groin sheet pile and anchorage and are considered temporary. This table is insufficient since it does not specify which area will experience which impacts. The Corps does not provide for any mitigation measures of the impacted wetlands. The Corps needs to provide a detailed assessment of the proposed project on delineated wetlands and secure mitigation measures for the impacted areas.	NCCF	Wetlands	Chapter 5, Alternatives 5A-5D, Salt Marsh Communities.	At this time, impacts to the saltmarsh community within the construction corridor are considered temporary. However, if detailed construction plans demonstrate additional impacts that could lead to long-term functional loss, then mitigative measures will be implemented.

79	Comparison to the Oregon Inlet groin project is overstated and irrelevant. First, it is important to note that the geological circumstances of Oregon Inlet are vastly different than those of Rich Inlet, thus this comparison is inadequate. Second, other scientists have questioned Overton's analysis. For example, Riggs and Aimes (2009) question the assumptions made in Overton's monitoring study, the lack of accounting for some critical coastal processes (such as human modification) as well as express concern with the paucity of the data in it. Third, and most importantly, the number of variables at play at the Oregon Inlet is so large that granting the seemingly positive impacts to the area solely to the groin is unwarranted. One such variable is the placement of 18.7 million of cubic yards of sand in the project area. For these reasons the example of Oregon Inlet is completely inadequate and should be discarded from the SEIS.	NCCF	General	Chapter 5, Question 3-terminal groin alternatives.	As the 2010 Moffat Nichol terminal groin study demonstrated, the amount of resources concerning long-term effects from terminal groins, as allowed by the SB 110, is limited. The EIS acknowledges the difference between Figure Eight's proposal and other terminal groins in NC, but disagrees that all the information is irrelevant and not useful in making general assessments.
80	The economic assessment provided in Appendix G is utterly incorrect. The Corps states that the assessment is based on modeling results. However, it appears that the study is based only on 2006 modeling given that it completely ignores the 2012 results presented throughout the SEIS.	NCCF	Economics	Appendix G, Page 2.	See Response in Comment # 70.
81	30 year costs associated with Alternative 5D are grossly underestimated (the SEIS states $18.738M, NCCF estimates it would be $53.43M)	NCCF	Economics	Appendix G	Reference Appendix G for how the cost was estimated.
82	The Corps arbitrarily uses an interest rate of 6% to present annualized present values or the opportunity cost of funds, even though as recognized by the author of the economic assessment the discount rate at present time is 2%, whereas the most commonly used discount rate in civil works is 4.125%. This high rate	NCCF	Economics		The economic results for the 6% interest rate were selected for reporting in the main document, however, the sensitivity of the economic impacts to the interest rate was evaluated for three interest rates. The results of the sensitivity analysis is provided in Appendix G-Economics. The three rates used were 2.5%, 4.125%, and

	skews the results showing lower present costs than if a lower rate were used.				6.0%. The annual costs were determined for each alternative by computing the present worth of the cost associated with each alternative over time using the various discount rates. Once the present worth was determined using each discount rate, the average annual equivalent costs were computed using the capital recovery factor for each discount rate. In the case of Alternatives 1 and 2, future damages associated with moving and/or demolishing homes, installing sandbags, or the loss of infrastructure were based on the projected year the impact would occur. For alternatives involving erosion response measures (beach nourishment, channel maintenance, and terminal groin) the present worth and average annual equivalent costs were based on the project year in which the action would be taken. In any event, the interest rate did not play a significant role in determining the overall relative economic impacts of one alternative versus the others and the use of another interest rate besides 6% would not have led to any different results.
83	The economic assessment is insufficient because it does not include the value of the ecosystem services, including recreational value, provided by Rich Inlet and Figure Eight Island. The author of the assessment admits that these values are “substantial … but remain unknown.” Despite the difficulties associated with monetizing values of ecosystem services, frameworks for standardizing valuation of ecosystem services have been developed for a variety of conditions (Costanza et.al. 1997; de Groot et.al. 2002). Therefore, in order to present the true costs of the project the Corps needs to put a value on the ecosystem services affected by the proposed project.	NCCF	Economics	Appendix G	As stated in Appendix G, "We do not attempt to monetize all aspects of the range of non-market costs and benefits that are associated with alternative actions such as those associated with aesthetics, opportunities for recreation or services provided by the natural environment. Based on results in the literature, these values are known to be substantial. However, in the absence of formal valuation efforts, their precise magnitude remains unknown. As such, the select monetary values that are provided herein should not be considered to be a representation of the true economic worth associated with the alternatives. Given the lack of formal valuation and the inherent uncertainties regarding specific performance of alternatives over a 30-year project horizon, providing an

					estimate of total costs, total benefits or net gains is not possible. Further, ranking of the alternatives based on their relative economic values is not possible."
84	Failure to secture property rights: 33 CFR 325.1(d)(8) mandates that the applicant's signature is an "affirmation that the applicant possesses or will possess the requisite property interest to undertake the activity proposed in the application, except where the lands are under the control of the Corps of Engineers." Further, the same requirement applies under Major CAMA permit where 15A NCAC 07J.0204(b)(4) mandates that a dredge/fill permit application must present "a copy of a deed or other instrument under which the applicant claims title must accompany a CAMA major development and/or dredge and fill permit application."	NCCF	Easements	N/A	Noted.
85	A report that was cited several times in the SEIS, "Cleary, W.J. 2009. Rich Inlet: History and inlet related oceanfront and estuarine shoreline changes. Final report submitted to Figure Eight Beach Homeowners Association. 61 p.", does not exist. Audubon North Carolina contacted Dr. Cleary, CP&E, USACE, and the Figure 8 Island HOA in an attempt to obtain a copy of this report, yet no one could or would produce it, even though it was stated CP&E could answer questions about the content of the report. We were informed by	Audubon NC	General	Various locations	Citation was been modified to personal communication.

	Dr. Cleary, the author, that the report and the data were deliberately “destroyed” when he retired.				
86	The SEIS does not demonstrate that the HOA has acquired the easements necessary to construct its preferred alternative. Until such rights have been acquired, this process should be halted and public funds should cease to be used to evaluate a project that cannot legally proceed.	Audubon NC	Easements	N/A	See Comment #84. The process will be halted at the appropriate time, should easements not be obtained.
87	The SEIS fails to cite the applicable, most recent scientific literature and fails to accurately describe the impacts a terminal groin, beach renourishment, and inlet channelization would have on Rich Inlet and adjacent areas. Some of the impacts that are insufficiently addressed are the narrowing of downdrift oceanfront beach, loss of sediment from the inlet system, impacts to spits at ends of adjacent islands, loss of critical wildlife habitat, and cumulative impacts of the alternatives, among others. The model outcomes and the predicted results of the preferred alternative—a spit persisting on the north end of Figure 8 Island—are not seen at any other inlet on the U.S. Atlantic coast.	Audubon NC	General	Various locations	Noted. Chapter 5 assesses the consequences of all the alternatives, citing scientific literature when appropriate, and have addressed impacts to the elements listed in this comment.
88	The near certainty that Figure 8 Island will need to mine sand from Rich Inlet and replenish the downdrift beach on Figure 8 Island more frequently than every five years	Audubon NC	Downdrift Effects	Various locations	Both the modeled 2006 and 2012 shoreline conditions for the applicant's preferred alternative verify the once every 5 year maintenance cycle. As acknowledged in the EIS, it is difficult to make predictions using models, but at this

	has not been accurately assessed in the preferred or other alternatives presented in the SEIS.				time, there is no basis demonstrating with any certainty that more maintenance events will be needed.
89	The SEIS also cites Oregon Inlet, NC as an example of a successful terminal groin project that has not "caused adverse impacts to the shoreline" (p. 232). One need only drive Highway 12 along Pea Island to see the fallacy of this conclusion. Riggs and Ames (2011) also provide an excellent review of the impacts of the modifications to Oregon Inlet.	Audubon NC	General	Chapter 5, Question 3- terminal groin alternatives.	See Comment #79 above.
90	Hard structures at inlets permanently remove sand from the inlet system, reducing or eliminating shoal systems from affected inlets (Pilkey et al. 1998) and accelerating the loss of saltmarsh in the vicinity of the inlet (Hackney and Cleary 1987). The loss of saltmarsh at Rich Inlet would have significant negative impacts on fisheries, other wildlife, recreation, small businesses, and the local economy. These impacts and the loss of saltmarsh resulting from removal of sand from Rich Inlet have not been assessed for the preferred or other alternatives in the SEIS.	Audubon NC	Salt Marsh	Chapter 5, Alternatives 5A-5D, Salt Marsh Communities.	See Estuarine Habitat, Salt Marsh Communities discussions in Chapter 5 to review the effects of each terminal groin alternative (5A, 5B, 5C, & 5D).

91	The SEIS predicts that the result of Alternative 5D under 2012 conditions will be the persistence of a smaller spit north of the terminal groin (Figure 5.45b on p. 261). The SEIS states, "The sand spit on the north end of Figure Eight Island experienced some erosion under Alternative 5D, but the mean high water shoreline did not reach the terminal groin" (p. 261). Meanwhile, the modeling reported for Alternatives 5A-5C under 2012 conditions predict that the spit would disappear, resulting in the loss of about 35 acres of current intertidal habitat. This is a gross underestimate of the amount of habitat that will be lost under all alternatives that include a terminal groin (Alternatives 5A-5D). The amount of habitat that will be lost is actually approximately 241 acres of high quality habitat that supports shorebirds, including two federally-listed species, plus additional saltmarsh. The habitat lost would be primarily low-energy shoals and sandbars which provide habitat for a variety of benthic invertebrates that are essential food for shorebirds and fishes, and the sandy spit which is prime nesting habitat. Such a loss constitutes the some of the highest quality habitat in the entire Rich Inlet complex. This disparity in the predicted fate of the spit on the north end of Figure 8 Island is not explained in the SEIS.	Audubon NC	Impacts Analysis	Chapter 5, Question 3. Chapter 3, Table 3.1.	Question #3 in Chapter 5 thoroughly summarizes the modeled shoreline changes for the alternatives. Alternative 5A-C were only modeled under the 2006 conditions. See Table 3.1 for a compilation of the modeled alternatives with their respective shoreline conditions.

92	By eliminating the spit on the north end of Figure 8 Island and interfering with natural sediment transport throughout the inlet system, the preferred alternative would severely and adversely impact the Critical Habitat Unit, eliminating approximately 60% (241 acres) of the total primary constituent elements of habitat for Piping Plovers in Rich Inlet and at least 25% of all the primary constituent elements of habitat for Piping Plovers in Critical Habitat Unit NC-11. The preferred alternative, as well as Alternatives 5A-5D, would not only destroy essential foraging and roosting habitat in the Critical Habitat Unit NC-11, but also prevent such habitats from forming again. All other alternatives besides Alternative 2, would also result in negative impacts to Piping Plovers and Critical Habitat Unit NC-11.	Audubon NC	Piping Plover	Chapter 5, Alternatives 5A-5D Inlet Dunes and Dry Beaches	The EIS acknowledges the reduction of piping plover habitat along the northern end of Figure Eight Island for the terminal groin options, but it also discloses that the magnitude and extent of any long-term or cumulative impacts to the bird's habitat is unknown and is difficult to determine over the 30-year study period.
93	The construction of a terminal groin at Rich Inlet and alternatives that include channelization of the inlet will permanently and adversely impact critical habitat for Piping Plovers, and threaten the Endangered Great Lakes breeding population and the recovery of the Threatened Atlantic breeding population. The USACE should not permit an action that would degrade high-quality habitat in a critical habitat unit and jeopardize either the survival or recovery of a species.	Audubon NC	Piping Plover	Chapter 5, Alternatives 5A-5D: Inlet dunes and dry beaches.	Noted. See also Comment #77.

94	The SEIS largely overlook impacts of the alternatives on the infaunal community (species that live within the sediment) at Rich Inlet and Figure 8 Island, and consistently marginalizes and understates impacts to these organisms. The infaunal community is comprised of multiple different species that have variable recovery rates. The SEIS treats the infaunal community as a single species and states, "In general, the recolonization of these infaunal species typically tends to occur within the order of several months, which depends greatly on the compatibility of the material used for nourishment" (p. 282). The SEIS repeatedly uses the terms "short-term" and "resilient" (for examples, see pages 102, 268, 269, 279, 282, 318, 319, 320, 332, 337, 341, 367, 369, 393, 394) when addressing the impacts to the infaunal community, which is misleading because some organisms take up to four years to recover (Jaramillo et al. 1987, Peterson et al. 2014).	Audubon NC	Benthic Invertebrates	Chapter 5, General Environmental Consequences Related to Dredging	Additional discussion points have been included to further address each alternatives overall impacts to the benthic community. See Comment #53.
95	The majority of peer-reviewed literature demonstrates that infaunal species are negatively impacted by beach nourishment, and that the length of time for recovery varies by species (Hayden and Dolan 1974, Jaramillo et al. 1987, Rakocinski et al. 1996, Peterson et al. 2000a, Peterson et al. 2000b, Bishop et al. 2006, Dolan et al. 2006, Peterson et al. 2006, Bertasi et al. 2007, Colosio et al. 2007, Cahoon et al. 2012, Leewis et al. 2012, Schlachler et al. 2012, Viola et al. 2013, Manning et al. 2014, Petersen et al. 2014). In North Carolina, Emerita talpoida (mole crab) abundance recovered within months on nourished beaches compared to control beaches, but Donax spp. (coquina clam) and amphipods did not recover within the time frame of the study (Peterson et al. 2006). Peterson et al. (2014) monitored the recovery of a sandy beach community for 3-4 years	Audubon NC	Benthic Invertebrates	Chapter 5, General Environmental Consequences Related to Dredging	See Comment #94.

	following nourishment and documented that haustoriid amphipods (small crustaceans) and Donax spp. had reduced densities for 3-4 years following nourishment, E. talpoida had lower densities for 1-2 years following nourishment, and ghost crabs had lower abundances for four years.				
96	The SEIS States: "Nelson (1985) indicates that organisms that reside in intertidal zones are more adaptable to fluctuations in their environment, including high sediment transport and turbidity levels. This may support the reasoning for some organisms to withstand burial up to 10 cm. Other studies reported by Maurer (National Research Council, 1995) supported the burial capabilities of nearshore species, which found that these species are capable of burrowing through sand up to 40 cm (p. 269)." Even if some of the infauna can survive burial up to 10-40 cm, nearly all bird species that utilize Rich Inlet would not have access to prey at those depths.	Audubon NC	Benthic Invertebrates	Chapter 5, General Environmental Consequences Related to Beach Fill	The buried organisms have the capability to burrow through sand up to 40cm meaning that they will be able to reach the surface after burial, and once at the surface, they will be available to birds as prey. Also, see text added to Chapter 5, General Environmental Consequences Related to Beach Fill.

97	Of the 43 peer-reviewed, scientific articles that found an impact to infaunal organisms, only two (Peterson et al. 2000 and Rakocinski et al. 1996) are cited in the SEIS. Peterson et al. (2000a) was cited in order to make a general statement about the biomass of mole crabs and coquinas: “Therefore, mole crabs and coquina clams dominate the benthic infaunal community due to their biomass (Peterson et al. 2000a)” (p. 128). The conclusions of the paper, however, were omitted from the SEIS and are significant and relevant to an evaluation of the impacts of all alternatives except Alternative 2. From Peterson et al., 2000a: "Our studies of the ecological consequences of beach nourishment and bulldozing demonstrate large short-term effects on dominant species of beach macro-invertebrates. Abundances of both Emerita talpoida and Donax spp. were 86-99% lower on nourished beaches in late June-early July, 5 and 10 weeks after cessation of nourishment (Figure 3). This is a season of the year when abundances of both of these dominant species of burrowing macro-invertebrates are typically at their maximum (Diaz, 1980; Leber 1982) and when they are providing the important ecosystem service of feeding abundant surf fishes (Leber, 1982; Delancey, 1989) and ghost crabs (Wolcott 1978). This transfer of energy to higher trophic levels was almost certainly dramatically reduced by nourishment. Our short-term observation period does not suffice to allow estimation of the length of time over which this tertiary production was diminished "	Audubon NC	Benthic Invertebrates	Chapter 5, General Environmental Consequences Related to Dredging	See Comment #94.

98	The results of the other scientific paper that was cited, (Rakocinski et al. 1996), were not accurately reported by the SEIS because relevant findings were omitted. The authors studied the impacts of a beach and profile nourishment project on the Gulf coast of Florida for about two years following the initial beach fill event. The SEIS states, “Rakocinski et al. (1996) found that the mole crab populations exhibited a pattern of initial depression after being covered by sediment but fully recovered in less than one year after beach nourishment.” However, the SEIS does not mention that the same study also found that the dominant species of amphipod and a dominant species of polychaete had not recovered within that same time frame and that the amphipod did not recover until two years after the beach renourishment. Like the mole crab, amphipods and polychaetes are common shorebird prey items.Further, the SEIS use the authors’ summaries of nearshore (0-100 m) and offshore (125-825 m) impacts: "Various macrobenthic responses attributable to beach restoration included: decreased species richness and total density, enhanced fluctuations in those indices, variation in abundances of key indicator taxa, and shifts in macrobenthic assemblage structure. […] Considerable macrobenthic recovery was apparent during the study, although macrobenthic recovery remained indeterminate in some places. […] One long-term impact of beach nourishment at several nearshore stations was the development of assemblage’s characteristic of deep nearshore profiles. This implied that typical shallow-water macrobenthic assemblages characteristic of the usual dissipative beach morphometry was reduced after beach nourishment to a narrower zone like that of a reflective beach	Audubon NC	Benthic Invertebrates	Chapter 5, General Environmental Consequences Related to Beach Fill	Text has been amended.

	morphometry.[…] Two long-term negative impacts of beach restoration at offshore stations included impacts from both beach nourishment and profile nourishment. After beach nourishment, macrobenthic assemblage structure shifted at intermediate seaward distances for roughly 6 km parallel with the shoreline, probably in response to increased silt/clay loading. Macro-benthic impacts from silt/clay loading still were evident at the end of the study, more than two years after beach nourishment" (Rakocinski et al. 1996).				

99	We find it extraordinary that in a 513-page SEIS and over 2,000 additional pages of appendices only two peer-reviewed scientific articles are cited in reference to infauna—and that one is not cited to report its findings. It is equally troubling that a good-faith effort to accurately and fully describe and discuss the impacts these actions would have on the infaunal community would fail to actually describe the results of the only other peer-reviewed article it did reference.	Audubon NC	Benthic Invertebrates	Chapter 5, General Environmental Consequences Related to Beach Fill and Table 5.16.	Text updated accordingly and see also Table 5.16.
100	According to the SEIS, seabeach amaranth has been documented on Figure 8 Island in six of the nine years from 2002-2010; no plants were found in 2008 and 2009, and no data was collected in 2006 (p. 161). As many as 768 plants were found on the island during those years, and plants were located within the permit area in 2002, 2003, 2004, 2005, and 2010 (p. 162-170). The SEIS presents no data from 2011-2015. In the early to mid-2000s the spit at the north end eroded and was replaced with intertidal shoals. It was following 2011 that the north end of Figure 8 Island again transitioned from a shoal complex to an attached spit that remained emergent more regularly than the shoals, creating dry, sandy habitat that seabeach amaranth colonizes. Since recent, relevant data was lacking, we surveyed from the north end of Figure 8 Island. We found 262 seabeach amaranth plants, concentrated in the area north of the location proposed for a terminal groin in Alternative 5D.	Audubon NC	Seabeach Amaranth	Chapter 4, Question 3: What are the characteristics of the federally threatened, endangered, and state listed species within the project area? Section D- Plants.	Text updated accordingly.

101	Seabeach amaranth's preferred habitats are found in some years along the length of Figure 8 Island, as demonstrated by its distribution in 2004 and 2005 (p. 164-165). However, as can be seen in Figure 6, it also prefers accreting ends of islands, which is habitat the construction of a terminal groin would remove. Second, storms are natural events that can create or maintain habitat suitable for seabeach amaranth. An 18-year review of rangewide data did not find a correlation between population size and tropical storm or hurricane activity (Rosenfeld et al. 2006), suggesting that seabeach amaranth does not need "protection" from these events. The five-year review found that impacts of beach renourishment, which is included in all alternatives but Alternative 2, are not fully known, but that in cases where beaches have severely eroded back to sea walls, buildings, or dense vegetation it may create wider, vegetation-free beaches that seabeach amaranth can colonize; however, work during outside environmental windows, which is becoming more common in North Carolina, can bury living plants (USFWS 2007).	Audubon NC	Seabeach Amaranth	N/A	Noted.
102	The SEIS does not cite the recovery plan or the status review for the Threatened loggerhead sea turtle. Such documents are blueprints for conservation of listed species, and we are seriously concerned that the SEIS apparently overlooked and does not cite these documents.	Audubon NC	Sea Turtles	Chapter 1, Question 4: How has government agencies been involved?	Formal consultation with USFWS and NMFS has been initiated and the loggerhead sea turtle and its Critical Habitat are included in the consultation review.

103	No mention of direct or indirect mortality or other impacts on fishes was made in the SEIS other than acknowledging that increased turbidity would clog fish gills. Fishes would be negatively impacted by the construction of a terminal groin and the subsequent beach nourishment projects at Rich Inlet in the following ways: 1) the groin would interrupt larval transport through the inlet, therefore impacting recruitment; 2) the native fish community would be replaced with a completely different structure-associated fish community; and 3) surf zone fishes would suffer from direct mortality. Hard structures reduce the successful passage of fish larvae from the open ocean to the estuarine nurseries they inhabit until reaching maturity (Hettler and Barker 1993, Pilkey et al. 1998). Inlets are critical pathways for adult fishes to get to offshore spawning sites and larvae immigrate through inlets to get to estuarine nurseries (Able et al. 2010).	Audubon NC	Fish	374-375, 446 Chapter 5, General Environmental Consequences Related to Dredging, General Environmental Consequences Related to Beach Fill, Larval Transport sections for Alternatives 5A-5D.	See referenced sections.
104	The preferred alternative, a terminal groin, was not mentioned in the February 26, 2007 Notice of Intent and it was not included the scoping meetings (Appendix A of the SEIS), which took place when hardened structures were illegal in North Carolina. It is unclear, therefore, how a terminal groin could be included in this project.	Audubon NC	NEPA Compliance	N/A	Upon the passing of State Bill 110, Figure 8 HOA reviewed a terminal groin as an alternative and determined that it was their preferred option, including it as such in the DEIS and SEIS.
105	NEPA also states that “text of final environmental impact statements […] shall normally be less than 150 pages and for proposals of unusual scope or complexity shall normally be less than 300 pages” (Section 1502.7).	Audubon NC	NEPA Compliance	N/A	Noted.

106	Currently, no properties that might be protected by a terminal groin on Figure 8 Island are threatened. Despite this, the SEIS uses outdated aerial imagery (e.g. Figure 3.1 p. 32) and calls houses “imminently threatened” (e.g. Figure 2.7 p. 25) to give this impression. In the early 2000s, 19 houses along the oceanfront of the island received sandbags as the beach in front of them narrowed. Another house on the soundside at Nixon Channel also has sandbags, but its situation is independent of the beachfront homes, and a terminal groin would have no bearing on its status. One house has been moved to another lot, leaving 18 houses with sandbags; however, contrary to what the SEIS states, the sandbags are no longer providing protection because the beach has naturally widened as the inlet channel shifted naturally.	Audubon NC	General	Chapter 2, Shoreline Protection History	The EIS acknowledges that all the sandbagged homes were previously considered "imminently threatened", but currently do not fall within the State's definition of "imminently threatened".
107	The SEIS vastly overstates the risks associated with its non-preferred alternatives. For example, the SEIS uses atypical worst-case erosion rates to assume that 40 houses will be at risk over the next 30 years—over twice as many more than the 19 oceanfront homes that received sandbags when the beach was in its narrowest condition—and that all but 10 of the 40 would be demolished instead of relocated (p. 34). However, even its own consultant’s report (Appendix B, Sub-appendix A) found that from 1938-2007, on Figure 8 Island, “net progradation has characterized the past seven decades of oceanfront shoreline change” (p. 56). Therefore, it is also possible that no houses would have to be moved or demolished in the next 30 years. What is most likely, however, is that some houses would eventually need to be moved in response to natural barrier island shoreline change. Though the SEIS does not consistently report the number of unbuilt lots available	Audubon NC	General	Chapter 3, Alternative 2.	See comment #27.

	on Figure 8 Island—80 or 93—with scores of lots available, 76 of which are waterfront (p. 33), if a future change at the inlet necessitates relocating, lots could be purchased without much trouble.				
108	The SEIS also persistently conflates value with cost in its estimates. The tax-assessed value of property that might be lost due to erosion or demolition is not the same as the cost to construct and maintain a terminal groin or carry out beach renourishment. For example, a cost of $4.7 million for damage to roads and infrastructure it predicts will wash away under Alternative 2. However, even if roads on the north end of the island were lost, there would be no cost, as they would not be rebuilt in the water. Similarly, the cost of Alternative 2 includes $16.9 million, the tax-assessed value of the 30 houses that the SEIS projects will be demolished, and $38.3 million for the value of the projected lost land. The only actual costs Alternative 2 includes is $1.4 to demolish the 30 houses and $2.4 million to relocate the 10 houses for a total cost of $3.8 million, orders of magnitude less than the $63.7 million in Tables 3.12a and 3.12b (p. 96-97). Even if the cost of purchasing new lots for relocated homes were accounted for—the 16 lots that were listed in 2013 cost an average of $1.5 million (p. 301)—the cost would come in under the cost of a terminal groin, if a reasonable number of houses were projected to be relocated.	Audubon NC	Economics	Appendix G.	Potential damages to roads and other infrastructure used the replacement cost method as discussed in the Economics Appendix (pages 9 and 10 in Appendix G). Replacement cost was used as a proxy to assign economic value to the future loss but there was no pretext that the infrastructure would actually be replaced. The projected future economic impact to threatened homes and lots under Alternatives 1 and 2 are real costs that would be incurred under these two alternatives whereas these economic impacts would be avoided if action is taken to counter the long-term erosion impacts. In order to make an equitable comparison of the potential economic impact of each alternative, the consequences of not taking action to prevent future damages must be included.

109	There is also no predicted loss of tax revenue for Alternatives 3-5D. If a terminal groin is installed, the aesthetic value of the lots at the north end of the island would be diminished by replacing a natural beach view with loss of beach and a rock pile in the viewshed and replacing the shoreline with large boulders. This could affect tax-assessed value which could decrease tax revenue. Similarly, tax revenue is projected to be lost in Alternatives 1 and 2 due to loss of houses, but the increases in tax revenue from previously vacant lots, should houses be relocated, are not taken into account.	Audubon NC	Economics	N/A	The projected future economic impact to threatened homes and lots under Alternatives 1 and 2 are real costs that would be incurred under these two alternatives whereas these economic impacts would be avoided if action is taken to counter the long-term erosion impacts. In order to make an equitable comparison of the potential economic impact of each alternative, the consequences of not taking action to prevent future damages must be included.
110	This SEIS fails to incorporate the recent, substantial changes in Rich Inlet into its analyses in any meaningful way and fails to provide the "clear basis for choice among options by the decision maker and the public" because it fails to address adequately "the environmental impacts of the proposal and the alternatives." 40 C.F.R. § 1502.14. Therefore, it violates NEPA and must be rejected.	SELC	Legal		See Comment #70. The 2006 modeled shoreline conditions are indicative of erosive conditions along the northern section of Figure Eight Island while the modeled 2012 shoreline conditions demonstrate accretion. The results from the 5-year simulations for both conditions are included in the EIS and provide the reader an opportunity to review the shoreline changes and make a meaningful comparison.
111	Taking into account the accretion of the beach on the north end of Figure Eight Island, all of the DEIS's erosion-based purpose and need statements are satisfied by the No Action alternative. Erosion rates have reversed. No houses are threatened. There is no indication that the inlet will migrate and erode the northern end of the island within the next 30 years. In sum, these developments undercut the rationale and justification for the proposed action, as well as the entire analysis presented in the DEIS.	SELC	Purpose and Need	15, 16	See Comment #63 concerning the applicant's long-term protection needs and the application of the geomorphological analysis.

112	Use of the 2006 habitat data, and the Corps' failure to update that data, results in an analysis that ignores the presence of significant numbers of seabeach amaranth on the northern spit of Figure Eight Island. As documented in Audubon's comments, recent surveys revealed 262 plants notih of the proposed location of the terminal groin in Alternative 5D.	SELC	Seabeach Amaranth	Chapter 4, Question 3: What are the characteristics of the federally threatened, endangered, and state listed species within the project area? Section D- Plants.	Text has been updated.
113	By recognizing that the existing habitat map is outdated and choosing not to update it with existing data, the Corps has elected not to evaluate the actual environmental effects of the proposed project or alternatives. Such a decision is illegal in any instance, bu particularly where that data involves habitat for endangered species, including federally designated critical habitat which receives its own protections. The omission of any analysis ofthis habitat and the potential direct and indirect effects on it violates NEPA. See 40 C.F.R. § 1502.2(d) ("Environmental impact statements shall state how alternatives considered in it and decisions based on it will or will not achieve the requirements of sections 101 and 102(1) of the Act and other environmental laws and policies.")	SELC	Biological Resources	Chapter 4, Figure 4.1 and 4.2.	Figure has been added to show most current mapped habitats within the Permit Area.

114	If the Corps insists on projecting shoreline changes based on 2006 shorelines and conditions, then it must use the actual results of taking no action in 2006. Modeling is unnecessary to evaluate the consequences of taking no action in response to erosion rates and shorelines as they existed in 2006. In fact, the Engineering Report describes the surveys necessary to use the 2012 shoreline for the purpose of comparison. Therefore, if the Corps is to rely on the anticipated changes to the 2006 shoreline, the modeled changes under Alternatives 3, 4, and 5D must be compared to the actual 2012 shoreline.	SELC	Modeling	Chapter 5, Question 3: What impacts would each alternative have on the shorelines of Figure Eight Island and Hutaff Island over a 5-year period?	Question #3 in Chapter 5 provides a comparion for the alternatives modeled under the 2006 shoreline conditions and the alternatives simulated under the 2012 shoreline conditions.
115	When introducing the Delft3D model, the SEIS maintains that "[t]he model results are by no means intended to represent predictions of what changes to expect in the future with certainty." With respect to the location of the inlet, the Corps states that "[p]redicting the time when any shifting would occur is not possible due to variability and contingency on weather and storm events". The Corps must present its best analysis of the expected environmental effects of the proposed action and the alternatives. Doing so requires projecting a single shoreline for each alternative and analyzing the economic and environmental effects of that alternative over the same time period.	SELC	Modeling	Chapter 5, Question 2: What are the Monitoring Initiatives Being Developed?	The EIS has provided the best analysis by using the Deftl3D monitoring effort, geomorphological analysis and other additional information as the basis to help determine what the economic and environmental effects may be for each alternative under the same conditions (the 2006 shoreline conditions) and time frame.

116	On page 203, in its description of Alternative 1, the SEIS describes shoreline change rates from 1974 to 2007 as ranging "from+ 1.1 feet/year just north of Bridge Road to -16.8 feet/year in the northern area fronting the sandbags." In describing Alternative 2, the SEIS uses a different time period and a different set of rates. It states that "[f]or the northernmost area of Figure Eight Island, shoreline change rates have varied from -12.6 feet/year to -92.8 feet/year during the 1996 to 2007 time period." The same page references erosion and accretion rates from 1998 to 2007, which we presume is a typographical error, but creates additional confusion nonetheless.	SELC	Erosion Rates	Chapter 5, Question 3: What impact would each alternative have on the shorelines of Figure Eight Island and Hutaff Island over a 5-year period?	Text has been modified accordingly.
117	The SEIS is not consistent or clear regarding the erosion rates used to conduct the economic analysis. In assessing Alternative 1, "the economic assessment assumed the shoreline would erode into the existing development at rates comparable to those measured between 1999 and 2007." In Alternative 2, the assessment states that "shoreline erosion rates along the north end of Figure Eight Island are expected to accelerate with erosion rates approaching rates observed between 1993 and 2007." For Alternatives 3, 4, and 5D, the economic analysis is based on the 5-year Delft3D model runs. Yet in Appendix G, Dr. Schuhmann states that his analysis relies on "Delft3D modeling" to determine that existing structures would be destroyed or relocated under Alternatives 1 and 2 while simultaneously appearing to rely on past erosion rates. The Corps must clarify how it analyzed economic impacts and can do so by providing simple graphics depicting the expected shorelines for each	SELC	Economics	Appendix G.	All of the economic impact analyses for the alternatives were based on shoreline change rates between 1999 and 2007. Inconsistencies regarding the time period in the EIS have been corrected or clarified. Appendix G has been modified to reflect that Delft3D modeling was not included in the economic analysis provided in that appendix.

	alternative over the 30-year period presumably analyzed.				
118	The Corps' failure to attempt to evaluate the impacts of the project over the 30-year period used to conduct the economic analysis is indefensible. That omission is puzzling given that the Corps presumably predicted the expected 30-year shoreline in order to estimate economic impacts and that the indirect effects of the proposed terminal groin-specifically to wildlife that depend on the shoals in Rich Inlet-are the most critical environmental impacts.	SELC	General	Chapter 5, Table 5.1	The evaluation of the economic impacts for Alternatives 1 and 2 were based on the assumption that past shoreline change rates along the ocean shoreline would be applicable over the 30-year evaluation period. This is standard procedure for formulating coastal protection projects. Based on the results of 5-year simulation in the Delft3D model for the various alternatives, the alternatives involving beach fills and/or terminal groins were found to minimize long-term erosion impacts providing the projects were maintained over the 30-year evaluation period. As a result, the primary difference in the economic impact of the alternatives was directly related to the cost of initial construction and the cost of maintaining the alternatives over the 30-year evaluation period. With respect to the future impacts of the various alternatives on the adjoining inlet-shoal complex, relative differences in the impacts between the various alternatives were again based on 5-year Delft3D model

					simulations. As stated in the EIS, the Delft3D model is not capable of "predicting" future changes due to the inability of science to predict weather and ocean patterns 30-years into the future. Rather, the model comparisons between the alternatives were based on using a known set of wave, wind, and tide conditions to drive the model for all alternatives with all simulations carried out over a 5-yer period. Given the same forcing functions and the same initial bathymetric conditions in the model, the relative differences in the morphological response of the simulated system produced by the model for the various alternatives was directly due to the simulated "man-induced" changes such as a new channel, placement of beach fill, or installation of a terminal groin. Based on the interpretation of the relative differences in the Delft3D model response to the various alternatives, potential impacts on habitats within the entire island/inlet complex were estimated and the results summarized in Table 5.1 in Chapter 5 of the FEIS.
119	The SEIS cannot rely on 1999 to 2007 Erosion Rates to Predict Future Conditions. Those erosion rates are an anomaly in the history of Rich Inlet. Such rates have never been recorded for a continuous 30-year period. This fundamental assumption underlies the entire SEIS analysis, but is refuted by Dr. Cleary's report as well as the respective modeling analyses.	SELC	Erosion Rates	Chapter 3, Beach Fill Design/	The EIS recognizes that the shoreline conditions (and associated erosion rates) change as a result of the migration of the inlet channel. There is no mention that the 1999 to 2007 shoreline erosion rates are used to "predict the future" in the document. Rather, the text states that the design widths of the beach fill were based on maximum shoreline recession rates observed during the period from 1999 to 2007.
120	The SEIS repeatedly assumes that the inlet will imminently shift toward Hutaff Island. In fact, the entire economic analysis relies on the assumption that erosion rates from 1999 to 2007 exist now and will continue. This fundamental error is described plainly in	SELC	General	Chapter 3, Rich Inlet History.	The EIS acknowledges the difficulty in making predictions on the movement of the bar channel and does not rely on the assumption that erosion rates from 1999 to 2007 exist now and will continue. In Chapter 3's Rich Inlet History section, the geomorphological analysis suggests

	Appendix G, which calculates expected economic impacts "[a]ssuming the main channel of Rich Inlet will assume an alignment back toward Hutaff island within the next 5 years." The analysis of Alternative 3 similarly assumes that "the present bar channel condition may only last another 3 to 5 years" without any support for the statement or citation to any supporting documentation. The environmental analysis fares no better, stating that "the bar channel is expected to once again assume a more northern alignment toward Hutaff Island in the future." As discussed above, there is no historical support for such predictions and the SEIS itself says that making predictions regarding the timing of the inlet's movement "is not possible." They cannot, therefore, serve as the basis for any part of the Corps' analysis.				that the bar channel has been shown to move considerably over the past decades. As shown in Figure 2.4, the channel has displayed a shift in migration from a southern alignment to a more central position closer to Hutaff. Text has been amended to include a discussion regarding the most recent trend in the ocean bar orientation between 2010 and 2015.
121	The Shoreline Management Plan Erroneously Excludes Recent Accretion and must be rejected.	SELC	Inlet Management Plan	Chapter 3, Rich Inlet History, Chapter 6, Inlet Management Plan.	The EIS has been updated as much as possible in order to show current conditions.
122	The proposed terminal groin would be built partially on private land not owned by the HOA proposing the project and partially on public trust resources owned by North Carolina. The Corps should find that this use of public trust resources is not in the public interest. Not only is the purpose of the project to protect private property on a privately owned, limited access island, it jeopardizes important public recreational resources. Rich Inlet is an extremely popular recreational area that is frequently accessed by the public by boat. Construction of a terminal groin, and the ensuing erosion of the northern spit of Figure Eight Island,	SELC	General		Noted

	would eliminate these recreational resources and eliminate public use of these public trust resources.				
	**** "The Corps office received over 450 individual e-mails from the public with comments of general nature and are summarized below. To review the specific e-mails, each individual comment has been posted on the USACE Wilmington District webpage at http://www.saw.usace.army.mil/Missions/RegulatoryPermitProgram/MajorProjects and are incorporated in the Final EIS by reference.***				
123	General opposition of the proposed project	General Public	General		Noted.
125	Concern regarding potential impacts to bird resources	General Public	Bird resources		Noted.
126	Concern regarding other public trust resources including recreation	General Public	Other public trust resources (recreation)		Noted.
127	Concern regarding the economics of the proposed project	General Public	Economics		Noted.
128	Request for an extension to the Public Commenting period with regards to the SEIS	General Public	Public Commenting Period		Noted.

129	Concern regarding impacts to fishery resources	General Public	Fisheries		Noted.
130	Concern regarding the impacts to wildlife critical habitat	General Public	Critical Habitat		Noted.
131	Concerns regarding down-drift impacts	General Public	Downdrift Effects		Noted.
132	General support of the proposed project	General Public	General		Noted.