ATTACHMENT H
CSE 2018 Geotechnical
Data Analysis

SEA ISLAND SHORE PROTECTION PROJECT
2018 BEACH NOURISHMENT

Sea Island Georgia

GEOTECHNICAL DATA ANALYSES

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PREFACE

This report is prepared at the direction of the Sea Island Company (GA) in support of a proposed beach nourishment project involving ~1.5-2.5 million cubic yards of sediment (CSE 2017). The borrow area investigated is ~4 miles due east of Gould's Inlet along a low relief ridge in 20–30 feet (ft) of water. This report presents results of beach and borrow area sediment quality analyses to demonstrate the suitability of sand within the proposed borrow areas for beach nourishment at Sea Island, Georgia.

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TABLE OF CONTENTS

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1.0 INTRODUCTION

This report presents sediment data for the proposed Sea Island, Georgia, beach nourishment project based on sampling and analyses performed in 2017. Samples were obtained along the beach and inshore zone along seven stations (transects) spaced at 2,500–5,000 feet (ft) (annual monitoring survey stations 75+00, 100+00, 150+00, 175+00, 200+00, 225+00, and 250+00) (CSE 2017). Samples were collected at four cross-shore positions (dune toe, dry beach, wet beach, low-tide line), provided there was enough room to collect dune toe and dry beach samples. An offshore sand search area encompassing ~255 acres was sampled by 3-inch borings at an average core spacing of ~700–1,000 ft (Fig 1.1). The borings were subsampled and analyzed for comparison with the existing beach sand.

Nourishment success depends on finding a source of sand that is similar in character to the native beach. The degree to which a particular borrow sediment matches the native beach sediments strongly influences project longevity and environmental impacts. Three outcomes are possible (Fig 1.2) (cf – Dean 1991, 2002):

- ***Borrow sediment is finer than native*** – The majority of fill will shift offshore and yield a more gently sloping profile. Dry beach will be narrowest.
- ***Borrow sediment is coarser than native*** – The majority of fill will tend to "perch" on the visible beach and yield a steeper profile through the surf zone. Dry beach will be widest.
- ***Borrow sediment matches the native sediment*** – The fill will tend to follow the natural contours of the profile and retain similar slopes and morphology.

It is generally accepted that environmental impacts of nourishment are most likely to be minimized if the borrow sediment "matches" the native (NRC 1995). However, the question of what constitutes "native" is debatable. Some settings exhibit more variable sediment size distributions, and finer sand often dominates the dunes and offshore while coarser sand dominates the surf zone. For instance, along many beaches sediments can range in size between very fine and coarse sands [eg – mean grain size = 0.28 to 0.51 millimeter (mm) at Myrtle Beach (SC), 0.14 to 0.54 mm at Isle of Palms (SC)]. Georgia beaches are typically composed of quartz sand in the fine to medium size range (0.125–0.5 mm mean diameter). Tidal inlets complicate the distribution of sands and finer-size sediments along the coast, such that areas closer to inlets tend to have more fine grains than areas away from inlets.

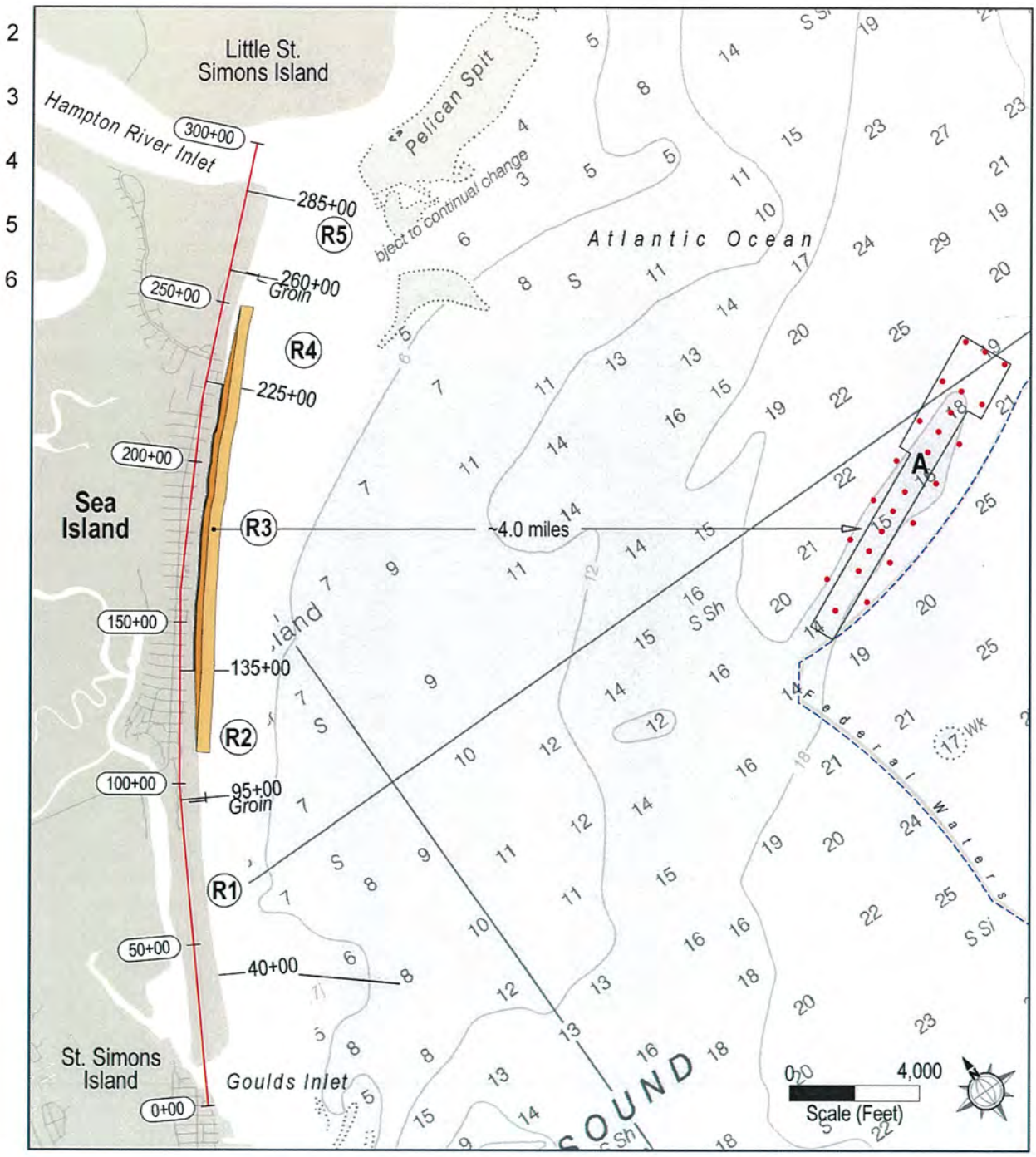


FIGURE 1.1. Map showing the Sea Island project area, survey stations along the beach, and offshore sand search areas (along with location of borings).

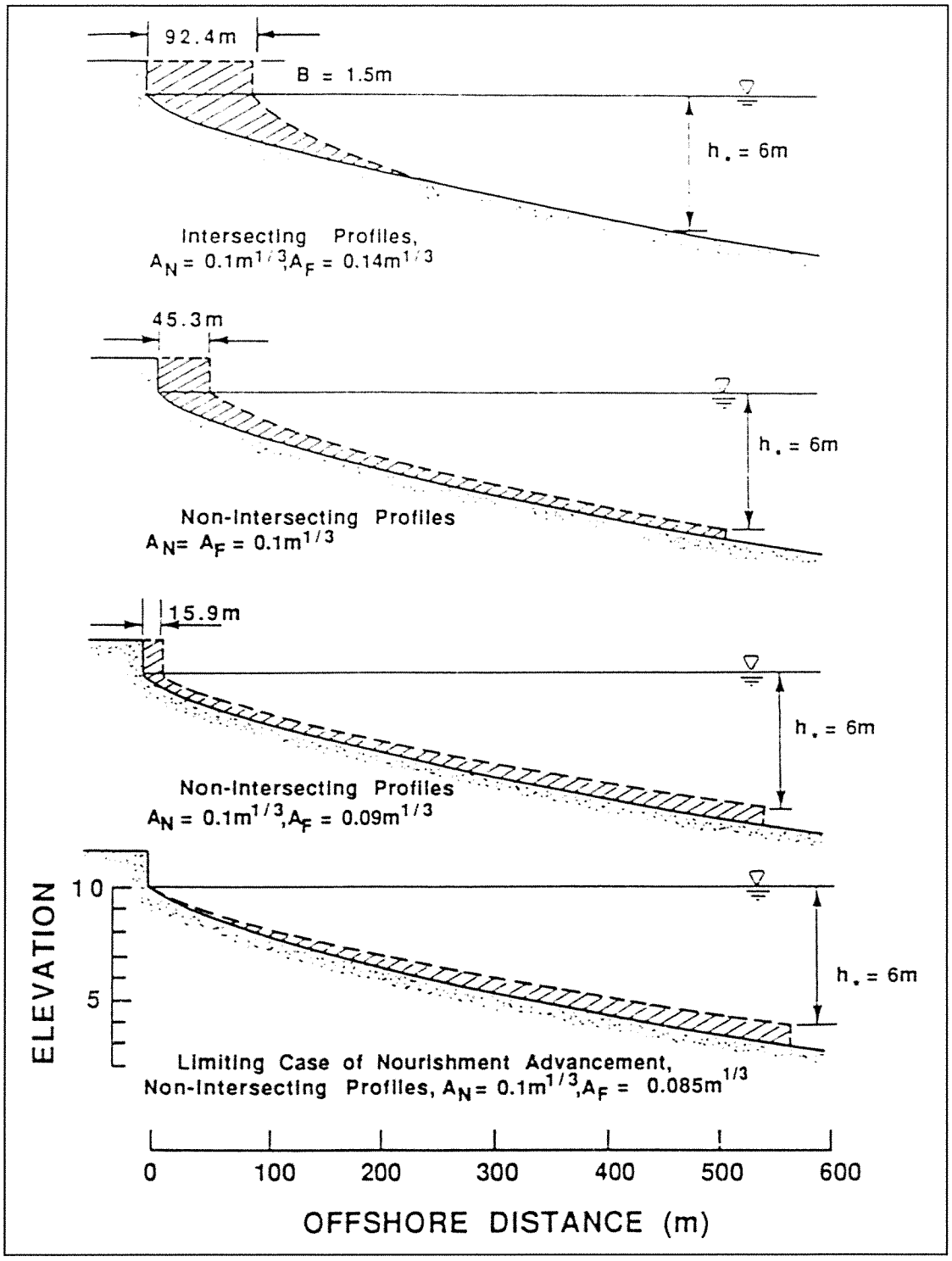


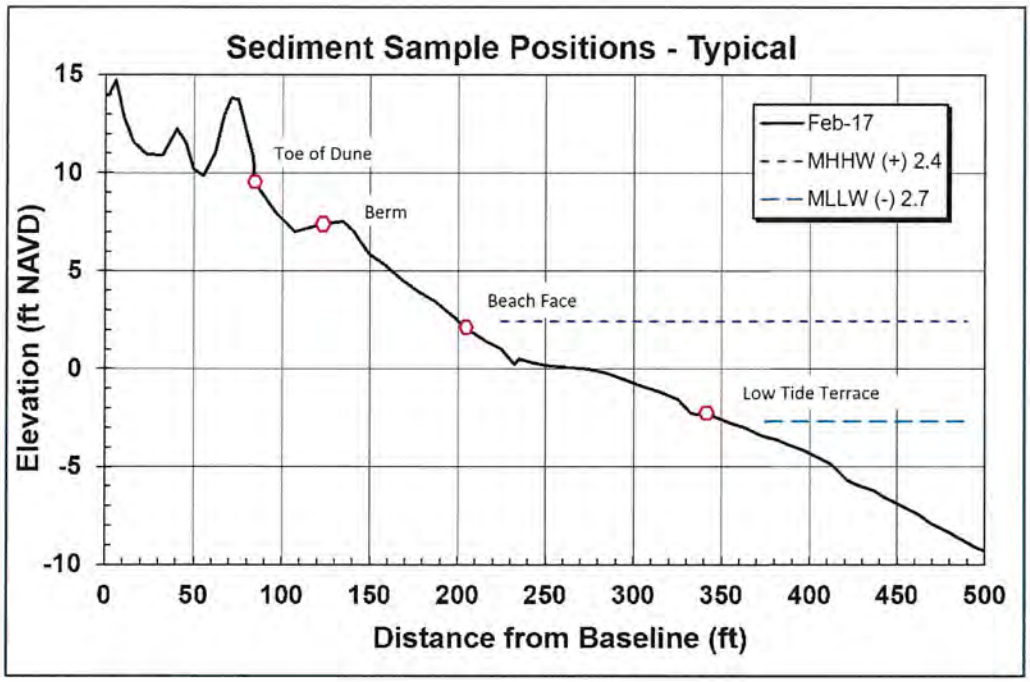
FIGURE 1.2. Effect of borrow material grain size (nourishment scale parameter, A_F) on the width of the dry beach for a fixed volume of nourishment sand added per unit beach length (from Dean 1991, Fig 25). In simple terms, coarser sand relative to the native sediment produces a wider visible beach than finer sand. [Note: 1 m ≈ 3.28 ft]

Waves and nearshore currents, as well as winds, sort the sediments of the littoral zone such that grain size and topography are related across the profile. Coarser material tends to concentrate at the inshore "plunge" point of breaking waves where energy dissipation is focused and slope is relatively steep (Miller & Ziegler 1958, Greenwood & Davidson-Arnott 1972, Komar 1998). Finer sands are winnowed and shifted seaward, beyond the breaker zone, where slopes tend to be gentler than the swash zone. Sands washed up the profile and across the berm at high tide dry out and are sorted by wind, leading to accumulation of finer sand in the dunes as well. Any suite of sediment sizes introduced to a beach by natural or artificial means will similarly sort under waves and migrate across the profile.

Figure 1.3 [upper] illustrates a typical profile across the littoral zone showing primary morphologic features such as the foredune, dry beach (berm), wet beach, and low tide level. A composite mean grain size of samples from each cross-shore position on Sea Island is shown at the bottom of Figure 1.3. The visible beach (ie – above low water) along most coasts tends to exhibit well-sorted (poorly graded) sands of some dominant size class. If such sand is desirable for aesthetics and other environmental reasons, prospective borrow areas should contain high proportions of those grain sizes (NPS 2012). Nourishment sediments within the size distribution that are finer than those of the dry-sand beach are likely to shift offshore during initial fill adjustment and erosion events, or be transported by winds toward the foredune.

Borrow sediments should be similar in texture and color to the native beach sediment. Georgia has state-wide rules and standards for beach fill projects requiring borrow sediments match the texture, grain size, and color of those on the native beach. Other states use quantitative criteria based upon measured grain size distributions. For this project, sediment compatibility is defined as borrow sediments that are similar in texture, grain size, and color to the native beach.

Ridges tend to contain coarser sediments and have lower concentrations of fines than the swales, although that is not always the case. Riggs et al (1995) discuss the importance of underlying geology on the distribution and thickness of surficial sediments. Areas adjacent to inlets or shoals, like the project area, tend to have a more plentiful supply of Holocene (recent) sediments. The following sections provide detailed results of sampling and analyses performed to identify potential borrow sediments for beach fill.



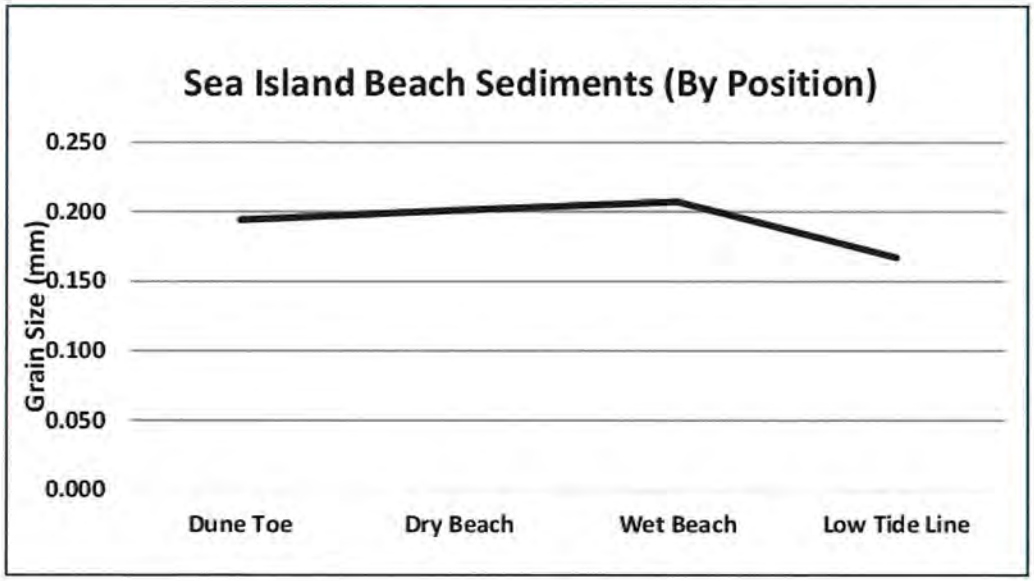


FIGURE 1.3. **[UPPER]** Littoral profile showing four sediment sampling positions based on morphology. **[LOWER]** Overall trends in mean grain size by position across the profile based on 7 transects at Sea Island.

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2.0 METHODS

2.1 Beach Samples

CSE collected beach samples along the Sea Island project area in March 2017. Four samples were collected along five transects, and two samples were collected along two transects (n=24). The lack of a dune or dry sand beach in the center of the island meant only two samples could be collected at stations 175+00 and 200+00. Figure 2.1 shows the sampling tool used for surface grabs in the upper 15 centimeters (cm) (~6 inches) of substrate.

Samples were inspected for mud then washed, dried, and weighed in splits for analysis of grain size, gravel, and shell content. The split for grain size (~100-gram sample) was mechanically sieved at 0.25-phi intervals (ie – ~21 sieves in the sand size range) and each subsample was split, weighed, and recorded on lab sheets. The split for shell analysis (~20-gram sample) was immersed in diluted muriatic acid (ie– nearly pure hydrochloric acid—HCl). After ~24 hours or once there was no evidence of bubbling, the remainder was rinsed, dried, and reweighed to the nearest 0.01 gram. The difference represented the proportion of shell in the sample.

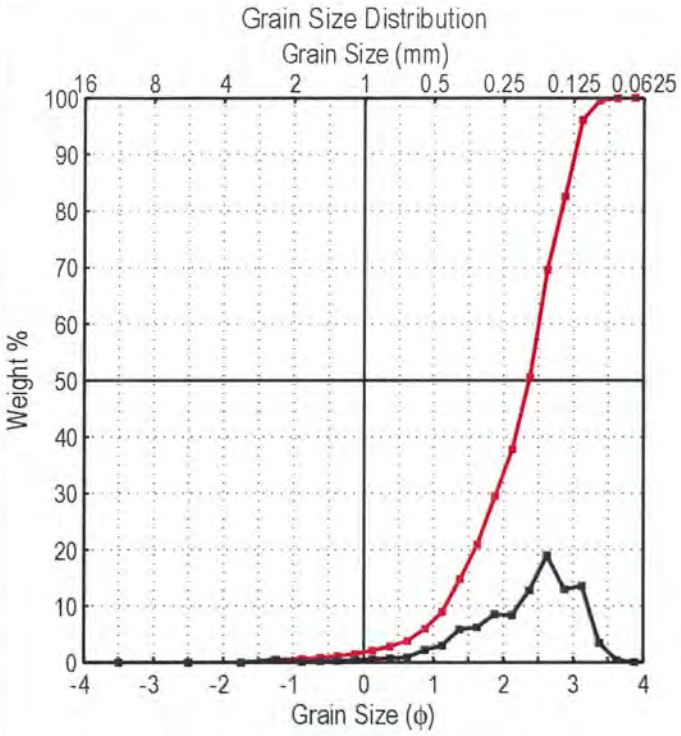
Summary tables of results, including sediment size distribution statistics, shell percentages, and fines percentages, are given in Section 3.0 (Results). Most beaches tend to have well-sorted and slightly coarse (ie – negative), skewed sediments. Shell material often adds a coarse fraction as do granules and pebbles (though these are less common on Sea Island beaches). Fines are defined here as material passing the US Standard Sieve #230 (ie – <0.0625 mm) and generally consist of minute fractions of silt.

FIGURE 2.1. Uniform sediment samples were collected on the beach in the upper 6 inches (15 centimeters), mixed, and subsampled for laboratory testing.

No beach samples were observed to contain measurable quantities of clays or organics. Gravel percentage was determined from the split retained on the US Standard Sieve #10 (>2.0 mm). In some cases, additional coarse sieves were used in the analysis for a breakdown of the small gravel sizes.

Sample splits were converted to percentages and graphed as frequency and cumulative frequency distributions. Standard statistical measures were computed including true-moment measures, graphic means, and standard deviations (ie – Inman 1952, Folk & Ward 1957). Mean is the commonly reported typical grain size; standard deviation is a measure of the degree of sorting; and skewness reflects the degree to which the sample contains higher proportions of coarse sediment or fine sediment. Results were reported in millimeters as well as standard phi units. Figure 2.2 shows a typical data sheet for one sample; the set of laboratory data sheets is given in Attachment 1.

Statistical composites of groups of samples were determined mathematically by averaging results for each individual size class for a given group of samples, then calculating moment measures for the composite. (This gives a linear, non-weighted average.) Composites were developed for each morphological unit sampled (ie – all dune toe samples combined, all beach face samples combined, etc). Results of composite size distributions are given after the individual sample results in Attachment 1. Composites are identified and sorted on the data sheets in Attachment 1 by cross-shore position, then combined for all samples. Percent fines are given on the sample data sheets, and summary tables provide all key statistics including mean, standard deviation, skewness, percent shell, and percent gravel. Summary tables of results, including shell and gravel percentages follow in Section 3.0.



Project	2473
Location	Sea Island, GA
Date	Mar 2017
Station	SI 30
Interval	Wet Beach
Mean	0.203 mm
STD	0.583 mm
Skewness	-1.289
USCS	Wentworth
SP	Fine Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	116.52
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	0.00
% $CaCO_3$	5.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.59	0.51	0.51
-0.75	-0.875	0.13	0.11	0.62
-0.5	-0.625	0.25	0.21	0.83
-0.25	-0.375	0.33	0.28	1.12
0	-0.125	0.48	0.41	1.53
0.25	0.125	0.68	0.58	2.11
0.5	0.375	0.86	0.74	2.85
0.75	0.625	1.08	0.93	3.78
1	0.875	2.55	2.19	5.96
1.25	1.125	3.46	2.97	8.93
1.5	1.375	6.79	5.83	14.76
1.75	1.625	7.22	6.20	20.96
2	1.875	9.92	8.51	29.47
2.25	2.125	9.70	8.32	37.80
2.5	2.375	14.89	12.78	50.58
2.75	2.625	22.13	18.99	69.57
3	2.875	15.09	12.95	82.52
3.25	3.125	15.76	13.53	96.04
3.5	3.375	4.02	3.45	99.49
3.75	3.625	0.49	0.42	99.91
4	3.875	0.08	0.07	99.98
>4.0	4.125	0.02	0.02	100.00

Percentiles	
1	-0.475
5	0.765
16	1.425
25	1.745
50	2.365
75	2.730
84	2.900
95	3.105
99	3.340

Moment Measures	(phi)	(mm)
Mean	2.301	0.203
Standard Deviation	0.778	0.583
Skewness	-1.289	
Kurtosis	5.507	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	2.162	2.230
Standard Deviation	0.738	0.723
Skewness (1)	-0.275	-0.321
Skewness (2)	-0.583	
Kurtosis	0.586	0.974

FIGURE 2.2. Sample data sheet (SIGA–01) displaying grain-size characteristics and descriptions.

2.2 Borrow Samples

There is one proposed offshore borrow area in the Sea Island vicinity (see Fig 1.1). A second borrow area was delineated and sampled, but was not considered a viable source because of its location and quality.

Thirty-six cores were obtained by Athena Technologies under CSE direction in 2017 using a 3-inch steel core barrel vibrated into the substrate. Core locations were based on CSE's review of prior data with the goal of filling in gaps and confirming a minimum of 1 million cubic yards of beach quality sand. Lengths of cores ranged from 4.8 ft to 11.5 ft with an average core length of 8.5 ft (n=36). Cores were logged by an Athena and a CSE professional geologist, and subsampled by CSE for sediment analysis.

The "saved" core half was photographed and archived in plastic sleeves. Subsamples representing the section lithology were taken from the other half of the core at full-section intervals as given on the core logs. CSE only subsampled upper sections of cores that clearly contained "clean" sediments with negligible mud content. Samples were dried, weighed, disaggregated (if mud was present) and/or washed of salts, dried, weighed, and subsampled (~100 grams) for grain-size analysis via dry sieves at 0.25-phi intervals in the sand size range and several intervals as appropriate up to the "pea" gravel range (−4.0 phi or 16 mm).

Any pebbles, cobbles, or shells greater than 16-mm diameter were retained on the −4.0 phi sieve and included in the weight percentages. Sections of cores that contained significant concentrations of mud were generally not sampled and rejected for possible borrow material. In some cases, if a discrete mud lens of about 0.1 ft or less was observed, the lens was not sampled but included in the percent mud calculations. Visual inspections indicated that only minor amounts of mud occurred in core samples retained for sieving and therefore a separate mud analysis was not performed. A separate subsample (~20 grams) was taken for "shell" analysis ($CaC0_3$ content) which was determined by acid-burning using dilute hydrochloric acid. Percent gravel was determined by sieving as the percent >2-mm diameter retained.

Figure 2.3 contains an example photo-mosaic and core log for CSE core SIGA-01. Attachment 2 contains the set of photomosaic and core logs as well as the set of grain-size distributions (statistics, frequency, and cumulative frequency curves) for individual samples. Sample results were composited (weighted by section length) for the various thicknesses of substrate (Fig 2.4), and these GSD curves and statistics are also provided in Attachment 2. This provides a practical operational result for evaluating sediment quality under representative dredge cuts.

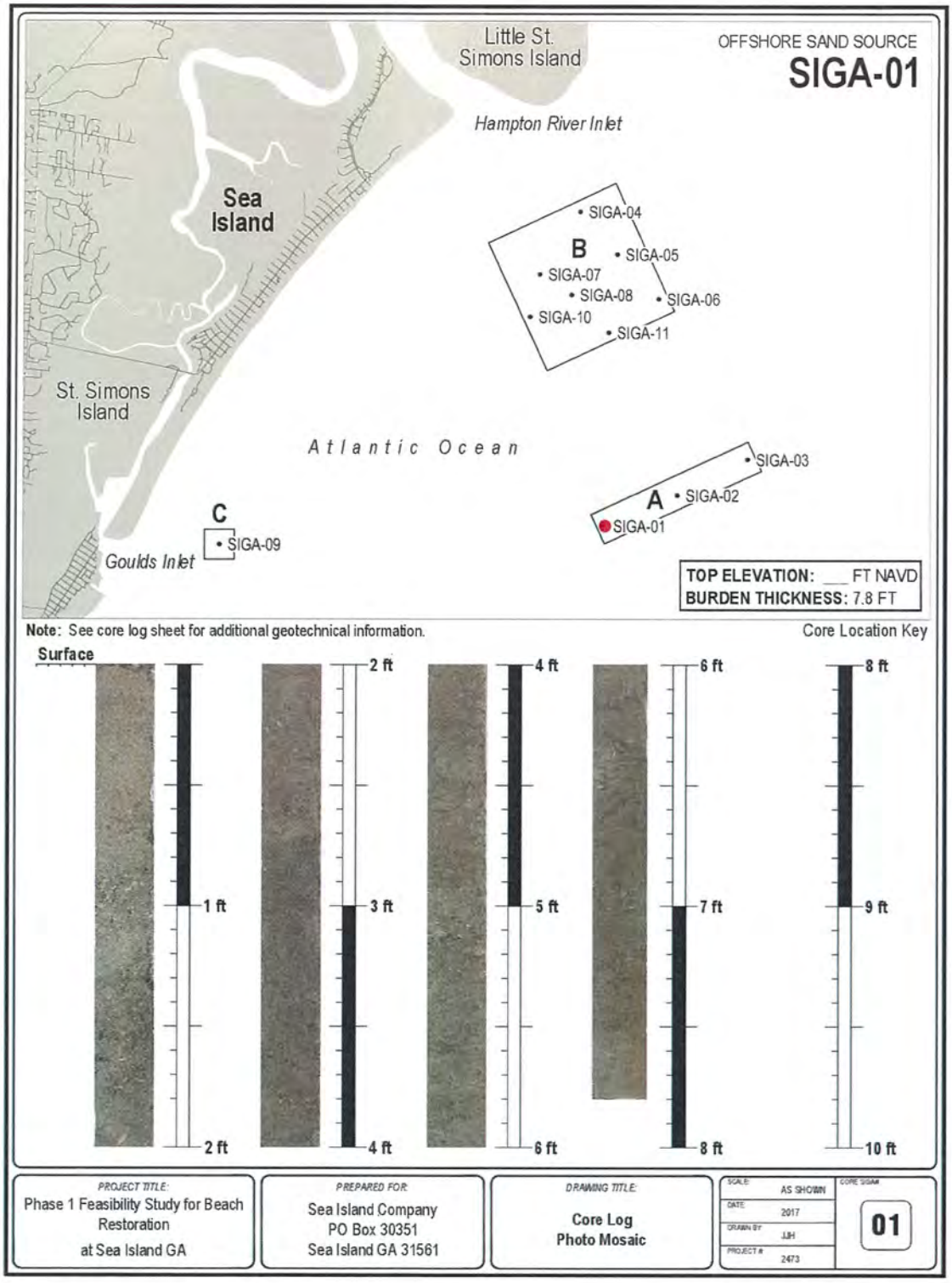


FIGURE 2.3. Example core photo log for SIGA-01 obtained by Athena in June 2017 in water depths of ~24 ft.

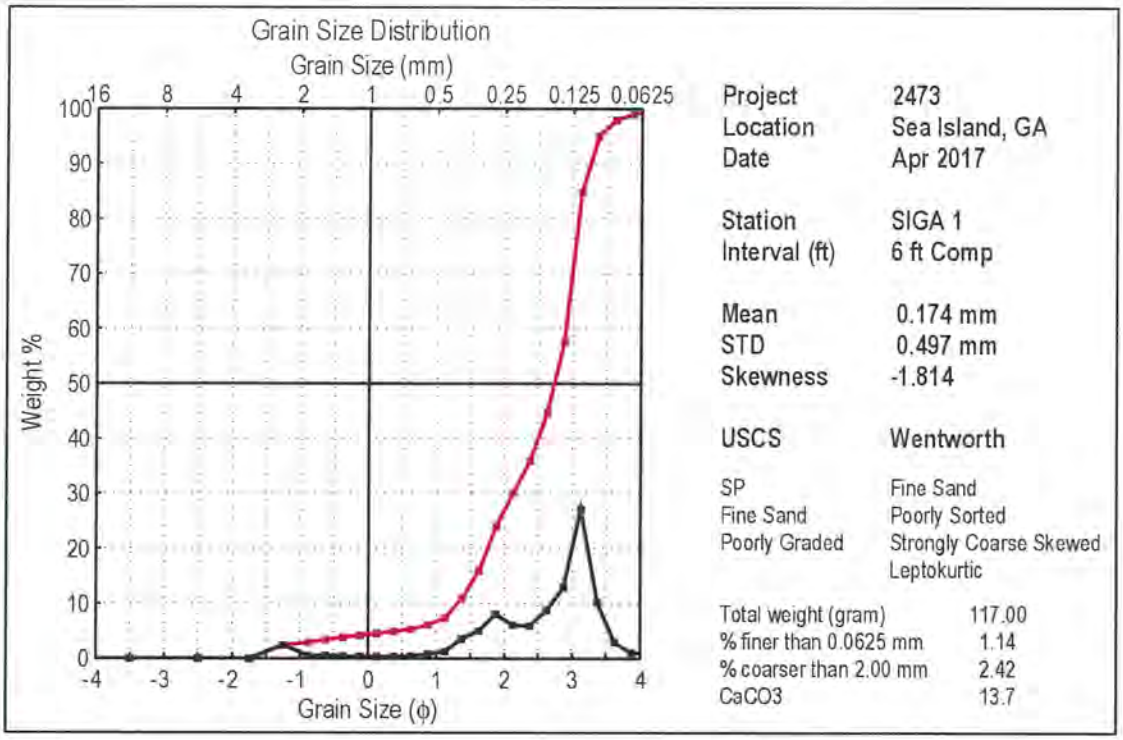


FIGURE 2.4. Example grain-size distribution (GSD) for the upper 6 ft of the SIGA-01 core. Results were composited from individual samples (weighted) for the upper 4 and 6 ft of substrate. See Attachment 2 for composite GSDs for each core. These thicknesses are representative of typical dredging depths (excavation sections) for offshore sediments along the East Coast (USACE 2010).

Sediment quality for beach nourishment can be evaluated using the analytical model of James (1975), which is a standard method adopted by the USACE (CERC 1984). The James method computes an "overfill factor" (R_A), which uses two simple parameters (mean grain size and standard deviation) to compare a prospective borrow sediment with the native size distributions.

The overfill factor (R_A) compares these parameters (using phi units) with a prospective borrow material and yields a simple ratio between 1 and 10. A value of R_A=1.0 means the prospective borrow material matches or exceeds the native beach in terms of its potential performance (not necessarily a duplicate size distribution). A value of R_A=1.5 means that ~1.5 times more borrow material would have to be placed to provide performance equaling the native beach. Borrow material that is considerably finer than the native sediment may have R_A's >>1 and, consequently, require many times more volume to yield the same performance as native sand. The overfill factor, R_A, is consistent with Dean's equilibrium profile predictions as previously illustrated in Figure 1.2.

The similarity between borrow sediments and native beach sediments was also evaluated by means of comparative size-frequency curves for composited samples, which offers a more critical (as well as visual) comparison of the beach and borrow sediments. If the two frequency curves are similar, the nourished beach will generally maintain the same aesthetic qualities. In general, the broader the size distribution of the native beach, the less likely there will be a perfect match with prospective borrow areas (Kana & Mohan 1998). As Gravens et al (2008) report, sediment grain size is the most important borrow material characteristic.

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3.0 RESULTS – BEACH SAMPLES

3.1 Beach Statistics – February 2017

The Sea Island project area grain-size distributions (GSDs) for all beach samples (24) are given in Attachment 1 and summarized in Tables 3.1–3.3. Primary measures based on method of moments and graphical methods show that arithmetic mean grain size for all samples is 0.199 mm (fine sand) with ~5.4 percent shell and ~1.0 percent gravel (Table 3.2).

Averaging by sample position (Table 3.2), mean grain size ranges from ~0.194 mm on the dune toe to 0.207 mm in the swash zone. The visible beach samples, collected on the berm and at the dune toe, averaged ~0.197 mm. The submerged beach samples are slightly finer, with an average mean grain size of ~0.187 mm.

Figure 3.1 (upper) plots the results of all samples by station (north to south). Mean grain size is fairly consistent from south to north along Sea Island, ranging from ~0.15 mm to ~0.25 mm (fine to medium sand; Table 3.3). Shell content is relatively uniform (~5 percent) across all seven stations, although there is an outlier at station SI 45 (~20 percent). The gravel percent also peaks near station SI 45 at ~7.5 percent and is at or below 1 percent at nearly every other station. The coincidence of outlier gravel and shell percentages suggests the SI 45 submerged beach samples may have included some coarse shell material (Fig 3.1, lower). No significant concentration of large clasts was observed along the beach at the time of CSE samplings in 2017.

TABLE 3.1a. Sea Island project area beach sediment statistics in March 2017. See Attachment 1 for detailed frequency and cumulative frequency results of each sample.

Station	Position	phi				mm			
		Mean	STD	Skew	Kurt	Mean	STD	Shell	>2 mm
SI 15	Dune Toe	2.591	0.384	-0.490	5.992	**0.166**	0.766	2.3	0.0
SI 15	Dry Beach	2.644	0.462	0.192	3.775	**0.160**	0.726	5.1	0.0
SI 15	Wet Beach	2.487	0.536	-0.535	4.590	**0.178**	0.690	6.7	0.0
SI 15	Low Tide Line	2.151	1.248	-0.549	2.086	**0.225**	0.421	6.4	0.8
SI 20	Dune Toe	2.201	0.478	0.119	3.794	**0.217**	0.718	2.9	0.0
SI 20	Dry Beach	1.698	0.478	-0.332	4.524	**0.308**	0.718	2.5	0.1
SI 20	Wet Beach	2.032	0.547	-0.192	2.972	**0.245**	0.684	2.8	0.0
SI 20	Low Tide Line	2.612	0.501	-0.927	5.387	**0.164**	0.707	4.2	0.0
SI 30	Dune Toe	1.747	1.005	-0.876	3.944	**0.298**	0.498	7.7	2.6
SI 30	Dry Beach	2.221	0.492	-0.189	3.576	**0.215**	0.711	5.8	0.0
SI 30	Wet Beach	2.301	0.778	-1.289	5.507	**0.203**	0.583	5.3	0.5
SI 30	Low Tide Line	2.570	1.201	-1.999	5.654	**0.168**	0.435	5.6	2.3
SI 35	Wet Beach	2.275	0.719	-0.541	2.463	**0.207**	0.608	5.7	0.0
SI 35	Low Tide Line	2.888	0.381	-1.967	13.421	**0.135**	0.768	5.6	0.0
SI 40	Wet Beach	2.468	0.684	-1.008	3.320	**0.181**	0.622	4.5	0.0
SI 40	Low Tide Line	2.859	0.515	-4.208	31.417	**0.138**	0.700	6.0	0.6
SI 45	Dune Toe	2.613	0.344	0.062	3.839	**0.163**	0.788	6.4	0.0
SI 45	Dry Beach	2.444	0.454	-0.307	4.457	**0.184**	0.730	4.8	0.0
SI 45	Wet Beach	1.424	1.629	-0.485	2.154	**0.373**	0.323	20.2	7.5
SI 45	Low Tide Line	1.981	1.735	-1.390	3.852	**0.253**	0.300	6.2	9.3
SI 50	Dune Toe	2.671	0.414	-0.426	4.547	**0.157**	0.751	2.1	0.0
SI 50	Dry Beach	2.569	0.533	-0.641	3.256	**0.168**	0.691	2.5	0.0
SI 50	Wet Beach	2.914	0.385	-1.537	8.901	**0.133**	0.766	2.2	0.0
SI 50	Low Tide Line	2.991	0.592	-3.678	21.855	**0.126**	0.663	5.6	0.5

TABLE 3.1b. Sea Island project area beach sediment characteristics (descriptive) in March 2017. See Attachment 1 for detailed frequency and cumulative frequency results of each sample.

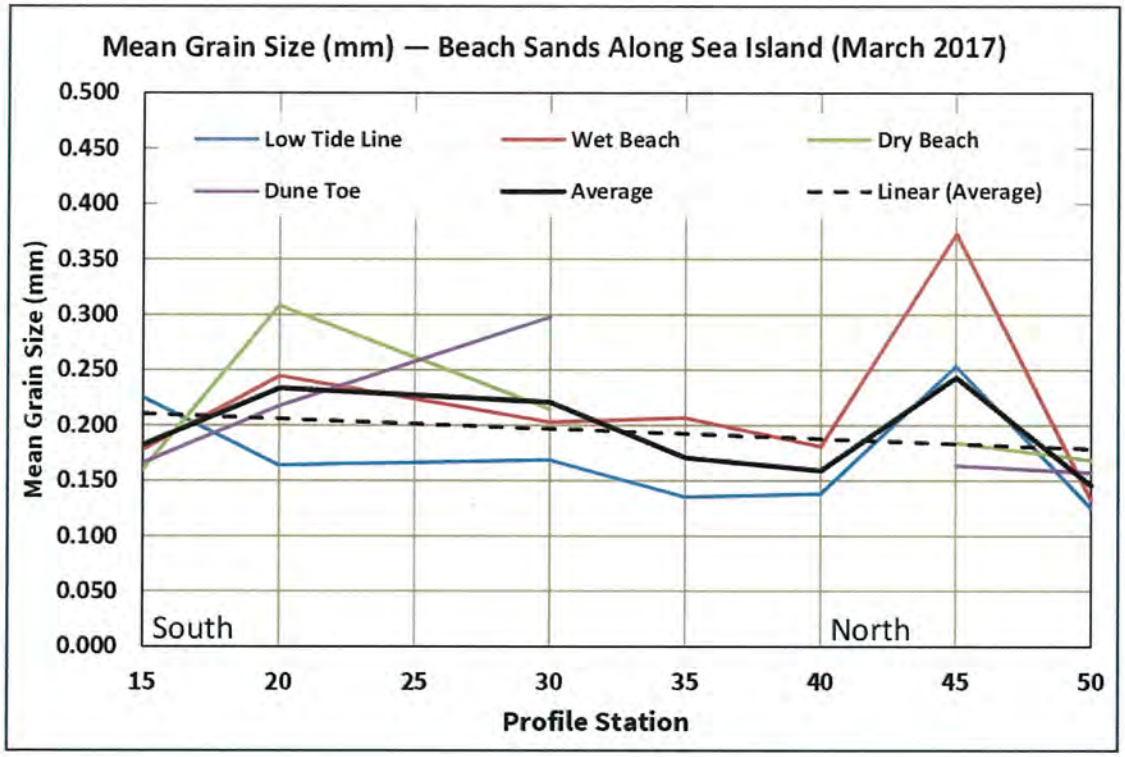
USCS			Wentworth			
SP	Fine Sand	Poorly Graded	Fine Sand	Well Sorted	Coarse Skewed	Leptokurtic
SP	Fine Sand	Poorly Graded	Fine Sand	Well Sorted	Symmetrical	Leptokurtic
SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Well Sorted	Coarse Skewed	Leptokurtic
SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Coarse Skewed	Platykurtic
SP	Fine Sand	Poorly Graded	Fine Sand	Well Sorted	Symmetrical	Leptokurtic
SP	Fine Sand	Poorly Graded	Medium Sand	Well Sorted	Symmetrical	Leptokurtic
SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Well Sorted	Symmetrical	Mesokurtic
SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Well Sorted	Coarse Skewed	Leptokurtic
SP	Fine Sand	Poorly Graded	Medium Sand	Poorly Sorted	Coarse Skewed	Leptokurtic
SP	Fine Sand	Poorly Graded	Fine Sand	Well Sorted	Symmetrical	Mesokurtic
SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Coarse Skewed	Leptokurtic
SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Coarse Skewed	Platykurtic
SP	Fine Sand	Poorly Graded	Fine Sand	Well Sorted	Strongly Coarse Skewed	Very Leptokurtic
SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Well Sorted	Coarse Skewed	Mesokurtic
SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Well Sorted	Strongly Coarse Skewed	Very Leptokurtic
SP	Fine Sand	Poorly Graded	Fine Sand	Very Well Sorted	Symmetrical	Leptokurtic
SP	Fine Sand	Poorly Graded	Fine Sand	Well Sorted	Symmetrical	Leptokurtic
SP	Fine Sand	Poorly Graded	Medium Sand	Poorly Sorted	Coarse Skewed	Platykurtic
SP	Fine Sand	Poorly Graded	Medium Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SP	Fine Sand	Poorly Graded	Fine Sand	Well Sorted	Symmetrical	Leptokurtic
SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Well Sorted	Coarse Skewed	Mesokurtic
SP	Fine Sand	Poorly Graded	Fine Sand	Well Sorted	Strongly Coarse Skewed	Very Leptokurtic
SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Well Sorted	Strongly Coarse Skewed	Very Leptokurtic

TABLE 3.2. Mean grain size (mm) for March 2017 beach samples in the Sea Island project area, averaged by cross-shore position.

Position	phi				mm		%	
	Mean	STD	Skew	Kurt	Mean	STD	Shell	>2 mm
Dune Toe	2.365	0.677	-1.775	8.920	**0.194**	0.626	4.3	0.5
Dry Beach	2.315	0.592	-0.319	3.322	**0.201**	0.663	4.2	0.0
Wet Beach	2.272	0.946	-1.680	6.932	**0.207**	0.519	6.8	1.2
Low Tide Line	2.580	1.061	-2.402	9.376	**0.167**	0.479	5.6	1.9
ALL	2.390	0.687	-0.966	6.470	**0.199**	0.640	5.4	1.0

TABLE 3.3. Sample statistics for March 2017 beach samples in the Sea Island project area, averaged by station.

Station	phi				mm		%	
	Mean	STD	Skew	Kurt	Mean	STD	Shell	>2 mm
75+00	2.468	0.658	-0.345	4.111	**0.182**	0.651	5.114	0.211
100+00	2.136	0.501	-0.333	4.169	**0.233**	0.707	3.093	0.017
150+00	2.210	0.869	-1.088	4.670	**0.221**	0.557	6.100	1.334
175+00	2.582	0.550	-1.254	7.942	**0.171**	0.688	5.685	0.000
200+00	2.664	0.599	-2.608	17.369	**0.159**	0.661	5.269	0.290
225+00	2.115	1.041	-0.530	3.575	**0.243**	0.535	9.404	4.199
250+00	2.787	0.481	-1.571	9.640	**0.146**	0.718	3.099	0.115
ALL	2.390	0.687	-0.966	6.470	**0.199**	0.640	5.381	1.003



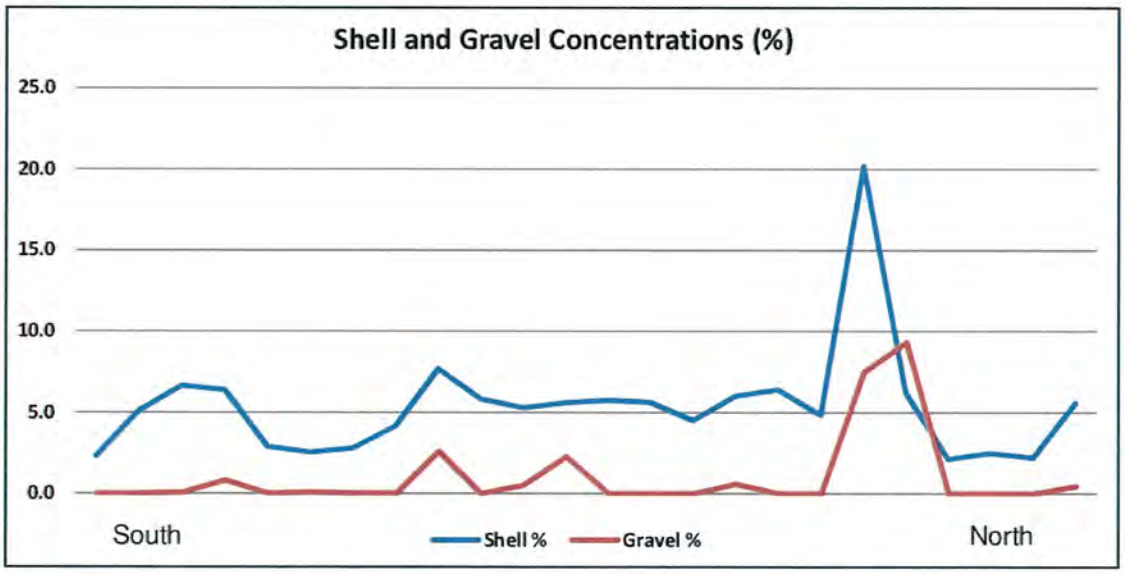


FIGURE 3.1. **[UPPER]** Changes in mean grain size by station and sample position across Sea Island beach. **[LOWER]**. Shell and gravel percentages by station across Sea Island beach. Notice the strong outlier near SI 45.

3.2 Selection of Native Mean Grain Size

"Typical" mean grain size is likely to fall between 0.15 mm and 0.25 mm along Sea Island, and probably varies with the season—finer during calmer periods and coarser during rougher conditions. However, this change is probably relatively subtle—Georgia beaches as well as a majority of beaches in sand-dominated environments (eg - the Carolinas, Florida, Texas), particularly those that have been nourished, are less likely to exhibit as large a difference in "native" sand sizes from season to season. Beaches of New England, where glacial moraines have yielded broad mixtures of gravel and sand, commonly exhibit wide grain-size variability (Colony 1932, Taney 1961).

Tables 3.1–3.3 presented the results for all 24 samples. The March 2017 samples yielded a mean and standard deviation of 0.199 mm and 0.640 mm (respectively, see Tables 3.2 and 3.3). If only the visible beach/dune samples are included, the resulting mean and standard deviation are 0.198 mm and 0.645 mm (respectively). [Under the Wentworth size classification, the composite means are in the fine sand-size range (0.125–0.25 mm) for calculations involving the majority of samples.]

4.0 RESULTS – BORROW AREA INVESTIGATION

Two offshore search areas ("A" and "B") were considered (see upper portion of Fig 2.3). However, Offshore Area B is in shallower water and is closer to the Hampton River Inlet. Because Offshore Area A contains a suitable volume of beach quality sediment, Offshore Area B was abandoned as a potential borrow area and this report only focuses on Offshore Area A.

The average grain size (calculated for the upper 4 ft of sediment across Offshore Area A) is 0.201 mm with a standard deviation of 0.523. When calculated for the upper 6 ft of sediment, the average is 0.181 and standard deviation 0.509 (see Section 4.1 for more details). The native sand on Sea Island's beach ranges from 0.13 mm to 0.37 mm with an average of 0.199 mm. Fines (silty material) as well as gravels (coarse material) were low across the borrow areas, averaging 1.8 and 1.5 percent (respectively). Shell material was higher at 11.8 percent.

Offshore Area A — Borrow Area A is ~255 acres and is located ~4 miles southeast of central Sea Island (see Fig 1.1). Area A as delineated is ~10,000 ft by 1,700 ft. Borings presented herein indicate this area contains beach-quality sediment. Up to 1.6 million cubic yards of beach-quality sand are contained in the upper 4 ft of the bottom for the search area delineated and up to 2.5 million cubic yards are contained in the upper 6 ft. Water depths in Area A range from ~20 ft to ~30 ft and are, therefore, considered well outside the normal limits of the beach zone. The core density in Area A is presently ~1 per 13 acres, which is acceptable for characterizing a borrow area for dredging (including nine additional cores within 500 ft of Area A which reduces this density to 1 per ~9.1 acres). In anticipation of the maximum project volume of 2.5 million cubic yards, Area A would provide the necessary volume of sediment.

4.1 Offshore Area A

CSE collected 36 borings during the Summer of 2017 to characterize sediments off Sea Island. Figure 1.1 showed the location of the available borings, and Figure 4.1 presents a contour map and representative cross-sections cut across the borrow areas. A total of 19 cores are presently available for analysis over the borrow area (roughly ~255 acres) for a density of ~13 acres per core. [An additional nine borings are immediately outside the area. If these are included, the density increases to ~9.1 acres per core.] The average core length was ~9.1 ft for all cores collected within Borrow Area A. Lengths ranged from 6.5 ft to 11.3 ft. Of the 19 cores in Borrow Area A, 17 have an overfill factor (R_A) between 1.0 and 1.5 (composite values to 4 ft and 6 ft).

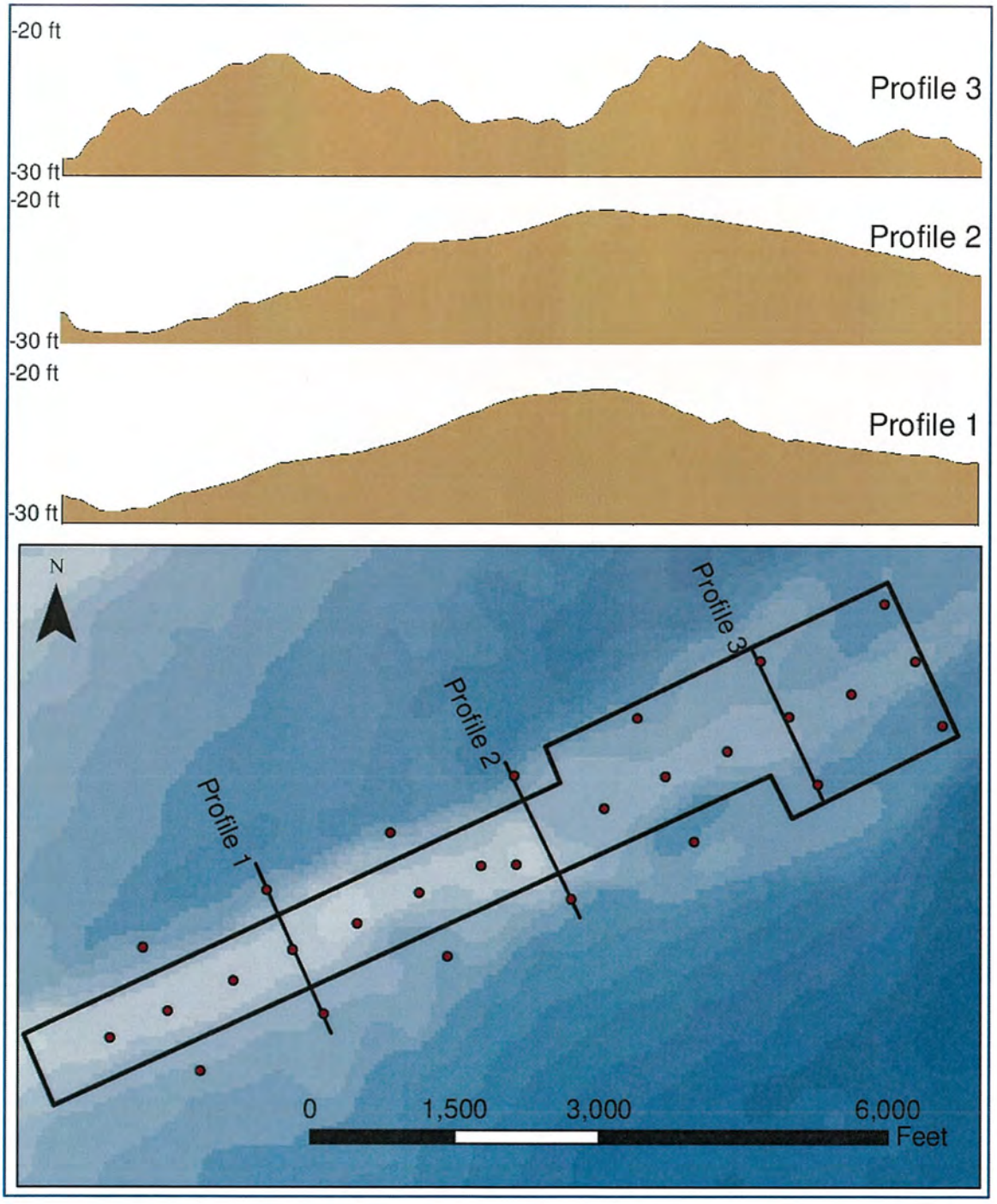


FIGURE 4.1. Borrow area bathymetric map and selected profiles.

Table 4.1 lists the key descriptive statistics for each core sample along with the USCS and Wentworth description and the interpreted Munsell color. The unweighted, arithmetic mean grain size for all 36 cores (105 samples) is 0.170 mm (fine sand). The unweighted, arithmetic mean shell and gravel percentages are 12.2 percent and 2.5 percent (respectively).

Figure 2.3 presented a photograph of one of the cores (SIGA-01) situated within Borrow Area A. For the most part, sediments in each core were gray or grayish green in color and consisted of various mixtures of fine to medium sand with minor amounts of shell material and silt. Munsell color numbers were interpreted for each sample. Granules and trace amounts of "pea" gravel also occurred in some cores. Core logs and photos of each core are provided in Attachment 2.

For purposes of visualizing sediment quality within the sand search area, CSE computed weighted composite statistics to 4 ft of core sections. Under operational conditions, dredges excavate to a particular depth, mixing sediments before discharge along the beach. Typically, 2 ft, 6 ft, and even 8 ft composites would also be calculated for each core; however, there was little beach-quality material below 6 ft in many of the cores. A cut depth of ~4 ft is considered to be close to the operational minimum for a traditional cutterhead suction dredge. Therefore, the results of core samples were weighted proportionally over the upper 4 and 6 ft. This yields a "composite" mean grain size, shell content, gravel content, and overfill factor for each designated interval.

Similarities between the results for each composite are a measure of the down-core consistency of the sediments. It is anticipated excavations will be restricted to the upper ~4 or 6 ft of substrate, or the limit of confirmed sediment grain size for a particular section of the borrow area. A goal of the design is to leave sediments at the base of the excavation which are similar in size and character as the removed sediments. This improves the chance for rapid recovery of benthic organisms (Van Dolah et al 1998, NPS 2012). Tables 4.2 and 4.3 provide key statistics for each core to the composited lengths of 4 ft and 6 ft. The composite grain-size distributions for each set of data are given in Attachment 2.

To more easily visualize results, Figures 4.2–4.7 provide color isopach maps of mean grain size, mud content, and overfill factors ('RA') for Comp 4 (composite to 4 ft) and Comp 6 (composite to 6 ft) results. Coarsest sediments are found along a ridge in ~21-22 ft of water. Grain size decreases moving away from the ridge, so the borrow area is somewhat elongate. When composited to 4 ft, gravel content ranges from 0.3 to 6.4 percent, while shell content ranges between 5.7 and 22.9 percent. At a 6 ft cut depth, gravel and shell content are almost identical (0.3–6.4 percent gravel; 5.7–22.9 percent shell). These different ranges confirm that most of the shell material in each sample is smaller than 2mm diameter, the lower size limit for gravel, and that most of the gravel material is probably shell material (instead of pea gravel or granule-sized particles).

TABLE 4.1a. Offshore borrow area sediment characteristics (statistical measures) for Sea Island GA. See Attachment 2 for detailed frequency and cumulative frequency results of each sample.

2473 Sea Island GA		Method of Moments						Folk Graphical Method							Overfill
		Mean	STD	Skew	Kurt	Mean	Std	Mean	STD	Skew	Kurt	Shell	Gravel	Mud	Factor
Sample	Interval	ϕ				mm		ϕ				%	%	%	(Ra)
SIGA-1	0-2	1.86	1.05	-1.45	5.39	**0.276**	**0.483**	1.89	0.70	-0.16	2.00	13.7	5.1	0.0	**1.3**
SIGA-1	2-4	2.73	0.82	-2.33	10.14	**0.150**	**0.566**	2.69	0.52	-0.54	1.62	8.9	1.0	0.0	**1.8**
SIGA-1	4-6	2.98	0.76	-3.27	17.13	**0.127**	**0.590**	2.95	0.35	-0.24	1.89	9.4	1.2	0.0	**1.9**
SIGA-1	6-7.8	3.04	0.81	-2.61	12.14	**0.122**	**0.571**	3.02	0.39	-0.25	2.37	10.6	0.6	0.0	**1.9**
SIGA-2	0-3	2.21	0.73	-1.52	8.55	**0.217**	**0.602**	2.13	0.61	-0.06	0.96	5.2	1.2	0.0	**1.0**
SIGA-2	3-5.3	2.68	0.58	-2.37	15.65	**0.156**	**0.670**	2.60	0.43	-0.09	1.15	5.1	0.5	0.0	**1.0**
SIGA-2	5.3-6.5	2.82	0.68	-2.80	15.89	**0.142**	**0.623**	2.77	0.36	-0.26	1.39	10.0	0.7	0.0	**1.7**
SIGA-3	0-2	1.65	0.92	-1.14	4.75	**0.318**	**0.527**	1.61	0.76	-0.26	1.28	9.2	2.9	0.0	**1.0**
SIGA-3	2-4.5	2.39	0.69	-1.82	10.54	**0.190**	**0.620**	2.33	0.54	-0.08	1.27	5.6	0.9	0.0	**1.0**
SIGA-3	4.5-7	2.86	0.78	-2.23	10.81	**0.137**	**0.581**	2.82	0.47	-0.33	1.71	11.6	0.6	0.0	**1.8**
SIGA-3	7-9.4	2.92	0.90	-2.26	9.66	**0.132**	**0.537**	2.88	0.52	-0.38	2.13	12.4	1.0	0.0	**1.9**
SIGA-4	0-3	2.32	1.03	-1.52	5.13	**0.200**	**0.488**	2.22	0.98	-0.56	1.01	6.5	2.4	0.0	**1.5**
SIGA-4	3-5.1	2.62	1.06	-1.93	6.64	**0.163**	**0.480**	2.59	0.69	-0.57	2.20	13.8	2.0	0.0	**1.9**
SIGA-4	5.1-7.4	2.81	0.88	-2.42	10.22	**0.143**	**0.545**	2.83	0.43	-0.37	2.14	8.8	1.1	0.0	**1.9**
SIGA-5	0-2	2.60	1.19	-1.64	5.26	**0.165**	**0.437**	2.49	0.97	-0.60	2.39	14.9	2.4	10.3	**2.0**
SIGA-5	2-4.8	2.91	0.96	-2.46	10.12	**0.133**	**0.513**	2.94	0.42	-0.31	2.98	9.3	1.6	10.7	**2.0**
SIGA-5	4.8-9.6	2.82	1.17	-1.88	6.31	**0.142**	**0.443**	2.76	0.84	-0.51	2.60	13.8	2.3	0.0	**2.0**
SIGA-6	0-1.8	2.58	1.35	-1.44	4.26	**0.167**	**0.392**	2.45	1.17	-0.60	2.03	11.0	3.5	10.8	**2.0**
SIGA-6	1.8-3.6	2.32	1.33	-1.04	3.30	**0.200**	**0.397**	2.26	1.21	-0.58	1.05	12.2	2.8	7.8	**2.0**
SIGA-6	3.6-6.9	2.90	0.86	-1.88	7.23	**0.134**	**0.552**	2.88	0.51	-0.39	2.31	11.5	0.1	7.8	**1.9**
SIGA-7	0-1.8	1.95	1.22	-0.91	3.27	**0.259**	**0.431**	1.94	1.13	-0.34	0.95	10.6	4.6	0.0	**0.5**
SIGA-7	1.8-4.2	2.97	0.69	-3.87	22.83	**0.128**	**0.620**	2.93	0.30	-0.20	1.66	10.3	1.2	0.0	**1.8**
SIGA-7	4.2-6	3.11	0.66	-3.55	22.77	**0.116**	**0.635**	3.04	0.33	-0.02	1.68	8.5	0.8	0.0	**1.9**
SIGA-7	6-7.5	2.81	1.08	-2.28	8.31	**0.143**	**0.473**	2.87	0.51	-0.43	2.92	14.1	2.6	0.0	**2.0**
SIGA-8	0-3	2.87	0.86	-2.51	10.46	**0.137**	**0.551**	2.90	0.38	-0.41	2.84	8.1	1.1	0.0	**1.9**
SIGA-8	3-5.1	3.07	0.66	-2.80	15.83	**0.119**	**0.631**	3.02	0.34	-0.17	2.05	8.2	0.5	0.0	**1.8**
SIGA-8	5.1-8.2	2.43	1.34	-1.49	4.40	**0.186**	**0.394**	2.39	1.04	-0.61	1.93	15.5	4.9	0.0	**2.0**
SIGA-9	0-4.1	3.15	0.67	-3.46	19.64	**0.112**	**0.628**	3.13	0.27	0.02	1.69	7.1	0.6	0.0	**1.9**
SIGA-9	4.1-5.4	2.75	1.29	-1.72	4.97	**0.149**	**0.408**	2.62	1.06	-0.64	3.03	11.1	2.4	0.0	**2.0**
SIGA-9	5.9-7.8	2.32	0.81	-0.11	4.87	**0.200**	**0.571**	2.16	0.54	-0.08	1.82	4.4	0.1	0.0	**0.9**
SIGA-10	0-4	3.14	0.44	-4.54	42.50	**0.113**	**0.740**	3.05	0.24	0.07	1.44	5.2	0.3	0.0	**1.0**
SIGA-10	4-9	3.14	0.67	-2.81	15.70	**0.113**	**0.629**	3.10	0.34	-0.07	2.02	8.1	0.3	0.0	**1.9**
SIGA-11	0-3.5	3.15	0.74	-2.58	13.07	**0.113**	**0.600**	3.13	0.38	-0.11	2.21	9.4	0.4	0.0	**1.9**
SIGA-11	3.8-4.6	2.14	1.53	-0.88	2.65	**0.227**	**0.347**	2.00	1.58	-0.59	1.07	19.6	5.4	0.0	**2.0**
SIGA-11	5-7.4	3.01	0.80	-2.31	10.80	**0.124**	**0.575**	2.97	0.45	-0.27	2.02	9.1	0.5	0.0	**1.9**
SIGA-12	0-2.5	2.12	0.79	-1.36	7.33	**0.230**	**0.577**	2.07	0.68	0.14	0.94	8.0	1.4	0.0	**1.1**
SIGA-12	2.5-4	2.53	0.79	-2.11	9.69	**0.174**	**0.579**	2.46	0.63	-0.34	1.04	9.3	1.2	0.0	**1.4**
SIGA-12	4-8.4	2.32	1.60	-1.34	4.11	**0.201**	**0.330**	2.23	1.46	-0.61	1.26	13.7	5.5	10.8	**2.0**
SIGA-13	0-4.8	2.92	0.79	-2.09	9.00	**0.132**	**0.579**	2.89	0.46	-0.36	2.15	17.7	0.3	16.1	**1.9**
SIGA-14	0-2.8	2.91	0.68	-2.73	13.81	**0.133**	**0.626**	2.87	0.36	-0.37	1.87	10.1	0.3	0.0	**1.8**
SIGA-14	2.8-5.6	2.80	0.95	-1.88	7.36	**0.144**	**0.518**	2.78	0.61	-0.42	1.94	14.0	0.8	7.2	**1.9**
SIGA-14	5.6-9	2.65	1.06	-1.77	6.15	**0.160**	**0.481**	2.61	0.75	-0.57	2.02	15.5	1.7	0.0	**1.9**
SIGA-15	0-1.7	2.74	0.72	-2.43	11.93	**0.150**	**0.607**	2.68	0.47	-0.39	1.36	8.6	0.7	0.0	**1.6**
SIGA-15	1.7-5.1	2.93	0.85	-2.26	9.69	**0.131**	**0.554**	2.91	0.48	-0.37	2.09	11.7	0.7	0.0	**1.9**
SIGA-15	5.1-9.1	2.65	1.26	-1.68	5.80	**0.160**	**0.418**	2.60	0.95	-0.50	1.91	18.8	2.1	14.7	**2.0**
SIGA-16	0-3.0	2.63	1.29	-1.26	3.89	**0.161**	**0.408**	2.55	1.18	-0.56	1.17	17.8	1.9	13.4	**2.0**
SIGA-16	3-6.0	1.91	1.94	-1.02	2.89	**0.266**	**0.261**	1.88	1.88	-0.65	1.06	27.9	10.9	13.4	**2.0**
SIGA-17	0-1.7	1.70	0.94	-2.63	11.59	**0.307**	**0.522**	1.71	0.44	-0.26	2.32	7.5	3.8	0.0	**1.0**
SIGA-17	1.7-3.2	2.50	0.71	-1.61	8.65	**0.177**	**0.609**	2.42	0.62	-0.18	0.90	6.1	0.6	0.0	**1.3**
SIGA-17	3.2-8.2	2.82	0.86	-2.33	9.89	**0.142**	**0.549**	2.81	0.49	-0.44	2.06	11.7	1.0	0.0	**1.9**

TABLE 4.1a (cont.). Offshore borrow area sediment characteristics (statistical measures) for Sea Island GA. See Attachment 2 for detailed frequency and cumulative frequency results of each sample.

2473 Sea Island GA		Method of Moments						Folk Graphical Method							Overfill
		Mean	STD	Skew	Kurt	Mean	Std	Mean	STD	Skew	Kurt	Shell	Gravel	Mud	Factor
Sample	Interval	ϕ				mm		ϕ				%	%	%	(Ra)
SIGA-18	0-2.8	2.89	0.59	-2.38	13.08	**0.134**	**0.664**	2.83	0.37	-0.39	1.50	9.1	0.2	0.0	**1.0**
SIGA-18	2.8-5.6	2.86	0.92	-2.22	8.98	**0.137**	**0.528**	2.87	0.48	-0.39	2.40	14.1	1.0	9.3	**1.9**
SIGA-19	0-4.9	2.82	0.71	-2.47	12.48	**0.141**	**0.611**	2.77	0.44	-0.41	1.45	15.1	0.5	0.0	**1.7**
SIGA-19	4.9-8.4	2.86	1.03	-1.83	6.59	**0.138**	**0.491**	2.85	0.66	-0.43	2.09	15.0	0.9	12.9	**2.0**
SIGA-19	8.4-10.9	2.71	0.96	-1.53	6.07	**0.153**	**0.514**	2.62	0.77	-0.42	1.69	12.9	0.8	0.0	**1.9**
SIGA-20	0-2.0	2.89	1.04	-1.87	6.56	**0.135**	**0.485**	2.88	0.66	-0.44	2.38	16.7	0.9	0.0	**2.0**
SIGA-20	2.5-6.5	2.77	1.15	-1.63	5.36	**0.146**	**0.450**	2.70	0.91	-0.50	2.09	22.6	1.4	7.4	**2.0**
SIGA-21	0-3.4	2.33	0.85	-1.54	7.11	**0.198**	**0.554**	2.29	0.73	-0.22	0.86	11.6	1.4	0.0	**1.0**
SIGA-21	3.4-8.2	2.81	0.78	-2.20	10.03	**0.142**	**0.582**	2.77	0.48	-0.43	1.68	13.4	0.6	0.0	**1.8**
SIGA-22	0-2.5	2.83	0.66	-2.78	15.08	**0.141**	**0.635**	2.78	0.37	-0.34	1.36	11.5	0.5	0.0	**1.7**
SIGA-22	2.5-5.7	2.83	0.90	-1.95	8.02	**0.140**	**0.537**	2.81	0.56	-0.40	1.96	16.1	0.7	0.0	**1.9**
SIGA-22	5.7-9.0	2.59	1.05	-1.61	5.72	**0.166**	**0.484**	2.55	0.72	-0.45	1.90	19.3	1.1	6.4	**1.9**
SIGA-23	0-2.3	1.68	0.90	-2.24	11.08	**0.312**	**0.538**	1.67	0.52	-0.06	1.66	8.8	2.9	0.0	**1.0**
SIGA-23	2.3-5	2.78	0.64	-2.29	12.10	**0.146**	**0.643**	2.72	0.41	-0.31	1.41	11.9	0.3	0.0	**1.0**
SIGA-23	5-8.6	2.86	0.87	-1.98	7.93	**0.138**	**0.549**	2.83	0.54	-0.44	2.01	16.7	0.4	0.0	**1.9**
SIGA-24	0-3.0	2.88	1.12	-1.91	6.37	**0.136**	**0.461**	2.91	0.65	-0.43	2.67	17.3	1.1	0.0	**2.0**
SIGA-24	3-6.2	2.46	1.58	-1.40	4.20	**0.182**	**0.334**	2.37	1.43	-0.61	1.30	21.5	4.6	9.9	**2.0**
SIGA-25	0-1.8	2.44	0.82	-1.97	8.77	**0.184**	**0.565**	2.39	0.63	-0.29	1.20	12.6	1.4	0.0	**1.3**
SIGA-25	1.8-5	2.81	0.91	-2.17	8.77	**0.143**	**0.533**	2.80	0.53	-0.46	2.10	15.7	1.0	0.0	**1.9**
SIGA-25	5-8.2	2.74	1.24	-2.04	7.46	**0.149**	**0.424**	2.76	0.80	-0.48	2.10	16.2	2.5	10.3	**2.0**
SIGA-25	8.2-11.3	2.72	1.02	-1.89	6.72	**0.152**	**0.492**	2.69	0.67	-0.54	2.45	13.3	1.3	0.0	**1.9**
SIGA-26	0-3.6	2.45	0.76	-1.77	8.67	**0.183**	**0.590**	2.39	0.64	-0.22	0.98	7.4	0.9	0.0	**1.3**
SIGA-26	3.6-7.8	2.78	0.96	-1.81	6.93	**0.146**	**0.515**	2.75	0.64	-0.45	1.88	12.1	0.7	0.0	**1.9**
SIGA-26	7.8-10.4	2.51	1.15	-1.42	4.87	**0.175**	**0.450**	2.46	0.90	-0.46	1.60	13.0	1.9	11.3	**1.9**
SIGA-27	0-2	2.18	1.17	-1.29	5.38	**0.220**	**0.444**	2.16	0.99	-0.31	0.88	12.4	2.4	0.0	**1.5**
SIGA-27	2-6.0	2.97	0.92	-2.14	8.59	**0.127**	**0.530**	2.97	0.50	-0.33	2.40	12.3	0.7	0.0	**2.0**
SIGA-27	6.0-8	2.87	1.22	-1.63	5.08	**0.137**	**0.428**	2.81	0.94	-0.50	2.26	14.9	1.2	18.4	**2.0**
SIGA-28	0-4	2.14	0.82	-1.14	5.89	**0.227**	**0.566**	2.08	0.73	-0.06	0.94	5.7	1.1	0.0	**1.7**
SIGA-28	4-8.2	2.76	0.94	-1.81	6.83	**0.148**	**0.520**	2.72	0.65	-0.50	1.92	10.6	0.7	0.0	**1.9**
SIGA-28	8.2-9.5	2.84	1.16	-1.76	5.93	**0.139**	**0.448**	2.85	0.77	-0.43	2.19	17.7	1.5	0.0	**2.0**
SIGA-29	0-4	2.83	0.78	-1.80	8.16	**0.140**	**0.581**	2.78	0.54	-0.39	1.60	11.8	0.3	0.0	**1.8**
SIGA-29	4-8.0	2.77	0.96	-1.75	6.75	**0.146**	**0.514**	2.74	0.65	-0.44	1.91	13.1	0.7	12.4	**1.9**
SIGA-29	8-11.5	2.63	0.97	-1.77	6.53	**0.161**	**0.511**	2.57	0.66	-0.53	1.91	14.4	1.0	0.0	**1.8**
SIGA-30	0-3.4	2.00	1.09	-2.02	8.19	**0.250**	**0.471**	2.01	0.74	-0.37	1.43	10.1	3.6	0.0	**1.0**
SIGA-30	3.4-6.7	2.85	0.86	-2.03	8.52	**0.139**	**0.551**	2.81	0.56	-0.44	1.92	10.7	0.7	0.0	**1.9**
SIGA-30	6.7-9.6	2.67	1.05	-1.35	5.16	**0.157**	**0.482**	2.61	0.83	-0.38	1.56	14.2	0.8	0.0	**1.9**
SIGA-31	0-1.5	1.71	1.07	-1.60	6.96	**0.305**	**0.476**	1.71	0.81	-0.17	1.31	11.2	3.4	0.0	**1.9**
SIGA-31	1.5-5.4	2.87	0.86	-2.04	8.65	**0.137**	**0.550**	2.84	0.51	-0.39	2.11	11.7	0.7	0.0	**1.9**
SIGA-31	5.4-7.5	2.95	1.06	-2.05	7.29	**0.130**	**0.478**	2.99	0.56	-0.38	2.78	13.7	1.1	11.1	**2.0**
SIGA-31	7.5-10.9	1.83	1.88	-0.91	2.69	**0.282**	**0.271**	1.73	1.95	-0.60	1.01	21.4	11.7	0.0	**2.0**
SIGA-32	0-2.5	2.00	1.14	-2.00	8.16	**0.249**	**0.454**	2.03	0.81	-0.35	1.33	9.9	3.4	0.0	**0.3**
SIGA-32	2.5-5.4	2.71	0.99	-1.72	6.20	**0.153**	**0.502**	2.67	0.71	-0.53	1.93	12.5	0.8	0.0	**1.9**
SIGA-32	5.4-9.3	2.48	1.30	-1.42	4.78	**0.179**	**0.405**	2.42	1.10	-0.55	1.39	14.0	2.2	6.8	**2.0**
SIGA-33	0-1.7	1.99	0.83	-1.35	6.19	**0.252**	**0.561**	1.92	0.67	-0.23	1.12	8.1	1.6	0.0	**1.1**
SIGA-33	1.7-6.0	2.72	0.95	-1.72	6.56	**0.152**	**0.517**	2.68	0.69	-0.50	1.70	14.7	0.8	0.0	**1.9**
SIGA-33	6-9.4	2.39	1.21	-1.69	6.09	**0.191**	**0.433**	2.32	0.96	-0.58	1.37	16.1	2.3	0.0	**1.9**
SIGA-34	0-3.4	1.63	1.06	-1.74	6.91	**0.323**	**0.481**	1.63	0.75	-0.34	1.42	11.1	3.9	0.0	**1.1**
SIGA-34	3.4-6.2	2.73	0.75	-1.64	7.65	**0.151**	**0.596**	2.67	0.53	-0.33	1.36	11.2	0.2	0.0	**1.7**
SIGA-34	6.2-9.7	2.86	1.12	-1.77	6.00	**0.138**	**0.459**	2.83	0.77	-0.45	2.38	15.4	1.3	0.0	**2.0**
SIGA-35	0-3	1.99	0.82	-1.51	6.92	**0.252**	**0.567**	1.92	0.62	-0.24	1.31	6.8	1.7	0.0	**1.0**
SIGA-35	3-5.8	2.84	0.82	-1.84	8.18	**0.140**	**0.567**	2.79	0.55	-0.39	1.72	12.3	0.5	0.0	**1.8**
SIGA-35	5.8-9.1	2.66	1.27	-1.80	6.47	**0.159**	**0.415**	2.60	0.94	-0.53	1.79	15.2	2.2	11.6	**2.0**
SIGA-36	0-1.7	2.35	0.91	-1.83	7.68	**0.196**	**0.533**	2.32	0.61	-0.29	1.45	8.2	1.6	0.0	**1.2**
SIGA-36	1.7-5.5	2.62	1.04	-1.51	5.53	**0.162**	**0.487**	2.58	0.78	-0.48	1.56	13.5	1.0	8.4	**1.9**
SIGA-36	5.5-9.7	2.53	1.05	-1.59	5.54	**0.173**	**0.484**	2.46	0.80	-0.55	1.61	15.2	1.5	0.0	**1.8**

TABLE 4.1b. Offshore Area sediment characteristics (descriptive) for Sea Island GA. See Attachment 2 for detailed frequency and cumulative frequency results of each sample.

Sample	Interval	USCS Description			Wentworth Desciprtion			
SIGA-1	0-2	SP	Fine Sand	Poorly Graded	Medium Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-1	2-4	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-1	4-6	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-1	6-7.8	SP	Fine Sand	Poorly Graded	Very Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-2	0-3	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-2	3-5.3	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Well Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-2	5.3-6.5	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Well Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-3	0-2	SP	Fine Sand	Poorly Graded	Medium Sand	Moderately Sorted	Coarse Skewed	Leptokurtic
SIGA-3	2-4.5	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Well Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-3	4.5-7	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-3	7-9.4	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-4	0-3	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-4	3-5.1	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-4	5.1-7.4	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-5	0-2	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-5	2-4.8	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-5	4.8-9.6	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-6	0-1.8	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-6	1.8-3.6	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Coarse Skewed	Mesokurtic
SIGA-6	3.6-6.9	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-7	0-1.8	SP	Fine Sand	Poorly Graded	Medium Sand	Poorly Sorted	Coarse Skewed	Mesokurtic
SIGA-7	1.8-4.2	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Well Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-7	4.2-6	SP	Fine Sand	Poorly Graded	Very Fine Sand	Moderately Well Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-7	6-7.5	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-8	0-3	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-8	3-5.1	SP	Fine Sand	Poorly Graded	Very Fine Sand	Moderately Well Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-8	5.1-8.2	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-9	0-4.1	SP	Fine Sand	Poorly Graded	Very Fine Sand	Moderately Well Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-9	4.1-5.4	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-9	5.9-7.8	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Symmetrical	Leptokurtic
SIGA-10	0-4	SP	Fine Sand	Poorly Graded	Very Fine Sand	Well Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-10	4-9	SP	Fine Sand	Poorly Graded	Very Fine Sand	Moderately Well Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-11	0-3.5	SP-SM	Fine Sand	Poorly Graded	Very Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-11	3.8-4.6	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Coarse Skewed	Mesokurtic
SIGA-11	5-7.4	SP	Fine Sand	Poorly Graded	Very Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-12	0-2.5	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-12	2.5-4	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-12	4-8.4	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-13	0-4.8	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-14	0-2.8	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Well Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-14	2.8-5.6	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-14	5.6-9	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-15	0-1.7	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-15	1.7-5.1	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-15	5.1-9.1	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-16	0-3.0	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Coarse Skewed	Leptokurtic
SIGA-16	3-6.0	SP	Fine Sand	Poorly Graded	Medium Sand	Poorly Sorted	Coarse Skewed	Mesokurtic
SIGA-17	0-1.7	SP	Fine Sand	Poorly Graded	Medium Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-17	1.7-3.2	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-17	3.2-8.2	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic

TABLE 4.1b (cont.). Offshore Area sediment characteristics (descriptive) for Sea Island GA. See Attachment 2 for detailed frequency and cumulative frequency results of each sample.

Sample	Interval	USCS Description			Wentworth Desciprtion			
SIGA-18	0-2.8	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Well Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-18	2.8-5.6	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-19	0-4.9	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-19	4.9-8.4	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-19	8.4-10.9	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-20	0-2.0	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-20	2.5-6.5	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-21	0-3.4	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-21	3.4-8.2	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-22	0-2.5	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Well Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-22	2.5-5.7	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-22	5.7-9.0	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-23	0-2.3	SP	Fine Sand	Poorly Graded	Medium Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-23	2.3-5	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Well Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-23	5-8.6	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-24	0-3.0	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-24	3-6.2	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-25	0-1.8	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-25	1.8-5	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-25	5-8.2	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-25	8.2-11.3	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-26	0-3.6	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-26	3.6-7.8	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-26	7.8-10.4	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-27	0-2	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Coarse Skewed	Leptokurtic
SIGA-27	2-6.0	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-27	6.0-8	SP-SM	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-28	0-4	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Coarse Skewed	Leptokurtic
SIGA-28	4-8.2	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-28	8.2-9.5	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-29	0-4	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-29	4-8.0	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-29	8-11.5	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-30	0-3.4	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-30	3.4-6.7	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-30	6.7-9.6	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-31	0-1.5	SP	Fine Sand	Poorly Graded	Medium Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-31	1.5-5.4	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-31	5.4-7.5	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-31	7.5-10.9	SP	Fine Sand	Poorly Graded	Medium Sand	Poorly Sorted	Coarse Skewed	Mesokurtic
SIGA-32	0-2.5	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-32	2.5-5.4	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-32	5.4-9.3	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-33	0-1.7	SP	Fine Sand	Poorly Graded	Medium Sand	Moderately Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-33	1.7-6.0	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-33	6-9.4	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-34	0-3.4	SP	Fine Sand	Poorly Graded	Medium Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-34	3.4-6.2	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-34	6.2-9.7	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-35	0-3	SP	Fine Sand	Poorly Graded	Medium Sand	Moderately Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-35	3-5.8	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-35	5.8-9.1	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-36	0-1.7	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA-36	1.7-5.5	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA-36	5.5-9.7	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic

TABLE 4.1c (cont.). Offshore Area sediment color (from Athena Technologies, Inc.).

Sample	Interval	Munsell Color
SIGA-12	0-0.8	5Y-5/2
SIGA-12	0.8-1.9	5Y-5/1
SIGA-12	1.9-2.5	5Y-5/2
SIGA-12	2.5-8.4	5GY-4/1 to 5Y-5/2
SIGA-12	8.4-10.6	5Y-3/1
SIGA-12	10.6-12.2	5Y-3/1
SIGA-12	12.2-13.0	10GY-5/1
SIGA-13	0-0.2	5Y-5/2
SIGA-13	0.2-3.9	5GY-4/1
SIGA-13	3.9-4.8	5GY-4/1
SIGA-13	4.8-8.9	10GY-5/1
SIGA-13	8.9-10.8	5Y-7/1
SIGA-13	10.8-11.0	5Y-5/1
SIGA-14	0-2.8	5GY-4/1
SIGA-14	2.8-9.0	5GY-3/1
SIGA-14	9.0-9.4	10GY-5/1
SIGA-14	9.4-10.0	10GY-5/1
SIGA-15	0-1.7	5Y-5/1
SIGA-15	1.7-5.1	5GY-4/1
SIGA-15	5.1-9.1	5GY-3/1
SIGA-16	0-0.2	5Y-5/2
SIGA-16	0-6.0	5GY-4/1
SIGA-16	6.0-9.1	10GY-5/1
SIGA-16	9.1-10.4	10GY-5/1
SIGA-17	0-1.7	5Y-5/2
SIGA-17	1.7-3.2	5Y-5/1
SIGA-17	3.2-8.2	5GY-4/1
SIGA-18	0-2.8	5Y-5/1
SIGA-18	2.8-5.6	5GY-4/1
SIGA-18	5.6-7.9	5GY-3/1
SIGA-18	7.9-9.4	5GY-4/1
SIGA-19	0-1.1	5Y-5/1
SIGA-19	1.1-4.9	5GY-4/1
SIGA-19	4.9-8.4	5GY-3/1
SIGA-19	8.4-10.9	5GY-4/1
SIGA-20	0-2.0	5GY-4/1
SIGA-20	2.0-2.5	5GY-3/1
SIGA-20	2.5-6.5	5GY-4/1
SIGA-20	6.5-7.3	5GY-3/1
SIGA-20	7.3-8.6	10GY-5/1
SIGA-20	8.6-11.4	10GY-5/1
SIGA-20	11.4-11.8	5Y-5/1
SIGA-21	0-0.8	5Y-5/1
SIGA-21	0.8-2.5	5Y-5/2
SIGA-21	2.5-3.4	5Y-5/1
SIGA-21	3.4-8.2	5GY-4/1
SIGA-22	0-0.4	5Y-5/1
SIGA-22	0.4-2.5	5Y-4/1
SIGA-22	2.5-8.9	5GY-4/1
SIGA-22	8.9-9.6	5GY-4/1
SIGA-23	0-2.3	5Y-5/2
SIGA-23	2.3-3.5	5Y-5/1
SIGA-23	3.5-9.8	5GY-4/1
SIGA-24	0-4.4	5GY-4/1
SIGA-24	4.4-5.3	5GY-3/1
SIGA-24	5.3-6.2	5Y-4/1
SIGA-24	6.2-7.6	5GY-3/1
SIGA-24	7.6-12.0	5Y-4/1
SIGA-24	12.0-12.9	5GY-4/1
SIGA-25	0-1.8	5Y-5/1
SIGA-25	1.8-10.4	5GY-4/1
SIGA-25	10.4-11.3	5GY-4/1
SIGA-26	0-1.4	5Y-5/2
SIGA-26	1.4-3.6	5Y-4/1
SIGA-26	3.6-7.6	5GY-4/1
SIGA-26	7.6-10.4	5GY-4/1
SIGA-27	0-2.0	5Y-5/1
SIGA-27	2.0-7.7	5GY-4/1
SIGA-27	7.7-10.9	5GY-3/1
SIGA-28	0-1.9	5Y-5/2
SIGA-28	1.9-3.5	5Y-5/1
SIGA-28	3.5-7.8	5GY-4/1
SIGA-28	7.8-9.5	5GY-3/1
SIGA-29	0-11.5	5GY-4/1
SIGA-29	11.5-11.8	5GY-3/1
SIGA-30	0-3.4	5Y-6/2 to 5Y-5/1
SIGA-30	3.4-6.7	5GY-4/1
SIGA-30	6.7-9.6	5GY-3/1
SIGA-31	0-1.5	5Y-5/1
SIGA-31	1.5-7.5	5GY-4/1
SIGA-31	7.5-10.2	5GY-4/1
SIGA-31	10.2-10.9	5GY-4/1
SIGA-32	0-1.6	5Y-5/2
SIGA-32	1.6-2.5	5Y-5/1
SIGA-32	2.5-9.3	5GY-4/1 to 5Y-4/2
SIGA-33	0-1.4	5Y-5/1
SIGA-33	1.4-9.0	5GY-4/1
SIGA-33	9.0-11.6	5GY-4/1
SIGA-34	0-3.4	5Y-5/2
SIGA-34	3.4-9.7	5GY-3/1 and 5GY-4/1
SIGA-35	0-3.0	5Y-5/1
SIGA-35	3.0-9.1	5GY-4/1
SIGA-35	9.1-10.0	5GY-4/1
SIGA-36	0-1.7	5Y-5/2
SIGA-36	1.7-5.5	5GY-4/1
SIGA-36	5.5-6.5	5GY-3/1
SIGA-36	6.5-9.7	5GY-4/1
SIGA-36	9.7-12.0	5GY-4/1 to 5Y-4/1

TABLE 4.2a. Composited offshore core sediment statistics to 4 ft based on weighted averages of individual samples. See Attachment 2 for size frequency curves.

2473 Sea Island GA		Method of Moments						Folk Graphical Method							Overfill
		Mean	STD	Skew	Kurt	Mean	Std	Mean	STD	Skew	Kurt	Shell	Gravel	Mud	Factor
Sample	Interval	ϕ				mm		ϕ				%	%	%	(Ra)
SIGA 1	4 ft Comp	2.29	1.04	-1.57	5.98	0.204	0.487	2.29	0.80	-0.36	1.18	10.7	2.4	0.0	1.16
SIGA 2	4 ft Comp	2.32	0.73	-1.58	8.73	0.200	0.604	2.25	0.62	-0.13	0.94	5.7	0.9	0.0	1.01
SIGA 3	4 ft Comp	2.02	0.90	-1.34	5.78	0.246	0.538	1.96	0.71	-0.29	1.21	8.3	1.5	0.0	1.02
SIGA 4	4 ft Comp	2.39	1.05	-1.58	5.35	0.190	0.483	2.28	0.96	-0.58	1.19	9.4	2.1	0.0	1.21
SIGA 5	4 ft Comp	2.76	1.09	-1.99	6.98	0.148	0.468	2.80	0.58	-0.46	2.89	12.1	2.0	10.5	1.53
SIGA 6	4 ft Comp	2.50	1.31	-1.30	3.94	0.177	0.402	2.39	1.17	-0.61	1.42	11.5	1.9	9.1	1.38
SIGA 7	4 ft Comp	2.51	1.09	-1.73	5.78	0.176	0.471	2.41	0.91	-0.67	1.33	9.8	2.1	0.0	1.30
SIGA 8	4 ft Comp	2.92	0.82	-2.60	11.51	0.132	0.566	2.94	0.36	-0.35	2.78	9.2	1.5	0.0	2.20
SIGA 9	4 ft Comp	3.15	0.67	-3.46	19.64	0.112	0.628	3.13	0.27	0.02	1.69	8.0	1.0	0.0	6.54
SIGA 10	4 ft Comp	3.14	0.44	-4.54	42.50	0.113	0.740	3.05	0.24	0.07	1.44	6.2	0.3	0.0	101.64
SIGA 11	4 ft Comp	3.10	0.83	-2.56	11.71	0.117	0.562	3.10	0.41	-0.18	2.48	10.9	1.2	0.0	3.05
SIGA 12	4 ft Comp	2.27	0.82	-1.49	7.31	0.207	0.568	2.23	0.70	-0.08	0.82	10.3	2.7	0.0	1.04
SIGA 13	4 ft Comp	2.92	0.79	-2.09	9.00	0.132	0.579	2.89	0.46	-0.36	2.15	17.7	0.3	16.1	2.34
SIGA 14	4 ft Comp	2.88	0.77	-2.42	11.09	0.136	0.587	2.86	0.42	-0.38	2.07	12.3	0.6	2.2	2.23
SIGA 15	4 ft Comp	2.85	0.80	-2.24	10.15	0.139	0.573	2.82	0.50	-0.38	1.73	11.9	0.9	0.0	1.97
SIGA 16	4 ft Comp	2.45	1.51	-1.38	4.35	0.183	0.350	2.41	1.34	-0.60	1.13	22.9	6.4	13.4	1.41
SIGA 17	4 ft Comp	2.22	0.96	-1.80	9.03	0.214	0.513	2.19	0.75	0.00	0.93	9.1	1.7	0.0	1.09
SIGA 18	4 ft Comp	2.89	0.71	-2.48	12.40	0.135	0.612	2.84	0.40	-0.36	1.77	11.6	0.6	2.8	2.63
SIGA 19	4 ft Comp	2.82	0.71	-2.47	12.48	0.141	0.611	2.77	0.44	-0.41	1.45	15.1	0.6	0.0	2.24
SIGA 20	4 ft Comp	2.84	1.09	-1.76	5.99	0.139	0.469	2.79	0.78	-0.48	2.28	20.5	1.2	3.2	1.64
SIGA 21	4 ft Comp	2.40	0.86	-1.54	7.04	0.189	0.551	2.35	0.73	-0.26	0.86	12.4	1.0	0.0	1.12
SIGA 22	4 ft Comp	2.83	0.76	-2.36	11.32	0.141	0.592	2.80	0.44	-0.37	1.64	14.4	0.6	0.0	2.07
SIGA 23	4 ft Comp	2.15	0.96	-1.62	8.29	0.226	0.513	2.10	0.82	-0.01	0.80	11.5	1.3	0.0	1.07
SIGA 24	4 ft Comp	2.78	1.26	-1.83	6.05	0.146	0.417	2.75	0.89	-0.53	2.46	19.4	2.8	2.5	1.58
SIGA 25	4 ft Comp	2.64	0.89	-1.92	8.06	0.160	0.540	2.58	0.62	-0.41	1.44	14.9	1.4	0.0	1.36
SIGA 26	4 ft Comp	2.49	0.79	-1.69	8.15	0.178	0.579	2.41	0.65	-0.23	1.00	9.2	0.9	0.0	1.15
SIGA 27	4 ft Comp	2.58	1.12	-1.53	5.94	0.168	0.459	2.51	0.97	-0.55	1.08	12.4	1.2	0.0	1.36
SIGA 28	4 ft Comp	2.14	0.82	-1.14	5.89	0.227	0.566	2.08	0.73	-0.06	0.94	7.3	1.0	0.0	1.01
SIGA 29	4 ft Comp	2.83	0.78	-1.80	8.16	0.140	0.581	2.78	0.54	-0.39	1.60	12.2	0.5	0.0	1.98
SIGA 30	4 ft Comp	2.13	1.10	-1.87	7.87	0.229	0.467	2.14	0.82	-0.30	1.32	10.4	2.3	0.0	1.12
SIGA 31	4 ft Comp	2.43	1.10	-1.49	6.27	0.185	0.467	2.36	0.93	-0.43	1.01	11.8	1.4	0.0	1.26
SIGA 32	4 ft Comp	2.27	1.14	-1.76	7.40	0.207	0.454	2.24	0.90	-0.36	1.12	11.5	2.0	0.0	1.19
SIGA 33	4 ft Comp	2.41	0.97	-1.18	5.02	0.189	0.510	2.32	0.85	-0.29	1.05	12.8	1.0	0.0	1.18
SIGA 34	4 ft Comp	1.79	1.09	-1.52	6.50	0.288	0.470	1.77	0.81	-0.24	1.40	11.1	2.3	0.0	1.04
SIGA 35	4 ft Comp	2.20	0.90	-1.12	5.73	0.218	0.537	2.16	0.78	-0.11	1.20	9.6	1.2	0.0	1.06
SIGA 36	4 ft Comp	2.51	0.99	-1.53	6.08	0.176	0.503	2.46	0.72	-0.36	1.41	12.1	1.2	4.8	1.26
AVERAGE		2.55	0.94	-1.90	8.99	0.175	0.528	2.51	0.69	-0.32	1.48	11.8	1.5	1.8	1.46

TABLE 4.2b. Composited offshore core sediment descriptions to 4 ft based on weighted averages of individual samples. See Attachment 2 for size frequency curves.

Sample	Interval	USCS Description			Wentworth Desciprtion			
SIGA 1	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 2	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 3	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Coarse Skewed	Leptokurtic
SIGA 4	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 5	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 6	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 7	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 8	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 9	4 ft Comp	SP	Fine Sand	Poorly Graded	Very Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 10	4 ft Comp	SP	Fine Sand	Poorly Graded	Very Fine Sand	Moderately Well Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 11	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 12	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 13	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 14	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 15	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 16	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Coarse Skewed	Leptokurtic
SIGA 17	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 18	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 19	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 20	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 21	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 22	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 23	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 24	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 25	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 26	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 27	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 28	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Coarse Skewed	Leptokurtic
SIGA 29	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 30	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 31	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 32	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 33	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 34	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 35	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Coarse Skewed	Leptokurtic
SIGA 36	4 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic

TABLE 4.3a. Composited offshore core sediment statistics to 6 ft based on weighted averages of individual samples. See Attachment 2 for size frequency curves.

2473 Sea Island GA		Method of Moments						Folk Graphical Method							Overfill
		Mean	STD	Skew	Kurt	Mean	Std	Mean	STD	Skew	Kurt	Shell	Gravel	Mud	Factor
Sample	Interval	ϕ				mm		ϕ				%	%	%	(Ra)
SIGA 1	6 ft Comp	2.52	1.01	-1.81	7.00	0.174	0.497	2.49	0.75	-0.52	1.08	10.7	2.4	0.0	1.28
SIGA 2	6 ft Comp	2.46	0.72	-1.71	9.32	0.182	0.608	2.38	0.62	-0.20	0.97	5.7	0.9	0.0	1.10
SIGA 3	6 ft Comp	2.26	0.93	-1.27	5.71	0.208	0.526	2.21	0.81	-0.22	1.11	8.3	1.5	0.0	1.09
SIGA 4	6 ft Comp	2.50	1.04	-1.72	5.92	0.177	0.487	2.38	0.88	-0.58	1.54	9.4	2.1	0.0	1.27
SIGA 5	6 ft Comp	2.79	1.10	-2.01	7.12	0.145	0.468	2.83	0.58	-0.44	2.87	12.1	2.0	8.4	1.57
SIGA 6	6 ft Comp	2.63	1.20	-1.53	4.88	0.161	0.436	2.51	1.02	-0.59	1.97	11.5	1.9	8.7	1.43
SIGA 7	6 ft Comp	2.71	1.00	-2.07	7.62	0.153	0.499	2.63	0.73	-0.59	2.06	9.8	2.1	0.0	1.46
SIGA 8	6 ft Comp	2.87	0.92	-2.50	10.27	0.136	0.530	2.90	0.43	-0.40	2.63	9.2	1.5	0.0	1.79
SIGA 9	6 ft Comp	3.04	0.88	-2.80	11.88	0.121	0.542	3.08	0.35	-0.28	3.13	8.0	1.0	0.0	2.46
SIGA 10	6 ft Comp	3.14	0.53	-3.67	27.20	0.113	0.695	3.06	0.27	0.04	1.49	6.2	0.3	0.0	21.78
SIGA 11	6 ft Comp	2.97	0.98	-2.28	8.96	0.127	0.508	3.00	0.51	-0.33	2.63	10.9	1.2	0.0	1.95
SIGA 12	6 ft Comp	2.29	1.14	-1.57	6.51	0.205	0.454	2.30	0.84	-0.31	1.24	10.3	2.7	3.6	1.20
SIGA 13	6 ft Comp	2.92	0.79	-2.09	9.00	0.132	0.579	2.89	0.46	-0.36	2.15	17.7	0.3	16.1	2.34
SIGA 14	6 ft Comp	2.84	0.84	-2.22	9.42	0.140	0.557	2.83	0.48	-0.41	2.12	12.3	0.6	3.4	1.84
SIGA 15	6 ft Comp	2.83	0.90	-2.21	9.54	0.140	0.537	2.82	0.55	-0.41	1.91	11.9	0.9	2.2	1.71
SIGA 16	6 ft Comp	2.27	1.69	-1.29	3.88	0.207	0.311	2.22	1.55	-0.65	1.17	22.9	6.4	13.4	1.37
SIGA 17	6 ft Comp	2.42	0.97	-1.77	8.35	0.187	0.509	2.38	0.76	-0.28	0.90	9.1	1.7	0.0	1.19
SIGA 18	6 ft Comp	2.88	0.77	-2.43	11.34	0.136	0.584	2.86	0.42	-0.37	1.99	11.6	0.6	4.7	2.21
SIGA 19	6 ft Comp	2.83	0.78	-2.29	10.69	0.141	0.583	2.79	0.48	-0.39	1.65	15.1	0.6	2.4	1.98
SIGA 20	6 ft Comp	2.82	1.12	-1.71	5.75	0.142	0.462	2.75	0.84	-0.49	2.20	20.5	1.2	4.7	1.61
SIGA 21	6 ft Comp	2.54	0.86	-1.64	7.31	0.172	0.553	2.46	0.71	-0.37	0.95	12.4	1.0	0.0	1.23
SIGA 22	6 ft Comp	2.82	0.82	-2.18	9.78	0.142	0.568	2.80	0.49	-0.39	1.81	14.4	0.6	0.3	1.84
SIGA 23	6 ft Comp	2.37	0.96	-1.61	7.90	0.193	0.516	2.31	0.82	-0.31	0.82	11.5	1.3	0.0	1.15
SIGA 24	6 ft Comp	2.67	1.39	-1.70	5.42	0.157	0.383	2.58	1.13	-0.58	2.12	19.4	2.8	4.9	1.51
SIGA 25	6 ft Comp	2.69	0.96	-2.01	8.40	0.155	0.514	2.66	0.65	-0.44	1.67	14.9	1.4	1.7	1.43
SIGA 26	6 ft Comp	2.58	0.86	-1.61	7.20	0.167	0.551	2.50	0.67	-0.30	1.18	9.2	0.9	0.0	1.28
SIGA 27	6 ft Comp	2.71	1.08	-1.69	6.52	0.153	0.474	2.62	0.89	-0.53	1.44	12.4	1.2	0.0	1.47
SIGA 28	6 ft Comp	2.35	0.91	-1.08	5.10	0.197	0.531	2.28	0.82	-0.22	0.89	7.3	1.0	0.0	1.12
SIGA 29	6 ft Comp	2.81	0.85	-1.82	7.78	0.142	0.556	2.78	0.57	-0.40	1.71	12.2	0.5	4.1	1.75
SIGA 30	6 ft Comp	2.37	1.08	-1.81	7.78	0.194	0.473	2.33	0.83	-0.34	1.10	10.4	2.3	0.0	1.21
SIGA 31	6 ft Comp	2.56	1.15	-2.08	9.98	0.169	0.452	2.51	0.90	-0.51	1.22	11.8	1.4	1.1	1.36
SIGA 32	6 ft Comp	2.39	1.14	-1.68	6.85	0.190	0.454	2.34	0.90	-0.42	1.19	11.5	2.0	0.7	1.25
SIGA 33	6 ft Comp	2.51	0.98	-1.31	5.27	0.176	0.508	2.43	0.81	-0.37	1.14	12.8	1.0	0.0	1.25
SIGA 34	6 ft Comp	2.11	1.08	-1.47	6.49	0.232	0.472	2.09	0.90	-0.21	1.11	11.1	2.3	0.0	1.11
SIGA 35	6 ft Comp	2.41	0.94	-1.19	5.62	0.189	0.522	2.33	0.79	-0.18	1.01	9.6	1.2	0.4	1.16
SIGA 36	6 ft Comp	2.54	1.01	-1.52	5.86	0.172	0.497	2.49	0.74	-0.41	1.44	12.1	1.2	5.3	1.29
AVERAGE		2.62	0.98	-1.87	8.16	0.165	0.511	2.58	0.72	-0.38	1.60	11.8	1.5	2.4	1.45

TABLE 4.3b. Composited offshore core sediment descriptions to 6 ft based on weighted averages of individual samples. See Attachment 2 for size frequency curves.

Sample	Interval	USCS Description			Wentworth Desciprtion			
SIGA 1	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 2	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 3	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Coarse Skewed	Leptokurtic
SIGA 4	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 5	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 6	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 7	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 8	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 9	6 ft Comp	SP	Fine Sand	Poorly Graded	Very Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 10	6 ft Comp	SP	Fine Sand	Poorly Graded	Very Fine Sand	Moderately Well Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 11	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 12	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 13	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 14	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 15	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 16	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Coarse Skewed	Leptokurtic
SIGA 17	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 18	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 19	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 20	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 21	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 22	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 23	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 24	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 25	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 26	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 27	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 28	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Coarse Skewed	Leptokurtic
SIGA 29	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 30	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 31	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Very Leptokurtic
SIGA 32	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 33	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 34	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic
SIGA 35	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Moderately Sorted	Coarse Skewed	Leptokurtic
SIGA 36	6 ft Comp	SP	Fine Sand	Poorly Graded	Fine Sand	Poorly Sorted	Strongly Coarse Skewed	Leptokurtic

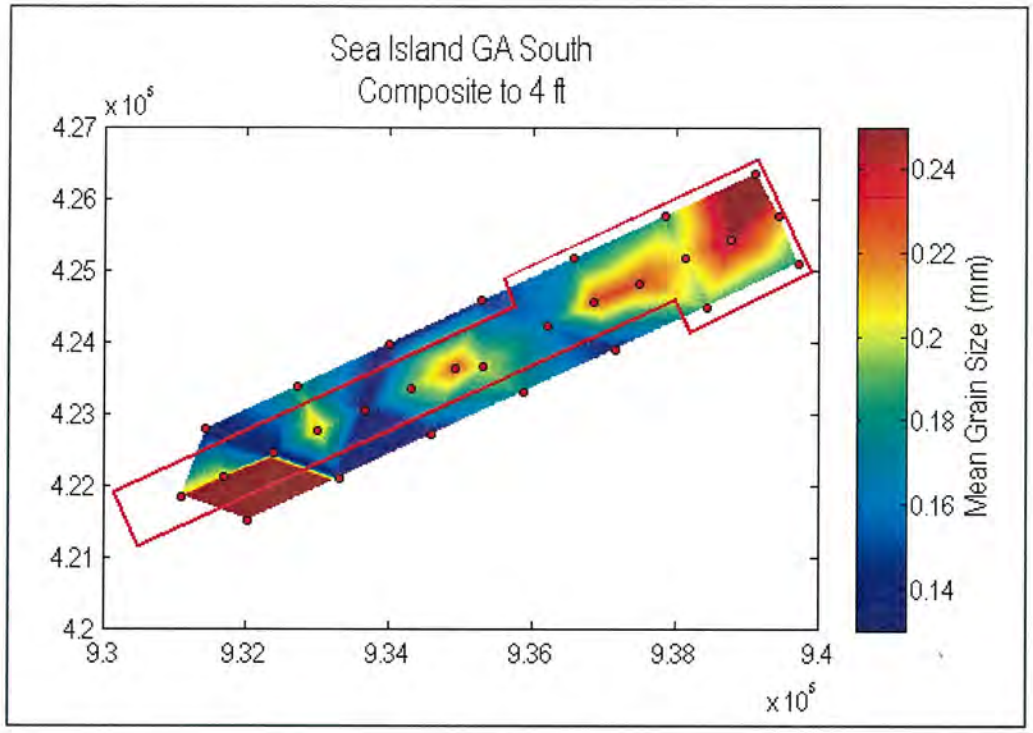


FIGURE 4.2. Mean grain size for core composite samples to **4 ft** in Borrow Area A.

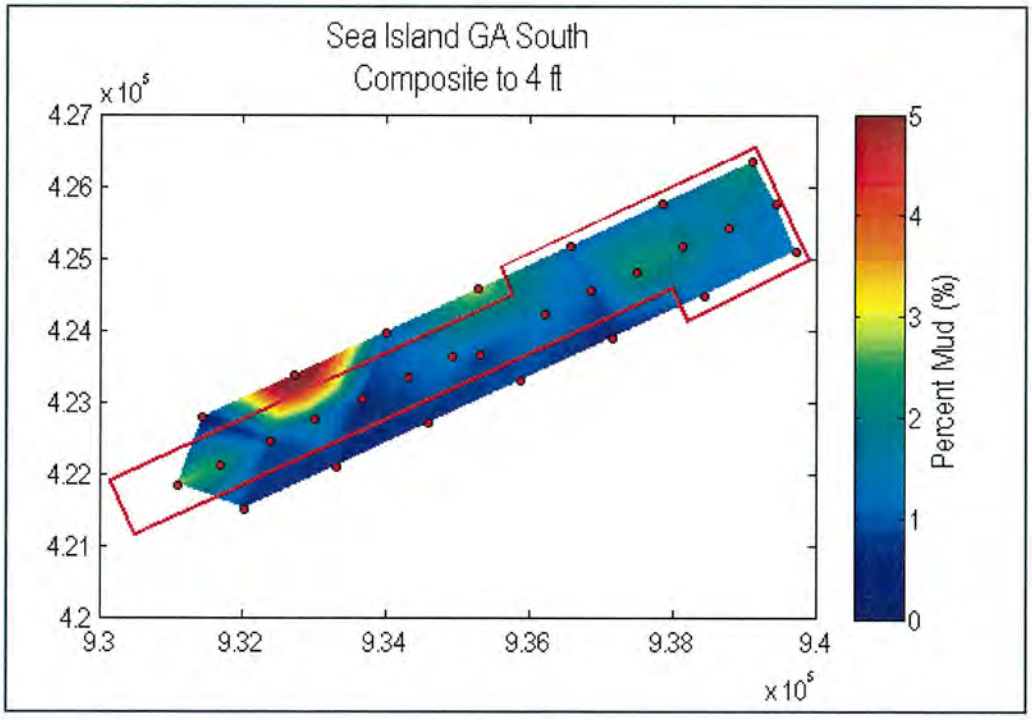


FIGURE 4.3. Percent mud for core composite samples to **4 ft** in Borrow Area A.

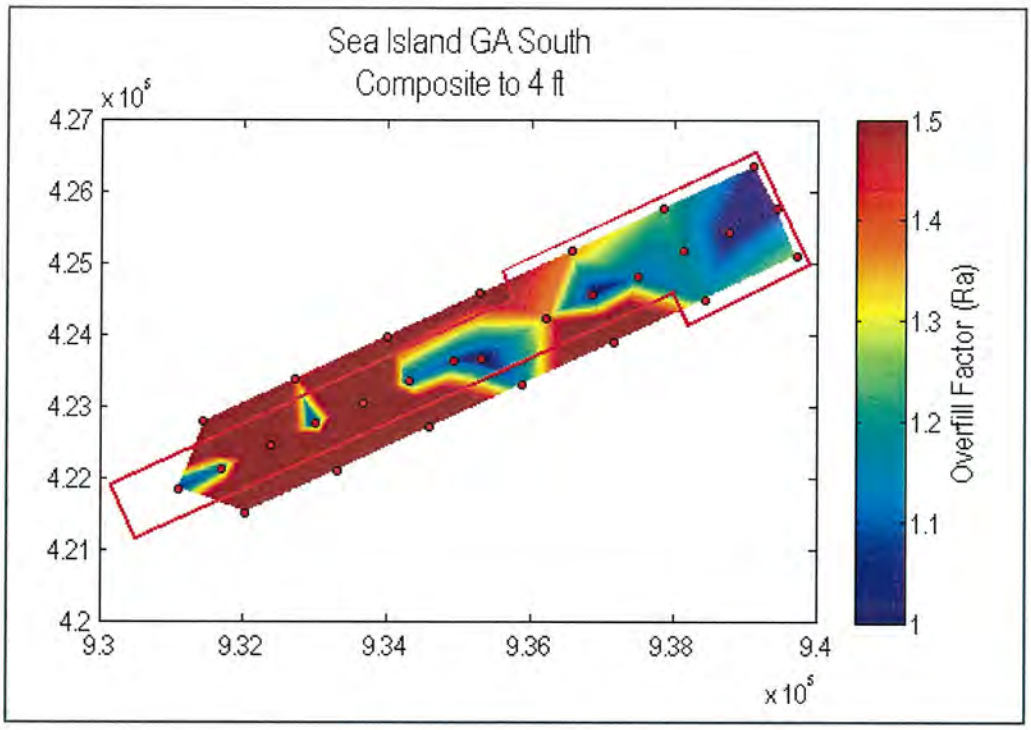


FIGURE 4.4. Overfill factors (R_A) for core composite samples to **4 ft** in Borrow Area A.

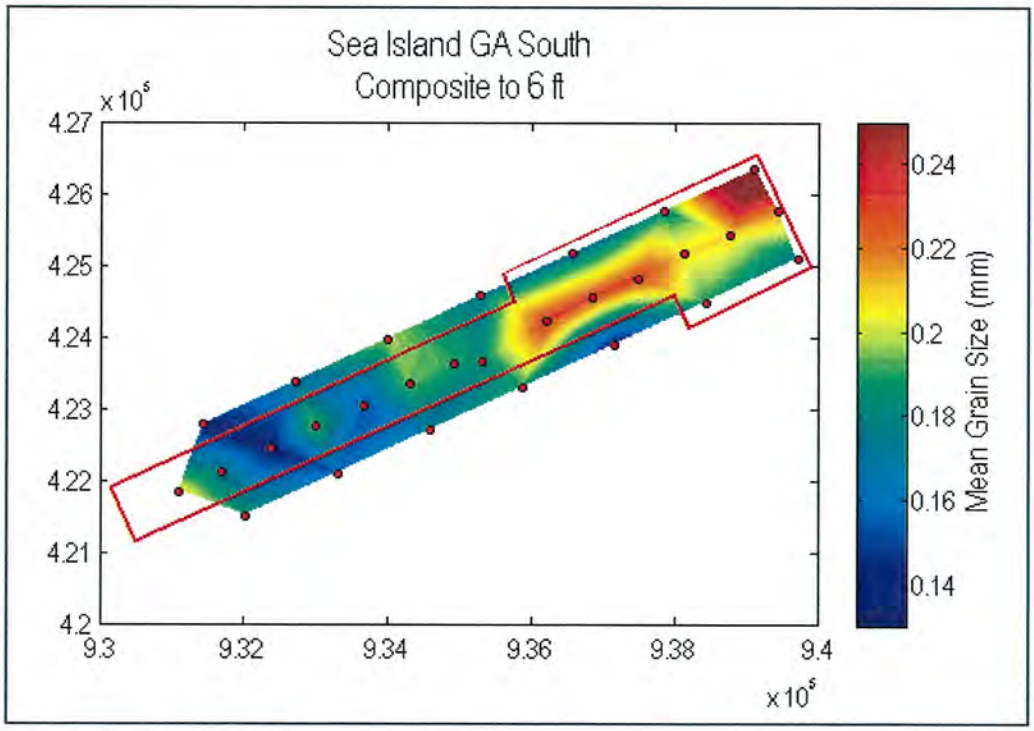


FIGURE 4.5. Mean grain size for core composite samples to **6 ft** in Borrow Area A.

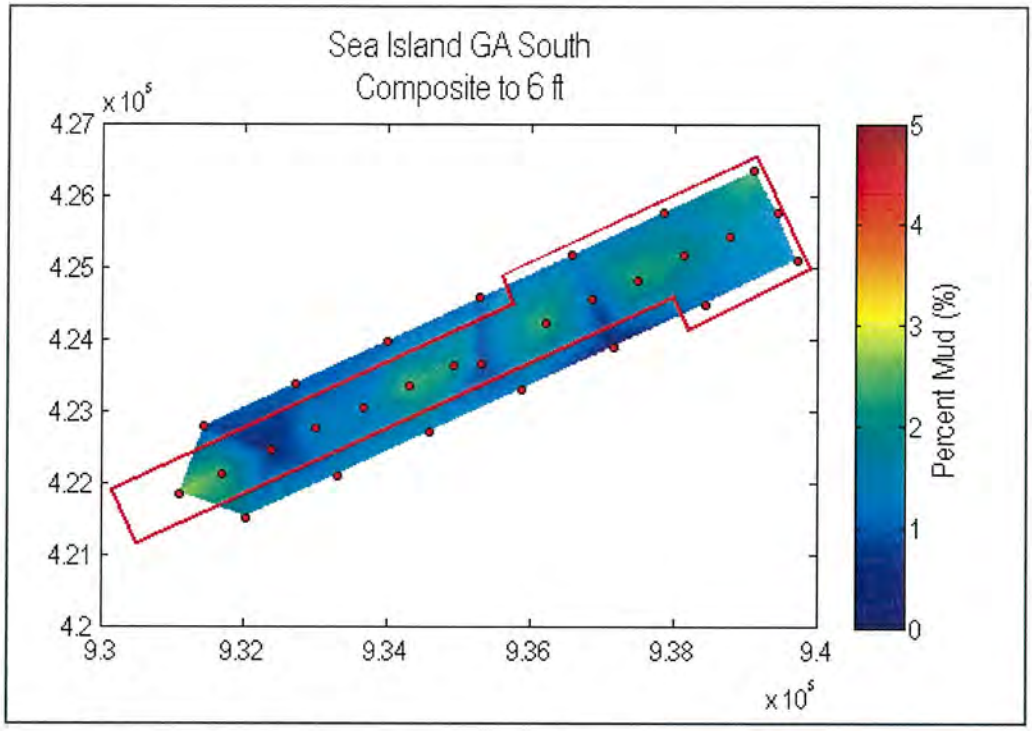


FIGURE 4.6. Percent mud for core composite samples to **6 ft** in Borrow Area A.

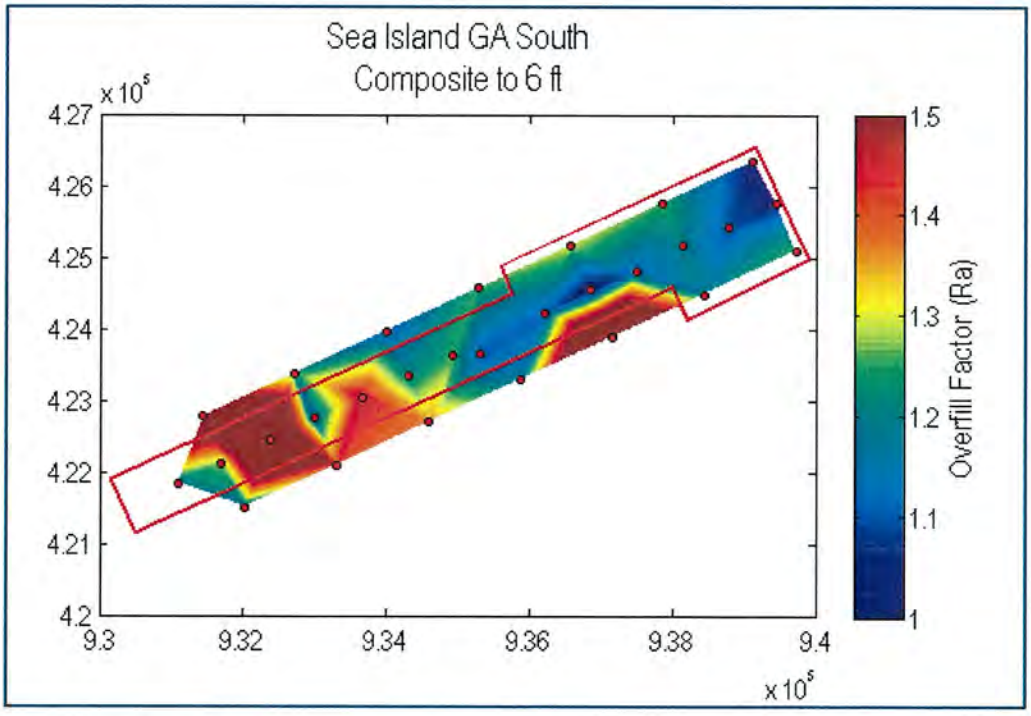


FIGURE 4.7. Overfill factors (R_A) for core composite samples to **6 ft** in Borrow Area A.

5.0 SEDIMENT COMPATIBILITY

CSE evaluated sediment compatibility by comparison of grain-size distribution (GSD) of all "native" beach and offshore borrow areas sampled.

Figure 5.1 contains a composited beach sample GSD plotted against the 4 ft composite GSD from Borrow Area A. The results show relative uniformity of size distribution between the native and borrow sediments, with average grain size differing by only 0.007 mm between the two sample sets. The distribution curves of the borrow and native beach sediments plotted against one another show how closely the sediment distributions match.

CSE also computed overfill factors (R_A) for various combinations of native GSDs and each core. The overfill factor (R_A) (CERC 1984) provides a measure of how a particular sediment will perform as beach nourishment. Low R_A's are generally preferred, with ideal being equal to 1.0. To apply the method, a native sediment size must be assumed.

As noted, Tables 4.1–4.3 provided R_A's for each core sample and composite. The tables also included the applicable mean and standard deviation in phi units which are required in the James (1975) formulation (CERC 1984). Inspection of Tables 4.2 and 4.3 showed that composite R_A's within the borrow area range from ~1.00 to ~1.98 with a 4-ft composite R_A mean of 1.24 and a 6-ft mean of 1.29 (4 ft and 6 ft composite R_A values for *all samples* are 1.45 and 1.46—respectively).

While R_A's are not considered to be definitive in matching sediment texture for nourishment (Dean 2002), the results herein suggest the majority of cores will provide good nourishment performance. The overlap of the GSDs (Fig 5.1) further supports this finding. The final borrow area for the Sea Island project will be determined after results of cultural resource surveys (in progress). Nevertheless, Borrow Area A would probably provide sufficient volume to accomplish a 1.6 million-cubic-yard project (minimum project volume). The minimum excavation area to provide this design volume would be ~255 acres, assuming a dredge cut averaging ~4 ft deep. With a ~6 ft dredge cut, the total volume would potentially increase to ~2.5 million cubic yards.

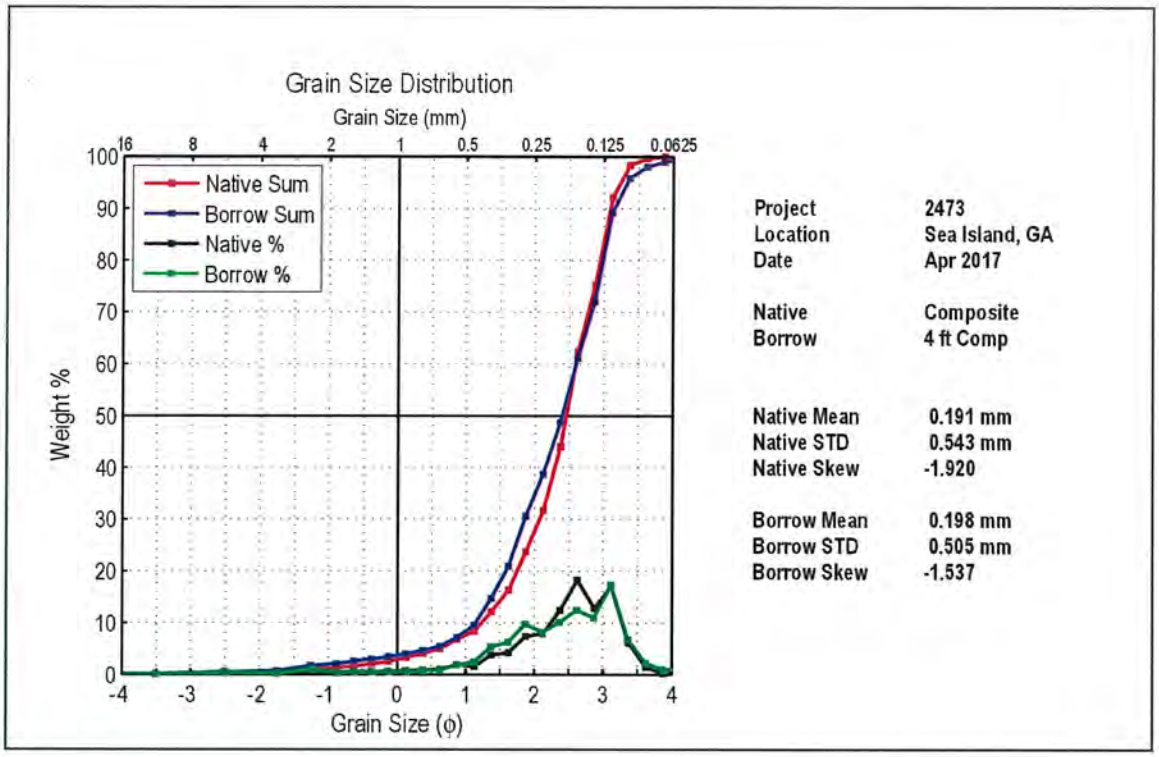


FIGURE 5.1. Grain-size distribution (frequency and cumulative frequency) for both native beach and borrow area sediments.

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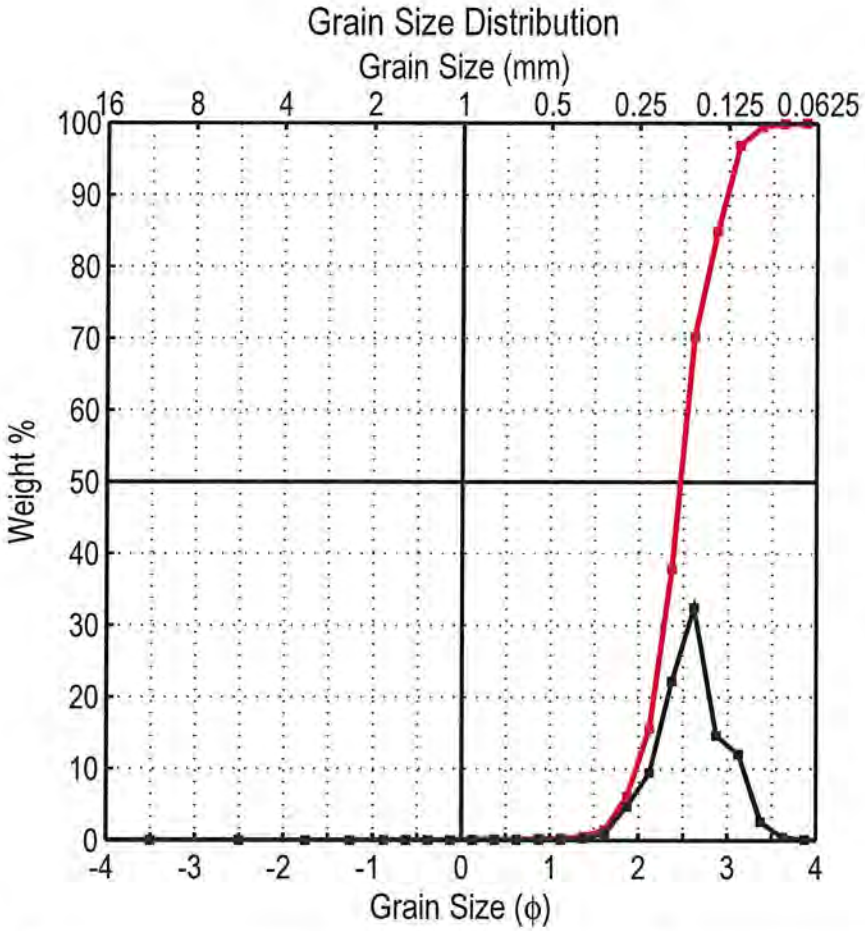


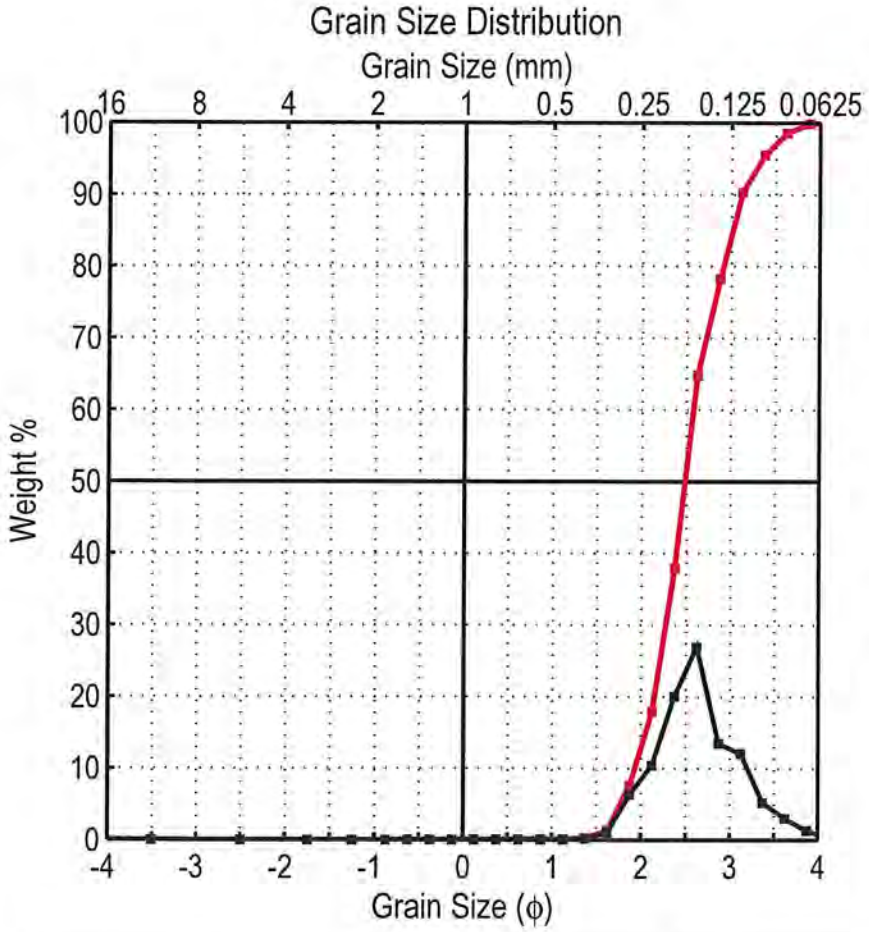
Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 15**
Interval	**Dune Toe**
Mean	**0.166 mm**
STD	**0.766 mm**
Skewness	**-0.490**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	116.78
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	0.00
% $CaCO_3$	2.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.00	0.00	0.00
-0.75	-0.875	0.02	0.02	0.02
-0.5	-0.625	0.00	0.00	0.02
-0.25	-0.375	0.02	0.02	0.03
0	-0.125	0.01	0.01	0.04
0.25	0.125	0.03	0.03	0.07
0.5	0.375	0.03	0.03	0.09
0.75	0.625	0.04	0.03	0.13
1	0.875	0.06	0.05	0.18
1.25	1.125	0.06	0.05	0.23
1.5	1.375	0.29	0.25	0.48
1.75	1.625	1.14	0.98	1.46
2	1.875	5.48	4.69	6.15
2.25	2.125	11.00	9.42	15.57
2.5	2.375	25.91	22.19	37.75
2.75	2.625	37.92	32.47	70.23
3	2.875	17.06	14.61	84.83
3.25	3.125	14.06	12.04	96.87
3.5	3.375	3.04	2.60	99.48
3.75	3.625	0.48	0.41	99.89
4	3.875	0.11	0.09	99.98
>4.0	4.125	0.02	0.02	100.00

Percentiles	
1	1.510
5	1.815
16	2.130
25	2.230
50	2.470
75	2.705
84	2.860
95	3.085
99	3.330

Moment Measures	**(phi)**	**(mm)**
Mean	2.591	0.166
Standard Deviation	0.384	0.766
Skewness	-0.490	
Kurtosis	5.992	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.495	2.487
Standard Deviation	0.365	0.375
Skewness (1)	0.068	0.018
Skewness (2)	-0.055	
Kurtosis	0.740	1.096



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 15**
Interval	**Dry Beach**
Mean	**0.160 mm**
STD	**0.726 mm**
Skewness	**0.192**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Well Sorted
Poorly Graded	Symmetrical
	Leptokurtic

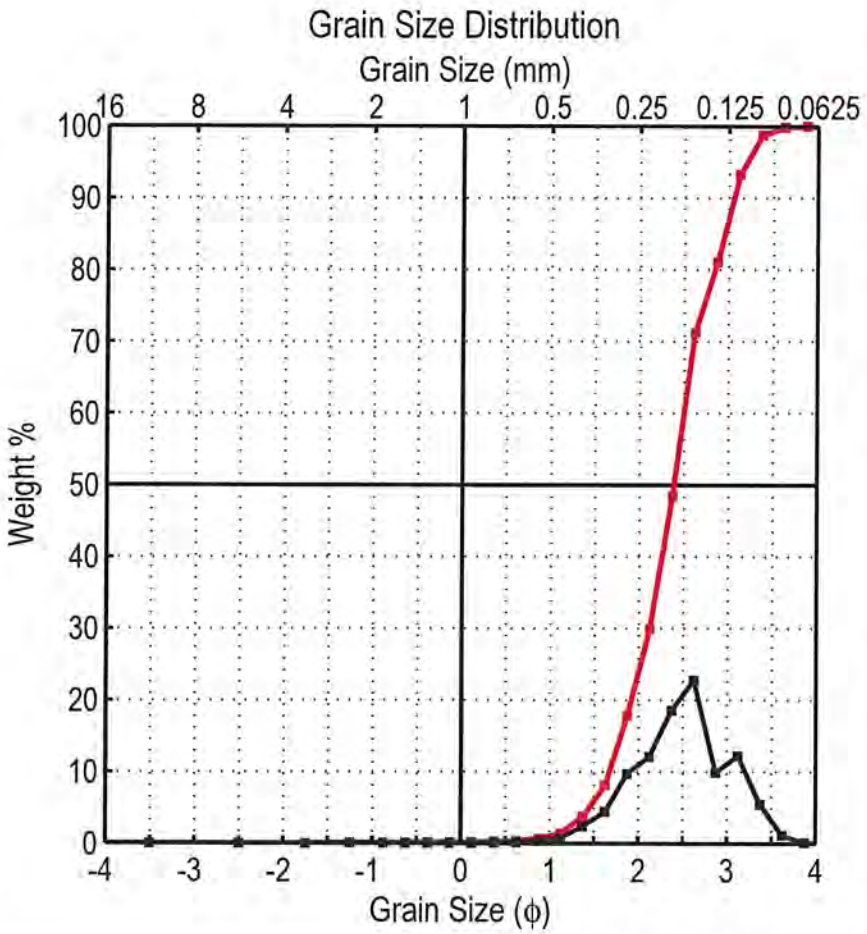
Total weight (gram)	116.15
% finer than 4.00 phi	0.18
% coarser than -1.00 phi	0.00
% $CaCO_3$	5.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.00	0.00	0.00
-0.75	-0.875	0.00	0.00	0.00
-0.5	-0.625	0.01	0.01	0.01
-0.25	-0.375	0.01	0.01	0.02
0	-0.125	0.02	0.02	0.03
0.25	0.125	0.01	0.01	0.04
0.5	0.375	0.02	0.02	0.06
0.75	0.625	0.01	0.01	0.07
1	0.875	0.02	0.02	0.09
1.25	1.125	0.01	0.01	0.09
1.5	1.375	0.17	0.15	0.24
1.75	1.625	1.19	1.02	1.27
2	1.875	7.28	6.27	7.53
2.25	2.125	12.01	10.34	17.87
2.5	2.375	23.19	19.97	37.84
2.75	2.625	31.29	26.94	64.78
3	2.875	15.63	13.46	78.24
3.25	3.125	13.99	12.04	90.28
3.5	3.375	6.05	5.21	95.49
3.75	3.625	3.50	3.01	98.50
4	3.875	1.53	1.32	99.82
>4.0	4.125	0.21	0.18	100.00

Percentiles	
1	1.560
5	1.775
16	2.080
25	2.215
50	2.490
75	2.815
84	2.995
95	3.350
99	3.720

Moment Measures	**(phi)**	**(mm)**
Mean	2.644	0.160
Standard Deviation	0.462	0.726
Skewness	0.192	
Kurtosis	3.775	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.538	2.522
Standard Deviation	0.458	0.467
Skewness (1)	0.104	0.098
Skewness (2)	0.158	
Kurtosis	0.721	1.076



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 15**
Interval	**Wet Beach**
Mean	**0.178 mm**
STD	**0.690 mm**
Skewness	**-0.535**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic

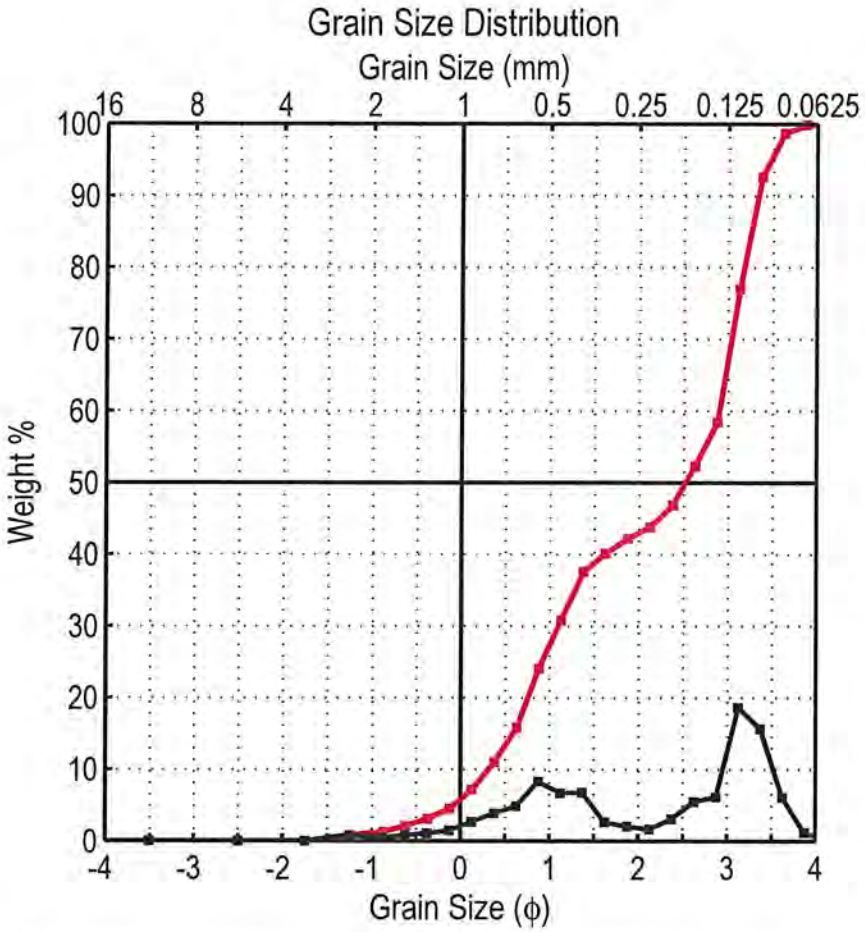
Total weight (gram)	116.23
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	0.00
% $CaCO_3$	6.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.05	0.04	0.04
-0.75	-0.875	0.01	0.01	0.05
-0.5	-0.625	0.03	0.03	0.08
-0.25	-0.375	0.02	0.02	0.09
0	-0.125	0.03	0.03	0.12
0.25	0.125	0.04	0.03	0.15
0.5	0.375	0.07	0.06	0.22
0.75	0.625	0.11	0.09	0.31
1	0.875	0.38	0.33	0.64
1.25	1.125	0.82	0.71	1.34
1.5	1.375	2.74	2.36	3.70
1.75	1.625	5.11	4.40	8.10
2	1.875	11.28	9.70	17.80
2.25	2.125	14.03	12.07	29.87
2.5	2.375	21.57	18.56	48.43
2.75	2.625	26.44	22.75	71.18
3	2.875	11.50	9.89	81.07
3.25	3.125	14.17	12.19	93.26
3.5	3.375	6.38	5.49	98.75
3.75	3.625	1.30	1.12	99.87
4	3.875	0.14	0.12	99.99
>4.0	4.125	0.01	0.01	100.00

Percentiles	
1	1.005
5	1.450
16	1.830
25	2.025
50	2.390
75	2.720
84	2.935
95	3.205
99	3.430

Moment Measures	**(phi)**	**(mm)**
Mean	2.487	0.178
Standard Deviation	0.536	0.690
Skewness	-0.535	
Kurtosis	4.590	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.383	2.385
Standard Deviation	0.552	0.542
Skewness (1)	-0.014	-0.042
Skewness (2)	-0.113	
Kurtosis	0.588	1.035



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 15**
Interval	**Low Tide Line**
Mean	**0.225 mm**
STD	**0.421 mm**
Skewness	**-0.549**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic

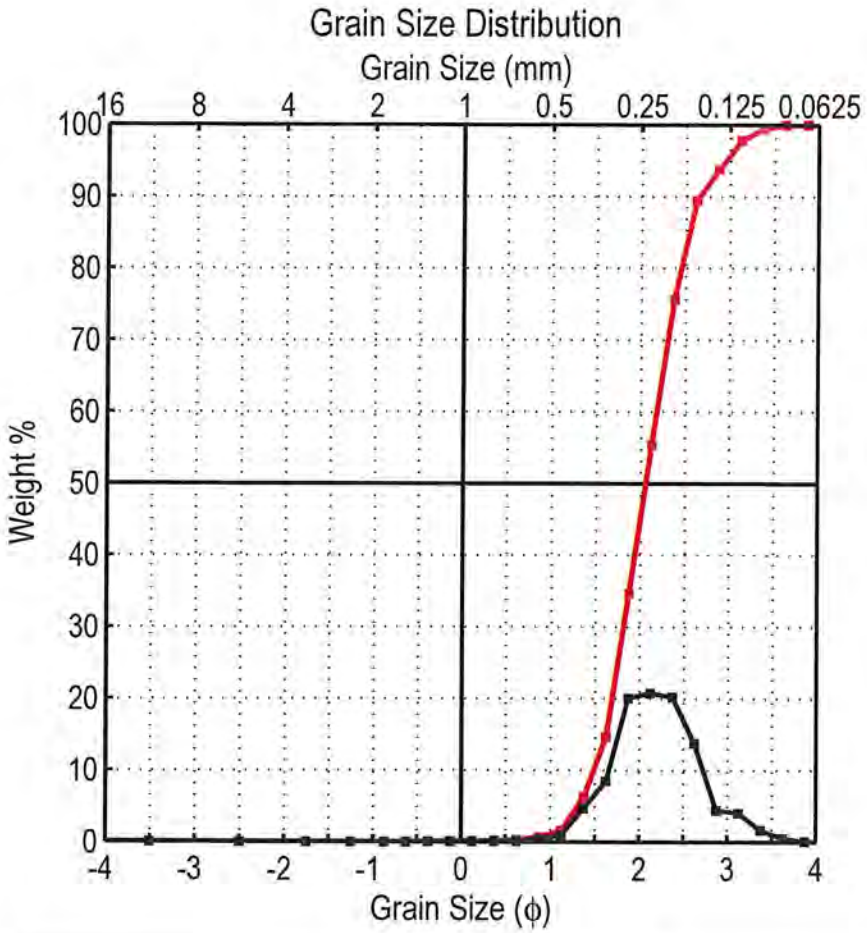
Total weight (gram)	116.02
% finer than 4.00 phi	0.16
% coarser than -1.00 phi	0.00
% $CaCO_3$	6.4

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.93	0.80	0.80
-0.75	-0.875	0.49	0.42	1.22
-0.5	-0.625	0.94	0.81	2.03
-0.25	-0.375	1.20	1.03	3.07
0	-0.125	1.66	1.43	4.50
0.25	0.125	3.05	2.63	7.13
0.5	0.375	4.44	3.83	10.96
0.75	0.625	5.58	4.81	15.76
1	0.875	9.63	8.30	24.06
1.25	1.125	7.74	6.67	30.74
1.5	1.375	7.86	6.77	37.51
1.75	1.625	3.00	2.59	40.10
2	1.875	2.37	2.04	42.14
2.25	2.125	1.89	1.63	43.77
2.5	2.375	3.54	3.05	46.82
2.75	2.625	6.33	5.46	52.28
3	2.875	7.10	6.12	58.40
3.25	3.125	21.56	18.58	76.98
3.5	3.375	18.12	15.62	92.60
3.75	3.625	7.03	6.06	98.66
4	3.875	1.38	1.19	99.84
>4.0	4.125	0.18	0.16	100.00

Percentiles	
1	-1.075
5	-0.075
16	0.630
25	0.910
50	2.520
75	3.100
84	3.235
95	3.475
99	3.695

Moment Measures	**(phi)**	**(mm)**
Mean	2.151	0.225
Standard Deviation	1.248	0.421
Skewness	-0.549	
Kurtosis	2.086	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.932	2.128
Standard Deviation	1.303	1.189
Skewness (1)	-0.451	-0.457
Skewness (2)	-0.630	
Kurtosis	0.363	0.664



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 20**
Interval	**Dune Toe**
Mean	**0.217 mm**
STD	**0.718 mm**
Skewness	**0.119**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Well Sorted
Poorly Graded	Symmetrical
	Leptokurtic

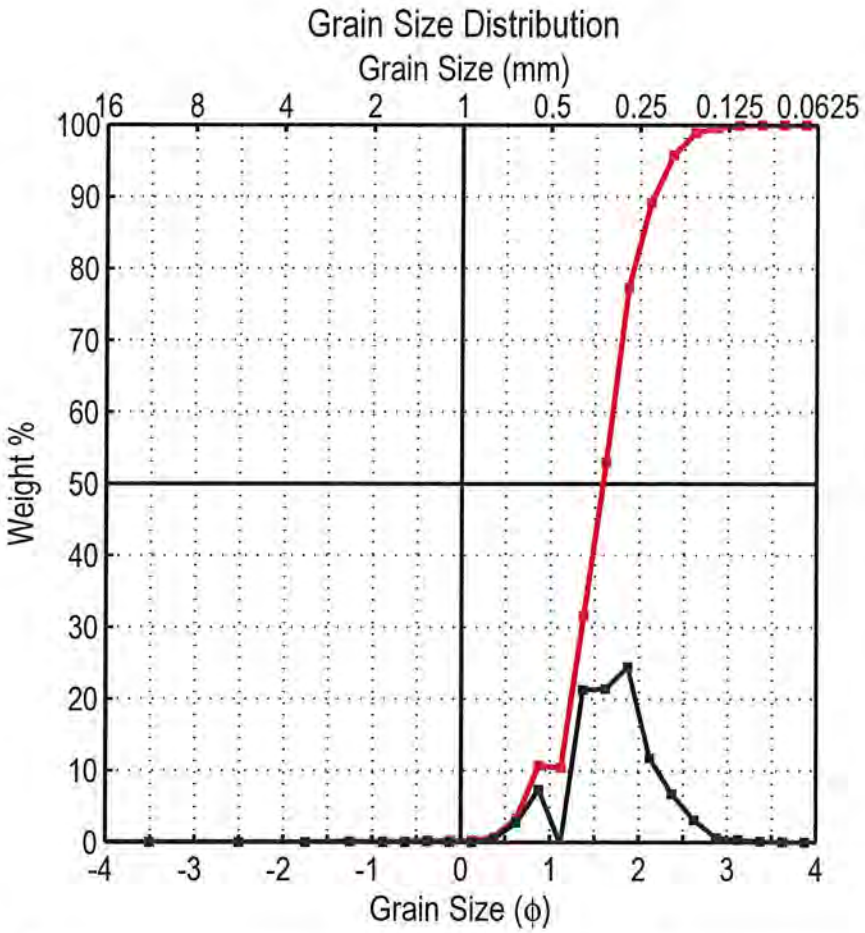
Total weight (gram)	117.02
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	0.00
% $CaCO_3$	2.9

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.00	0.00	0.00
-0.75	-0.875	0.00	0.00	0.00
-0.5	-0.625	0.00	0.00	0.00
-0.25	-0.375	0.04	0.03	0.03
0	-0.125	0.03	0.03	0.06
0.25	0.125	0.04	0.03	0.09
0.5	0.375	0.06	0.05	0.15
0.75	0.625	0.10	0.09	0.23
1	0.875	0.44	0.38	0.61
1.25	1.125	1.09	0.93	1.54
1.5	1.375	5.44	4.65	6.19
1.75	1.625	9.88	8.44	14.63
2	1.875	23.44	20.03	34.66
2.25	2.125	24.28	20.75	55.41
2.5	2.375	23.63	20.19	75.60
2.75	2.625	16.11	13.77	89.37
3	2.875	5.15	4.40	93.77
3.25	3.125	4.70	4.02	97.79
3.5	3.375	1.90	1.62	99.41
3.75	3.625	0.59	0.50	99.91
4	3.875	0.10	0.09	100.00
>4.0	4.125	0.00	0.00	100.00

Percentiles	
1	0.980
5	1.310
16	1.640
25	1.755
50	2.060
75	2.370
84	2.525
95	2.950
99	3.310

Moment Measures	**(phi)**	**(mm)**
Mean	2.201	0.217
Standard Deviation	0.478	0.718
Skewness	0.119	
Kurtosis	3.794	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.083	2.075
Standard Deviation	0.442	0.470
Skewness (1)	0.051	0.068
Skewness (2)	0.158	
Kurtosis	0.853	1.093



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 20**
Interval	**Dry Beach**
Mean	**0.308 mm**
STD	**0.718 mm**
Skewness	**-0.332**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Well Sorted
Poorly Graded	Symmetrical
	Leptokurtic

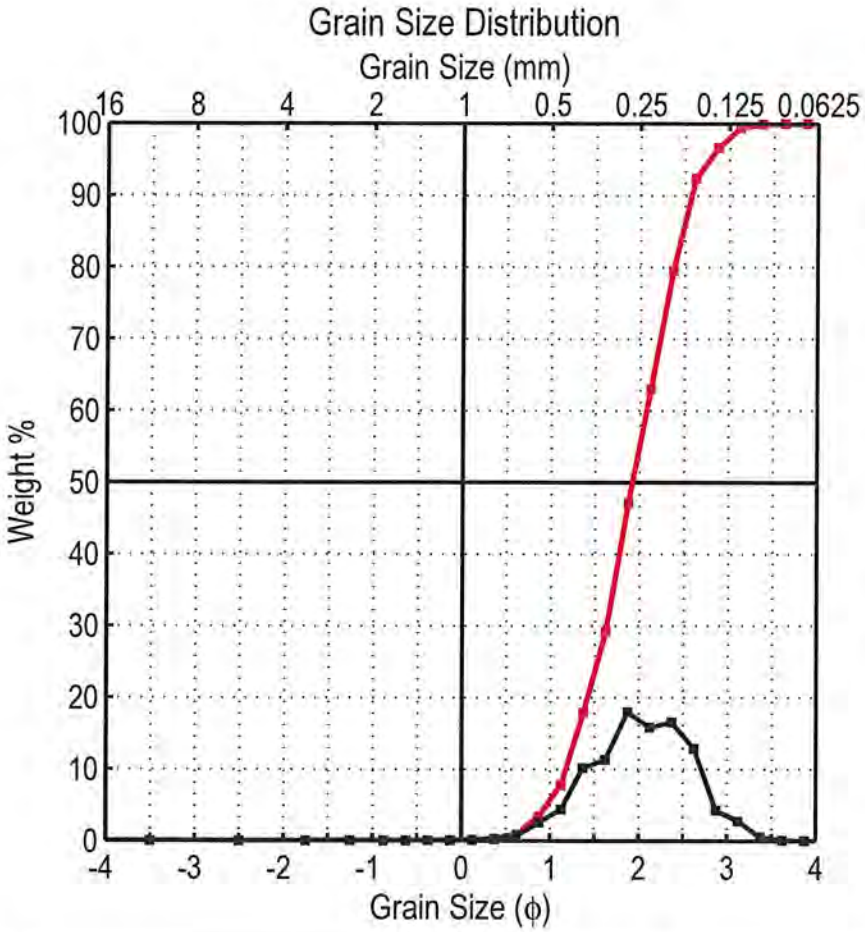
Total weight (gram)	117.02
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	0.00
% $CaCO_3$	2.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.07	0.06	0.06
-0.75	-0.875	0.00	0.00	0.06
-0.5	-0.625	0.00	0.00	0.06
-0.25	-0.375	0.15	0.13	0.19
0	-0.125	0.03	0.03	0.21
0.25	0.125	0.00	0.00	0.21
0.5	0.375	0.51	0.44	0.65
0.75	0.625	3.15	2.69	3.34
1	0.875	8.55	7.31	10.65
1.25	1.125	-0.33	-0.28	10.37
1.5	1.375	24.80	21.19	31.56
1.75	1.625	25.01	21.37	52.93
2	1.875	28.57	24.41	77.35
2.25	2.125	13.71	11.72	89.06
2.5	2.375	7.87	6.73	95.79
2.75	2.625	3.66	3.13	98.91
3	2.875	0.72	0.62	99.53
3.25	3.125	0.40	0.34	99.87
3.5	3.375	0.12	0.10	99.97
3.75	3.625	0.03	0.03	100.00
4	3.875	0.00	0.00	100.00
>4.0	4.125	0.00	0.00	100.00

Percentiles	
1	0.410
5	0.680
16	1.190
25	1.300
50	1.590
75	1.850
84	2.015
95	2.345
99	2.660

Moment Measures	**(phi)**	**(mm)**
Mean	1.698	0.308
Standard Deviation	0.478	0.718
Skewness	-0.332	
Kurtosis	4.524	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.602	1.598
Standard Deviation	0.412	0.459
Skewness (1)	0.030	-0.031
Skewness (2)	-0.188	
Kurtosis	1.018	1.241



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 20**
Interval	**Wet Beach**
Mean	**0.245 mm**
STD	**0.684 mm**
Skewness	**-0.192**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Mesokurtic

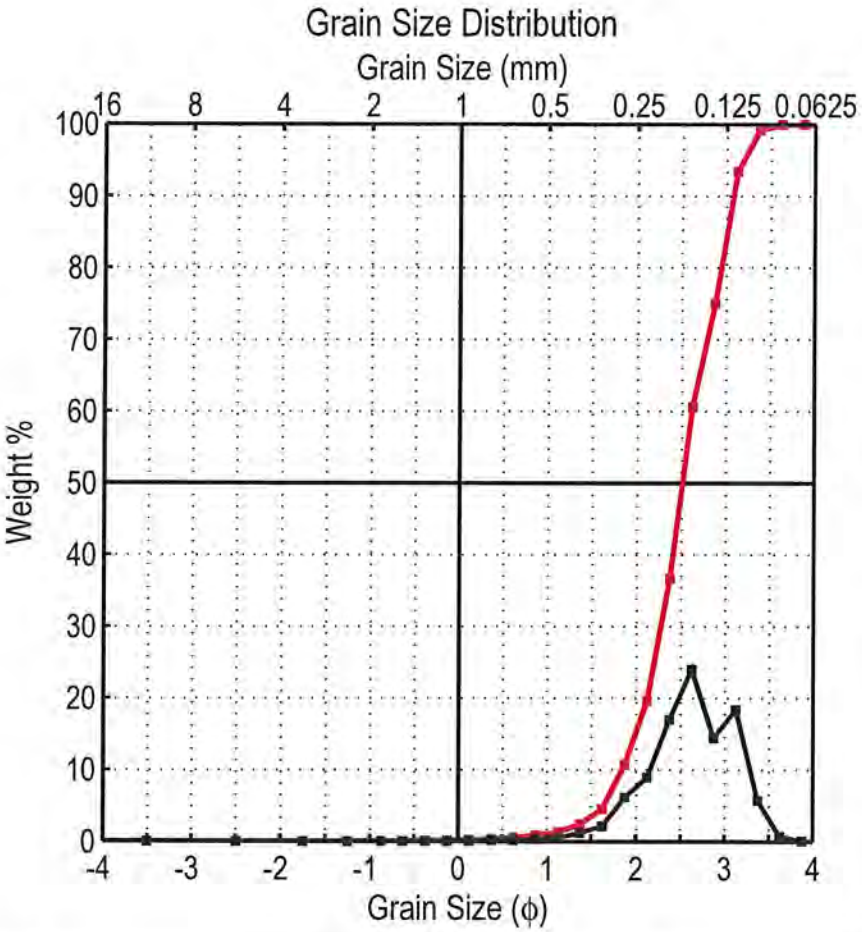
Total weight (gram)	116.50
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	0.00
% $CaCO_3$	2.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.01	0.01	0.01
-0.75	-0.875	0.00	0.00	0.01
-0.5	-0.625	0.00	0.00	0.01
-0.25	-0.375	0.02	0.02	0.03
0	-0.125	0.02	0.02	0.04
0.25	0.125	0.07	0.06	0.10
0.5	0.375	0.22	0.19	0.29
0.75	0.625	0.70	0.60	0.89
1	0.875	2.90	2.49	3.38
1.25	1.125	5.06	4.34	7.73
1.5	1.375	11.81	10.14	17.86
1.75	1.625	13.16	11.30	29.16
2	1.875	20.93	17.97	47.12
2.25	2.125	18.44	15.83	62.95
2.5	2.375	19.27	16.54	79.49
2.75	2.625	15.02	12.89	92.39
3	2.875	4.95	4.25	96.64
3.25	3.125	3.20	2.75	99.38
3.5	3.375	0.60	0.52	99.90
3.75	3.625	0.08	0.07	99.97
4	3.875	0.02	0.02	99.98
>4.0	4.125	0.02	0.02	100.00

Percentiles	
1	0.635
5	0.970
16	1.330
25	1.535
50	1.920
75	2.305
84	2.460
95	2.780
99	3.090

Moment Measures	**(phi)**	**(mm)**
Mean	2.032	0.245
Standard Deviation	0.547	0.684
Skewness	-0.192	
Kurtosis	2.972	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.895	1.903
Standard Deviation	0.565	0.557
Skewness (1)	-0.044	-0.047
Skewness (2)	-0.080	
Kurtosis	0.602	0.963



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 20**
Interval	**Low Tide Line**
Mean	**0.164 mm**
STD	**0.707 mm**
Skewness	**-0.927**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic

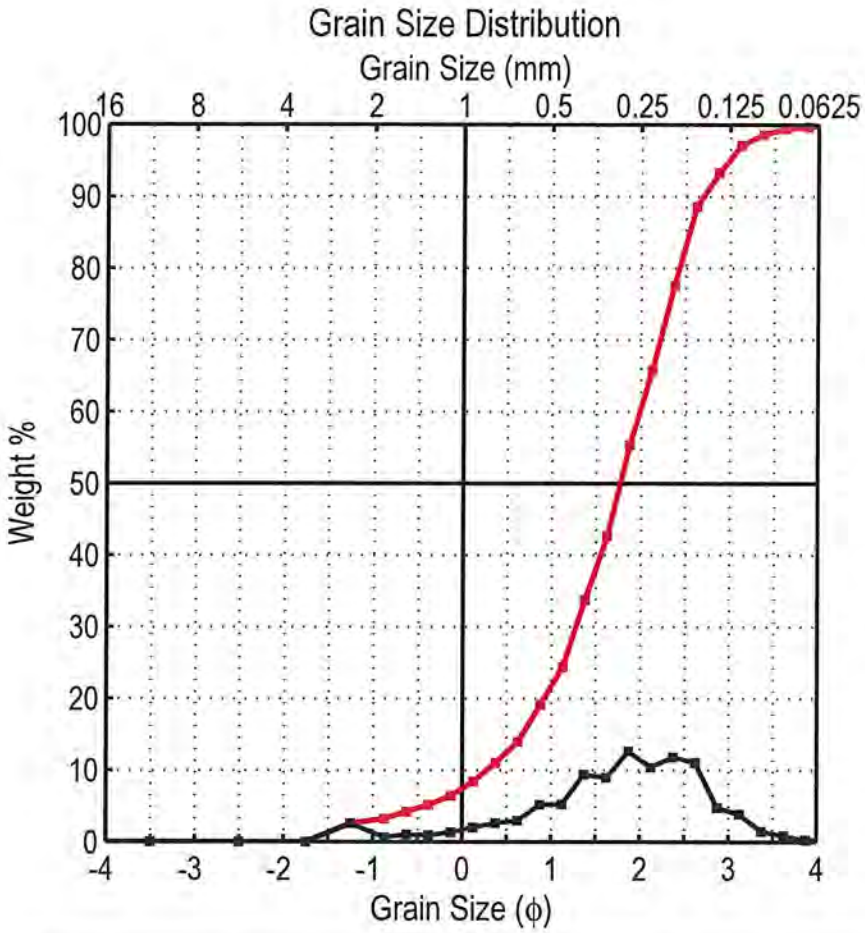
Total weight (gram)	117.12
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	0.00
% $CaCO_3$	4.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.00	0.00	0.00
-0.75	-0.875	0.01	0.01	0.01
-0.5	-0.625	0.02	0.02	0.03
-0.25	-0.375	0.05	0.04	0.07
0	-0.125	0.03	0.03	0.09
0.25	0.125	0.10	0.09	0.18
0.5	0.375	0.16	0.14	0.32
0.75	0.625	0.19	0.16	0.48
1	0.875	0.40	0.34	0.82
1.25	1.125	0.51	0.44	1.26
1.5	1.375	1.36	1.16	2.42
1.75	1.625	2.49	2.13	4.54
2	1.875	7.20	6.15	10.69
2.25	2.125	10.49	8.96	19.65
2.5	2.375	19.88	16.97	36.62
2.75	2.625	28.09	23.98	60.60
3	2.875	16.89	14.42	75.03
3.25	3.125	21.54	18.39	93.42
3.5	3.375	6.72	5.74	99.15
3.75	3.625	0.90	0.77	99.92
4	3.875	0.08	0.07	99.99
>4.0	4.125	0.01	0.01	100.00

Percentiles	
1	0.980
5	1.645
16	2.025
25	2.205
50	2.515
75	2.875
84	2.995
95	3.195
99	3.370

Moment Measures	**(phi)**	**(mm)**
Mean	2.612	0.164
Standard Deviation	0.501	0.707
Skewness	-0.927	
Kurtosis	5.387	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.510	2.512
Standard Deviation	0.485	0.477
Skewness (1)	-0.010	-0.066
Skewness (2)	-0.196	
Kurtosis	0.598	0.948



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 30**
Interval	**Dune Toe**
Mean	**0.298 mm**
STD	**0.498 mm**
Skewness	**-0.876**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic

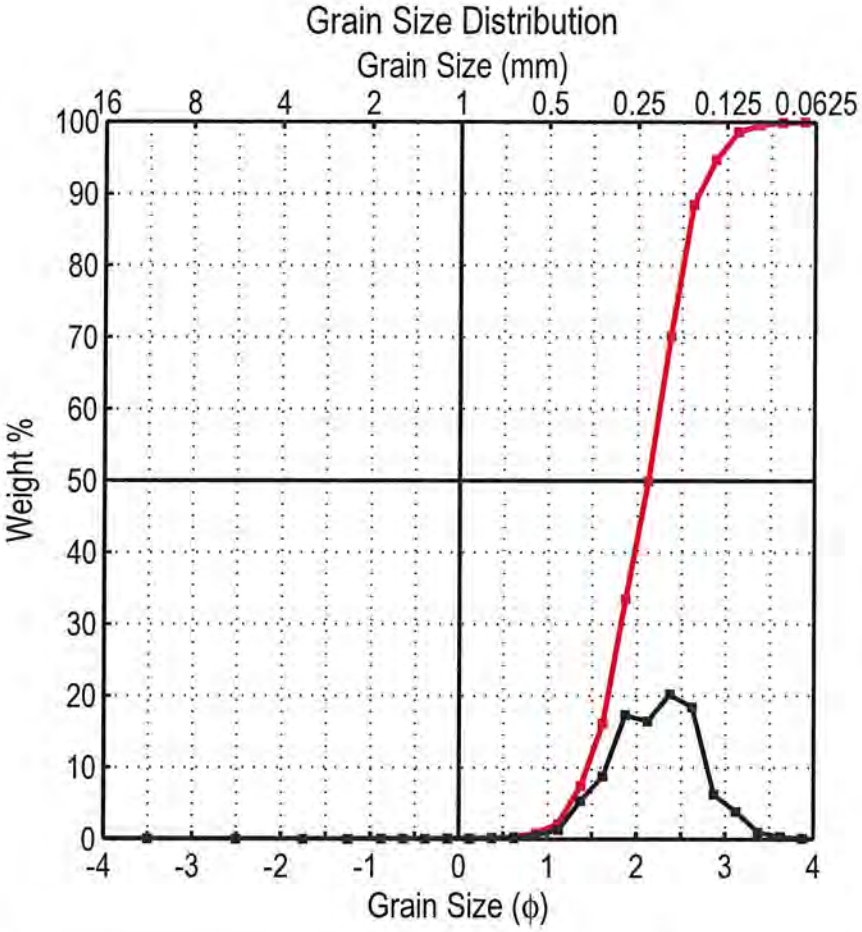
Total weight (gram)	116.60
% finer than 4.00 phi	0.38
% coarser than -1.00 phi	0.00
% $CaCO_3$	7.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	3.00	2.57	2.57
-0.75	-0.875	0.72	0.62	3.19
-0.5	-0.625	1.18	1.01	4.20
-0.25	-0.375	1.08	0.93	5.13
0	-0.125	1.51	1.30	6.42
0.25	0.125	2.31	1.98	8.40
0.5	0.375	3.02	2.59	10.99
0.75	0.625	3.41	2.92	13.92
1	0.875	6.03	5.17	19.09
1.25	1.125	6.15	5.27	24.37
1.5	1.375	10.93	9.37	33.74
1.75	1.625	10.42	8.94	42.68
2	1.875	14.72	12.62	55.30
2.25	2.125	12.14	10.41	65.71
2.5	2.375	13.78	11.82	77.53
2.75	2.625	12.87	11.04	88.57
3	2.875	5.51	4.73	93.29
3.25	3.125	4.46	3.83	97.12
3.5	3.375	1.66	1.42	98.54
3.75	3.625	0.98	0.84	99.38
4	3.875	0.28	0.24	99.62
>4.0	4.125	0.44	0.38	100.00

Percentiles	
1	-1.555
5	-0.410
16	0.725
25	1.140
50	1.770
75	2.320
84	2.520
95	2.985
99	3.510

Moment Measures	**(phi)**	**(mm)**
Mean	1.747	0.298
Standard Deviation	1.005	0.498
Skewness	-0.876	
Kurtosis	3.944	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.623	1.672
Standard Deviation	0.897	0.963
Skewness (1)	-0.164	-0.224
Skewness (2)	-0.538	
Kurtosis	0.891	1.179



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 30**
Interval	**Dry Beach**
Mean	**0.215 mm**
STD	**0.711 mm**
Skewness	**-0.189**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Well Sorted
Poorly Graded	Symmetrical
	Mesokurtic

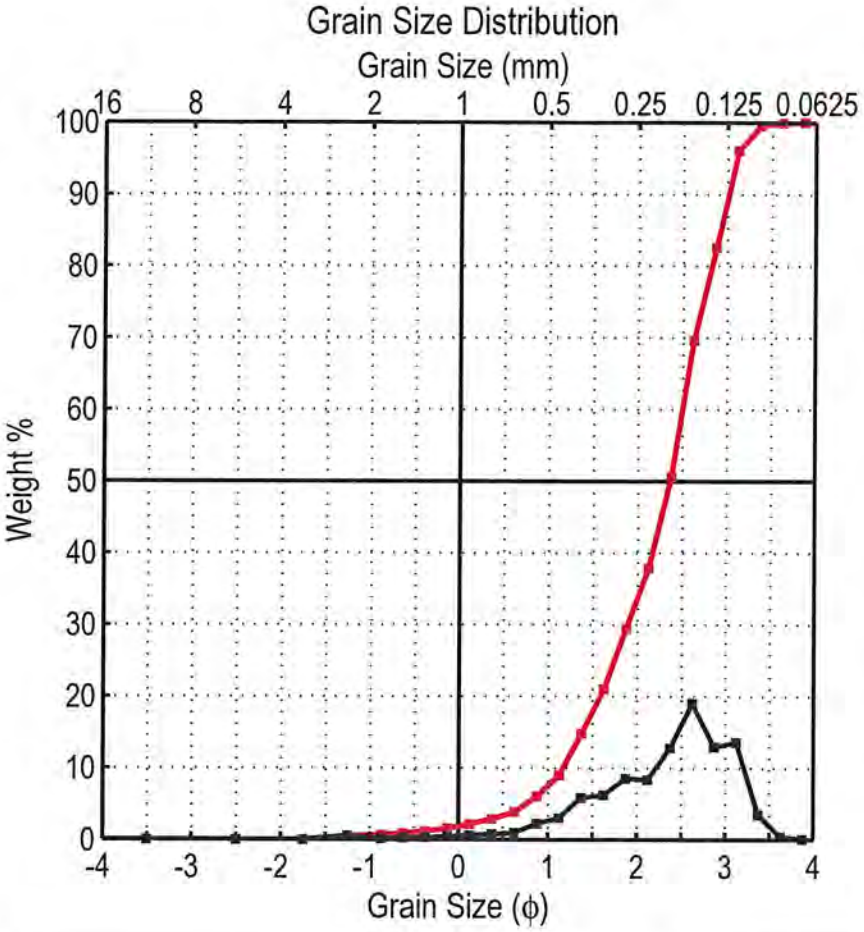
Total weight (gram)	116.55
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	0.00
% $CaCO_3$	5.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.00	0.00	0.00
-0.75	-0.875	0.02	0.02	0.02
-0.5	-0.625	0.01	0.01	0.03
-0.25	-0.375	0.01	0.01	0.03
0	-0.125	0.02	0.02	0.05
0.25	0.125	0.04	0.03	0.09
0.5	0.375	0.08	0.07	0.15
0.75	0.625	0.14	0.12	0.27
1	0.875	0.60	0.51	0.79
1.25	1.125	1.49	1.28	2.07
1.5	1.375	6.20	5.32	7.39
1.75	1.625	10.19	8.74	16.13
2	1.875	20.17	17.31	33.44
2.25	2.125	19.16	16.44	49.88
2.5	2.375	23.52	20.18	70.06
2.75	2.625	21.49	18.44	88.49
3	2.875	7.30	6.26	94.76
3.25	3.125	4.48	3.84	98.60
3.5	3.375	1.14	0.98	99.58
3.75	3.625	0.36	0.31	99.89
4	3.875	0.11	0.09	99.98
>4.0	4.125	0.02	0.02	100.00

Percentiles	
1	0.915
5	1.265
16	1.620
25	1.755
50	2.125
75	2.440
84	2.565
95	2.890
99	3.225

Moment Measures	**(phi)**	**(mm)**
Mean	2.221	0.215
Standard Deviation	0.492	0.711
Skewness	-0.189	
Kurtosis	3.576	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.093	2.103
Standard Deviation	0.472	0.482
Skewness (1)	-0.069	-0.064
Skewness (2)	-0.101	
Kurtosis	0.720	0.972



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 30**
Interval	**Wet Beach**
Mean	**0.203 mm**
STD	**0.583 mm**
Skewness	**-1.289**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic

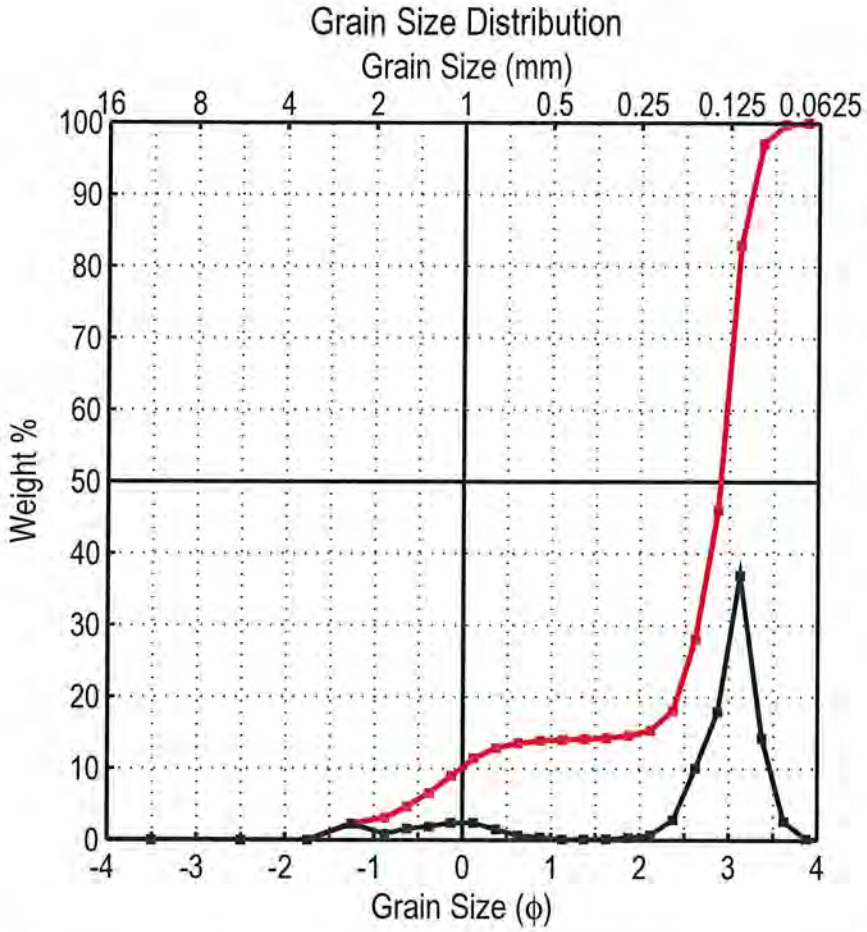
Total weight (gram)	116.52
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	0.00
% $CaCO_3$	5.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.59	0.51	0.51
-0.75	-0.875	0.13	0.11	0.62
-0.5	-0.625	0.25	0.21	0.83
-0.25	-0.375	0.33	0.28	1.12
0	-0.125	0.48	0.41	1.53
0.25	0.125	0.68	0.58	2.11
0.5	0.375	0.86	0.74	2.85
0.75	0.625	1.08	0.93	3.78
1	0.875	2.55	2.19	5.96
1.25	1.125	3.46	2.97	8.93
1.5	1.375	6.79	5.83	14.76
1.75	1.625	7.22	6.20	20.96
2	1.875	9.92	8.51	29.47
2.25	2.125	9.70	8.32	37.80
2.5	2.375	14.89	12.78	50.58
2.75	2.625	22.13	18.99	69.57
3	2.875	15.09	12.95	82.52
3.25	3.125	15.76	13.53	96.04
3.5	3.375	4.02	3.45	99.49
3.75	3.625	0.49	0.42	99.91
4	3.875	0.08	0.07	99.98
>4.0	4.125	0.02	0.02	100.00

Percentiles	
1	-0.475
5	0.765
16	1.425
25	1.745
50	2.365
75	2.730
84	2.900
95	3.105
99	3.340

Moment Measures	**(phi)**	**(mm)**
Mean	2.301	0.203
Standard Deviation	0.778	0.583
Skewness	-1.289	
Kurtosis	5.507	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.162	2.230
Standard Deviation	0.738	0.723
Skewness (1)	-0.275	-0.321
Skewness (2)	-0.583	
Kurtosis	0.586	0.974



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 30**
Interval	**Low Tide Line**
Mean	**0.168 mm**
STD	**0.435 mm**
Skewness	**-1.999**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic

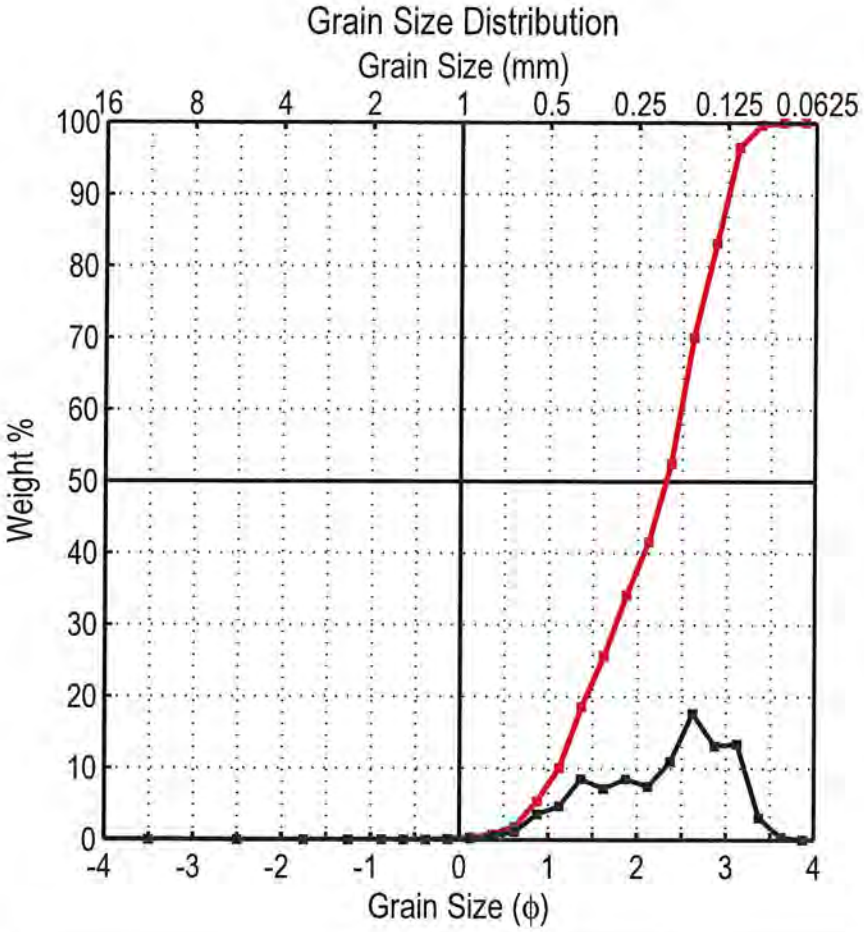
Total weight (gram)	116.63
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	0.00
% $CaCO_3$	5.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	2.63	2.25	2.25
-0.75	-0.875	0.97	0.83	3.09
-0.5	-0.625	1.84	1.58	4.66
-0.25	-0.375	2.18	1.87	6.53
0	-0.125	2.80	2.40	8.93
0.25	0.125	2.79	2.39	11.33
0.5	0.375	1.75	1.50	12.83
0.75	0.625	0.77	0.66	13.49
1	0.875	0.42	0.36	13.85
1.25	1.125	0.15	0.13	13.98
1.5	1.375	0.14	0.12	14.10
1.75	1.625	0.16	0.14	14.23
2	1.875	0.38	0.33	14.56
2.25	2.125	0.84	0.72	15.28
2.5	2.375	3.26	2.80	18.07
2.75	2.625	11.68	10.01	28.09
3	2.875	20.88	17.90	45.99
3.25	3.125	43.08	36.94	82.93
3.5	3.375	16.57	14.21	97.14
3.75	3.625	3.04	2.61	99.74
4	3.875	0.25	0.21	99.96
>4.0	4.125	0.05	0.04	100.00

Percentiles	
1	-1.530
5	-0.580
16	2.190
25	2.550
50	2.900
75	3.070
84	3.145
95	3.335
99	3.555

Moment Measures	**(phi)**	**(mm)**
Mean	2.570	0.168
Standard Deviation	1.201	0.435
Skewness	-1.999	
Kurtosis	5.654	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.668	2.745
Standard Deviation	0.478	0.832
Skewness (1)	-0.487	-0.632
Skewness (2)	-3.188	
Kurtosis	3.099	3.086



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 35**
Interval	**Wet Beach**
Mean	**0.207 mm**
STD	**0.608 mm**
Skewness	**-0.541**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Platykurtic

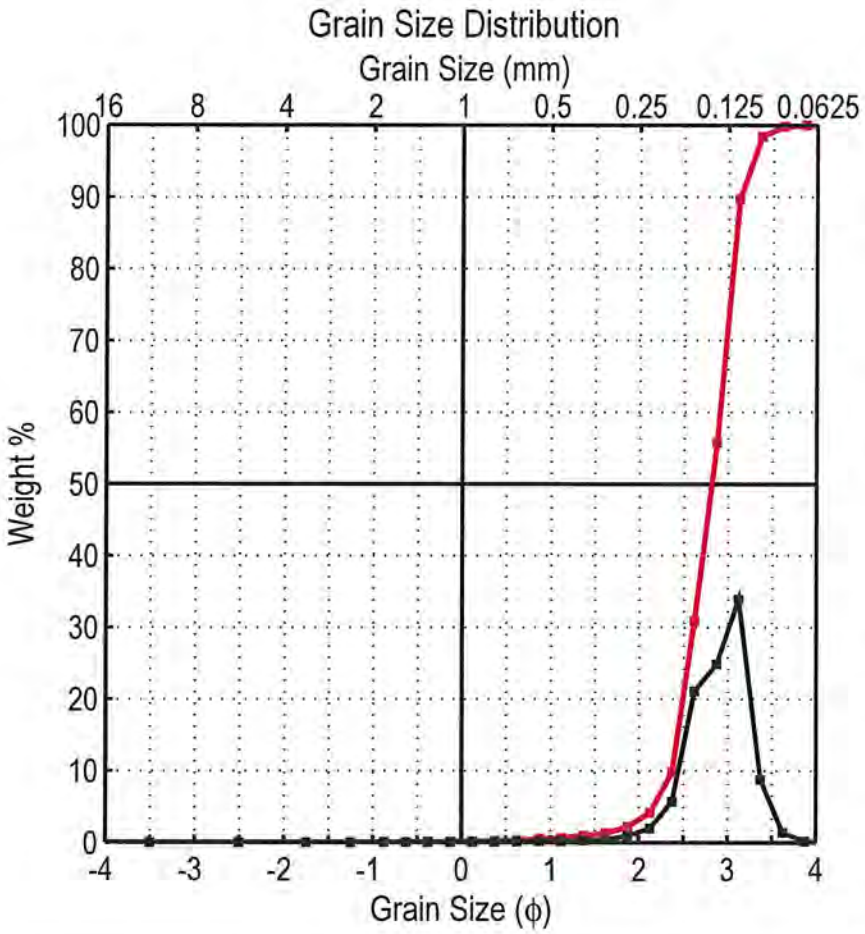
Total weight (gram)	115.68
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	0.00
% $CaCO_3$	5.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.00	0.00	0.00
-0.75	-0.875	0.01	0.01	0.01
-0.5	-0.625	0.01	0.01	0.02
-0.25	-0.375	0.02	0.02	0.03
0	-0.125	0.07	0.06	0.10
0.25	0.125	0.19	0.16	0.26
0.5	0.375	0.55	0.48	0.73
0.75	0.625	1.26	1.09	1.82
1	0.875	4.07	3.52	5.34
1.25	1.125	5.40	4.67	10.01
1.5	1.375	9.82	8.49	18.50
1.75	1.625	8.24	7.12	25.62
2	1.875	9.79	8.46	34.09
2.25	2.125	8.62	7.45	41.54
2.5	2.375	12.61	10.90	52.44
2.75	2.625	20.37	17.61	70.05
3	2.875	15.17	13.11	83.16
3.25	3.125	15.48	13.38	96.54
3.5	3.375	3.58	3.09	99.64
3.75	3.625	0.40	0.35	99.98
4	3.875	0.01	0.01	99.99
>4.0	4.125	0.01	0.01	100.00

Percentiles	
1	0.435
5	0.850
16	1.300
25	1.605
50	2.320
75	2.720
84	2.890
95	3.095
99	3.325

Moment Measures	**(phi)**	**(mm)**
Mean	2.275	0.207
Standard Deviation	0.719	0.608
Skewness	-0.541	
Kurtosis	2.463	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.095	2.170
Standard Deviation	0.795	0.738
Skewness (1)	-0.283	-0.296
Skewness (2)	-0.437	
Kurtosis	0.412	0.825



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	
Interval	**Low Tide Line**
Mean	**0.135 mm**
STD	**0.768 mm**
Skewness	**-1.967**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic

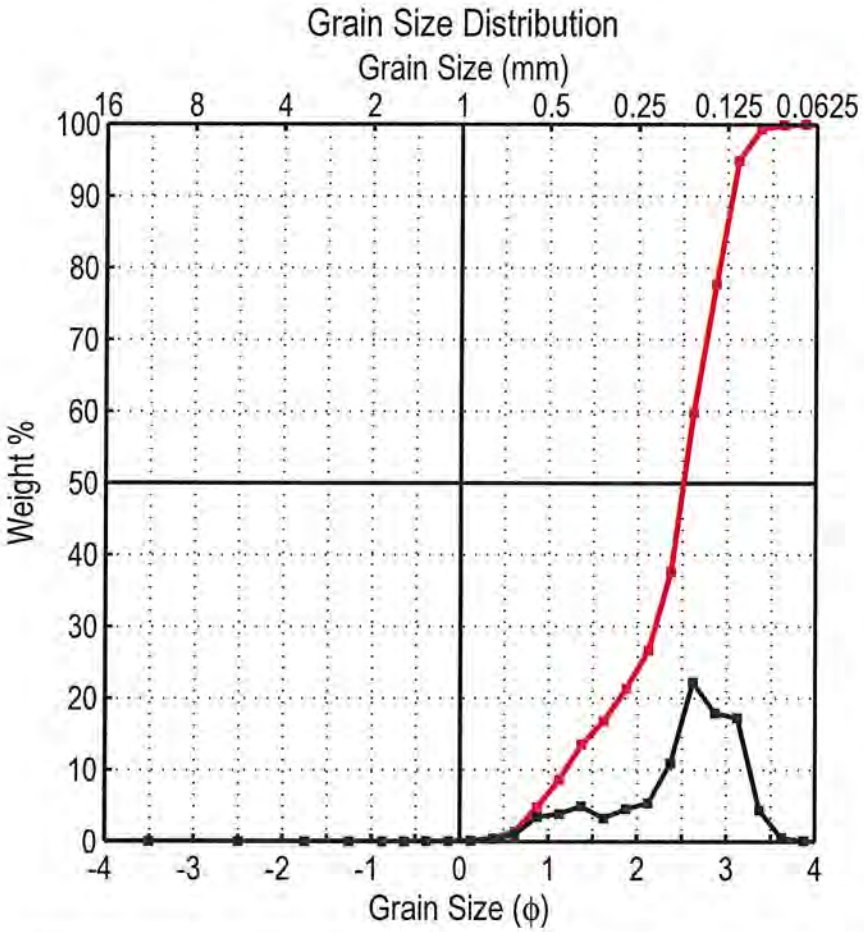
Total weight (gram)	116.96
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	0.00
% $CaCO_3$	5.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.00	0.00	0.00
-0.75	-0.875	0.02	0.02	0.02
-0.5	-0.625	0.02	0.02	0.03
-0.25	-0.375	0.03	0.03	0.06
0	-0.125	0.02	0.02	0.08
0.25	0.125	0.05	0.04	0.12
0.5	0.375	0.08	0.07	0.19
0.75	0.625	0.11	0.09	0.28
1	0.875	0.20	0.17	0.45
1.25	1.125	0.20	0.17	0.62
1.5	1.375	0.34	0.29	0.91
1.75	1.625	0.41	0.35	1.27
2	1.875	1.06	0.91	2.17
2.25	2.125	2.26	1.93	4.10
2.5	2.375	6.64	5.68	9.78
2.75	2.625	24.68	21.10	30.88
3	2.875	29.10	24.88	55.76
3.25	3.125	39.67	33.92	89.68
3.5	3.375	10.25	8.76	98.44
3.75	3.625	1.61	1.38	99.82
4	3.875	0.16	0.14	99.96
>4.0	4.125	0.05	0.04	100.00

Percentiles	
1	1.435
5	2.165
16	2.450
25	2.555
50	2.815
75	3.015
84	3.085
95	3.275
99	3.475

Moment Measures	**(phi)**	**(mm)**
Mean	2.888	0.135
Standard Deviation	0.381	0.768
Skewness	-1.967	
Kurtosis	13.421	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.768	2.783
Standard Deviation	0.317	0.327
Skewness (1)	-0.150	-0.160
Skewness (2)	-0.299	
Kurtosis	0.748	0.989



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 40**
Interval	**Wet Beach**
Mean	**0.181 mm**
STD	**0.622 mm**
Skewness	**-1.008**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic

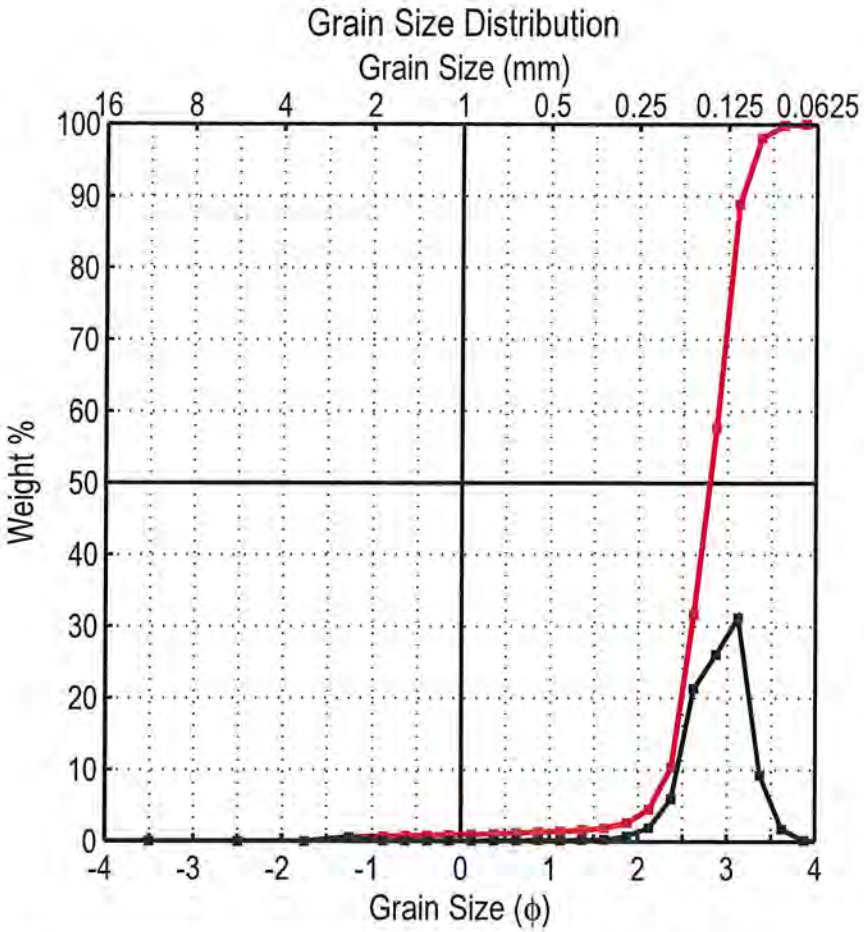
Total weight (gram)	116.82
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	0.00
% $CaCO_3$	4.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.00	0.00	0.00
-0.75	-0.875	0.00	0.00	0.00
-0.5	-0.625	0.00	0.00	0.00
-0.25	-0.375	0.02	0.02	0.02
0	-0.125	0.02	0.02	0.03
0.25	0.125	0.09	0.08	0.11
0.5	0.375	0.36	0.31	0.42
0.75	0.625	1.07	0.92	1.34
1	0.875	4.00	3.42	4.76
1.25	1.125	4.51	3.86	8.62
1.5	1.375	5.73	4.90	13.53
1.75	1.625	3.80	3.25	16.78
2	1.875	5.29	4.53	21.31
2.25	2.125	6.23	5.33	26.64
2.5	2.375	12.75	10.91	37.55
2.75	2.625	25.94	22.21	59.76
3	2.875	20.93	17.92	77.68
3.25	3.125	20.18	17.27	94.95
3.5	3.375	5.12	4.38	99.33
3.75	3.625	0.64	0.55	99.88
4	3.875	0.12	0.10	99.98
>4.0	4.125	0.02	0.02	100.00

Percentiles	
1	0.535
5	0.890
16	1.565
25	2.050
50	2.515
75	2.840
84	2.965
95	3.130
99	3.355

Moment Measures	**(phi)**	**(mm)**
Mean	2.468	0.181
Standard Deviation	0.684	0.622
Skewness	-1.008	
Kurtosis	3.320	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.265	2.348
Standard Deviation	0.700	0.689
Skewness (1)	-0.357	-0.404
Skewness (2)	-0.721	
Kurtosis	0.600	1.162



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	
Interval	**Low Tide Line**
Mean	**0.138 mm**
STD	**0.700 mm**
Skewness	**-4.208**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic

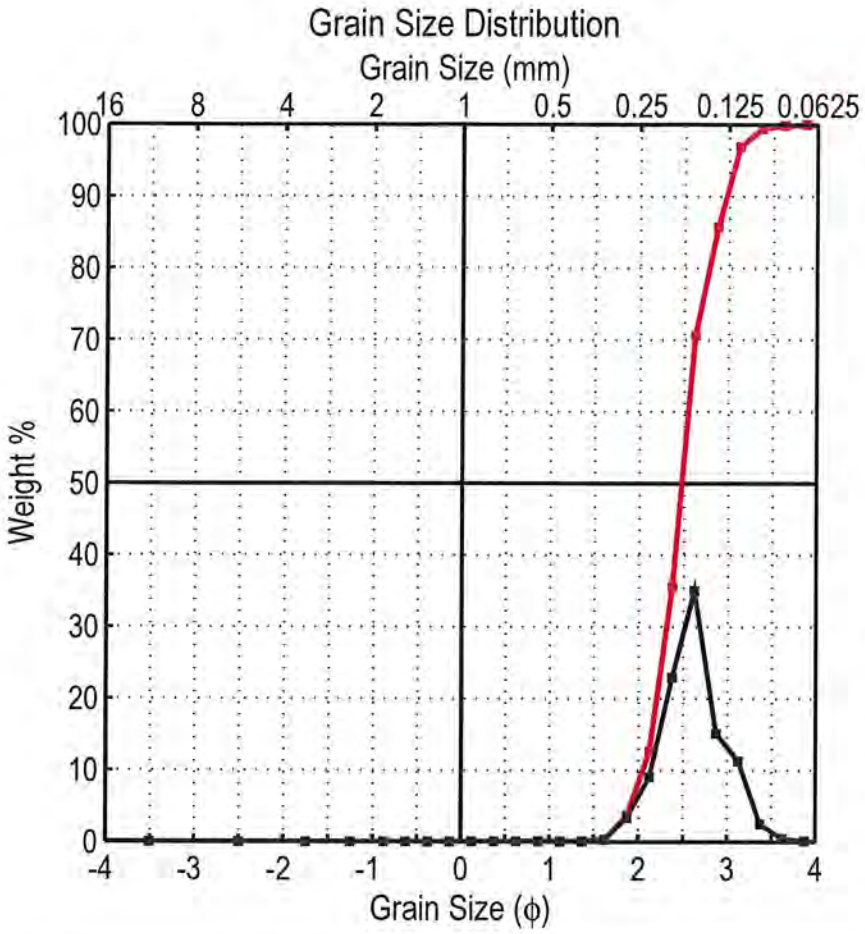
Total weight (gram)	117.36
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	0.00
% $CaCO_3$	6.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.68	0.58	0.58
-0.75	-0.875	0.08	0.07	0.65
-0.5	-0.625	0.10	0.09	0.73
-0.25	-0.375	0.06	0.05	0.78
0	-0.125	0.07	0.06	0.84
0.25	0.125	0.09	0.08	0.92
0.5	0.375	0.12	0.10	1.02
0.75	0.625	0.12	0.10	1.12
1	0.875	0.17	0.14	1.27
1.25	1.125	0.14	0.12	1.39
1.5	1.375	0.23	0.20	1.58
1.75	1.625	0.30	0.26	1.84
2	1.875	0.85	0.72	2.56
2.25	2.125	2.21	1.88	4.45
2.5	2.375	6.91	5.89	10.34
2.75	2.625	24.99	21.29	31.63
3	2.875	30.57	26.05	57.68
3.25	3.125	36.57	31.16	88.84
3.5	3.375	10.82	9.22	98.06
3.75	3.625	2.04	1.74	99.80
4	3.875	0.20	0.17	99.97
>4.0	4.125	0.04	0.03	100.00

Percentiles	
1	0.320
5	2.150
16	2.440
25	2.545
50	2.800
75	3.015
84	3.085
95	3.290
99	3.510

Moment Measures	**(phi)**	**(mm)**
Mean	2.859	0.138
Standard Deviation	0.515	0.700
Skewness	-4.208	
Kurtosis	31.417	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.763	2.775
Standard Deviation	0.323	0.334
Skewness (1)	-0.116	-0.128
Skewness (2)	-0.248	
Kurtosis	0.767	0.994



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 45**
Interval	**Dune Toe**
Mean	**0.163 mm**
STD	**0.788 mm**
Skewness	**0.062**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Very Well Sorted
Poorly Graded	Symmetrical
	Leptokurtic

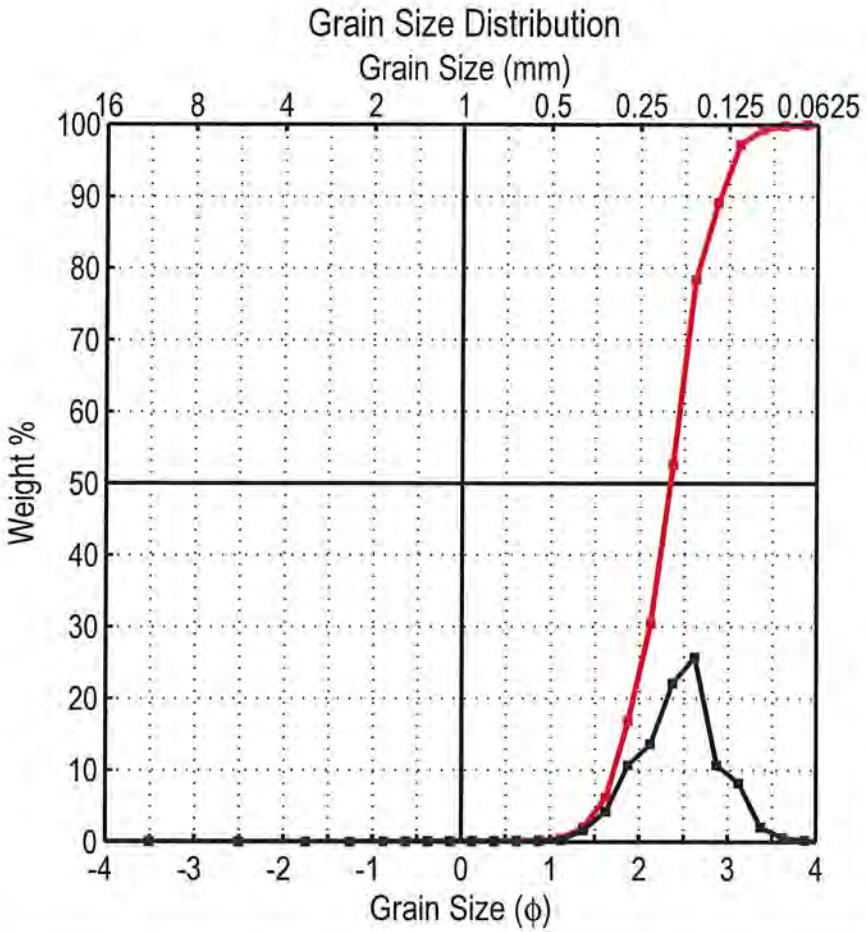
Total weight (gram)	116.06
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	0.00
% $CaCO_3$	6.4

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.00	0.00	0.00
-0.75	-0.875	0.00	0.00	0.00
-0.5	-0.625	0.00	0.00	0.00
-0.25	-0.375	0.00	0.00	0.00
0	-0.125	0.00	0.00	0.00
0.25	0.125	0.01	0.01	0.01
0.5	0.375	0.02	0.02	0.03
0.75	0.625	0.01	0.01	0.03
1	0.875	0.01	0.01	0.04
1.25	1.125	0.00	0.00	0.04
1.5	1.375	0.03	0.03	0.07
1.75	1.625	0.26	0.22	0.29
2	1.875	3.85	3.32	3.61
2.25	2.125	10.47	9.02	12.63
2.5	2.375	26.61	22.93	35.56
2.75	2.625	40.64	35.02	70.58
3	2.875	17.54	15.11	85.69
3.25	3.125	13.05	11.24	96.93
3.5	3.375	2.88	2.48	99.41
3.75	3.625	0.53	0.46	99.87
4	3.875	0.12	0.10	99.97
>4.0	4.125	0.03	0.03	100.00

Percentiles	
1	1.680
5	1.915
16	2.160
25	2.260
50	2.480
75	2.700
84	2.845
95	3.080
99	3.335

Moment Measures	**(phi)**	**(mm)**
Mean	2.613	0.163
Standard Deviation	0.344	0.788
Skewness	0.062	
Kurtosis	3.839	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.502	2.495
Standard Deviation	0.342	0.348
Skewness (1)	0.066	0.048
Skewness (2)	0.051	
Kurtosis	0.701	1.085



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 45**
Interval	**Dry Beach**
Mean	**0.184 mm**
STD	**0.730 mm**
Skewness	**-0.307**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Well Sorted
Poorly Graded	Symmetrical
	Leptokurtic

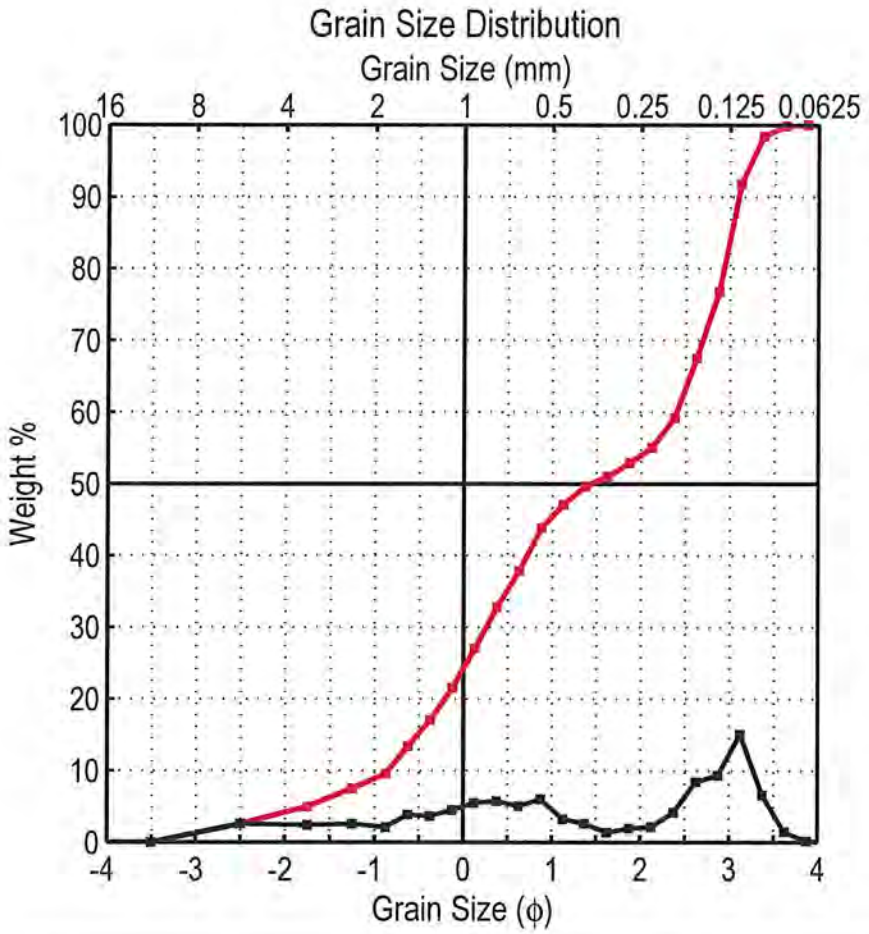
Total weight (gram)	116.51
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	0.00
% $CaCO_3$	4.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.00	0.00	0.00
-0.75	-0.875	0.02	0.02	0.02
-0.5	-0.625	0.02	0.02	0.03
-0.25	-0.375	0.02	0.02	0.05
0	-0.125	0.02	0.02	0.07
0.25	0.125	0.03	0.03	0.09
0.5	0.375	0.03	0.03	0.12
0.75	0.625	0.03	0.03	0.15
1	0.875	0.06	0.05	0.20
1.25	1.125	0.22	0.19	0.39
1.5	1.375	1.81	1.55	1.94
1.75	1.625	4.91	4.21	6.15
2	1.875	12.44	10.68	16.83
2.25	2.125	15.85	13.60	30.44
2.5	2.375	25.78	22.13	52.56
2.75	2.625	30.03	25.77	78.34
3	2.875	12.45	10.69	89.02
3.25	3.125	9.55	8.20	97.22
3.5	3.375	2.35	2.02	99.24
3.75	3.625	0.61	0.52	99.76
4	3.875	0.23	0.20	99.96
>4.0	4.125	0.05	0.04	100.00

Percentiles	
1	1.225
5	1.555
16	1.855
25	2.025
50	2.345
75	2.595
84	2.755
95	3.055
99	3.345

Moment Measures	**(phi)**	**(mm)**
Mean	2.444	0.184
Standard Deviation	0.454	0.730
Skewness	-0.307	
Kurtosis	4.457	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.305	2.318
Standard Deviation	0.450	0.452
Skewness (1)	-0.089	-0.071
Skewness (2)	-0.089	
Kurtosis	0.667	1.079



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 45**
Interval	**Wet Beach**
Mean	**0.373 mm**
STD	**0.323 mm**
Skewness	**-0.485**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic

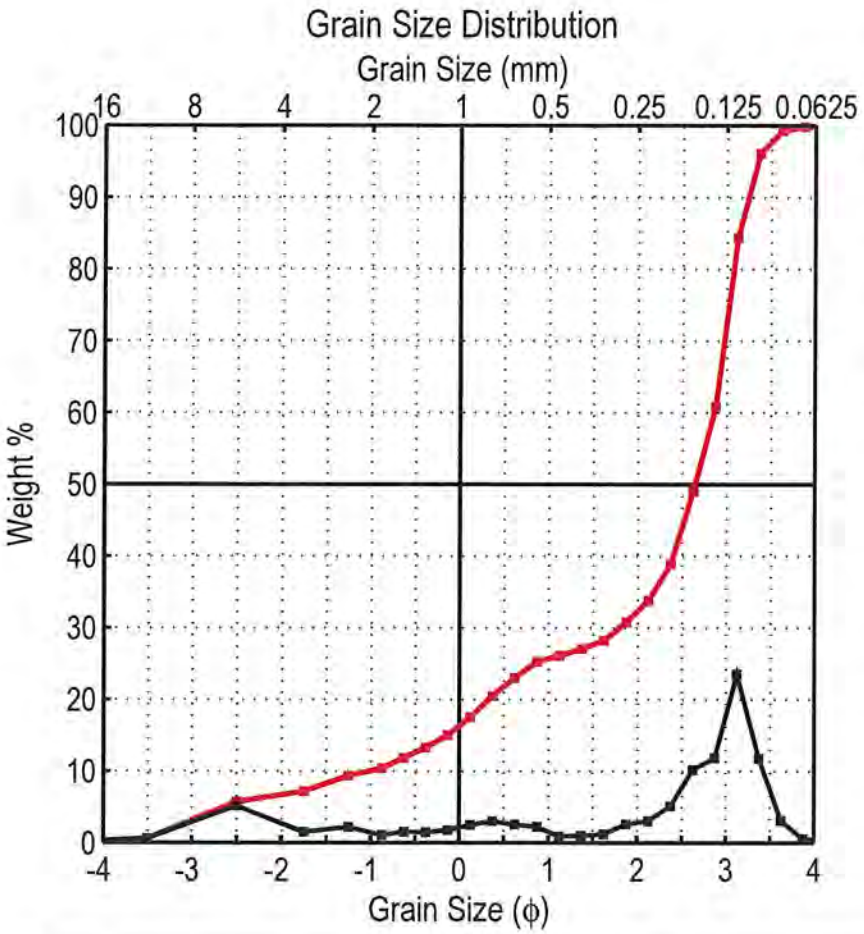
Total weight (gram)	116.78
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	0.00
% $CaCO_3$	20.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	3.00	2.57	2.57
-1.5	-1.75	2.78	2.38	4.95
-1	-1.25	2.96	2.53	7.48
-0.75	-0.875	2.41	2.06	9.55
-0.5	-0.625	4.48	3.84	13.38
-0.25	-0.375	4.25	3.64	17.02
0	-0.125	5.23	4.48	21.50
0.25	0.125	6.41	5.49	26.99
0.5	0.375	6.71	5.75	32.74
0.75	0.625	5.91	5.06	37.80
1	0.875	7.00	5.99	43.79
1.25	1.125	3.78	3.24	47.03
1.5	1.375	3.01	2.58	49.61
1.75	1.625	1.60	1.37	50.98
2	1.875	2.24	1.92	52.89
2.25	2.125	2.46	2.11	55.00
2.5	2.375	4.82	4.13	59.13
2.75	2.625	9.77	8.37	67.49
3	2.875	10.85	9.29	76.79
3.25	3.125	17.55	15.03	91.81
3.5	3.375	7.68	6.58	98.39
3.75	3.625	1.67	1.43	99.82
4	3.875	0.18	0.15	99.97
>4.0	4.125	0.03	0.03	100.00

Percentiles	
1	-3.110
5	-1.740
16	-0.445
25	0.035
50	1.445
75	2.825
84	2.995
95	3.245
99	3.480

Moment Measures	**(phi)**	**(mm)**
Mean	1.424	0.373
Standard Deviation	1.629	0.323
Skewness	-0.485	
Kurtosis	2.154	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.275	1.332
Standard Deviation	1.720	1.615
Skewness (1)	-0.099	-0.188
Skewness (2)	-0.403	
Kurtosis	0.449	0.732



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 45**
Interval	**Low Tide Line**
Mean	**0.253 mm**
STD	**0.300 mm**
Skewness	**-1.390**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic

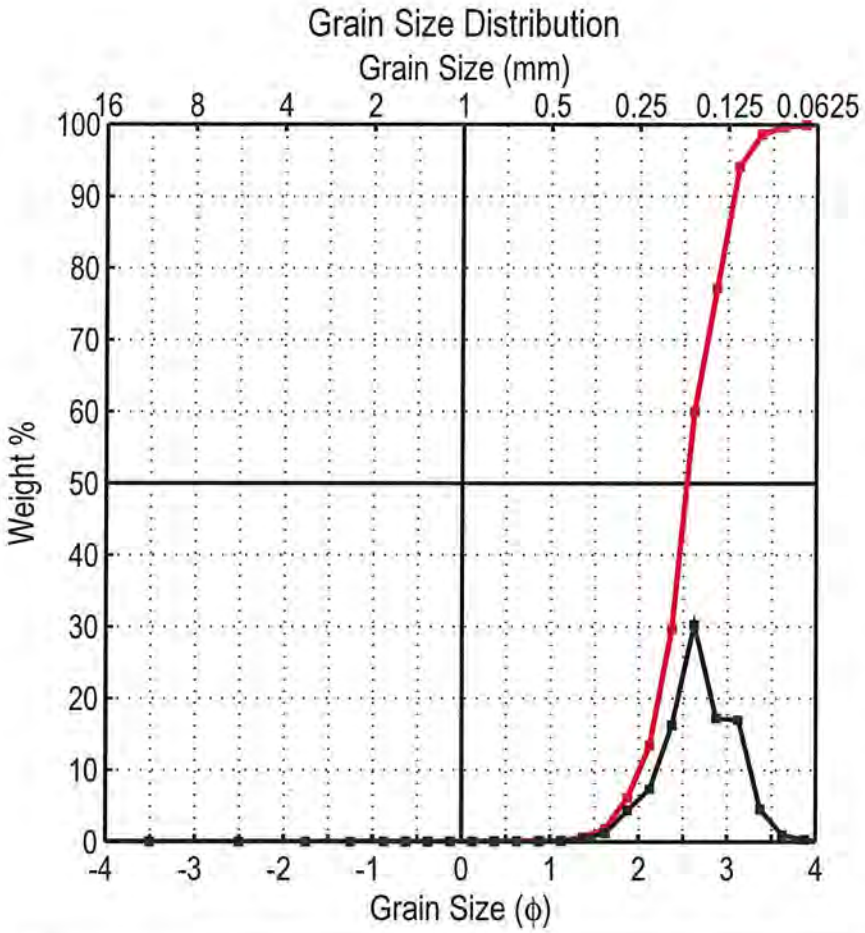
Total weight (gram)	116.31
% finer than 4.00 phi	0.22
% coarser than -1.00 phi	0.00
% $CaCO_3$	6.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.65	0.56	0.56
-2	-2.5	5.94	5.11	5.67
-1.5	-1.75	1.74	1.50	7.16
-1	-1.25	2.50	2.15	9.31
-0.75	-0.875	1.22	1.05	10.36
-0.5	-0.625	1.72	1.48	11.84
-0.25	-0.375	1.66	1.43	13.27
0	-0.125	2.00	1.72	14.99
0.25	0.125	2.89	2.48	17.47
0.5	0.375	3.45	2.97	20.44
0.75	0.625	2.93	2.52	22.96
1	0.875	2.59	2.23	25.18
1.25	1.125	1.01	0.87	26.05
1.5	1.375	1.10	0.95	27.00
1.75	1.625	1.37	1.18	28.17
2	1.875	2.96	2.54	30.72
2.25	2.125	3.52	3.03	33.75
2.5	2.375	5.91	5.08	38.83
2.75	2.625	11.82	10.16	48.99
3	2.875	13.76	11.83	60.82
3.25	3.125	27.31	23.48	84.30
3.5	3.375	13.69	11.77	96.07
3.75	3.625	3.64	3.13	99.20
4	3.875	0.67	0.58	99.78
>4.0	4.125	0.26	0.22	100.00

Percentiles	
1	-3.415
5	-2.630
16	-0.025
25	0.855
50	2.645
75	3.025
84	3.120
95	3.350
99	3.610

Moment Measures	**(phi)**	**(mm)**
Mean	1.981	0.253
Standard Deviation	1.735	0.300
Skewness	-1.390	
Kurtosis	3.852	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.547	1.913
Standard Deviation	1.573	1.692
Skewness (1)	-0.698	-0.731
Skewness (2)	-1.453	
Kurtosis	0.901	1.129



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 50**
Interval	**Dune Toe**
Mean	**0.157 mm**
STD	**0.751 mm**
Skewness	**-0.426**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Well Sorted
Poorly Graded	Symmetrical
	Leptokurtic

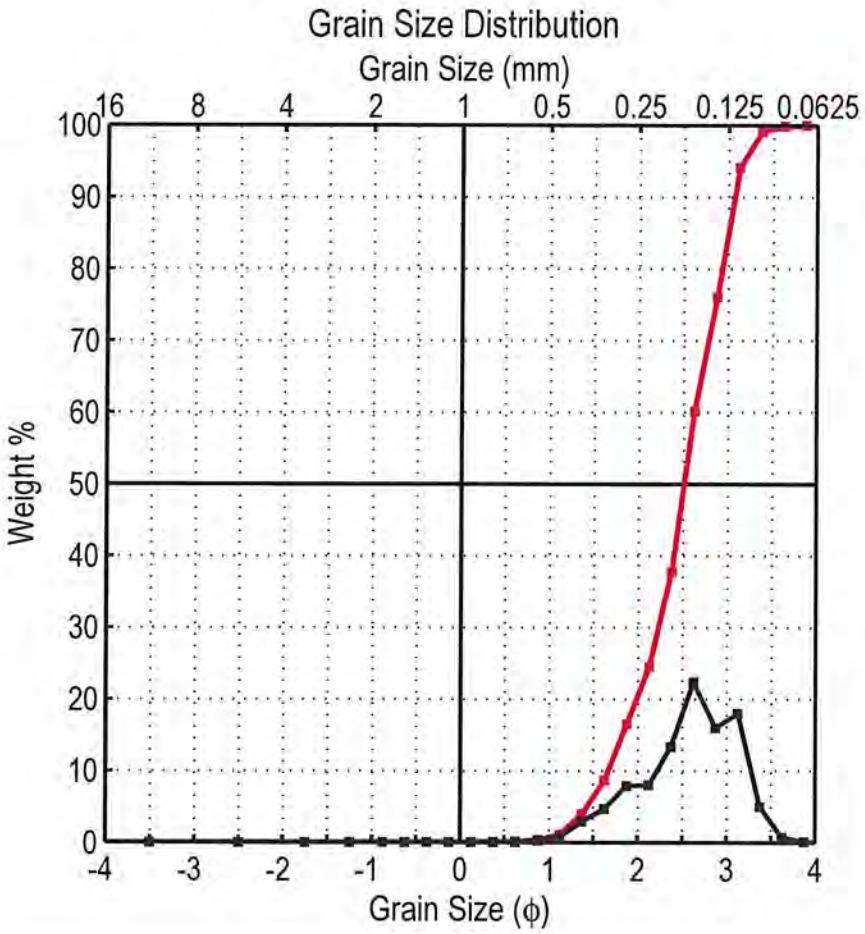
Total weight (gram)	116.93
% finer than 4.00 phi	0.07
% coarser than -1.00 phi	0.00
% $CaCO_3$	2.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.00	0.00	0.00
-0.75	-0.875	0.01	0.01	0.01
-0.5	-0.625	0.00	0.00	0.01
-0.25	-0.375	0.00	0.00	0.01
0	-0.125	0.02	0.02	0.03
0.25	0.125	0.02	0.02	0.04
0.5	0.375	0.02	0.02	0.06
0.75	0.625	0.02	0.02	0.08
1	0.875	0.04	0.03	0.11
1.25	1.125	0.07	0.06	0.17
1.5	1.375	0.50	0.43	0.60
1.75	1.625	1.39	1.19	1.79
2	1.875	5.08	4.34	6.13
2.25	2.125	8.53	7.29	13.43
2.5	2.375	18.97	16.22	29.65
2.75	2.625	35.41	30.28	59.93
3	2.875	20.13	17.22	77.15
3.25	3.125	19.84	16.97	94.12
3.5	3.375	5.31	4.54	98.66
3.75	3.625	1.15	0.98	99.64
4	3.875	0.34	0.29	99.93
>4.0	4.125	0.08	0.07	100.00

Percentiles	
1	1.460
5	1.810
16	2.165
25	2.305
50	2.545
75	2.845
84	2.975
95	3.175
99	3.460

Moment Measures	**(phi)**	**(mm)**
Mean	2.671	0.157
Standard Deviation	0.414	0.751
Skewness	-0.426	
Kurtosis	4.547	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.570	2.562
Standard Deviation	0.405	0.409
Skewness (1)	0.062	-0.008
Skewness (2)	-0.130	
Kurtosis	0.685	1.036



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 50**
Interval	**Dry Beach**
Mean	**0.168 mm**
STD	**0.691 mm**
Skewness	**-0.641**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic

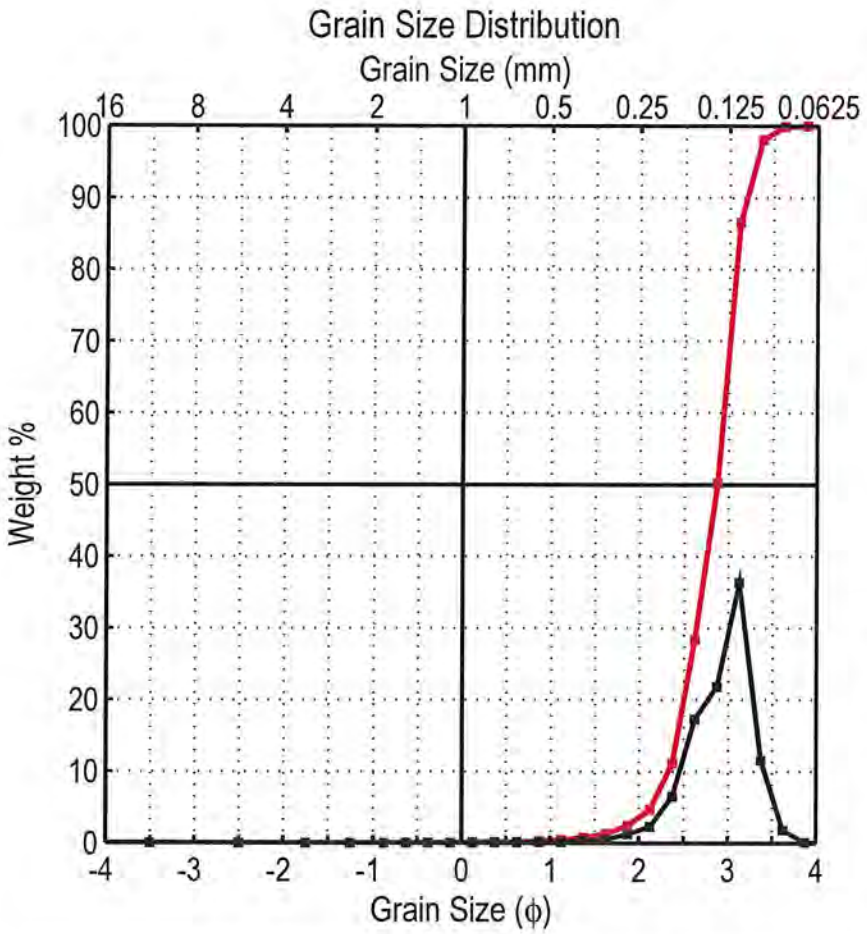
Total weight (gram)	116.89
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	0.00
% $CaCO_3$	2.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.00	0.00	0.00
-0.75	-0.875	0.01	0.01	0.01
-0.5	-0.625	0.00	0.00	0.01
-0.25	-0.375	0.01	0.01	0.02
0	-0.125	0.01	0.01	0.03
0.25	0.125	0.02	0.02	0.04
0.5	0.375	0.03	0.03	0.07
0.75	0.625	0.04	0.03	0.10
1	0.875	0.28	0.24	0.34
1.25	1.125	0.85	0.73	1.07
1.5	1.375	3.39	2.90	3.97
1.75	1.625	5.44	4.65	8.62
2	1.875	9.18	7.85	16.48
2.25	2.125	9.34	7.99	24.47
2.5	2.375	15.55	13.30	37.77
2.75	2.625	26.13	22.35	60.12
3	2.875	18.67	15.97	76.10
3.25	3.125	21.03	17.99	94.09
3.5	3.375	5.84	5.00	99.08
3.75	3.625	0.90	0.77	99.85
4	3.875	0.13	0.11	99.97
>4.0	4.125	0.04	0.03	100.00

Percentiles	
1	1.100
5	1.430
16	1.860
25	2.135
50	2.510
75	2.860
84	2.985
95	3.170
99	3.370

Moment Measures	**(phi)**	**(mm)**
Mean	2.569	0.168
Standard Deviation	0.533	0.691
Skewness	-0.641	
Kurtosis	3.256	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.422	2.452
Standard Deviation	0.563	0.545
Skewness (1)	-0.156	-0.198
Skewness (2)	-0.373	
Kurtosis	0.547	0.984



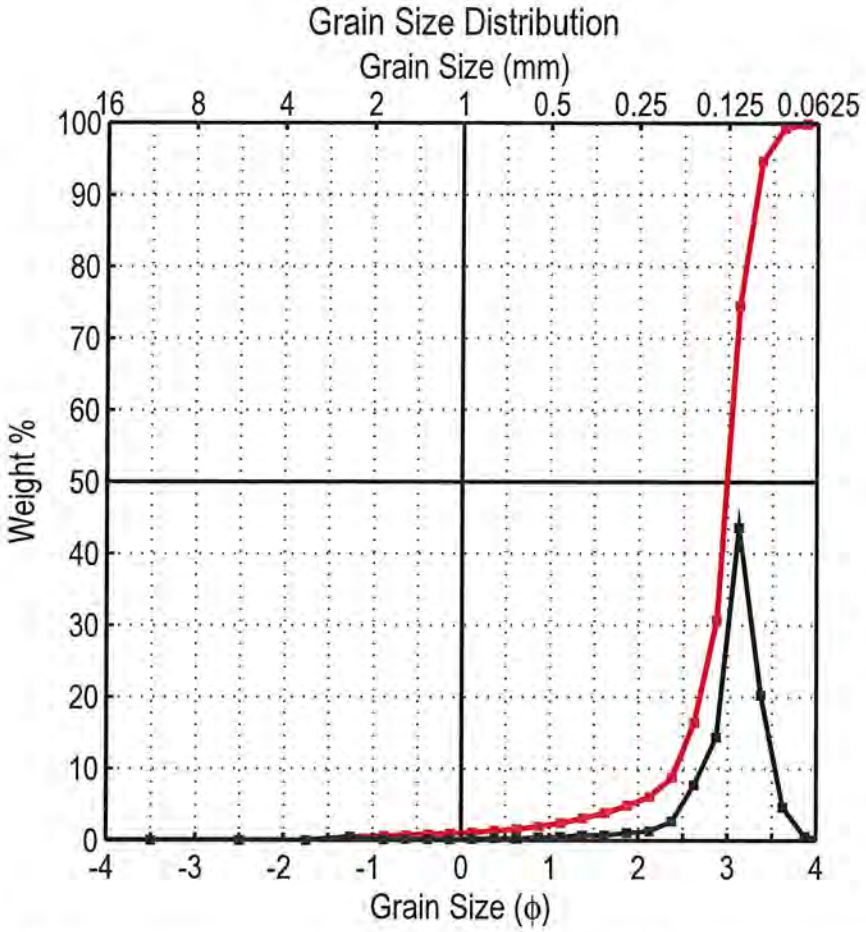
Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 50**
Interval	**Wet Beach**
Mean	**0.133 mm**
STD	**0.766 mm**
Skewness	**-1.537**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	117.32
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	0.00
% $CaCO_3$	2.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.00	0.00	0.00
-0.75	-0.875	0.00	0.00	0.00
-0.5	-0.625	0.01	0.01	0.01
-0.25	-0.375	0.01	0.01	0.02
0	-0.125	0.02	0.02	0.03
0.25	0.125	0.03	0.03	0.06
0.5	0.375	0.06	0.05	0.11
0.75	0.625	0.06	0.05	0.16
1	0.875	0.13	0.11	0.27
1.25	1.125	0.15	0.13	0.40
1.5	1.375	0.41	0.35	0.75
1.75	1.625	0.53	0.45	1.20
2	1.875	1.43	1.22	2.42
2.25	2.125	2.63	2.24	4.66
2.5	2.375	7.60	6.48	11.14
2.75	2.625	20.24	17.25	28.39
3	2.875	25.57	21.80	50.19
3.25	3.125	42.60	36.31	86.50
3.5	3.375	13.56	11.56	98.06
3.75	3.625	2.14	1.82	99.88
4	3.875	0.11	0.09	99.97
>4.0	4.125	0.03	0.03	100.00

Percentiles	
1	1.515
5	2.140
16	2.445
25	2.575
50	2.875
75	3.045
84	3.110
95	3.310
99	3.505

Moment Measures	**(phi)**	**(mm)**
Mean	2.914	0.133
Standard Deviation	0.385	0.766
Skewness	-1.537	
Kurtosis	8.901	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.777	2.810
Standard Deviation	0.332	0.344
Skewness (1)	-0.293	-0.275
Skewness (2)	-0.451	
Kurtosis	0.759	1.020



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**SI 50**
Interval	**Low Tide Line**
Mean	**0.126 mm**
STD	**0.663 mm**
Skewness	**-3.678**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic

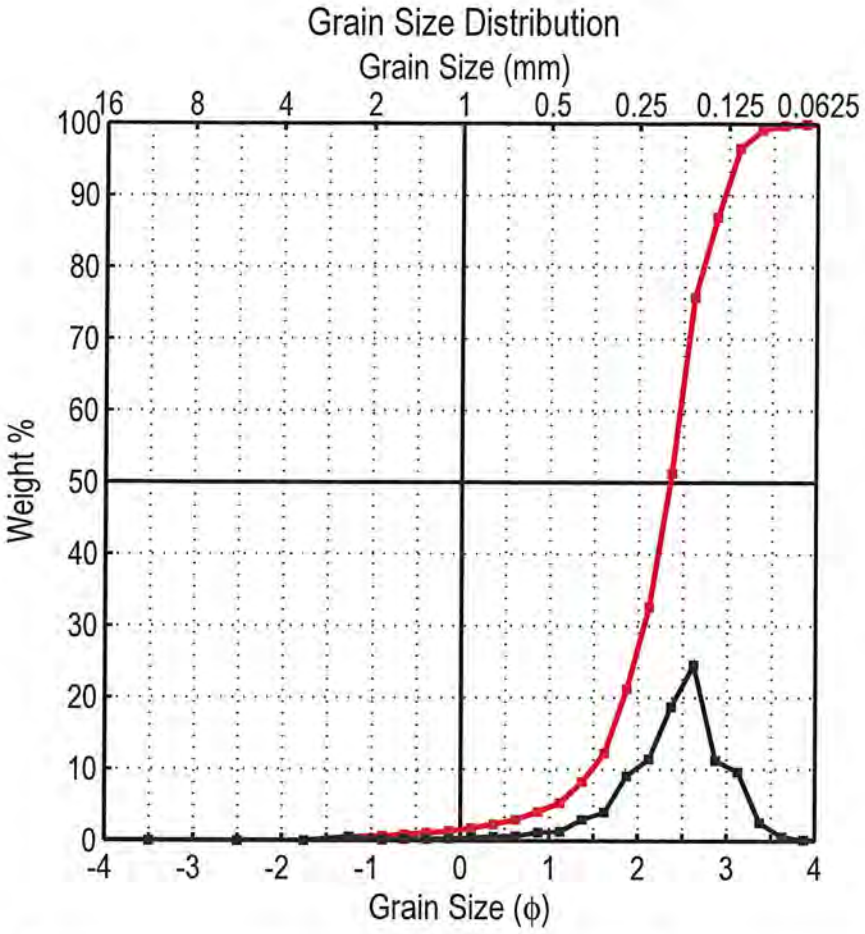
Total weight (gram)	117.34
% finer than 4.00 phi	0.21
% coarser than -1.00 phi	0.00
% $CaCO_3$	5.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.54	0.46	0.46
-0.75	-0.875	0.08	0.07	0.53
-0.5	-0.625	0.17	0.14	0.67
-0.25	-0.375	0.13	0.11	0.78
0	-0.125	0.13	0.11	0.89
0.25	0.125	0.17	0.14	1.04
0.5	0.375	0.34	0.29	1.33
0.75	0.625	0.23	0.20	1.53
1	0.875	0.47	0.40	1.93
1.25	1.125	0.51	0.43	2.36
1.5	1.375	0.85	0.72	3.09
1.75	1.625	0.82	0.70	3.78
2	1.875	1.22	1.04	4.82
2.25	2.125	1.47	1.25	6.08
2.5	2.375	3.09	2.63	8.71
2.75	2.625	9.02	7.69	16.40
3	2.875	16.88	14.39	30.78
3.25	3.125	51.23	43.66	74.44
3.5	3.375	23.74	20.23	94.67
3.75	3.625	5.39	4.59	99.27
4	3.875	0.61	0.52	99.79
>4.0	4.125	0.25	0.21	100.00

Percentiles	
1	0.055
5	1.910
16	2.610
25	2.775
50	2.985
75	3.130
84	3.245
95	3.395
99	3.610

Moment Measures	**(phi)**	**(mm)**
Mean	2.991	0.126
Standard Deviation	0.592	0.663
Skewness	-3.678	
Kurtosis	21.855	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.928	2.947
Standard Deviation	0.318	0.384
Skewness (1)	-0.181	-0.314
Skewness (2)	-1.047	
Kurtosis	1.339	1.714



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**Composite**
Interval	**Dune Toe**
Mean	**0.194 mm**
STD	**0.626 mm**
Skewness	**-1.775**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic

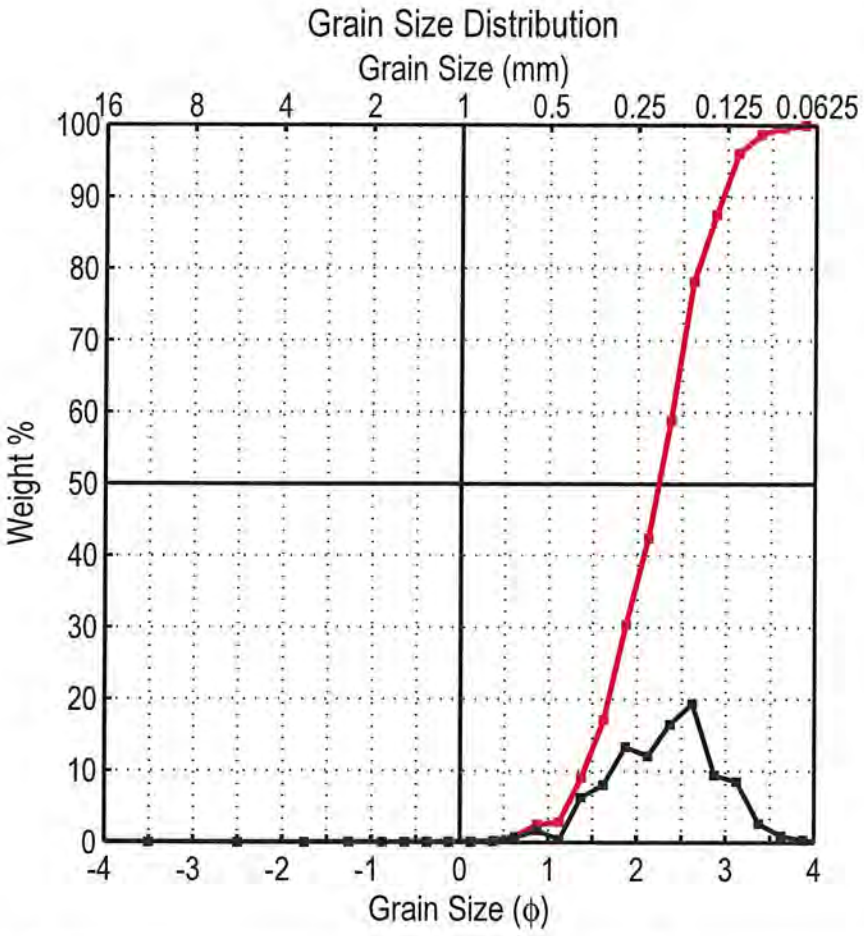
Total weight (gram)	116.68
% finer than 4.00 phi	0.10
% coarser than -1.00 phi	0.00
% $CaCO_3$	4.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.60	0.51	0.51
-0.75	-0.875	0.15	0.13	0.64
-0.5	-0.625	0.24	0.20	0.85
-0.25	-0.375	0.23	0.20	1.04
0	-0.125	0.31	0.27	1.31
0.25	0.125	0.48	0.41	1.72
0.5	0.375	0.63	0.54	2.26
0.75	0.625	0.72	0.61	2.88
1	0.875	1.32	1.13	4.00
1.25	1.125	1.47	1.26	5.27
1.5	1.375	3.44	2.95	8.21
1.75	1.625	4.62	3.96	12.17
2	1.875	10.51	9.01	21.18
2.25	2.125	13.28	11.39	32.57
2.5	2.375	21.78	18.67	51.24
2.75	2.625	28.59	24.50	75.74
3	2.875	13.08	11.21	86.95
3.25	3.125	11.22	9.62	96.56
3.5	3.375	2.96	2.54	99.10
3.75	3.625	0.75	0.64	99.74
4	3.875	0.19	0.16	99.90
>4.0	4.125	0.11	0.10	100.00

Percentiles	
1	-0.425
5	1.070
16	1.730
25	1.960
50	2.360
75	2.615
84	2.810
95	3.085
99	3.365

Moment Measures	**(phi)**	**(mm)**
Mean	2.365	0.194
Standard Deviation	0.677	0.626
Skewness	-1.775	
Kurtosis	8.920	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.270	2.300
Standard Deviation	0.540	0.575
Skewness (1)	-0.167	-0.224
Skewness (2)	-0.523	
Kurtosis	0.866	1.261



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**Composite**
Interval	**Dry Beach**
Mean	**0.201 mm**
STD	**0.663 mm**
Skewness	**-0.319**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Mesokurtic

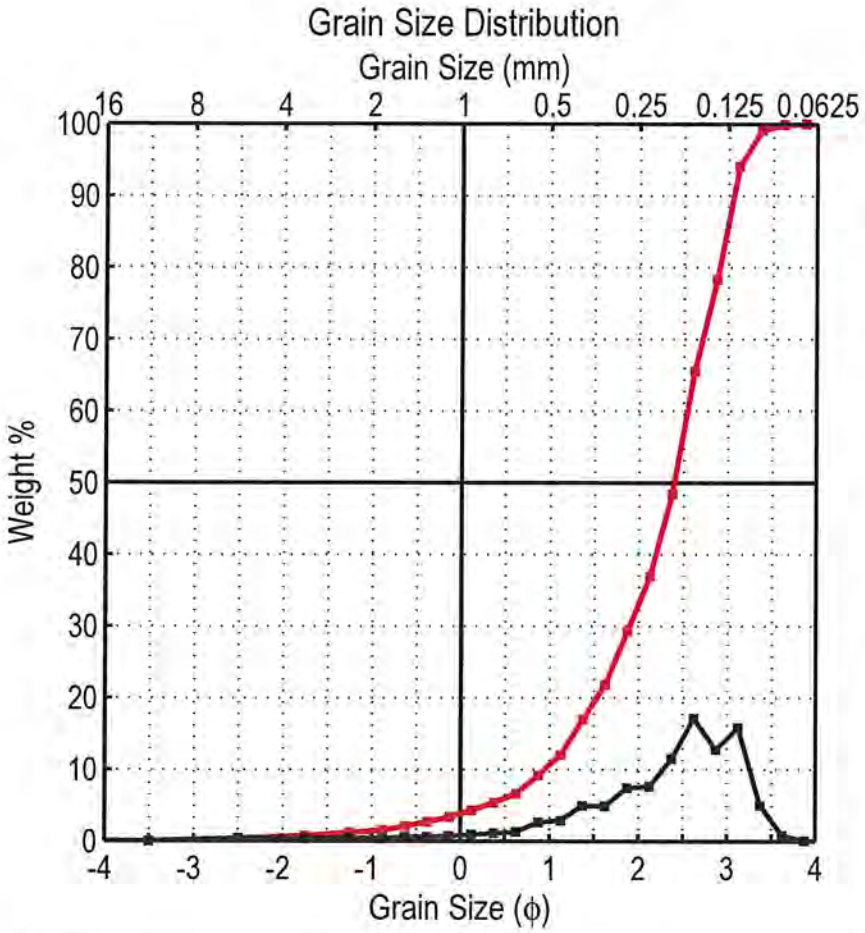
Total weight (gram)	116.62
% finer than 4.00 phi	0.05
% coarser than -1.00 phi	0.00
% $CaCO_3$	4.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.01	0.01	0.01
-0.75	-0.875	0.01	0.01	0.02
-0.5	-0.625	0.01	0.01	0.03
-0.25	-0.375	0.04	0.03	0.06
0	-0.125	0.02	0.02	0.08
0.25	0.125	0.02	0.02	0.10
0.5	0.375	0.13	0.11	0.21
0.75	0.625	0.67	0.58	0.79
1	0.875	1.90	1.63	2.42
1.25	1.125	0.45	0.38	2.80
1.5	1.375	7.27	6.24	9.04
1.75	1.625	9.35	8.02	17.06
2	1.875	15.53	13.31	30.37
2.25	2.125	14.01	12.02	42.39
2.5	2.375	19.18	16.45	58.84
2.75	2.625	22.52	19.31	78.15
3	2.875	10.95	9.39	87.54
3.25	3.125	9.89	8.48	96.02
3.5	3.375	3.10	2.66	98.68
3.75	3.625	1.08	0.93	99.60
4	3.875	0.40	0.34	99.95
>4.0	4.125	0.06	0.05	100.00

Percentiles	
1	0.655
5	1.215
16	1.590
25	1.775
50	2.240
75	2.585
84	2.780
95	3.095
99	3.460

Moment Measures	**(phi)**	**(mm)**
Mean	2.315	0.201
Standard Deviation	0.592	0.663
Skewness	-0.319	
Kurtosis	3.322	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.185	2.203
Standard Deviation	0.595	0.582
Skewness (1)	-0.092	-0.091
Skewness (2)	-0.143	
Kurtosis	0.580	0.951



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**Composite**
Interval	**Wet Beach**
Mean	**0.207 mm**
STD	**0.519 mm**
Skewness	**-1.680**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic

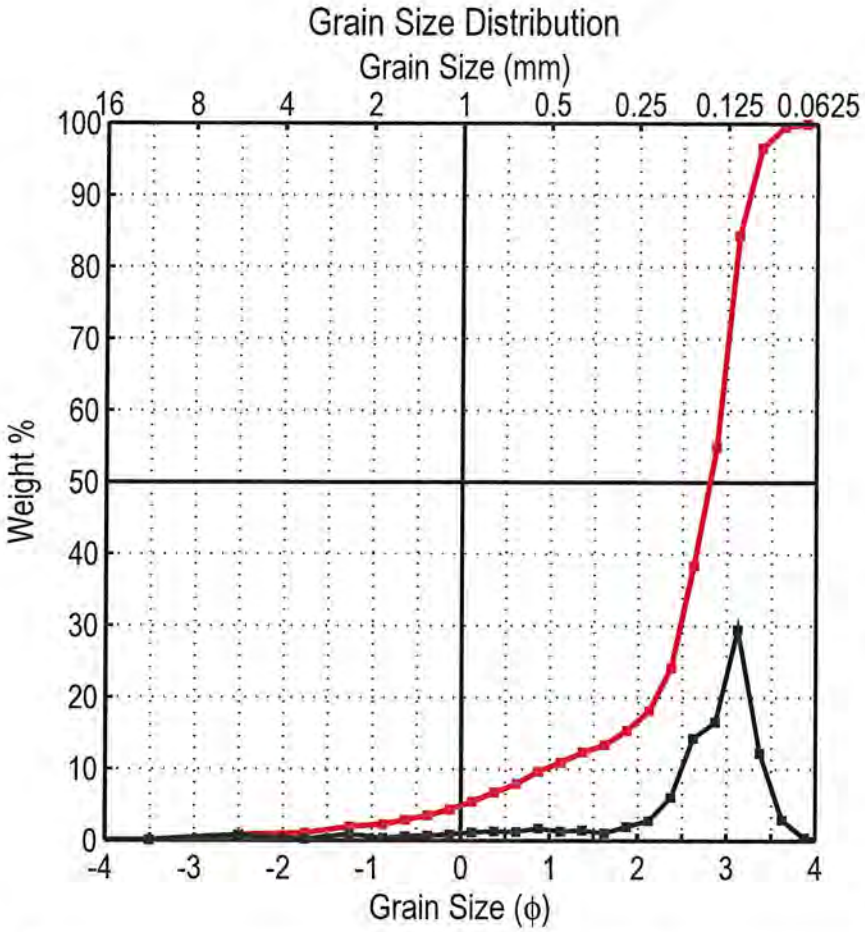
Total weight (gram)	116.55
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	0.00
% $CaCO_3$	6.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.00	0.00	0.00
-2	-2.5	0.43	0.37	0.37
-1.5	-1.75	0.40	0.34	0.71
-1	-1.25	0.52	0.44	1.15
-0.75	-0.875	0.37	0.31	1.46
-0.5	-0.625	0.68	0.59	2.05
-0.25	-0.375	0.67	0.57	2.62
0	-0.125	0.84	0.72	3.34
0.25	0.125	1.07	0.92	4.26
0.5	0.375	1.26	1.08	5.35
0.75	0.625	1.46	1.25	6.59
1	0.875	3.00	2.58	9.17
1.25	1.125	3.31	2.84	12.01
1.5	1.375	5.76	4.94	16.95
1.75	1.625	5.67	4.86	21.82
2	1.875	8.70	7.46	29.28
2.25	2.125	8.87	7.61	36.89
2.5	2.375	13.36	11.46	48.35
2.75	2.625	19.99	17.15	65.50
3	2.875	14.87	12.75	78.26
3.25	3.125	18.42	15.80	94.06
3.5	3.375	5.85	5.02	99.08
3.75	3.625	0.96	0.82	99.90
4	3.875	0.09	0.08	99.98
>4.0	4.125	0.02	0.02	100.00

Percentiles	
1	-1.420
5	0.295
16	1.325
25	1.730
50	2.400
75	2.810
84	2.965
95	3.170
99	3.370

Moment Measures	**(phi)**	**(mm)**
Mean	2.272	0.207
Standard Deviation	0.946	0.519
Skewness	-1.680	
Kurtosis	6.932	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.145	2.230
Standard Deviation	0.820	0.846
Skewness (1)	-0.311	-0.388
Skewness (2)	-0.814	
Kurtosis	0.753	1.091



Project	**2473**
Location	**Sea Island, GA**
Date	**Mar 2017**
Station	**Composite**
Interval	**Low Tide Line**
Mean	**0.167 mm**
STD	**0.479 mm**
Skewness	**-2.402**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic

Total weight (gram)	116.82
% finer than 4.00 phi	0.10
% coarser than -1.00 phi	0.00
% $CaCO_3$	5.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-4	-4.5	0.00	0.00	0.00
-3	-3.5	0.09	0.08	0.08
-2	-2.5	0.85	0.73	0.81
-1.5	-1.75	0.25	0.21	1.02
-1	-1.25	1.04	0.89	1.91
-0.75	-0.875	0.41	0.35	2.26
-0.5	-0.625	0.69	0.59	2.85
-0.25	-0.375	0.76	0.65	3.50
0	-0.125	0.96	0.82	4.32
0.25	0.125	1.31	1.12	5.44
0.5	0.375	1.48	1.26	6.70
0.75	0.625	1.42	1.21	7.91
1	0.875	1.98	1.70	9.61
1.25	1.125	1.47	1.25	10.87
1.5	1.375	1.70	1.45	12.32
1.75	1.625	1.22	1.05	13.36
2	1.875	2.29	1.96	15.33
2.25	2.125	3.24	2.77	18.10
2.5	2.375	7.03	6.02	24.12
2.75	2.625	16.66	14.26	38.38
3	2.875	19.31	16.53	54.91
3.25	3.125	34.42	29.47	84.38
3.5	3.375	14.27	12.22	96.60
3.75	3.625	3.38	2.89	99.49
4	3.875	0.48	0.41	99.90
>4.0	4.125	0.12	0.10	100.00

Percentiles	
1	-1.815
5	0.030
16	1.935
25	2.390
50	2.800
75	3.045
84	3.120
95	3.340
99	3.585

Moment Measures	**(phi)**	**(mm)**
Mean	2.580	0.167
Standard Deviation	1.061	0.479
Skewness	-2.402	
Kurtosis	9.376	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	2.527	2.618
Standard Deviation	0.593	0.798
Skewness (1)	-0.460	-0.567
Skewness (2)	-1.882	
Kurtosis	1.793	2.071